



Updated Statement of Heritage Impact

Including responses to recommendations R16, R17, R18 and R19 of the Independent Planning Commission Assessment Report dated 27 May 2019

Prepared for Hume Coal Pty Ltd
April 2020









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Updated Statement of Heritage Impact

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Executive Summary

ES1 Introduction

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a 23-year project life which encompasses construction, mining and rehabilitation phases.

As the number of submissions objecting to the project was greater than 25, the Minister for Planning referred the project to the Independent Planning Commission (IPC) to conduct a public hearing on the project, assess the merits of the proposed development, and prepare a report outlining the Commission's findings and recommendations. The IPC published its report (IPC 2019) on 27 May 2019.

ES2 Purpose of the supplementary statement of heritage impact

The IPC report contained 30 recommendations within 18 themes, including Historic Heritage (8.9).

The purpose of this report is to provide an updated Statement of Heritage Impact (SoHI), to respond directly to recommendation R18 of the IPC report, which stated:

R18 - The Statement of Heritage Impact Assessment should be updated in response to recommendations R16 and R17, and the visual impact of the Project on the significance of the above items and the cultural landscape in accordance with an updated visual assessment.

ES3 Results

The original SoHI presented in the EIS (EMM, 2017a) has therefore been updated taking into consideration additional studies conducted in accordance with recommendations of the IPC. Specifically, this SoHI has considered the following assessments:

- *Groundwater dependence assessment for cultural heritage landscapes and gardens prepared in response to recommendations R16 and R19 in the Independent Planning Commission Assessment report dated 27 May 2019* (EMM 2020a; attached as Annexure A);
    - the risk of groundwater drawdown is associated with Hawkesbury Sandstone in places where it outcrops or is not overlain by the Wianamatta Shale group;
    - all listed heritage gardens occur over Wianamatta Shale;
    - low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
    - moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation;
    - high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands. [1]

[1] Drawdown impacts presented here use the 67th percentile (unlikely to occur) uncertainty analysis.

- *Cultural Landscape Assessment* (Catherine Brouwer Landscape Architects 2020a) as required by recommendation R17 (Annexure B);
    - impacts to the cultural landscape identified by Morris (2017) are predicted to be low; and
    - impacts to views of parts of the Project surface infrastructure on the cultural landscape will have a low effect on the values of that landscape as a whole.
- *Sorensen Garden Analysis & the Garden at Mereworth* (Catherine Brouwer Landscape Architects 2020b) as required by recommendation R17 (Annexure C);
    - the comparative analysis concluded that the garden is of local significance; and
    - project-related impacts are not anticipated.
- *Supplementary historical archaeological assessment: supplementary archaeological assessment prepared in response to the Independent Planning Commission Assessment report dated 27 May 2019* (EMM 2020b) as required by recommendation R17 (Annexure D); and
    - additional research clarified the date and ownership of the homestead under the modern house and pool at Mereworth as that of the Cowley family, built around 1912 – this site was identified as "Mereworth 1" in the SoHI (EMM 2017);
    - additional field survey was undertaken where possible and recorded features and relics including:
        - sandstone flagging, a drain-like feature and an artefact scatter in a stockyard (inside the Project area but away from project-related impacts);
        - a drystone retaining wall on the property that once held the *Kentish Arms/Three Legs of Man/Mereworth House* building on the banks of the Medway Rivulet (outside the project area); and
        - the piers of a reconstructed David Lennox designed bridge, the *Three Legs o' Man Bridge,* under the Hume Motorway in Medway Rivulet (outside the Project area).
- *Supplementary Visual Impact Assessment* (EMM 2020c), prepared in accordance with recommendation R15, and included as Appendix D of the IPC Response Report.

ES4 Management of impacts

Impacts to identified historical significance inside and on the external boundary of the Project area can be managed through a number of measures that will be detailed in the historical heritage management plan. Management measures include:

- screening sensitive views using suitable vegetation species;
- preparing a plant succession plan and activating when necessary;
- monitoring the structural stability of heritage items inside the Project area and selected items outside the project area; and
- monitoring excavation works within the curtilage of the house and farm buildings at Mereworth for relics.

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1 Introduction

1.1 Background

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a 23-year project life which encompasses construction, mining and rehabilitation phases.

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop.

Approval for both the Hume Coal Project and the Berrima Rail Project is sought under Part 4 Division 4.1 (State significant development) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Hume Coal Project and the Berrima Rail Project are adjacent to each other and are linked. Hume Coal has submitted two separate development applications; however, the two projects are collectively referred to as 'the project' in this report. The project area is located to the west of Moss Vale, in the Wingecarribee local government area (LGA) as shown in Figure F.1. The indicative Hume Coal Project layout, including surface infrastructure locations and the underground mine, is shown in Figure F.6. The conceptual layout of the Berrima Rail Project is illustrated in Figure F.6

A full description of the Hume Coal Project and the Berrima Rail Project is provided in Chapter 2 of the Hume Coal Project Environmental Impact Statement (EIS) (EMM 2017a) and the Berrima Rail Project EIS (EMM 2017b).

Following submission of the two development applications and accompanying EISs to the DPIE, the documents were publicly exhibited between 31 March 2017 and 30 June 2017. Hume Coal subsequently prepared a Response to Submissions (RTS) report, responding to submissions received on the two projects, which was provided to the NSW Government in June 2018.

As the number of submissions objecting to the project was greater than 25, the Minister for Planning referred the project to the Independent Planning Commission (IPC) to conduct a public hearing on the project, assess the merits of the proposed development, and prepare a report outlining the Commission's findings and recommendations. The IPC published its report (IPC 2019) on 27 May 2019.

1.2 Scope and purpose of this updated statement of heritage impact

1.2.1 Purpose

The IPC report contained 30 recommendations within 18 themes, including Historic Heritage (8.9).

The purpose of this report is to provide an updated Statement of Heritage Impact (SoHI), to respond directly to recommendation R18 of the IPC report, which stated:

> R18 - The Statement of Heritage Impact Assessment should be updated in response to recommendations R16 and R17, and the visual impact of the Project on the significance of the above items and the cultural landscape in accordance with an updated visual assessment.

For reference, R16 and R17 recommended that:

> R16 - Further information should be provided to allow the assessment of the potential impact of water table drawdown on heritage items (including gardens, plantings and landscape settings) within or in the vicinity of the Project area. The information should include confirmation of the existing level of the water table and the anticipated drawdown at both the 67th percentile and the 90th percentile.
>
> R17 - The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.

The original SoHI presented in the EIS (EMM, 2017a) has therefore been updated taking into consideration additional studies conducted in accordance with recommendations of the IPC. Specifically, this SoHI has considered the following assessments:

- *Groundwater impact assessment for cultural heritage landscapes and gardens* (EMM 2020a) as required by recommendation R16 (attached as Annexure A);
- *Cultural Landscape Assessment* (Catherine Brouwer Landscape Architects 2020a) as required by recommendation R17 (Annexure B);
- *Sorensen Garden Analysis and the Garden at Mereworth* (Catherine Brouwer Landscape Architects 2020b) as required by recommendation R17 (Annexure C);
- *Updated historical archaeological assessment* (EMM 2020b) as required by recommendation R17 (Annexure D); and
- *Supplementary Visual Impact Assessment* (EMM 2020c), prepared in accordance with recommendation R15, and included as Annexure E of the IPC Response Report.

1.2.2 Limitations

The limitations of this report are in the team's inability to access all of the Project area and in many cases, the lack of primary historical information. Despite these limitations, subsidence modelling is a strong indicator that relics in the underground mine area will not be affected.

1.2.3 Structure of this report

This report is a supplement to the *Hume Coal Project Statement of Heritage Impact* (EMM 2017) prepared as part of the EIS. Some information is reproduced in this report to provide context, particularly the management measures, but the majority of this report is a summary of the updated and/or new assessments requested by the IPC. The structure of this report is as follows:

- Chapter 2 – summarises the findings of the groundwater dependence assessment as it relates to heritage items (R16), the cultural landscape assessment report (R16 and R17), the Sorensen garden analysis report (R16 and R17), and the supplementary historical archaeological assessment (R18);
- Chapter 3 – summarises the revised assessments of significance and predicted impacts to heritage values, including an updated statement of heritage impacts; and
- Chapter 4 – summarises the updated management measures.

2 Summary of additional studies

2.1 Groundwater dependence for cultural heritage landscapes and gardens (R16 and R 19)

The IPC recommended that further information be provided to allow the assessment of impacts as a result of groundwater drawdown on heritage items (including gardens, plantings, exotic trees and landscape settings) within or in the vicinity of the project area. A groundwater impact assessment for cultural heritage landscapes and gardens (included as Annexure A) was therefore prepared to respond directly to these recommendations (R16 and R19 in the Independent Planning Assessment Report).

The study area has been refined for this assessment and is the area of potential maximum impact (ie the predicted 2 m drawdown extent for the 90th percentile modelling results). The assessment considered both the listed heritage items on the Wingecarribee Local Environmental Plan and/or the State Heritage Register, and landscape conservation areas. The majority of heritage gardens accessing shallow groundwater and part of the vegetation in the landscape conservation areas are situated above the Wianamatta Group shale. As this is a perched groundwater system with limited hydraulic connection to the underlying Hawkesbury Sandstone (where groundwater drawdown is predicted to occur), no impacts are predicted in these areas. Should private gardens occur in areas where the Wianamatta Group shale outcrops at surface, there will also be no impacts due to the perched groundwater system.

Based on the conceptual hydrogeological understanding, in areas where the shale is weathered and thin (in the south and west of the study area) the shale is likely to be unsaturated (dry), with the water table located within the Hawkesbury Sandstone underlying the shale. Where the shale thickens (in the east and the north), the water table is present at varying depths depending on topography and hydrogeological properties of the shale.

Limited natural vertical connectivity of the Wianamatta Group shale occurs with the underlying Hawkesbury Sandstone aquifer. Most groundwater monitoring sites indicate that groundwater in the shale is perched above the regional water table in the sandstone (ie there is no hydraulic connection as there is an unsaturated zone in between these systems). In areas where hydraulic connection between these two units may occur, groundwater would leak from the shale to the sandstone at a low rate. Where there is no hydraulic connection between these two units, downward groundwater leakage would already be occurring at a maximum rate.

Therefore, mining induced drawdown would not result in increased leakage (vertical downward movement) of groundwater from the shale to the sandstone. There is, therefore, no predicted impact on heritage gardens or vegetation in the landscape conservation areas (including the identified cultural landscape) that rely on perched groundwater.

Parts of two pine windbreaks (0.1 ha) on the Mereworth property have a low interaction with groundwater (ie existing modelled depth of 5-10 mbgl) overlie an area where Hawkesbury Sandstone outcrops at the surface and therefore have a potential risk of drawdown. Following mining, the groundwater underlying these windbreaks is predicted to drawdown to a depth of greater than 10 mbgl. These pine windbreaks are located over 1 km from the listed Mereworth House and Garden and are outside its heritage curtilage. Mereworth House and Garden overlies an area where Wianamatta Group Shale outcrops at the surface and therefore does not have a risk of drawdown. The northern windbreak and parts of the southern windbreak that can be avoided by mine infrastructure will be monitored for signs of water stress during prolonged drought, with remedial action taken as required (Chapter 6).

Drawdown impacts using the 50th percentile (about as likely to occur as not) uncertainty analysis results in the portion of the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in are predicted to have:

- no risk of impact during drought conditions to 5.2 ha of non-native vegetation and 0.2 ha of grasslands;

- low risk of impact during drought conditions to 0.8 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 3.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 6.8 ha of non-native vegetation and 3 ha of grasslands.

Accordingly, 9.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 50th percentile results. This represents 0.08 % of the cultural landscape study area and 0.06 % of the common boundary of the cultural landscapes.

Drawdown impacts using the 67th uncertainty percentile class are described as 'unlikely to occur'. Based on this assessment, potential impacts on vegetated areas within the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are predicted to result in:

- no risk of impact during drought conditions to 3.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation;
- high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 10.3 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 67th percentile results. This only represents 0.09% of the cultural landscape study area and 0.07% of the common boundary of the cultural landscapes.

Drawdown impacts using the 90th uncertainty percentile class are described as 'very unlikely to occur'. Based on this assessment, potential impacts on vegetated areas within the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are predicted to result in:

- no risk of impact during drought conditions to 1.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.6 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 5.2 ha of non-native vegetation; and
- high risk of impact during drought conditions to 8.7 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 11.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 90th percentile results. This only represents 0.11% of the cultural landscape study area and 0.08% of the common boundary of the cultural landscapes.

2.2 Cultural landscape assessment (R17)

The Cultural Landscape Assessment (CLA) report was prepared by Catherine Brouwer Landscape Architects (CBLA) to respond to part of IPC recommendation R17. The full Cultural Landscape Assessment report is included as Annexure C of this report. The CLA report considered the impacts on the proposed Berrima, Sutton Forest and Exeter Cultural Landscape (B,SF&E Cultural Landscape) as proposed in the 'Cultural Landscape Assessment of the Berrima, Sutton Forest and Exeter Area', report prepared by Colleen Morris (2017), and the Exeter and Sutton Forest Landscape Conservation Area (as listed by the National Trust of Australia).

The analysis by CBLA assessed the cultural landscape in and around the project area to include places of acknowledged heritage significance, which vary in significance from State to local. The landscape around these places holds values of several of the NSW local heritage criteria, with strong indicators for historical, aesthetic and

research (criteria a, c and e respectively). The assessment found that the response of the community to changes in the landscape is an indication of some of the community members attachment to, and desire for the status quo of the landscape as they know it in current times. Thus, social significance is present to a degree (criteria d).

This constantly evolving landscape has developed to its present appearance with considerable changes through several periods: from the early historical and the post WW2 periods during which much of the subject landscape was extensively cleared; the 1970s to 1990s period when there was a substantial increase in the introduced, predominantly pine windbreak and hedge plantings, the highways and other roads, and industrial structures became a more noticeable part of the landscape character; through the late 20th and early 21st century period in which screen hedgerow planting increased, including obscuring many of the historic homesteads, historic hawthorn plants spread as 'weeds' over rural fields, and the residential and service and industrial areas around the towns and villages expanded considerably.

Landscape changes since the late 19th century and early 20th century formed a landscape that is very different to that historical period, but in which some interpretation can evoke aspects of the historical landscape, in particular, in the local environs of the earliest homesteads and the heart of the historic towns and villages. Tree and hedgerows, avenues of trees and European plant species that change colour with the seasons lend an atmosphere of the northern hemisphere to the region. The attraction due to this vegetation character with its undoubted beauty and aesthetic difference to Australian vegetation has given rise to an attitude that avoids acknowledging the industry that has been integral to the growth and maintenance of the area. Appreciation of the wider cultural landscape as a mix of indigenous vegetation, for example along some roadsides and parts of fields, with the traditional northern hemisphere trees and garden plants, and the mix of the railway and industry which allowed the region to develop and support it, with and amongst the rural landscape is not appreciated with the same balance.

The CLA concludes that the cultural landscapes as described by the National Trust (1998) and Morris (2017) require clarification and additional information to support the values and the degree that heritage criteria may be met, and to establish defined boundaries, both in accordance with best practice cultural landscape identification, assessment and delineation. The CLA concurs with many of the points of both assessments; however, it adds the importance of industry to the region and its influence on today's landscape: the village of Medway, the railway network, the altered appearance of parts of Mt Gingenbullen, and the very longstanding contribution to the character and value of all these and of Stanley Taylor's cement works (now Boral).

The cultural landscape extends from the Wingecarribee River south to the viewshed south of Sally's Corner Road, west to the viewshed extent of the Belanglo Forests and east to the east viewshed of the Mt Broughton Road and to include Bundanoon. This is a continuing cultural landscape, changing as rural practices change with the times and cultural practices, changing as uses within the landscape change such as in contemporary times with the considerable changes that have arisen with vineyards, olive orchards, horse breeding and pastures, tourism ventures and increased population and consequent developments. The extensive historical, rural central and southern cultural landscapes, the Wingecarribee River corridor, the historic towns and village centres, with the railway network and the longstanding industries, and the eastern area with historic *Hillview* and the Illawarra Highway landscape setting, are assessed to hold the substantial core of the cultural landscape values. With the basis of the studies and other information which informed the CLA, the cultural landscape is assessed as holding local heritage significance.

The impact of views of project related surface infrastructure would be over a minor part of the cultural landscape. The impacts would vary due to the distance from the visible parts of infrastructure, the heritage significance of the viewpoint, or the role the viewpoint or view route plays in the overall appreciation of the cultural landscape as a whole. The impacts are assessed as varying according to these considerations and either of moderate or of minor effect.

The impacts of views of parts of the project surface infrastructure on the proposed *B,SF&E Cultural Landscape*, and on a larger cultural landscape after a refined boundary delineation, are assessed as likely to have a low effect on the values of the cultural landscape as a whole.

Mitigation measures for visual impacts arising from the project related surface infrastructure would need to be varied and tailored to each location and to the characteristics of the viewpoint where the project item(s) is viewed and there is a discernible impact.

Mitigation measures from the CLA report are reproduced in Section 4.2.2 and are for screening, limiting visual impacts and succession planting.

2.3 Sorensen gardens analysis and the garden at Mereworth (R17)

The Sorensen Gardens Analysis and the Garden at Mereworth (SGA) report was prepared by Catherine Brouwer Landscape Architects to respond to part of the IPC recommendation R17.

The full Sorensen Gardens Analysis and the Garden at Mereworth report (CBLA, 2020b) is included as Annexure C of this report.

Paul Sorensen's career in Australia, starting with his nursey business in Katoomba 1917, encompassed plant propagation, tree management and garden design and construction. He designed approximately 100 gardens, all in NSW. During his time as a landscape architect, Sorensen was known for keeping his designs in his head and generally playing an active part in their construction. Ratcliffe described Sorensen's working style as communicating his ideas to his client while on site and then carrying out the work himself (CBLA 2020b, p.18). As a result, few records of Sorensen's ideas and designs exist as documents.

The appraisal of Sorensen through published sources finds that he is not highly visible in the Interwar period. While his name is included with landscape designers and horticulturalists such as Edna Walling, Max Shelley and Olive Mellor, Paul Sorensen's work was not noticeably influential (CBLA 2020b, p.18). His closest peer chronologically and stylistically was Edna Walling and later, with Howard Tanner's principles for garden design. Walling's garden design principles correspond remarkably the same as Ratcliffe's explanation of Sorensen's approach (CBLA 2020b, p.28).

In NSW, Paul Sorensen designed and planted gardens in a wide range of localities and scale. His designs used large trees and shrubs to create rooms and space that "borrowed" views from outside, such as at *Everglades*, built on many levels, and with views to the Blue Mountains outside (Aitken 2002, p.559 in CBLA 2020b, p.18). His gardens exhibited a variety of styles and character, which responded to the location and the environment of the garden.

This site-responsive approach included:

- taking advantage of existing features such as trees, landforms of interest and the salvage of rocks or other materials for re-use;
- native and exotic plants;
- using trees and large shrubs to create a feeling of mystery and anticipation and to provide a visual sense of enclosure and shelter;
- incorporating beautiful scenery into his designs wherever possible;
- broad sweeps of colour using flowering shrubs; and
- an acknowledgement that a garden needs to develop over time.

There are likely to be features in Sorensen's gardens still in existence which were not designed by Paul Sorensen personally, but the continuing development of gardens was a main theme in his philosophy. As Sorensen aged, his son, became involved in the execution of his garden designs. Despite the lack of written plans, the creative process that went into Sorensen's designs must have been made known to his son.

The garden designed and constructed at *Mereworth* is a rural homestead garden, designed for the Oxleys in 1963. Mereworth was compared to other Sorensen-designed rural, homestead gardens, to rank it in the larger body of his work. Table 5 in the report (CBLA 2020b) presents 10 Sorensen gardens and describes the standard elements in most of his designs, being a driveway; garden rooms; land shaping/terraces; windbreak/tree belts; and plantings. The results of the comparison demonstrate that Sorensen's rural homestead gardens are consistent in design features and characteristics sites and localities. The design responses appear to have changed little over the period of his work.

Mereworth (house and garden) was listed in 1991 and is an item of local heritage on the WLEP 2010 (I351). While the listing covers the entire property, the heritage significance of the place does not lie equally over the entire area. The garden is where the substantive heritage significance is held.

The comparative analysis of the *Mereworth* garden in the context of Sorensen's body of garden design work indicates it has the typical Sorensen garden design features and is not uncommon in a state context and unlikely to be amongst his highest calibre rural homestead garden designs (CBLA 2020b, p.65).

The assessment undertaken in response to R17 of the IPC report concludes with the following assessment of significance:

> Assessment of *Mereworth* in the context of Sorensen's body of garden design work confirms it is a place of local heritage significance and that additional criterion may be addressed in the register entry.

CBLA (2020b) recommends that a conservation management plan (CMP) is prepared for *Mereworth* house and garden. In addition, a tree replacement/tree succession strategy (TSS) would be effective in planning for the future of the garden. There is value in combining the CMP and TSS for the comprehensive and parallel management of the place.

2.4 Supplementary archaeological assessment (R17 and R18)

A revised historical archaeological assessment report was prepared by EMM Consulting to respond directly to IPC recommendations R17 and R18. The complete revised archaeology assessment report is included as Annexure D of this report.

The focus of the assessment was on locations in the project area that will have noticeable levels of activity associated with coal mining operations and, where possible, the locations identified by the Heritage Council (17 August 2018), including the *Three Legs of Man Inn, Newbury* and the *Eling Forest Winery Group.* Access to private property not owned by Hume Coal was not granted and the assessment in these locations is made on the basis of aerial photography, subsidence predictions and the taphonomy of archaeological sites.

Additional research and field investigation were undertaken in response to the concerns of the Heritage Council (DOC18/513719) and was combined with the archaeological component of the SoHI prepared for the EIS (EMM 2017c) in a stand-alone archaeological assessment. Additional primary research was also undertaken to assist with the analysis of archaeological sensitivity, significance and impacts. Primary sources relating to development on early properties are scarce and in some cases were not located; however, the locations in the project area that will experience the highest level of physical change have been addressed with a high degree of confidence.

The revised archaeological assessment resulted in the findings summarised below:

- the homestead that is now beneath the main house and pool at *Mereworth* was built and occupied by the Cowley family from 1912; it was not the residence of John Atkinson and his family;
- relics related to the Cowley phase of the property were located in a stockyard visible in 2019 as a result of the drought;
- a dry stone retaining wall was recorded in a location that indicates it may be part of the former inn grounds, later residence called *Mereworth House*; this wall is in poor condition and cannot be definitively identified as part of *The Kentish Arms/Three Legs of Mann Inn/Mereworth House* archaeological site; no other relics were noted;
- the piers of the *Three Legs o' Man Bridge* survive in good condition as does a retaining wall, all beneath the Hume Motorway over Medway Rivulet; and
- no relics were noted within *Newbury* where the mine plan intersects with the property.

The outcomes of the additional field assessment and research have been included, in summary, in Table 6.1 to Table 6.11 in Annexure D.

It is anticipated that impacts to known relics will not occur through the activities of mine construction, due to these relics being avoided, and during operation, due to the negligible subsidence that will occur a result of the first workings only mining method. Nevertheless, in all cases where significant heritage values may be affected by a project, it is prudent to take a precautionary approach by excising the construction disturbance footprint where it intersects with items that have been identified as having potential to contain relics. Avoidance of relics will be detailed in the HHMP.

3 Updated assessment of significance and impact assessment

3.1 Assessments of significance

The significance of identified heritage items has been reassessed in consideration of the findings of the additional assessments recommended by the IPC in R16 and R17 (groundwater assessment, cultural landscape assessment, additional historical archaeological assessment and revised visual assessment). This section fulfils the requirements of R18 (updated statement of heritage impact).

Three of the four issues identified in the IPC assessment included supplementary information to assist with the reassessment of heritage significance with which to guide the project's design and manage residual impacts. Those three issues are:

- the Sorensen garden at Mereworth;
- the cultural landscape; and
- supplementary information to inform the significance of, and impacts to, relics.

Survey undertaken in October 2019 identified relics in a stock yard, a drystone retaining wall in poor condition and the piers of the *Three Legs O' Man* bridge. Additional research clarified the origin of the homestead shown in the 1949 aerial photograph that was initially attributed to John Atkinson and his family; the homestead was built and lived in by the Cowley family who took over Atkinson's inn on the Great South Road. The date of the homestead is 1912 and the date of the inn (*Kentish Arms/Three Legs of Man/Mereworth House*) is some time in the 1820s. Atkinson also built a residence and employee cottages in addition to the two-storey brick inn; all structures were close to the Great South Road and are outside the project area.

The fourth issue that does not require a reassessment of significance is the predicted effects of groundwater drawdown resulting from underground mining activities (R16 and R19). The area defined for the drawdown impacts is assessed in the cultural landscape assessment and the comparative analysis of the Sorensen garden at *Mereworth.*

The significance of the cultural landscape, the Sorensen garden at *Mereworth*, and the archaeological landscape of the project area and beyond is based on the supplementary investigation and is summarised below.

- The Sorensen garden at Mereworth was assessed at *local* significance.
- The cultural landscape does not reach the threshold of *State* significance.

Table 3.1 summarises the level of significance of all heritage items in the Project area. All items (except one) are assessed of being of *local* significance, with the archaeological site of *The Kentish Arms/Three legs of Man/Mereworth House* located near Medway Rivulet, being potentially of *State* significance.

As shown in Table 3.1, the assessment of significance of each item as described in the original SoHI (EMM 2017c) has not changed.

Table 3.1 Impacts significance and management

Item	Listed status	Relationship to Project area		Potential impact	Predicted impacts			Significance		Management
		In	Out	Construction/ operation	Physical	Visual/ landscape	Groundwater drawdown	EIS SoHI	Revised	
Mereworth House and Garden (I351)	Local (WLEP 2010)	Partial Close proximity to SIA	Partially outside	Inadvertent during construction	None	High	Potential high in limited locations to the west of the Sorensen garden Potential impacts to tree rows to the west of the Sorensen garden. No impacts to Sorensen garden	Local	Local	Photographic archival recording Conservation management plan Dilapidation report Tree screening Underground power lines Monitor soil moisture levels Water as required
Cowley Homestead (Mereworth 1)	-	Totally inside Close proximity to SIA		Inadvertent during construction	None	None	NA	Local	Local	Photographic archival recording Protect from mine-related activities; Continue farming activities
HC_127 (artefact scatter)	Not listed	Inside Close proximity to SIA		Inadvertent during construction and operation	None	None	Na	None	None	Photographic archival recording Protect from mining activities by flaggings as per Aboriginal objects (also HC_127) in proximity

Table 3.1 Impacts significance and management

Item	Listed status	Relationship to Project area		Potential impact	Predicted impacts				Significance	Management
		In	Out	Construction/ operation	Physical	Visual/ landscape	Groundwater drawdown	EIS SoHI	Revised	
The Kentish Arms/Three Legs of Man/Merewo rth House	Not listed		Outside Within 160 m of Project boundary	Subsidence - negligible	None	None	NA	-*	Potentially State	NA
Former Three Legs O' Man Bridge piers	Not listed		Outside Within 200 m of Project boundary	None	None	None	NA	-*	Local	Photographic archival recording Dilapidation report Monitor annually
Evandale Scatter HC_127	Not listed	Inside		Inadvertent during construction and operation	None	None	Low to high near creek	NA	NA	Protect from mine-related activities; Continue farming activities
Oldbury	State (00488), and local (I246, I247)		Outside Within 1.6 km from Project boundary	None identified	None	None	No	-*	State	NA
Newbury (I202)	Local (WLEP 2010)	Partially inside	Mine plan	Subsidence - negligible	None	None	No	Local	Local	Consult with owners
Sutton Farm (I035)	Local (WLEP 2010)	Inside	Mine plan	Subsidence - negligible	None	None	No	Local	Local	Consult with owners
The Pines (I029)	Local (WLEP 2010)	Inside	Mine Plan	Subsidence - negligible	None	None	No	Local	Local	Consult with owners
The Harp (I027)	Local (WLEP 2010)	Inside	Mine plan (partial)	Subsidence - negligible	None	None	No	Local	Local	Consult with owners

Table 3.1 Impacts significance and management

Item	Listed status	Relationship to Project area		Potential impact	Predicted impacts			Significance		Management
		In	Out	Construction/ operation	Physical	Visual/ landscape	Groundwater drawdown	EIS SoHI	Revised	
Bunya Hill (I018)	Local (WLEP 2010)	Inside	Mine plan (partial)	Subsidence - negligible	None	None	No	Local	Local	Consult with owners
Eling Forest Winery (I004, I009, I010)	Local (WLEP 2010)	Partial	Partial	Subsidence - negligible	None	None	No	Local	Local	Consult with owners
Comfort Hill (I021, I356, I357)	Local (WLEP 2010)	Partial	Partial	Subsidence - negligible	None	None	Yes	Local	Local	Consult with owners
Former Berrima Coal rail corridor	-	Partial	Partial	Physical – construction	Partial	None	NA	Local	Local	Impacts to as much as necessary
Cultural landscape	-	Partial	Partial	Physical – construction and operational	Partial	Yes	Potential for part of the landscape	Local	Local	Photographic archival recording

*Not assessed in the SoHI prepared for the EIS, as these sites are outside the project area, and no impacts were predicted.

4 Updated management measures

4.1 Introduction

The management measures presented in this report are from the *Hume Coal Project Statement of Heritage Impact 2017,* with additional site and impact specific measures developed in response to the IPC requests. The rail line that was proposed to cross through the Sorensen garden at Boral Cement has been moved to the south and will not avoid the garden completely. All earlier management measures remain valid and are reproduced below in Section 4.2. New sites that were identified during the preparation of the revised archaeological assessment should be managed as per the measures below and included in the historical heritage management plan.

The overriding objective in managing heritage significance is the avoidance of impacts. Avoidance removes the need for mitigation or amelioration and is in keeping with the philosophy of the *Burra Charter 2013*.

In all cases where significant heritage values may be affected by a project, it is prudent to take a precautionary approach by excising the construction disturbance footprint where it intersects with heritage items or with areas that have been identified as having potential to contain relics. This has been the approach accepted in planning the Hume Coal Project.

The following overarching strategy to protect the significance of heritage items within the project area has been followed to date and will be implemented as needed:

1. A precautionary approach will be followed to all activities that could impact on heritage items or potential heritage items. That is, the items will either be completely excluded from the disturbance footprint or its heritage values will be investigated and recorded prior to the works.

2. Impacts to heritage items including buildings, bridges, landscapes and landscape elements will be avoided through the project design.

3. Following determination and prior to any work commencing, an historical heritage management plan (HHMP) will be prepared to guide the conservation of heritage items and unexpected finds for the duration of the project. The relevant measures in the HHMP will be incorporated into the project construction environmental management plan (CEMP) to avoid inadvertent impacts during the construction phase of the project.

4. The management measures outlined in Section 4.2 below will be specified in detail in the HHMP.

5. The Department of Planning, Industry and Environment as well as Heritage NSW in the Department of Premier and Cabinet (formerly in the Office of Environment and Heritage) will be consulted on the content of the HHMP and the relevant sections of the CEMP.

6. Tree line windbreaks will be retained to the greatest extent practicable and/or replaced as soon as possible if their removal is unavoidable.

7. The window frame and wagon wheel fragment leaning against the shed on the north-west of the house and garden at *Mereworth* were moved to the piggery for safekeeping.

4.2 Management measures

4.2.1 Original proposed measures (SoHI, EMM 2017)

The following management measures are from the SoHI prepared by EMM in 2017 and apply to the archaeological, built and cultural landscape significance of the project area. Site-specific measures are included in Annexure E of this report and the Historical archaeological assessment (Section 7.1.2 EMM 2020b).

A HHMP will be prepared for the project that identifies heritage items and addresses processes and protocols for managing known and potential historic heritage. The HHMP will include provisions for the listed measures, which are described in more detail following:

- avoidance;
- archaeological monitoring of mine water pipeline;
- the preparation of dilapidation reports and regular monitoring after mining has commenced beneath identified items;
- archival recording;
- unexpected finds;
- preparation of a conservation management plan (CMP) for Mereworth house and garden;
- tree wind-breaks and screens (refer also to Section 4.2.2) and fencing;
- strategies to assess the efficacy of the management and mitigation measures; and
- clear amelioration measures where impacts do occur.

These measures are expanded in the historical heritage report and SoHI prepared by EMM (2017c). Additionally, detailed management measures for each archaeological site (relics and works) are included in Table 5.1, Annexure E and in the revised archaeological assessment (EMM 2020b).

4.2.2 Cultural landscape and gardens

Additional proposed measures to manage impacts to the cultural landscape are summarised below. The detailed measures are included in the technical report prepared by CBLA 2020a.

- the use of plantings to screen mining infrastructure:
    - within the project surface infrastructure area, close to and amongst the structures and infrastructure where feasible;
    - between the surface infrastructure and the Project area property boundaries; and
    - alongside the existing natural waterways, augmenting existing, remnant riparian vegetation and/or reinstating a native vegetation corridor and with woodland extensions into the adjacent lands where feasible.

- locate power and other service/supply lines underground where feasible;
- locate project vehicle circulation (eg roadways) away from heritage features and visibility from significant viewpoints and view routes where feasible;
- design detail, materials and finishes (such as colours) of surface infrastructure to minimise visual impacts when they are visible from significant viewpoints and view routes where feasible; and
- locate buildings, their configuration and works ancillary structures away from significant viewpoints and routes to minimise visual impacts where feasible.

4.2.3 Groundwater drawdown

There will be potential groundwater drawdown on a portion of the Mereworth property that overlies the Hawkesbury Sandstone. This may result in potential impacts to 0.1 ha of pine windbreaks to the south-west of the listed Mereworth House and Garden (EMM 2020a).

The impact mitigation strategy to groundwater drawdown predicted to occur as a result of the project is as detailed in the groundwater report (EMMa). With the addition of:

- the listed Mereworth House and Garden will be maintained in accordance with the CMP;

the mitigation strategy is as follows:

- Following project approval, Hume Coal will conduct additional 'post-approval' groundwater modelling and field investigations, where possible, to confirm the depth to groundwater in the areas identified as being at high risk of water stress during periods of prolonged drought.
- Planted pine windbreaks on Mereworth property, that cannot be avoided by surface mine infrastructure, will be monitored for signs of water stress during prolonged drought, and supplemented with water if required.
- There will be no impacts to gardens and plantings within local or state listed heritage items, and as such no mitigation measures are proposed to these areas.
- The remaining non-native, exotic grassland and private gardens located within the landscape conservation study areas that are predicted to experience watertable drawdown and have been identified as being at risk of water stress during periods of prolonged drought cover a small area, are not classified as high priority GDEs and are not covered under any statutory requirement to manage or mitigate the potential and unlikely effects.
- Ongoing 'post-approval' groundwater modelling will be undertaken as and when new data become available, and at regular intervals throughout the life of the mine. It is expected the confidence level of model predictions will increase over time as the model is updated to reflect the observed effects on groundwater obtained from the monitoring program. This is consistent with International Organisation for Standardisation (ISO) continuous improvement guidelines and industry standard.

5 Summary

The mine plan has avoided the area occupied by and beneath items listed on the State Heritage Register (SHR). By excising the land beneath SHR items from the mine plan, Hume Coal removed all potential for subsidence related impacts to occur to these items. Further, the first workings mining method adopted has eliminated the potential for significant impacts to other heritage items in the mining area.

Where avoidance is not possible the HHMP will guide measures to avoid the deterioration of significant elements, or where approved impacts occur, they will be controlled and recorded. Monitoring of these measures will be required to check for their efficacy and to survey for inadvertent impacts.

A CMP will be prepared for *Mereworth* house and garden. This document will record the significance of the house and garden site in more detail than is presently available and will identify areas that require immediate repairs. The CMP will include a cyclical maintenance plan for the house and the garden and provide guidance on suitable uses.

Long-term residual impacts to the landscape and built environment will be low as the project does not involve any demolition of heritage items and when mining operations come to an end, an approved rehabilitation plan will be implemented. Changes that may remain include dams, which are utilitarian items in rural landscapes, and the improvement of *Mereworth* house and garden.

5.1.1 Statement of heritage impact

The Hume Coal Project is anticipated to result in some impacts to heritage values in and around the Project area. These impacts are largely confined to areas within the identified cultural landscape and in limited locations where groundwater drawdown may occur.

Impacts to heritage values have been assessed overall to be minor after the implementation of the management measures developed for the project.

6 References

CBLA 2020a, *Hume Coal & Berrima Rail Project Cultural landscape assessment* prepared for Hume Coal Pty Ltd

CBLA 2020b, *Sorensen Gardens Comparative Analysis & the Garden at Mereworth,* prepared for Hume Coal Pty Ltd

EMM 2020a, *Groundwater dependence assessment for cultural heritage landscapes and gardens prepared in response to recommendations R16 in the Independent Planning Commission Assessment report dated 27 May 2019*

EMM 2020b, *Historical archaeological assessment: supplementary archaeological assessment prepared in response to the Independent Planning Commission report dated 27 May 2019*

EMM 2017a, *Hume Coal Project Environmental Impact Statement*, report to Hume Coal

EMM 2017b, *Berrima Rail Project Environmental Impact Statement*, report to Hume Coal, *Hume Coal Project*, *Hume Coal Project Hume Coal and Berrima Rail Project*

Annexure A

Groundwater dependence assessment for cultural heritage landscapes and gardens









Hume Coal and Berrima Rail Project

Groundwater dependence assessment for cultural heritage landscapes and gardens prepared in response to recommendations R16 and R19 in the Independent Planning Commission Assessment report dated 27 May 2019

Prepared for Hume Coal Pty Ltd
April 2020

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Groundwater dependence assessment for cultural heritage landscapes and gardens prepared in response to recommendations R16 and R19 in the Independent Planning Commission Assessment report dated 27 May 2019

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Date

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v0.1 Final

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6 April 2020

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This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

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Executive Summary

ES1 Introduction

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a project life of about 23 years, including construction and rehabilitation. The Project area is located to the west of Moss Vale, in the Wingecarribee local government area (LGA).

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop. The Hume Coal Project and the Berrima Rail Project together form 'the Project'.

The development application for the Hume Coal Project was publicly exhibited between March and June 2017. Submissions were received from government agencies, organisations and the public. A response to submissions report was submitted to the Department of Planning, Industry and Environment (DPIE) in June 2018, with their Preliminary Assessment Report (PAR) provided in December 2018. The project was referred to the Independent Planning Commission (IPC), to conduct a public hearing, to assess the merits of the project, and to prepare a report outlining the Commission's findings on the projects, including any recommendations.

The IPC findings and recommendations were published in their Independent Planning Assessment Report, released in May 2019. Specific to groundwater impacts on biodiversity and historic heritage, the IPC recommended that further information should be provided to allow the assessment of drawdown on heritage items (including gardens, plantings, exotic trees, native vegetation and landscape settings) within or in the vicinity of the project area. The purpose of this groundwater impact assessment for cultural heritage landscapes and gardens is to respond directly to these recommendations (R16 and R19 in the Independent Planning Assessment Report). Technical assessment on the impacts of the project on native vegetation from a declining water table has been assessed previously and is presented in Section 13 of the RTS Main Report, Volume 1 and therefore is not assessed further in this report.

This assessment was conducted by a team comprising an ecologist, an archaeologist, a landscape planner/registered landscape architect, arboricultural specialist, a hydrogeologist and a spatial analyst, using the inputs from the Updated Statement of Heritage Impact (EMM 2020a) and Updated Water Assessment (EMM 2020c) and for the Hume Coal Project. This interdisciplinary approach provides a robust impact assessment that addresses R16 and R19.

ES2 Methods

This impact assessment is based on the results of the groundwater modelling uncertainty analysis completed in support of the RTS (EMM 2018). IPC recommendation R16 requires assessment of the potential impacts of the predicted watertable drawdown on vegetation and cultural heritage landscapes using the results of the 67th percentile (unlikely to occur) and the 90th percentile (very unlikely to occur) uncertainty analysis. The model outcomes for the 67th percentile provide a conservative prediction of the impacts caused by the Project. While these are useful when considering worst-case outcomes, results higher than the 67th percentile are considered 'unlikely', or 'not expected to occur' (Table 2.1) when considered in line with IESC guidelines (Middlemiss and Peeters 2008). The 50th percentile results were also assessed as this scenario is 'about as likely as not' to occur.

As presented in earlier submissions, the Hume Coal groundwater model has undergone numerous reviews by many leading experts in groundwater modelling in Australia, including a review by the then DPE's expert Mr Hugh

Middlemis (HydroGeoLogic Pty Ltd). Hume Coal recently engaged Dr Lloyd Townley of GW SW Pty Ltd, an expert with over 40 years of experience in groundwater modelling, to independently review the RTS groundwater model. Dr Townley's review finds that the modelling undertaken for the Project is fit for purpose, which is predicting groundwater inflows to the proposed mine and drawdown of the watertable within and near the Project area (Townley 2020). That is, the model is fit for purpose at predicting mine inflows and watertable drawdown at a regional scale.

The predicted impact of watertable drawdown has been modelled using the RTS regional model. The model predicts results for bores and areas of interest, with reference to the nearest model cell for the location of the bore and point of interest. It should be noted that while the model is accurate at the regional scale, there will be differences between model predicted depth to groundwater and reality at a local scale (ie at a bore or tree level). However, this does not mean that the groundwater model cannot be used to assess the potential effects of the changes on receptors. The groundwater model is consistent with industry standards and provides guidance on the potential watertable drawdown due to the project.

The study area for the groundwater dependence assessment presented in the EIS and RTS reports was defined as the groundwater model domain. For the purposes of this assessment, the study area (Figure 4.1) has been refined and delineated into two study areas, comprising:

- 90th percentile study area: to assess potential impacts on heritage items and private gardens. Defined as the 2-metre (m) drawdown contour for the 90th percentile; and

- cultural landscape study area: to assess potential impacts on cultural landscapes. Defined as the common boundary of:

    - the previously listed *Key Historic Unit 6 – Sutton Forest Landscape Area* on the superseded Wingecarribee LEP 1993;

    - the non-statutory landscape area *Exeter/Sutton Forest Landscape Conservation Area* recognised by the National Trust of Australia (NSW); and

    - the abovementioned predicted 2 m drawdown extent for the 90th percentile modelling results.

The assessment comprised a desktop analysis to identify heritage items, a site inspection to characterise gardens and a literature review on vegetation interactions with groundwater. Using the results of these analyses, combined with a spatial analysis conducted in ArcMap, gardens and plantings within heritage items and vegetation (non-native and grasslands) in the landscape conservation study area with access to shallow groundwater were identified. This area is defined by the common boundaries of the *Key Historic Unit 6 - Sutton Forest Landscape Area* (previously listed on the Wingecarribee LEP 1993) and the *Exeter/Sutton Forest Landscape Conservation Area* (a non-statutory listing by the National Trust of Australia (NSW)).

To assess private gardens, descriptions of historic gardens were reviewed using the *State Heritage Register* (SHR) and *Wingecarribee Local Environmental Plan 2010* (Wingecarribee LEP), where available. A review of garden species identified during the site inspection and literature review was undertaken by an arboricultural specialist. The review focused on the origin, climate, biology, typical rooting depths and response to reduced water availability of these species to assess their vulnerability to shallow watertable decline.

The level of groundwater interaction was also identified. Wooded vegetation was classified into areas with a high potential for groundwater interaction (0−3 metres below ground level (mbgl)), moderate potential for groundwater interaction (3−5 mbgl) and low potential for groundwater interaction (5−10 mbgl). Exotic grasslands only have access to groundwater to approximately 1 mbgl, and therefore all grasslands overlying groundwater 0−1 mbgl in low-lying areas and near creeks were classified as having a high potential for interaction, while areas overlying

deeper groundwater had no access. Typical species within private gardens and roadside plantings sensitive to drought conditions were also identified.

ES3 Results

Shale of the Wianamatta Group geology occurs across the eastern part of the study area, while Hawkesbury Sandstone surface geology outcrops in south-west to north-west of the study area. Vegetation access to groundwater would vary across the Wianamatta Group Shale sediments with depth and permeability of the layer. Similarly, vegetation access to groundwater would vary across the Hawkesbury Sandstone surface geology and would be restricted to areas where roots could exploit cracks and fissures in the rock.

All heritage gardens occur in areas where the Wianamatta Shale outcrops at surface and therefore have a negligible risk of drawdown (see Section 4.1). The boundary between the Wianamatta Shale and Hawkesbury Sandstone intersects the property containing Mereworth House and Garden. Mereworth House and Garden, listed as having local significance under the Wingecarribee LEP lies on the Wianamatta Group Shale and therefore the listed heritage item has a negligible drawdown risk during drought conditions.

The Mereworth property also contains planted pine windbreaks to the west and south-west of the house and garden, outside the heritage curtilage. Approximately 0.1 ha of these windbreaks have a low interaction with groundwater (ie lies at 5−10 mbgl) and overlies Hawkesbury Sandstone.

Approximately 19.4 ha of vegetation, comprising non-native vegetation and exotic grasslands, has access to shallow groundwater in the landscape conservation study area. Of this 19.4 ha of vegetation, 4 ha of non-native vegetation and 3.2 ha of exotic grasslands has a high level of groundwater interaction.

The literature review and site inspection identified 60 species planted in private gardens and on roadsides in the 90th percentile study area. Of these 60 species, 26 are considered sensitive to reduced water availability where they overlie Hawkesbury Sandstone.

ES4 Impact assessment

Based on the conceptual hydrogeological understanding, in areas where the Wianamatta Group Shale is weathered and thin (in the south and west of the study area) the Shale is likely to be unsaturated (dry), with the watertable located within the Hawkesbury Sandstone underlying the Shale. Where the Shale thickens (in the east and the north), the watertable is present at varying depths depending on topography and hydrogeological properties of the Shale.

There is limited natural vertical connectivity between the Wianamatta Group Shale and the underlying Hawkesbury Sandstone aquifer, as evidenced by lower water levels in the Sandstone. At most groundwater monitoring sites (such as at the HU035A and B monitoring sites; refer to the Updated Water Assessment, Appendix B of the IPC response report (EMM 2020c)), groundwater in the Shale is perched above the regional watertable and there are areas of unsaturated Hawkesbury Sandstone underlying the saturated Shale (refer to Plate 4.1 to Plate 4.3).

In areas where hydraulic connection between these two units may occur, groundwater would leak from the Shale to the Sandstone at a low rate. Where there is no hydraulic connection between these two units (ie where the Sandstone is unsaturated below the saturated Shale, e.g. perched groundwater), downward groundwater leakage would already be occurring at a maximum rate (see Plate 4.3). Mining induced drawdown would not result in increased leakage (vertical downward movement) of groundwater from the Shale to the Sandstone, and any potential impacts to groundwater availability would be negligible. For this reason, areas of Shale overlying Sandstone will not be further assessed for potential impacts to groundwater dependent vegetation.

The regional scale RTS groundwater model was used to predict watertable drawdown in vegetated areas identified to contain plants that may access shallow groundwater and may be susceptible to water stress during periods of

prolonged drought. During average and wet climate periods, vegetation in these areas will not be affected by groundwater level drawdown. During especially dry periods when the soil moisture is low and not replenished by rainfall or surface water runoff, vegetation in these areas may exhibit increased stress or die back due to reduced access to groundwater as a result of groundwater level drawdown. These areas are limited to low lying topographical areas where the watertable is shallow and near watercourses where groundwater discharges as baseflow. However, under prolonged drought conditions, without mining, the watertable would decline naturally in these areas. As such, vegetation either currently naturally adapts or is subject to water stress during these times, with replenishment when the drought breaks. In particular, exotic grasslands may die back during times of drought during water stress but would rapidly re-colonise following rain. Accordingly, the following impact assessment should be interpreted within this context.

Some planted pine windbreaks (0.1 ha) located within farm paddocks and outside of the heritage curtilage (as shown in Figure 4.2), approximately 750 m to the west and south-west of Mereworth House and Garden overlie the Hawkesbury Sandstone. The windbreaks have a low potential for groundwater interaction. In this location, the maximum predicted watertable levels (as a result of mining, under the 50th, 67th and 90th percentile results) would be >10 mbgl, and risk of the groundwater table becoming inaccessible during drought conditions is high.

Part of the southern windbreak is in an area proposed for surface mine infrastructure, in particular entry/exit to the personnel and materials drift and an access road to the explosives magazine (Figure 1.3). The northern windbreak and parts of the southern windbreak that can be avoided by mine infrastructure will be monitored for signs of water stress during prolonged drought, with remedial action taken as required (Chapter 6).

Drawdown impacts are scattered across the landscape conservation study area and are generally restricted to low-lying areas proximal to Olbury Creek, Medway Rivulet, Wells Creek and Black Bobs Creek.

Drawdown impacts using the 50th percentile (about as likely to occur as not) uncertainty analysis results in the portion of the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and on Figure 5.2. The combined 50th percentile impacts across the landscape conservation study area are predicted to have:

- no risk of impact during drought conditions to 5.2 ha of non-native vegetation and 0.2 ha of grasslands;
- low risk of impact during drought conditions to 0.8 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 3.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 6.8 ha of non-native vegetation and 3 ha of grasslands.

Accordingly, 9.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 50th percentile results. This only represents 0.08% of the cultural landscape study area and 0.06% of the common boundary of the cultural landscapes.

Drawdown impacts using the 67th percentile (unlikely to occur) uncertainty analysis results in the portion of the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and on Figure 5.3. The combined 67th percentile impacts across the landscape conservation study area are predicted to have:

- no risk of impact during drought conditions to 3.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 10.3 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 67th percentile results. This only represents 0.09% of the cultural landscape study area and 0.07% of the common boundary of the cultural landscapes.

Drawdown impacts using the 90th percentile (very unlikely to occur) uncertainty analysis results in the portion of the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and on Figure 5.4. The combined 90th percentile impacts across the landscape conservation study area, the project is predicted to have:

- no risk of impact during drought conditions to 1.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.6 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 5.2 ha of non-native vegetation; and
- high risk of impact during drought conditions to 8.7 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 11.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 90th percentile results. This only represents 0.11% of the cultural landscape study area and 0.08% of the common boundary of the cultural landscapes.

Twenty-six plant species typically observed in private gardens are considered drought-sensitive to reduced water availability. Where these plant species overlie Hawkesbury Sandstone surface geology that contain shallow groundwater (restricted to low-lying areas and areas proximal to creeks) they may be subject to water stress during prolonged drought.

ES5 Impact mitigation strategy

Following project approval, Hume Coal will conduct additional 'post-approval' groundwater modelling and field investigations, where possible, to confirm the depth to groundwater in the areas identified as being at high risk of water stress during periods of prolonged drought.

Planted pine windbreaks on Mereworth property, that cannot be avoided by surface mine infrastructure, will be monitored for signs of water stress during prolonged drought, and supplemented with water if required.

There will be no impacts to gardens and plantings within local or state listed heritage items, and as such no mitigation measures are proposed to these areas.

The remaining non-native, exotic grassland and private gardens located within the landscape conservation study areas that are predicted to experience watertable drawdown and have been identified as being at risk of water stress during periods of prolonged drought cover a small area, are not classified as high priority GDEs and are not covered under any statutory requirement to manage or mitigate the potential and unlikely effects.

Ongoing 'post-approvals' groundwater modelling will be undertaken as and when new data become available, and at regular intervals throughout the life of the mine. It is expected the confidence level of model predictions will increase over time as the model is updated to reflect the observed effects on groundwater obtained from the monitoring program. This is consistent with International Organisation for Standardisation (ISO) continuous improvement guidelines and industry standard.

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1 Introduction

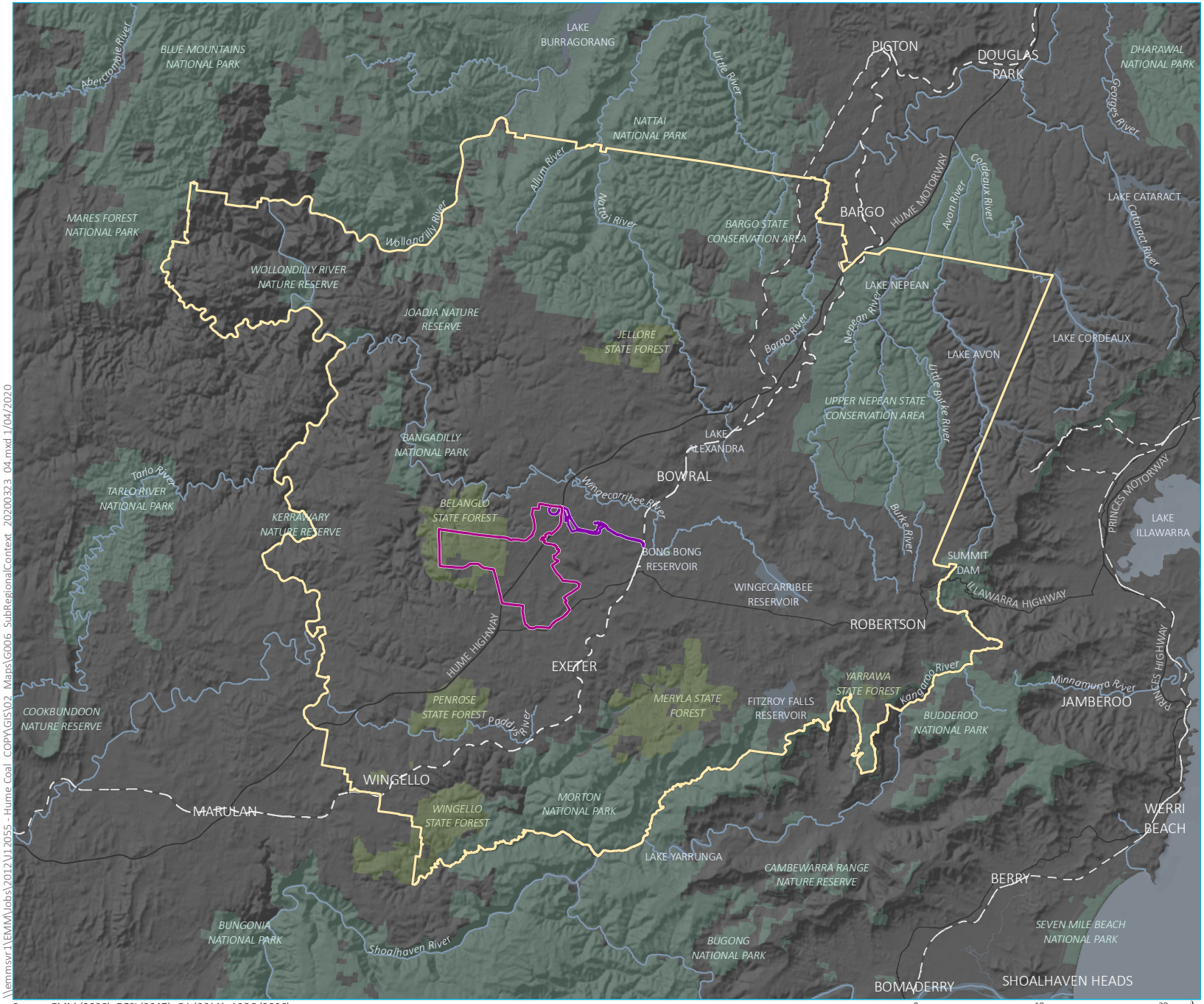
1.1 Overview of the Hume Coal Project

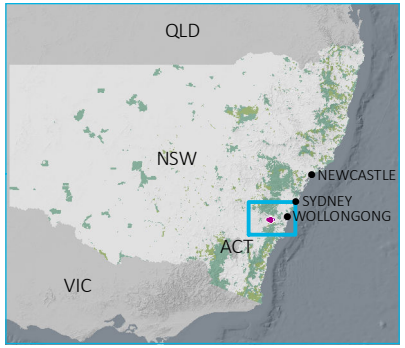
Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a project life of about 23 years, including construction and rehabilitation. The Project area is located to the west of Moss Vale, in the Wingecarribee local government area (LGA). Figure 1.1 illustrates the location of the project at a regional scale.

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop. The project areas for the Hume Coal Project and the Berrima Rail Project are shown on Figure 1.1. The Hume Coal Project and the Berrima Rail Project are collectively referred to as 'the project' in this report.

Indicative mine and surface infrastructure plans for the Hume Coal Project are provided in Figure 1.3. A full description of the Hume Coal Project, as assessed in this report, is provided in Chapter 2 of the main EIS report (EMM 2017a). A full description of the Berrima Rail Project is provided in Chapter 2 of the Berrima Rail Project EIS (EMM 2017b), noting the alternative option has been selected.

Approval for both the Hume Coal Project and the Berrima Rail Project is sought under Part 4 Division 4.1 (State significant development) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Wingecarribee Shire local government area
- Rail line
- Motorways and primary roads
- River
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

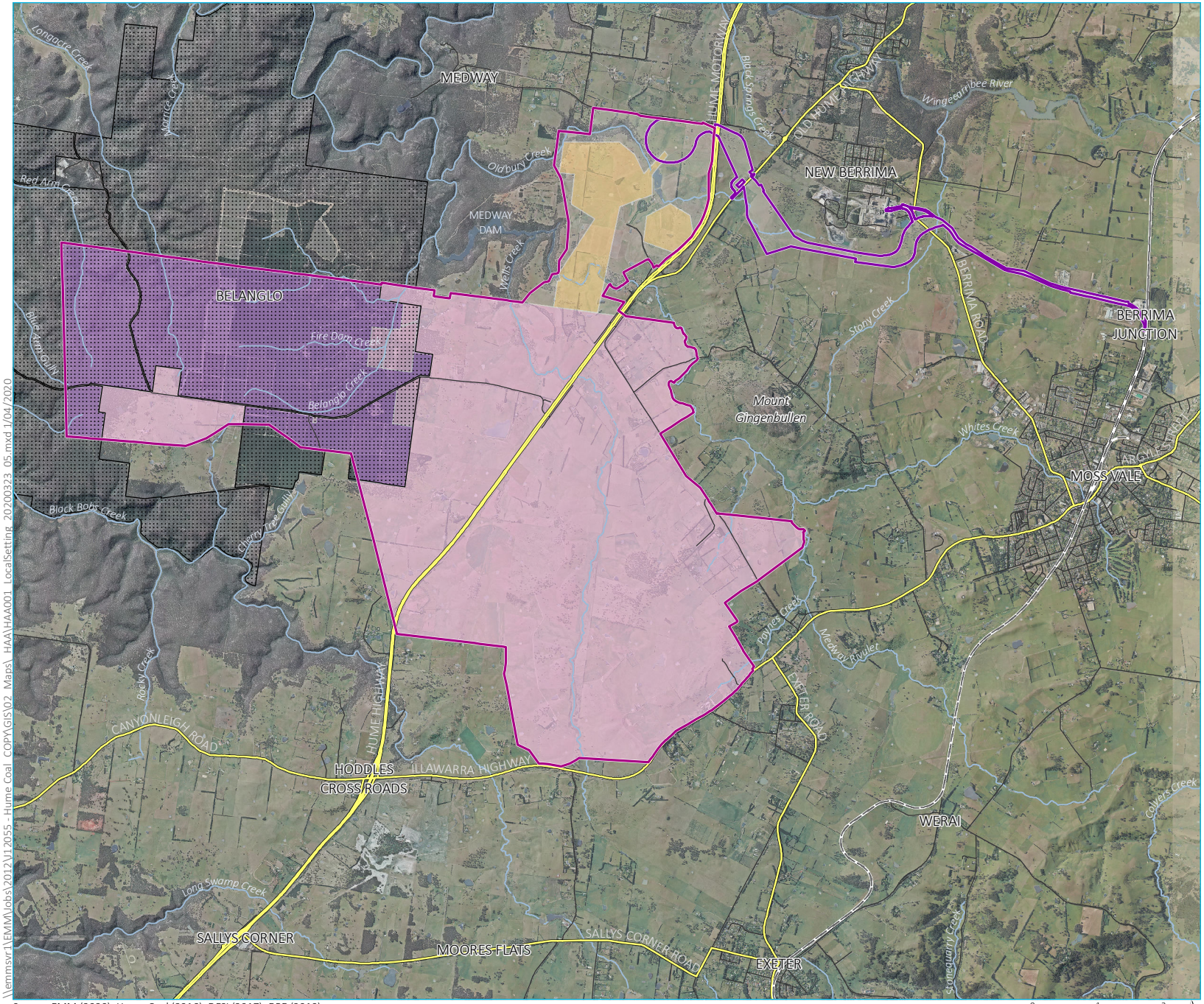
\\emmsvr1\EMM\Jobs\2012\12055 - Hume Coal COPY\GIS\02 Maps\G006 SubRegionalContext 20200323 04.mxd 1/04/2020

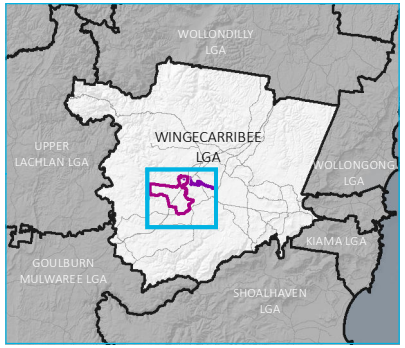
Regional setting

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 1.1

HUMECOAL PROJECT

EMM creating opportunities





KEY

- Hume Coal Project area (5,051 ha, 44,740 m perimeter)
- Berrima Rail Project area (181 ha, 23,201 m perimeter)

Mining lease application area

- MLA 527
- MLA 528
- MLA 529

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 56

N

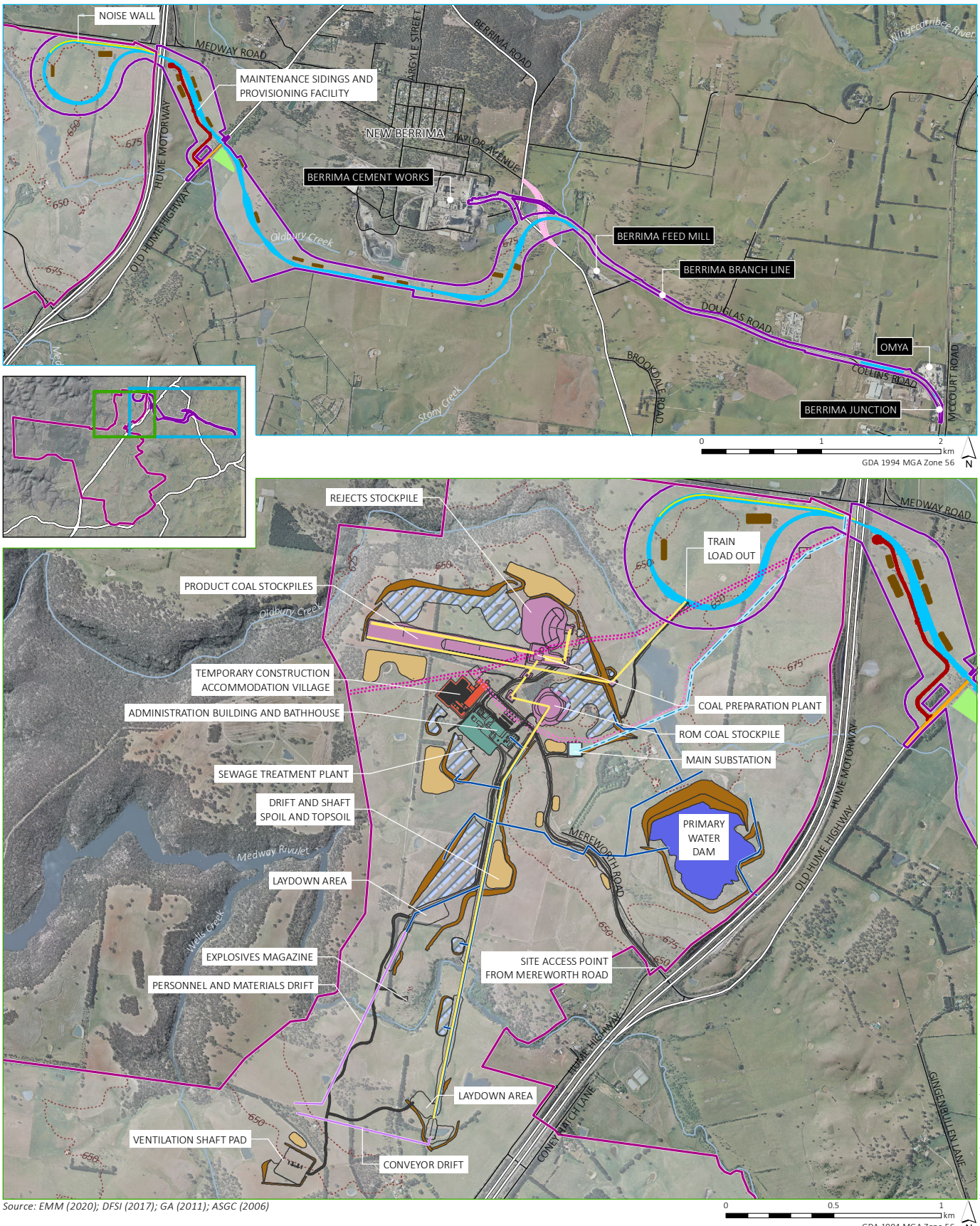
\\emmsvr1\EMM\Jobs\2012\V12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA001 LocalSetting 20200323 05.mxd 1/04/2020

Local setting

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 1.2

HUMECOAL PROJECT

EMM creating opportunities



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Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

KEY

- Major road
- Minor road
- Contour (25 m increments)
- Named watercourse
- Waterbody
- Berrima Rail Project area

Berrima Rail Project elements

- Noise wall
- New rail line
- Rail maintenance facility access road
- Berrima Road relocation (works by Wingecarribee Shire Council)
- Topsoil stockpiles
- Rail temporary construction facility
- Turning lane/shoulder
- Hume Coal Project area

Hume Coal Project elements

- Conveyor
- Drift (underground)
- Powerline route
- Water pipeline
- Proposed powerline and pipeline easement
- Existing WSC easement
- Temporary construction accommodation village
- Administration/bathhouse/workshop
- Main substation
- Internal road
- CPP and stockpiles
- Topsoil stockpiles
- Stormwater management earthworks
- Water management area
- Top water level

Layout plan

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 1.3

HUMECOAL PROJECT

EMM creating opportunities

1.2 Background and assessment process

Plate 1.1 outlines the assessment process to date.

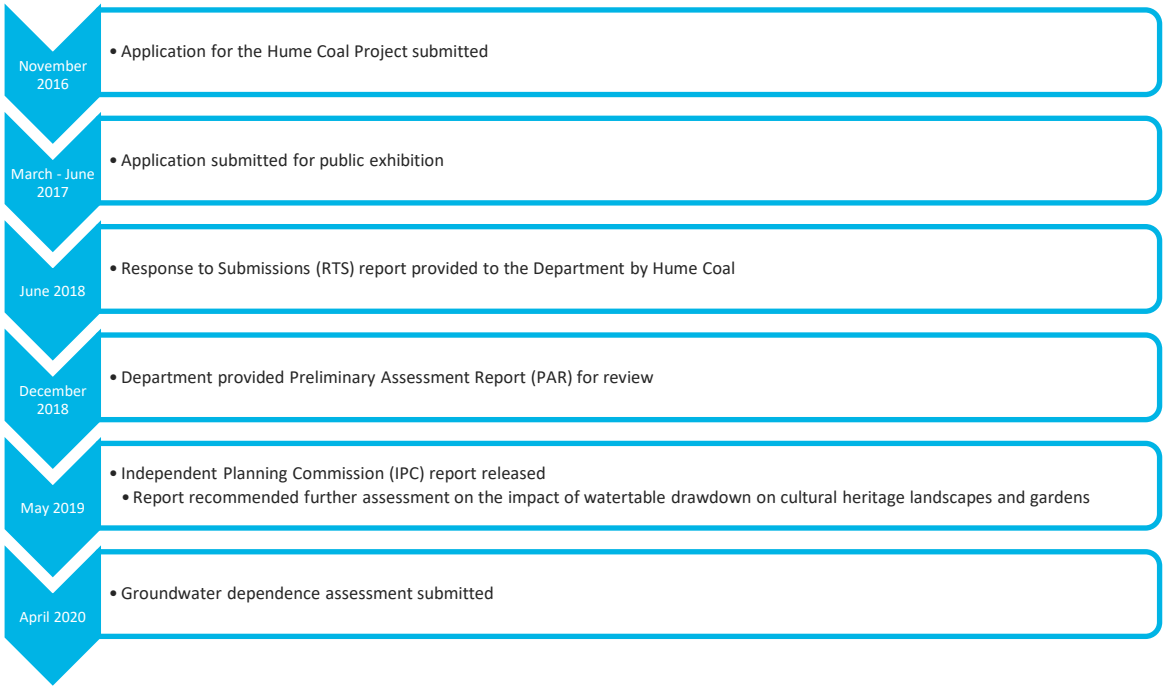


Plate 1.1 The assessment process to date

Application for the Hume Coal Project and Berrima Rail Project submitted

The development applications and accompanying environmental impact statements (EIS) for the Hume Coal Project (EMM 2017a) and the Berrima Rail Project (EMM 2017b) were submitted to the NSW Department of Planning and Environment (now the Department of Planning, Infrastructure and Environment (DPIE)) on 29 November 2016 for adequacy review. Following feedback and some modification, the two EISs were deemed adequate for exhibition, which occurred between 31 March 2017 and 30 June 2017.

A Biodiversity Assessment Report (BAR) (EMM 2017c) was prepared and submitted to the DPIE as Appendix H of the EIS for the Hume Coal Project. A Biodiversity Assessment Report (EMM 2017b) for the Berrima Rail Project was also prepared and submitted to DPIE as Appendix J to the Berrima Rail Project EIS. Both BARs were prepared in accordance with the former *Framework for Biodiversity Assessment: NSW Offsets Policy for Major Projects* (OEH 2014) and included an assessment of groundwater impacts on native vegetation, following the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (NOW 2012).

A Statement of Heritage Impact (SoHI) was prepared and submitted to the DPIE as Appendix T of the EIS for the Hume Coal Project (EMM 2017a). A Statement of Heritage Impact for the Berrima Rail Project was also prepared and submitted to DPIE as Appendix I to the Berrima Rail Project EIS (EMM 2017b).

Response to submissions report

Following public exhibition of the EISs, Hume Coal prepared a Response to Submissions (RTS) report, responding to submissions received from government agencies, organisations and the public. A total of 12,666 submissions were received on both projects. In their submission on the project, the former Office of Environment and Heritage (OEH) concluded that there were no major issues with direct impacts on biodiversity. However, there were some minor aspects of the biodiversity assessment that required rectification. These related to re-classification of some plant

community types and revision of some credit calculator inputs. The assessment was updated in the RTS report (Chapter 13 and Appendix 4), with all concerns addressed. Chapter 13 of the RTS also addressed potential impacts of water table decline on native vegetation within the project areas and surrounds.

Chapter 25 of the RTS contained an assessment of potential impacts of water table decline on four state listed heritage items: Oldbury Farm, Golden Vale, Whiteley House and Hillview House. The review concluded that these SHR properties are predominately near the edge of the zone of groundwater drawdown and for some of these areas, the predicted change (ie the magnitude of water table drawdown) is comparable to what would be experienced during natural seasonal variations and local landholder pumping.

The RTS report was submitted to the DPIE in June 2018.

Preliminary assessment report

The DPIE subsequently prepared a preliminary assessment report (PAR) for the project which was released in December 2018. In relation to biodiversity, the PAR concluded that "*The Department and OEH consider that biodiversity impacts would not be significant and could be managed through the following:*

- *Offset any impacts in accordance with the NSW Biodiversity Offsets Scheme.*
- *Prepare and implement a Biodiversity Management Plan in consultation with the OEH."*

In relation to historic heritage, the PAR concluded that "*impacts would not be significant and could be managed through the following:*

- *Include conditions requiring protection of all items.*
- *Prepare and implement management plans in consultation with OEH, Council and Heritage Council".*

Independent Planning Commission

As the number of submissions objecting to the project was greater than 25, the Minister for Planning referred the projects to the Independent Planning Commission (IPC) to conduct a public hearing, to assess the merits of the project, and to prepare a report outlining the Commission's findings on the projects, including any recommendations.

The IPC 'Independent Planning Assessment Report' (the IPC assessment report), released in May 2019, included findings and recommendations relating to Biodiversity and Historic Heritage. Table 1.1 lists IPC recommendation R16 and R19.

Table 1.1 IPC recommendations for further assessment

Submission	Category	IPC Recommendation
R16	Historic Heritage	Further information should be provided to allow the assessment of the potential impact of water table drawdown on heritage items (including gardens, plantings and landscape settings) within or in the vicinity of the Project area. The information should include confirmation of the existing level of the water table and the anticipated drawdown at both the 67th percentile and the 90th percentile.
R19	Biodiversity	The Applicant is to undertake further technical assessment on the impacts on private gardens, exotic trees and native vegetation from a declining water table.

1.3 Purpose

The purpose of this groundwater dependence assessment is to respond directly to the IPC findings and recommendations as published in the IPC assessment report released in May 2019, as they relate to IPC recommendations R16 and R19, as described in Section 1.2.

Where necessary, this study also addresses items presented in the IPC assessment report that informed the IPC findings and assessment that the applicant feels are erroneous, unsubstantiated or are otherwise worthy of response.

Table 1.2 describes where this report addresses each historic heritage item. Several items have been addressed in the *Hume Coal and Berrima Rail Projects Updated Statement of Heritage Impact* (EMM 2020a), and supplementary annexures therein.

Table 1.2 Response to IPC report on matters relating to Historic Heritage

Reference number	IPC assessment considerations	Location where addressed
283	The Commission in its assessment of merits of the Project has had regard to historic heritage impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:	
	groundwater that is primarily to preserve our heritage listed gardens;	Section 4.2 Section 5.1
	the proximity of significant local and state heritage assets;	Addressed in EMM (2020a)
	Golden Vale Homestead is owned by the National Trust. The Trust is deeply concerned that the Hume Coal Project may impact on the property's water supplies;	Section 4.2
	Southern Highlands area has had a unique social and economic role and its heritage values need recognition and protection if they are to survive into the future. These values are incompatible with the development of the coal mining landscape;	Addressed in EMM (2020a)
	Berrima, located approximately two kilometres from the Project area, is one of the best-conserved towns from the colonial period of Australia. It has a significant collection of state heritage register-listed properties concentrated in a small area;	Addressed in EMM (2020a)
	there are 64 heritage items just within the village, 16 of which are on the state register;	Addressed in EMM (2020a)
	it is impossible to assert that the impact of the Project on Berrima can be mitigated;	Addressed in EMM (2020a)
	the adequacy of the SHIA, an alternate Heritage Impact Assessment (HIA) prepared on behalf of two community groups reached different conclusions, particularly in relation to the impact of the Project on the significance of Mereworth, as its heritage listing goes beyond the house and garden and includes its rural setting; and	Addressed in EMM (2020a)
	the SHIA does not address impacts, other than from the surface infrastructure works, on the heritage items in the study area and the cultural landscape. In particular, the impacts of groundwater and water table drawdown have not been adequately assessed.	Section 4.2 Section 5.1

Table 1.2 Response to IPC report on matters relating to Historic Heritage

Reference number	IPC assessment considerations	Location where addressed
284	The Commission notes that the SHIA, based on expert studies, assumes that the level of groundwater drawdown will not impact on the cultural landscape. However, there are residual questions in relation to the level of water table drawdown. The additional information provided in the Hume Coal RTS illustrated that the impact on three State Heritage Register (SHR) items outside the project area but not on the items that are within or partly within the Project area where the level of water table drawdown is greater. Furthermore, the impacts were based on the 67th percentile and not the 90th percentile and the level of water table decline is not confirmed.	Section 2.1 Section 4.2 Section 5.1
285	The Commission notes that the historic heritage impacts of the Project within the locality have been peer reviewed by the Heritage Council of NSW against the requirements of relevant Government policy frameworks. The Commission notes that the Heritage Council of NSW retained concerns which included:	Addressed in EMM (2020a)
	the adequacy of the assessment on the impacts on Mereworth House; and	Addressed in EMM (2020a) Brouwer (2020a)
	the need for a detailed assessment of the impacts of the Project on the Berrima, Sutton Forest and Exeter cultural landscape.	EMM (2020a) Brouwer (2020b) Section 4.2 Section 5.1
286	At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding historic heritage impacts. The Commission considers the magnitude of water table drawdown is not confirmed and thus there is a potential change to the aesthetic significance of the heritage items' settings (gardens, tree plantings) and cultural landscape. The SHIA relies on the VIA and further information provided with the Hume Coal RTS to assess the visual impacts of the surface infrastructure on Mereworth House, other heritage items and the cultural landscape. However, the visual impact assessment has shortcomings (that are addressed separately) and the impacts on heritage significance would need to be reassessed in accordance with an updated visual impact study.	EMM (2019) Section 4.2 Section 5.1
287	The Commission makes the following recommendations that will require further information and/or assessment:	-
R16	Further information should be provided to allow the assessment of the potential impact of water table drawdown on heritage items (including gardens, plantings and landscape settings) within or in the vicinity of the Project area. The information should include confirmation of the existing level of the water table and the anticipated drawdown at both the 67th percentile and 90th percentile.	Brouwer (2020b) Section 2.1 Section 4.2 Section 5.1
R17	The Applicant should address the recommendation of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.	Addressed in EMM (2020a)
R18	The Statement of Heritage Impact Assessment should be updated in response to recommendations R16 and R17, and the visual impact of the project on the significance of the above items and the cultural landscape in accordance with an updated visual impact assessment (see R15 in Visual Impact recommendations).	Addressed in EMM (2020a and 2020b) Brouwer (2020b)

Table 1.3 describes where this report addresses each item relevant to biodiversity. A number of items have been addressed in the *Hume Coal and Berrima Rail Project Response to Submissions Report*, Chapter 13 (EMM 2018).

Table 1.3 Response to IPC report on matters relating to Biodiversity

Reference number	IPC assessment considerations	Location where addressed
338	The Commission in its assessment of merits of the Project has had regard to biodiversity impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:	-
	our local environment is unique with rich biodiversity, complex ecosystems, intricate waterways and a wide variety of landform, soils and living conditions;	Addressed in EMM (2018)
	biodiversity must be protected from all and every activity that would threaten it;	Addressed in EMM (2018)
	the biodiversity assessment clearly identifies that there will be negative impacts of the proposed development on an identified critically endangered ecological community and two threatened flora species;	Addressed in EMM (2018)
	the shire is considered to be a biodiversity hotspot and is one of the most biodiverse regions in Australia; and	Addressed in EMM (2018)
	impacts on both native vegetation and planted exotic gardens and trees associated with the loss of groundwater supplies.	Addressed in EMM (2018) and this report
339	The Commission notes the Applicant's attempts to best reduce surface impacts from infrastructure in the mine design and acknowledges that during its site inspection and locality tour it was apparent that the Project site has already been significantly cleared for farming purposes and that there has been significant historical investment in the establishment of exotic trees and gardens in the area.	Chapter 4
340	The Commission finds that the Applicant and Department have considered and assessed the impacts on biodiversity, and at this stage of its assessment the Commission finds that it is generally satisfied with the information provided up to this point regarding biodiversity impacts on native species, however it is not satisfied that appropriate consideration and assessment has been given to the possible impacts of water table decline on exotic trees and gardens. The Hume Coal EIS reporting is based on eucalyptus tree species and their estimated rooting depths. Nothing has been reported on the rooting depths of introduced garden plants and exotic trees.	This report
341	The Commission makes the following recommendations that will require further information and/or assessment:	-
R19	The Applicant is to undertake further technical assessment on the impacts on private gardens, exotic trees and native vegetation from a declining water table.	Section 4.3 Section 5.1 Section 5.2 Technical assessment on the impacts of the project on native vegetation from a declining water table has been assessed previously and is presented in Section 13 of the RTS Main Report, Volume 1.

2 Methods

2.1 Groundwater model uncertainty analysis

This impact assessment is based on the results of the groundwater modelling uncertainty analysis completed in support of the RTS (EMM 2018). Groundwater model uncertainty analysis gives insight into the likelihood of a project meeting or exceeding impacts predicted in the median case (based on the uncertainty inherent in the choices of model parameters). Percentile classes (Table 2.1) are used to present the results of the uncertainty analysis.

Table 2.1 Uncertainty percentile classes

Narrative descriptor	Percentile class	Description
Very likely	0-10%	Likely to occur even in extreme conditions
Likely	10-33%	Expected to occur in normal conditions
About as likely as not	33-67%	About an equal chance of occurring as not
Unlikely	67-90%	Not expected to occur in normal conditions
Very unlikely	90-100%	Not likely to occur even in extreme conditions

IPC recommendation R16 requires assessment of the potential impacts of the predicted groundwater level drawdown on vegetation and cultural heritage landscapes using the results of the 67th percentile (unlikely to occur) and the 90th percentile (very unlikely to occur) uncertainty analysis. The model outcomes for the 67th percentile provide a conservative prediction of the impacts caused by the Project. While these are useful when considering worst-case outcomes, results higher than the 67th percentile are considered 'unlikely', or 'not expected to occur' (Table 2.1) when considered in line with IESC guidelines (Middlemiss and Peeters 2008). Likewise results higher than the 90th percentile are considered 'very unlikely' or 'not likely to occur even in extreme conditions'. The model outcomes for the 50th percentile represent the median result (ie lie in the middle of the 33-67% percentile class) and are considered to have an equal chance of occurring or not occurring, and therefore is more likely than the 67th and 90th percentiles.

As presented in earlier submissions, the Hume Coal groundwater model has undergone numerous reviews by many leading experts in groundwater modelling in Australia, including a review by the then DPE's expert Mr Hugh Middlemis (HydroGeoLogic Pty Ltd). Hume Coal recently engaged Dr Lloyd Townley of GW SW Pty Ltd, an expert with over 40 years of experience in groundwater modelling, to independently review the RTS groundwater model. Dr Townley's review finds that the modelling undertaken for the Project is fit for purpose, which is predicting groundwater inflows to the proposed mine and drawdown of the watertable within and near the Project area (Townley 2020).

The predicted impact of watertable drawdown has been modelled using the RTS regional model. The model predicts results for bores and areas of interest, with reference to the nearest model cell for the location of the bore and point of interest. It should be noted that while the model is accurate at the regional scale, there will be differences between model predicted depth to groundwater and reality at a local scale (ie at a bore or tree level). However, this does not mean that the groundwater model cannot be used to assess the potential effects of the changes on receptors. The groundwater model is consistent with industry standards and provides guidance on the potential watertable drawdown due to the project.

2.2 Study area

The study area for the groundwater dependence assessment presented in the EIS and RTS reports was defined as the groundwater model domain. For the purposes of this assessment, the study area has been refined and delineated into two study areas.

To assess impacts on heritage items and private gardens, the study area is defined as the 2-metre (m) drawdown contour for the 90th percentile results shown on Figure 4.1 (the 90th percentile study area). The 90th percentile study area is 15,792 ha.

To assess impacts on cultural landscapes, the study area is defined as the common boundary of the previously listed landscape areas *Key Historic Unit 6 – Sutton Forest Landscape Area* on the superseded Wingecarribee LEP 1993, the non-statutory landscape area *Exeter/Sutton Forest Landscape Conservation Area* recognised by the National Trust of Australia (NSW) and the abovementioned predicted 2 m drawdown extent for the 90th percentile modelling results (the landscape conservation study area). The landscape conservation study area is 11,108 ha (Figure 4.1).

Parts of the common boundary of *Key Historic Unit 6 – Sutton Forest Landscape Area* and *Exeter/Sutton Forest Landscape Conservation Area* (the cultural landscapes) lie outside the landscape conservation study area (ie outside the area where drawdown predictions are greater than 2 m), to the north-east and south. The total extent of the cultural landscape s is 14,636 ha.

2.3 Site inspection

A site inspection was conducted during the week of 30 September 2019 by Katie Diver (Ecologist), Pamela Kottaras (Archaeologist) and Catherine Brouwer (Landscape Planner/Registered Landscape Architect). The purpose of the inspection was to identify commonly planted trees and shrubs in the areas of interest. An inspection was completed of sites that were accessible, including Mereworth House and Garden, Boral Cement Works, the Bank of NSW and Remembrance Driveway Gardens. A brief inspection was conducted from the roadside of sites to which access was not possible. Inspections were also conducted of the cultural landscape conservation areas from prominent viewpoints. The results of the site inspection and literature review were used to inform the list of species commonly planted in private gardens.

2.4 Review of garden species response to reduced water availability

Where available, descriptions of historic gardens were reviewed using the *State Heritage Register* (SHR) and *Wingecarribee Local Environmental Plan 2010* (Wingecarribee LEP). A review of garden species identified during the site inspection and literature review was undertaken by an arboricultural specialist. The review focused on the origin, climate, biology, typical rooting depths and response to reduced water availability of these species to assess their vulnerability to shallow watertable decline.

Commonly planted species identified in the historic gardens visited during the site inspection were provided to an arboricultural specialist (Tree Survey Arboricultural Consultants). The arboricultural specialist assessed each species vulnerability to a declining watertable by examining each species:

- origin;
- typical climate;
- biology;
- typical root structure and rooting depths; and
- tolerance to reduced water availability.

The Melbourne University - Burnleigh Plant Guide Online (University of Melbourne 2016) was used to determine each species level of drought tolerance. This has been used to determine each species tolerance to reduced water availability.

2.5 Definition of potential drawdown risk areas

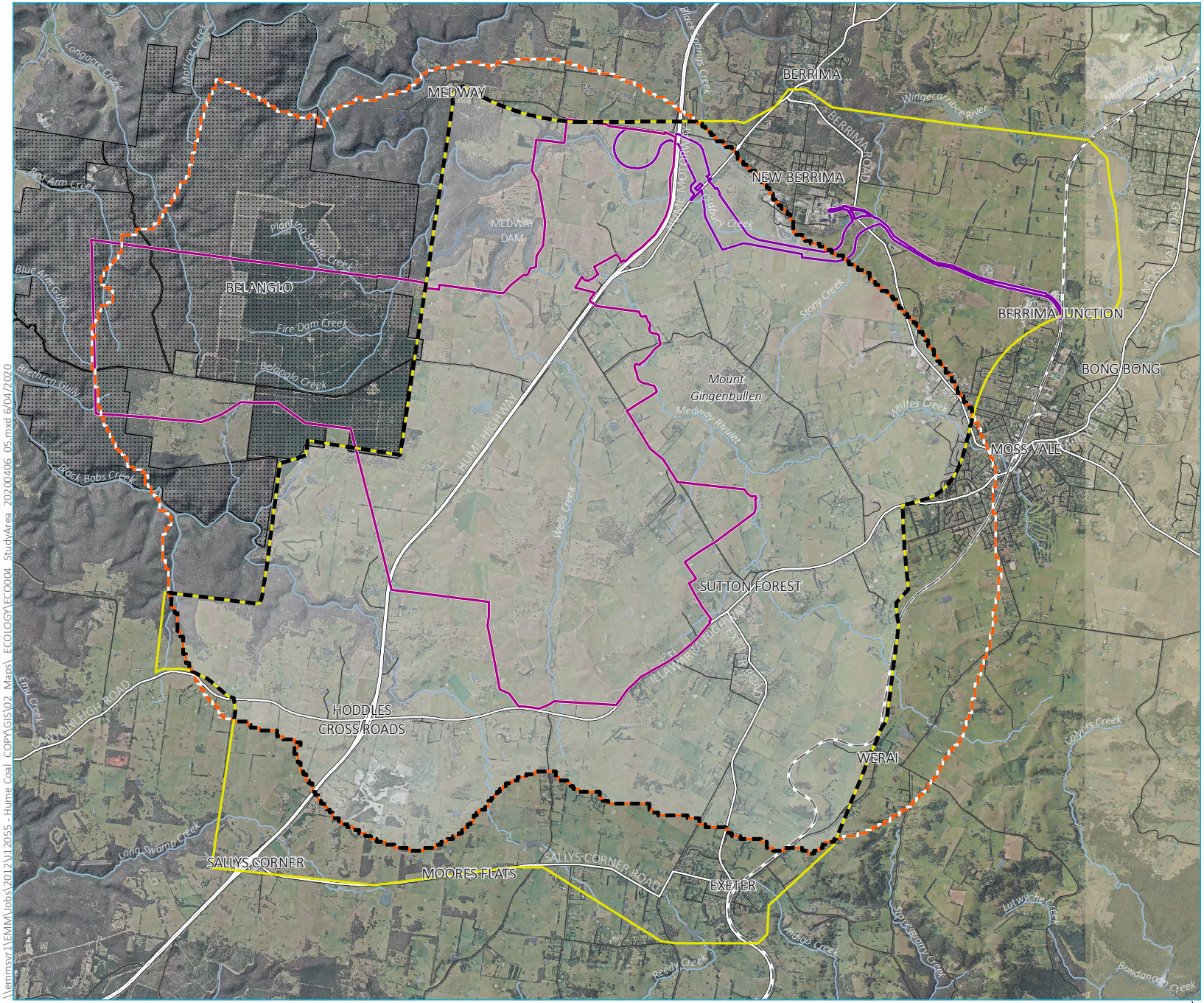
2.5.1 Data review

Spatial data and historic heritage studies were reviewed to identify heritage items that may have associated cultural landscapes, gardens and plantings within the study area:

- items listed on the SHR;
- landscape items, landscape conservation areas and general items listed on the Wingecarribee LEP;
- previously listed landscape areas *Key Historic Unit 6 – Sutton Forest Landscape Area* on the superseded Wingecarribee LEP 1993;
- non-statutory landscape area *Exeter/Sutton Forest Landscape Conservation Area* recognised by the National Trust of Australia (NSW);
- Hume Coal Project Environmental Impact Statement (EMM 2017a) and Appendices;
- Berrima Rail Project Environmental Impact Statement (EMM 2017b) and Appendices;
- Hume Coal and Berrima Rail Project Response to Submissions: Main Report (EMM 2017d);
- cultural landscapes identified in *Hume Coal and Berrima Rail Project Cultural Landscape Assessment* (Brouwer 2020b);
- Wollongong 1:250 000 Geological Sheet (Rose 1966);
- Hume Coal and Berrima Rail Project Updated Water Assessment (EMM 2020c);
- vegetation mapping in Wingecarribee Biodiversity Strategy (ELA 2003);
- LiDAR point cloud data (DFSI 2014; 2018); and
- Hume Coal Project Revised Groundwater Modelling for Response to Submissions (HydroSimulations 2018).

2.5.2 Heritage items

ArcMap was used to define areas of potential drawdown risk during drought conditions in local and state-listed heritage items within the study area. Listed heritage items were clipped to the study area, and trees and gardens occurring within these were digitised. Listed heritage items (and their associated trees and gardens) were then clipped to areas where Hawkesbury Sandstone outcrops at the surface (refer to Section 4.1).



Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

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Study area

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 2.1

HUMECOAL PROJECT

EMM creating opportunities

Depth to groundwater surfaces were created for existing conditions (Digital Elevation Model (DEM) minus pre-mining watertable elevation). Resultant depth to groundwater surfaces were then reclassified into the following categories, following Serov *et al* (2012):

- high potential for groundwater interaction (depth to groundwater ranges from 0 to 3 mbgl);
- moderate potential for groundwater interaction (3 to 5 mbgl); and
- low potential for interaction (5 to 10 mbgl).

These were intersected with the height models described above to provide a modelled existing depth to groundwater for each vegetation category. All modelled assessment surfaces are of 50 m cell size.

2.5.3 Cultural landscapes

ArcMap was used to define areas of potential drawdown risk during drought conditions in non-statutory cultural landscapes (ie *Key Historic Unit 6 – Sutton Forest Landscape Area* on the superseded Wingecarribee LEP 1993 and *Exeter/Sutton Forest Landscape Conservation Area* recognised by the National Trust (NSW)) within the study area. The non-statutory cultural landscape boundaries were merged and clipped to the study area (referred to as the landscape conservation areas) and then to areas where Hawkesbury Sandstone outcrops at the surface (refer to Section 4.1).

A Digital Elevation Model (DEM) and Digital Surface Model (DSM) were generated in ArcMap from publicly-available LiDAR point cloud data (captured in 2014 and 2018). Surface features were extracted by subtracting the DEM from the DSM. The model excluded heights less than 0.5 m. This was clipped to the landscape conservation area boundary, within the study area (ie the landscape conservation study area, Figure 4.1).

Vegetation in the landscape conservation study area was classified into native vegetation, non-native vegetation (ie trees and shrubs) and exotic grasslands. As stated in Table 1.2, the impacts of the project on native vegetation from a declining watertable has been assessed previously, including areas within the landscape conservation study area, and is presented in Section 13 of the RTS Main Report, Volume 1. Accordingly, the assessment of a declining watertable in the landscape conservation areas is restricted to non-native vegetation and exotic grasslands.

The DEM was used to define all vegetation polygons in the landscape conservation study area. Native vegetation canopy polygons from the Wingecarribee Biodiversity Strategy (EcoLogical 2003) were erased from the DEM to define polygons for non-native vegetation.

Depth to groundwater surfaces were created for existing conditions relevant to non-native vegetation (DEM minus pre-mining watertable elevation). Resultant depth to groundwater surfaces were then reclassified into the following categories, following Serov *et al* (2012):

- high potential for groundwater interaction (depth to groundwater ranges from 0 to 3 mbgl);
- moderate potential for groundwater interaction (3 to 5 mbgl); and
- low potential for interaction (5 to 10 mbgl).

These were intersected with the height models described above to provide a modelled existing depth to groundwater for each groundwater interaction category. All modelled assessment surfaces are of 50 m cell size.

Depth to groundwater surfaces were also created for existing conditions relevant to exotic grasslands (DEM minus pre-mining watertable elevation). Resultant depth to groundwater surfaces were then reclassified into the following categories, informed by exotic perennial grass rooting depths (Lodge and Murphy 2006):

- high potential for groundwater interaction (depth to groundwater ranges from 0 to 1 mbgl).

The regional scale RTS groundwater model predicts watertable drawdown as a result of the simulated Hume Coal Project, including low-lying grassland areas where the watertable is shallow. Under existing pre-mining conditions, the watertable is naturally deeper in higher elevated areas and shallower in low lying topographical areas, including around watercourses where groundwater discharges as baseflow. As such, the assessment only considers shallow groundwater (less than 5 m below ground surface) areas within close proximity to or adjacent to watercourses.

2.5.4 Private gardens

ArcMap was used to define areas of potential drawdown risk during drought conditions for private gardens in the study area (Figure 4.1) in areas where Hawkesbury Sandstone outcrops at the surface (refer to Section 4.1). Depth to groundwater surfaces were created from groundwater modelling results (existing groundwater level; predicted groundwater level (existing groundwater level minus groundwater drawdown (50th, 67th, 90th percentiles)). Existing groundwater level, and each predicted groundwater level, were subtracted from the DEM to give depth to groundwater surfaces that were then categorised (0−3, 3−5, 5−10). Existing DTGW was then unioned with other predicted DTGW to compare drawdown risk for private gardens.

The following areas were removed to define the maximum extent of shallow groundwater (ie 0−10 mbgl) available to and potential drawdown risk to private gardens:

- areas of native vegetation;
- exotic grasslands; and
- pine forest in Belanglo State Forest.

It should be noted that the maximum extent of potential drawdown risk is conservative, and private gardens would only be potentially impacted during drought conditions if they contain the species identified as drought-sensitive (Table 5.3) and are not watered as normal.

2.6 Impact assessment

For heritage gardens and private gardens in the study area and non-native vegetation and exotic grasslands in the landscape conservation study area, depth to groundwater surfaces were created for the predicted maximum mining induced drawdown for the 50th, 67th and 90th percentiles (existing modelled depth to groundwater minus predicted (maximum) mining induced drawdown, with the result subtracted from the DEM). Resultant predicted (maximum) depth to groundwater surfaces were then reclassified into 0−3 mbgl, 3−5 mbgl and 5−10 mbgl categories. These were intersected with the height models described above to give predicted (maximum) depth to groundwater for each vegetation category. All modelled assessment surfaces are of 50 m cell size.

A union was performed in ArcMap with the modelled existing and predicted maximum depth to groundwater and each groundwater dependence category. Groundwater dependence categories were then compared to create categories for wooded vegetation (ie heritage gardens, non-native vegetation in the landscape conservation study area and private gardens) based on the change from the pre-mining to predicted maximum depth to groundwater categorisation and to inform the impact assessment.

A risk-matrix was developed to assess potential drawdown risk in woody vegetation during drought conditions. These categories and their associated potential drawdown risk during drought conditions are shown in Plate 2.1.

Existing modelled depth to groundwater (mbgl)	Predicted (maximum) depth to groundwater					Potential drawdown risk during drought conditions
		0 – 3 m	3 – 5 m	5 -10 m	> 10 m	
	0–3 m High potential for groundwater interaction	None	Low	Moderate	Moderate	
	3–5 m Moderate potential for groundwater interaction	None	None	Moderate	High	
	5–10 m Low potential for groundwater interaction	None	None	None	High	

Plate 2.1 **Potential drawdown risk categories for woody vegetation in historic gardens, non-native vegetation in the landscape conservation study area and private gardens**

A risk-matrix was also developed to assess potential drawdown risk in exotic grasslands during drought conditions. These categories and their associated potential drawdown risk during drought conditions are shown in Plate 2.2.

Existing modelled depth to groundwater (mbgl)	Predicted (maximum) depth to groundwater			Potential drawdown risk during drought
		0 – 1 m	> 1 m	
	0–1 m High potential for groundwater interaction	None	High	

Plate 2.2 **Potential drawdown risk categories for exotic grasslands in the landscape conservation study area**

3 Vegetation interactions with groundwater

3.1 Background

While no guidelines have been developed to assess groundwater impacts on cultural heritage gardens, plantings and landscapes, the Risk Assessment Guidelines for Groundwater Dependent Ecosystems (Office of Water 2012) provides a framework for the identification of vegetation interacting with groundwater and understanding their degree of groundwater dependence. Similarly, this approach can be used to assess groundwater impacts on native and non-native vegetation, including privately owned gardens.

Vegetation interactions with groundwater can be described as:

- non-dependent (ie do not access groundwater);
- facultative (have some degree of dependence on groundwater); and
- entirely dependent/obligate (ie essential to vegetation functioning).

Non-dependent vegetation does not have access to groundwater (ie groundwater is too deep to access) and the vegetation relies solely on rainfall or surface flows to fulfill its water requirements. Vegetation with a facultative dependence would rely on groundwater to partially meet its water requirements, but would also rely on rainfall, surface flows and watering. Although rainfall would contribute to water levels, entirely dependent/obligate ecosystems are nearly exclusively dependent on groundwater for functioning (ie groundwater dependent wetlands or karst/cave ecosystems).

There are seven different types of groundwater dependent ecosystems (noting that stream baseflow is both a sub-surface and surface ecosystem), comprising:

- sub-surface ecosystems:
  - karst/cave ecosystems;
  - aquifer ecosystems; and
  - stream baseflow ecosystems;
- surface ecosystems:
  - groundwater-dependent wetlands;
  - stream baseflow ecosystems;
  - estuarine and near-shore ecosystems; and
  - terrestrial vegetation.

For the purposes of this assessment, all identified vegetation types are categorised as ‘terrestrial vegetation’, being a surface ecosystem (and noting that other groundwater dependent ecosystems were assessed rigorously as part

of the biodiversity assessments for the EIS and revised in the RTS). The interaction of terrestrial vegetation with groundwater is discussed further in Section 3.2.

3.2 Interaction of terrestrial vegetation with groundwater

For many terrestrial plants, groundwater forms only part of the overall water requirement, particularly where rainfall is seasonal and soil water (water droplets available in soil) has the potential to be regularly replenished (Howe *et al* 2007). Vegetation will draw water from sources that require the least amount of energy, meaning that vegetation will use shallow soil water first before seeking deeper soil water or groundwater (Eamus and Froend 2006). Where there is insufficient soil water to meet plant water requirements, plants that can access groundwater will become increasingly dependent on that groundwater source as soil water is depleted (Howe *et al* 2007), ie have a facultative groundwater dependence. Groundwater becomes less important as a water source to terrestrial vegetation when depths exceed 10 mbgl (Froend and Loomes 2005), as most plants do not have roots long enough to access this deeper groundwater.

Terrestrial vegetation relies on the availability of groundwater below the surface but within its rooting depth. Woody terrestrial vegetation is generally characterised by a large deep tap root that extends to the watertable (where present). Water is generally accessed from the capillary fringe immediately above the saturated zone, as root growth is inhibited by saturation and low oxygen (Stygoecologia 2013).

Sown exotic perennial grasslands such as those occurring within the project area and landscape conservation study areas have been reported as ranging from 0.65 to 1 mbgl (Lodge and Murphy 2006). Given their very shallow rooting depths, exotic perennial grasslands do not have the same capability as wooded ecosystems to utilise deeper groundwater, and therefore would have a facultative-opportunistic groundwater dependence where the watertable is very shallow (ie between 0−1 mbgl).

3.3 Rooting depths, climate and surface geology

Root structure and rooting depths vary across vegetation types and range from shallow to deep, but will also vary between soil types for the same plant. Soil type and structure has a large influence on a plant's ability to access groundwater. Soils that are deep and well drained allow roots to grow to a greater depth. Deeper roots allow plants to draw groundwater from greater depths during drought and avoid hydraulic failure (Hacke *et al*. 2000). Although groundwater access is still possible, finer textured subsoil (eg clay and shale) has low permeability, restricting root growth (Xu and Li 2008). Roots are also capable of permeating into harder surface geologies like sandstone, exploiting cracks and fissures in the rock (Stygoecologia 2013).

Root systems tend to be shallower and wider in dry and hot climates, and deeper and narrower in cold and wet climates, except for trees (Schenk and Jackson 2002). The root systems of many woody trees and shrubs typically extend vertically and laterally into the soil retrieving water and nutrients from both deep and shallow soil layers. Shallow root systems are favoured over deeper root systems as the energy required for the plant to maintain shallow roots is lower (Stygoecologia 2013).

3.4 Water stress

Plants experience water stress when water availability to their roots is reduced. Measurable changes in the vigour of vegetation can include branch die-back, reduced growth and leaf shed (Serov et al 2012). Water stress reduces turgor (ie the pressure exerted by water that makes the plant rigid), which can inhibit growth and reproduction. Plants can adapt to drought and can employ strategies to survive for some time under water stress. These strategies comprise water stress tolerance and water stress avoidance (Lisar *et al* 2012). Grasslands may die back during times of drought during water stress but would rapidly re-colonise following rain.

Some plants can adapt to water stress and changes in groundwater levels by extending root networks to greater depths (Dillon *et al* 2009; Lisar *et al* 2012). However, if the groundwater depth exceeds the maximum rooting depth of a species, groundwater cannot be accessed as a water source. A watertable that declines faster than root growth will prevent groundwater access, leaving the only sources of water as rainfall and soil moisture (Dillon *et al* 2009), or watering. Minor changes to the groundwater regime may not have any adverse impacts but these ecosystems can die if the soil layer is dry and a lack of access to groundwater is prolonged (Serov et al 2012).

4 Results

4.1 Influence of water table height and geology on groundwater access

Plate 4.1 and Plate 4.2 provide conceptual diagrams of various vegetation types and the inferred groundwater access in the study area, separated to show the influence of surface geology on groundwater movement. In areas of shallow groundwater, terrestrial vegetation can have a 'facultative (opportunistic)' dependence on groundwater as it is present just below the root zone. Conversely, where the watertable is deeper, terrestrial vegetation is 'non-dependent', as plant roots cannot access groundwater.

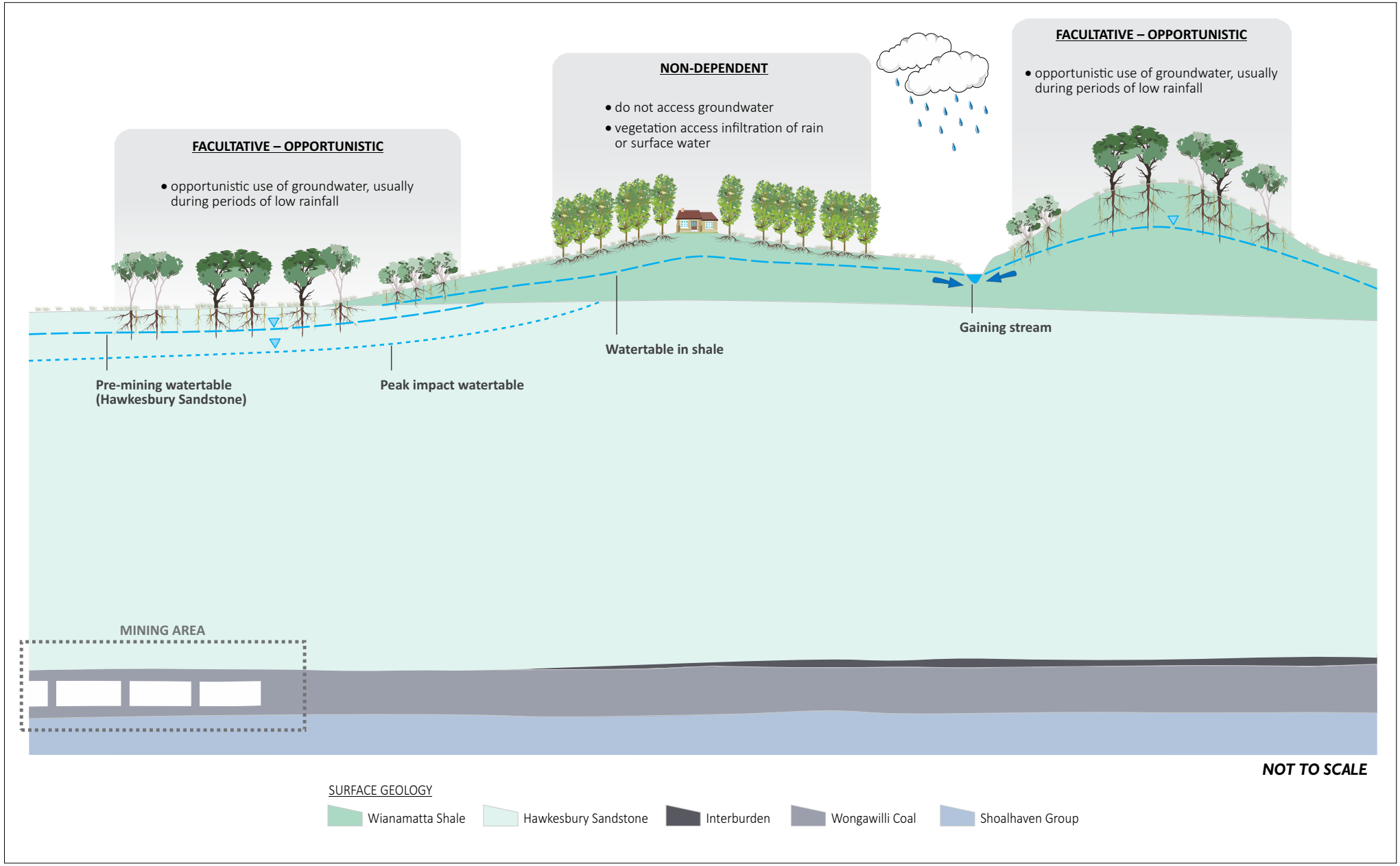
Plate 4.1 illustrates the conceptual understanding of groundwater movement in areas where the Wianamatta Group Shale is present at the surface (in the eastern part of the study area). Vegetation access to groundwater would vary in the Wianamatta Group Shale area with depth and permeability of the layer.

Plate 4.2 illustrates the conceptual hydrogeological understanding in areas where the shale is absent and the Hawkesbury Sandstone outcrops at surface (generally in the western part of the study area). Vegetation access to groundwater would vary where the Hawkesbury Sandstone is present at the surface and would be restricted to areas where roots could exploit cracks and fissures in the rock.

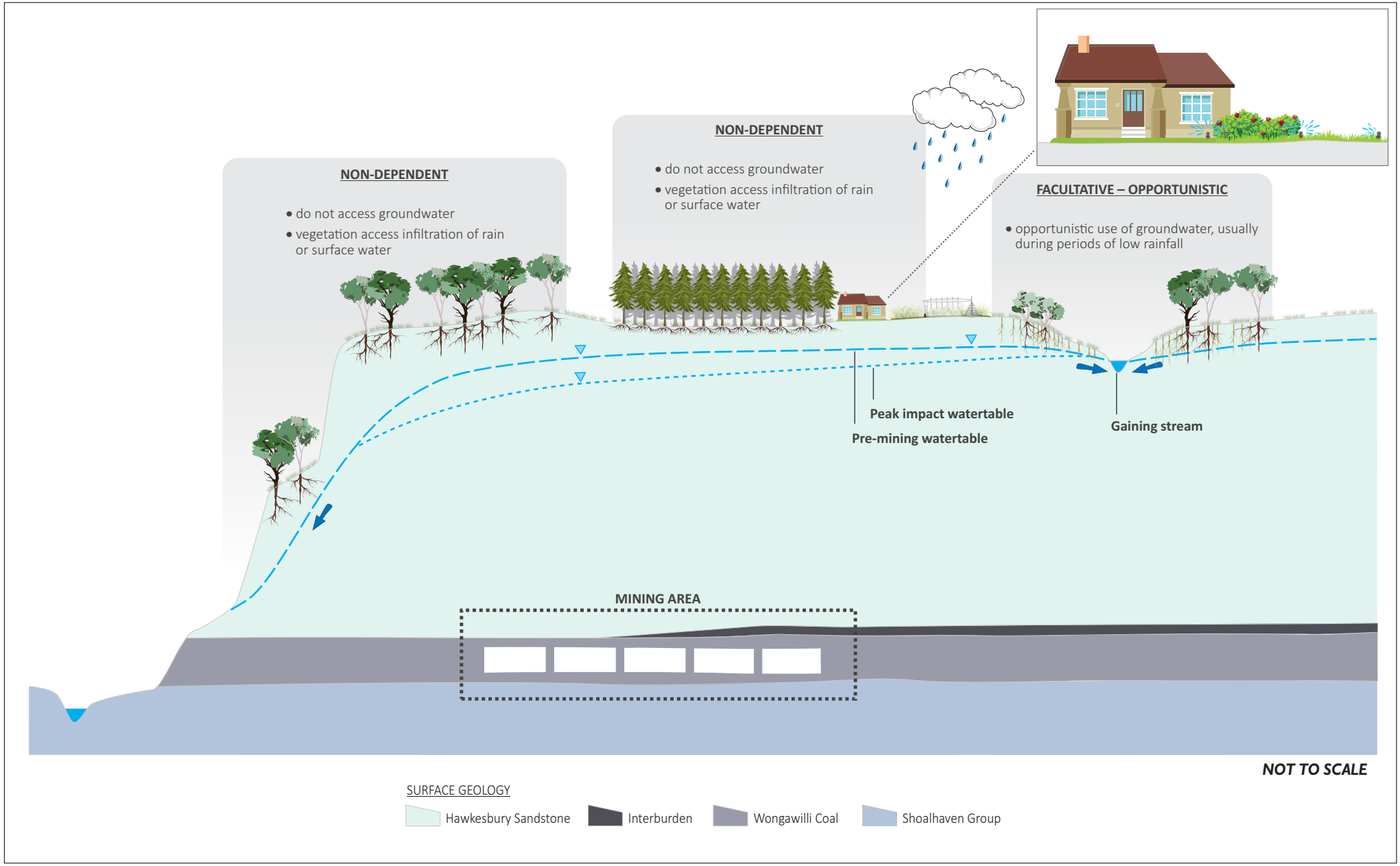
Based on the conceptual hydrogeological understanding, in areas where the Wianamatta Group Shale is weathered and thin (in the south and west of the study area) the Wianamatta Group Shale is likely to be unsaturated (dry), with the watertable located within the Hawkesbury Sandstone underlying the shale. Where the Wianamatta Group Shale thickens (in the east and the north), the watertable is present at varying depths depending on topography and hydrogeological properties of the Wianamatta Group Shale.

There is limited natural vertical connectivity between the Wianamatta Group Shale and the underlying Hawkesbury Sandstone aquifer, as evidenced by lower water levels in the Hawkesbury Sandstone. At most groundwater monitoring sites (such as at the HU035A and B monitoring sites; refer to the Water technical report, Appendix B of the IPC response report (EMM 2020c)), groundwater in the Wianamatta Group Shale is perched above the regional watertable and there are areas of unsaturated Hawkesbury Sandstone underlying the saturated Wianamatta Group Shale (refer to Plate 4.1 to Plate 4.3).

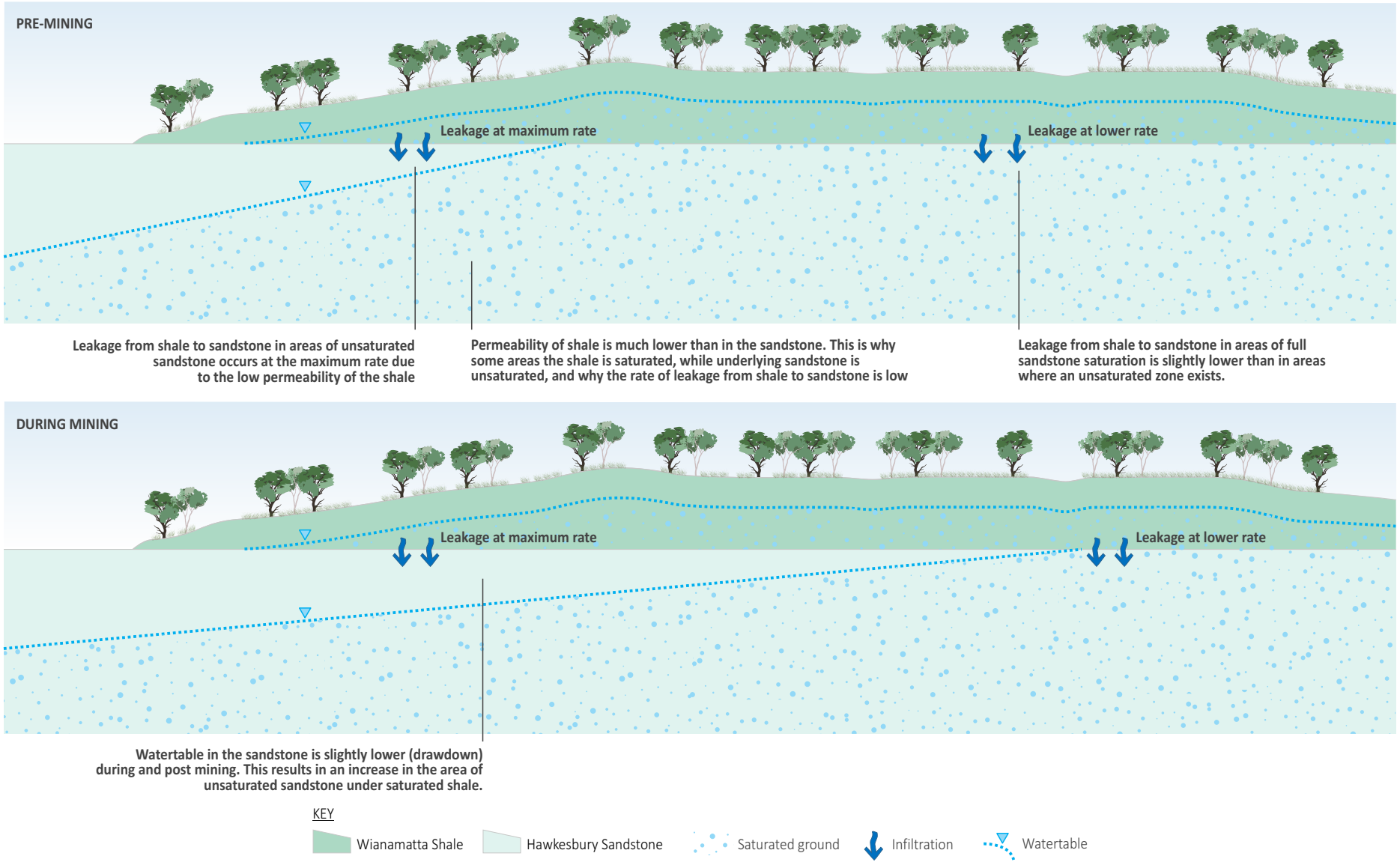
In areas where hydraulic connection between these two units may occur, groundwater would leak from the Wianamatta Group Shale to the Hawkesbury Sandstone at a low rate. Where there is no hydraulic connection between these two units (ie where the Hawkesbury Sandstone is unsaturated below the saturated Wianamatta Group Shale , e.g. perched groundwater), downward groundwater leakage would already be occurring at a maximum rate (see Plate 4.3). Mining induced drawdown would not result in increased leakage (vertical downward movement) of groundwater from the Wianamatta Group Shale to the Hawkesbury Sandstone, and any potential impacts to groundwater availability would be negligible. For this reason, areas of Wianamatta Group Shale overlying Hawkesbury Sandstone will not be further assessed for potential impacts to groundwater dependent vegetation.



Conceptual diagram for surface vegetation interaction with groundwater – Wianamatta Group Shale outcrop areas



Conceptual diagram for surface vegetation interaction with groundwater – Hawkesbury Sandstone outcrop areas



Conceptual schematic representation of Wianamatta Group – Hawkesbury Sandstone relationship

Hume Coal Project

Groundwater dependent ecosystem assessment for cultural landscapes and gardens

Plate 4.3

EMM creating opportunities

HUMECOAL PROJECT

4.2 Cultural items in the study area

4.2.1 Overview

The study area contains 61 heritage items listed on the Wingecarribee LEP 2010 and/or the State Heritage Register. Heritage items in the study area and their conservation status are listed in Attachment A and shown on Figure 4.1. Note this excludes local and state listed heritage items that are outside the area of predicted maximum watertable drawdown when calculated at the 90th percentile.

Two landscape conservation areas, namely *Key Historic Unit 6 - Sutton Forest Landscape Area* previously listed on the Wingecarribee LEP 1993 and the non-statutory listing of the *Exeter/Sutton Forest Landscape Conservation Area*, by the National Trust of Australia (NSW), are also within the study area (referred to as the landscape conservation area). To date, the conservation values of the landscape conservation areas have not been well defined. A detailed assessment of their conservation and character is provided in Brouwer (2020b), with a summary provided below.

The landscape conservation study area is representative of the cultural landscape environment of the region and has historical, associational and aesthetic values. Its value is largely related to aesthetic appreciation of vegetation in the landscape. The vegetation types and forms with some heritage significance to the cultural landscape values, as defined by registered landscape architect Brouwer (2020b) include:

- windbreak/tree lines of pines, cypress and similar evergreen trees and roadside pine plantings (noting that these are new features that were not present until between 1997 - 2000);
- remnant roadside native vegetation;
- hawthorn, and similar, historical and reconstructed hedges;
- garden perimeter hedges including at road reserve edges;
- specimen trees and groups of trees -both native and exotic;
- remnant riparian corridor vegetation, including reconstruction and restoration planting; and
- historical gardens, at rural homesteads /villas, particularly as appreciated from the public realm.

Landscape character of the significant potential view zone surrounding the project area has also been characterised in the Updated Visual Impact Assessment (VIA) (see Figure 4.2, EMM 2020b) as:

- forested hills and ridges;
- plantation pine on hills;
- undulating pastoral lands;
- flat pastoral lands;
- peri-urban;
- urban; and
- Mount Gingenbullen.

For the purposes of this assessment, and to best identify potentially groundwater-dependent vegetation in the landscape conservation areas and assess impacts, the above categories were merged into:

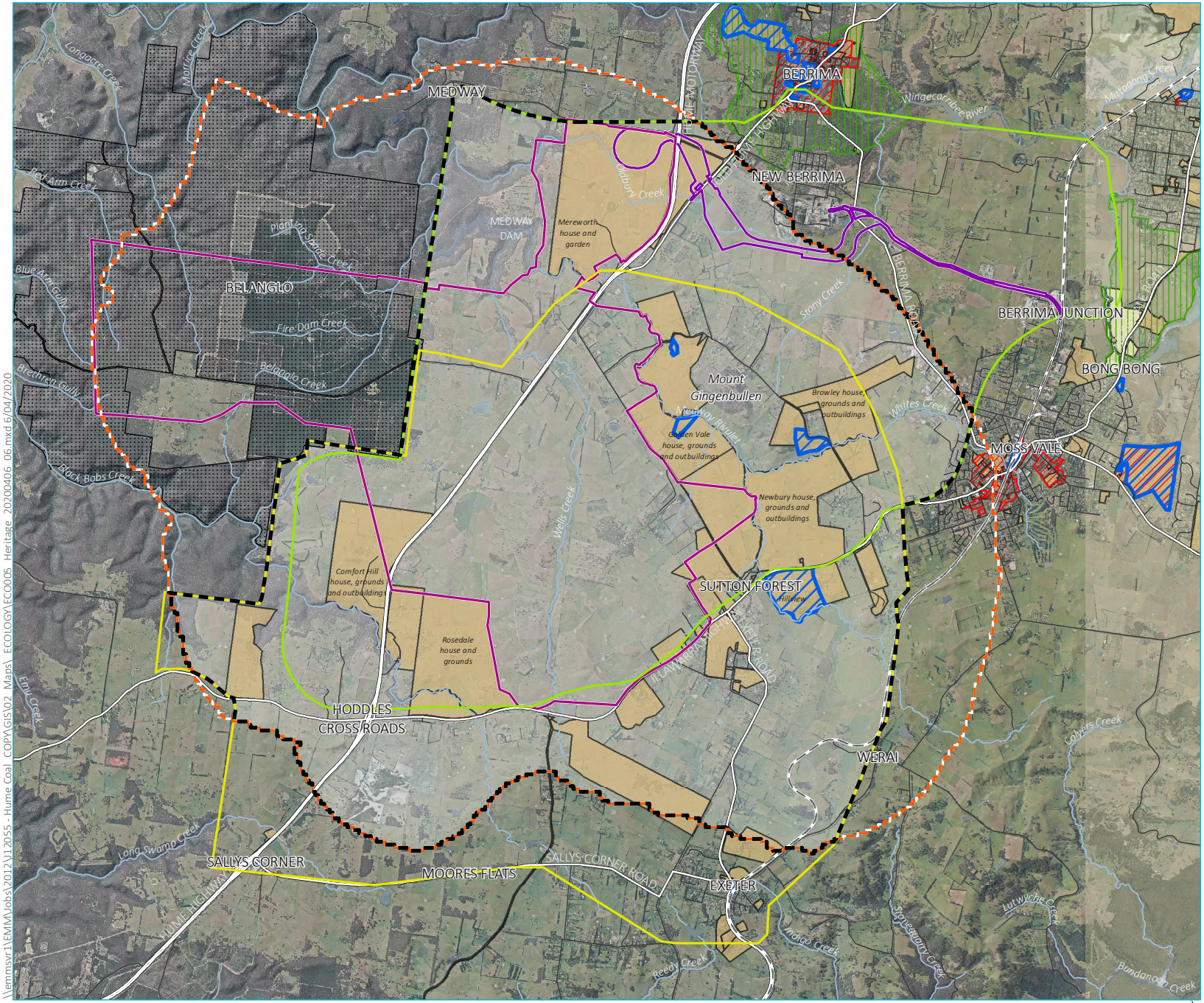
- non-native vegetation (comprising gardens, plantings, exotic trees, plantations and windrows); and
- exotic grasslands (comprising undulating and flat pastoral lands).

As stated in Table 1.3, the impacts of the project on native vegetation from a declining water table has been assessed previously and is presented in Section 13 of the RTS Main Report, Volume 1.

4.2.2 Heritage gardens with access to shallow groundwater

All heritage gardens occur in areas where the Wianamatta Group Shale outcrops at surface and therefore have a negligible risk of drawdown (see Section 4.1). The boundary between the Wianamatta Group Shale and Hawkesbury Sandstone intersects the property containing Mereworth House and Garden. Mereworth House and Garden, listed as having local significance under the Wingecarribee LEP lies on the Wianamatta Group Shale and therefore the listed heritage item has a negligible drawdown risk during drought conditions.

The property also contains planted pine windbreaks to the west and south-west of the house and garden, outside the heritage curtilage. Approximately 0.1 ha of these windbreaks have a low potential for interaction with groundwater (ie modelled pre-mining watertable lies at 5−10 mbgl). As the planted pine windbreaks overlie Hawkesbury Sandstone, further assessment is provided in Chapter 5.



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Cultural landscape study area
- Predicted 2 m drawdown extent (90th percentile)

Heritage Act 1977

- State Heritage Register

Heritage

- Conservation Area - General
- Conservation Area - Landscape
- Item - General
- Item - Archaeological
- Item - Landscape
- Berrima Key Historic Unit 6
- Sutton Forest/Exeter cultural landscape area

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 56

N

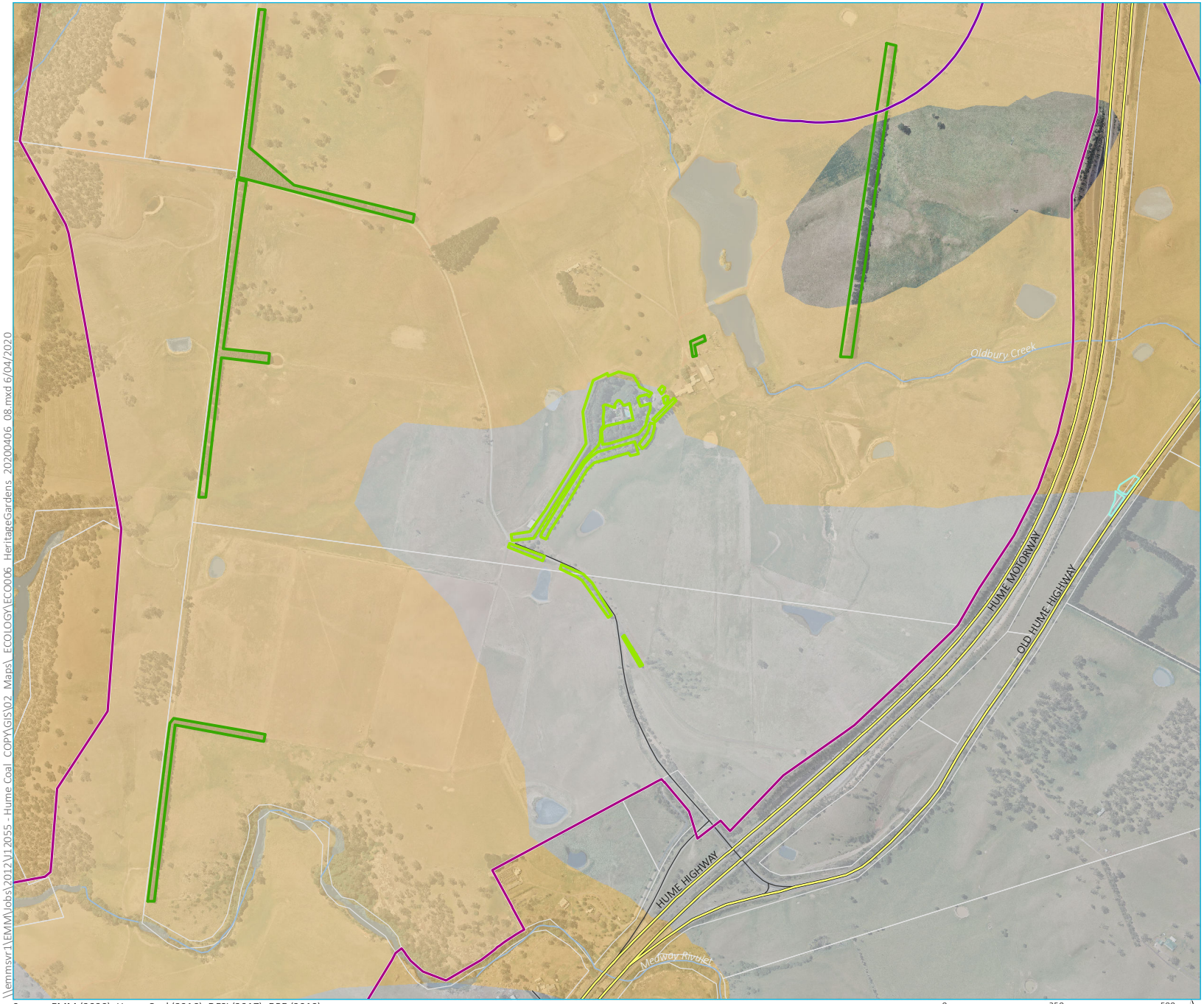
\\emmsvr1\EMM\Jobs\2012\V12055 - Hume Coal COPY\GIS\02 Maps\ ECOLOGY\ECO005 Heritage 20200406 06.mxd 6/04/2020

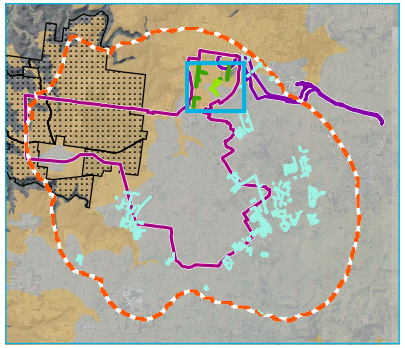
Cultural items in the project area

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 4.1

HUMECOAL PROJECT

EMM creating opportunities





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Predicted 2 m drawdown extent (90th percentile)

Planted gardens within listed heritage items

- Mereworth House and Garden
- Gardens and trees outside Mereworth heritage curtilage
- Other planted gardens within listed heritage items

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- Lot boundary
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 250 500 m

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2012\J12055 - Hume Coal COPY\GIS\02 Maps\ ECOLOGY\ECO006 HeritageGardens 20200406 08.mxd 6/04/2020

Heritage gardens with access to shallow groundwater

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 4.2

HUMECOAL PROJECT

EMM creating opportunities

4.2.3 Vegetation in the landscape conservation study area with access to shallow groundwater

Approximately 16.2 ha of non-native vegetation in the landscape conservation study area has access to shallow (0–10 mbgl) groundwater. Of this 16.2 ha, 4 ha has a high potential for groundwater interaction, 2.8 ha has a moderate potential for groundwater interaction and 9.4 ha has a low potential for groundwater interaction.

Approximately 3.2 ha of grasslands in the landscape conservation study area has access to shallow (0–1 mbgl) groundwater.

Table 4.1 Non-native gardens in the landscape conservation study area with access to shallow groundwater

Cultural landscape component	Depth to groundwater	Potential for groundwater interaction	Hawkesbury Sandstone surface geology
Non-native vegetation	0–3 m	High	4
	3–5 m	Moderate	2.8
	5–10 m	Low	9.4
Exotic grasslands	0-1 m	High	3.2

4.3 Private gardens

A typical root system is defined as the roots of most plants, including large trees, that typically extend 1 mbgl (Day et al 2010). However, depth is also influenced by soil type and watertable height and where suitable conditions exist, can extend to 10 mbgl.

Drought tolerance categories assigned by the Burnleigh Plant Guide (University of Melbourne 2016) have been used to determine garden species response to reduced water availability. The Guide defines drought as a shortfall of rainfall over that required by the plant, for an extended period, and is very site and location specific. The Guide states that drought tolerance mechanisms vary. For example, a plant that survives in the desert by tapping deep groundwater may perform poorly if grown in a shallow, compacted soil. In assessing drought tolerance, the soil quality of the planting site, as well as climatic extremes such as unusually extended periods without rainfall, should be considered.

The Burnleigh Plant Guide assigns four drought tolerance categories, namely ‘very good’, ‘moderately good’, ‘average’ and ‘poor’. Various drought tolerance has been assigned where different species within the same genus, ie *Quercus sp.,* would have different drought tolerance responses. For this reason, various species have been conservatively assumed to be drought-sensitive.

These tolerance categories are based on 500–700 millimetres (mm) annual rainfall, for plants fully established in the landscape. As the study area (Moss Vale station 068045) receives a long-term average rainfall of 959.8 mm (ie. higher than the rainfall these tolerance categories was designed for), the categories are deemed suitable in determining species response to reduced water availability.

Drought tolerance categories (ie response to reduced water availability) are defined in Table 4.2.

Table 4.2 Drought tolerance categories for garden plants

Drought tolerance category	Description
Very good	Plant should perform acceptably without irrigation
Moderately good	Plant should perform acceptably without irrigation in a garden position sheltered from extreme heat, under normal rainfall patterns. Irrigation may be required during extended dry periods in the dry season.
Average	Plant will require some irrigation during the dry season to perform acceptably.
Poor	Plant requires regular irrigation during the dry season to perform acceptably.
Various	Different species within the genus (ie *Quercus sp.*) have different watering requirements.

Typical species recorded in heritage gardens, private gardens, plantings and roadsides in the landscape conservation areas are listed in Table 4.3. A description of the species biology, typical root system and rooting depths and responses to reduced water availability are also provided.

Species with a very good or moderately good tolerance to reduced water availability are unlikely to be impacted by drawdown if shallow groundwater is present in the area where they occur. Accordingly, these species are not assessed further. Conversely, species with various, poor and average tolerance to reduced water availability may be impacted by drawdown if shallow groundwater is present in the area where they occur. Potential impacts on these species are discussed further in Section 5.2.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Arbutus unedo	Strawberry Tree	Mediterranean regions, and south west Ireland	Cool, temperate	A wide-spreading and very dense-canopied evergreen small tree	Typical	Very good	Fruiting appears to be more prolific in stressed trees. Fruits are edible	Flowers: Terminal panicles of small white bell-shaped flowers in autumn and winter. Fruit: Ornamental strawberry-like fruit, yellow ripening to red.
Betula pendula	Silver Birch	Europe, northern Asia and northern Africa	Cool, temperate	Deciduous tree; upright, with ascending main branches and pendulous branchlets	Typical	Poor	Requires a cool moist site and is badly affected by drought. Ingestion can cause stomach cramps or more serious heart problems	Bark: Silvery-white peeling, with black lenticels, becoming dark grey and craggy with age.
Buxus sempervirens	Box	Western and southern Europe, western Asia and north Africa	Cool, temperate	A slow growing and very long-lived, very dense evergreen shrub, eventually becoming a gnarled tree	Typical	Moderately good	Long-lived, and very tolerant of clipping, hence its popularity for hedging; needs less attention than faster growing species. Very shade tolerant, and will tolerate full sun provided there is sufficient water available	None, does not flower.
Camellia sasanqua	Camellia	Evergreen coastal forests of Japan - southern Shikoku, Kyushu and the Ryukyu islands	Cool, temperate, subtropical	Graceful, arching evergreen shrub	Typical	Moderately good	More sun tolerant than Camellia japonica, and possibly more drought tolerant, but will not perform well in very dry sites	Flowers: Large showy flowers in single or double, smaller and more delicate than those of Camellia japonica, borne from autumn to winter. Many cultivars.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Cedrus atlantica glauca	Blue Atlas Cedar	Atlas Mountains, Morocco and Algeria	Cool, temperate	An evergreen conifer with tabular, spreading branches. Dramatic when mature	Typical	Moderately good	Very long lived, and best left to its own devices. More drought tolerant than Cedrus deodara, and slower growing	Foliage: Rich glaucous, blue-grey foliage.
Cedrus deodara	Himalayan Cedar	West Himalayas to Afghanistan	Cool, temperate	An evergreen conifer with layered, horizontal branches. The tips of the branches are down-turned	Typical	Average	Not as drought tolerant as Cedrus atlantica	Fruit: Female cones barrel shaped, 80-120 mm long, breaking up at maturity.
Cedrus sp.	Cedar	Mediterranean regions	Cool, temperate	Evergreen conifers with layered, horizontal branches	Shallow, spreading	Average	NA	None, does not flower.
Cephalothaxus harringtoniana	Japanese Yew	Japan and eastern Asia	Cool, temperate, subtropical	A dense, multi-stemmed evergreen shrub or small tree, with strongly upright branches. Dioecious	Typical	Average	Require a humid and sheltered location. Very tolerant of pruning, and suitable for hedging in shady areas. May be pruned into old wood	None, does not flower.
Chamaecyparis sp.	False Cypress	Siskiyou Mountains, Oregon and North California	Cool, temperate	The species is a tall and narrow conical evergreen conifer, but is usually grown in Australia as one of numerous cultivars	Typical	Average	Generally trouble free when young, but very sensitive to pollution, and Honey Fungus (Armillaria mellea). Cypress Canker may cause problems	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Cotinus coggyria 'Purpurea'	Purple Smoke Bush	Mediterranean and south eastern Europe	Cool, temperate	A large rounded deciduous shrub; upright at first, but broadening with age	Typical	Very good	An extremely drought tolerant shrub	Foliage: Rounded leaves displaying brillant autumn foliage. Flowers: Feathery purple-pink panicles of flowers.
Cotoneaster sp.	Cotoneaster	China	Cool, temperate	An evergreen large shrub to small tree, of neat, rounded habit	Typical	Very good	A very resilient species, although plants have been observed to be very stressed in the prolonged drought of 2008–2009. Tolerant of saline soils	Flowers: Flat clusters of cream white flowers in spring. Fruit: Red pomes in numerous clusters.
Crataegus mexicana	Mexican Hawthorn	Mexico and parts of Guatemala	Cool, temperate	A deciduous, rounded, twiggy and thorny shrub to small tree	Typical	Moderately good	Due to its high pectin content, the fruit is industrially processed to extract pectin for the food, cosmetic, pharmaceutical, textile and metal industries	Flowers: White flowers in rounded corymbs in mid-spring. Fruit: Small showy golden yellow pomes.
Crataegus monogyna	Hawthorn	Europe, south-west Asia and north Africa	Cool, temperate	A deciduous, rounded, twiggy and thorny shrub to small tree. Thorns are 20–25 mm long	Typical	Moderately good	Susceptible to and a potential host of Fireblight (Erwinia amylovora), a devastating disease of pome fruits that is in 2009 not seriously established in Australia	Flowers: White flowers in rounded corymbs in mid-spring. Fruit: Small showy crimson pomes.
Crataegus oxycantha	Red Hawthorn	Northern Europe	Cool, temperate	A deciduous, rounded, twiggy and thorny shrub to small tree	Typical	Moderately good	NA	Flowers: White flowers in rounded corymbs in mid-spring. Fruit: Small showy crimson pomes.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Crataegus sp.	Hawthorn	Northern Hemisphere in Europe, Asia and North America	Cool, temperate	A deciduous, rounded, twiggy and thorny shrub to small tree	Typical	Moderately good	NA	Flowers: Prolific flowers in rounded corymbs in mid-spring. Fruit: Small pomes.
Cupressus macrocarpa	Monterrey Cypress	Cypress Point and Point Lobos, Californian coast	Temperate	Ultimately wide-spreading evergreen conifer; low branched, with massive ascending branches, although some selected forms are tighter in habit	Typical	Very good	Widely used as a hedge-windbreak plant, but will not respond if pruned back into old wood. Breaks up at about 100 years	None, does not flower.
Cupressus sempervirens	Italian Cypress	Mediterranean regions	Temperate	Tightly columnar, tall evergreen conifer, broadening with age	Typical	Very good	No special attention needed; cannot be pruned into old wood	None, does not flower.
Cupressus sp.	Cypress	Warm temperate regions in the Northern Hemisphere	Temperate	Extensive cultivation has led to a wide variety of forms, sizes and colours	Typical	Moderately good	NA	None, does not flower.
Cupressus torulosa	Cypress	Western Himalayas at high altitudes	Cool, temperate	Dense and compact evergreen conifer, with ascending branches	Typical	Moderately good	Young trees have a very distinctive spire-like tapered top and bulging base, becoming broader with age	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Cuprocyparis leylandii	Lleyland Cypress	Garden origin: hybrids between Cupressus macrocarpa (cones) and Chamaecyparis nootkatensis	Cool, temperate, subtropical	A conical to columnar, very fast-growing upright evergreen conifer	Typical	Moderately good	Best suited to cool climates, but amazingly robust. Commonly used as a hedge, but will quickly grow into a large tree if left unpruned	None, does not flower.
Eucalyptus dives	Broad-leaved peppermint	South-eastern Australia	Temperate	A medium to large tree growing from an inconspicuous lignotuber	Typical	Very good	Usually grows in poor, dryish soils in open forest and woodland, usually in poor, shallow, stony soils in higher places	None, does not flower.
Eucalyptus mannifera	Brittle Gum	Inland ranges, Victoria, the ACT and New South Wales	Temperate	An open growing small to medium evergreen tree; may be erect and straight trunked, or more spreading and picturesque	Typical	Very good	Adaptable to various soils and climates providing the soils are well drained	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Eucalyptus pauciflora	Snow Gum	Southern Queensland near Stanthorpe, Victoria, New South Wales, Tasmania, and a small occurrence in south-eastern South Australia; mainly in mountainous regions	Cool, temperate	A small evergreen tree with an open canopy	Typical	Moderately good	Cold tolerant. Requires well drained soils	None, does not flower.
Exocarpos cuppressiformis	Brush Cherry	Tasmania, and eastern Australia from South Australia to Queensland, in open forests	Cool, temperate, subtropical	A tree-like evergreen root parasite, resembling a rounded cypress	Typical	Very good	Plants are rarely available, as they are difficult to propagate and establish, so existing plants should be looked after where they occur. May be rejuvenated by coppicing. Fruit is a toxic green nut, supported by a red, fleshy, edible pedicel	Fruit: A toxic green nut, supported by a red, fleshy, edible pedicel.
Fagus sylvatica	European Beech	Europe	Cool, temperate	A broadly conical deciduous tree, with semi-pendulous branchlets. Graceful and very beautiful	Typical	Average	A tree for cool moist conditions; better in elevated sites. Leaves may burn on hot days in exposed sites; the purple-leaved forms are the most heat tolerant	Foliage: Vivid green in spring, bronze gold in autumn.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Fraxinus excelsio aurea pendula	Weeping Golden Ash	Garden origin	Cool, temperate	A medium deciduous tree, with a rounded to broadly pyramidal head	Typical	Average	Drought tolerance will depend on the rootstock used. No special maintenance needs	Foliage: Green turning clear yellow in autumn.
Ginkgo biloba	Maidenhair Tree	China	Cool, temperate	A primitive deciduous gymnosperm, narrow to broadly cone-shaped. Old specimens may have a weeping habit	Typical	Moderately good	Trees are dioecious; female trees bear foul smelling "fruit", and would be best avoided for street plantings	Foliage: Fan-shaped, autumn colour brilliant yellow.
Hedera sp.	Ivy	Europe, north Africa and western Asia	Cool, temperate	A woody-stemmed climber producing aerial roots along the stems. At reproductive maturity, which takes many years to reach, forms a shrub-like mound, losing its clinging habit	Typical	Moderately good	A useful and tough, extremely shade and moderately dry-tolerant self-attaching climber for covering walls, and for ground cover, also used as "topiary", trained around frames, in baskets and as cut foliage	None, does not flower.
Juniperous sp.	Juniper	Garden origin, Japan, around 1939.	Cool, temperate	Evergreen coniferous shrub	Typical	Moderately good	NA	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Larix sp.	Larch	Europe	Cool, temperate	A conical deciduous conifer, with branches drooping, but upturned at the tips. Becomes wider with age. Growth rate is variable, depending on growing conditions	Typical	Poor	NA	Fruit: Small upright cones, retained for several years.
Liquidambar styraciflua	Liquid Amber	Eastern North America	Cool, temperate, subtropical	A broadly-pyramidal medium to large deciduous tree. Becomes rounded with age	Shallow, spreading	Average	Roots are large and vigorous and many are close to the surface, making it difficult to grow other plants beneath. Often implicated in blockage of drains and lifting of pavements. Brittle wooded, and subject to wind damage	Foliage: Glossy green above, lighter green beneath. Autumn colour yellow to deep crimson.
Magnolia sp.	Magnolia	South-eastern North America	Cool, temperate, subtropical	Group of small trees with fragrant flowers	Typical	Average	NA	Flowers: Ornamental, often fragrant flowers.
Malus sp.	Crab Apple	Said to be Japan, although perhaps an old Japanese garden hybrid	Cool, temperate	A widespreading, rounded deciduous small tree	Typical	Average	Generally trouble free. Susceptible to, and a potential host of, Fireblight (Erwinia amylovora), a devastating disease of pome fruits that in 2009 is not seriously established in Australia. Susceptible to Armillaria mellea (Honey Fungus)	Flowers: Prolific flowers.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Olea europaea. Subsp. Europaea	Olive	Mediterranean to India	Temperate	An evergreen large shrub to small tree. Old specimens are often multi-trunked, and very handsome, with glossy, billowing grey foliage	Typical	Very good	No special attention needed. May be clipped as a robust hedge. Susceptible to damage by heavy frosts	None, does not flower.
Olea sp.	Olive	Mediterranean to India, Africa and Asia	Temperate	A long-lived, vigorous, dense and spreading evergreen tree	Typical	Very good	NA	None, does not flower.
Paeonia suffruticosa	Paeonie	Bhutan, Tibet and China	Cool, temperate	A rounded, deciduous shrub with fleshy roots	Typical	Average	Peonies are cool to cold climate plants, and can be tricky in Australia in all but the coolest areas, although they can be surprisingly resilient, and will tolerate some drought once established	Flowers: Large delicate flowers with crepe-like petals. Cultivars may be red, pink, mauve, purple, white or occasionally pale yellow, and are often very double.
Picea sp.	Spruce	Western North America	Cool, temperate	A very stiff and regularly conical evergreen conifer	Typical	Average	Drought-stressed specimens become very unattractive	Fruit: Pendulous oblong female cones are borne towards the top of the tree.
Pinus radiata	Radiata Pine	Monterey County, California	Temperate	A fast-growing, large and statuesque evergreen conifer, with a very dark canopy	Typical	Very good	Extensively planted throughout southern Australia for timber, and as a shelter-belt tree on farms	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Pinus sp.	Pine Tree	Northern hemisphere	Various	Various	Typical	Various	NA	None, does not flower.
Pinus sylvestris	Scots Pine	Northern Eurasia, from Scotland to Scandinavia, and the Baltic to far eastern Russia	Cool, temperate	An evergreen conifer, of variable height and form depending on provenance and density of the stand	Typical	Poor	Less suited to Australian conditions than some species. Occasionally encountered as a park tree. Slow growing	None, does not flower.
Platanus x acerifolia	Plane Tree	Garden origin (reputed to be a hybrid between Platanus occidentalis and Platanus orientalis)	Cool, temperate	Deciduous rounded to pyramidal tree	Typical	Moderately good	Well-suited to conditions in streets and grows well in southern Australia	Foliage: Alternate, maple-like leaves. Autumn colour yellow-brown.
Platanus x hybrida	Plane Tree hybrid	Garden origin (reputed to be a hybrid between Platanus occidentalis and Platanus orientalis)	Cool, temperate	Deciduous rounded to pyramidal tree	Typical	Moderately good	Well-suited to conditions in streets and grows well in southern Australia	Foliage: Alternate, maple-like leaves. Autumn colour yellow-brown.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Poplus sp.	Poplar	Northern hemisphere	Cool, temperate	Group deciduous trees	Shallow, spreading	Average	A very tough tree, but defoliates when very drought stressed. No special maintenance needs: the main issues with this tree will be control of suckers and invasive roots	None, does not flower.
Prunus laurocerasis	Cherry Laurel	From the Balkans to southern Russia	Cool, temperate	A rounded, dense and solid large evergreen shrub	Typical	Moderately good	Cold and shade tolerant	Flowers: Small, white single five-petalled flowers, in stiff, ascending racemes.
Prunus serrulata	Japanese Flowering Cherry	Garden origin - Japan	Cool, temperate	Deciduous small trees; habit varies with cultivar, from flat-topped and very wide-spreading to upright (some cultivars are identified by their form)	Typical	Average	At its best in cool moist climates, and in sheltered sites; performs well in good garden conditions, but tends to scorch on hot days in Australian summers	Flowers: Prolific flowers.
Prunus sp.	Cherry	China and Japan	Cool, temperate	Deciduous small trees; habit varies with cultivar, from flat-topped and very wide-spreading to upright (some cultivars are identified by their form)	Typical	Average	At its best in cool moist climates, and in sheltered sites; performs well in good garden conditions, but tends to scorch on hot days in Australian summers	Flowers: Prolific flowers.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Pseudotsuga menziesii	Douglas Fir Tree	Western North America, from British Columbia to California, in mountains, often on gravelly slopes	Cool, temperate	A large conical evergreen conifer. Lower branches droop, upper ones are horizontal	Typical	Average	Does well in more elevated sites. No special maintenance needs. Sometimes seen in suburban gardens much too small for its ultimate size	Fruit: Long, pendulous cones with soft scales, and conspicuous three-pronged bracts. Cones are shed, but do not break up.
Pyrus salicifolia 'Pendula'	Willow-leaved Pear	Garden origin for this cultivar; the species is from south east Europe to the Caucasus	Cool, temperate	A pendulous, small deciduous tree, forming a dense weeping mound	Typical	Moderately good	Plants need to be trained up to give them some height. Best in full sun. Moderately dry-tolerant when established. Once established need no special attention	Foliage: Grey-tomentose when young, becoming less so as the season advances.
Pyrus sp.	Pear	China	Cool, temperate	Deciduous broadly pyramidal tree	Typical	Moderately good	NA	None, does not flower.
Quercus palustris	Pink Oak	East and central North America	Cool, temperate	A large deciduous tree, tabular and conical when young, becoming more rounded with age	Typical	Average	Generally trouble free. Leaf Miners are occasionally seen, but the species seems freer from these than many other oaks commonly grown in south-eastern Australia. Prone to chlorosis in alkaline	Foliage: Vibrant autumn colours.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Quercus sp.	Oak Tree	Northern hemisphere	Cool, temperate	Comprises both deciduous and evergreen trees	Typical	Various	NA	Foliage: Vibrant autumn colours.
Rhododendron sp.	Rhododendron	Northern hemisphere	Cool, temperate	A rounded and dense evergreen shrub	Typical	Average	A plant for good garden or landscape conditions, best with some protection, shade, and adequate water, in acid soils. More vigorous cultivars may become open, and benefit from pruning. Can be hard pruned to rejuvenate	Flowers: Prolific flowers.
Rosmarinus officinalis	Rosemary	Southern Europe and north Africa	Cool, temperate	Erect to spreading or nearly prostrate evergreen shrubs, varying in habit according to cultivar	Typical	Very good	A very tough plant. Can be trimmed after flowering to keep bushy, and clips well as a low hedge. Tolerates moderate pruning, but not into old wood with no green growth apparent	Flowers: Small, pale to dark or bright blue flowers in clusters forming short racemes. Flowering is mostly in spring, but also sporadic throughout the year.
Sequoiadendron giganteum	Giant Sequoia	Western slopes of the Sierra Nevadas, California	Cool, temperate	An evergreen conifer with massive trunk and conical crown	Typical	Average	Trees in southern Australia have been affected in recent years by a fungal disease that causes die-back of patches of foliage. There is no known treatment	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Taxodium distichum	Swamp Cypress	South-eastern North America, famously in swamps, but also in drier sites	Cool, temperate, subtropical	A large deciduous conifer, conical when young, although can be multi-stemmed and spreading with age. Trunks of mature trees are often buttressed at the base	Shallow	Average	In wet conditions produces upward-growing protuberances from the roots, (commonly known as "cypress knees"). Slow when young	Foliage: Long deciduous small branchlets which are arranged on the stems in spirals. Autumn colour rich russet brown.
Ulmus glabra	Golden Elm	Garden origin; a form of Ulmus glabra, the Wych Elm	Cool, temperate	A wide-spreading deciduous tree with a rounded crown	Typical	Moderately good	As for all elms, must be monitored for Elm Leaf Beetle, and other disease problems. Ulmus glabra and its cultivars are non-suckering	Foliage: Oblong and rough textured, pale green at first, becoming clear golden-yellow.
Ulmus glabra pendula	Weeping Wych Elm	Garden origin; a form of Ulmus glabra, the Wych Elm	Cool, temperate	A wide-spreading deciduous tree with a rounded crown	Typical	Moderately good	As for all elms, must be monitored for Elm Leaf Beetle, and other disease problems. Ulmus glabra and its cultivars are non-suckering	Foliage: Pendulous, pale green at first, becoming clear golden-yellow.
Ulmus procera 'Vanhouttei'	English Elm	Western and southern Europe	Cool, temperate	A medium to large deciduous tree, with a straight trunk and broad columnar canopy	Typical	Average	Requires considerable attention since the arrival of Elm Leaf Beetle in Australia. Old trees are prone to branch drop and decay, and require regular monitoring to ensure safety	None, does not flower.

Table 4.3 Requirements of typical species recorded in heritage gardens, private gardens, plantings and roadsides

Botanical name	Common name	Origin	Climate	Biology	Root system	Tolerance to reduced water availability	Species requirements	Ornamental features
Ulmus sp.	Elm	Western and southern Europe	Cool, temperate	A wide-spreading deciduous tree with a rounded crown	Typical	Average	NA	None, does not flower.
Vitus sp.	Grape	NA	NA	NA	Typical	NA	NA	None, does not flower.

Notes: A 'typical' root system is defined as the roots of most plants, including large trees, that grow primarily in the top meter of soil (Harris et al 2010)

5 Impact assessment

5.1 Cultural items

5.1.1 Overview

The regional scale RTS groundwater model was used to predict watertable drawdown in vegetated areas identified to contain plants that may access shallow groundwater and may be susceptible to water stress during periods of prolonged drought. During average and wet climate periods, vegetation in these areas will not be affected by groundwater level drawdown.

During especially dry periods when the soil moisture is low and not replenished by rainfall or surface water runoff, vegetation in these areas may exhibit increased stress or die back due to reduced access to groundwater as a result of groundwater level drawdown. These areas are limited to low lying topographical areas where the watertable is shallow and near watercourses where groundwater discharges as baseflow. However, under prolonged drought conditions, without mining, the watertable would decline naturally in these areas.

As such, vegetation either currently naturally adapts or is subject to water stress during these times, with replenishment when the drought breaks. In particular, exotic grasslands may die back during times of drought and water stress but would rapidly re-colonise following rain. Accordingly, the impact assessment presented in Section 5.1.2 to 5.2 below should be interpreted within this context.

5.1.2 Heritage gardens located in sandstone outcrop areas

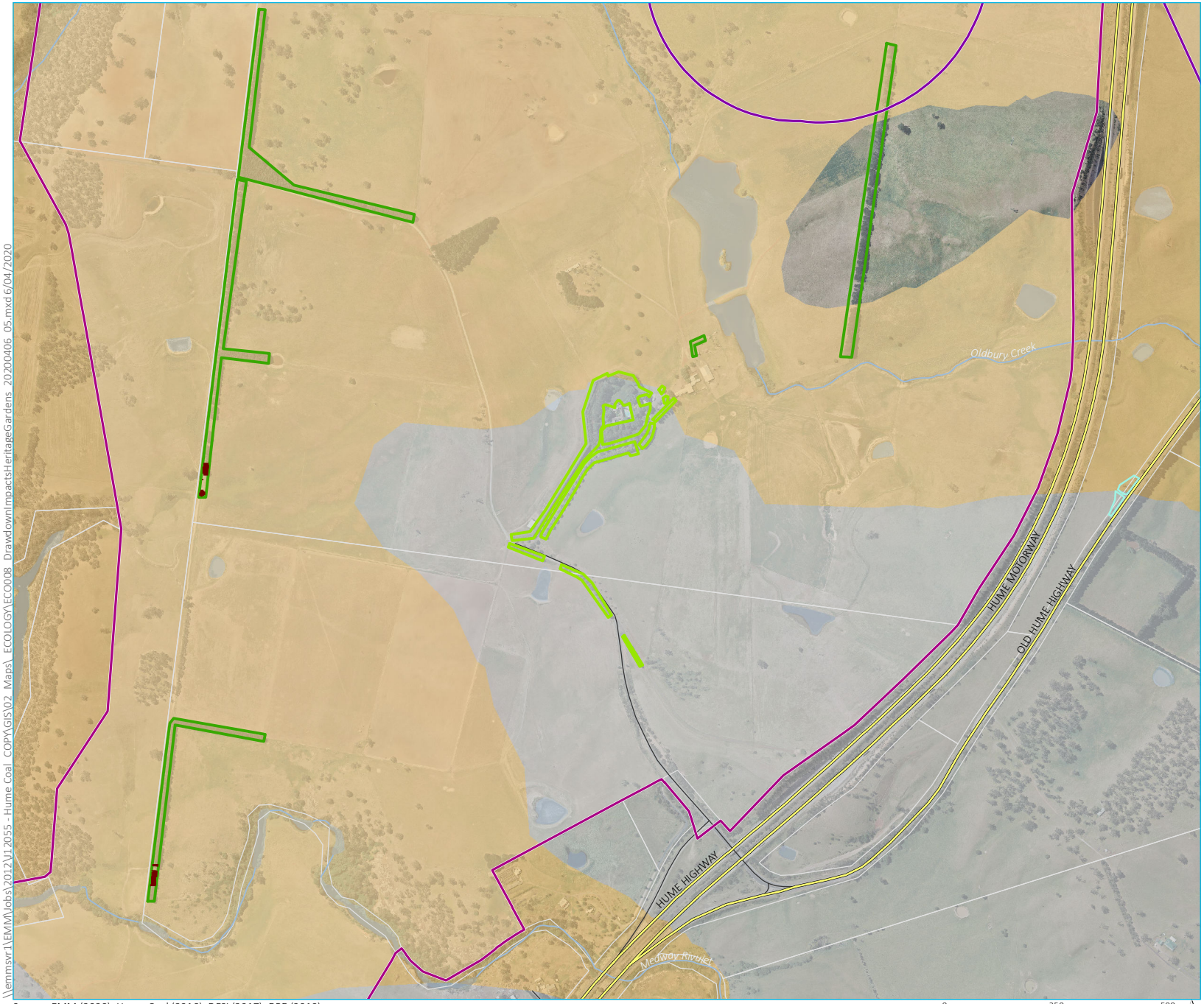
The planted pine windbreaks on the Mereworth property (0.1 ha) have a low potential for groundwater interaction, with a pre-mining inferred depth to groundwater of 5−10 mbgl. Although located on the same property, these planted pine windbreaks are outside the heritage curtilage of Mereworth House and Garden (listed as having local significance under the Wingecarribee LEP).

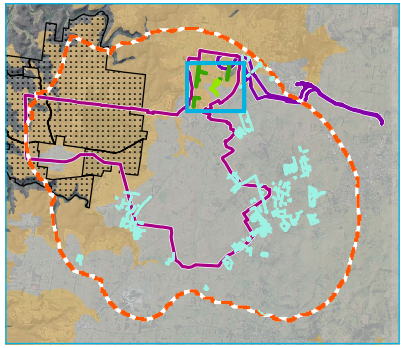
In this location, the maximum predicted water table level (as a result of mining, under the 50th, 67th and 90th percentile results) would be >10 mbgl. Based on the risk matrix presented in Table 5.1, the risk of the groundwater table becoming inaccessible drought conditions is high.

Part of the southern windbreak is in an area proposed for surface mine infrastructure, in particular entry/exit to the personnel and materials drift and an access road to the explosives magazine (Figure 1.3). Parts of the windbreak that can be avoided by mine infrastructure will be monitored for signs of water stress during prolonged drought, with remedial action taken as required (Chapter 6).

Table 5.1 Potential drawdown impacts on pine windbreaks on the Mereworth property in areas of Hawkesbury Sandstone outcrop (outside the heritage curtilage of Mereworth House and Garden)

Impact category		Groundwater interaction category	50th percentile results (ha)	67th percentile results (ha)	90th percentile results (ha)	Risk of impact during drought conditions
Pre-mining inferred depth to groundwater	Predicted (maximum) depth to groundwater					
5−10 m	>10 m	Low	0.1	0.1	0.1	High





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Predicted 2 m drawdown extent (90th percentile)

Planted gardens within listed heritage items

- Mereworth House and Garden
- Gardens and trees outside Mereworth heritage curtilage
- Other planted gardens within listed heritage items

Drawdown risk categories for cultural plantings on Hawkesbury Sandstone*

- 5 - 10 m (no groundwater access)

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- Lot boundary
- Belanglo State Forest

Potential drawdown impacts on gardens and trees outside Mereworth heritage curtilage – 50th, 67th and 90th percentiles

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.1

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 250 500 m

GDA 1994 MGA Zone 56

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5.1.3 Cultural landscapes on sandstone

Drawdown impacts using the 50th uncertainty percentile class represents the median results, and is described as 'about as likely to occur as not' (Table 2.1). Based on this assessment, potential impacts on vegetated areas within the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and on Figure 5.2. Drawdown impacts are scattered across the landscape conservation study area and are generally restricted to low-lying areas proximal to Olbury Creek, Medway Rivulet, Wells Creek and Black Bobs Creek. Based on the risk matrices in Plate 2.1 and Plate 2.2, the project is predicted to result in:

- no risk of impact during drought conditions to 5.2 ha of non-native vegetation and 0.2 ha of grasslands;
- low risk of impact during drought conditions to 0.8 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 3.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 6.8 ha of non-native vegetation and 3 ha of grasslands.

Accordingly, 9.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 50th percentile results. This only represents 0.08% of the cultural landscape study area and 0.06% of the common boundary of the broader cultural landscapes.

Drawdown impacts using the 67th uncertainty percentile class are described as 'unlikely to occur' (Table 2.1). Based on this assessment, potential impacts on vegetated areas within the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and Figure 5.3. Based on the risk matrices in Plate 2.1**Error! Reference source not found.** and Plate 2.2, the project is predicted to result in:

- no risk of impact during drought conditions to 3.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 10.3 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 67th percentile results. This only represents 0.09% of the cultural landscape study area and 0.07% of the common boundary of the cultural landscapes.

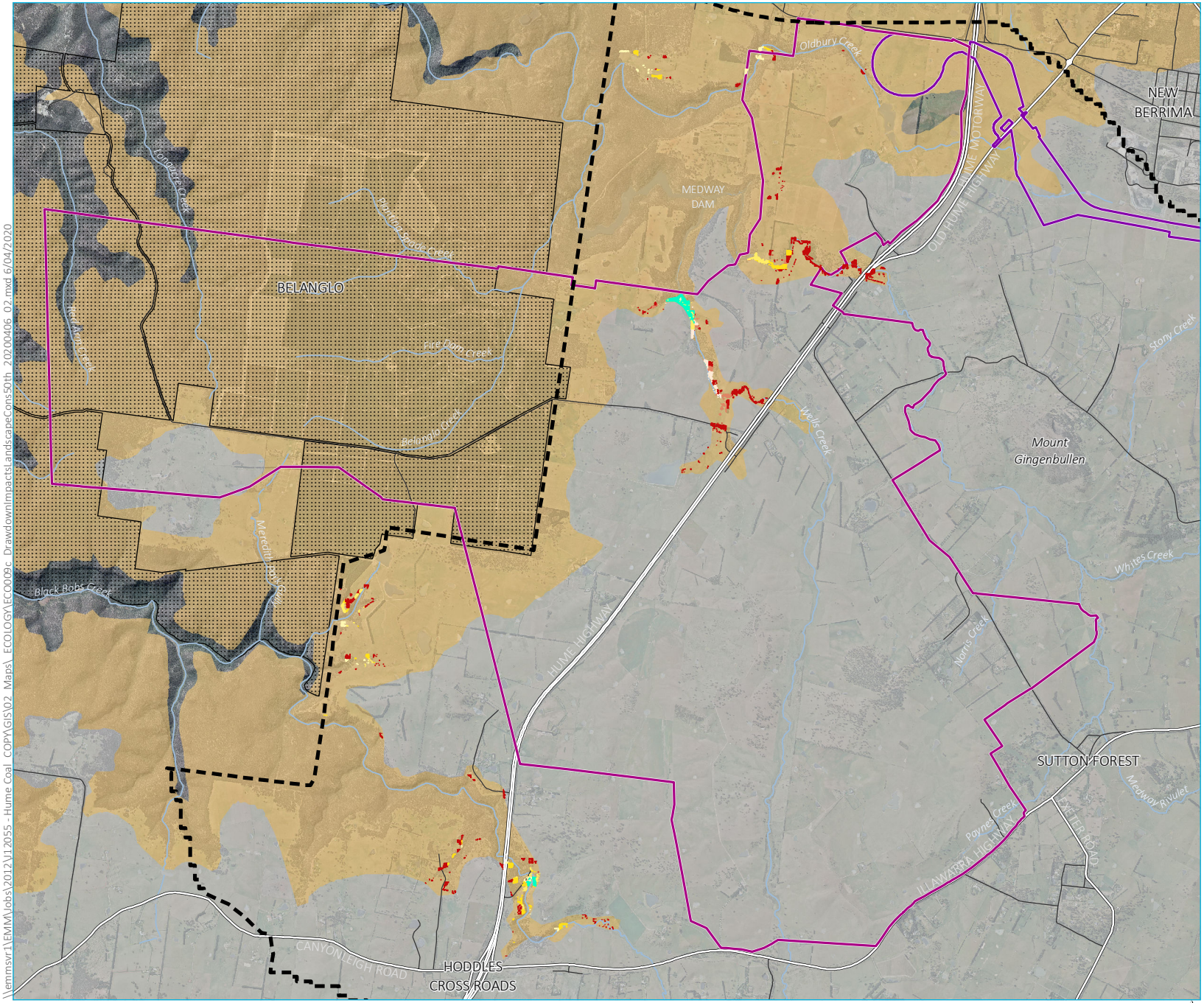
Drawdown impacts using the 90th uncertainty percentile class are described as 'very unlikely to occur' (Table 2.1). Based on this assessment, potential impacts on vegetated areas within the landscape conservation study area where the Hawkesbury Sandstone outcrops at surface are shown in Table 5.2 and on Figure 5.4. Based on the risk matrices in Plate 2.1and Plate 2.2, the project is predicted to result in:

- no risk of impact during drought conditions to 1.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.6 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 5.2 ha of non-native vegetation; and
- high risk of impact during drought conditions to 8.7 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 11.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 90th percentile results. This only represents 0.11% of the cultural landscape study area and 0.08% of the common boundary of the cultural landscapes.

Table 5.2 Potential drawdown impacts in the landscape conservation study area in areas of Hawkesbury Sandstone outcropping –50th, 67th and 90th percentile uncertainty analysis model results

Impact category		50th percentile results (ha)	67th percentile results (ha)	90th percentile results (ha)	Risk of impact during drought conditions
Pre-mining inferred depth to groundwater	**Predicted (maximum) depth to groundwater**				
Non-native vegetation					
0–3 m	0–3 m	1.6	1.5	1.1	None
3–5 m	3–5 m	0.5	0.6	1.0	None
5–10 m	5–10 m	0.8	0.7	0.6	None
0–3 m	3–5 m	1.1	1.2	1.4	Low
0–3 m	5–10 m	0.3	0.1	0.0	Moderate
3–5 m	5–10 m	0.6	1.1	1.4	Moderate
0–3 m	>10 m	1.8	1.6	1.4	Moderate
3–5 m	>10 m	3.3	2.2	0.7	Moderate
5–10 m	>10 m	6.1	7.2	8.7	High
Sub-total non-native vegetation	**-**	**16.3**	**16.3**	**16.3**	**-**
Grasslands					
0-1 m	0–1 m	0.3	0.1	0.1	None
0-1 m	>1 m	3.0	3.1	3.1	High
Sub-total grasslands	**-**	**3.2**	**3.2**	**3.2**	**-**



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Cultural landscape study area

Drawdown risk categories for non-native vegetation on Hawkesbury Sandstone

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Drawdown risk categories for exotic grasslands on Hawkesbury Sandstone

- 0 - 1 m to >1 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale

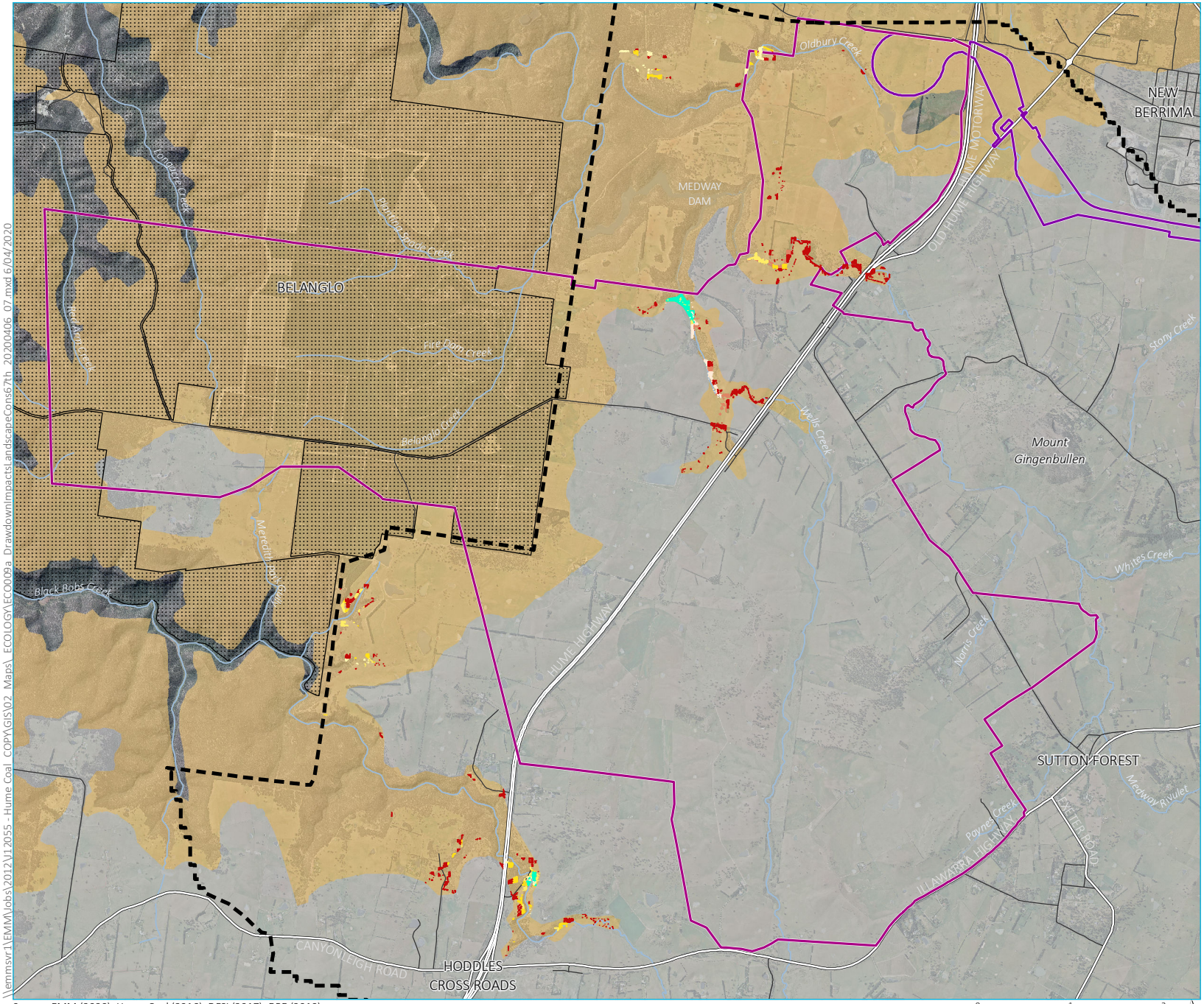
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Drawdown impacts on landscape conservation areas - 50th percentile

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.2

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

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KEY

- Hume Coal Project area
- Berrima Rail Project area
- Cultural landscape study area

Drawdown risk categories for non-native vegetation on Hawkesbury Sandstone

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Drawdown risk categories for exotic grasslands on Hawkesbury Sandstone

- 0 - 1 m to >1 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale

- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Drawdown impacts on landscape conservation areas - 67th percentile

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.3

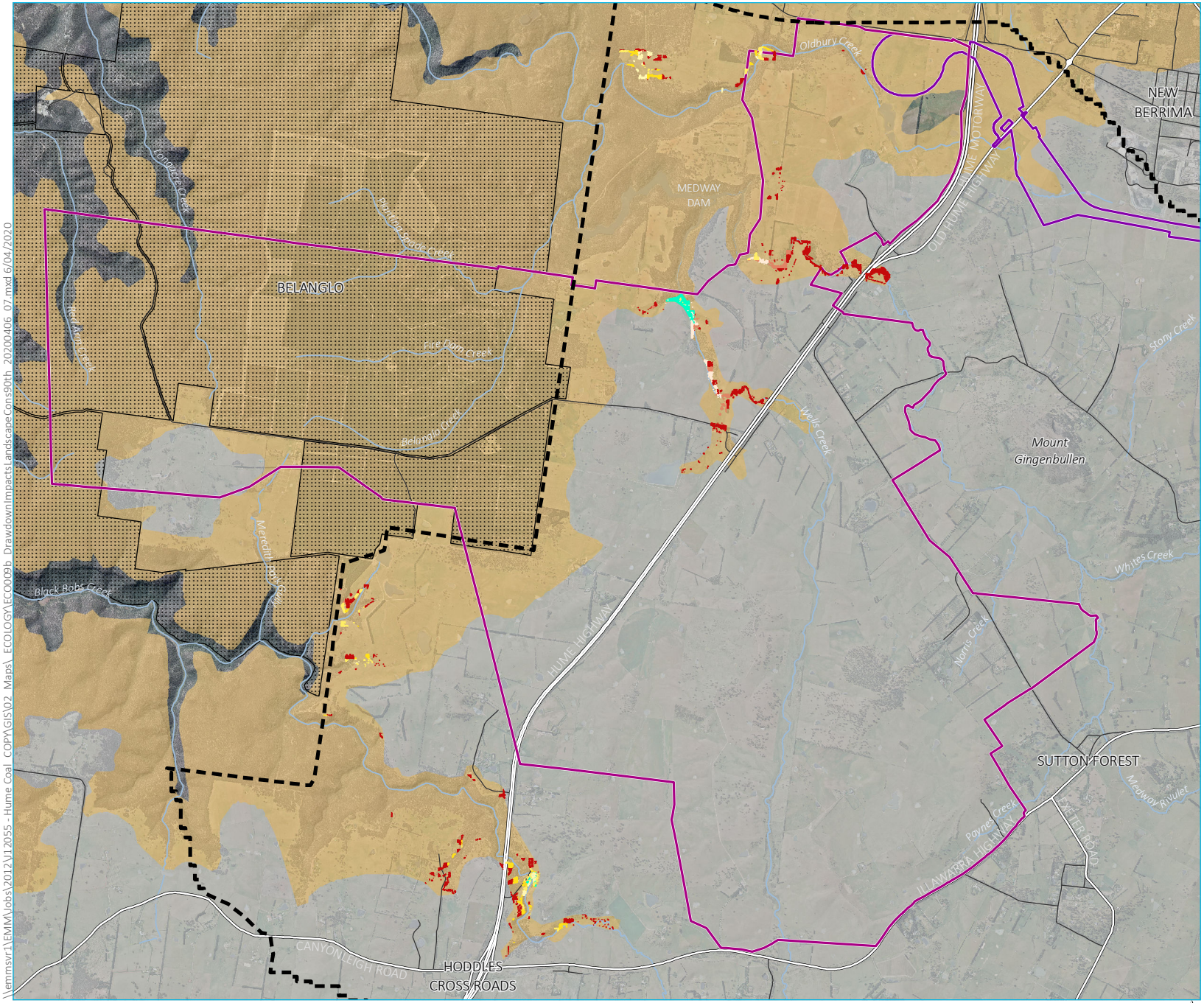
Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

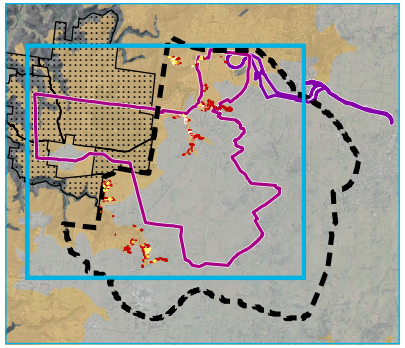
0 1 2 km

GDA 1994 MGA Zone 56

N

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KEY

- Hume Coal Project area
- Berrima Rail Project area
- Cultural landscape study area

Drawdown risk categories for non-native vegetation on Hawkesbury Sandstone

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Drawdown risk categories for exotic grasslands on Hawkesbury Sandstone

- 0 - 1 m to >1 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale

- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Drawdown impacts on landscape conservation areas - 90th percentile

Hume Coal and Berrima Rail Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.4

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 56

N

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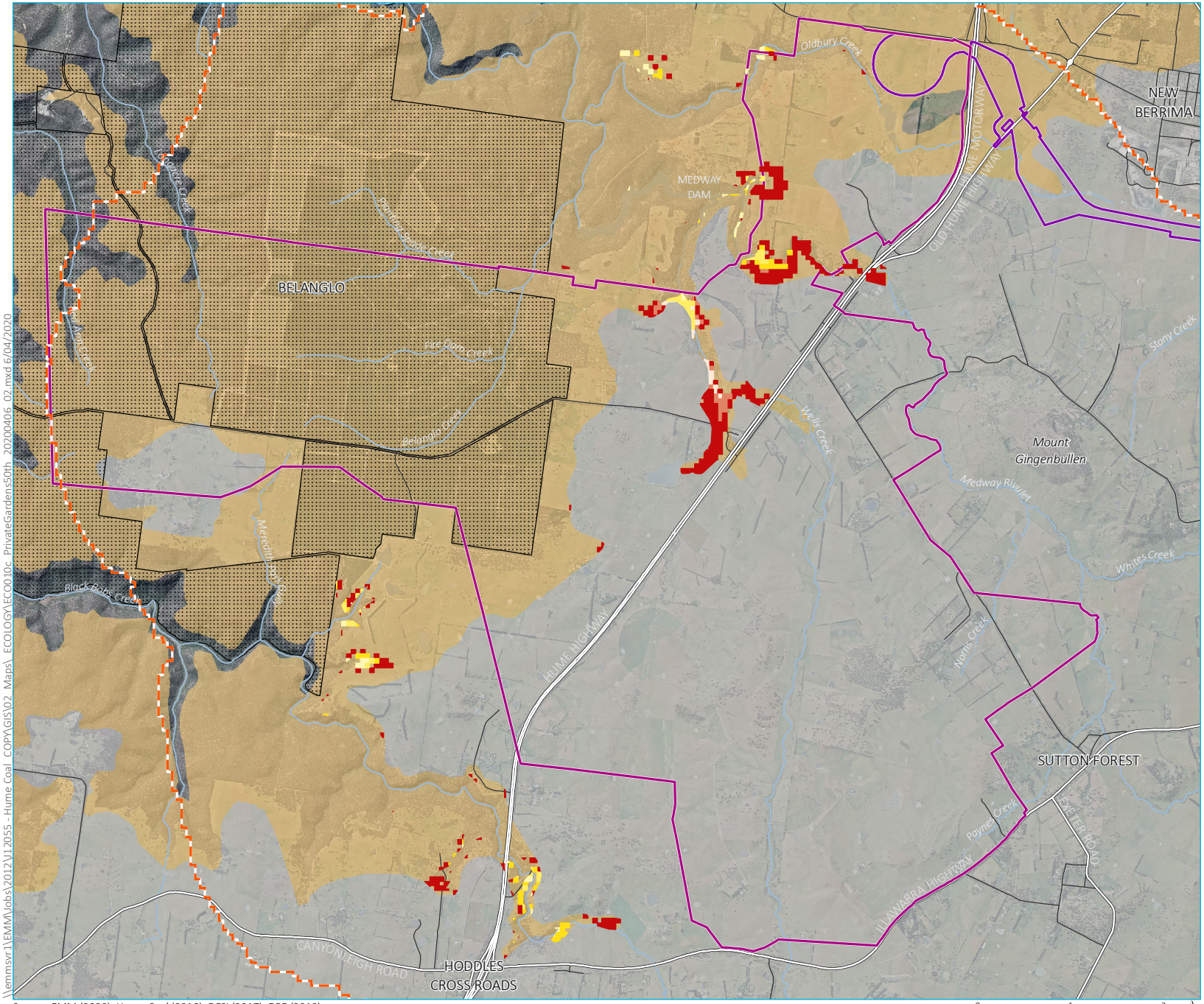
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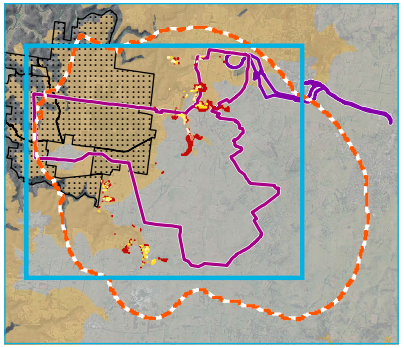
5.2 Private gardens

Twenty-six plant species observed in private gardens are considered sensitive to reduced water availability (Table 5.3). Where private gardens containing these plant species overlie areas of shallow groundwater within the Hawkesbury Sandstone (see Figure 5.5 to Figure 5.7), these plants may be subject to water stress during periods of prolonged drought. It should be noted that the maximum extent of potential drawdown risk is conservative, and private gardens would only be potentially impacted during drought conditions if they contain the species identified as drought-sensitive.

Table 5.3 Garden species sensitive to reduced water availability

Botanical name	Common name	Tolerance to reduced water availability
Cedrus deodara	Himalayan Cedar	Average
Cedrus sp.	Cedar	Average
Cephalothaxus harringtoniana	Japanese Yew	Average
Chamaecyparis sp.	False Cypress	Average
Fagus sylvatica	European Beech	Average
Fraxinus excelsio aurea pendula	Weeping Golden Ash	Average
Liquidambar styraciflua	Liquid Amber	Average
Magnolia sp.	Magnolia	Average
Malus sp.	Crab Apple	Average
Paeonia suffriticosa	Paeonie	Average
Picea sp.	Spruce	Average
Poplus sp.	Poplar	Average
Prunus serrulata	Japanese Flowering Cherry	Average
Prunus sp.	Cherry	Average
Pseudotsuga menziesii	Douglas Fir Tree	Average
Quercus palustris	Pink Oak	Average
Rhododendron sp.	Rhododendron	Average
Sequoiadendron giganteum	Giant Sequoia	Average
Taxodium distichum	Swamp Cypress	Average
Ulmus procera 'Vanhouttei'	English Elm	Average
Ulmus sp.	Elm	Average
Betula pendula	Silver Birch	Poor
Larix sp.	Larch	Poor
Pinus sylvestris	Scots Pine	Poor
Pinus sp.	Pine Tree	Various
Quercus sp.	Oak Tree	Various





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Predicted 2 m drawdown extent (90th percentile)

Drawdown risk categories for private gardens on Hawkesbury Sandstone - 50th percentile

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

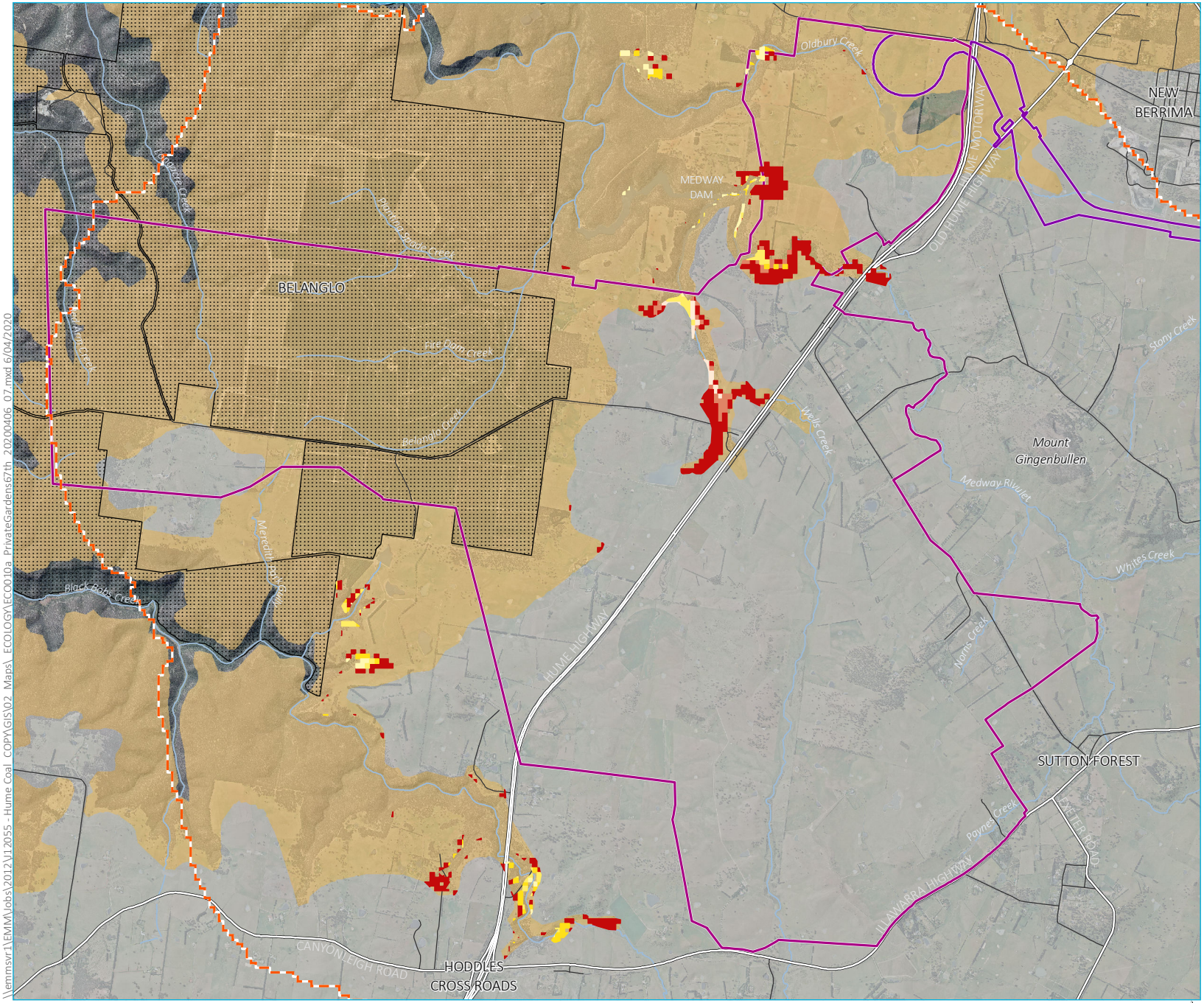
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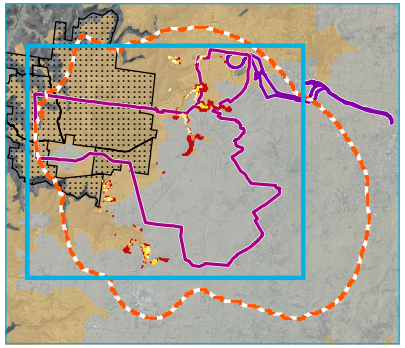
Area of potential impacts on private gardens - 50th percentile

Hume Coal Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.5

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KEY

- Hume Coal Project area
- Berrima Rail Project area
- Predicted 2 m drawdown extent (90th percentile)

Drawdown risk categories for private gardens on Hawkesbury Sandstone - 67th percentile

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

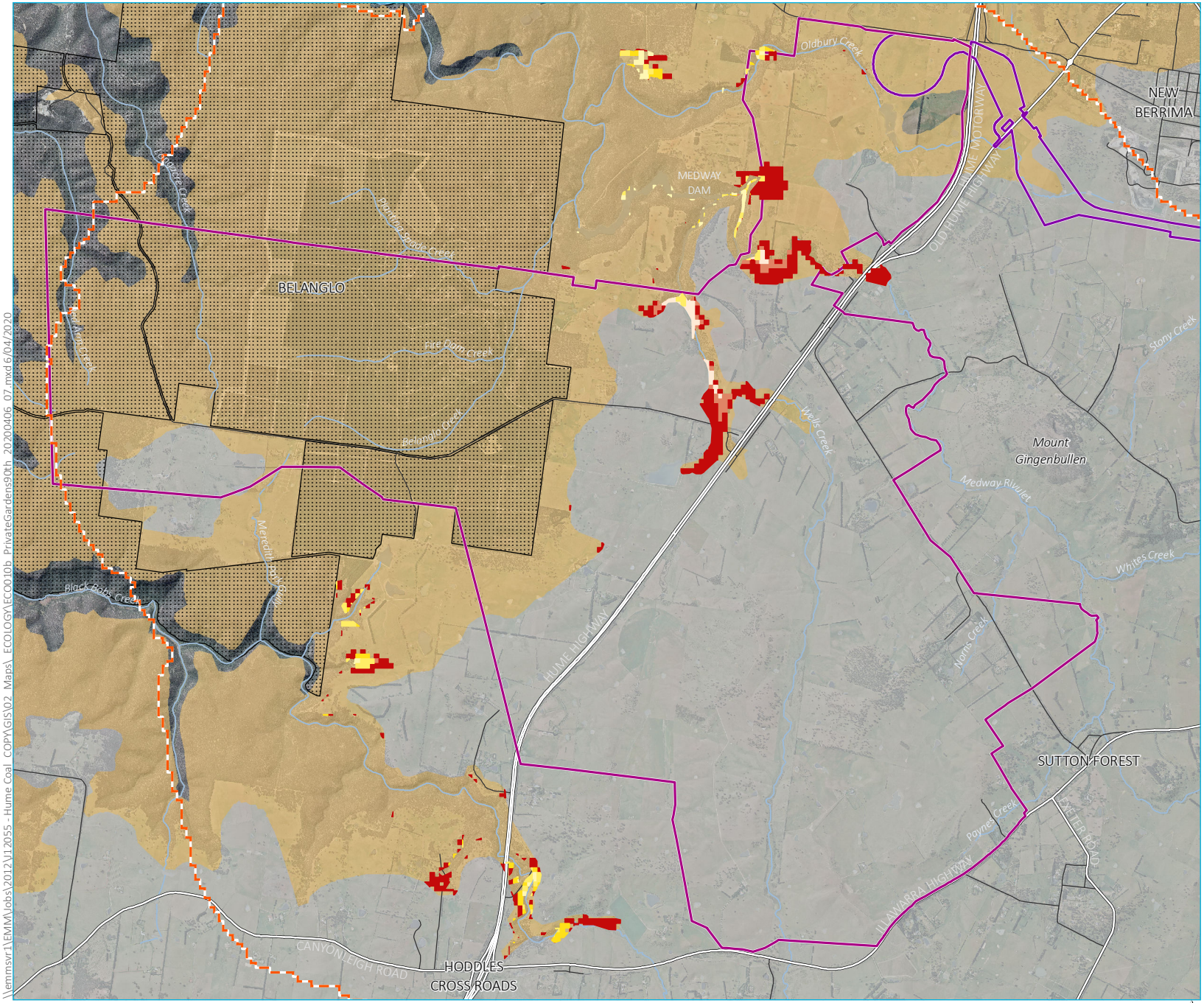
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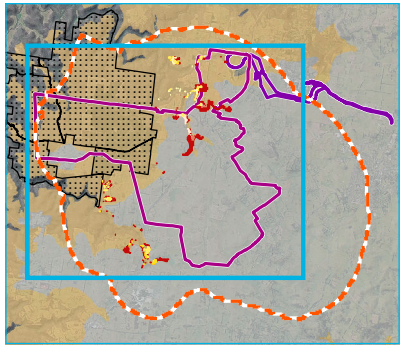
Area of potential impacts on private gardens - 67th percentile

Hume Coal Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.6

HUMECOAL PROJECT

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KEY

- Hume Coal Project area
- Berrima Rail Project area
- Predicted 2 m drawdown extent (90th percentile)

Drawdown risk categories for private gardens on Hawkesbury Sandstone - 90th percentile

- 0 - 3 m change to 3 - 5 m
- 0 - 3 m change to 5 - 10 m
- 3 - 5 m change to 5 - 10 m
- 0 - 3 m to >10 m
- 3 - 5 m to >10 m
- 5 - 10 m to >10 m

Surface geology (250K)

- Hawkesbury Sandstone
- Wianamatta Shale
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

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Area of potential impacts on private gardens - 90th percentile

Hume Coal Project
Groundwater dependence assessment
for cultural heritage landscapes and gardens
Figure 5.7

HUMECOAL PROJECT

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6 Monitoring, management and mitigation

The regional scale RTS groundwater model was used to predict watertable drawdown in vegetated areas identified to contain plants that may access shallow groundwater and may be susceptible to water stress during periods of prolonged drought.

During average and wet climate periods, vegetation in these areas will not be affected by groundwater level drawdown. During especially dry periods when the soil moisture is low and not replenished by rainfall or surface water runoff, vegetation in these areas that may access groundwater may exhibit increased stress or die back due to reduced access to groundwater as a result of groundwater level drawdown. However, these areas are limited to low lying topographical areas where the watertable is shallow and near watercourses where groundwater discharges as baseflow. However, under prolonged drought conditions, without mining, the watertable would decline naturally in these areas. As such, vegetation either naturally adapts or is subject to water stress during these times, with replenishment when the drought breaks.

Following project approval, Hume Coal will conduct additional 'post-approval' groundwater modelling and field investigations, where possible, to confirm the depth to groundwater in the areas identified as being at high risk of water stress during periods of prolonged drought.

Planted pine windbreaks on Mereworth, that cannot be avoided by surface mine infrastructure, will be monitored for signs of water stress during prolonged drought, and supplemented with water if required.

There will be no impacts to gardens and plantings within local or state listed heritage items, and as such no mitigation measures are proposed to these areas.

The remaining non-native, exotic grassland and private gardens located within the landscape conservation study areas that are predicted to experience watertable drawdown and have been identified as being at risk of water stress during periods of prolonged drought cover a small area, are not classified as high priority GDEs and are not covered under any statutory requirement to manage or mitigate the potential and unlikely effects.

Ongoing 'post-approvals' groundwater modelling will be undertaken as and when new data become available, and at regular intervals throughout the life of the mine. It is expected the confidence level of model predictions will increase over time as the model is updated to reflect the observed effects on groundwater obtained from the monitoring program. This is consistent with International Organisation for Standardisation (ISO) continuous improvement guidelines and industry standard.

7 Conclusion

This assessment has been prepared to respond directly to the IPC findings and recommendations, as published in the IPC assessment report released in May 2019. Gardens within heritage items, vegetation within landscape conservation areas and species typically planted in private gardens have been identified. The potential impacts of the predicted change in groundwater depth as result of the project on the identified at-risk vegetation has been assessed, using the groundwater model, spatial analysis and a risk-based approach.

All listed heritage gardens accessing shallow groundwater and part of the vegetation in the landscape conservation areas are situated above the Wianamatta Group shale. As this is a perched groundwater system with limited hydraulic connection to the underlying Hawkesbury Sandstone (where groundwater drawdown is predicted to occur), no impacts are predicted in these areas. Should private gardens, non-native vegetation or exotic grasslands occur in areas where the Wianamatta Group Shale outcrops at surface, there will also be no impacts due to the perched groundwater system.

The regional scale RTS groundwater model was used to predict watertable drawdown in vegetated areas identified to contain plants that may access shallow groundwater and may be susceptible to water stress during periods of prolonged drought. During average and wet climate periods, vegetation in these areas will not be affected by groundwater level drawdown. During especially dry periods when the soil moisture is low and not replenished by rainfall or surface water runoff, vegetation in these areas may exhibit increased stress or die back due to reduced access to groundwater as a result of groundwater level drawdown. These areas are limited to low lying topographical areas where the watertable is shallow and near watercourses where groundwater discharges as baseflow. However, under prolonged drought conditions, without mining, the watertable would decline naturally in these areas. As such, vegetation either currently naturally adapts or is subject to water stress during these times, with replenishment when the drought breaks.

During drought conditions, approximately 0.1 ha of planted pine windbreaks at the Mereworth property (outside the heritage curtilage of Mereworth House and Garden) has a high risk of impact during drought conditions. Part of the southern windbreak is in an area proposed for surface mine infrastructure, in particular entry/exit to the personnel and materials drift and an access road to the explosives magazine. Parts of the windbreak that can be avoided by mine infrastructure will be monitored for signs of water stress during prolonged drought, with remedial action taken as required.

Within the landscape conservation study area, the 50th percentile results (about as likely as not) where Hawkesbury Sandstone outcrops at the surface predicts:

- no risk of impact during drought conditions to 5.2 ha of non-native vegetation and 0.2 ha of grasslands;
- low risk of impact during drought conditions to 0.8 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 3.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 6.8 ha of non-native vegetation and 3 ha of grasslands.

Accordingly, 9.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 50th percentile results. This only represents 0.08% of the cultural landscape study area and 0.06% of the common boundary of the cultural landscapes.

Within the landscape conservation study area, the 67th percentile results (unlikely) where Hawkesbury Sandstone outcrops at the surface predicts:

- no risk of impact during drought conditions to 3.8 ha of non-native vegetation and 0.1 ha of grasslands;

- low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation; and
- high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 10.3 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 67th percentile results. This only represents 0.09% of the cultural landscape study area and 0.07% of the common boundary of the cultural landscapes.

Within the landscape conservation study area, the 90th percentile results (very unlikely) where Hawkesbury Sandstone outcrops at the surface predicts:

- no risk of impact during drought conditions to 1.8 ha of non-native vegetation and 0.1 ha of grasslands;
- low risk of impact during drought conditions to 0.6 ha of non-native vegetation;
- moderate risk of impact during drought conditions to 5.2 ha of non-native vegetation; and
- high risk of impact during drought conditions to 8.7 ha of non-native vegetation and 3.1 ha of grasslands.

Accordingly, 11.8 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 90th percentile results. This only represents 0.11% of the cultural landscape study area and 0.08% of the common boundary of the cultural landscapes.

Private properties with gardens containing the species listed in Table 5.3 located within the predicted area of groundwater drawdown and overlying the Hawkesbury Sandstone may be subject to increased water stress during prolonged drought as a result of the project.

Following project approval, Hume Coal will conduct additional 'post-approval' groundwater modelling and field investigations, where possible, to confirm the depth to groundwater in the areas identified as being at high risk of water stress during periods of prolonged drought.

Planted pine windbreaks on Mereworth, that cannot be avoided by surface mine infrastructure, will be monitored for signs of water stress during prolonged drought, and supplemented with water if required.

There will be no impacts to gardens and plantings within local or state listed heritage items.

The remaining non-native, exotic grassland and private gardens located within the landscape conservation study areas that are predicted to experience watertable drawdown and have been identified as being at risk of water stress during periods of prolonged drought cover a small area, are not classified as high priority GDEs and are not covered under any statutory requirement to manage or mitigate the potential and unlikely effects.

Ongoing 'post-approvals' groundwater modelling will be undertaken as and when new data become available, and at regular intervals throughout the life of the mine. It is expected the confidence level of model predictions will increase over time as the model is updated to reflect the observed effects on groundwater obtained from the monitoring program. This is consistent with International Organisation for Standardisation (ISO) continuous improvement guidelines and industry standard.

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Attachment A

Heritage items in the study area

Table A.1 Heritage items in the 90th percentile study area

Heritage item	Heritage Act 1977 No 136	Wingecarribee Local Environmental Plan 2010	
	State significance	Local significance	State significance
"Cottesbrooke" house		1	
All Saints Anglican Church hall and cemetery			1
Argyle/Browley St Conservation Area		1	
Black Bob's Bridge			1
Bonheur house, grounds and outbuildings		1	
Boscobel house, grounds and outbuildings		1	
Browley house, grounds and outbuildings		1	
Bunya Hill house, grounds and outbuildings		1	
Cardrona, (former Eagleroo) grounds		1	
Charlie Grey's Cottage		1	
Clover Hill house, grounds and outbuildings		1	
Coach House Antiques, Argyle Galleries		1	
Comfort Hill house, grounds and outbuildings			1
Cottage		1	
East St Conservation Area		1	
Eccleston Park house and outbuildings		1	
Eling Forest Winery house, grounds and outbuilding			1
Everything Store, former Butcher Shop		1	

Table A.1 Heritage items in the 90th percentile study area

Heritage item	Heritage Act 1977 No 136	Wingecarribee Local Environmental Plan 2010	
	State significance	Local significance	State significance
Former Post Office		1	
Former St John's Anglican Rectory		1	
Glendalough		1	
Golden Vale	1		
Golden Vale house, grounds and outbuildings			1
Highfield house, grounds and outbuildings			1
Hillview	1		
Hillview house, grounds and outbuildings			1
Interwar bungalow		1	
Interwar transitional bungalow		1	
Jemmy Moss Inn		1	
Kalaurgan		1	
Lynton		1	
Mereworth house and garden		1	
Montrose house and grounds		1	
Moss Vale Public School		1	
Newbury house, grounds and outbuildings		1	
Oldbury Farm	1		

Table A.1 Heritage items in the 90th percentile study area

Heritage item	Heritage Act 1977 No 136	Wingecarribee Local Environmental Plan 2010	
	State significance	Local significance	State significance
Oldbury house, grounds and outbuildings			1
Peppers, (former Mt Broughton) house, grounds			1
Railway station gatehouse		1	
Remembrance Driveway Plantings		1	
Remembrance Driveway Trees		1	
Road Reservation		1	
Rosedale house and grounds			1
Rotherwood house, grounds and outbuildings			1
Royal Hotel (Sutton Forest Inn)		1	
Semi-detached houses		1	
Spring Grove Farm house, grounds and outbuildings		1	
St Andrew's Presbyterian Church		1	
St John's Anglican Church		1	
St Patrick's Roman Catholic Church and cemetery			1
St Paul's International College (former Dominican			1
Summerlees house and grounds		1	
Sutton Farm house, grounds and outbuildings (forme		1	
Sutton Forest Public School— 1879 classroom and toilets and 1912 classroom		1	

Table A.1 Heritage items in the 90th percentile study area

Heritage item	Heritage Act 1977 No 136	Wingecarribee Local Environmental Plan 2010	
	State significance	Local significance	State significance
The Harp (former Bindagundra) house, grounds		1	
The Pines slab cottage		1	
Victorian shop, painted wall signs and house		1	
Vine Lodge house, grounds and outbuildings			1
Whitley house, grounds and outbuildings			1
Whitley, outbuildings, entry gate, garden	1		
Willow Grange house and grounds		1	
Grand Total	4	42	15

Annexure B

Cultural Landscape Assessment









Hume Coal & Berrima Rail Project

Cultural Landscape Assessment







CATHERINE BROUWER
Landscape Architects

Hume Coal Project SSD 7172
&
Berrima Rail Project SSD 7171

Cultural Landscape Assessment

prepared by **Catherine Brouwer Landscape Architects**
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email brouwer@eis.net.au

for **EMM Consulting**

date **March 2020**

issue	*issue description*	*date*	*review*
1	Draft for Discussion - Internal review	December 2019	
2	Draft - Internal EMM review	13 January 2020	
3	Draft	22 January 2020	
4	Draft	14 February 2020	
5	Draft for review	28 February 2020	
6	Final draft	2 March 2020	
7	Final draft - client review	11 March 2020	
8	Final	23 March 2020	

Executive Summary

This report addresses the IPC report Recommendation R17, that is, the part of the NSW Heritage Council's 2018 letter which states: "The EIS should be amended to include a detailed assessment of impacts of both the Hume Coal Project (SSD 7172) and the Berrima Rail Project (SSD 7171) on the Berrima, Sutton Forest and Exeter Cultural Landscape". Specifically, that "the assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail."

To meet the IPC recommendation, this report establishes an understanding of a cultural landscape, outlines the cultural landscapes and designated heritage landscapes within the Project area and its environs, and assesses the designations of cultural landscapes within the context of a wider central Southern Highlands cultural landscape.

The previously identified cultural landscapes designated at different times over the same core landscape are reviewed and assessed as potentially significant continuing cultural landscapes. The report analyses the National Trust (NSW) non-statutory 1998 listed *Exeter/Sutton Forest Landscape Conservation Area* cultural landscape, and the *Proposed B,SF&E Cultural Landscape,* which was the 'study area' presented in the Morris 2017 study, having regard to the need for a sound basis to establish statutory protection for a cultural landscape. The statements of heritage significance of both the *Exeter/Sutton Forest Landscape Conservation Area* and the Morris 2017 *Proposed B,SF&E Cultural Landscape* study are assessed. These assessments conclude that the statements do not demonstrate that the cultural landscapes would meet eligibility for state listing.

The heritage places adjacent or near the Project area and rail loop which lie within the *Proposed B,SF&E Cultural Landscape* are assessed as being part of the overall historical narrative and contributing to the aesthetic value of the cultural landscape. There are heritage places which are likely to experience an impact from visibility of part of the surface infrastructure, and with consideration of the locations of the viewpoints, which are generally away from the heritage house and gardens, and the partial visibility of these views, the views are assessed as having a minor or low impact on the heritage significance of the places.
Impact assessments are based on the supplementary EIS reports prepared by EMM, in particular the Visual Impact Assessment report (EMM 2020a).
The Berrima rail loop and new rail link are unlikely to be seen from the heritage places in the northern cultural landscape. The Old Hume Highway Remembrance Day planting place is closer to the rail line than other heritage places and any view of the rail line would have an impact through this change, however the impact is assessed as low.

The impacts of views of parts of the Project surface infrastructure and the Berrima rail loop on the *Proposed B,SF&E Cultural Landscape* are together assessed as likely to have a low impact on the heritage values of that cultural landscape as a whole. The impacts on the views of landscape at and immediately around the Project surface infrastructure, which are foreground views, are assessed as together to have a low to moderate impact on the heritage values of the whole landscape of that locality.

Mitigation of the impacts of the visibility of the Project surface infrastructure on the heritage places and the cultural landscape are presented. Mitigation by a range of forms and species of planting, - as appropriate to the location and the infrastructure to be screened, - undertaken during both the planning and design phase of the Project, and of - the planting during and after Project implementation, are assessed to likely be moderately effective within approximately five years of plant growth and moderate to highly effective after fifteen years of plant growth. The mitigation measures will substantially reduce the potential impacts on appreciation of the *Proposed B,SF&E Cultural Landscape* from the public realm viewpoints and routes, and from the tourism, recreation, and social destinations where there may be some view of part of the Project surface and rail loop infrastructure.

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1.0 Introduction

1.1 Overview of the Hume Coal Project

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a project life of about 23 years, including construction and rehabilitation. The Project area is located to the west of Moss Vale, in the Wingecarribee local government area.

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop. The Hume Coal Project and the Berrima Rail Project together form 'the Project'.

A full description of the Hume Coal Project, including the location at a regional scale, the project areas and the indicative mine and surface infrastructure plans, is provided in Chapter 2 of the main EIS report (EMM 2017a).

Approval for the Project is being sought under Part 4 Division 4.1 (State significant development) of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act). A detailed description of the environmental assessment process to date is provided in Hume Coal's response to the Independent Planning Commission (IPC) assessment report, to which this Cultural Landscape Assessment (CLA) is appended.

1.2 Purpose

The purpose of this CLA is to respond directly to the IPC findings and recommendations as published in their assessment report released in May 2019.

Specifically, this CLA report addresses and responds to IPC recommendation R17, as included in Table 1.2.

Where necessary, this study also addresses items presented in the IPC report that the applicant feels are erroneous, unsubstantiated or are otherwise worthy of response.

A number of items have been addressed in other reports for the Hume Coal and Berrima Rail Projects, including the supplementary visual impact assessment, the groundwater dependence assessment for cultural heritage landscapes and gardens, the supplementary historical archaeological assessment and the updated statement of heritage impact: IPC Response (EMM 2020a, EMM 2020b, EMM 2020c and EMM 2020d respectively).

Table 1.2 notes where this report addresses each of the relevant IPC considerations. Table 1.2 also notes where this report addresses the items relevant to the cultural landscape.

Table 1.2 Response to IPC report on matters relating to Cultural Landscapes

Reference number	*IPC assessment considerations*	*Location where addressed*
R17	"The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283." In R17, the IPC referred to the Heritage Council of NSW correspondence. The part of that letter to which this report responds is as follows: " . . Accordingly, previous comments on the EIS are reiterated and should be addressed prior to determination: • The EIS should be amended to include a detailed assessment of impacts of both the Hume Coal Project (SSD 7172) and the Berrima Rail Project (SSD 7171) on the Berrima, Sutton Forest and Exeter Cultural Landscape. The applicant should provide this assessment prior to determination of the application, so that it informs the conclusion of any determination. The assessment should be undertaken by a heritage consultant with demonstrated experience with similar issues and scale of historic landscapes. The assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail. It should analyse any impact on these values as well as significant elements or groupings that comprise the landscape, that is the towns and villages, habitable buildings, pastoral and other structures, roads (such as the Old Hume Highway, Hume Highway, Oldbury Road and other local roads), streets, lanes, paths, fences, waterbodies, trees, plants, paddocks, cropping, their fabric as well as significant historical links across the landscape such as explorer and stock routes, the visual connections across the landscape as well as local and precinct-wide settings. The assessment should also consider whether any modifications to the projects' scope would prevent any adverse impacts to this multifaceted cultural landscape including the impact of project wide water usage, any water table draw-down and altered surface and sub-surface flows." NSW Heritage Council 17 August 2018.	Addressed in EMM 2020a, *Supplementary Visual Impact Assessment* & Addressed in Sections 2.4, 4.0, and 6.0 of this report Addressed in Section 7.4 of this report, and EMM 2020 b, *Groundwater dependence assessment for cultural heritage landscapes and gardens.*
283	"The Commission in its assessment of merits of the Project has had regard to historic heritage impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:	
	•groundwater that is primarily to preserve our heritage listed gardens;	Addressed in EMM 2020 b.
	• the proximity of significant local and state heritage assets;	Addressed in EMM 2020 d, *Statement of Heritage Impact*
	• Golden Vale Homestead is owned by the National Trust. The Trust is deeply concerned that the Hume Coal Project may impact on the property's water supplies;	Addressed in EMM 2020 b.
	• Southern Highlands area has had a unique social and economic role and its heritage values need recognition and protection if they are to survive into the future. These values are incompatible with the development of the coal mining landscape;	Addressed in EMM 2020 d, *Statement of Heritage Impact*
	• Berrima, located approximately two kilometres from the Project area, is one of the best-conserved towns from the colonial period of Australia. It	Addressed in EMM 2020 c,

	has a significant collection of state heritage register-listed properties concentrated in a small area;	*Supplementary historical archaeological assessment*
	• there are 64 heritage items just within the village, 16 of which are on the state register;	Addressed in EMM 2020 c.
	• it is impossible to assert that the impact of the Project on Berrima can be mitigated;	Addressed in EMM 2020 c.
	•the adequacy of the SHIA, an alternate Heritage Impact Assessment (HIA) prepared on behalf of two community groups reached different conclusions, particularly in relation to the impact of the Project on the significance of Mereworth, as its heritage listing goes beyond the house and garden and includes its rural setting; and	Addressed in CBLA 2020. Addressed in EMM 2020 c.
	• the SHIA does not address impacts, other than from the surface infrastructure works, on the heritage items in the study area and the cultural landscape. In particular, the impacts of groundwater and water table drawdown have not been adequately assessed."	Addressed in EMM 2020 b, *Groundwater dependence assessment for cultural heritage landscapes and gardens*
285	"The Commission notes that the historic heritage impacts of the Project within the locality have been peer reviewed by the Heritage Council of NSW against the requirements of relevant Government policy frameworks. The Commission notes that the Heritage Council of NSW retained concerns which included: • the need for a detailed assessment of the impacts of the Project on the Berrima, Sutton Forest and Exeter cultural landscape."	Addressed in EMM 2020 d, *Statement of Heritage Impact*. Addressed in Chapter 6.0
286	"At this stage of its assessment the Commission finds that it is not satisfied with the information provided up to this point regarding historic heritage impacts. The Commission considers the magnitude of water table drawdown is not confirmed and thus there is a potential change to the aesthetic significance of the heritage items' settings (gardens, tree plantings) and cultural landscape. The SHIA relies on the VIA and further information provided with the Hume Coal RTS to assess the visual impacts of the surface infrastructure on Mereworth House, other heritage items and the cultural landscape. However, the visual impact assessment has shortcomings (that are addressed separately) and the impacts on heritage significance would need to be reassessed in accordance with an updated visual impact study."	Addressed in EMM 2020a. Addressed in EMM 2020 b. Addressed in EMM 2020d, *Statement of Heritage Impact*. Addressed in Chapter 7.0

1.3 Scope of this Report

The purpose of this report is to:

- assess the impacts of the Project on the *Proposed B,SF&E Cultural Landscape* which formed the 'study area' in the 'Cultural Landscape Assessment of the Berrima, Sutton Forest and Exeter Area', a report prepared by Colleen Morris, May 2017 for the Berrima Residents Association, with support of Wingecarribee Shire Council (WSC) (Morris 2017);
- assess the impacts of the Project on the values and significant elements or groupings that comprise the landscape of the National Trust of Australia (NSW) listing of the *Exeter and Sutton Forest Landscape Conservation Area* as set out in the 1998 Summary Statement of Significance; and
- consider whether any modifications to the project scope would prevent adverse impacts to the cultural landscape.

Chapter 2.0 establishes an understanding of cultural landscapes, and outlines the cultural landscapes and designated heritage landscapes within the Project area and its environs. This chapter outlines the basis for designation of a cultural landscape in the context of established listed places on the relevant WSC Local Environmental Plan (WSC LEP) and the Southern Highlands cultural landscape.

Chapter 3.0 addresses the NSW Heritage Council letter recommendation to the Department to "address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail" in relation to the non-statutory listing of the *Exeter and Sutton Forest Landscape Conservation Area*.

Chapter 4.0 reviews aspects of the *Proposed B,SF&E Cultural Landscape*, which was the 'study area' presented in the Morris 2017 study for the Berrima Residents Association "with support of Wingecarribee Shire Council" (Morris 2017 p. 8) with regard to the values and boundary delineation required for a statutory designation of a cultural landscape.

Chapters 5.0 and 6.0 assess the impacts of the Project on the heritage places within the Project area, and on the cultural landscape which extends beyond the project area.

Chapter 7.0 outlines measures to manage and mitigate the potential impacts of the Project on the cultural landscape.

Both the Hume Coal /Berrima Rail Projects and the *Proposed B,SF&E Cultural Landscape* are in a state of being proposed, but not approved or accepted. All reference to the Hume Coal Project and the *Proposed B,SF&E Cultural Landscape* in this report assumes that they are proposed, but not yet approved or accepted.

1.4 Study Limitations

Indigenous Values & Cultural Significance Indigenous values of the region are acknowledged as a major part of the *Proposed B,SF&E Cultural Landscape*; however, this living heritage is not the focus of this report or part of the scope as it is outside the recommendations of the IPC report. (Reference can be made to the Hume Coal Project Environmental Impact Statement (EIS) (EMM 2017), the Response to Submissions (EMM 2018), and the updated Statement of Heritage Significance (EMM 2020d)).

Archaeological Places This report does not encompass investigations or analysis of existing or potential archaeological places. (Reference can be made to EMM 2017, EMM 2018 and the Supplementary historical archaeological assessment (EMM 2020c)).

Heritage Places Survey This report does not encompass a survey of the heritage listed places in Wingecarribee Shire or the Project area, nor of potential individual places for local or state level listing. (Reference can be made to EMM 2017 and EMM 2018).

Cultural Landscape Statutory Determination This report does not comprise a review of the *Proposed B,SF&E Cultural Landscape* for the purpose of preparation for, or determination of, state level heritage listing.

Time Frames & Research Possibilities The cultural landscape field assessments were undertaken in October 2019. Research of original historical documentary evidence, for example in the state library or local sources of historical documents, has been precluded as timeframes have compelled use of existing publications. The report has referred to the Morris 2017 study as a resource for data on the cultural landscape, and to other publications. These have proved a satisfactory basis to address IPC recommendation R17 in this report.

1.5 Authorship

The author is Catherine Brouwer BA, GDLA, MDesS (Harvard), FAILA, MICOMOS
Catherine is a landscape planner and registered landscape architect. Her practice *Catherine Brouwer Landscape Architects*, based in Brisbane, encompasses: landscape planning; landscape design, documentation and construction administration; expert witness for the Planning and Environment Court; urban design and other Panel advisory roles. Catherine is a widely respected expert in landscape heritage, including preparation of conservation management plans and impact assessments, and in cultural landscapes, landscape character, intangible heritage and visual assessments for strategic planning and management plans.

An example project is the award-winning ***Gold Coast Landscape Character (& Heritage) Study***, a joint project of Catherine Brouwer and Cardno. Catherine identified and assessed the cultural landscapes, aesthetic landscapes, the historical landscapes and their cultural and intangible values and stories, following a methodology developed by Catherine for this. She shared the community engagement, and formulated the

analysis, the statements of significance and the planning and management strategy and guidelines for the cultural, aesthetic, and historical landscapes. The study received the 2015 AILA Qld Award of Excellence in Planning and the 2017 Deputy Premiers Award for Urban Design Commendation.

NSW projects which demonstrate Catherine's cultural landscape expertise and experience include:
- The ***Tweed Shire Scenic and Cultural Landscape Evaluation***. This study comprised a comprehensive assessment of the Shire's landscapes, their cultural values, their natural characteristics, and scenic quality and sensitivity, through a detailed, thorough, repeatable and accountable procedure. The procedure was developed by Catherine Brouwer. Future protection and management of the Shire's cultural heritage and scenic resource is established through a Shire landscape policy and planning mechanisms, including designated scenic resources, scenic-cultural planning frameworks, development application requirements, parameters for development and for the assessment of development proposal and its likely impacts. The study outcomes have been used in the Tweed until the 2019 update by the Council with the *Scenic Landscape Strategy*.
- The ***Lake Macquarie Recreation and Open Space Plan and DCP.*** The Lake Macquarie region landscapes are diverse, highly scenic and valued for their significant contribution to the amenity and scenic liveability of the region. They include the backdrop of the Wattagan Ranges, the scenic rural valleys, the extensive indented lake shore and surrounded hills and ridges and a varied coastline to the Pacific Ocean. The seen landscape forms the city image and is highly valued by residents and tourists. Catherine's landscape character and visual assessment identified the landscape setting, the scenic quality of the landscapes and led to the formulation of landscape management policy and guidelines to be incorporated with other open space and recreation strategies in the city's open space planning and Planning Scheme.

Additional cultural landscape projects include the ***Coastal Visual Evaluation Procedure and Planning Framework*** for the Qld state government. A most significant project for the management of the valued coastal and hinterland landscapes in Queensland. Catherine's role was: project director, the development of the visual landscape assessment and evaluation procedure, its trial application in the Whitsunday coast and islands, the development (with Chenoweth) of planning and management objectives and guidelines for the State and local government planning framework, and preparation of the report and Procedure publication. This study was awarded a Merit Award by the Royal Australian Planning Institute.
In the following year Catherine prepared the ***Coastal Scenic Amenity Planning Guideline***. The preparation of the planning guideline for coastal local government authorities for the evaluation, planning and management of the visual value of their landscapes. This guideline incorporates planning mechanisms and development application requirements for development proponents to ensure the scenic values of the landscape are maintained.
Two years later, again for the Qld government, Catherine Brouwer Landscape Architects undertook the ***Coastal Landscapes of Queensland*** study (with assistance for the 4 regional applications). Catherine developed the evaluation procedure for the visual and cultural values of the coastal regions, undertook community consultation, and the applications -FNQ (over 300km) assisted with the Wet Tropics region, and conducted the Wide Bay region (over 350 km) and the South Coast studies from the Brisbane River to the border. The studies informed the Regional Coastal Management Plans and provide a GIS and other data bases to guide State and Local planning and management to protect and manage the coastal region scenic resource in the face of landscape change.

Catherine has been a member of ICOMOS since 1996, was six years on the Queensland Heritage Council, has taught at QUT & Univ. of Qld., held positions on the Australian Institute of Landscape Architects (AILA) and Gold Coast City Urban Design awards judging panels, is one of the two Queensland representatives on the AILA Connection to Country Committee, and has presented landscape character and heritage related papers at Australian and international conferences. Her most recent paper, on the *Draft Scenic Landscapes Strategy* of the NSW Tweed Shire, was accepted and presented in 2019 to the Oceania International Ecosystem Services Forum in New Zealand.

2.0 Listed Cultural Landscapes Values Assessment

2.1 Introduction

The IPC report presented *"key issues that require further information and assessment, including:*

- impact of the Project on historic heritage and the Berrima, Sutton Forest and Exeter Cultural Landscape" . (IPC NSW, 2019. p. 6).

This chapter provides the necessary context for assessment of values of a cultural landscape over a part of the central Southern Highlands region and subsequently an assessment of any impacts that may arise to the cultural landscape from the Project infrastructure.

This chapter's scope includes:

- an explanation of a cultural landscape section 2.2;
- a description of the two past designated cultural landscapes in and about the Project area and the differences in their extents section 2.3; and
- an outline of the National Trust listed *Exeter/Sutton Forest Landscape Conservation Area*, and assessment of its values according to IPC recommendation R17 section 2.4.

2.2 Cultural Landscapes

2.2.1 Definitions & Typology

The term 'cultural landscape' is a well-established typology for particular landscapes, and "*well established as a heritage identification tool*" (Ramsay, 2018). Carl Sauer, who introduced the term 'cultural landscape' in 1925, regarded it as follows:

"The cultural landscape is fashioned out of a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape is the result." (Lennon, 2019. p. 4)

A cultural landscape is the expression of the relationships between people and place, and the patterns created by ongoing use over many years, in association with the operation of bio-physical systems. *"Landscape is seen primarily as a cultural artefact [sic], consisting of the tangible remains left on the land by present and earlier cultures."* (Blair & Truscott, 1988. p. 3)

Cultural landscapes encompass a defined content of natural and cultural characteristics established over time and with a continuity which may entail changes through time. They also embody the relationships of a community and region with the landscape. These characteristics and socio-cultural relationships with the landscape must form the sound basis necessary for any designation and delineation of a cultural landscape, particularly if it is planned to establish and manage that landscape within statutory plans and regulations.

Cultural landscapes can be highly diverse in their extent and content. They are living landscapes - lived in, and often evolving with the community that identifies with them as homelands. These changing landscapes fit within the established typology of 'organically evolving continuing landscapes' or a 'continuing landscape'.

Australia ICOMOS (International Council on Monuments and Sites) has established that "*cultural landscapes are valued by communities because they:*

- *show evolution of settlement and societies;*
- *hold myths, legends, spiritual and symbolic meanings;*
- *are highly regarded for their beauty;*
- *tell us about societies' use of natural resources, past events, and sustainable land use; and*
- *display landscape design and technology achievements."* (Australia ICOMOS, *Understanding Cultural Landscapes*)

A cultural landscape will contain evidence of human activities such as roads and paths, other movement routes, buildings, reserves, parks and gardens, archaeological sites, communications infrastructure, as well as rural landscapes and naturalistic components that are also involved in landscape formation and changes brought by human action.

2.2.2 Statutory Listing of a Cultural Landscape

In order to classify a cultural landscape for statutory management provisions, it is beneficial to clearly differentiate the already statutory listed heritage places and components, within the wider landscape scope of a potential cultural landscape area, having consideration that there is usually a close relationship between the heritage listed places and the wider landscape setting.

Cultural landscapes in NSW can receive formal recognition and statutory protection if they receive statutory heritage listing. There are two levels of statutory heritage listing in NSW (DPIE 2020):

- local heritage items listed on heritage schedules to a local council's Local Environmental Plan (LEP). This covers most of the 20,000 heritage items in NSW; or
- state heritage items listed on the State Heritage Register. This list includes only those items which have been identified as having particular importance to the people of NSW.

While a listing by the National Trust of NSW can recognise heritage value(s) of significance, it does not afford statutory protection. In order to include a cultural landscape on a register to give it statutory protection, it is necessary to define the values it holds and that differentiate it from its surroundings. This will also enable the boundary to be clearly delineated. An identified cultural landscape may include individual heritage places, so in the instance the cultural landscape receives a statutory listing there may be overlapping layers of statutory protection.

2.3 Past Listed Cultural Landscapes

2.3.1 Background and Introduction

This section outlines the two cultural landscapes, as assessed in 1993 and 1998 respectively, and their significance and extent. These were:

- Key Historic Unit 6 -*Sutton Forest Landscape Area* - zoned as 7(b) in the WSC LEP until 2010; and,
- *Exeter/Sutton Forest Landscape Conservation Area* - a 1998 National Trust (NSW) listing.

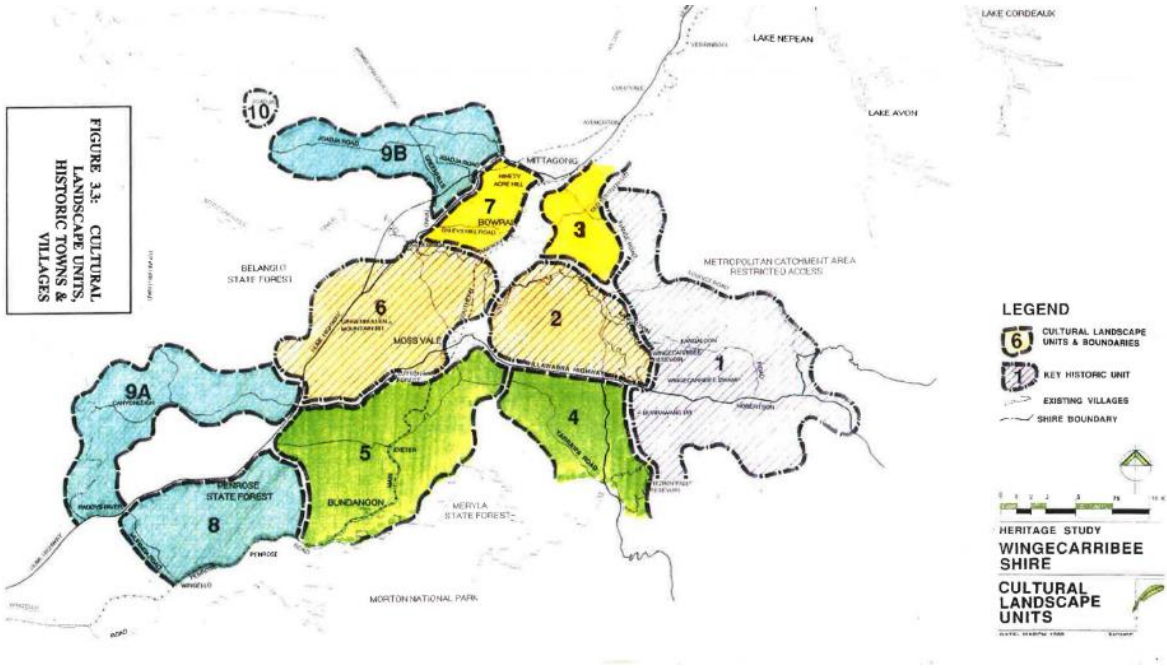
Some of the values assessed in these cultural landscapes are substantially intact today, and those past assessments and listings are invaluable information for the assessment of landscape values in the current cultural landscape of the central Southern Highlands.

2.3.2 Key Historic Unit 6 - Sutton Forest Landscape Area and zone 7(b) in the 1989 WSC LEP

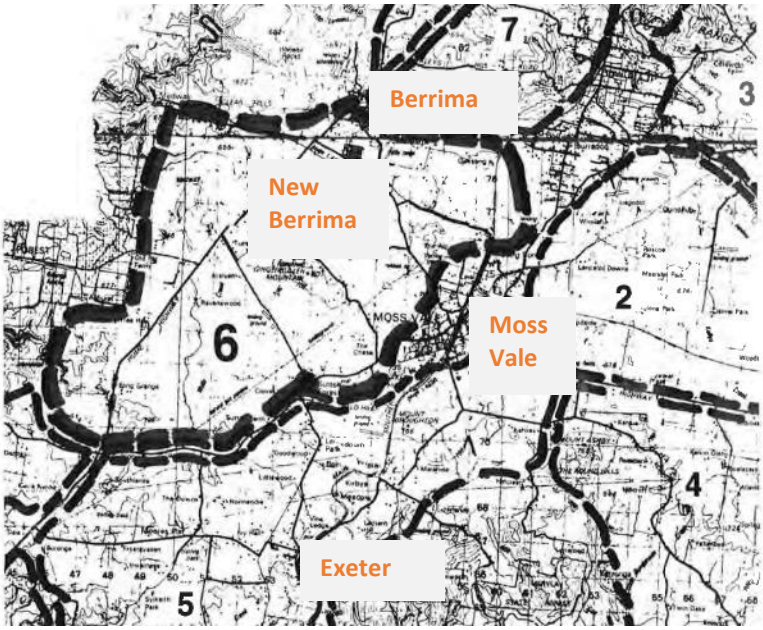
A study of the heritage places and landscapes of the Wingecarribee Shire was commissioned in 1990 by the Heritage Council of NSW, the Department of Planning, and WSC, and was undertaken and published in 1993 by JRC Planning Services.

This section describes the extent and values of Key Historic Unit 6 – *Sutton Forest Landscape Area*, as described in the Wingecarribee Heritage Study, on which the 1989 WSC LEP listing was based. When the 1989 WSC LEP was superseded in 2010, the zone 7(b) landscape conservation area was not transferred to the updated version. Therefore, any zoning constraints or statutory protections relating to landscape conservation set out in the 1989 WSC Scheme no longer apply.

The Cultural Landscape Extent The bounds of Key Historic Unit 6 *6 – Sutton Forest Landscape Area* (1989 WSC LEP 7b) appear to be drawn to encompass the central Southern Highlands historic, rural pastoral properties - between Berrima, Burradoo and Moss Vale, over the Mount Gingenbullen landscape, with Oldbury Road and Golden Vale Road rural properties lying at the centre. The designated landscape extends south west along the Hume Highway and to Hoddles Crossroads, with the Illawarra Highway its east boundary. This identified significant heritage landscape edges New Berrima and the Boral cement works, the Berrima branch rail line (in the WSC LEP indicated as a "future industrial corridor"), Medway Road, and encompasses sections of the Main South Railway. It is a landscape of closely related historical, aesthetic and socio-cultural values of both the rural and industrial landscape components, which have been generally consistent and intact in the cultural landscape.



Wingecarribee Shire Heritage Study Cultural Landscape Units 1993.
source: JRC Planning Services, 1993. p. 57.

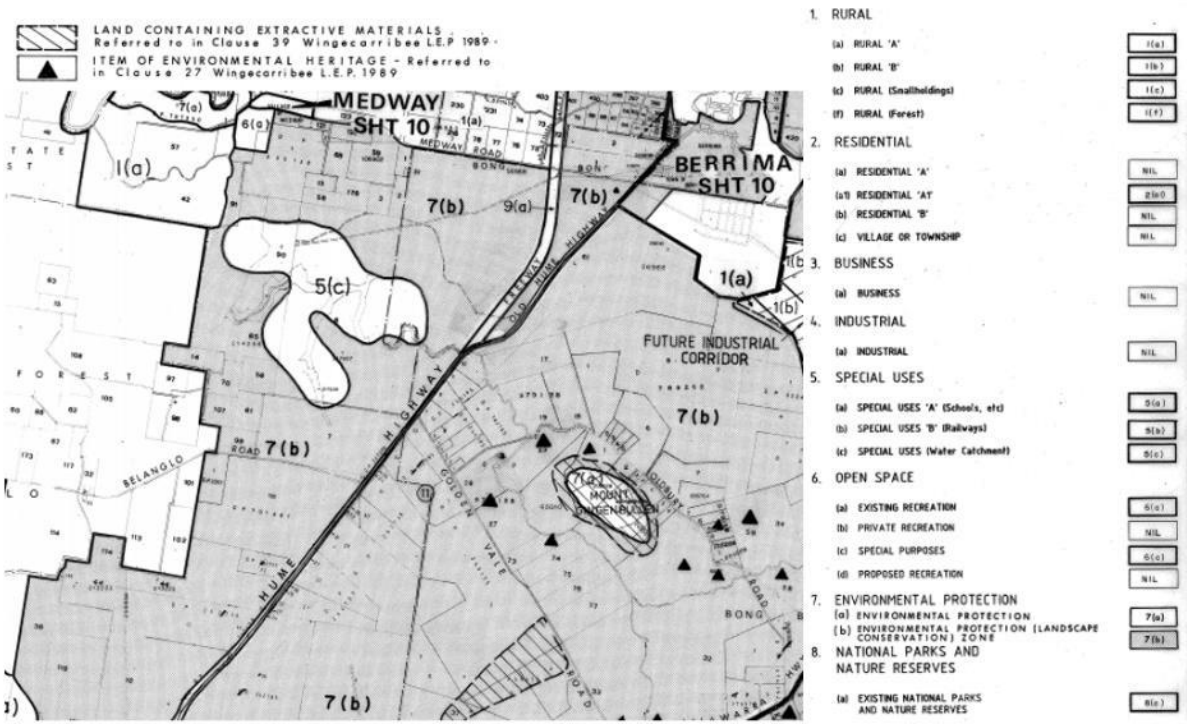


Cultural Landscape Units with 'Key Historic Unit 6 – *Sutton Forest Landscape Area*
(orange labels added for clarity) source: JRC Planning Services, 1993. p. 81.

1989 WSC LEP listing The Wingecarribee Heritage Study's list of heritage items was incorporated into the WSC LEP 1989, in place until 2009 (WSC, 1989a and WSC, 1989b). The 1989 WSC LEP included planning zone 7(b) designated as 'Environmental Protection (Landscape Conservation) Zone' which approximately represents Key Historic Units 2 and 6, and parts of Unit 1.

The objectives of Zone 7(b) were to:

a) to identify and protect areas of particular scenic value and to ensure the preservation of their cultural, heritage, aesthetic and environmental significance,
b) to recognise the value of the rural scenic landscape to the local tourist economy,
c) to permit development and land use activities which are compatible with the heritage and scenic qualities of the key cultural landscape, and
d) to recognise the potential of coal and extractive resources on land within the zone, and to ensure that their winning takes place by means which are compatible with the heritage and scenic qualities of the key cultural landscape.



Part of the 1989 WSC LEP map showing zone 7(b) on land east and west of the Hume Highway. (The Project area is in the north, west of the Hume Highway.) source: WSC LEP, 1989.

Heritage Study Assessment of Values The Wingecarribee Heritage Study summarised its assessment of the central area of "Landscape Units" 1, 2, 4 and 6 as follows: "These four units, as key historic units, illustrate comprehensively the history of the landscape of the study area. They are a complete cross section through its history and are imbued with significant historic values and social values." (Wingecarribee Heritage Study 1993. p 47) Within the Heritage Study, the cultural landscape *Key Historic Unit 6 - Sutton Forest* was assessed as follows:

"The combination of landform, vegetation and land use result in a broad, open rolling landscape with remnant areas of Eucalypts on ridges and scattered eucalypt timber dotting the country...

...The extensive rolling landscape is complemented by the large-scale paddocks associated with grazing, predominantly for beef cattle. Pastoral properties are extensive and homestead sites are marked by distinctive groups of introduced planting. In addition, there are various late nineteenth century houses and gardens... A nucleus of the larger pastoral properties date from the 1820's period of settlement. Smaller homesteads, now disappeared, have their sites marked by groups of introduced tree plantings...

...The overall character is that of rich and varied cultural landscape shared by associations with early land grants and settlement of the region. Spatial organisation is large scale in relation to the rest of the study area. Variety in the landscape is a result of the range of tree species and the importance placed on planting by landholders. There is a high degree of sense of stewardship of the landscape."

(Wingecarribee Heritage Study 1993. p 82)

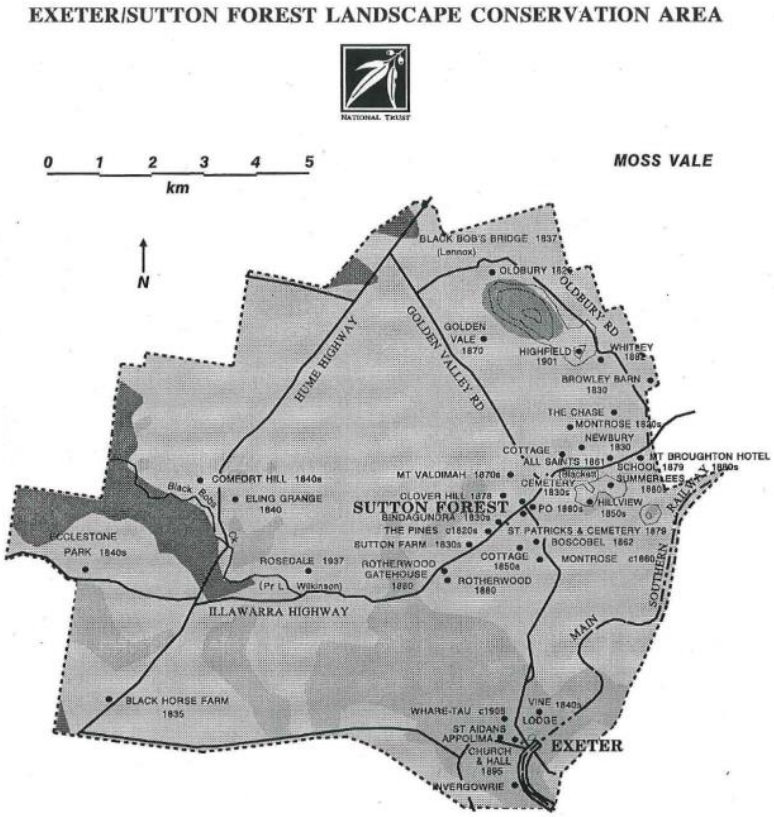
The Heritage Study did not detail the presence, both historically and aesthetically, of the railways and the industrial / manufacturing activity at Berrima Cement Works and Berrima Feed Mill. As well as the large rural properties of the cultural landscape, the industrial activities and their associated historical narratives have been a visible part of the cultural landscape since early in the 20th century.

The Cultural Landscape Today Today, the area is predominantly rural in character; however, while it is substantially similar to its form in 1993, and historic homesteads and their curtilage predominantly remain, there appears some noticeable changes in parts. There have been changes in pastoral practices and property usage, expansion of the industrial activity visible at Boral Cement, expansion of the urban areas, subdivisions and residential developments. Vegetation changes include increase in hawthorn 'wild-strike' over some rural properties and increased planting of pine and cypress windbreak and high privacy hedges. The historical and research values in the landscape largely remain.

2.3.3 Exeter/Sutton Forest Landscape Conservation Area

The Listed Cultural Landscape The National Trust (NSW) listed the *'Exeter/Sutton Forest Landscape Conservation Area*' in 1998 (National Trust, 1998. Listing number R2218). This is a non-statutory listing. It includes the localities of Sutton Forest in the centre east and Exeter in the south. It extends west to encompass the historic properties of *Eling Forest, Comfort Hill* and *Ecclestone Park* west of the Hume Highway, and north to include the *Golden Vale* and *Oldbury* properties, as well as Mt Gingenbullen and Oldbury Road and their environs.

This 1998 listing was a new delineation of a significant landscape in the central Southern Highlands.



The plan figure of the *Exeter/Sutton Forest Landscape Conservation Area* from the 1998 National Trust (NSW) listing.

The Cultural Landscape Extent The *Exeter /Sutton Forest Landscape Conservation Area* overlaps the *Key Historic Unit 6 - Sutton Forest*, however, has a boundary drawn which excludes the northern part of the *Key Historic Unit 6 – Sutton Forest Landscape Area* which had been assessed as holding heritage values. It excludes "Cultural Units" 1, 2 and 4 of the Wingecarribee Heritage Study. The reasons for these exclusions, and the addition of the southern area, and the south eastern area including Exeter, are not explained in the National Trust (NSW) listing.

The excluded area encompasses the southern part of Berrima township, New Berrima, the Berrima Cement Works established in 1938, and the historical rural landscape east and west of those places. It excludes the historical *Mereworth* property, Medway Road, the historical Main South Railway line and the Berrima branch line. It extends further south than the *Key Historic Unit 6 – Sutton Forest Landscape Area* to include the villages of Sutton Forest and Exeter, and the rural landscape south of the Illawarra Highway to Sally's Corner Road. This area was part of "Cultural Unit" 5, and that unit also included Bundanoon and landscape to the south including much more of the Main South railway.

National Trust (NSW) Assessment of Significance The National Trust (NSW) assessed the *Exeter/Sutton Forest Landscape Conservation Area* using the state heritage inventory criteria in place at that time. It was assessed as holding historical, aesthetic, social, and technical / research significance. In addition, it was assessed as meeting measures of: representativeness, rarity, and integrity.

2.3.4 Differences in the Statutory & Non-Statutory Cultural Landscapes Listings

There are no current statutory listings of cultural landscapes within the project area, as shown in Table 2.2.2. While the National Trust (NSW) *Exeter/Sutton Forest Landscape Conservation Area* covers portions of the underground mine and a small portion of the surface mine infrastructure, it is not a statutory listing.

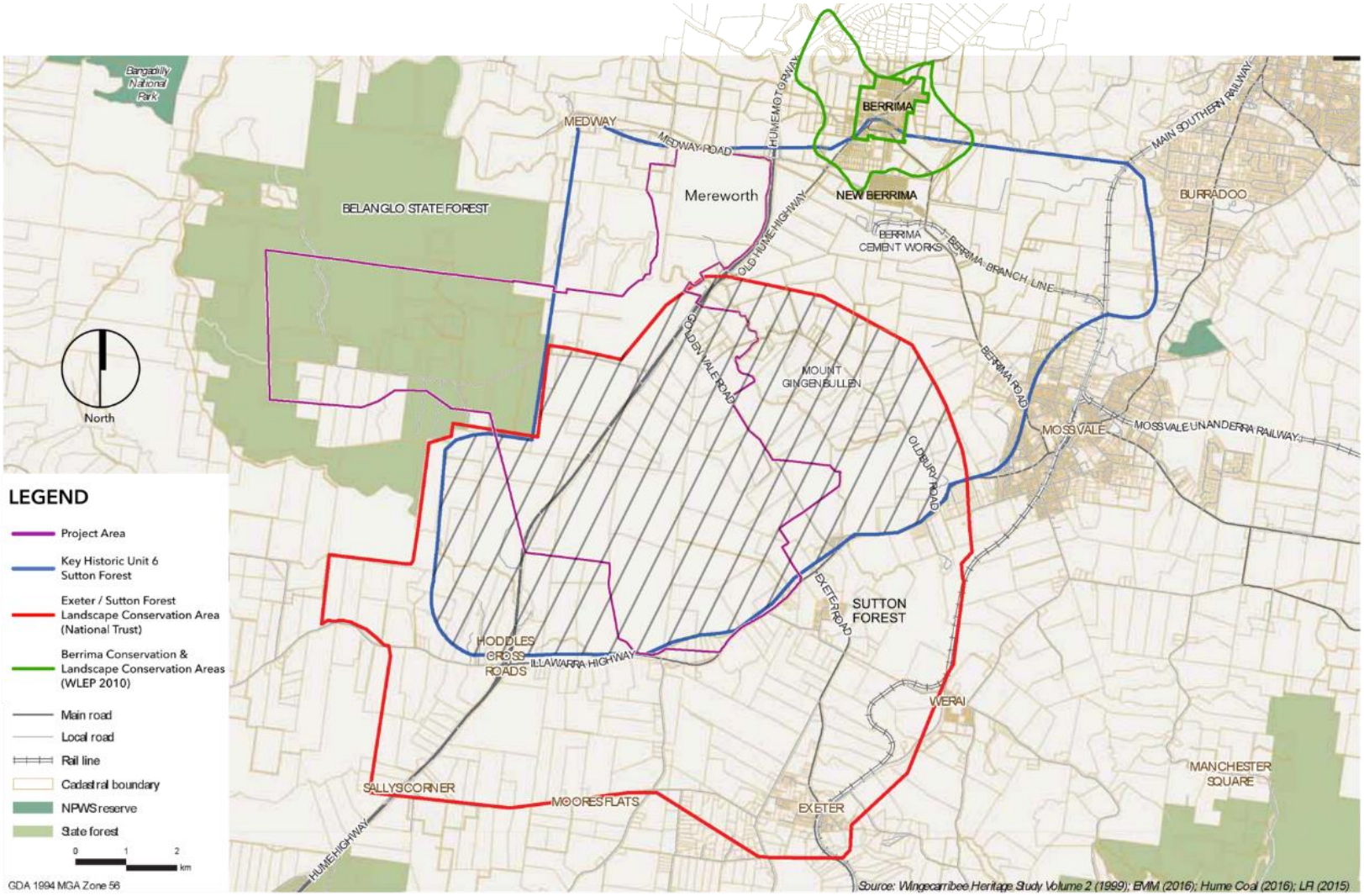
The cultural landscapes summarised in Table 2.3.4 are illustrated on the following page.

Table 2.3.4 Summary of cultural landscapes in and around the project area

Name	***Current Status***	***In project area?***
Cultural landscapes identified in the past		
Berrima Landscape Conservation Area (C1843)	**Statutory** Local WSC LEP	No
Key Historic Unit 6 – Sutton Forest Landscape Area	**Non-statutory** *Between 1993 and 2010 this was a local statutory listing in WSC LEP within Zone 7(b).*	Yes – surface mine infrastructure, rail loop and portions of the underground mine
Exeter/Sutton Forest Landscape Conservation Area	**Non-statutory** *Identified by the National Trust of Australia (NSW) in 1998*	Yes – Portions of the surface mine infrastructure on Evandale and portions of the underground mine.
Colleen Morris (2017) proposed cultural landscape area		
Proposed Berrima, Sutton Forest and Exeter Cultural Landscape hereafter: *Proposed B,SF&E Cultural Landscape*	**Non-statutory** Study area of Morris (2017)	Yes – surface mine infrastructure, and portions of the rail loop and underground mine

These two differing, cultural landscapes are presented on figure 01 Designated Cultural Landscapes on the next page.

The reasons for the difference in the cultural landscape delineation and heritage assessment from the cultural landscape *Key Historic Unit 6 - Sutton Forest Landscape Area*, and *Cultural Units* 1, 2 and 4, and reasons for the boundary location, were not made clear in the National Trust (NSW) listing document for the *Exeter/Sutton Forest Landscape Conservation Area*. It would be reasonable to assume that the application of the boundary and the assessment of significance indicated that there was insufficient landscape significance north of the Oldbury Road environs, and east and south, to include the cultural landscape there.



Note: Figure based on EMM Consulting Figure 2.3 - Identified significant landscapes from EIS - Historic Heritage Assessment and Statement of Heritage Impact draft 2019

figure 01 - Designated Cultural Landscapes

The differing areas designated as cultural landscapes in 1993 and 1998 are indicated in this figure. The hatched area indicates the area common to both.

2.3.5 Analysis of Past Identification of Significant Cultural Landscapes

The two cultural landscapes outlined above, designated over broadly the same central Southern Highlands landscape though with varying extents of the northern and southern parts, were both assessed as significant continuing cultural landscapes at the times of designation, although one was statutory until 2010 and the other non-statutory.

There remains a degree of historical, aesthetic, social, and research values over much of these two identified valued cultural landscapes since the assessments of 1993 and 1998, despite changes in land usage and development extent and consequently landscape character appearance. The Berrima Bypass and adjacent sections of the Hume Motorway, which have been a major change in this rural landscape locality since the historical periods of the 19th and early 20th centuries, have been in place since c. 1985.

There has been no explanation found to date as to why the National Trust (NSW) 1998 *Exeter/Sutton Forest Conservation Area* landscape and the 1993 *Key Historic Unit 6 – Sutton Forest Landscape Area* have different assessments of cultural landscape significance and different boundaries. It would be reasonable to understand that the later *Exeter/Sutton Forest Landscape Conservation Area* would have had an updated, rigorous assessment of where the values lie in the cultural landscape to be conserved.

2.3.6 Preliminary Assessment of Significance in the Central Cultural Landscape

The landscape common to both areas, as outlined above and as indicated in figure 01 *Designated Cultural Landscapes,* hasn't had substantial changes to its landscape form and character when compared to 1998. Based on the earlier assessments a preliminary assessment is that this cultural landscape holds some heritage significance. Section 2.4 adds an assessment of the values in the landscape and its significance.

2.4 Exeter/Sutton Forest Landscape Conservation Area Values Assessment

2.4.1 Introduction

The IPC report recommendation R17 is that the Heritage Council of NSW's 2018 letter be addressed:

> *"The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 . . ."* (IPC NSW, 2019)

Included in the Heritage Council NSW recommendations is that: *"The assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail."*
The National Trust of Australia (NSW) listed the *Exeter/Sutton Forest Landscape Conservation Area* in 1998 (R2218) and that listing includes a statement of significance for each of the values that were assessed as present in the landscape.

To establish the context for assessment of the cultural landscape significance (and subsequent impact assessment) the related landscapes of the National Trust (NSW) listed *Exeter/Sutton Forest Landscape Conservation Area* and the earlier Wingecarribee Heritage Study *Key Historic Unit 6 Cultural Landscape* were outlined in section 2.3 above and presented on figure 01 with the Project area, highlighting the different landscape coverage for each and the common area. This section:

- analyses the *Exeter/Sutton Forest Landscape* Conservation Area extent and values - parts 2.4.2 and 2.4.3;
- assesses the *Exeter/Sutton Forest Landscape* Conservation Area cultural landscape using the National Trust (NSW) statement of significance values - parts 2.4.5 and 2.4.6,to address the IPC recommendation.

The Heritage Council NSW letter recommendation can also be understood to be for a landscape assessment of the *Proposed B,SF&E Cultural Landscape* which was the study area outlined by Morris in 2017, and is a different cultural landscape. That assessment is addressed in chapters 3.0 and 4.0.

2.4.2 Exeter/Sutton Forest Landscape Conservation Area Extent

Landscape area included The *Exeter/Sutton Forest Landscape Landscape Conservation Area* was described by the National Trust (NSW) as follows:

> "*The Area is bounded to the east by the edge of the plateau which drops to sandstone gorges, to the north by the southern perimeter of the town of Moss Vale, to the west by the western boundaries of the properties originally forming part of 'Sutton Forest' and to the south by the environs of the town of Bundanoon.*" (National Trust (NSW) 1998. p. 1)

However, the east extent appears some distance from "the edge of the plateau", and from the "perimeter of the town of Moss Vale" and " environs of the town of Bundanoon". The rail line to Moss Vale in the 19th century was a major contributor to the settlement of the region and the formation of villages and businesses and this remains a key historical narrative of the wider cultural landscape, however much of its extent and role is excluded.

Landscape area and features excluded The cultural landscape delineation is different to Key Historic Unit 6 – *Sutton Forest Landscape Area*, part of the 1989 WSC LEP area 7b. It purposefully deleted the northern part of that cultural landscape, including Berrima, New Berrima, the Boral Cement Works and the branch rail line and environs, Berrima Road between Berrima and Moss Vale, the historical properties of *Mereworth* and *Evandale* west of the Hume Highway. The Mt Broughton and Bundanoon areas in the south east were not included. The rail line to Moss Vale in the 19th century was a major contributor to the settlement of the region and the formation of villages and businesses and this remains a key historical narrative of the wider cultural landscape, however much of its extent and role is excluded.

Area Assessment for listing For the purposes of listing a cultural landscape there should be delineation of the landscape extent where there is consistency and integrity of the values and /or criteria used for the listing. The extent of a cultural landscape to be delineated with the intent of some protection of the values there should encompass the area that holds the values of significance, and the thematic connections of places and associations of significance need to be explained. Relationships of terrain, landscape character and land uses, which are often revealed as aesthetic values, and historical development patterns are inter-related. These characteristics and the inter-relationships need to be described including the evidence and extent over the landscape.

2.4.3 Significance Assessment Criteria

The National Trust (NSW) assessed the *Exeter/Sutton Forest Landscape Conservation Area* based on the State Heritage Inventory criteria at the time of its listing in February 1998. The current criteria for assessing heritage significance, as presented in the guideline 'Assessing Heritage Significance' (NSW Heritage Council, 2001), are different to those used in 1998. The difference in listing criteria are set out in Table 2.4.3.

Table 2.4.3 Comparison of Heritage Listing Criteria

National Trust's SHI criteria -1998	***NSW Heritage Council criteria*** (NSW Heritage Council, 2001) *- State Heritage Inventory listing criteria*
Criterion 1 - **Historical** significance	**Criterion a)** an item is important in the course, or pattern, of NSW's cultural or natural history.
Not used in the National Trust listing	**Criterion b)** an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history.
Criterion 2 - **Aesthetic** significance	**Criterion c)** an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW.
Criterion 3 - **Social** significance	**Criterion d)** an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.
Criterion 4 - Technical / **Research** significance	**Criterion e)** an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.
Rarity	**Criterion f)** an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history.
Representativeness	**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.
Integrity	No equivalent criterion listed

The National Trust (NSW) listing is supported with reasons categorised according to the state heritage significance criteria in 1998. These also include intangible heritage measures, such as associations, representativeness and rarity, and these latter two are assessed to some degree in the listing.

2.4.4 Listed Heritage Places within the Cultural Landscape

The distinction between heritage values in different cultural landscapes, and the listed heritage places within those landscapes is required to address the IPC recommendation to assess impacts on the values of those cultural landscapes.

The listed heritage places have a level of heritage protection and heritage values management provisions in place, either the State Heritage Register (SHR) or the local WSC LEP. The considerations and assessments of the heritage values in the landscapes are therefore separate to the already assessed and listed heritage places, though there are very close relationships between the state or locally listed heritage buildings and their curtilages and their wider landscape settings. The historical villages and towns and their immediate settings, and the listed heritage places there, are therefore considered separately to the rural cultural landscape areas in the values assessments to determine the values of the cultural landscape. See **Attachment 4** ***Heritage Listed Places of the Villages and Settings***.

2.4.5 The Exeter /Sutton Forest Conservation Area Values Analysis

The National Trust (NSW) 1998 assessment of the heritage significance of the *Exeter/Sutton Forest Landscape Conservation Area* is set out in the section 'Reasons for Classification' in that listing. The 'values' as assessed by the National Trust (NSW) are expressed in the statements of significance under the old State Heritage Inventory heritage criteria used. Those values are analysed here in Table 2.4.5.

Table 2.4.5 Analysis of the Exeter/Sutton Forest Landscape Conservation Area Listing Assessment of Values

Historical Significance
Criterion a) an item is important in the course, or pattern, of NSW's cultural or natural history.

National Trust (NSW) assessment of significance of 1998	***Assessment analysis***
"The Area has historic significance through its long and direct association with the Badgery Family, commencing with one of Australia's earliest pastoralist settlers, who formed a family dynasty based in Sutton Forest and ranging throughout NSW and Queensland and which played a vital role in the development of Australia's cattle and horse breeding and horse-racing industries."	This historical significance is assessed as present, however, this statement omits to explain any historic significance associated with the other rural properties encompassed within the area (except the "Badgery Family"), nor on the establishment of the villages of Exeter, Sutton Forest and Bundanoon. The forestry, quarrying and mining industries, the role of the rail and road in establishing the pattern of development over the landscape, and importantly, of agricultural development and changes through time since the early 1800s are not included.
"The Area also has a strong historic association with sixteen New South Wales Governors who utilised "Hillview" as their country residence from Lord Augustus Loftus in 1879 to Sir John Northcott in 1957."	Assessment is that the association is clear and of a high degree at *Hillview*, the holiday residence. While the governors would have visited in the district the association through the landscape and even the villages of Sutton Forest and Exeter must be considered 'light'.

Table 2.4.5 Analysis of the Assessment of Significance / Values continued

Historical Significance continued	
National Trust (NSW) assessment of significance of 1998	***Assessment analysis***
"The Area has historic significance as the community in which numerous prominent Australian identities established their country estates including Australian Iron and Steel Limited founder Cecil Hoskins and Arthur Yates (Yates Seeds) and garden designer Paul Sorensen at "Invergowrie"; Miss Irene Hope Meek founder of the Australian Brownie Movement at "Whare-Tau"; Benjamin Carter who discovered shale in the Joadja Valley in 1852 and established the shale mining operation at Joadja ("Golden Vale"); Christopher Bennett proprietor of the Sydney Evening News Newspaper at "Rotherwood"; Mr Justice later Sir William Owen at Whitely" and James Atkinson author of "An Account of the State of Agriculture and Grazing in New South Wales" - published 1826 and his botanist daughter Caroline Louise Atkinson at "Oldbury"".	The listing is in error in indicating "garden designer Paul Sorensen" established his country estate "at Invergowrie." Sorensen designed and implemented the garden at Invergowrie for Cecil Hoskins in the mid to late 1930s. It was not Sorensen's country estate. Historical "country estates" which the listing area purposefully encompassed (as distinct to the Historic Unit 6 – *Sutton Forest Landscape Area*) are omitted eg the *Black Horse Farm*; the 1837 Lennox Bridge; and the 1840s *Eccleston Park*, *Comfort Hill* and *Eling Grange* properties. Historical significance, likely of a high degree, lies over more of the landscape than that of the notable people listed. The pattern and characteristics of the landscapes formed and re-formed through the 19th and 20th centuries should be included with the outline histories of the longstanding, larger properties.
Aesthetic Significance Criterion c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW.	
National Trust (NSW) assessment of significance of 1998	***Assessment analysis***
"The Conservation Area has aesthetic significance as an homogenous "English-style" landscape of grand estates, gardens and mature plantings, meandering country lanes with remnant native vegetation, churches & churchyards, historic railway complex and very impressive residences in a range of architectural styles all in sympathy with and contributing to the aesthetic qualities of this cultural landscape."	The statement omits to describe what "an homogenous "English-style" landscape" comprises in appearance. The components which could be called typical or representative of an "English-style" landscape are not explained, except that there are "grand estates, gardens and mature plantings, meandering country lanes with remnant vegetation . . ." These could be found in many other historical landscapes in Tasmania, Victoria and elsewhere in coastal regions of NSW and SE Qld. The park and garden design 'style' sometimes called the 'English landscape school' has particular characteristics which are not recorded here, and in any case, it generally refers to the design of a garden or park usually of a large scale, not a part of rural English countryside (one should ask: of which English rural county?). If the term "English-style" refers to a part of the English countryside then it would assist if more of the aesthetic characteristics stated to be in common had been elaborated and where they are to be seen in this particular landscape. It should also be noted that the majority of the "impressive residences" are not visible from the public roads.

Table 2.4.5 Analysis of the Assessment of Significance / Values continued

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

National Trust (NSW) assessment of significance of 1998	*Assessment analysis*
"The Landscape Conservation area is socially significant to the residents of Sutton Forest and Exeter who have each contributed on their own properties towards maintaining the Area's landscape, historic and architectural qualities and who have joined together to fight unsympathetic developments at Mt Gingenbullen and Exeter."	The intangible, social association of residents of Sutton Forest and Exeter villages with the landscape, historic and architectural qualities of those villages and environs values appears present and long standing according to the entry. Additional evidence of a wider community social attachment to the wider landscape would indicate social values are present over much more of the cultural landscape.

Research Significance
Criterion e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.

National Trust (NSW) assessment of significance of 1998	*Assessment Analysis*
"The Area has research significance as the majority of its landholdings (subdivision patterns and buildings) have remained intact since the days of its first settlement in the 1820s." "There would be significant potential for archaeological investigation on the early Badgery landholdings from the 1820s particularly in the area of the original homesteads. The area is rich in potential for the study of early horticultural and landscaping practice."	In addition to the Badgery landholding, the Nicholson and Atkinson properties appear from that report to be another two important ones. Archaeological investigations on private landholdings would generally require owner's permission. The Hume Coal Project EIS Statement of Heritage Impact included investigations of archaeological potential over the Project area. The outcomes of those detailed studies, including field investigations, are recorded in the EIS Chapter 5. Information such as this would considerably inform any update of the National Trust (NSW) listing.

Representativeness Significance
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.

National Trust (NSW) assessment of significance of 1998	*Assessment analysis*
"The Area is an exceptional example of a very early pastoral landscape the core of which is based on a single family dynasty and which has been enriched by the overlay of a remarkable collection of country estates of many of the most influential and noteworthy persons in New South Wales."	This statement indicates the place meets this measure to a high degree. The statement requires more explanation of how the statement's high level is achieved. In addition, there should be reference to a comparative analysis of other NSW "early" pastoral landscapes. Possible areas to compare include: - the Sydney region; - the Hunter Valley; -the Richmond-Tweed "Big Scrub" with its similar historical land clearing and subsequent settlement with dairying and agriculture /Northern Rivers region;- the Clarence and Macleay Rivers coastal regions; -the Tilba-Tilba district.

Table 2.4.5 Analysis of the Assessment of Significance / Values continued

Rarity Significance

Criterion f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history.

National Trust (NSW) assessment of significance of 1998	***Assessment analysis***
"The Exeter/Sutton Forest Landscape Conservation Area's combination of early settlement (1820s), superb "English-style" landscaping, remnant Ribbon Gum lined country lanes, largely intact land settlement and land grant patterns, a range of notable architecture of various periods and styles (from the 1820 Georgian "Oldbury", the Celtic style 1890s St Aidan's Church listed on the RAIA's List of Significant Twentieth Century Buildings to the 1937 Professor Leslie Wilkinson designed "Rosedale", the Area's link with sixteen Governors of New South Wales, its two historic townships of Exeter and Sutton Forest with their very low key stores and post offices - all these combine to create a landscape which is arguably unique in the State of New South Wales."	The statement would benefit with more explanation of how the high level is achieved. The assessment commentary of the 'aesthetic' value / criteria above, regarding the "*superb*" English-style" landscaping", applies to this statement. The "*Ribbon Gum lined country lanes*" not located or named, are not explained how they fit in the "*superb English-style*" landscape. The "*largely intact land settlement and land grant patterns*" are the strongest value and measure for this significance statement. The link with "*sixteen Governors of New South Wales*" is repeated here (from historical significance). It is to be noted that the governors used *Hillview* as a summer residence. *Hillview* is a place on the state heritage register and this 'rarity' value is more to be associated with the house than with the cultural landscape. While the villages, and the connecting roads, and rail, are integral components of the settled and culturally shaped landscape in form and appearance, it is the breadth of the landscape over which the value of rarity or "*arguably unique*" must be detailed.

Integrity Significance

The National Trust listing records the heritage significance according to "Integrity". This is not part of the state heritage criteria.

National Trust (NSW) assessment of significance of 1998	***Assessment analysis***
"The outstanding quality of the Exeter/ Sutton Forest Landscape Conservation Area is its intactness and integrity. There has been exceptionally little of cultural heritage value destroyed or compromised within the area. Those buildings of heritage significance from the very early days of settlement which have been lost (e.g. the original Ivy Hall) were lost through accidental fire or demolished by their original owners when ·new and grander residences were built to replace them. It is remarkable that when passing through the townships of both Sutton Forest and Exeter, their appearance has remained virtually unchanged from photographs depicting them at the last change of a century. While there have been subdivisions for new housing west of Exeter, the siting of this development has not impacted adversely on the Landscape Conservation Area's key vistas and most historic precincts."	This first sentence on the value of integrity presents that the place meets the criteria to a very high degree. Integrity is primarily presented as present in the buildings and the two villages. The "historic precincts" noted in the last sentence are presumably Exeter and Sutton Forest. The *Exeter/Sutton Forest Landscape Conservation Area*'s "key vistas" are not detailed. Explanations in recent studies (eg Bowie 2006) of changes in land cover, land use and landholdings indicate there has been substantial change over much of the landscape since the 1820s. The intactness of the landholdings (as stated in the 'research value / criterion statement) could be justified with more explanation of landholdings where there has been little change.

2.4.6 Exeter/Sutton Forest Landscape Conservation Area Values Assessment

The values of the statements of significance in the listing by the National Trust of Australia (NSW) for the *Exeter/Sutton Forest Landscape Conservation Area* are appropriate, to varying extents and to varying degrees, for the cultural landscape as delineated by the National Trust (NSW) in 1998.

To address the IPC requirements of R17, the author has undertaken an assessment of the values of the *Exeter/Sutton Forest Landscape Conservation Area* using the superseded State Heritage Inventory that was used by National Trust (NSW) in 1998. This assessment is set out in Table 2.4.6.

Table 2.4.6 Assessment against the State Heritage Inventory (SHI) criteria used by the National Trust (NSW) in 1998 (criteria now superseded)

Superceded SHI criterion	*Assessment*
1. Historical significance	This cultural landscape area holds considerable historical significance in the intangible evidence of historical rural properties which have operated continuously over much of the landscape since the early 19th century following European settlement, timber getting and clearing and fencing of pastoral runs. Ownership and property boundaries have changed through time, however, the general scale and nature of the rural properties continues. In the landscape historical features include 19th century homesteads, hawthorn hedges, and elm and other exotic tree plantings around homesteads and along fence lines, and mid to late 20th century pine windbreak plantings forming paddock divisions and screens. The Main South Railway line was set out through this area in the 1830s and from its presence grew the village of Exeter which now has heritage places at and near a small core with historical character at the central crossroads. The Hume and Illawarra Highways through the heart of this landscape are the major historical routes not only connecting regions and towns north and south of this landscape, but also serving the places within. Oldbury Road and Golden Vale Road are historical local roads associated with the properties they served historically. These movement route corridors potentially indicate historical narratives of the cultural landscape. The village of Sutton Forest on the Illawarra Highway, the heart of its rural and semi-rural locality, holds historical significance not only for the heritage places within and in its environs but as one of the historical villages of the region.
2. Aesthetic significance	Mt Gingenbullen which rises above the generally open, rural landscape is a landmark for the locality and a scenic feature visible from local roads and the two highways. Mt Gingenbullen is in private ownership and public views from there are not possible. The gently undulating rural landscape around the mountain, extending west to the Belanglo Forest ridges and east to the Mt Broughton area, has a moderate scenic quality formed by the modulation of land form, the grassed fields and the vegetation cover. The fields are of different sizes, interspersed by winding riparian corridor vegetation and linear tree belts along field borders. There are tree groupings around homesteads and at village fringes. The aesthetic experience from travelling the often curving, historic roads and from the rail line is of a high degree of variety and contrast of form, colour and texture, in particular as the trees include both eucalyptus and other native species and evergreen exotic pines.
3. Social significance	This cultural landscape holds intangible social significance through the attachment of the residents, including those of Exeter and Sutton Forest, Berrima, Bundanoon and Werai (the latter three communities outside the landscape) who travel through the landscape in the course of their lives.

	Some of the communities have joined community actions to retain landscape aspects they appreciate in the face of development pressures. The degree of social significance is not assessed as of a high significance based on the information available in the listing and from recent assessments of social aspects pertaining to this cultural landscape.
4. Technical / Research significance	Areas within this cultural landscape hold a potential to reveal aspects of historical, associative and archaeological significance.
Representativeness	This cultural landscape holds some level of representativeness of the characteristics of 19th and 20th century settlement and development of rural regions of the Sydney Basin region however it is assessed as not substantial and not at a state level. A comparative analysis with other NSW "early" pastoral landscapes is required to inform any further or higher level assessment.
Rarity	The degree of *'rarity'* over this cultural landscape has only a low degree of tangible evidence. The majority of land settlement and land grant patterns have been altered considerably. The association of the presence of the governors' summer residence, *Hillview,* is a value of 'rarity' to be associated with the house rather than with the whole cultural landscape. Similarly, the presence of historic villages in an otherwise rural cultural landscape is not an aspect of 'rarity' in NSW. Comparisons in the context of other NSW cultural landscapes may reveal a value of local level significance.
Integrity	This cultural landscape holds a minor degree of integrity value in the historical rural properties with historical homestead buildings, and to a lesser degree in the two villages. The historical precincts of Exeter and Sutton Forest, have a degree of *'integrity'* or intactness.

The Cultural Landscape Today This rural, continuing cultural landscape appears to hold a moderate to high degree of historical, aesthetic, research and integrity values, though there have been noticeable changes in pastoral and rural residential practices through its history and these are highly evident and now form the major part of the landscape character.

2.4.7 Exeter/Sutton Forest Landscape Conservation Area Assessment of State Listing Potential

While the 1998 listing by the National Trust (NSW) for the *Exeter/Sutton Forest Landscape Conservation Area* addresses the superseded State Heritage Inventory criteria, the listing does not state that the landscape meets eligibility for state listing.

If the *Exeter/Sutton Forest Landscape Conservation Area* is under consideration for state heritage listing, the existing entry requires the following modifications.

- An update of the "Reasons" / the statements of significance using the current SHI criteria.
- An expansion and update of the history, including the industrial, manufacturing and commercial narratives of the region and through this cultural landscape.
- Descriptions to incorporate detailed information on the historical patterns of development / the continuing changes over the cultural landscape, including the rail, mining, industry and contemporary land use changes and recreation should be added.
- The extent and boundaries need to be detailed with reasons.
- The historical and continuing relationships between the community and the landscape need to be detailed.
- A comparative analysis with other state listed (or potential listings), rural, continuing cultural landscapes would provide a more rigorous basis for a state level assessment.

The values related to heritage significance need to be soundly based and clearly expressed without favour or bias if the entry is considered for state heritage listing. Without the above additional data and assessments, eligibility is not met for a state listing of the cultural landscape.

This rural, continuing cultural landscape holds a moderate to high degree of historical, aesthetic, research and integrity values, however these values or qualities, and the heritage significance assessed for them, is of a local level of heritage significance. There is not the degree of contribution to the state according to the state heritage criteria that indicates the landscape is a place of state significance.

3.0 Cultural Landscape Assessment Considerations

3.1 Introduction

The IPC report recommendation R17 is that the Heritage Council of NSW's 2018 letter be addressed:

> *"The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 . . ."* (IPC NSW, 2019)

Included in the Heritage Council NSW recommendations is that: *"The assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail."*
The National Trust (NSW) listed the *Exeter / Sutton Forest Landscape Conservation Area* in 1998 (R2218) and that listing includes a statement of significance for each of the values that were assessed as present in the landscape.

This chapter provides the context for assessment of the values of a proposed cultural landscape over part of the central Southern Highlands region, hereafter called the *Central Southern Highland Cultural Landscape* for this report. This chapter includes:

- a broadening of the necessary considerations of the Central Southern Highlands cultural landscape and the approach for assessment of the values and significance - section 3.2;

This information serves to support the analysis and values assessment of the *Proposed B,SF&E Cultural Landscape* (Morris 2017) of chapter 4.0.

Historic heritage The Hume Coal Project EIS *Statement of Heritage Impact* (EMM, 2017) included a comprehensive historical background of the Project area and surrounding cultural landscape. It addressed: historical themes, Aboriginal - settler contact, and a comprehensive history. The IPC response report, *Historical archaeological assessment & SoHI*, similarly detailed the Project area heritage places, their heritage significance and assessed impacts to those places. This detailed, reference background of the cultural landscape is not repeated here.

3.2 The Southern Highlands Cultural Landscape Considerations

3.2.1 Additional Cultural Landscape Parameters

The Southern Highlands landscape can be understood as predominantly a cultural landscape. In *Wingecarribee: Our Home* (Bowie, 2006), Ian Bowie explains that the extent of the 'Southern Highlands' is not officially defined. He uses the name to describe "what was known as the 'Berrima District' in the nineteenth century and sometimes as the 'Southern Tablelands' in the twentieth century", and takes it to be synonymous with the Wingecarribee Shire (Bowie, 2006. p. 2). He explains how the 'Southern Highlands' can be distinguished from adjacent areas both historically, as the historic Berrima Registry and the Berrima Police District were the same as the Wingecarribee Shire now, and physically, by its plateau landform and the separate character from the National Parks and water reserves to the north, east and south.

An overview of the Southern Highlands, presented through extracts from *Wingecarribee: Our Home* (Bowie 2006), is presented in **Attachment 1 *Additional Cultural Landscape Characteristics and Values***. This is from a single author however it appears rigorously researched and systematically documented in great detail. It presents an authoritative perspective to provide context to the National Trust (NSW) designated *Exeter/Sutton Forest Landscape Conservation Area* (R2218) and the *Proposed B,SF&E Cultural Landscape* by Morris in 2017. Some key considerations which appear lightly addressed in the *Exeter/Sutton Forest Landscape Conservation Area* National Trust (NSW) listing and in the *Proposed B,SF&E Cultural Landscape* Morris 2017 study are introduced in Table 3.2 as important considerations.

In addition, the research and reports in the Project EIS (EMM 2017) and the supplementary reports, including the SoHI (EMM 2020) present contemporary expert information on the natural and heritage components within the *Central Southern Highlands Cultural Landscape*.

Table 3.2.1 The Central Southern Highlands Cultural Landscape Physical Characteristics

Landscape, Vegetation /Land Cover, Aesthetic & Environmental Values Changes

The widespread clearing of vegetation over the past two centuries gave rise to a considerably altered landscape from the early decades of settlement in the first half of the 19th century. The studies have indicated estimates that over 60% of the shire's natural vegetation has been substantially cleared, and that the native vegetation land cover is in the outer parts of the Shire - not in the rural cultural landscape. This change has arisen not only in the 19th century but early in the 20th century after the First World War (Bowie, 2006. pp. 24-25). The impacts and changes from land use practices continued through the 20th century, as indicated in part by the 1998 collapse following clearing of vegetation and years of peat mining of the Wingecarribee Swamp, the largest upland peat-swamp in Australia (Bowie, 2006. p.9). In summary, the landscape of the historical settlement period has been substantially altered by the 20th and 21st century landscape changes. This was not presented in the assessments of historical and aesthetic values in the National Trust (NSW) *Exeter/Sutton Forest Landscape Conservation Area* listing and the *Proposed B,SF&E Landscape.* These changes must be acknowledged in any assessment of the cultural landscape values.

The imperative for sustainable and regenerative agriculture, pastoral practices is strongly indicated in this landscape of relatively low rainfall and poor soil. There are of relatively recent land use changes over considerable areas, including olive orchards, vineyards, and horse breeding and training runs. These have brought, and will bring more, noticeable change of the rural landscape and villages character.

The Wingecarribee River and a Catchment Approach

The Wingecarribee River and its tributaries featured prominently in the historical early 1800s settlement of this subject landscape. These waterways and the pattern of land use and land shaping around them must be included.

> "*The guidelines required for protecting our evolved farming landscapes vary depending on the dominant agricultural uses and contemporary concerns about the interaction of human intervention with natural systems. While there should be State and national policies of landscape protection, the agricultural lands require a fine grained approach either based on catchments or regions.*" (Ramsay 2018 p50)

A water catchment approach should be taken in any determination of a cultural landscape boundary.

The Importance of the Railway

The role of the railway in the formation of the subject cultural landscape must be incorporated in the landscape description and assessment and the delineation of the boundary.

> "*Private subdivisions anticipating the railway created villages at Wingecarribee (1858, now Bowral), Nattai (1863, as New Sheffield), and Moss Vale (1864). By the time the railway was completed (1867) each of these had their established inns and other commercial establishments and towns developed around these, rather than around markets or other meeting places. . .* The railway was central to the commercial development of what are now the main towns." (Bowie 2006 p35)

This was from 1862, so the railway has been a continuous part of the subject Southern Highlands cultural landscape and part of the narratives of the historical, developmental, social and aesthetic values.

Social Value and the Relationship with the Rural Landscape

> "*Although the shire has a reputation of being 'genteel' a review of census CD data suggests that this reputation might be more imagined than real. This reputation seems to have arisen because of associations between the Wingecarribee and the elites of Sydney that developed after the beginning of the railway era and that became very strong as the motor vehicle came into prominence.*" (Bowie 2006 p 48)

The assessment of cultural landscape values benefits from recognition of the historical and current diversity of the population and their activities rather than only notable people and large landholders with stately mansions.

The Presence of Mining and Industry

Mining and other industries have a long history in the Southern Highlands.
"The Centennial Coal's Berrima Colliery at Medway was in continuous production from 1872 to a recent closure [2013]. Since 1924 it has supplied "high-ash coal to its single customer, Boral's Southern Blue Circle cement works at Berrima." (Bowie 2006 p 54)
The New Berrima cement works, opened in 1929, supplies much of NSW's cement needs. It established on the rail line between the Berrima Colliery and the Main South Railway giving access to markets in Sydney and Wollongong and to the limestone source at South Marulan.
The rail and the industry have been a visible part of the landscape for nearly a hundred years. Much of the early mining in the area was spurred on by the need to create the steel for Port Kembla to make railway components for the rail line in the region.
The Berrima Feed Mill on Berrima Road New Berrima, has also been a visible part of the cultural landscape.
Both the very high structures of the Berrima Cement Works (762 metres AHD /87m above ground level) and the Berrima Feed Mill (716 metres AHD /50m above ground level) lie in the viewshed of the landscape and roads north of Mt Gingenbullen.

Historical - Aesthetic Characteristics - Changes through Time

Assessment of the values in the landscape related to the historical significance, which is to be found to varying degrees throughout the cultural landscape, needs to be based on a review of the changes that have occurred over the landscape through the historical periods. The patterns of landscape character formed through time are the major contributing aspect of the aesthetic values in the landscape.

The National Trust (NSW) listing stated that the *Exeter/Sutton Forest Cultural Landscape Area* showed evidence of: "superb English-style" landscaping, remnant Ribbon Gum lined country lanes". The historical continuity of the landscape as viewed today, or at the time of the National Trust assessment, is not established. The changes through time can be understood in part through study of historical documents including aerial photography. Such study has indicated that the historical and associated aesthetic characteristics of the landscape today, in particular the "English-style" landscape, are unlikely to be evidence of the characteristics present in the 19th and early 20th century.

Some of these changes through time are included with analysis in **Attachment 2** ***Aerial Photo Comparisons*****.** This has comparisons of historical aerial photos and appraisals of historical and aesthetic changes through time.

Traditional Owners and Regenerative Management

"Throughout Australia the conservation and management of cultural landscapes should be guided by the Indigenous communities who belong to those landscapes." (Ramsay, 2018. p. 4)
Additional information and engagement with the Indigenous community is vital to a fuller and appropriate understanding of a Central Southern Highlands Cultural Landscape.

3.2.2 Historical – Aesthetic Values - Additional Values Consideration

Assessment of values in the cultural landscape requires a comprehensive widely drawn description of the landscape characteristics, including the changes through time, which shaped the central, southern rural area of the Wingecarribee Shire landscape as appreciated today. The historical, early European settlement evidence in the landscape is important, however so are the continuing changes of the 20th century and recent times.
Attachment 2 ***Aerial Photo Comparisons*** presents the *Proposed B,SF&E Cultural Landscape* with a somewhat different assessment of historical and aesthetic changes through time to that in the Morris 2017 study.

The assessment of the cultural landscape in Chapter 4.0 is informed by that appraisal of historical and aesthetic values through the mid to late 20th century.

3.2.3 Thematic Description for Assessment of a Cultural Landscape

Another broader, accepted assessment method to understand and determine a cultural landscape is through a thematic description and analysis. This thematic approach to understanding a cultural landscape and its overlapping values is outlined in **Attachment 3** ***Thematic Changes Through Time***.

It is important to understand and assess the cultural landscape through all the phases of its history as it developed to have the form, appearance and associations it holds today. The appraisals of the aerial photo comparisons of Attachment 2 and of the thematic approach considerations of Attachment 3 indicate that the assessments of the *Proposed B,SF&E Cultural Landscape* may be enriched and amended to better represent the Central Southern Highlands Cultural Landscape heritage significance and extent.

Some of the preliminary findings include:

- The landscape has been extensively modified in the previous fifty years from 2020.
- The remnant indigenous vegetation - eucalyptus and other trees, have been increasingly removed or have died. There is a very different character to that of the mid 20th century, and certainly to the years of early European settlement and subsequent pastoral and towns developments. This is contrary to the assessments made for the *Exeter/Sutton Forest Landscape Conservation Area* and the Morris 2017 *Proposed B,SF&E Cultural Landscape*.
- The landscape appreciated from the roads of the district now would appear noticeably different to that in 1949. The roadside vegetation and the hedges and windbreak lines of trees have increased considerably and are now widespread.
- The Hume Highway has been widened and planting is alongside the roadways. This is now a noticeably different movement corridor dividing the landscapes on either side.
- Moss Vale is seen to have expanded west, and while there is a clear line of the edge of subdivisions there is no physical or vegetative separation from the cultural landscape. The commercial / industrial / service zone, and the abattoir and yards, NW of Moss Vale, are now a part of the central cultural landscape.

The assessment of the cultural landscape in Chapter 4.0 is informed by that appraisal of historical and aesthetic values through the mid to late 20th century.

3.2.4 Assessment of a Cultural Landscape Assessment

The considerations outlined in this chapter have been drawn upon to form the following summary or conclusion statements.

Cultural Landscape Assessment Context- Additional Appraisal Conclusion

The *Central Southern Highlands Cultural Landscape* is highly varied, and this multiplicity of values, and including historical and social narratives through its history to the present times, needs to be included and the roles of all given acknowledgement in delineation, description and assessment of the cultural landscape. The mid and late 19th century pastoral and house and garden histories and their imagined aesthetics should not be given sole prominence in assessing this landscape. The region as present today - the cultural landscape, has been continually transformed by considerable natural then rural alterations, and by rail and road, by industry and mining, tourism and recreational uses and even in recent times by considerable, visually prominent, changes in rural land uses.

It should be noted that there is a difference in extent, diversity, content of historical, aesthetic and social values of those indicated in the earlier listed cultural landscapes, to those in the *Proposed B,SF&E Cultural Landscape*.

In addition, delineation of a designated cultural landscape boundary is important, in particular as it records the landscape which encompasses the values and associated narratives of the landscape. A water catchment approach should be undertaken in any determination of a cultural landscape boundary.

4.0 Proposed Cultural Landscape Values Assessment

4.1 Introduction

The landscape values of the *Proposed Berrima, Sutton Forest & Exeter Cultural Landscape* are assessed in this chapter as part of addressing the IPC Recommendation 17.

> "**R17** The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283."
>
> (IPC NSW, 2019. p. 8)

Included in the Heritage Council NSW recommendations is that:

> *"The assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail.*"

To establish a sound basis for the assessments of this report, including the assessment of impacts by the Project on the *Proposed B,SF&E Cultural Landscape,* this chapter:

- outlines the differing cultural landscapes identified and proposed in the central Southern Highlands, - section 4.2;
- reviews aspects of the proposed cultural landscape extent, - section 4.3; and
- addresses the values of "the National Trust of Australia (NSW) 1998 Summary Statement of Significance" with reference to the assessments in the Morris 2017 study - section 4.4.

4.2 The Proposal for a Cultural Landscape

A cultural landscape designation has been proposed by the Morris 2017 report *Cultural Landscape Assessment Berrima, Sutton Forest, Exeter Area*. The landscape proposed includes part of the central Southern Highlands and encompasses the Hume Coal Project area - both the proposed underground workings area and the lesser area of surface infrastructure and rail loop.

The National Trust (NSW) listed *Exeter/Sutton Forest Landscape Conservation Area* (R2218) and Morris' 2017 *Proposed B,SF&E Cultural Landscape* have differing boundaries, and assessments of heritage significance have been made based on differing perspectives on the historical, aesthetic and social characteristics.

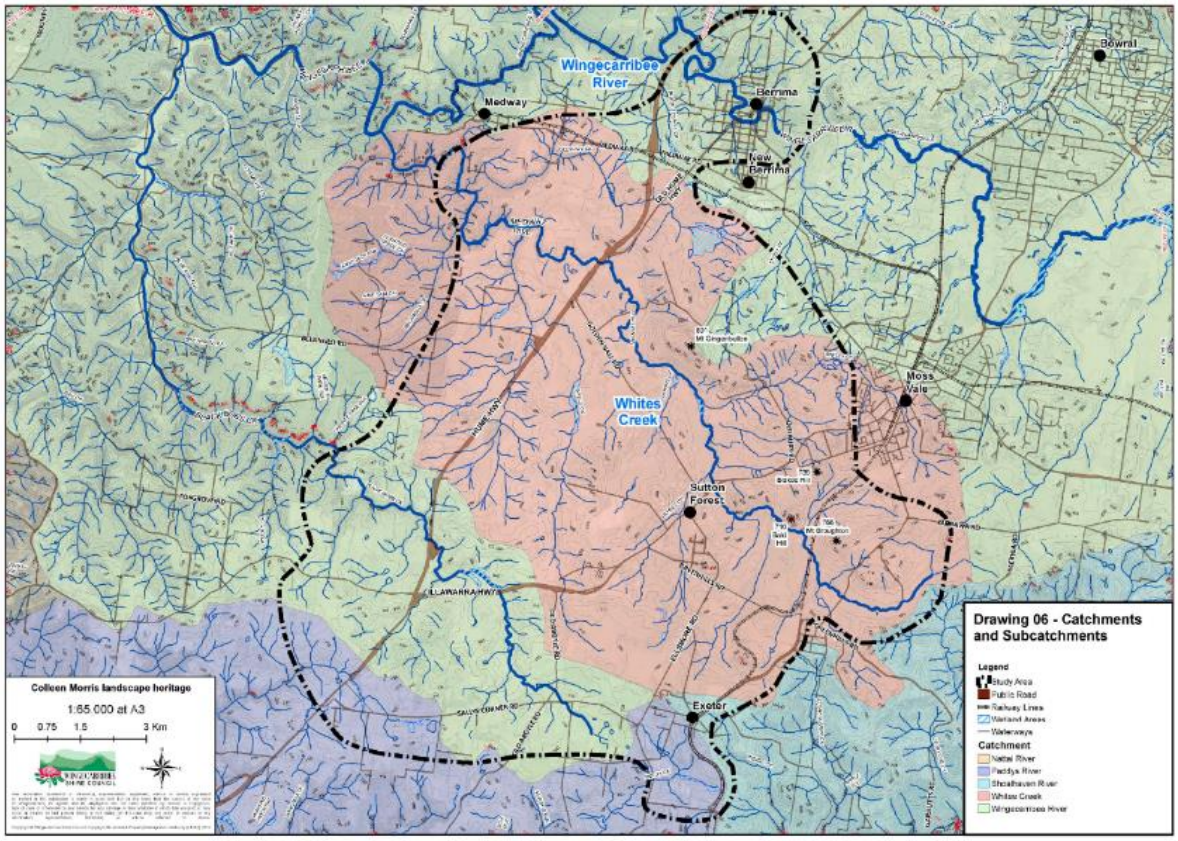
In section 2.3 above, two past listed cultural landscapes, overlapping in part though of differing extent, were outlined and presented on figure 01 with the whole Project area also outlined.

4.3 Extent & Boundaries

4.3.1 The B, SF & E Study Area

The Morris 2017 "study area" boundary is shown on this figure from the study. This study area became the area for the *Proposed B,SF&E Cultural Landscape* of that study.

The *Proposed B,SF&E Cultural Landscape* delineated a different cultural landscape to the *Exeter /Sutton Forrest Landscape Conservation Area* listed by the National Trust (NSW) in 1998, and to the *Key Historic Unit 6 – Sutton Forest Landscape Area* listed in the WSC LEP between 1993 and 2010. The Morris 2017 study proposes inclusion of the current WSC LEP delineated *Berrima Landscape Conservation Area* (C1843) and the *Berrima Conservation Area* (C148), and additional lands to the west and south of the National Trust cultural landscape area.



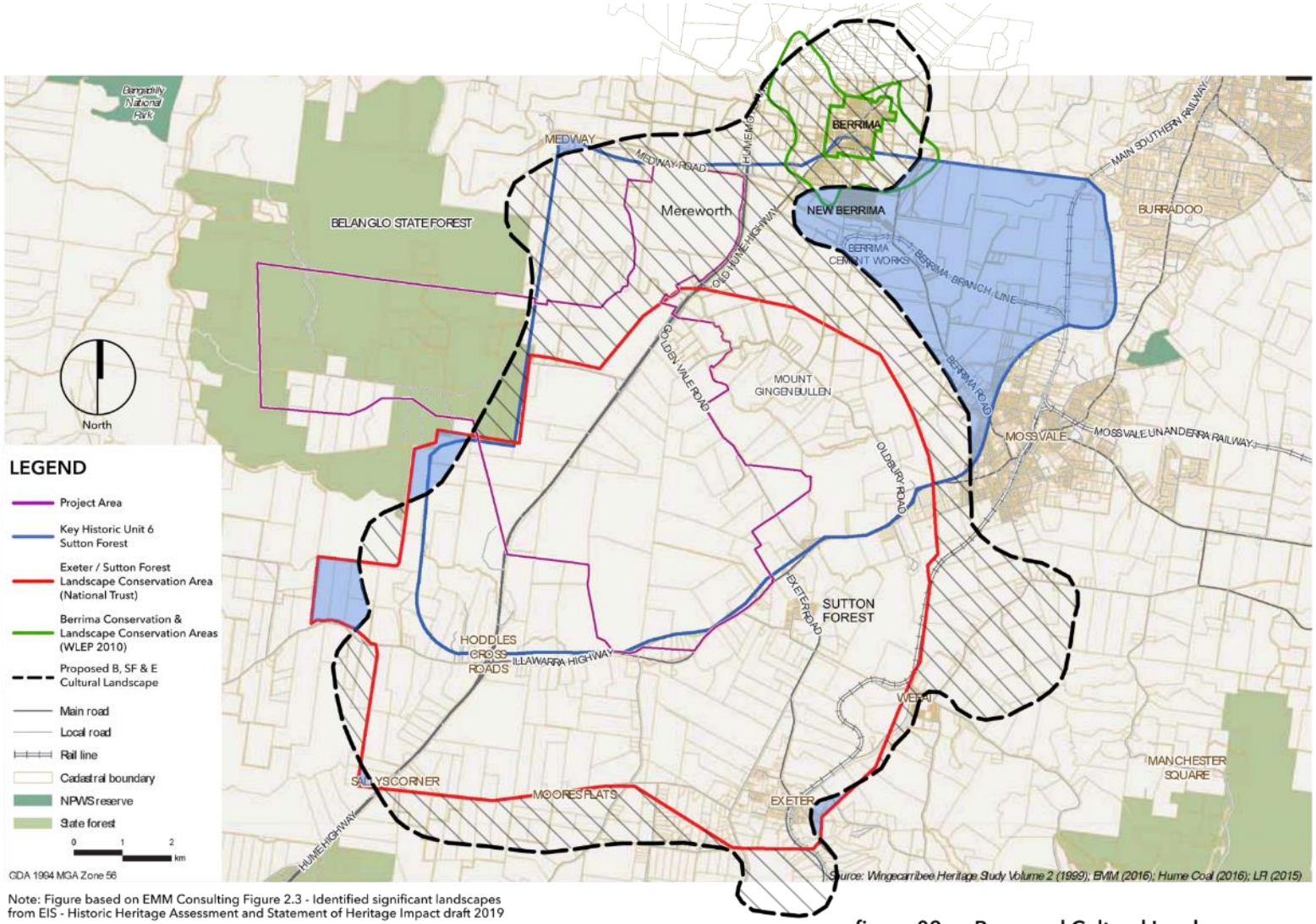
The *Proposed B,SF&E Cultural Landscape* "study area" dashed in black (Morris 2017 - drawing 06). Whites Creek catchment is shown in pink and Wingecarribee River catchment is pale green. South of these are the Paddys River (purple) and Shoalhaven River (blue) catchments.

4.3.2 The Proposed Changes to the Cultural Landscape Extent

Expansion of an earlier assessed and delineated cultural landscape is legitimate if based on new information revealed by further research and soundly based landscape assessments. Similarly, removal of previously identified valued landscapes from a designated and statutory regulated area should only arise after changes in that landscape have removed those significant values.

There are landscape areas which were included in previously assessed and designated cultural heritage landscapes but which are omitted from the *Proposed B, SF & E Cultural Landscape*. These are indicated on figure 02.

There are no reasons presented as to why the *Proposed B,SF&E Cultural Landscape* was drawn to omit such a large portion of the *Key Historic Unit 6 -Sutton Forest Landscape Area* in the north east, and the area at Medway which was also in Unit 6, and two areas in the west. The study states that the Council assisted with the study and mapping. The following paragraphs provide an analysis highlighting the differences between the earlier assessed landscapes of heritage and character significance and the *Proposed B,SF&E Cultural Landscape* .

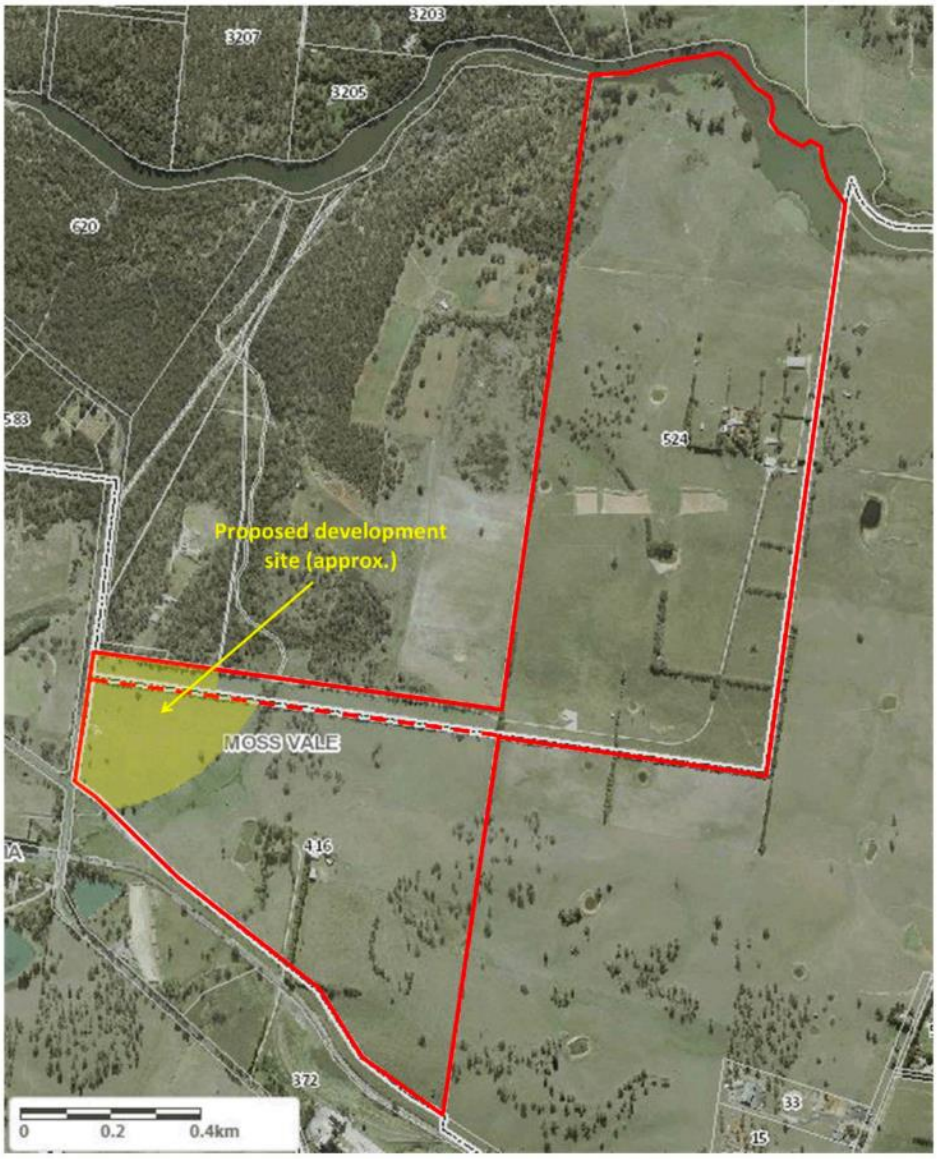


Note: Figure based on EMM Consulting Figure 2.3 - Identified significant landscapes from EIS - Historic Heritage Assessment and Statement of Heritage Impact draft 2019

figure 02 - Proposed Cultural Landscape

The *Proposed B, SF & E Cultural Landscape* area comparison. The hatched areas indicate the additional area compared with the *Exeter / Sutton Forest Landscape Conservation Area* National Trust (NSW).The blue shading indicates reductions from both past cultural landscape areas.

Northeast Cultural Landscape Sector



'Attachment 3' of the Wingecarribee Shire Council DA 18/0576 - General Industry (Masonry Manufacturing), Lot 1 DP785111 and Lot 1 DP414246, 416 Berrima Road, Moss Vale and 524 Berrima Road, Berrima. source: WSC Ordinary Meeting of Council: Attachments to Reports 25 September, 2019, p. 5.

This annotated aerial photo from the report of a 2019 ordinary meeting of WSC for a DA approval shows the area proposed for a masonry manufacturing works (yellow area). In addition to that area, there is proposed an extractive industry area, a "New Berrima Shale Quarry Project" over the northern lot of 524 Berrima Road, Berrima (not shown on this figure). Publicly available information indicates this will entail about a third of the lot for direct extraction, a surplus overburden area, access roads, and site office, amenities and storage buildings. (WSC Ordinary Meeting of Council 25 Sept., 2019)

The existing landscape seen in the above aerial photo shows many of the characteristics of the landscape included within the "study area" of the *Proposed B,SF&E Cultural Landscape*. It has a rural pastoral landscape extending from the Berrima rail line to the Wingecarribee River of a landscape character similar to much of the central Southern Highlands, homesteads surrounded by gardens and planted trees, trees planted along drives to these rural homesteads, lines of planted windbreaks and hedgerows, and dams in the paddocks. These lands and the wider landscape around them appear highly similar in historical narratives, land use, landscape character to much of the *Proposed B,SF&E Cultural Landscape.*

It should be noted that this sizeable area of the cultural landscape has not been included in the proposal for a *B,SF&E Cultural Landscape*. This landscape, which includes a border with the ecologically and culturally important Wingecarribee River, and which was part of the earlier WSC LEP *Key Historic Landscape Unit 6 – Sutton Forest Landscape Area,* is excluded from the 2017 proposal for a *B,SF&E Cultural Landscape,* however the reasons are not presented. The community appears to have not presented objections to this extractive industry or quarry land use though it is over a part of the cultural landscape holding historical, aesthetical, research and integrity values of significance

North west and Southwest Cultural Landscape Sectors

A part of the cultural landscape environs of Medway, south of Medway Road, is removed in the proposed *B,SF&E Cultural Landscape.* Medway should be considered one of the villages of the continuing cultural landscape. This boundary difference to the *Exeter/Sutton Forest Landscape Conservation Area* is not explained.

Two areas of landscape in the south west are removed in the *Proposed B,SF&E Cultural Landscape*. The area deleted just south of the *Cherry Tree Hill* property appears a contiguous character to the included land to the east of it and in any case is part of the same catchment physically and visually.

A similar situation applies to the lands deleted to the west of the historical *Eccleston Park* property homestead curtilage.

4.4 Assessment of Values and Heritage Criteria

4.4.1 Introduction

This section analyses the assessments of heritage significance as used in the Morris (2017) report and indicates where additional information and clarification are suggested. In addition, heritage values or significance and heritage assessment criteria, which are present in the landscape though not recorded in the 'statement of significance', are indicated. This addresses the IPC recommendation to assess the "values" of the cultural landscape. These assessments are to be considered in conjunction with assessment of values of the *Exeter/Sutton Forest Landscape Conservation Area*, in chapter 2.0, as also apparently recommended by IPC recommendation R17.

4.4.2 Heritage Places

The IPC recommendation is for assessment of the values as set out by the National Trust (NSW) in the listing of the *Exeter / Sutton Forest Landscape Conservation Area.* In order to address this recommendation, including to assess possible impacts, an understanding of the different heritage components in the subject landscapes is of assistance. The historical villages and towns and their immediate settings, and the listed heritage places there, can be considered separately to the rural cultural landscape areas. These places are outlined in **Attachment 4** ***Heritage Listed Places of the Villages and Settings***.

It should be noted that the IPC response report, *Historical archaeological assessment & SoHI*, (EMM, 2020), also details the Project area heritage places, their heritage significance and assesses any impacts to those places.

4.4.3 Analysis of Significance /Values Assigned in the B, SF & E Landscape Proposal

In the Morris 2017 study the *Proposed B,SF&E Cultural Landscape* is assessed according to some of the criteria for entry of places on the State Heritage Register. (Morris 2017 pp154 - 163) This state level assessment is a different measure to the local heritage assessment, not only in the quality of the historical, aesthetic, social, technical and intangible values and the fabric and associations in evidence, but such assessment also requires consideration of comparative analysis and of the relative importance of the place to the state or local area context.

The assessments of the values in the *Proposed B,SF&E Cultural Landscape* (Morris 2017) are analysed in the following tables and summaries, in sections: 4.4.4 to 4.4.11. The values of the *Proposed B,SF&E Cultural Landscape* are assessed using the values in the superseded State Heritage Inventory (SHI) criteria used by the National Trust 1998 listing of a cultural landscape, as recommended by the Heritage Council NSW and the IPC report R17.

4.4.4 Assessment of Historical Significance *& to Criterion a)*

NSW heritage assessment criterion a) *An item is important in the course or pattern of NSW's (or the local area's) cultural or natural history (Historical Significance).*

This was a National Trust (NSW) criterion (number 1). In addition, associative significance appears to have been considered within their assessment for historical significance.

Table 4.4.4 Historical Significance - assessment analysis
criterion a) *An item is important in the course or pattern of NSW's (or the local area's) cultural or natural history (Historical Significance).*

Morris' 2017 measures of historical significance Source: Morris, 2017. pp. 154 - 155	***Assessment analysis***
"as a place of early exploration"	The evidence of the exploration and the area of early settlement should be expressed and included in the defined landscape. However, early places at Moss Vale and elsewhere are not included.
as a place of "early settlement and pastoralism from 1819"	
"early European response to the landscape is remarkably intact"	The coverage or distribution of the significant values over the curtilage of the proposed cultural landscape is not expressed and / or the values are not widespread over that area. The area proposed for the cultural landscape appears to require adjustment.
"with new patterns from the twentieth century subtly accommodated within the pre-existing landscape."	
"The use of Hillview, Sutton Forest, as the governors' summer residence 1879-1957 and the influence of that use still permeate and render the area unique."	The use of *Hillview* by the governors does not appear to "permeate" the cultural landscape, or "render the area unique". In the early history the governors' visits likely gave some status to the area for summer holidays by the social elite. It cannot be said that the area is unique because of *Hillview*, nor that this aspect still 'permeates' the cultural landscape character. The summer 'hill station' use was common in all states.
"The physical evidence in the concentration of so many 19th century buildings . . . imbues the area with a high degree of historical importance."	These buildings are generally not seen from the roads or the wider landscape so it is questionable the degree the historical homesteads give "a high degree of historical importance". The other historical characteristics of the homestead and villa properties, such as the scale and form of the property, need to be stated. Berrima village with its 19th Century buildings holds historical importance.
"Important 20th century houses such as Invergowrie, Rosedale and Mereworth added a layer to the already rich cultural landscape."	Why these are important is not stated. Rosedale and Mereworth properties date from early history of the region, though Mereworth's historic homestead no longer exists. Invergowrie and Mereworth have gardens with heritage significance though it should be noted these are private places and not visible from anywhere in the cultural landscape. Through awareness of their presence the region may gain some intangible value, however, this is a very minor layer of the cultural landscape.
"The main circulation routes are historically important dating from the 1820s and 1830s . . ."	Of the "main circulation routes" only two roads are then specifically noted in Morris, 2017. The current Hume Motorway is not an historical circulation route but is a major component of

	the cultural landscape, and divides the cultural landscape there into two parts.
"The area is significant for its association with convictism with a convict workforce playing a crucial part in quarrying, in the construction of early buildings and roads and as part of the workforce on early estates."	"Convictism" is noted for its typical (not unique) role in pre-1840s settlement areas.
"The opening of the railway line is of historical importance in the development of the area and the rise of early twentieth century tourism."	Much of the rail line is not included in the *Proposed B,SF&E Cultural Landscape*. The ongoing role of the railway after the early 20th century has an important role. The role of the railway line is noted for "importance in the development of the area" and "early twentieth century tourism". These are legitimate aspects of the cultural landscape though not unique or uncommon for the state's pattern of cultural history.
"Berrima is of exceptional significance as one of the few substantially intact villages, dating from the Georgian period . . . an early administrative centre and as a major stopping place for travellers on the South Road."	Berrima already has heritage designation both of the state and local heritage places and the Conservation Areas. Moss Vale needs to be addressed for its significance. Moss Vale was an important hub for handling produce, and was established, with the railway, from the early 1860s.

Additional characteristics of the cultural landscape's historical significance

Following are some aspects which appear to have been omitted:

- The industry of the region, including the cement works which is still operating and a landmark in much of the cultural landscape;
- The manufacturing;
- The mining and quarrying, both historically and that still present and operating;
- The forestry and the pine plantations which form a strong visual framework, as well as its long history; and
- The agricultural developments.

The assessment, in Morris 2017, is inadequate in fully describing the historical narratives and the historical significance characteristics of the cultural landscape, either as in the Morris defined study area, or over the wider, legitimate cultural landscape.

Summary assessment points - historical significance:

- The historical settlement dates, process and some specific area narratives pertaining to the *Proposed B,SF&E Cultural Landscape* as described by Morris 2017 are supported by the several histories referred to in the report. Nevertheless, some important historical significance values are not included, and some should be enriched by additional explanation or background.
- The coverage or distribution of the significant historical values over the *Proposed B,SF&E Cultural Landscape* is not expressed and / or the values noted are not widespread over that area and that is not stated. The area of the *Proposed B,SF&E Cultural Landscape* appears to require adjustment.

4.4.5 Associative Significance & Criterion b)

NSW heritage assessment criterion b) *An item has strong or special association with the life or works of a person, or group of person importance in NSW's (or the local area's) cultural or natural history (Associative Significance).*

This was not one of the SHI criterion and was therefore not used by the National Trust (NSW), though it appears to have been considered within their assessment for historical significance.

Table 4.4.5 Associative Significance - assessment analysis
criterion b) *An item has strong or special association with the life or works of a person, or group of person importance in NSW's (or the local area's) cultural or natural history (Associative Significance).*

Morris' 2017 measures of associative significance Source: Morris, 2017. pp. 155 - 156	***Assessment analysis***
"The Berrima, Sutton Forest and Exeter area has strong links with prominent colonial settlers, individuals and families and a special association with important wealthy Sydney families and sixteen governors of New South Wales between 1879 and 1957."	The "special association" indicated by the list of persons included appears in the majority to be for their ownership / development of large properties including by the Sydney 'elites'. The lands which are implied hold state value for the association with most of the persons of the statement, and which together make a substantial part of the whole cultural landscape, are not described. The fabric of the landscape outside the separate heritage listed properties associated with these persons is not presented. Of consideration is that members of parliament, banking, and legal fraternities are in the majority of historical regions in east Australia. The governors visited / stayed at Hillview. How this association is in evidence elsewhere in the proposed landscape is not described.

Summary assessment points - associative significance:

- The list of associations should be enriched to include persons and /or groups outside the colonial settlers, for example to include the many transport and rail, manufacturing, commercial and mining associations, and the broader evidence of these other associations included.
- The coverage or distribution of the significant associative values over the proposed cultural landscape is not expressed and / or the values noted are not widespread over that area and that is not stated. The area proposed for the cultural landscape requires adjustment.

4.4.6 Aesthetic Significance & Criterion c)

NSW heritage assessment criterion c) *An item is important in demonstrating aesthetic characteristics and /or a high degree of creative or technical achievement in NSW (or the local area) (Aesthetic Significance).* This was a National Trust (NSW) criterion (number 2).

Table 4.4.6 Aesthetic Significance - assessment analysis
criterion c) *An item is important in demonstrating aesthetic characteristics and /or a high degree of creative or technical achievement in NSW (or the local area) (Aesthetic Significance).*

Morris' 2017 measures of aesthetic significance Source: Morris, 2017. pp. 156 - 157	***Assessment analysis***
"shaped by associations with early land grants and settlement of the region" "evidence of early settlement is still etched in the landscape."	The landscape has changed significantly as recorded, even in aerial photos of the past 50 years and the records of land clearing after 1798. The weedy spread of hawthorn, the removal of senescent pine windbreaks and replacement of pine species has been acknowledged elsewhere. This evidence is not explained over the whole landscape - the aesthetic qualities and where it is appreciated by the public.
"makes a substantial contribution to the visual qualities and spatial arrangements associated with the area."	The visual / aesthetic qualities of the landscape with the mountain needs to be detailed in scenic landscape assessment terminology. This would facilitate assessment, in particular, assessment of state level significance.
"The attachment to, and value of, the area by the early explorers and settlers, particularly for grazing, are still associated with the area."	This evidence is not explained over the whole landscape - the aesthetic qualities and where it is appreciated by the public.
"Whilst the scene has changed in detail, the 1798 description of the 'finest prospect' from the top of Mt Gingenbullen can still be appreciated."	The view from the top of Mt Gingenbullen cannot "still be appreciated" (Morris 2017 p. 156) as it is not in public land, is not a viewpoint generally open to visitors, not a place of listed heritage significance and not from a road or community gathering place, and has not been one. This viewpoint (or a series along the top of the mountain) and the views should not be used to establish the view appreciation of the landscape. It also appears conflicting to describe as "the natural landscape character" (p. 35) of the area as the study also called them as "the numerous pastoral valleys" (p. 35) which were recorded earlier as follows: "the paddocks cleared . . . resulting in a pastoral landscape".
"The early impressions of a rich and beautiful pastoral landscape remain, with mature avenue plantings and gardens signaling [sic] the location of country homesteads and their outbuildings."	The "early impressions" recorded are few, and appear to not encompass the "study area" landscape. A discussion of these 'early impressions' explaining the context and the considerable changes since would better explain this value.

"Its natural significance is based on the area's close connection with the terrain of the Wingecarribee River"	The natural significance of the "close connection with the terrain of the Wingecarribee River" is not explained. Except for the section in Berrima, the River was not included in the proposed BSF&E Cultural Landscape area. This is an omission of the important natural feature of the region. The River itself is rarely seen from much of the cultural landscape. Nevertheless, the cultural landscape should be drawn to include the River, not only as part of a catchment approach (important to use), but also as it has always been such a strong determinant of the wider cultural landscape. Council has approved an extractive industry area including a shale quarry project close to the Wingecarribee River within the wider cultural landscape, however this landscape has been excluded from the *BSF&E Cultural Landscape*.
"the focus of which is Mt Gingenbullen and the landscape beauty this landmark generated." "Many early properties were located within range of this volcanic remnant because richer soils and watered lands were in close proximity."	The visual / aesthetic qualities of the landscape with the mountain needs to be detailed in scenic landscape assessment terminology. This would facilitate assessment, in particular, assessment of state level significance. (It should be noted that the geological base is plutonic not "volcanic".)
"Berrima is significant as a collection of substantially intact early buildings, which are predominantly Georgian in style, the value of which is reinforced by the high landscape quality, in terms of both the village's mature exotic streetscape features and its remarkable sense of enclosure with indigenous vegetation, all combine to provide a sense of timelessness that is part of Berrima's character and appeal."	Berrima is stated by Morris as holding and displaying 'timelessness' made by the rural landscapes of the north and south approach "combined with the remnant native vegetation" (Morris, 2017. p. 14) The value of this type of "timelessness" in forming a significant cultural landscape is not explained further, and it does not appear in any other part of the cultural landscape "study area". Also, in section 3.4.2 *Vegetation of the towns and pastoral landscape* (Morris, 2017. p. 33), this combination and measure of 'timelessness' is not mentioned or recorded. There is undoubtedly a period character to the centre of Berrima and parts of the approaches, however, it has many altered aspects in its appearance so is not an intact period piece. Timelessness appears an incorrect term because of this period character. To be noted is that the sewerage works lie at the south approach to Berrima.
"The undeveloped nature of the surrounds of Berrima provides an important rural curtilage for the village, again contributing to the sense of timelessness."	This curtilage is designated a Conservation Area. It could be managed as part of the Berrima village conservation management. It serves as an enclosure through its character and is predominantly visually separate or distinct from the rural cultural landscape beyond.

"Churches and cemeteries at Berrima, Sutton Forest and Exeter are notable State level examples of cemeteries and churches with a high degree of integrity of design and aesthetic value."	The listed places in the villages have protection mechanisms. The aesthetic links with the wider cultural landscape should be outlined. The Berrima churches and cemeteries have heritage significance, though it should be noted that in most other heritage listed NSW towns and villages, the churches and cemeteries are likewise of heritage significance. Berrima is undoubtedly a place of state heritage significance. It may give clarity and benefit to heritage management if Berrima and its setting or "rural curtilage" (Morris 2017 p. 157) were separated at a statutory level (as in the WSC LEP) from the remainder of the rural cultural landscape.
"The . . . gardens and the rural landscapes of the Sutton Forest/Exeter area are highly valued for their scenic qualities by visitors from all over Australia."	The aesthetic characteristics of state level of quality that are valued are not stated so this value is unclear. Similarly, the gardens' era and characteristics are not stated. Garden visits, tulip festivals and other public garden shows in many other NSW historical regions are "highly valued for their scenic qualities by visitors from all over Australia". Appreciation by the visitors of the "scenic qualities" of the rural landscapes would primarily be only streetscape views. The roads and the views from those roads need to be stated in order to assess this value.

Historical, Associative and Aesthetic Values assessment points:
Together, the historical fabric and intangible narratives, and the aesthetic appreciation of this rural cultural landscape, can be appreciated as forming a particular landscape identity and a significant place.

- There are highly relevant and substantial historical and aesthetic values of heritage significance which are not included in the statements of significance. These include:
  - The rail and road influences on formation of the cultural landscape pattern, as well as that of,
  - the inns at stopping places, and the commercial businesses.

  Similarly omitted are the:
  - extensive vegetation removal;
  - the quarry and mining industries, even if modest in extent; and
  - the manufacturing, such as Boral Cement.

These are unnecessary omissions, indicating an inadequate assessment, as their role in shaping the cultural landscape pattern and appearance was strong, remains evident today and contributes much to an understanding of the richness of the cultural landscape.

- There is an emphasis on the influence by the wealthier, historical landholders and of government and social elites on the landscape appearance. This influence is possibly no greater than:
  - the movement and transport patterns including the major Sydney - Goulburn (and later Canberra) corridors;
  - the commercial, extractive, and manufacturing industries; and
  - the newer olive orchards, vineyards and horse studs.

Some of these formative cultural landscape patterns and characteristics were outlined in sections 3.2 and 3.3 above. Inclusion of narratives encompassing the diversity of the landscape formative influences and values would serve to enrich the understanding of this landscape and its potential significance.

- The area of the broader Southern Highlands which has been "shaped by associations with early land grants and settlement of the region" (Morris 2017 p156) has been recorded as at least 3 different extents - the *Key Historic Unit 6 - Sutton Forest Landscape Area*, the *Exeter /Sutton Forest Conservation Area*, the *Berrima Conservation Area,* and in the 2017 *Proposed B,SF&E Cultural Landscape* by Morris. These use the same measure to meet the heritage criteria. The significant landscape extent appears still not satisfactorily delineated. This has also been assessed in in 4.3 Extent and Boundaries.

- The "scenic qualities" of the villages and gardens of the *Proposed B,SF&E Cultural Landscape* are acknowledged (Morris 2017 p. 157). The "scenic qualities" of the "rural landscapes" are not explained in the statement of significance, in particular, how they may be of a high degree of integrity, representativeness or a high degree of aesthetic quality to raise them to a level to be contributory to state comparison.

4.4.7 Social Significance & Criterion d)

NSW heritage assessment 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 (Social Significance).* This was National Trust (NSW) criterion 3.

Table 4.4.7 Social Significance - assessment analysis
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 (Social Significance).*

Morris' 2017 measures of social significance Source: Morris, 2017. pp. 157 - 158	***Assessment analysis***
" a strong feeling of continuity, a sense of stewardship of the landscape and also participation in history among the local community who, across all social strata, have rallied to support the retention of their heritage."	Social or associative values which are not made clear or which may be enriched by additional explanation or background include: The social commitment of Cecil Hoskins, the banks and businesses who instigated and funded the Remembrance Driveway gardens along the Hume Highway seems worthy of inclusion at state significance however is not included.
"The [AGHS] has a deep interest in the gardens and landscapes of Berrima and Sutton Forest and has funded conservation studies and garden recordings for a number of gardens and an oral history of one of the gardeners at Mereworth."	Other community groups social attachment and commitment, from the past and currently, should be discussed.

Summary assessment points - social significance:

- Aspects of social significance associated with the landscape are not explained to the extent that a depth and breadth of social value is demonstrated.
- Social significance at a state level has been assessed to not have been met.

4.4.8 Research Significance & Criterion e)

NSW heritage assessment criterion e) *An item has the potential to yield information that will contribute to an understanding of NSW's (or the local area's) cultural or natural (Research Significance).* This was National Trust (NSW) criterion 4.

Table 4.4.8 Research Significance - assessment analysis
criterion e) *An item has the potential to yield information that will contribute to an understanding of NSW's (or the local area's) cultural or natural (Research Significance).*

Morris' 2017 measures of research significance Source: Morris, 2017. p. 158	***Assessment analysis***
"Within the Study Area there are a number of archaeological sites" "These include aboriginal sites around Mt Gingenbullen" "indigenous groove stones and quarrying sites at Comfort Hill"	These indicate important values in the landscape.
"agricultural sites including research into the location of the early ploughing fields at Sutton Forest"	These indicate features in the landscape of a degree of significance.
"the convict sites at Berrima and the outbuildings associated with early settlement sites"	
"Many inns were established on the Great Southern Road south from Berrima to Sutton Forest and beyond, . . . "	
"Endangered Ecological Communities (EEC) and Threatened Ecological Communities (TEC) . . . have potential to contribute to the knowledge of the regeneration of these community types on previously cleared land."	These Communities appear to have a minimal presence within the proposed cultural landscape. The substantial clearing that has occurred has decimated the original ecosystems. There are very small remnants within large rural holdings and a small patch along Oldbury Creek within Mereworth property. The overwhelming majority of this vegetation Community is outside the cultural landscape in the Belanglo Forest area. Regeneration, part of continuing rural landscape changes, needs to be addressed.

Summary assessment points - research significance:

- Traditional Owners values in the landscape inform and shape research, as well as associative and aesthetic values appreciation. These could be expanded in the background and statement of significance.
- Regeneration of endangered Ecological Communities, and contemporary new pastoral practices, including regenerative farming and agro-forestry, which arguably should be implemented over much of the landscape would transform the historical fabric and aesthetic qualities which are elsewhere indicated as high values. This continuing change that can occur in a rural landscape needs to be addressed.

4.4.9 Rarity - principal characteristics & Criterion f)

NSW heritage assessment criterion f) *An item possesses uncommon, rare or endangered aspects of NSW's (or the local area's) cultural or natural history (Rarity).*
This was a National Trust (NSW) criterion (no number).

Table 4.4.9 Rarity Significance - assessment analysis
criterion f) *An item possesses uncommon, rare or endangered aspects of NSW's (or the local area's) cultural or natural history (Rarity).*

Morris' 2017 measures of rarity significance Source: Morris, 2017. p. 159	***Assessment analysis***
"The built form of the area, village layouts and rural landscapes combine to form a complex and distinctive character, which is not found elsewhere in the State."	The comparative analysis with in the study focuses on historic villages and built precincts and their curtilages. The "rural Landscape" character is not explained to demonstrate the "complex and distinctive character" unique in NSW.
" combination of early settlement from the 1820s... superb 'English-style' landscaping, remnant Ribbon Gum lined country lanes, largely intact land settlement and land grant patterns, and a range of notable nineteenth and early twentieth century buildings... " . . . the Area's link with sixteen Governors of New South Wales, its three historic townships of Berrima, Exeter and Sutton Forest - all these combine to create a landscape which is arguably unique in the State of New South Wales."	Each historic 19th and early 20th century landscape in Australia is generally unique. The measure of significance to the state would generally require a threshold that would include that this particular landscape type is uncommon or rare in the NSW cultural history. This has not been clearly demonstrated by Morris. Morris has not established that this landscape is "unique" in NSW, in particular, in relation to the native vegetation-lined country lanes, the land settlement patterns, a range of notable 19th and early 20th Century buildings, and the three historic townships. Other regions and towns of significant historical, social and aesthetic values include; the Hunter Valley, the Tilba Tilba region, the Northern Rivers ('Big Scrub') region, the Monaro region, and the New England tableland.
"The rural landscapes in the vicinity of Mt Gingenbullen . . . The qualities found here are not found elsewhere in the State."	The qualities of the landscapes "in the vicinity of Mount Gingenbullen " are stated to be "not found elsewhere in the State". (Morris 2017 p. 159) This general statement would apply to most places with "associations" back to the first Aboriginal people who lived in the area".

Summary assessment points - rarity significance:
- The comparative analysis with in the study focuses on historic villages and built precincts and their curtilages.

The "rural landscape" character is not explained to demonstrate the "complex and distinctive character" unique in NSW. The measure of significance to the state would generally require a threshold that would include that this particular landscape type is uncommon or rare in the NSW cultural history.

4.4.10 Representativeness - principal characteristics & Criterion g)

NSW heritage assessment criterion g) *An item is important in demonstrating the principle characteristics of a class of NSW's (or the local area's) cultural or natural places or environments (Representativeness).* This was a National Trust (NSW) criterion (no number).

Table 4.4.10 Representativeness Significance - assessment analysis
criterion g) *An item is important in demonstrating the principle characteristics of a class of NSW's (or the local area's) cultural or natural places or environments (Representativeness).*

Morris'2017 measures of representativeness significance Source: Morris, 2017. p. 160	***Assessment analysis***
"The [B,SF&E] shares characteristics with the wider Wingecarribee Shire." "These relate to early settlement patterns and the use of convict labour to build early houses and establish farms historic themes of changes to the environment, early settlement, agriculture, pastoralism, tourism, and the development of building styles."	"The Berrima, Sutton Forest and Exeter Study Area shares characteristics with the wider Wingecarribee Shire. It also shares similarities with colonial settlement to the southwest near Marulan, Goulburn and Lake Bathurst . . . " The statement appears to contradict the statements under criteria f) " a landscape which is arguably unique". (Morris 2017 p. 159)

Summary assessment - representativeness significance:

- The central, north landscape is a good example of an early NSW pastoral landscape, as stated by the National Trust (NSW) for the smaller area they listed. The relationship to the wider Wingecarribee Shire is not clearly established in the discussion to this statement of significance, nor the uniqueness of the landscape for the rural landscape characteristics recorded.
- Statements of uniqueness appear contradictory to the statements of representativeness.

4.4.11 Integrity - principal characteristics

This was a National Trust (NSW) criterion (no number).

Table 4.4.11 Integrity Significance - assessment analysis

Morris' 2017 measures of integrity significance	***Assessment analysis***
The Morris study did not assess the cultural landscape using the value 'integrity'.	A place that meets the criteria of representativeness of its heritage significance may meet that criteria because it is "outstanding because of its integrity". (NSW Heritage Council, 2001) This measure can also be considered the intactness of a place.

Summary assessment - integrity significance:

- The cultural landscape assessed by Morris 2017 has a minor degree of intactness or integrity, however, the integrity of a Southern Highlands cultural landscape would be of a higher degree if the landscape encompassed either the Southern Highlands extent of landscape units 2, 4 and 6 of the Wingecarribee Heritage Study, or the lesser extent of the central *Exeter/Sutton Forest Conservation Area* landscape.

4.4.12 Summary of Values Assessments

The values described in the listing by the National Trust of Australia (NSW) for the *Exeter/Sutton Forest Landscape Conservation Area* are appropriate, though to varying extents and to varying degrees, for the cultural landscape as delineated by the National Trust (NSW). A new assessment for each of the values, of the *Proposed B,SF&E Cultural Landscape,* as recommended by the IPC in R17, is set out in Table 4.4.10.

Table 4.4.10 Assessment against the Criteria - *Proposed B,SF&E Cultural Landscape*

Criterion	*Assessment*
a) Historical	This cultural landscape area holds considerable historical significance in the intangible evidence of historical rural properties which have operated continuously over much of the landscape since the early 19th century following European settlement, timber getting and clearing and fencing of pastoral runs. Ownership and property boundaries have changed with time, however, the general extent, scale and nature of the rural properties continues. In the landscape, historical features include: 19th century homesteads, hawthorn hedges, and elm and other exotic tree plantings around homesteads and along fence lines; and mid to late 20th century pine windbreak plantings forming paddock divisions and screens. The Main South Railway line was set out through this area in the 1830s and from its presence grew the village of Exeter which holds many heritage places and historical streetscape character. The Hume and Illawarra Highways running through the heart of this landscape are the major historical road routes not only connecting regions and towns north and south of this landscape, but also serving the places within the cultural landscape. Oldbury Road and Golden Vale Road are historical local roads associated with the properties they served historically. These movement route corridors hold significant historical narratives of the cultural landscape. The village of Sutton Forest on the Illawarra Highway holds historical significance, not only for the heritage places within and in its environs, but as one of the historical villages of the region.
b) Associative	The association with this cultural landscape of notable people is not able to be established as of a wide extent, or of a high degree of significance in NSW. Historically a series of state governors visited /stayed at *Hillview,* however, the evidence of this association elsewhere in the landscape is not clearly established. The heritage significance for this value or criteria appears not of a state level significance.
c) Aesthetic	Mt Gingenbullen which rises above the generally open, rural landscape is a landmark for the locality and a scenic feature visible from local roads and the two highways. The gently undulating rural landscape around the mountain, extending west to the Belanglo Forest ridges and east to the Mt Broughton area, has a moderate scenic quality formed by the modulation of land form, the grassed fields and the vegetation cover. The fields are of different sizes, interspersed by winding riparian corridor vegetation and linear tree belts along field borders. There are tree groupings around homesteads and at village fringes. The aesthetic experience from travelling the often curving, historic roads and from the rail line is of an attractive degree of variety and contrast of form, colour and texture, in particular as the large trees, either in groups, lines or as specimen plantings, include both eucalyptus and other native species and evergreen exotic pines.
d) Social	This cultural landscape holds intangible social significance through the attachment of the residents, including those of towns and villages outside

	the cultural landscape. This significance has been established by some of the community members taking actions to retain landscape aspects they appreciate in the face of development pressures. The degree of social significance cannot be assessed as of a high significance level at this time, in particular to a state level of significance.
e) Research	Places within this cultural landscape hold a potential to reveal aspects of historical, associative and archaeological significance.
f) Rarity	The degree of *'rarity'* over this cultural landscape has a modest level of tangible evidence. Generally, the land settlement and land grant patterns have been altered considerably. The association of the presence of the governors' summer residence, *Hillview,* is a value of 'rarity' to be associated with the house rather than with the whole cultural landscape. Similarly, the presence of historic villages in a cultural landscape is not an aspect of 'rarity' in NSW. Comparisons in the context of other NSW cultural landscapes reveal a rarity value of local level significance.
g) Representativeness	This cultural landscape holds some level of representativeness of the characteristics of 19th and 20th century settlement and development of rural regions of the Sydney Basin region. A comparative analysis of other NSW "early" pastoral landscapes is required to inform the further assessment that would be needed to establish the degree of relative representativeness.

In the *Proposed B,SF&E Cultural Landscape* study, much of the expression of the values of the cultural landscape as stated in the statement of significance could be informatively augmented by additional explanation or background.

The reasons for the extent of the *Proposed B,SF&E Cultural Landscape* are not explained in the Morris 2017 study making it unclear why similar landscapes, and closely linked urban fringe and small towns, particularly to the north, north east and east are not included, or why the different landscape from the Illawarra Highway to south of Sally's Corner Road is included (it was not part of the National Trust NSW listing of the *Exeter/Sutton Forest Landscape Conservation Area)*.

The *Proposed B,SF&E Cultural Landscape* holds historical, aesthetic, and research values. The comprehensive set of values and the relevant narratives, or heritage significance should be covered. The landscape is a continuing cultural landscape encompassing both rural and semi-urban fringe areas. In addition, integrated through this landscape are service and commercial, industrial and manufacturing, and transport infrastructure components which are visible parts of the landscape character and the community's associations with the landscape.

There are continuing changes in this landscape, and over most of the landscape, which have made it a very different landscape character to what it presumably was in the late 19th and early 20th Centuries. Historical value from the late 19th and early 20th Centuries remains present in some parts, and to a minor to moderate degree of integrity, even if less an aesthetic part of the landscape, however the aesthetic values present today which are not derived from historical evidence also need to be described and included.

5.0 Impact Analysis - Heritage Places

5.1 Project Area Places, Location and Assessment Context

The Project surface infrastructure area lies almost entirely on land owned by Hume Coal including the properties of *Mereworth*, which includes *Mereworth House and Garden* (WSC LEP I351) and *Evandale* to the south. The Berrima Rail Project includes land outside that owned by Hume Coal. The heritage places which lie within, or part within the Project area and which may be subject to visual impacts from the Project are listed in Table 5.1 which indicates the locations of these heritage places in relation to the Project area.

The Visual Impact Assessment (VIA) Report Context The supplementary VIA report (EMM 2020a) addresses the impacts on heritage places in detail, including an assessment of visual impacts on heritage places and on views of the cultural landscape, which this report has relied on. This chapter sets out the heritage places which are part of the *Proposed B,SF&E Cultural Landscape*, outside the towns and villages, and assesses the potential impact on the heritage significance and the cultural landscape vales.

The EIS SoHI report, and the SoHI Response report, record the heritage places within the Project surface infrastructure area and those outside that area (EMM, 2017, EMM 2018, EMM 2020c). Table 5.1 is based on the EIS SoHI report.

Table 5.1 Heritage Places in the Project Area

item	*Heritage Place (LEP Item No.)*	*Wholly in surface infrastructure area*	*Wholly above underground mine area*	*Partly above underground mine area*
1	Mereworth House & Garden (I351)	•		
2	The Harp (I027)		•	
3	The Pines (I029)		•	
4	Sutton Farm House (I035)		•	
5	Newbury House (I202)			• no listed buildings occur in the mine plan area (EMM 2017)
6	Bunya Hill House (I018)			• no listed buildings occur in the mine plan area (EMM 2017)
7	Eling Forest Winery (I004, I009, I010)			• no listed buildings occur in the mine plan area (EMM 2017)
8	Comfort Hill House (I021, I356, I357)			• no listed buildings occur in the mine plan area (EMM 2017)
Cultural Landscapes & the Project Area				
9	Exeter /Sutton Forest Landscape Conservation Area (NT R2218)			• Exeter and Sutton Forest villages are outside the Project area

It should be noted that the *Exeter / Sutton Forest Landscape Conservation Area* is not yet a statutory protected heritage place and it is not on the Wingecarribee LEP. It is a 1998 National Trust listing. It has been included as it was assessed in section 2.4 and this report has given a wide consideration to heritage in the cultural landscape.

The southern portion of the Project area falls within the National Trust's *Exeter / Sutton Forest Landscape Conservation Area* (refer Figure 02). The properties within both the *Conservation Area* and the Project area are those east of the Hume Highway between *Comfort Hill* and *Rosedale* in the west and *Oldbury* and Golden Vale Road in the east. Potential visibility of parts of the surface infrastructure ansd potential impacts on those lands are assessed in chapter 6.0 and in the VIA report (Table 7.1 and Figure 7.3, EMM, 2020a). The potential impacts on heritage places are assessed in section 5.3.

The *Proposed B,SF&E Cultural Landscape* (Morris, 2017) includes the contributory cultural landscape aspects of the above heritage listed properties which, except for *Mereworth*, are situated outside the Project surface infrastructure area but are within, or partly within, the wider Project area. The heritage values of these places lie in:

- the physical features, the **historical fabric** of recognised heritage significance;
- the 'living', **continuity of use and appreciation** over long periods of time;
- the **intangible qualities** held in the reading of histories, and documents, memories and associations, the evocative qualities of the landscapes related to the **historic and aesthetic qualities**; and
- the **relationships across the wider landscape** of historic ties and aesthetic appreciation.

5.2 *Mereworth* Garden - Visual Impact Assessment and Mitigation

5.2.1 *Impact Assessment Considerations - the Place in the Cultural Landscape*

The place, *'Mereworth House & Garden',* is listed in the WSC LEP. The garden at *Mereworth*, and its key rural setting as seen in the north garden outlooks, is analysed in the report *Sorensen Gardens Analysis & the Garden at Mereworth* (CBLA, 2020).

The impact assessment for the *Mereworth* garden is included in this report and separately to the other heritage items in the Project area and locality. *Mereworth* is owned by Hume Coal and it is the location of the Project surface infrastructure area.

The Supplementary VIA report, including the visibility and impact analysis (EMM, 2020a), has been used as the basis for the assessments of this section.
Mereworth is located on an historical property in the Southern Highlands and as such it contributes to some degree to the historical and research values of the *Proposed B,SF&E Cultural Landscape*. The predominantly open, grassed paddocks over the gently undulating land are characteristic of the large rural properties of the central and north areas of the wider cultural landscape. The *Mereworth* garden is seen from a part of the Old Hume Highway, part of the Hume Motorway and from Medway Road. The grove of planted evergreen trees around the house and garden indicate the presence of a house and garden in the rural landscape. The Sorensen designed approach avenue is a distinct feature seen in these views. The original driveway entry from the Old Hume Highway and approach to the Mereworth house and garden can no longer be appreciated today as it was dissected by the construction of the Hume Motorway in c. 1985. The formerly available view from the Old Hume Highway is significantly curtailed by the Hume Motorway. The *Mereworth* property and garden make a moderate contribution to the overall significance of the cultural landscape. It should be noted that the whole of the *Mereworth* property was not included in the *Exeter/Sutton Forest Landscape Conservation Area* listed by the National Trust (NSW).

5.2.2 Criteria for Assessing Potential Impacts on Mereworth

Impacts on the heritage place may occur as a result of changes to these places due to Project infrastructure and operations if there is a:

- substantial loss or alteration of historical fabric due to the Project infrastructure;
- change of use and role due to Project operations;
- the obscuring of frequently viewed aspects of these places by the Project infrastructure, as viewed from the public realm, which are part of the significance;
- a noticeable, visually intrusive view of Project infrastructure in an outlook from a heritage place at a location which has substantial heritage significance.

These impacts are predominantly perceived visually. Substantial alterations, either removal or a substantial loss of heritage fabric, or of significant views, or of the primary avenues for its visual appreciation are primary measures of impact assessment. These also inform the proposals for mitigation measures to address impacts.

5.2.3 *Mereworth* Garden and Setting Impacts

The report *Sorensen Gardens Analysis & the Garden at Mereworth* (CBLA 2020) analysed the Sorensen garden design and recorded the characteristics of the garden's local heritage significance and the important viewpoints and views planned in Sorensen's design, including those assessed by the Sorensen expert Ratcliffe in 1990. The report also addressed views recommended to be assessed by the Heritage Council NSW.

Garden Heritage Significance

The *Mereworth* garden significance lies in the association with the garden designer Paul Sorensen and his design layout, form and character, the built and vegetation historical fabric, and the particular views planned as part of the design.

The yards in the paddock are a viewpoint of minor significance and are not part of the Sorensen garden design.

Views / Outlooks

The outlooks from the *Mereworth* driveway, avenue and garden, which hold varying degrees of significance, have been assessed and these views are noted in Table 5.2.3. These views are presented in the Supplementary VIA report (EMM, 2020a) with simulation photomontage views of planting mitigation measures.

Table 5.2.3 *Mereworth* Garden & Setting - Outlooks / Views

Heritage Council NSW 2017 letter	
A View: "View from Sorensen's garden out to the north and east." - A1 & A2	VIA Photos & Photomontages: Mereworth VP1, Mereworth VP2, Mereworth VP3, & Mereworth VP4 (EMM, 2020a).
Other Outlooks in Setting (Heritage Council NSW 2018 letter)	
B View: "open vistas from Sorensen garden to the rural landscape."	VIA Photos & Photomontages: Mereworth VP1, Mereworth VP2, Mereworth VP3 & Mereworth VP4 (EMM, 2020a).
C View: "where . . . outer yards and surrounds have outward views"	VIA Photos & Photomontages: (EMM, 2020a).
Views to *Mereworth* (as per Heritage Council NSW 2018 letter & 2017 letter)	
D View: "from the highest point on the original *Mereworth* drive."	VIA Photo & Photomontage: Mereworth VP13 (EMM, 2020a).
E View: "from the Old Hume Highway parallel to the original drive, now disused."	VIA Photos & Photomontages: Viewpoint 7 / Photomontage 5 (EMM, 2020a).

5.2.4 *Mereworth* Impacts Assessment Evaluation

The outlooks /views to the garden's rural setting, from the viewpoints of table 5.2.3, would have a view of part of the Project surface infrastructure within part of those outlooks. The impact assessment, without mitigation measures, and assessed on a three point scale of 'high', 'moderate', and 'low', is as follows:

- View from the garden - in the north lawn, view A1: low
- View from the Sorensen designed approach avenue, view A2: moderate
- View from the garden at the ha-ha walls, view B: moderate
- View from the yards near the dam, view C: moderate - high
- View from the remaining part of the former driveway, view D: moderate
- View from the Old Hume Highway, view E: moderate

The significant views, or outlooks, are from: the driveway remnant -view D; the approach avenue -view A2; and the north garden to the rural setting -view A1; and to a lesser degree, view B. These views have been represented to include the Project surface infrastructure in the Supplementary VIA report (EMM 2020a). These VIA report photomontages indicate that there would be visual impacts on the significant views.

5.2.5 Conservation at *Mereworth*

The conservation management measures likely to be undertaken at *Mereworth* should be a consideration in the impact assessment. The general measures are set out in this section.

***Mereworth* Garden, Avenue & Driveway Conservation**

Conservation management of the *Mereworth* driveway, avenue, and the garden proper, will ensure there are no direct impacts on the *Mereworth* garden. Conservation measures would be part of the Project implementation and will include:

- The Sorensen designed driveway, approach avenue and the internal garden area not be allocated for Project operations works vehicular use.
- Project vehicular use of the drive to access the house and yards be assigned only for light vehicles for visitors. It would likely continue to be used for the grazing property operations, and garden and grounds maintenance.
- The house and garden may be used as a residence, and /or small offices, and /or information centre on the Project and /or garden (the residential character maintained).

***Mereworth* Garden Setting Conservation**

Conservation management measures for the garden's key outlook to part of the rural setting will include:

- The dam and its island retained as at present.
- Any power lines required through the paddock in the foreground of the *Mereworth* garden north outlook be located underground.
- Service route(s) excavated be re-grassed to achieve visual integration into the pasture.
- Vehicular use of the yards, the dam and causeway maintained for the grazing property use as at present, and these routes not widened or altered in surface appearance. This conservation management measure will maintain the view of this feature from the garden as at present.
- No Project infrastructure to be located on the former driveway.

5.2.6 *Mereworth* Impacts Assessment Conclusion

Impact Assessment Considerations - the Place

The *Mereworth* private driveway, the avenue approach and the garden would have no detrimental loss of heritage fabric through construction of the Project surface infrastructure.

- There would unlikely be any detrimental loss of heritage fabric arising from the Project use of *Mereworth* and the uses are unlikely to cause alteration of the driveway and garden features form and appearance.
- The *Mereworth* house and its garden surround is to remain as a dwelling house, or compatible land use ensuring that it retains its current configuration and that maintenance is undertaken as directed by the Conservation Management Plan (CMP). The continuity of the residential-scale use of the place would remain unaltered, and thus the heritage significance related to its original intent would remain substantially intact.

The Project surface infrastructure would be over part of the *Mereworth* property and in part adjacent to the *Mereworth* garden. There is likely to be a visual impact from part of the Project surface infrastructure at the *Mereworth* property on the *Proposed B,SF&E Cultural Landscape.* The impact would be on the historical, aesthetic, research and representativeness values which are contributed by *Mereworth* to the much wider Southern Highlands landscape and on the potential interpretation of that landscape.

The impact is assessed as moderate in this central, northern locality within the cultural landscape; however, with consideration of the context of the overall Southern Highlands cultural landscape, the impact of the changes on the *Mereworth* property to the experience of that landscape and its identity (extending east past Werai and Bundanoon, south beyond the Sally's Corner Road viewshed, west to the Belanglo Forest and north to the Wingecarribee River), would be much lower.

5.2.7 *Mereworth* Garden and Setting Impacts Mitigation

Mitigation measures for the impacts on views from and to the *Mereworth* garden and its key rural setting landscapes are detailed in the Supplementary VIA (EMM 2020a,) including on the photomontage view representations in that report.

General Mitigation

The *Mereworth* garden and setting general mitigation measures include:

- The retention of the rural grazing property of *Mereworth* within and around the surface infrastructure area and throughout the remainder of the Project area of Hume Coal land.
- The design of the earthworks and grading near *Mereworth*, such as berms, to minimise extent and height, and to shapes that integrate with the existing ground form, finish, and land cover.
- The water storage, to the east of the *Mereworth* garden, formed with minimal water edge formal shaping to appear as would a natural waterbody. Trees, mid storey and shrub vegetation plantings from the perimeter of the earthworks in arrangements to integrate with the landscape character as appreciated from viewpoints and view routes of the locality.

Planting Mitigation

The *Mereworth* garden and setting planting mitigation measures include:

- The planting mitigation is to screen or semi-screen, the surface infrastructure in the views of significance whilst forming a landscape character which is appropriate for the location in terms of environmental characteristics and / or historical landscape characteristics, and appropriate for the existing view characteristics.

Mitigation of identified impacts are represented in the VIA view photomontages (EMM 2020a).

Table 5.2.7 below outlines the planting measures that would contribute to impact mitigation. The *Mereworth* garden views of significance and the impact mitigation which is understood as being part of the Project proposal are summarised here.

Table 5.2.7 *Mereworth* Garden & Setting - Impact Mitigation through Planting

Viewpoint Location	*Mitigation Function*	*Planting Type & Character*
The garden, in the north lawn, viewing the field between the ha-ha wall and dam. (Mereworth VP3 & VP4, EMM 2020a)	Semi screening and screening the view of the conveyor and the TLO.	Dense, spreading canopied, specimen trees visually relating to the existing trees in the paddock, planted in prepared mulched areas to ensure rapid and maximum growth.
Yards, near the *Mereworth* dam on Oldbury Creek. (Mereworth VP6, EMM 2020a)	Semi screening and screening the view of the conveyor and the TLO.	Native trees - tall and closely planted as occur naturally along watercourses - Casuarina. Pines - replicating the historical mature tree planting on *Mereworth,* Pinus & Cedrus, used in lines forming a screen belt.
***Mereworth's* avenue**, viewing east to water storage berm. (Mereworth VP11 & VP12, EMM 2020a)	Visually separating views of the water body into small parts seen between trees. Presentation of a semi-naturalistic rural scene of tree groups and patches of native vegetation in the paddocks similar to existing tree clumps nearby.	Cluster of trees, mid storey and lower shrubs as found in the locality on *Mereworth* and on nearby properties: - eucalyptus, acacia, melaleuca. Some of above planted in mulched areas with groundcovers.
Old Hume Highway view to *Mereworth* - at Highway edge. (VP7/ Photomontage 5, EMM 2020a) & **Hume Motorway** view to *Mereworth* - from Motorway. (CM-VP11, EMM 2020a)	Visually separating views of the water body into modest sized parts by trees. Presentation of a semi-naturalistic rural scene of a dam in paddocks, with fringing tree groves and patches of native vegetation.	Specimen native trees. Cluster of trees, mid storey and lower shrubs as found in the locality on *Mereworth* and on nearby properties: - eucalyptus, acacia, melaleuca.

5.2.8 *Mereworth* Garden Impacts Mitigation Evaluation

- The outlook from the approach avenue to the east and south east towards the *Mereworth* paddocks would be subject to moderate impact with view of part of the berm of the Project water storage. This impact would be substantially mitigated by proposals for plantings of both tall and wide spreading trees, also with mid-storey species, in grouped plantings, to visually integrate the berm with the paddocks, in a similar character to existing tree groups on the *Mereworth* property and in the nearby rural locality.
- The outlook from the north garden, near the ha-ha walls, has been assessed to be subject to moderate to low impact by a view of part of the surface infrastructure. This impact would be mitigated substantially by additional tree planting which is in the same form and character as the existing trees in the paddock.
- The outlook from the working yards to the existing dam on Oldbury Creek would be subject to high impact with the view of part of the Project infrastructure. This impact would be mitigated substantially

by tall, dense tree planting which is the appropriate species and character near this waterbody. It should be noted this viewpoint is not part of the Sorensen garden.

- The views to *Mereworth* from the Old Hume Highway and Hume Motorway would be subject to moderate to low impact by a view of part of the surface infrastructure. This impact would be mitigated substantially by tall, dense tree groves and line planting, of the appropriate species and character (planting species are identified in the VIA, EMM 2020a).

5.2.9 *Mereworth Garden* Impact Mitigation Conclusion

The mitigation measures proposed for the *Mereworth* outlooks and views of, including extensive and appropriate planting works, would reduce the impact on the cultural landscape such that the mitigation would have effect by the initial assessed 5-year growth period, and have a substantial mitigation of those impacts after 15 years.

5.3 Heritage Places - Impact Assessments

5.3.1 Introduction

In addition to *Mereworth*, there are other heritage places in or part within the Project area. *Mereworth* was assessed in Section 5.2 and is therefore not included in this section. These listed heritage places lie within the cultural landscape under assessment, the *Proposed B,SF&E Cultural Landscape* and their contribution to the cultural landscape is as follow:

- through their associations and research potential as part of the historical narratives of the places;
- through their aesthetic characteristics where seen from the public realm;
- when there is a social value associated with the wider community evidenced at the place
- or in its history; and
- if they have a contribution to the representativeness or rarity of the cultural landscape.

Potential visual impacts of the views of the Project surface infrastructure on those heritage places are addressed in this section as part of the cultural landscape impact assessment. The visibility of the Project surface infrastructure from the heritage places is based on the Supplementary VIA report including the Visibility Analysis and figures representing the viewsheds of the Project surface infrastructure (EMM VIA 2020a):

Figure 5.4 - Visibility analysis - publicly accessible heritage sites;
Figure 5.5 - Visibility analysis - private rural residential receptors;
Figure 5.6 - Visibility analysis - rural lands, (EMM 2020a).

In addition, the VIA report includes representation of the key views and of the mitigation measures in photomontages of those views (EMM 2020a). The VIA report including the visibility and impact analysis, has been used as the basis for the assessments of this section.

5.3.2 Heritage Places - Criteria for Assessing Potential Impacts

The potential impacts on the heritage significance are perceived primarily through views to the Project area including the view of the Project surface infrastructure, which is readily noticeable. The impacts on heritage items are primarily dependent on the proximity to the Project surface infrastructure area, the garden or landscape environs of the heritage place and its outlooks, and the presence of views of parts of the surface infrastructure from the more significant parts of the heritage place.

In this landscape, characteristics of a view which would give the terms of reference for assessment of a considerable impact are:

- The view to the distant landscape (outside the heritage place) is of considerable importance to the heritage significance of the place and as a view of landscape without any view of industrial or railway structures or infrastructure. Where there would be a readily noticeable view of Project infrastructure, and that component is greater than may have occurred in this continuing cultural landscape, and therefore developing and changing landscape, that view potentially brings an impact.

- The view of structures and /or infrastructure, if assessed as potentially intrusive on the heritage significance of the heritage place, is prominent in the view and in the foreground or mid-ground distance from the heritage place.
- The view of structures and /or infrastructure, if assessed as potentially intrusive on the heritage significance of the heritage place, is not mitigated, or screened by mitigation planting, after establishment and generally after five years growth of that mitigation planting.

The change and impact of an existing view should be assessed in the context of the views of the existing industrial character structures which are prominent in the landscapes where they are seen, namely, the Boral Cement works and the Berrima Feed Mill building.

5.3.3 Heritage Places in the Project Area & Potential Infrastructure Views and Impacts

The heritage listed places which are within or part within the Project area (in Table 5.1 above) are reviewed for their visual relationship to the Project surface infrastructure and for potential visual impacts on the heritage place. Table 5.3.3 presents an analysis of heritage places within, or partly within, the Project area, and the potential views of Project infrastructure which may be an indicator of impact on the place. The cultural landscape context for the assessment is indicated.

It is of note that the majority of the places in Table 5.3.3 are private property.

All of the following properties fall within the *Exeter/Sutton Forest Landscape Conservation Area* and the *Proposed B,SF&E Cultural Landscape*.

The key to the analysis in Table 5.3.3 is as follows:

- *Item*
  - This refers to the item numbers in Table 5.1
- *Potential View of Project Infrastructure:*
  - No;
  - Potential (minor / in viewshed); and
  - Yes (Noticeable view of some infrastructure).
- *View Characteristics:*
  - Distance from surface infrastructure - approx.;
  - Items seen; and
  - Item impact issue eg height, extent.
- *Cultural Landscape Context:*
  - This is an appraisal of the contribution of the heritage place /viewpoint to the cultural landscape as a whole.

Table 5.3.3 Heritage Places Within or Partly Within the Project Area - Potential Infrastructure View & Cultural Landscape Context

item	*Heritage Place (LEP item number)*	*Potential view of project infrastructure /impact*	*View Characteristics*	*Cultural Landscape Context*
6	***Bunya Hill*** House, grounds and outbuildings (I018)	Potential - very minor - tops of tallest structures. - likely only from parts of higher paddocks.	- private property ~7km from surface infrastructure - The tops of the following infrastructure may be seen: - Train Load Out (TLO), - Reclaimer - ROM Conveyor Tower	- Historical value. A minor contributor as little seen from the road. - High potential for mitigation of any impact.
8	***Comfort Hill*** House, grounds and outbuildings (I021, I356, I357)	Potential - - views likely only from northern paddocks. Refer Figure 5.4, EMM, 2020a	- private property ~8km from surface infrastructure - Some partial views of the following infrastructure may be possible: - TLO, - Reclaimer - ROM Conveyor Tower, - ROM Coal Stockpile - CHPP	- Historical value. - High potential for mitigation of any impact.
2	***The Harp*** (I027)	No	N/A	N/A
3	***The Pines*** slab cottage (I029)	No	N/A	
4	***Sutton Farm*** House, grounds and outbuildings (I035)	No	N/A	
5	***Newbury Farm*** House, grounds and outbuildings (I202, I036)	- Potential / very minor - tops of tallest structures. - likely only from west side of property.	- private property ~7km from surface infrastructure - The tops of the following infrastructure may be seen: - TLO, - Reclaimer - ROM Conveyor Tower	- Historical value. - High potential for mitigation of any impact.
7	***Eling Forest Winery*** House, grounds and outbuildings (I004, I009, I010)	No	N/A	N/A

5.3.4 Heritage Places Adjacent or Near the Project Area & Potential Infrastructure Views & Impacts

Table 5.3.4 presents an assessment of the potential views of Project infrastructure, and therefore potential impacts, on the heritage places outside or adjacent to the Project area. This table is an indicative assessment and should be used with reference to the detail of the VIA.

All of the following properties fall within the *Exeter / Sutton Forest Landscape Conservation Area* and the *Proposed B,SF&E Cultural Landscape*. The only exception is *Cottesbrooke* which is not within the *Exeter / Sutton Forest Landscape Conservation Area (*National Trust (NSW)).

The definitions of Table 5.3.4 are as described in Section 5.3.3.

Table 5.3.4 Heritage Places Adjacent and Near the Project Area - Potential Infrastructure View & Cultural Landscape Context

Heritage Place	*Potential View of Project Infrastructure*	*View Characteristics*	*Cultural Landscape Context*
On Old Hume Highway			
Remembrance Driveway Plantings WLEP I485	- Yes	- View unlikely within the planted area as trees and shrubs are screening. - From roadside edge the view is SW down Old Hume Highway. -Item potentially seen: Berrima Rail bridge	- viewpoints are outside the Conservation Area
On Golden Vale Road			
Golden Vale House, grounds and outbuildings SHR 00489 WLEP 2010 I003, I005, I001, I002	- Potential - "Moderate visual effect" Table 7.1, Figure 5.4, EMM, 2020a	- private property ~4km from surface infrastructure. - The tops of the following infrastructure may be seen: - Reclaimer - Product Coal Stockpile	- Views available from the house and front garden of its immediate rural setting hold significance. "Partial views glimpsed between trees of Reclaimers appearing above the trees; minor element in viewshed." EMM 2020a
Highfield House, grounds, and outbuildings WLEP I246, I247, I054	No	N/A	N/A
Bonheur House, grounds and outbuildings WLEP I049	No	N/A	
Browley House, grounds and outbuildings WLEP I056	No	N/A	
On Oldbury Road / Whites Creek			
Oldbury House, grounds, and outbuildings WLEP I353, I057, I164	- Potential / minor - tops of tall structures - from higher elevation at	- private property ~3km from surface infrastructure. - The tops of the following infrastructure may be seen: - TLO,	-views of its rural setting from the house and garden hold significance. - views from the fields are of minimal significance

	southeast side of property Refer Figure 5.4, EMM, 2020a	- Reclaimer - ROM Conveyor Tower, - ROM Stockpile	
Whitley House, grounds and outbuildings SHR 00504 WLEP I361, I360, I055	- Potential / minor - from northern fields Refer Figure 5.4, EMM, 2020a	- private property ~4km from surface infrastructure	-views of its rural setting from the house and garden hold significance. - views from the fields are of minimal significance
Sutton Forest Village & Environs			
Charlie Grey's Cottage WLEP I014 ***Montrose*** House and grounds WLEP I006 ***Clover Hill*** House, grounds and outbuildings WLEP I203 **St. Patrick's Roman Catholic Church** and cemetery WLEP I034, I349, I023 ***Boscobel*** House, grounds and outbuildings WLEP I013 **Sutton Forest Inn** WLEP I1187 **Everything Store**, former Butcher Shop WLEP I490 **Former Post Office** WLEP I016 **Sutton Forest Public School** WLEP I030 **Cottage** WLEP I028 **All Saints Anglican Church**, hall and cemetery WLEP I026, I022, I025, I350	No	N/A	N/A
On Illawarra Highway east of Sutton Forest			
Hillview House, grounds and outbuildings SHR 0042 WLEP I008, I007, I358, I359	No	N/A	N/A
Summerlees House and grounds WLEP I362, I037	No	N/A	
Remembrance Driveway Plantings WLEP I1691	No	N/A	
Cardrona grounds WLEP I352	No	N/A	
Peppers House, grounds and outbuildings WLEP I488, I486, I487, I489	No	N/A	
On Illawarra Highway west of Sutton Forest			
Rotherwood House, grounds and outbuildings WLEP I033, I032	No	N/A	N/A
Spring Grove Farm House, grounds and outbuildings	Potential - minor	- private property	The homestead gardens appear to surround the

WLEP I492	- tops of tallest structures only - from northwest paddocks only	~9km from surface infrastructure. - The tops of the following infrastructure may be seen: - TLO, - Reclaimer - ROM Conveyor	houses. The garden tree groves would be seen from the highway and these are the major contributors to the cultural landscape.
Rosedale House and grounds WLEP I031	Potential - minor - from northern paddocks only. Refer Figure 5.4, EMM, 2020a	- private property ~8km from surface infrastructure. - The tops of the following infrastructure may be seen: - TLO, - Reclaimer - ROM Conveyor Tower, - ROM Coal Stockpile, - CHPP - Ventilation shaft pad structures	
Black Bob's Bridge WLEP I019	No	N/A	N/A
Moss Vale southwest			
Cottesbrooke House WLEP I1516	- Potential / minor, 2020b, *Supplementary Visual Impact Assessment* - tops of tallest structures only.	- private property ~8km from surface infrastructure - TLO, - Reclaimer - ROM Conveyor	The garden around this suburban house is a minor contributor to the cultural landscape, though a contributor locally to the Moss Vale streetscape character.
Exeter - north			
Vine Lodge House, grounds and outbuildings WLEP I354, I204, I355	- Potential	- private property ~11km from surface infrastructure. - The tops of the following infrastructure may be seen: - TLO, - Reclaimer - ROM Conveyor	The homestead garden trees appear to surround the house. This tree grove, likely seen from Exeter Road, is a contributor to the cultural landscape.

5.3.5 Evaluation and Conclusion

The impact assessments are based on the information available in the EIA supplementary reports: *Supplementary Visual Impact Assessment* EMM 2020b, *Supplementary historical archaeological assessment* EMM 2020c, *Statement of Heritage Impact EMM* 2020d.

The Project surface infrastructure and rail loop would be over part of the *Mereworth* property and in part visible from parts of the Hume Motorway, the Old Hume Highway, Medway Road, Berrima Road near New Berrima, and some local roads in the locality. In addition, there are heritage places which have views towards the Project surface infrastructure area and which may have visibility of the higher parts of the infrastructure there. There are likely to be impacts by visibility of part of the Project surface infrastructure and rail loop where that view contributes part of the heritage significance of the place.

The heritage places adjacent or near the Project area lie within the *Proposed B,SF&E Cultural Landscape* and are part of the overall historical narrative, and, when they are seen from the public realm, contribute to the aesthetic value of the cultural landscape. Any impacts on a heritage place would primarily be on the historical, aesthetic, research and representativeness values of the place, and this will therefore bring some degree of impact to the cultural landscape (and on the potential interpretation of that landscape).

Heritage places which are likely to experience an impact from visibility of part of the surface infrastructure are parts of: *Oldbury*, *Golden Vale*, *Spring Grove Farm, Rosedale, Cottesbrooke*, *Vine Lodge*.
With consideration of the locations of the viewpoints, generally away from the house and gardens, and the partial visibility these views are assessed as having a minor or low impact on the heritage significance of the places.

The Berrima rail loop and new rail link are unlikely to be seen from the heritage places in the northern cultural landscape. The Old Hume Highway Remembrance Day planting place is closer to the rail line than other heritage places and any view of the rail line would have an impact through this change, however the impact is assessed as low.

The impact on the *Proposed B,SF&E Cultural Landscape* in this central, northern locality is assessed as low. However, with consideration of the context of the overall *Central Southern Highlands Cultural Landscape*, impact on some of the heritage places on the whole cultural landscape experience and identity (extending east past Werai and Bundanoon, south beyond the Sally's Corner Road viewshed, west to the Belanglo Forest and north to the Wingecarribee River), would be much lower.

6.0 Cultural Landscape - Impact Assessments

6.1 Introduction

The *Proposed Berrima, Sutton Forest & Exeter Cultural Landscape* (*B,SF&E Cultural Landscape*) is analysed in this chapter as part of addressing the IPC Recommendation 17.

> "**R17** The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283."
>
> (IPC NSW, 2019. p. 8)

The part of the NSW Heritage Council August 2018 letter referred to by the IPC is as follows:

> *"The EIS should be amended to include a detailed assessment of impacts of both the Hume Coal Project (SSD 7172) and the Berrima Rail Project (SSD 7171) on the Berrima, Sutton Forest and Exeter Cultural Landscape. . . . The assessment should address the values set out in the National Trust of Australia (NSW) 1998 Summary Statement of Significance in detail. It should analyse any impact on these values as well as significant elements or groupings that comprise the landscape, that is the towns and villages, habitable buildings, pastoral and other structures, roads (such as the Old Hume Highway, Hume Highway, Oldbury Road and other local roads), streets, lanes, paths, fences, waterbodies, trees, plants, paddocks, cropping, their fabric as well as significant historical links across the landscape such as explorer and stock routes, the visual connections across the landscape as well as local and precinct-wide settings."*

The landscapes of the *Exeter/Sutton Forest Landscape Conservation Area* (National Trust (NSW)) and the *Proposed B,SF&E Cultural Landscape* (Morris 2017) are different in extent with the boundary defined by Morris being the larger of the two. This assessment uses the larger cultural landscape proposed by Morris to assess impacts.

This chapter comprises:

- an outline of the cultural landscape considerations for impact assessment and impact mitigation measures, addressing separately the towns and villages and the wider cultural landscape – section 6.2.

6.2 The Cultural Landscape Impacts

6.2.1 The Cultural Landscape Impact Assessment Considerations

The visibility of the Project surface infrastructure from the heritage places is based on the Supplementary VIA report and figures representing the viewsheds of the infrastructure (EMM VIA 2020a). In that report the *Visibility Analysis* of the structures within the Project area is presented in the following figures:

Figure 5.4 - Visibility analysis - publicly accessible heritage sites

Figure 5.5 - Visibility analysis - private rural residential receptors

Figure 5.6 - Visibility analysis - rural lands.

This visibility analysis has been used as the basis for the assessments of this section.

Table 6.2.1 presents an analysis of the potential impacts on the cultural landscape components. The general analysis of the table uses measures as follows:

- *Potential View of Project Infrastructure:*
  - No;
  - Potential (minor / moderate - in viewshed); and
  - Yes (Noticeable view of some infrastructure).
- *View Characteristics*:
  - Distance from surface infrastructure - approx.;
  - Items seen; and
  - Item impact issue eg height, extent.
- *Cultural Landscape Context*:
  - This is an appraisal of the contribution of the heritage place /viewpoint to the cultural landscape as a whole.

Table 6.2.1 Impact Assessment Considerations

Cultural Landscape Place	*Potential View of Infrastructure / Impact*	*View Characteristics*	*Cultural Landscape Sensitivity*
Towns & Villages			
Exeter - Exeter Park, street cafes, station In E&SF CLA & B,SF&E CL	No	N/A	N/A
Sutton Forest - Cosh Park, stores, cemetery In E&SF CLA & B,SF&E CL	No	N/A	
Rural Residential Places			
Properties assessed in VIA (Table 5.2 and Figure 5.5 in EMM 2020a) In E&SF CLA & In B,SF&E CL	"Moderate visual effect" EMM 2020a	View of parts of: Reclaimer, CHPP, ROM, TLO	"Primary sensitivity zone - static glimpsed view of surface elements between trees, with elements partially backgrounded by vegetated elevated terrain to west. Visual effect – moderate to low on account of screening vegetation and proportion of view shed occupied." EMM 2020a Table 7.1
Properties assessed in VIA (Table 5.2 and Figure 5.5 in EMM 2020a) In E&SF CLA & In B,SF&E CL	"Low visual effect" EMM 2020a	View of parts of: Rail bridge and maintenance facility	"Primary sensitivity zone - static glimpsed view of elements between trees, with elements backgrounded by vegetation and elevated. Visual effect – low on account of screening vegetation, low contrast and moderate integration and proportion of view shed occupied." EMM 2020a Table 7.1
Highways, Roads, Lanes & Pathways			
North - Medway Road, Hume Motorway, Old Hume Highway roadside In B,SF&E CL	Yes From Medway Road there is the potential to view infrastructure for about a kilometre. From the Hume Motorway & Old Hume Highway views of infrastructure are comparatively short. Refer Figure 5.3 and Table 7.1, EMM, 2020a	Views of parts of the surface infrastructure. View content and extent varies with the viewpoint / view route.	The Hume Motorway and Old Hume Highway are major routes within the cultural landscape. The Old Hume Hwy has historical value and the views from the highway contribute to the cultural landscape value. Medway Road is an historical route from which the view south is to the northern cultural landscape.

Table 6.2.1 continued

Cultural Landscape Place	*Potential View of Infrastructure / Impact*	*View Characteristics*	*Cultural Landscape Sensitivity*
Central -, Oldbury Road, Golden Vale Road, Belanglo Road In E&SF CLA & In B,SF&E CL Hume Highway - north from motorway bypass only in B,SF&E CL.	Potential parts of these roads may give views in the background. Refer Figure 5.3 and Table 7.1 EMM, 2020a	Views of parts of the surface infrastructure. View content and extent varies with the location on the roads.	These roads are not the major circulation routes within the cultural landscape. Oldbury and Golden Vale Roads are historical roads through a landscape with historical and aesthetic values contributory to the cultural landscape value and identity.
Central - Illawarra Highway, Canyonleigh Road, Berrima Road In E&SF CLA & In B,SF&E CL	No	N/A	N/A
South - Sally's Corner Road, Exeter Road, Ringwood Road, Bundanoon Road, Main Southern Railway, Middle Road, Yarrawa Road, Mount Broughton Road, Stonequarry Creek Road, Werai Road, Westgrove Road, Old Argyle Road (north), Ellsmore Road, Greenhills In NT R2218 & In B,SF&E CL	No	N/A	N/A
Visitor / Tourist Destinations & Lookouts			
Historic homesteads and / or **gardens** - Red Cow Farm, Remembrance Driveway Plantings (Illawarra Hwy), Peppers In N E&SF CLA & In B,SF&E CL	No	N/A	N/A
Roadside Stops / cafes - Farm Club Werai, Sally's Corner Rd junction at Hume Hwy. In E&SF CLA & In B,SF&E CL	No	N/A	N/A
Olive groves - Eleuthera Farm In E&SF CLA & In B,SF&E CL	No	N/A	N/A
Vineyards - cellar door, Eling Forest Winery, Southern Highlands Winery, Sutton Forest Estate Wines, Cherry Tree Hill Wines (Sutton Forest) cafe views NW In E&SF CLA & In B,SF&E CL	No	N/A	N/A

Table 6.2.1 continued

Cultural Landscape Place	*Potential View of Infrastructure / Impact*	*View Characteristics*	*Cultural Landscape Sensitivity*
Cherry Tree Hill Wines (Sutton Forest) house and gardens In E&SF CLA & In B,SF&E CL	"Moderate visual effect" Table 7.1 EMM, 2020a	TLO and Rom Conveyor	
Restaurants - Sutton Forest Inn & Bistro, Katers Restaurant (Sutton Forest) In E&SF CLA & In B,SF&E CL	No	N/A	N/A
Coolabah Tree Cafe (Sally's Corner Road) Not in E&SF CLA - In B,SF&E CL	No	N/A	N/A
Zen Oasis (Medway Rd), Not in E&SF CLA or B,SF&E CL	Potential - Views of part surface infrastructure only from southern field of the property near Medway Road	TLO, ROM Conveyor Tower, Product Coal stockpile	N/A
Birch Restaurant (Moss Vale). Not in E&SF CLA or B,SF&E CL	No	N/A	N/A
Gathering, Recreation, Equestrian & Spiritual Places			
Sports grounds / **clubs** - Exeter Oval, Croquet Club In E&SF CLA & In B,SF&E CL	No	N/A	N/A
Horse Breeders / **Equestrian Centres** - Lime Country Thoroughbreds, The Chase, Sutton Forest Equestrian Centre, Lyle Equestrian In E&SF CLA & In B,SF&E CL	No	N/A	N/A
Churches & Halls - Sutton Forest Hall, Exeter Hall, Saint Aidan's Anglican Church, All Saint's Anglican Church In E&SF CLA & In B,SF&E CL	No	N/A	N/A
National / State Parks - Belanglo State Forest Not in E&SF CLA , part in B,SF&E CL	No	N/A	N/A

6.2.2 Impact Assessment Summation

The impact assessments are based on the information available in the following supplementary reports: *Supplementary Visual Impact Assessment* EMM 2020b, *Supplementary historical archaeological assessment* EMM 2020c, *Statement of Heritage Impact EMM* 2020d.

The potential impacts from the Project surface infrastructure on the cultural landscape are primarily visual, that is, the visibility of parts of the surface infrastructure in a landscape where this was not seen before. Assessment of these impacts is undertaken in the context that the cultural landscape's historical and aesthetic values include the presence of mining, industry, and rail structures and infrastructure, and that some heritage places, much of the cultural landscape of the Central Southern Highlands area and roads and other movement routes have had views of these features over a considerable timeframe back to the mid 20th century or earlier.

The following breakdown is a description of predicted Project impacts to the cultural landscape components of the headings below:

Towns & Villages

- Detrimental impacts to views from the villages of Exeter, Sutton Forest, Werai, and Bundanoon are unlikely to occur.
- Detrimental impacts to views from the towns of Berrima and Moss Vale including the immediate residential environs are unlikely to occur.

Rural Properties and Rural Residential Places

- There are places which may have an impact through a view in part of a customary outlook, of part of the higher component or components of the surface infrastructure. The Project Berrima rail loop and new linking line will be visible from adjacent properties fields and in some instances would be seen in part from buildings. These views are to have mitigation with planted vegetation screening. These are detailed in the Supplementary VIA (EMM 2020a).

Highways, Roads, Lanes & Pathways

The outlooks from the highways and major connecting roads are important means of understanding and appreciating the cultural landscape as these are the most frequently used movement routes.

- The views of the surface infrastructure in these views would have a moderate or low visual impact subject to the distance and duration of the view. These assessments are based on the Supplementary VIA (EMM 2020a).
- The historic roads of Oldbury Road, and Golden Vale Road hold historical heritage significance, although, as noted in Table 6.2.1, Oldbury Road and Golden Vale Road are not the major circulation routes within the cultural landscape. The views are occasional /on parts of these roads. These views of the Project infrastructure would have a low impact. These assessments are based on the Supplementary VIA (EMM 2020a).
- The rail loop, and the trains when present, may be seen from parts of Medway Road, the Hume Motorway and Old Hume Highway. In addition, the Project rail crossing at Berrima Road will be noticeable. These views of the Project rail would have a moderate impact in these localities. The overall cultural landscape is assessed as having a low impact from the Project rail infrastructure.
- Pathways and tracks in the Wingecarribee River Reserve and the Belanglo Forest / Parks would not have noticeable views of Project surface infrastructure due to the lower river elevation and / or the tree cover.
- Lanes and pathways in the villages and environs have been generally assessed as not having noticeable views of the Project surface infrastructure. Assessment of visual impacts from other lanes and pathways in the public realm on the cultural landscape area have not been detailed.

Visitor / Tourist Destinations & Lookouts

Visitors to attractions in the rural cultural landscape generally have an expectation for appreciation of the landscape that is characteristic of each area, for instance, open / wide vistas, rolling hills or clusters of vegetation around large homes, perhaps with stock in surrounding paddocks. Part of the visitor's time at the destination may involve time to view the surrounding landscape.

- Detrimental impacts to the visitor and tourist destinations and commercial ventures assessed are unlikely to occur, based on the assessments including those in Table 6.2.1.

- It is possible that the higher sections of surface infrastructure will be visible from the Cherry Tree Hill house and garden; this possible impact is considered to be low. The outdoor cafe has an outlook to the northwest over the vineyard, but is unlikely to have a view of, or be detrimentally affected by, the surface infrastructure.

Gathering, Recreation, Equestrian & Spiritual Places
Similar to tourist destinations, visitors to these places generally have an expectation for appreciation of the particular rural landscape character of the locality or region.

- Detrimental impacts to the gathering, recreation and spiritual gathering places assessed are unlikely to occur.

6.2.3 Impact Assessment Conclusion

The impacts of views of parts of the Project surface infrastructure and the Berrima rail loop on the *Proposed B,SF&E Cultural Landscape* are together assessed as likely to have a low impact on the heritage values of the cultural landscape as a whole. The impacts on the views of landscape at and immediately around the Project surface infrastructure, which are foreground views, are assessed as together to have a low to moderate impact on the heritage values of the whole landscape of that locality.

The impacts of views of parts of the Project surface infrastructure and the Berrima rail loop would be over a minor part of the wider *Central Southern Highlands Cultural Landscape,* which extends from the Wingecarribee River south to the viewshed south of Sally's Corner Road, west to the viewshed extent of the Belanglo Forests and east to the east viewshed of the Mt Broughton Road and to include Bundanoon, and that impact would be of minor impact.

7.0 Impact Mitigation for Heritage Places & Cultural Landscape

7.1 Introduction

The IPC report presented "key issues that require further information and assessment, including:

- impact of the Project on historic heritage and the Berrima, Sutton Forest and Exeter Cultural Landscape" (IPC NSW, 2019. p. 6), and recommendation R17.

In R17, the IPC referred to the Heritage Council of NSW correspondence. The part of that correspondence to which this chapter responds is as follows:

> *"The assessment should also consider whether any modifications to the projects' scope would prevent any adverse impacts to this multifaceted cultural landscape including the impact of project wide water usage, any water table draw-down and altered surface and sub-surface flows."*
> (Heritage Council NSW, 2018)

The potential impacts on the values, physical fabric, and heritage significance of the cultural landscape were addressed in chapters 5.0 and 6.0.

This chapter includes:

- the impact mitigation general landscape context section 7.2;
- assessments and mitigation for heritage places section 7.3;
- assessments and mitigation for the cultural landscape section 7.4; and
- assessments and mitigation for the water table matters section 7.5.

7.2 Impact Mitigation - General Landscape Context

7.2.1 Mitigation Measures - Types & Planning

Mitigation measures for potential impacts on the cultural landscape would encompass a range of types and may be applied over the whole Project timeframe. Mitigation works may be planned and applied:

- as 'early works' through the preparation and site establishment phase;
- as the Project works are implemented on the ground, throughout the operational phase of the Project; and
- could continue in the rehabilitation phase after the Project operation works are completed.

Mitigation measures would also be planned according to the nature of the anticipated impacts, ranging from:

- the visible intrusiveness of above ground structures on the significant viewscapes of the cultural landscape; and
- any impacts from the project water usage, and to "any water table draw-down and altered surface and sub-surface flows." (NSW Heritage Council letter 2018)

7.2.2 Visual Impacts & Mitigation Measures

Mitigation measures for visual impacts arising from the Project surface infrastructure would need to be varied and tailored to each location and to the characteristics of the viewpoint where the Project item(s) is viewed and there is a discernible impact. The measures would consider:

- The relative heritage and /or cultural landscape significance of the viewpoint / view route;
- The landscape context of the viewpoint and its relative contribution to the wider cultural landscape;
- The nature of the view and the potential impact.

Relative impacts are factors of: the view or seen area scale and, related to that, the distance between the viewing point or route and the Project element; and the nature and numbers of viewers and their expectations. The VIA report (EMM, 2020a) addresses these relative viewpoint considerations.

7.2.3 Varied Approaches to Ameliorate Potential Impacts

There are two major approaches which would be utilised to ameliorate potential Project surface infrastructure impacts on the cultural landscape. Broadly these are:

- Visual impact mitigation which has been incorporated in the Project surface infrastructure design;
- Visual impact mitigation planting undertaken in the landscape between the surface infrastructure and the viewpoints and view routes.

These are addressed in the following section 7.2.4.

7.2.4 Visual Impact Mitigation Measures

The Project surface infrastructure design incorporates design considerations which would provide mitigation of visual impacts on the heritage and cultural landscape values. The design of mitigation measures, primarily planting to integrate and screen, has been ascertained following assessment of the views of the Project surface infrastructure and of the view simulation photomontages of these views.

Mitigation Measures - Structures Design

Surface infrastructure impact mitigation measures are presented in the VIA report (EMM, 2020a). The mitigation measures include but are not limited to:

- Power and other service / supply lines located underground where feasible;
- Project vehicle circulation (eg haul roads) located away from heritage features and visibility from significant viewpoints and view routes;
- Design detail, materials and finishes (such as colours) of surface infrastructure to minimise visual impacts when they are visible from significant viewpoints and view routes; and
- Building locations and arrangements of building and works ancillary structures located to having regard to visibility from significant viewpoints and routes to minimise visual impacts. Importantly, and as described in the EIS, the surface infrastructure area was specifically located in consideration of the topography in the area, so that natural topography would screen views of the infrastructure as much as possible.

Mitigation Measures - Planting

Surface infrastructure impact mitigation by planting works are presented in the VIA report (EMM, 2020a). The planting mitigation is to screen the surface infrastructure in the views of significance whilst forming a landscape character which is appropriate for the location in terms of environmental characteristics and / or historical landscape characteristics, and appropriate for the existing view characteristics.

The planting mitigation measures include:

- Planting within the project surface infrastructure area, close to and amongst the structures and infrastructure where feasible.
- Planting between the surface infrastructure and the Project area property boundaries.
- Planting alongside the existing natural waterways, augmenting existing, remnant riparian vegetation and / or reinstating a native vegetation corridor and with woodland extensions into the adjacent lands where feasible.

The planting is detailed and represented in the VIA report (EMM, 2020a).

Mitigation Planting Within the Project Area

Planting will occur (and in some instances has been undertaken already) for mitigation of potential visual and cultural impacts within the Project surface infrastructure area, close to and amongst the structures and infrastructure, and around the Project area over the Hume Coal land including alongside the perimeter roads of Medway Road and the Hume Motorway.

The planting mitigation measures are based on assessment of:

- the particular environment considerations of the Project area;
- soils, aspect, hydrology; and

- the landscape character of the planting location and its visual environs, in particular, the landscape in the view to the infrastructure and the historical aesthetic values of that cultural landscape.

The mitigation planting characteristics are outlined here.

- Planting along and near existing waterways, Oldbury Creek and Medway Rivulet, comprises native riparian and woodland species endemic to the region.
- Planting near existing rural fields with mature rows of exotic species, Pinus sp. and similar evergreens, responds to the traditional character, (called "English-style" in the the *Exter/Sutton Forest – Landscape Conservation Area* and the *Proposed B.SF&E Cultural Landscape*). The lines of trees follow / extend existing lines, or are parallel or at 90 degrees, where that is appropriate and are integrating the planting mitigation with the cultural landscape patterns.
- Clusters of trees and specimen (separate) tree planting is also used to filter and break up views where parts of the structures and infrastructure may be seen and to generally replicate and extend the existing landscape character of the fields in the locality, to augment the amenity, environmental values and aesthetic appearance of the landscape over the whole Project area.

7.3 Heritage Places Impact Mitigation

7.3.1 *Mereworth* Garden and Setting Mitigation

The impact mitigation for the *Mereworth* garden and its key rural setting landscapes are detailed in section 5.2 of this report.

7.3.2 Heritage Places Mitigation

The potential impacts on heritage places (other than *Mereworth*) within or part within the Project area are assessed in section 5.3.3 of this report. The potential impacts on heritage places adjacent or near the Project area are assessed in section 5.3.4 of this report.

The Supplementary VIA report (EMM 2020a) addresses the specifics of views of the Project surface infrastructure and includes key views and representation of the mitigation measures in photomontages of those views.

Mitigation of impacts on heritage places would first be addressed at the planning and design phases, and then followed with the mitigation for the remaining impacts, primarily through planting to screen, to semi-screen and to visually integrate the infrastructure into the surrounding landscape, including as it appears from the viewpoints where potential impacts have been assessed.

Heritage places which may have some likelihood of a view of part of the Project surface infrastructure are listed in Table 7.3.2 and the potential view of the surface infrastructure and the mitigation described.

Table 7.3.2 Heritage Places Potential Views & Mitigation Planting

Heritage Place	*Potential view / View Characteristics*	*Mitigation Planting*
Mid-ground view distance		
Oldbury House, grounds, and outbuildings	Potential - very minor - tops of tall structures - TLO, Reclaimer, ROM Conveyor Tower, ROM Stockpile - from higher elevation at southeast side of property ~3km from surface infrastructure	The planting for mitigation is represented in photomontages from viewpoints close to these places. Refer EMM, 2020a. Planting is tailored to the location and the characteristics of the structures to reduce visibility and integrate the planting itself with the surrounding landscape character.
Golden Vale House, grounds and outbuildings	Potential - very minor - tops of tallest structures only - TLO, Reclaimer, ROM Conveyor Tower, ROM Coal Stockpile - only from west side of property adjacent Golden Vale Rd. ~4km from surface infrastructure	

Table 7.3.2 Heritage Places Potential Views & Mitigation Planting

Heritage Place	*Potential view / View Characteristics*	*Mitigation Planting*
Background view distance		
Bunya Hill House, grounds and outbuildings	Potential - very minor - tops of tallest structures - TLO, Reclaimer, ROM Conveyor Tower. - likely only from parts of higher paddocks. ~7km from surface infrastructure	The mitigation planting will be seen in association with the vegetation of the whole landscape of the view, augmenting the partial screening, and integration as to render any view of the structure much less obvious than otherwise.
Newbury Farm House, grounds and outbuildings	Partial - very minor - tops of tallest structures - TLO, Reclaimer, ROM Conveyor Tower - likely only from west side of property. ~7km from surface infrastructure	
Comfort Hill House, grounds and outbuildings	Potential - TLO, Reclaimer, ROM Conveyor Tower, ROM Coal Stockpile, CHPP. - likely only from northern paddocks. ~8km from surface infrastructure	
Rosedale House and grounds	Potential - very minor - TLO, Reclaimer, ROM Conveyor Tower, ROM Coal Stockpile, CHPP, Ventilation shaft pad structures. - from northern paddocks only. ~8km from surface infrastructure.	
Cottesbrooke House	Potential - very minor - TLO, Reclaimer, ROM Conveyor Tower. - tops of tallest structures only ~8km from surface infrastructure	
Spring Grove Farm House, grounds and outbuildings	Potential - very minor - tops of tallest structures only - TLO, Reclaimer, ROM Conveyor Tower. - from northwest paddocks only ~9km from surface infrastructure	
Vine Lodge House, grounds and outbuildings	Potential - tops of structures only - TLO, Reclaimer, ROM Conveyor Tower, ROM Coal Stockpile, CHPP. ~11km from surface infrastructure	

7.3.4 Evaluation & Conclusion

The impacts of the potential views of the Project infrastructure from some heritage places adjacent or near the Project area, based on assessments of the Supplementary VIA report analysis and findings, may be noticeably mitigated over the lower parts of the infrastructure up to the upper parts of the high structures by the planned mitigation measures, including the mitigation planting. These high structures are: the Train Load Out (TLO), the Reclaimer, the ROM conveyor tower, the ROM stockpile and the CHPP Coal handling and preparation plant.

7.4 Cultural Landscape Impact Mitigation

7.4.1 Heritage Places

The potential impacts on heritage places (other than *Mereworth*) within or part within the Project area are assessed in section 5.3.3 of this report. The potential impacts on heritage places adjacent or near the Project area are assessed in section 5.3.4 of this report. The impact mitigation for these places has been assessed in section 7.2.

7.4.2 Cultural Landscape Mitigation

The Supplementary VIA report (EMM, 2020a) addresses the specifics of views of the Project surface infrastructure and includes key views and representation of the mitigation measures in photomontages of those views.

Mitigation of potential impacts on heritage places include, the initial planning and design, and then for residual impacts the mitigation is primarily through planting to screen, to semi-screen and to visually integrate the infrastructure into the surrounding landscape, including as it appears from the viewpoints where potential impacts have been assessed. The planting mitigation has been detailed in section 7.3.

Table 7.4.2 Cultural Landscape Mitigation

Cultural Landscape Place	*Potential View of Project Infrastructure / View Characteristics*	*Mitigation*
Towns & Villages		
Exeter - Exeter Park, street cafes, Train station,	No view assessed Refer EMM, 2020a	The historical and aesthetic values of the villages, including the streetscape and landscape character of the immediate setting, are important contributors to the cultural landscape. These values are not detrimentally impacted.
Sutton Forest - Cosh Park, stores, cemetery	No view assessed Refer EMM, 2020a	
Roads & Lanes, Pathways and their Trees and Hedges		
North - Medway Road, Hume Motorway, Old Hume Highway roadside	Yes Refer EMM, 2020a, varies	The cultural landscape in experience, understanding and appreciation is to a great extent from the roads. The views subject to potential impact are represented in the detailed analysis of the VIA report (EMM, 2020a). Mitigation, which is planting, is represented in the photomontages in that report.
Central - Hume Highway, Oldbury Road, Golden Vale Road, Belanglo Road	Potential Refer EMM, 2020a, varies	
Illawarra Highway, Canyonleigh Road, Berrima Road	No	
South - Sally's Corner Road, Exeter Road, Bundanoon Road, Main Southern Railway, Middle Road, Yarrawa Road, Mount Broughton Road, Stonequarry Creek Road, Werai Road, Westgrove Road, Old Argyle Road, Ellsmore Road, Greenhills	No	

Table 7.4.2 Cultural Landscape Mitigation continued

Cultural Landscape Place	*Potential View of Project Infrastructure / View Characteristics*	*Mitigation*
Visitor / Tourist Destinations & Lookouts		
Historic homesteads and / or **gardens** - Red Cow Farm, Remembrance Driveway Plantings (Illawarra Hwy), Peppers	No	Views to the immediate surrounds, and of the cultural landscape able to be viewed, are often appreciated during a visit to a chosen destination in a village setting or in rural areas. Consideration of the mitigation of any impacts to those views is therefore of some importance. Mitigation of potential views of the Project infrastructure is proposed by considerable planting in selected locations and with appropriate species to maximise screening and mitigation. The views subject to potential impact are represented in the detailed analysis of the VIA report (EMM, 2020a). The mitigation is represented in the photomontages in that report.
Roadside Stops / cafes - *Farm Club* Werai, Sally's Corner Rd junction at Hume Hwy.	No	
Olive groves - Eleuthera Farm	No	
Vineyards - cellar door, *Eling Forest Winery, Southern Highlands Winery, Sutton Forest Estate Wines*, *Cherry Tree Hill Wines*	No	
Restaurants - *Sutton Forest Inn & Bistro, Katers Restaurant, Coolabah Tree Cafe, Birch Restaurant*	No, N/A	
Zen Oasis	Potential - Views of part surface infrastructure only from southern field of the property near Medway Road - TLO, ROM Conveyor Tower, Product Coal Stockpile	Mitigation of potential views of the Project infrastructure is proposed by considerable planting along the Project property along Medway Road and in selected locations nearer to the infrastructure and with appropriate species to maximise screening and mitigation. Along the Oldbury Creek corridor there is proposed extensive native revegetation not only augmenting the existing vegetation but adding density and new areas to form a continuous The views subject to potential impact are represented in the detailed analysis of the VIA report (EMM, 2020a). The mitigation is represented in the photomontages in that report.
Gathering, Recreation, Equestrian & Spiritual Places		
Sports grounds / **clubs** - Exeter Oval, Croquet Club	No, N/A	Similarly to 'Visitor / Tourist Destinations' above, the view appreciation of the cultural

Horse Breeders / **Equestrian Centres** - *Lime Country Thoroughbreds*, *The Chase*, *Sutton Forest Equestrian Centre*, *Lyle Equestrian*	No, N/A	landscape setting is often heightened when at these locations. The views subject to potential impact are represented in the detailed analysis of the VIA report (EMM, 2020a). Mitigation is represented in the photomontages in that report.
Churches & Halls - Sutton Forest Hall, Exeter Hall, Saint Aidan's Anglican Church, All Saint's Anglican Church	No, N/A	
National / State Parks - Belanglo State Forest,	No, N/A	

7.4.3 Evaluation & Conclusion

The mitigation measures, both of the planning and design phase of the Project and of the planting during and after Project implementation, will contribute a substantial reduction of the potential impacts on appreciation of the cultural landscape from the public realm viewpoints and routes, and the tourism, recreation, and social destinations where there would be some view of part of the Project surface infrastructure. The analysis in the Supplementary VIA (EMM, 2020a) provides the basis for this conclusion.

7.5 Water Table Impacts

7.5.1 The Cultural Landscape's Vegetation and the Water Table

The cultural landscape's values, in particular, aspects of historical, associational, and aesthetic importance, and its representativeness of the cultural landscape type in NSW, are largely related to aesthetic appreciation of much of the vegetation in the landscape, whether predominantly trees and shrubs or grasslands. The vegetation types and forms with some heritage significance contributory to the cultural landscape values include:

- windbreak lines of pines, cypress and similar evergreen trees;
- remnant roadside native vegetation;
- roadside historical pine plantings;
- hawthorn, and similar, historical and reconstructed hedges;
- garden perimeter hedges including at road reserve edges;
- specimen trees and groups of trees -both native and exotic;
- remnant riparian corridor vegetation, including reconstruction and restoration planting;
- historical gardens, at rural homesteads /villas, particularly as appreciated from the public realm.

The loss of one or all of these types of vegetation as a whole, characteristic of this cultural landscape, would potentially be a substantial impact on the landscape (removal for succession or appropriate species replacement for a type of tree / planting form may be an exception when necessary).

The analysis of whether alteration of the groundwater system and lowering of the water table under the cultural landscape, through underground Project works, has been undertaken and the findings presented in the report *Groundwater dependence assessment for cultural heritage landscapes and gardens. The g*roundwater studies have determined the relationship between the underlying rock layers, the groundwater nature and extent, and the water table over the Project area and the cultural landscape outside that area in the Project locality. The studies determined that over the Project area and the wider cultural landscape, there are two broad areas with different underlying geology and hydrological systems:

- the Wianamatta Group shales area;
- the Hawkesbury Sandstone area (EMM, 2020b).

There is limited natural vertical connectivity between the Wianamatta Group Shale and the underlying Hawkesbury Sandstone aquifer . The *Groundwater dependence assessment for cultural heritage landscapes and gardens* report figures 5.1, 5.2 and 5.3 indicate these areas (EMM, 2020b).

The *Groundwater dependence assessment for cultural heritage landscapes and gardens* investigated the potential for non-native vegetation, whether planted exotic trees, gardens and pastures to be detrimentally impacted by alteration of the water table under the vegetation, by the Project works. (EMM 2020b). The

evaluation in relation to the cultural landscape and impacts on the vegetation can be broadly summarised as follows:

> "All heritage gardens occur in areas where the Wianamatta Shale outcrops at surface and therefore have a negligible risk of drawdown." . . . "Mereworth House and Garden, listed as having local significance under the Wingecarribee LEP lies on the Wianamatta Group Shale and therefore the listed heritage item has a negligible drawdown risk during drought conditions". (EMM 2020b)
>
> "The combined 67th percentile impacts (described as 'unlikely to occur') across the landscape conservation study area are predicted to have:
> - no risk of impact during drought conditions to 3.8 ha of non-native vegetation and 0.1 ha of grasslands;
> - low risk of impact during drought conditions to 0.7 ha of non-native vegetation;
> - moderate risk of impact during drought conditions to 4.5 ha of non-native vegetation;
> - high risk of impact during drought conditions to 7.2 ha of non-native vegetation and 3.1 ha of grasslands.
>
> Accordingly, 10.3 ha of non-native vegetation (including exotic grasslands) has a high risk of impact during drought conditions under the 67th percentile results. This only represents 0.09% of the cultural landscape study area and 0.07% of the common boundary of the cultural landscapes".
>
> "Twenty-six plant species typically observed in private gardens are considered drought-sensitive to reduced water availability. Where these plant species overlie Hawkesbury Sandstone surface geology that contain shallow groundwater (restricted to low-lying areas and areas proximal to creeks) they may be subject to water stress during prolonged drought" (EMM, 2020b).

7.5.2 The Vegetation and Water Tables - Impact & Mitigation Analysis

Potential groundwater drawdown impacts on cultural landscape components identified in the *Groundwater Dependence Assessment* (EMM, 2020b) are discussed in Table 7.5.2.

Table 7.5.2 Groundwater / Water Table Change Considerations and Mitigation

Cultural Landscape feature *(includes Heritage Council NSW 2018 letter items)*	***Potential Impact Considerations***	***Impacts and Mitigation Indicated***
'Natural' /Undeveloped Woodlands -significant vegetation		
Reserves (eg Belanglo State Forest)	• Depth of water table, - and seasonal changes. • Species root system typical depths.	Technical assessment on the impacts of the project on native vegetation from a declining water table has been assessed previously and is presented in Section 13 of the RTS Main Report, Volume 1 and therefore is not assessed further in EMM (2020b)
Uncleared ridges / hillsides (north of Belanglo State Forest)		
Towns & Villages -significant vegetation -Exeter, Sutton Forest, Moss Vale, New Berrima, Berrima		
Parks - trees & shrubs	• Depth of water table, - and seasonal changes. • Species root system typical depths.	On Wianamatta Group shales & /or outside the 90th percentile. No impact indicated in EMM (2020b).
Gardens - trees & shrubs		
Streets - trees & hedges		
Roads & Lanes roadsides, Pathways -significant vegetation		
Hume Highway 'Remembrance' plantings	• Heritage values /significance	On Hawkesbury Sandstones. No impact indicated in EMM (2020b)

Table 7.5.2 Groundwater / Water Table Change Considerations and Mitigation

Cultural Landscape feature *(includes Heritage Council NSW 2018 letter items)*	***Potential Impact Considerations***	***Impacts and Mitigation Indicated***
North - Medway Road, part Hume Motorway, part Old Hume Highway roadside	• Depth of water table, and seasonal changes. • Species root system typical depths. • Age / senescence of historic plantings + sensitivity to change / drought tolerance.	On Hawkesbury Sandstones. Potential drawdown impacts restricted to small patches of vegetation adjacent to Oldbury Creek.
Central - part Hume Highway, Oldbury Road, Golden Vale Road, Berrima Road		On Wianamatta Group shales. No impact indicated in EMM (2020b)
Central - Illawarra Highway, Belanglo Road, Canyonleigh Road	• Age / senescence of historic plantings + sensitivity to change / drought tolerance.	On Hawkesbury Sandstone. Potential drawdown impacts restricted to small patches of vegetation adjacent to Medway Rivulet, Black Bobs Creek and tributaries.
South - Sally's Corner Road, Exeter Road, Bundanoon Road, Main Southern Railway, Middle Road, Yarrawa Road, Mount Broughton Road, Stonequarry Creek Road, Werai Road, Westgrove Road, Old Argyle Road, Ellsmore Road, Greenhills	• Depth of water table, and seasonal changes. • Species root system typical depths. • Age / senescence of historic plantings + sensitivity to change / drought tolerance.	Mainly on Wianamatta Group shales, with small areas on Hawkesbury Sandstone. All areas are outside the 90th percentile. No impact indicated in EMM (2020b)
Historical lanes and pathways including trees and hedges		Majority on Wianamatta Group shales - as above for Towns and Villages
Rural / Pastoral Lands -significant vegetation		
Historic pastures	• Depth of water table, and seasonal changes. • Species root system typical depths.	No impact to majority of pastures indicated in EMM (2020b). Potential drawdown impacts restricted to small patches of exotic grassland adjacent to Wells Creek and Black Bob's Creek.
Other rural fields /grass cover	• Depth of water table, and seasonal changes.	
Historic hedgerows Tree belts & windbreaks -planted Orchards, Olive groves Vineyards Historic homesteads gardens	• Depth of water table, and seasonal changes. • Species root system typical depths. • Seasonal requirements. • Age / senescence of historic plantings + sensitivity to change / drought tolerance.	No impact indicated in EMM (2020b). No mitigation indicated.
Rivers, Creeks, Waterbodies - dams and formed ponds -significant vegetation		
Wingecarribee River vegetation	• Any alterations in the catchment over the project period.	On Hawkesbury Sandstones & /or outside the 90th percentile. No impact indicated in EMM (2020b).

Table 7.5.2 Groundwater / Water Table Change Considerations and Mitigation

Cultural Landscape feature *(includes Heritage Council NSW 2018 letter items)*	***Potential Impact Considerations***	***Impacts and Mitigation Indicated***
'Natural' /historic creeks & waterways: Whites Creek, Stony Creek, Medway Rivulet & Wells Creek east of Hume Highway and Oldbury Creek	• Relationship / connection / infiltration to groundwater.	White's Creek and Stony Creek are on Wianamatta Group shales & /or outside the 90th percentile.No impact to these is indicated in EMM (2020b). Medway Rivulet & Wells Creek east of Hume Highway and Oldbury Creek are on Hawkesbury Sandstone. Potential drawdown impacts restricted to small patches of vegetation adjacent to Medway Rivulet, Wells Creek and Oldbury Creek.
Dams & formed ponds (except for *Mereworth* & *Evandale & Comfort Hill)*	• Condition of dam. typical seasonal dam /pond level.	Majority on Wianamatta Group shales & /or outside the 90th percentile. No impact indicated in EMM (2020b).

7.5.3 Evaluation & Conclusion

The vegetation within the region's cultural landscape is a significant component contributing primarily to the historical, aesthetic, and representativeness values.
The *Groundwater dependence assessment for cultural heritage landscapes and gardens* (EMM 2020b) has indicated that there would be no impacts by the Project underground works to significant vegetation in areas over the Wianamatta Group shales.

Small areas of non-native vegetation and exotic grasslands overlying the Hawkesbury Sandstone area may have varying degrees of impact and may experience water stress during drought conditions due to the Project underground works (see 7.5.2).

The regional scale RTS groundwater model was used to predict watertable drawdown in vegetated areas identified to contain plants that may access shallow groundwater and may be susceptible to water stress during periods of prolonged drought.

During average and wet climate periods, vegetation in these areas will not be affected by groundwater level drawdown. During especially dry periods when the soil moisture is low and not replenished by rainfall or surface water runoff, vegetation in these areas that may access groundwater may exhibit increased stress or die back due to reduced access to groundwater as a result of groundwater level drawdown. However, these areas are limited to low lying topographical areas where the watertable is shallow and near watercourses where groundwater discharges as baseflow. However, under prolonged drought conditions, without mining, the watertable would decline naturally in these areas. As such, vegetation either naturally adapts or is subject to water stress during these times, with replenishment when the drought breaks.

Although the vegetation contributes to the cultural landscape's values, the above areas are not classified as high priority groundwater depenent ecosystems and are not covered under any statutory requirement to manage or mitigate the potential and unlikely effects.

Following project approval, Hume Coal will conduct additional 'post-approval' groundwater modelling and field investigations, where possible, to confirm the depth to groundwater in the areas identified as being at high risk of water stress during periods of prolonged drought.

Ongoing 'post-approvals' groundwater modelling will be undertaken as and when new data become available, and at regular intervals throughout the life of the mine. It is expected the confidence level of model

predictions will increase over time as the model is updated to reflect the observed effects on groundwater obtained from the monitoring program. This is consistent with International Organisation for Standardisation (ISO) continuous improvement guidelines and industry standard.

7.6 Summary of Impact Mitigation

The *Proposed B,SF&E Cultural Landscape* has been assessed as likely to have some degree of low and moderate visual impacts, in particular in the northern area which is within the foreground and midground viewshed of the Project surface infrastructure. Mitigation by a range of forms and species of planting, as appropriate to the location and the infrastructure to be screened is proposed to be undertaken. These mitigation measures are assessed to be moderately effective within approximately five years of plant growth and moderate to highly effective after fifteen years of plant growth. This planting mitigation is represented in the view photomontages in the VIA report (EMM, 2020a).

The *Proposed B,SF&E Cultural Landscape* is an extensive area extending south of the Project area to the southern edge of the Sally's Corner Road viewshed, and east to the edge of the Southern Highlands east of the Mount Broughton and Bundanoon localities. The overall understanding, the experience and appreciation, and the identity of the cultural landscape would remain substantially intact.

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Attachment 1

Additional Cultural Landscape Characteristics and Values

In *Wingecarribee: Our Home,* Ian Bowie explains that the extent of the 'Southern Highlands' is not officially defined. He uses the name to describe "what was known as the 'Berrima District' in the nineteenth century and sometimes as the 'Southern Tablelands' in the twentieth", and takes it to be synonymous with the Wingecarribee Shire. (Bowie, 2006 p. 2) He explains how the 'Southern Highlands' can be understood as distinct from the adjacent areas both historically, as the historic Berrima Registry and the Berrima Police District were the same as the Wingecarribee Shire now, and physically, by its plateau landform and the separate character from the National Parks and water reserves to the north, east and south.

This brief overview of the Southern Highlands, presented through extracts from *Wingecarribee: Our Home* (Bowie 2006), is from just one researcher and authority, however it appears rigorously researched and systematically documented with great detail.

Attachment 1 Table 1a-d uses as reference Bowie's (2006) *Wingecarribee: Our Home.*

Attachment 1 Table 1a The Southern Highlands Landscape

The Southern Highlands Physical Characteristics
Terrain
"There is little truly flat land and most of this is in the poorly drained upper reaches of the Wingecarribee River system. However, there are extensive tracts of undulating land on the surface of the plateau in the centre and east." (p. 7) "Upstream on the plateau lower river gradients have restricted down-cutting and there has been little development either of flood plain landforms or of river terraces." (p. 12)
Soils
"In the Wingecarribee where weathering and erosion have taken place over long periods of time, underlying rocks do provide parent material for soils . . " . . NSW Agriculture . . . considers that barely a quarter of the shire is 'prime agricultural land'" and that "there is no land suitable for continuous cropping or intensive agriculture." (p. 14)
Erosion and Considerable Landscape Change
The "clearing of much natural vegetation over the past two centuries has accelerated erosion and deposition, giving rise to problems of river-bank management and silting-up of dams." "Most dramatically, on a scale comparable with the impacts of an earthquake or tsunami, was the collapse in 1998 of the Wingecarribee Swamp. This was the largest upland peat-swamp in Australia until, weakened by years of peat mining, much of its peat was washed into the Wingecarribee reservoir after a single night of intensive storm runoff." (p. 9)
Geological Strata and Coal
"The Illawarra coal measures are exposed only along the margins of the plateau . . . Historically the Wongawilli seam has been and remains the most important. It is the seam from which high-grade coals are currently mined near Medway and from the east." (mine now closed) "The plutonic magmas . . . are quarried for aggregate and have been quarried (for example, the microsyenites of Mount Gibraltar) for dimension stone." (p. 11)
Weather and Climate
"Climatically, the Wingecarribee is transitional between the coastal climates of Sydney including the Illawarra and the inland areas of the Southern Tablelands." "A notable feature of the weather of the

shire is its variability, unreliability indeed, which results from the constant interaction between the atmospheric systems . . ." (p. 19)

Moisture

Temperature and rainfall affect the availability of moisture for plants. Soil and surface moisture reservoirs in the Wingecarribee may be constantly depleted. "The consequences of this vary from species to species but mean that generally that plant growth in the Wingecarribee is less than it would be under ideal conditions." (p. 23)

Vegetation

The 'native vegetation cover is predominantly in the outer parts of the shire. "It is a matter for debate how much of the native vegetation cover is 'natural', ie pre-1750 or pre-European."
It has been estimated that over 60% "of the shire's natural vegetation has been 'modified', a figure that is similar to percentages of the shire that were in rural holdings during their First World War and 1960s peaks.
This suggests that less than forty percent of the shire's pre-European vegetation remains essentially undisturbed . . . mostly in less accessible areas in national parks and Sydney water reserves along the northern and southern edges of the shire." (pp. 24, 25)

Attachment 1 Table 1b The Southern Highlands Social & Development Characteristics

The Towns

"The first attempt to establish a town in the Wingecarribee was a government settlement at Bong Bong where the cart road from Sydney completed in 1821 crossed the Wingecarribee River. This settlement had an indifferent water supply which led to suggestions of its removal to Sutton Forest where the nucleus of a village was forming in the late 1820s."
"Private subdivisions anticipating the railway created villages at Wingecarribee (1858, now Bowral), Nattai (1863, as New Sheffield), and Moss Vale (1864). By the time the railway was completed (1867) each of these had their established inns and other commercial establishments and towns developed around these, rather than around markets or other meeting places." (p. 35)

The Importance of the Railways

"The railway was central to the commercial development of what are now the main towns. The railway station at Mittagong served the Fitzroy Iron Works and railway stations in Bowral and Moss Vale handled produce from Kangaloon and Robertson respectively in the new farming areas opened up in the Yarawa Brush from 1862. Other businesses depending on the railway for their supplies or markets tended to follow nearby." (p. 35)

Agricultural Development

"Despite its historical importance agriculture makes only a small contribution to the regional economy today." (p. 56)
"At the time of Sir John Robertson's Land Act of 1861 less than 10percent of the Wingecarribee was in rural holdings of an acre or more. Only a small area, then as now, was cultivated and most was for scrub cattle, though growing numbers of pigs suggests that there was some dairy farming.
Between 1861 and the early years of the First World War the area in rural holdings grew to more than sixty percent of the Wingecarribee and the number of holdings grew by a factor of more than ten." (p. 59)
"After the First World War the area in rural holdings declined steadily and there were dramatic falls in holding numbers, especially in the drier margins."
Since 1980, in "the last three decades there has been a loss of land in agriculture, especially on the drier margins."
"Nevertheless, steady decline in the numbers, areas and mean sizes of agricultural establishments from the 1970s are testimony to the effects of widespread rural subdivision of agricultural as well as non-agricultural land." . . . Rural subdivision has continued since 1986, with the area of land in agricultural operations falling by fifteen percent and the mean size of establishments falling from 155 to 136 ha by 2001." . . . From 1990, the "last fifteen years have seen agriculture at a standstill . . . "It

seems that agriculture has effectively retreated to a core area of better land in the centre and east, where it seems probable that broadacres grazing will remain as the region's dominant, if small, core agricultural business." (p. 60)

Society

"Although the shire has a reputation of being 'genteel' a review of census CD data suggests that this reputation might be more imagined than real. This reputation seems to have arisen because of associations between the Wingecarribee and the elites of Sydney that developed after the beginning of the railway era and that became very strong as the motor vehicle came into prominence." (p. 48)

Attachment 1 Table 1c Southern Highlands Industries

Forestry

Forestry developed associated with land clearing though "is now but a minor industry drawing timber mainly from softwood plantations planted in the west since 1919." (p. 54)

Mining

Mining has a long history in the Southern Highlands. At Bundanoon Rock Roof Colliery opened in 1869 and was renamed Erith Colliery in 1871. This colliery operated on and off until 1924. The Centennial Coal's Berrima Colliery at Medway was in continuous production from 1872 to a recent closure. Since 1924 it has supplied "high-ash coal to its single customer, Boral's Southern Blue Circle cement works at Berrima."

"There are 21 active quarries on Council's register of extractive industries producing sandstone, blue metal, gravel, sand and shale. Eight of these are classified as 'large' . . . "

"Most successful primary processors in the shire are ones that have capitalised on the location of the shire in relation to raw materials and markets beyond the shire. Amongst these are Omya's plant at new Berrima (1961), which processes limestone, and above all Boral's cement works also at New Berrima, which supplies about half of NSW cement needs." (p. 54)

"The New Berrima cement works was opened in 1929 on a site where shale was quarried and that was on the tramway between Berrima Colliery and the Main South Railway line at Berrima Junction. The tramway, upgraded to standard gauge in 1927 (the section from the cement plant top the colliery was closed about 1970) gave access to markets in Sydney, Canberra and (from 1932) Wollongong. Most importantly it also gave access to a vast limestone at South Marulan, which lies just southwest of the shire." (p. 54)

Attachment 1 Table 1d Challenges

Climate Change

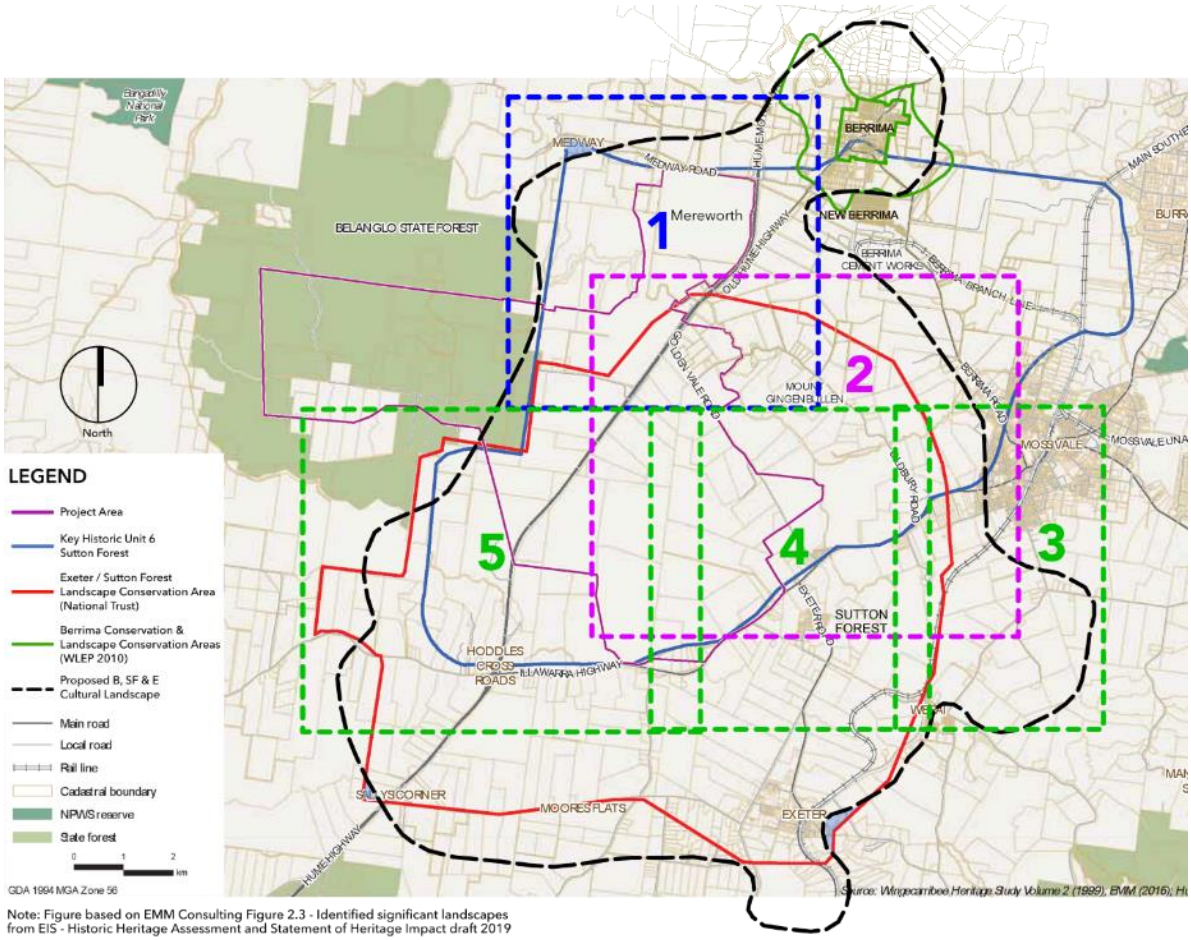
"For the Wingecarribee climatic modelling . . . is now sufficiently precise to predict a warming of at least 1.6^{o} C by 2030. Warming will be greater at night and in winter. There will be a twenty percent reduction in rainfalls, especially in winter and spring. . . . This is very bad news for plant growth because while winters may become milder, there will be less available moisture in soils. This might enable more cropping in the east but livestock carrying capacities will fall generally and many natural communities and ecosystems may not survive. Bush fires will become more common and, while winters might be more comfortable for humans, garden plantings may not survive increasingly unreliable conditions." (p. 67)

Traditional Owners

"Throughout Australia the conservation and management of cultural landscapes should be guided by the Indigenous communities who belong to those landscapes." (Ramsay 2018 p. 4)

Attachment 2

Aerial Photo Comparisons



Note: Figure based on EMM Consulting Figure 2.3 - Identified significant landscapes from EIS - Historic Heritage Assessment and Statement of Heritage Impact draft 2019

This key map shows the approximate extent of areas covered by the following aerial photo **Comparisons 1 - 5**. Aerial photos covering the remaining south and north areas were not available at the time of this report.

For the purposes of these comparisons the aerial images have approximately the same scale and extent however are not exact.



1949 aerial image source: NSW Spatial Services.

Comparison 1 - **North west area - south west of Berrima**
1949 aerial photo
Medway Road forms a distinct line running across the north.
The Old Hume Highway can be distinguished running NE - SW diagonally down to Belanglo Road and crossing Wells Creek.
Belanglo Creek and Medway Rivulet are to the west.
Golden Vale Road lies at bottom centre of image.
Mt Gigenbullen half appears in the south east part.
This area encompasses part of the Project area.
The *Mereworth* property, with earlier homestead and group of outbuildings at the yards is in the upper centre.

Landscape appraisal

- This formerly wet sclerophyll and woodland forested landscape has been extensively modified.
- This is a rural pastoral landscape after considerable widespread clearing of the woodlands and the riparian vegetation, not only after timber getting practices of the 19th Century settlement but also the clearing for traditional broad-acre livestock farming of the 20th Century.
- There are essentially no lines of windbreak plantings or hedgerows, except a few at 3 houses.
- There are no property dams of note, no cropping, vineyards, orchards or other intensive agriculture.
- There is no "English-style" landscape over this area.

This landscape would be similar to the landscape to the south and east in this mid 20th Century 'snapshot'.



1974 aerial. source: NSW Six Maps

Comparison 1 - **North west area - south west of Berrima**

This **1974** aerial photo is of the northern, central west area of the *Proposed B,SF&E Cultural Landscape*, however it includes more area than the 1949 aerial. Mt Gingenbullen is seen in the SE sector. The Hume Highway can be seen lying NE - SW.

Landscape appraisal

- This is still a rural pastoral landscape very similar to the 1949 landscape (seen above) after considerable widespread clearing of the woodlands and the riparian vegetation.
- There are some lines of windbreak plantings to be seen, however they would not be seen from the roads as a widespread prominent feature.
- There are more property dams than in the 1940s. Paddocks of varying pasture management can be noted, though no cropping, vineyards, orchards or other intensive agriculture (as present in parts today).
- Roads are not all lined with remnant woodland vegetation.
- There appears still no "English-style" landscape over this area.
- New Berrima is laid out and establishing.

- The paddocks show a pattern of divisions in one or all fencing, grazing, grass cover, pasture improvement or related pastoral uses.
- Radiata pine tree belts / windbreaks, planted hedgerows, are minimal or very few. There are possibly 4 to 5 plantings along paddock lines in this aerial photo.

The *Mereworth* property homestead now has an encircling planted windbreak of pines. (The garden and new driveway were established by Sorensen in 1966.)

- Mt Gingenbullen has regrowth around the NW lower hillside - cleared area higher and over the quarry site.



1997 aerial. source: NSW Six Maps

Comparison 1 - **North west area - south west of Berrima**

The **1997** aerial photo shows that the addition of the new Hume Motorway alters this part of the pastoral landscape and the perceptions of the users of the Motorway and of Medway Road in this locality.

Landscape appraisal

- Substantial clearing has occurred over the north half of Mount Gingenbullen and the property around its northern slopes.
- The lines of windbreak plantings from the 1970s have grown and some new linear plantings are to be identified. The windbreaks / windrows are not as many nor as widespread as seen in the next image of 2020.
- There is still no "English-style" landscape over this area.
- Golden Vale Road appears to have a little more vegetation along the roadsides.
- The Hume Highway and the Hume Motorway have additional plantings along the reserves.
- New Berrima appears more established.
- The Boral Cement Works have extended over the southern sparsely wooded hillside. Considerable clearing and earthworks and stockpiles have been formed at the Boral cement works.



2020 aerial

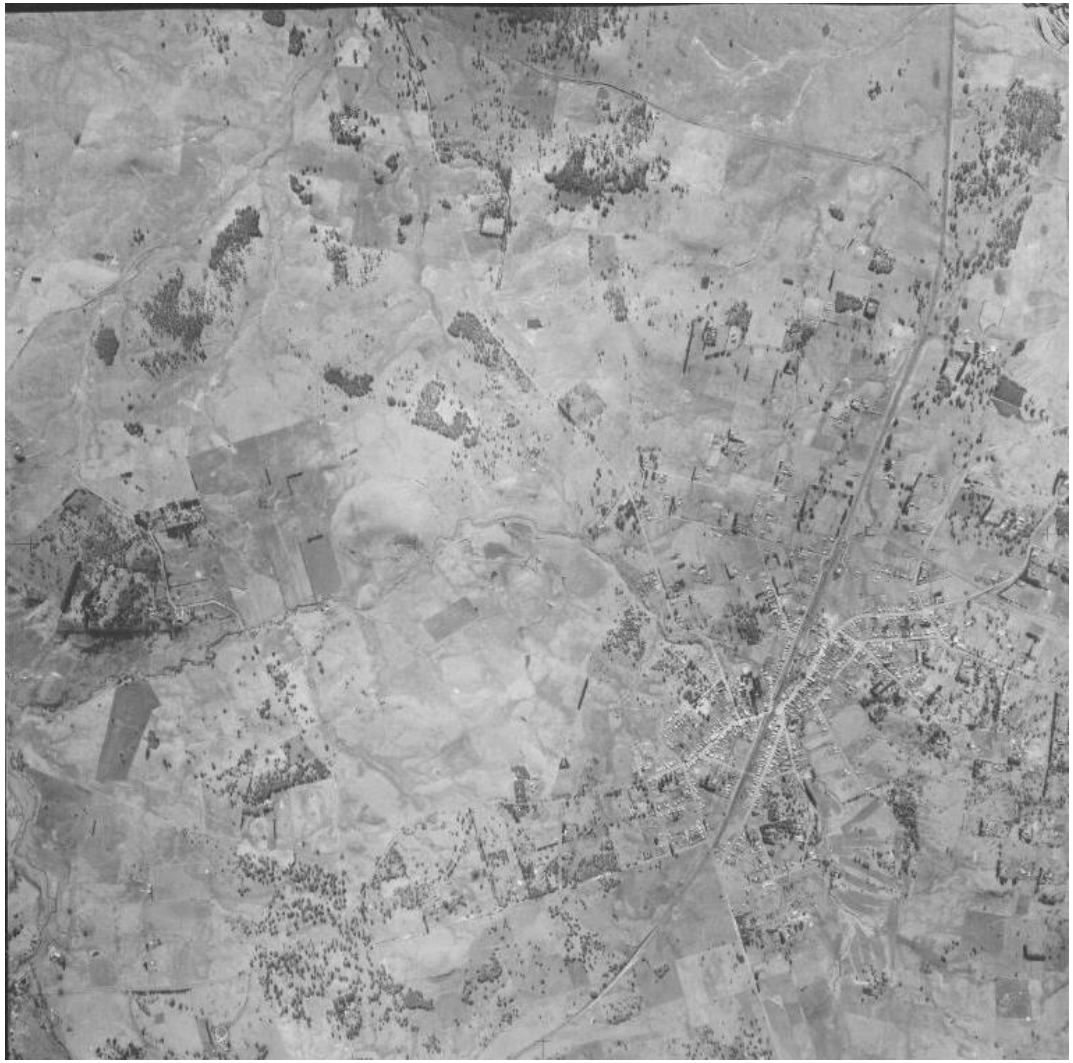
image source: Google Earth, 2020

Comparison 1 - North west area - south west of Berrima 2020.

Belanglo Creek and Medway Rivulet with riparian vegetation to the west.
Medway Road running across the north.
Old Hume Highway running diagonally down to Belanglo Road and crossing Wells Creek.
Hume Motorway (Berrima bypass) can be distinguished.
Golden Vale Road at bottom centre of image.

Landscape appraisal

- The landscape has been extensively modified.
- The edge of the extensive Belanglo pine plantation can be discerned on the lower left.
- The lines of windbreak plantings or hedgerows, are now fairly widespread.
- There are property dams of note, paddocks are more divided / smaller, likely with more pasture management.
- There may now considered by some to be an aspect of the "English-style" landscape which the National Trust (NSW) and Morris 2017 identified as being in place since the settlement period of the 1st half of the 19th century. However those assessments did not explain what were the specific landscape aesthetic qualities as continuous from the 1820s - 1830s.



Landscape appraisal

• This formerly wet sclerophyll and woodland forested landscape has been extensively modified.

• This is a rural pastoral landscape after considerable widespread clearing of the woodlands and the riparian vegetation, not only after timber getting practices of the 19th Century settlement but also the clearing for traditional broad-acre livestock farming of the 20th Century.

• There are very few lines of windbreak plantings or hedgerows.

• There appears no noticeable property dams, no cropping, vineyards, orchards or other intensive agriculture.

• There is no "English-style" landscape over this area.

This landscape would be similar to the landscape to the north, south and east in this mid 20th Century 'snapshot'.

• Moss Vale, and the main north south railway seen in the east are integral parts of the culture and this cultural landscape.

Comparison 2 - Central area to Sutton Forest

1949 aerial photos. Berrima Road lies diagonally northwest - southeast to Moss Vale at lower centre right of the image.
Whites Creek curves northwest from Moss Vale then runs east - west about the centre left of the image.
The railway line can be seen through Moss Vale.
image source: NSW Spatial Services.



Comparison 2 - Central area to Sutton Forest
2020. Belanglo Road, Old Hume Highway at west.
Golden Vale Road running diagonally south to Sutton Forest at centre bottom of image. Mt Gingenbullen at centre with Medway Rivulet and Whites Creek flowing south of it. Western side of Moss Vale at right with railway line at bottom right.
image source: Google Earth, 2020

Landscape appraisal

- The landscape has been extensively modified in the previous fifty years.
- The lines of windbreak plantings or hedgerows, are now widespread.
- There are in 2020 property dams of note, paddocks are more divided / smaller, likely with more pasture management.
- There may now be considered by some to be an aspect of the "English-style" landscape which the National Trust and Morris identified as being in place since the settlement period of the 1st half of the 19th century, however those assessments did not explain what those landscape aesthetic qualities were which were continuous from the 1820s - 1830s.
- Moss Vale is seen to have expanded west, and while there is a clear line of the edge of subdivisions there is no physical or vegetative separation from the cultural landscape. The commercial / industrial / service zone, and the abattoir and yards, NW of Moss Vale, are now a part of the central cultural landscape.





Comparison 3 - Moss Vale and South-Eastern Cultural Landscape.
Moss Vale is in the north.
Werai locality is at lower centre left of image.
The Main North-South Railway line lies diagonally across the image.
The eastern most boundary of the *Proposed B,SF&E Cultural Landscape* area lies in the lower quarter excluding a similar landscape seen in the east third of these images.
and Moss Vale is excluded from that landscape.

1949 aerial source: NSW Spatial Services.
2020 source: Google Earth, 2020

Landscape appraisal

• The landscape appreciated from the roads of the district now would appear noticeably different to that in 1949. The roadside vegetation and the hedges and windbreak lines of trees have increased considerably. The lines of windbreak plantings or hedgerows, are now widespread. The remnant indigenous vegetation - eucalyptus and other trees have been increasingly removed or have died.

• There may now be considered by some to be an aspect of the "English-style" landscape (assuming the National Trust (NSW) and Morris 2017 meant that to mean hedges and small, grassed divided fields) which the National Trust (NSW) and Morris identified as being in place since the settlement period of the 1st half of the 19th century. Those assumptions did not explain what those landscape aesthetic qualities were which were continuous from the 1820s - 1830s, nevertheless they appear incorrect.

• Moss Vale is seen to have expanded west, and while there is a clear line of the edge of subdivisions there is no physical or vegetative separation from the cultural landscape.



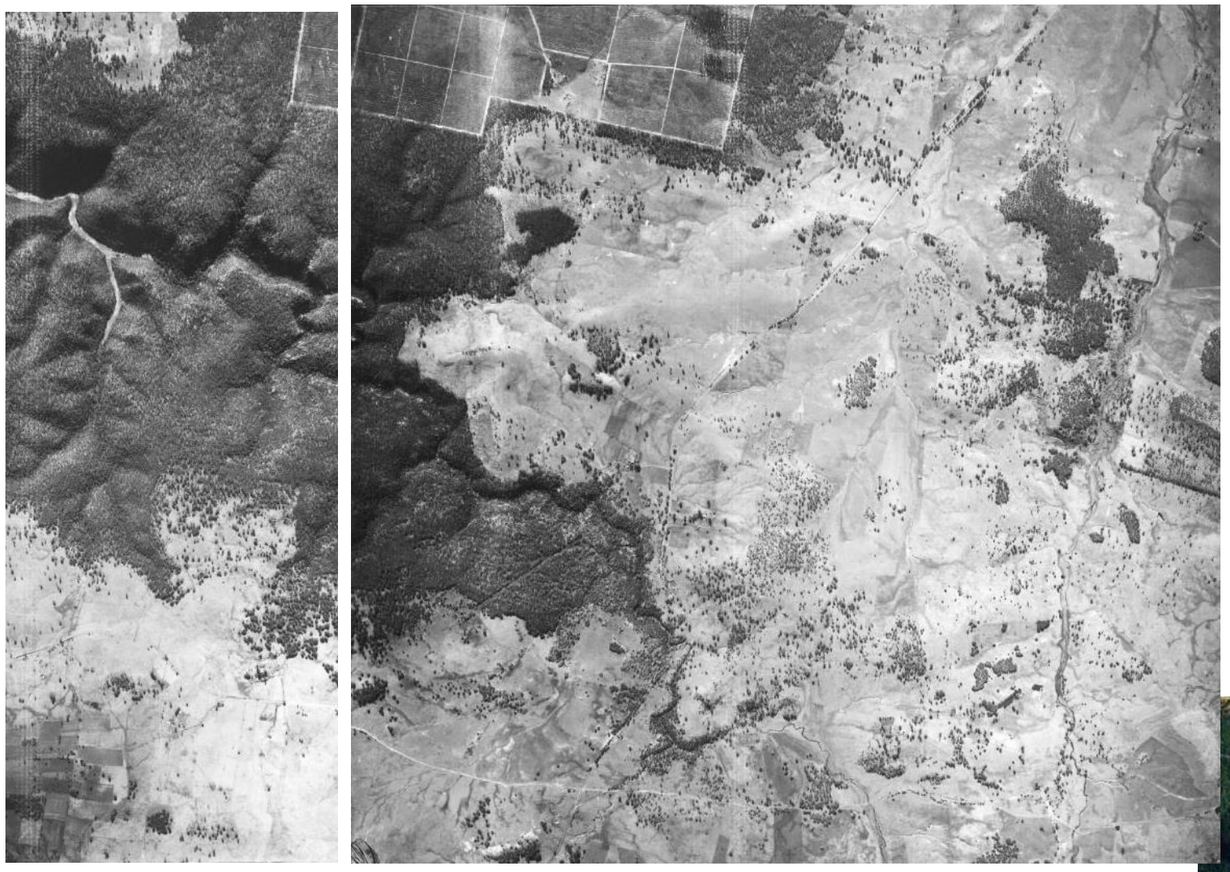


Comparison 4 - Golden Vale Road and Sutton Forest Area
Sutton Forest is seen at the centre of the image. The Illawarra Highway traverses this landscape northeast - southwest.
Golden Vale Road can be seen in the 1949 aerial and shows up through the new roadside vegetation in the 2020
The base of Mt Gingenbullen is visible at top.
Wells Creek is at the left side of the image.

1949 aerial source: NSW Spatial Services.
2020 source: Google Earth, 2020

Landscape appraisal
• The landscape has been extensively modified in the previous fifty years.
• The landscape appreciated from the roads of the district now would appear noticeably different to that in 1949. The roadside vegetation and the hedges and windbreak lines of trees have increased considerably. The lines of windbreak plantings or hedgerows, are now widespread. The remnant indigenous vegetation - eucalyptus and other trees, have been increasingly removed or have died.

• There may now be considered by some to be an aspect of the "English-style" landscape (assuming the National Trust (NSW) and Morris 2017 meant that to mean hedges and small, grassed divided fields) which the National Trust (NSW) and Morris identified as being in place since the settlement period of the 1st half of the 19th century. Those assumptions did not explain what those landscape aesthetic qualities were which were continuous from the 1820s - 1830s, nevertheless they appear incorrect.



Comparison 5 - Southwest to Illawarra Highway Area
Belanglo State Forest at left with Black Blobs Creek.
Cherry Tree Rd running across the southern edge of the square shaped tree plantation lots
Canyonleigh Road runs along the bottom of the image through Black Blobs Creek to Wells Creek to the east.

1949 aerial source: NSW Spatial Services.
2020 source: Google Earth, 2020

Landscape appraisal
• The edge of the extensive Belanglo pine plantation can be discerned in the upper centre.
In these fifty years:
• The lines of windbreak plantings or hedgerows, are now widespread.
• The remnant indigenous vegetation - eucalyptus and other trees, have been increasingly removed or have died. There is a very different character to that of the mid 20th century, and certainly to the years of early European settlement and subsequent pastoral and towns developments. This is contrary to the assessments made for the *Exeter/Sutton Forest Landscape Conservation Area* and the Morris 2017 *Proposed B,SF&E Cultural Landscape*.
• There are added property dams of note, paddocks are more divided / smaller, likely with more pasture management.
• The Hume Highway has been widened and planting is alongside the roadways. This is now a noticeably different movement corridor dividing the landscapes on either side.



Attachment 3

Thematic Understanding and Identification of Values

Local Cultural Landscapes Classification
Assessments of values in the landscape should distinguish not only any widespread and well-documented valued landscape narratives, outstanding values and heritage places, but also distinct localities. Locality cultural landscapes may be sub-sets of the whole cultural landscape, or found better delineated as separate cultural landscapes. Such local landscapes, which may be the landscape alongside a historic road, will, similarly to the wider study area, have a landscape identity formed through the different relationships of geology and soils, vegetation, water systems, land ownership, and the visible patterns or characteristics of development and land use changes. A classification of the local landscapes, often overlapping or nested landscapes, is a key step to identification of the extent or boundary of wider landscape to be designated. The boundary can be drawn on a sound basis.

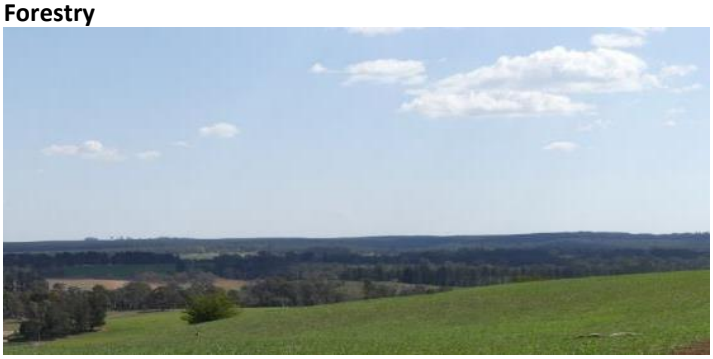
A Thematic Approach to Cultural Landscape Understanding and Delineation
As the eminent historical geographer Jane Lennon points out, a cultural landscape when designated becomes an extensive management zone (Lennon 2009 p. 11). The historic features listed within this landscape are vital features with specific management requirements, however, the cultural landscape is more than these particular places.

The cultural landscape boundary is determined by first understanding then assessing the contribution of the narratives of the place, which are usually organised by themes, geographic bounds, and / or the aesthetic appreciation of the components and relationships. The components and / or characteristics of the cultural landscape need to be described. The analysis of the Morris 2017 study contents and statements of significance would potentially explain the values and the approach to designation of the proposed cultural landscape if the descriptive presentation was based on a thematic approach and with more comparisons of the changes of the landscapes through time. The Heritage Council has established historical themes and correlated them with national and local themes. (*New South Wales Historical Themes* NSW Heritage Council, 2001)

The Attachment 3 Table 1 introduces for some of the appropriate themes and with just some examples of the landscape characteristics which hold landscape significance.

Attachment 3 Table 1 Cultural Landscape Delineation

Theme components & particular characteristics	*The Cultural Landscape elements*
theme: **Environment - naturally evolved** (NSW Historical Theme 1)	
Landform & features - natural patterns	 Small pockets of uncleared ridges / hillsides

Water - shaping the landscape	eg. Wingecarribee River, Stony Creek, Medway Rivulet, Wells Creek, Black Bobs Creek 
theme: **Indigenous cultural life** (NSW Historical Theme 2)	
Aboriginal cultures and interactions with other cultures	These aspects are addressed in the Supplementary history and archaeological assessment report EMM 2020c.
theme: **Peopling places and using and changing the land** (NSW Historical Themes 2 & 3)	
Vegetation Cover: - patterns, - clearing, - management.	 Property entry formally planted - eucalyptus woodland patch, - exotic pines on skyline ridge  outside Bowral - mix of planted pines and eucalyptus  Pine windrows
Exploration: - evidence, - association.	These aspects are addressed in the Supplementary history and archaeological assessment report EMM 2020c.
theme: **Developing local and regional industries** (NSW Historical Theme 3)	
Materials Sources: - extractive quarrying, - harvesting, - forestry, - industry.	**Forestry**  Pine plantations - Belanglo Forest The forested ridgeline is outside the subject cultural landscape.

- a prominent rural character along the west side of the landscape

Industry



Boral Cement Works New Berrima



Boral 'tower' prominent in view from *Mereworth*

Agriculture makes only a small contribution to the regional economy this century. Centennial Coal's Berrima Colliery, also contributes in part to the landscape.

Transport Routes:
- shaping the form of use,
- roads,
- rail,
- air.



Hume Motorway



Section of gravel road with Eucalypt woodland corridor

Past Routes - changes in use



Historic road - disused



The disused Black Bob's Creek bridge

The Important Role of the Railways

The railway was central to the commercial and industrial development of the region, and establishment of the towns of Bowral and Moss Vale.





Exeter station

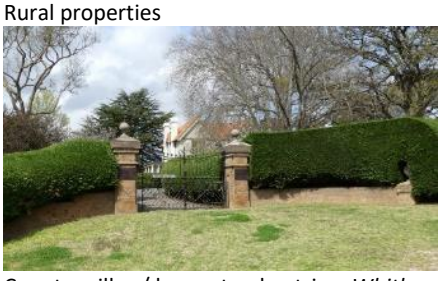
theme: **Building settlements, towns, cities & dwellings** (NSW Historical Themes 4)

Land Tenure:
- subdivision pattern,





Rural properties



Country villas / homestead entries -*Whitley*



near Exeter



Bunya Hill on Golden Vale Road

The "stately homes" are most often hidden from view. The characteristics which form part of the cultural landscape are the high fences, walls and /or hedges, a view of a driveway, and the unknown about what is beyond this entry. The 'introduced' tree planting indicates the drive and possibly a garden. At Bunya Hill note the new young pine trees planted to screen the property from views from the road -excluding it from the shared cultural landscape.

Contemporary Housing



now part of the rural landscape character

Settlements:
- towns,
- suburbs
- commerce,
- communications.



Exeter



Sutton Forest



Exeter

Utilities Infrastructure:
- power,
- pipelines,
- stormwater management.



Power transmission lines seen in the landscape

theme: **Developing cultural life** (NSW Historical Theme 8)

Leisure & Cultural Expressions:
- tourist destinations,
- artistic,
- design of places,
- gathering,
- spiritual.



Vineyards - Cellar door



Cafe courtyards

theme: **Spiritual connections and expression** (NSW Historical Themes 8 & 9)

Religious places, Births and deaths, and People Associations:
- churches,
- cemeteries,
- memorials & memorial plantings.

Sutton Forest Hall, Exeter Hall, Saint Aidan's Anglican Church, All Saint's Anglican Church





Remembrance Drive memorial plaques

additional themes

The Historical Themes 5 - *Working*, 6 - *Educating*, and 7 - *Governing* have not been included in this indicative table, however, they would be considered in a comprehensive thematic approach.

Attachment 4

Heritage Listed Places of the Villages and Settings

The Villages & Surrounds Heritage Listed Places

The historic towns and villages of the broader regional cultural landscape beyond the project area, namely, Berrima, Moss Vale, Bowral, Bundanoon and Mittagong, are key parts of that wider cultural landscape, having their origins at the same period of early settlement from the 1820s and historical development at later stages, however, none of these are within the *Exeter/Sutton Forest Landscape Conservation Area.* These towns and villages are not covered in this outline as they are at some distance beyond the project area and outside the cultural landscapes under assessment to the IPC requirements.

The villages within the Morris 2017 *Proposed B,SF&E Cultural Landscape* are Sutton Forest and Exeter and these are both outside the project surface infrastructure area.

A listing of the villages 'and towns' heritage places separate from the rural cultural landscape not only provides more clarity to a heritage understanding but also informs impact assessments and mitigation measures, in particular, as the Project area is outside the towns and villages and their settings and also substantially outside the foreground viewsheds of those villages and towns.

Within the continuing cultural landscape, places of identified heritage significance at either local or state level of heritage significance have been identified in relation to the Project area.
These are indicated on Tables 1a and 1b.

Attachment 4 Table 1a

Heritage Places outside the Project Area - Villages & Towns

State Register Places (item no.)	*No. of Local / LEP Places*
Berrima Village Berrima Internment Group, Berrima (I109), Church of the Holy Trinity (I147), The First Bank (I129), Munday Cottage (former Jellore Cottage) (I237), Berrima House (I131), Former Victoria Inn (I128), Riverview Cottage (I130), Former Coach and Horses Inn (I133), McMahons Inn (former Berrima Inn) (I132), Nurse's Cottage (I228), White Horse Inn (I123), Magistrate's House (I125), St Francis Xavier Roman Catholic Church (I120), Berrima Post Office (I138), Makin Cottages (I227), Harper's Mansion (I113)	**Berrima Village** 46
Exeter Village Exeter Railway Station, signal box and cottage (I607 & I610)	**Exeter Village** 11
Sutton Forest locality	**Sutton Forest Village** 1

Attachment 4 Table 1b

Heritage Places outside the Project Area - Rural

State Register Places (item no.)	*No. of Local / LEP Places*
Moss Vale locality Oldbury house, grounds and outbuildings (I353), (I057 & I164), Whitley house, grounds and outbuildings (I361) Golden Vale house, grounds and outbuildings (I003, I005, I001 & I002)	**Moss Vale** 9
Sutton Forest locality Hillview house, grounds and outbuildings (I008) (I007, I358 & I359).	**Sutton Forest** 1

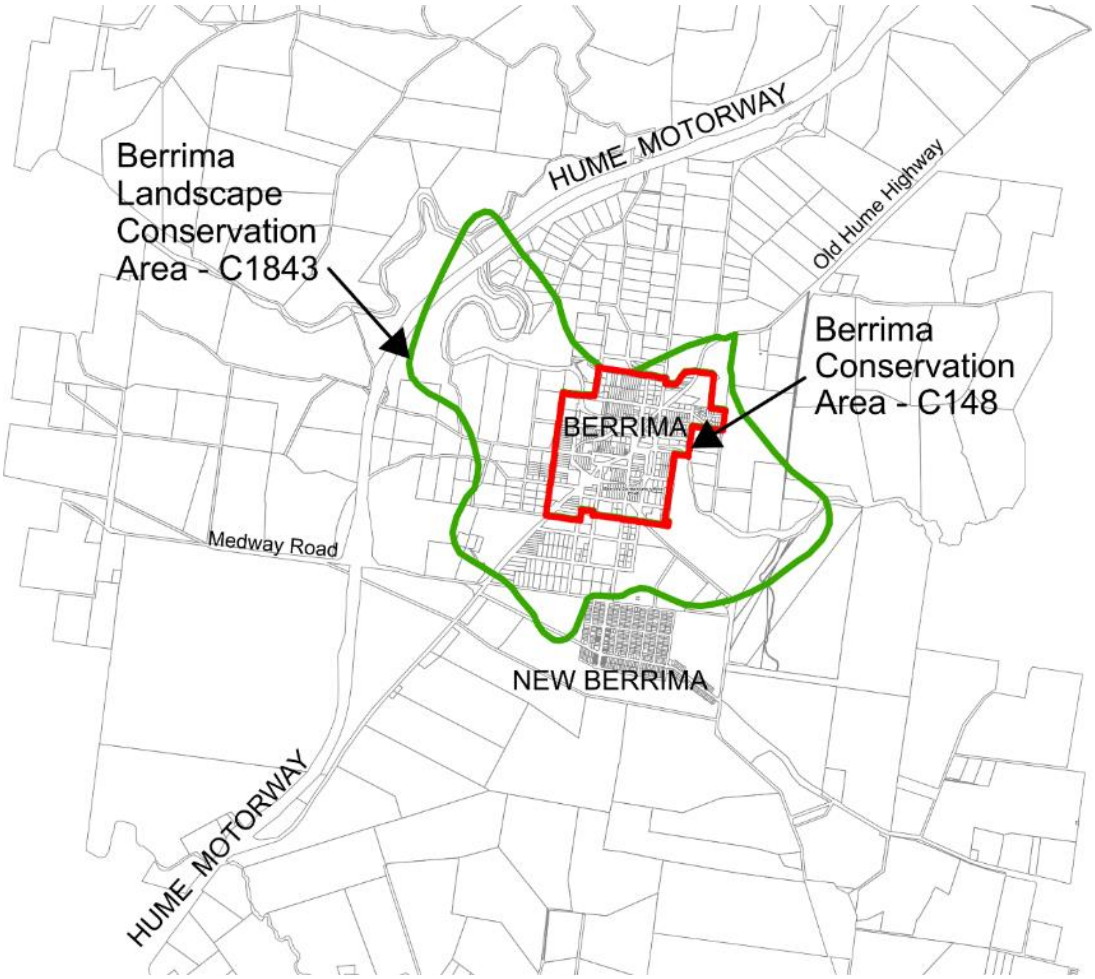
Villages & Settings Heritage Delineation for Management

Berrima The *Berrima Landscape Conservation Area* C1843 and the *Berrima Conservation Area* C148 together encompass the parts of Berrima and its immediate setting identified and listed as holding heritage significance.

Sutton Forest Sutton Forest has local significance heritage places within the 'village' area on the WSC LEP, and a landscape setting which is an important part of the heritage significance and its interpretation.

Exeter Exeter has 11 places of local heritage significance in the WSC LEP and the Railway Station on the State Register. The village surrounds or approaches, and the setting, are an important part of the heritage significance and its interpretation.

Village & Setting Heritage Management Similar to the landscape setting of heritage significance at Berrima, a landscape setting for Sutton Forest and Exeter should be assessed and defined.
The surrounds or "visual attachment" of Berrima has a close historical and aesthetic relationship to Berrima and could be separated from a Cultural Landscape delineation for clarity of heritage values and heritage conservation and measures.



Berrima Conservation Area C148 and Berrima Landscape Conservation Area C1843 on the Wingecarribee Shire Council LEP. Both of these are outside of the project area.

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Annexure C

Sorensen Garden Analysis & the Garden at Mereworth









Sorensen Gardens
Comparative Analysis
&
the Garden at *Mereworth*







CATHERINE BROUWER
Landscape Architects

Sorensen Gardens Comparative Analysis

&

the Garden at *Mereworth*

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issue	*issue description*	*date*	*review*
1	1st draft for discussion /EMM review 1st draft for discussion /EMM review	14 Nov, 2019 29 Nov 2019	PDF issue Word issue
2	Draft - for internal review	6 Dec 2019	
3	Draft	22 Jan 2020	
4	Draft	4 February 2020	
5	1st Final Draft	24 February 2020	
6	Final Draft	12 March 2020	
7	Final	23 March 2020	

Executive Summary

This report serves to address recommendation R17 of the NSW Independent Planning Commission's (IPC) report of May 2019.

> "*R17 The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.*"

The 2018 correspondence from the Heritage Council of NSW included the following statement:

> "*A comparative analysis of Sorensen's entire landscape design was previously requested. This was not provided in the RtS. Our previous comments on the EIS in relation to this matter are reiterated and should be addressed prior to determination.*"

The previous request was in the 2017 correspondence from the Heritage Council of NSW which included the following relevant statement:

> "*• The EIS should firstly include a comparative analysis of Sorenson's* [sic] *design at Mereworth within his whole body of work for an up-to-date understanding of Mereworth's level of significance, ie state or local.*"

This report serves to address the above-mentioned Heritage Council of NSW's recommendation. It comprises a survey and comparative analysis of Paul Sorensen's garden projects and the comparative analysis and assessment of the *Mereworth* garden in the context of the body of Sorensen's work.

The outline of the report chapters, and the findings from the report analysis and assessments are summarised here.

Paul Sorensen Garden Designer Building on the 1990 Richard Ratcliffe book *Australia's Master Gardener: Paul Sorensen and his gardens,* the body of Sorensen's garden projects over his lifetime are surveyed and generally assessed in a comparative analysis. Sorensen's homestead garden projects are surveyed to provide context for a focused comparative analysis for the *Mereworth* garden.

The Mereworth Garden Design The *Mereworth* garden analysis indicated several important considerations:

- The *Mereworth* garden, entry avenue, and small remnant portion of the original driveway form an attractive garden where some of Sorensen's design principles and features can be seen. The tree planting contributes a strong structure and character to the garden, though there is not the richness in the plants palette and thus the design character as in many other Sorensen gardens, in particular his rural homestead gardens.
- The *Mereworth* garden has a high degree of integrity or intactness except for the original driveway, a key Sorensen design component of the *Mereworth* garden design, which has been substantially lost.
- The garden is in good condition and under the informed management appears will have its good condition into the future.
- The views to and from the *Mereworth* garden as designed by Sorensen are not all remaining due to the loss of much of the driveway, and the views identified by the Heritage Council of NSW for assessment have varying degrees of relevance and significance.
- The remaining *Mereworth* garden design is a relatively small and simple design with fewer 'garden rooms', minor relationship to the landscape setting and minor incorporation of potential views relative to Sorensen's other homestead gardens.

Comparative Analysis The comparative analysis of the *Mereworth* garden in the context of Sorensen's body of garden design work indicates it has the typical Sorensen garden design features but is not uncommon in a state context and unlikely to be amongst his highest calibre rural homestead garden designs.

Heritage Significance Assessment Assessment of the *Mereworth* garden in the context of Sorensen's body of garden design work confirms it is a place of local heritage significance and that additional criterion may be addressed in the NSW Heritage Register entry. With consideration of the design characteristics, the design simplicity and its modest relationship to its rural setting, and the comparative analysis with Sorensen's body of work, including in particular with the rural homestead gardens, the assessments of *Mereworth* have indicated it is not a place holding a state level of heritage significance.

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1 Introduction

1.1 Overview of the Hume Coal Project

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a project life of about 23 years, including construction and rehabilitation. The Project area is located to the west of Moss Vale, in the Wingecarribee local government area (LGA).

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop. The Hume Coal Project and the Berrima Rail Project together form 'the Project'.

A full description of the Project, including the location at a regional scale, the Project areas and the indicative mine and surface infrastructure plans, is provided in the EIS report (EMM 2017a).

Approval for the Project is being sought under Part 4 Division 4.1 (State significant development) of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) and has been under assessment from 2015 to present. A detailed description of the environmental assessment process to date is provided in Hume Coal's response to the Independent Planning Commission (IPC) assessment report, to which this 'Sorensen Comparative Analysis & the Garden at *Mereworth*' report (SCA&M) is appended.

1.2 Purpose

The purpose of this 'Sorensen Gardens Comparative Analysis and the Garden at *Mereworth'* assessment is to respond directly to the Independent Planning Commission (IPC) findings and recommendations as published in their IPC assessment report released in May 2019.

Specifically, this comparative analysis of Sorensen's work and assessment of the *Mereworth* garden addresses and responds to IPC recommendation R17 as included in Table 1.2.

Where necessary, this study also addresses items presented in the IPC report that the applicant feels are erroneous, unsubstantiated or are otherwise worthy of response.

A number of items have been addressed in other reports for the Hume Coal and Berrima Rail Projects, including the supplementary visual impact assessment, the groundwater dependence assessment for cultural heritage landscapes and gardens report, the supplementary historical archaeological assessment and the updated statement of heritage impact: IPC Response (EMM 2020a, EMM 2020b, EMM 2020c and EMM 2020d respectively).

Table 1.2 notes where those reports address each of the relevant IPC considerations.
Table 1.2 also notes where this report addresses the items relevant to the work of garden designer Paul Sorensen and of the garden at Mereworth.

Table 1.2

Response to IPC report on matters relating to Sorensen & *Mereworth* House & Garden

Reference number	*IPC assessment considerations*	*Location where addressed*
283	The Commission in its assessment of merits of the Project has had regard to historic heritage impacts. The Commission has had regard to the Material before it and given consideration to the issues raised in public submissions. Relevant excerpts from the submissions included:	
	• groundwater that is primarily to preserve our heritage listed gardens;	Addressed in EMM 2020b
	• the proximity of significant local and state heritage assets;	Addressed in EMM 2020c
	• Golden Vale Homestead is owned by the National Trust. The Trust is deeply concerned that the Hume Coal Project may impact on the property's water supplies;	Addressed in EMM 2020b
	• Southern Highlands area has had a unique social and economic role and its heritage values need recognition and protection if they are to survive into the future. These values are incompatible with the development of the coal mining landscape;	Addressed in EMM 2020c
	• Berrima, located approximately two kilometres from the Project area, is one of the best-conserved towns from the colonial period of Australia. It has a significant collection of state heritage register-listed properties concentrated in a small area;	Addressed in EMM 2020c
	• there are 64 heritage items just within the village, 16 of which are on the state register;	Addressed in EMM 2020c
	• it is impossible to assert that the impact of the Project on Berrima can be mitigated;	Addressed in EMM 2020d
	• the adequacy of the SHIA, an alternate Heritage Impact Assessment (HIA) prepared on behalf of two community groups reached different conclusions, particularly in relation to the impact of the Project on the significance of *Mereworth*, as its heritage listing goes beyond the house and garden and includes its rural setting; and	Addressed in EMM 2020c
	• the SHIA does not address impacts, other than from the surface infrastructure works, on the heritage items in the study area and the cultural landscape. In particular, the impacts of groundwater and water table drawdown have not been adequately assessed.	Addressed in EMM 2020b
	• the need for a detailed assessment of the impacts of the Project on the Berrima, Sutton Forest and Exeter cultural landscape.	Addressed in EMM 2020c & EMM 2020d. Addressed in CBLA Cultural Landscapes report (2020)
R17	"The Applicant should address the recommendation of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283." The IPC referred in R17 to the Heritage Council of NSW correspondence. The part of that letter to which this report responds is as follows: *"Mereworth House and Garden is listed in the Wingecarribee Local Environmental Plan 2010 as a locally significant heritage item. It is understood that the house dates from 1965, but the garden is potentially*	

very significant as an intact, large-scale work of the renowned master landscape architect, Paul Sorensen. *Unfortunately, the location of Mereworth House and Gardens is not shown in any of the Hume Coal plans for the proposal, this omission makes thorough impact assessment and recommendation of mitigation measures difficult. " . .* *It is understood that the current surrounding rural setting contributes to the significance of the Mereworth House and Garden and its Sorenson [sic] landscaping, which sought to blend interior views of the garden with longer rural vistas. Despite additional visual impact assessment in the RtS, the visual impacts of mine on views from the driveway of Mereworth, from points where Mereworth's garden, outer yards and surrounds have outward views, and views of the property from the Hume Highway, do not appear to have been adequately addressed in RtS. Therefore, existing photomontages should be amended to show the real outcome of the proposal before any decision is made. Choices of locations for photographs must avoid 'internal' areas of the garden where enclosure (by vegetation or structures) blocks outward views."*	Addressed in Fig 7.3, EMM 2017, & EMM 2020a & EMM 2020d Addressed in EMM 2020a
In addition, the NSW Heritage Council letter stated: *"A comparative analysis of Sorensen's entire landscape design was previously requested. This was not provided in the RtS. Our previous comments on the EIS in relation to this matter are reiterated and should be addressed prior to determination."*	Addressed in Chapters 2.0 to 5.0
NSW Heritage Council letter to the Department of Planning & Environment 17 July 2017 The July 2017 Heritage Council letter to the Department stated: *"Mereworth House and Garden* *Mereworth House and Garden are listed in the Wingecarribe LEP 2010. It is understood that the house dates from 1965, but the garden is an intact work of the renowned master landscape architect Paul Sorenson* [sic] *from his most productive years.* *There is concern about potential adverse impact of the proposal on a key feature of Sorenson's* [sic] *garden design, the view to the north and east. The coal handling infrastructure, buildings, the powerlines, water infrastructure and stockpiles north of Mereworth will, for the life of the mine, has* [sic] *a potential to adversely impact the quality of Sorenson's* [sic] *garden design which borrows the long open view to the north and east. There is also insufficient information in the Statement of Heritage Impact to understand the height and size of the mine's above ground workings and structures north of Mereworth. Therefore, it is recommended that:*	
• *The EIS should firstly include a comparative analysis of Sorenson's* [sic] *design at Mereworth within his whole body of work for an up-to-date understanding of Mereworth's level of significance, ie state or local. Only then can the assessment discuss any potential impact with greater certainty and recommend effective measures to prevent a negative impact. . . . Then, based on the comparative analysis, the EIS should reassess the impact of the Hume Coal Project (SSD 7172) above ground workings in greater detail."*	Addressed in EMM 2020a Addressed in Chapters 2.0 to 5.0 & Chapter 6.0
The following three views need to be accurately rendered and presented at least at A4 size for clarity: *- the view from within Sorensen's garden out to the north and east;* *- the view to Mereworth House and Garden from the highest point on the original Mereworth drive; and*	Addressed in EMM 2020d Addressed in

- the view to Mereworth House and Garden from the Old Hume Hwy parallel to the original drive, now disused."	EMM 2020a & Section 5.5

1.3 Scope of this Report

The NSW Heritage Council advised:

> *"• The EIS should firstly include a comparative analysis of Sorenson's* [sic] *design at Mereworth within his whole body of work for an up-to-date understanding of Mereworth's level of significance, ie state or local. Only then can the assessment discuss any potential impact with greater certainty and recommend effective measures to prevent a negative impact."*

This comparative analysis has included research, desk-top assessment and visits to some Sorensen gardens. Paul Sorensen kept few records and generally did not prepare plans and other documentation of his garden projects therefore this report must be read in that context.

This study report comprises three parts.

Part One **Sorensen's Gardens - an Analysis** is an analysis of Paul Sorensen's garden projects. It assesses Paul's Sorensen' work and the context of contemporary NSW garden designers and influences that may have been derived from his work by contemporary and later garden designers and makers.

Part Two **The *Mereworth Garden & Comparative Analysis*** is an analysis of the *Mereworth* garden and its immediate rural setting, some of the changes that have occurred, the condition, and its garden design qualities, in particular the orchestration and nature of the views designed by Sorensen. The garden at *Mereworth* is analysed in the context of Sorensen's other rural homestead gardens and in the context of the body of Sorensen's work and his design.

Part Three ***Mereworth Assessment & Conclusions*** is an analysis of the heritage significance of *Mereworth,* in the context of Sorensen's gardens, his other rural homestead gardens and following the comparative analysis.

The research and analysis informing this report has included:

- Initial research on Paul Sorensen and a desk top review of the readily available published material on his work.
- Desk top investigations on the Sorensen body of work. Research on Sorensen contemporaries and NSW garden design critiques.
- A site visit by the author to *Mereworth*, and some other Southern Highlands historical gardens, as well as visits to other Sorensen gardens in the Southern Highlands and Illawarra regions by other project team members.
- Analysis of the design and views relationships of *Mereworth* and its rural setting.

The owners of the *Mereworth* property have undertaken investigations, researches and commissioned reports to support the considered management of the heritage place. Those which have informed this report include the *Arboricultural Hazard Assessment* 2016 by Bradley Hawthorne which includes a *Mereworth* garden Tree Location Plan and a Tree Hazard Appraisal, and *Mereworth Garden Management Plan* 2019, by Hume Coal.

1.4 Report Qualification

A fully comprehensive comparative analysis would ideally or theoretically encompass a study of all of Sorensen's garden projects - including those designed but no longer present, and those extant, with visits to all the gardens. Such a project would require over a year as it would include: investigative research for locations and the owners to contact; inquiries for visits; visits at a time that suits the owners; time to perform recording of the gardens, preparation of the study and documents; time for owners to review and approve the text about their gardens (considering privacy requirements); and other associated logistical and documentation tasks. That scope of study would not be practically feasible for this Project report and time available. Such a scope is not considered necessary for meeting the IPC recommendation as a soundly based, comprehensive comparative analysis has been undertaken.

1.5 Authorship

The author is Catherine Brouwer BA, GDLA, MDesS (Harvard), FAILA, MICOMOS.
Catherine is a landscape planner and registered landscape architect. Her practice *Catherine Brouwer Landscape Architects*, based in Brisbane, encompasses: landscape planning; landscape design, documentation and construction administration; heritage parks and gardens and settings, and cultural landscape evaluations and management guidelines; expert witness for the Planning and Environment Court; urban design and other Panel expert advisory roles.
Catherine is a widely respected expert in landscape heritage, including preparation of conservation management plans and impact assessments, and in landscape character, intangible heritage and scenic assessments for strategic planning and management plans.

An example project is the award-winning *Gold Coast Landscape Character (& Heritage) Study*, a joint project of Catherine Brouwer and Cardno. Catherine identified and assessed the cultural landscapes, aesthetic landscapes, the historical landscapes and their cultural and intangible values and stories, following a methodology she developed for this, and formulated planning and management guidelines.
Catherine has undertaken over 60 major conservation management plans (CMPs) and studies for heritage parks and gardens including cultural landscapes. These include: Memorial Park Gympie CMP and Implementation Plan, Ninney Rise (Innisfail) CMP, Picnic Point Parklands and Queens Park & Botanic Gardens Toowoomba CMPs, Queen's Park Ipswich CMP, Boyce Gardens Toowoomba CMP, Quetta Memorial Precinct Thursday Island CMP & Master Plan, Smoky Cape Lighthouse CMP, Yeronga Park Conservation Plan and P&E Court Expert Witness, Bowen Park CMPs, and, for the Old Museum Gardens the CMP, update CMP, palms replacement strategy and several impact reports. In addition, the practice has prepared heritage impact assessment reports, master plans and design and management plans for many heritage parks and gardens.

Catherine contributed to the *Oxford Companion to Australian Gardens* and prepared *Guide Brochures for Garden Restoration and Adaptation* for The National Trust (Qld) and Townsville City Council. In 2013, for the Australian Garden History Society, Catherine undertook the *AGHS Survey of Queensland Heritage Gardens*.

Catherine has been a member of ICOMOS since 1996, was six years on the Queensland Heritage Council, has taught at QUT & Univ. of Qld., held positions on AILA state and national awards, and City of Gold Coast Urban Design awards judging panels, is one of the two Queensland representatives on the AILA Connection to Country Committee. In 2018 Catherine was a member of National Trust of Qld Heritage Awards judging panel.

Catherine has presented landscape character and heritage related papers at Australian and international conferences. Her most recent paper was accepted and presented in 2019 to the Pacific Ecosystem Services Forum in New Zealand.

part one

Sorensen's Gardens - outline and analysis





2.0 Sorensen and the Record of his Garden Projects

2.1 Paul Sorensen

Richard Ratcliffe's 1990 book *Australia's Master Gardener Paul Sorensen and His Gardens* appears to be the definitive book to date solely on Paul Sorensen's garden design career and the body of his works. This has been the primary source for the following summary of Paul Sorensen.

Sorensen was born in Denmark in 1891. From 1902 he undertook horticultural training and then to complete the certificate requirements he worked at the Hørsholm Planteskole, a Copenhagen nursery, under prominent horticulturalist Lars Nielsen. He worked in Germany and France, and then around Zurich for the Mertens Brothers, a prominent firm of landscape designers and contractors. In 1915 he migrated to Australia and worked at the Carrington Hotel, Blue Mountains as a gardener. In 1917 Sorensen set up a nursery business in Katoomba where he married Anna Ernestena Hillenberg in 1919. Soon after, in 1920, he moved his home and business to Leura.

Sorensen designed and established gardens in the Blue Mountains utilising his nursery stock. His first garden outside the Blue Mountains was in 1932 at Heaton Lodge, Mudgee. "*This was to be the first of many gardens in the country starting in the Bathurst-Orange district but later in other areas, especially around the Southern Highlands.*" (Aitken, 2002. p. 559) Sorensen set up another nursery at Leura.

Sorensen lost two of his sons, Derrick and Neville, in the Second World War and closed operations at Berrima in about 1944. "*After the war Ib* (his third son) *joined his father in the business. As Paul Sorensen grew older he increasingly relied on Ib for the construction of his garden designs and there is no doubt that without his son's assistance he could not have achieved as much as he did*." (Aitken, 2002. p. 559)

Sorensen designed and constructed approximately 100 gardens in NSW ranging from the large rural property gardens to the small suburban gardens of the Blue Mountains and Sydney region. He worked in the Southern Highlands and in the Wollongong - Port Kembla region, notably for Sir Cecil Hoskins and his company 'Australian Iron & Steel'. Paul Sorensen died in 1983 at his home in Leura.

> *"Paul Sorensen's gardens were based on the idea of creating outdoor rooms defined by the use of large trees and shrubs or with walls and changes of level. He was not particularly interested in smaller flowering plants, which he considered as furniture to his rooms; he left those very much to the taste of the garden owner, whom he always seemed to be able to enthuse with his ideas. Wherever possible he would borrow views from outside the garden to expand its boundaries but was always conscious that the scale of some scenery, such as in the Blue Mountains, was such that these borrowed views had to be achieved with great care to avoid conflict of scale between nature and the garden."*
>
> (Aitken, 2002. p. 559)

2.2 The Record of Sorensen Gardens

2.2.1 Publication of Sorensen's Work in His Lifetime

Some of Paul Sorensen's gardens were photographed and published within his lifetime. These included:





Dean Park, Leura (1926, early 1930s)
Sydney Morning Herald, 1937. *The Home.*



Cheppen, Leura (1929 - 1931)

Everglades, (1933 - 1936) Refer to 2.3.2 page 9 below.

Australian Home Beautiful, 1 April 1938.
Australian Women's Weekly, 11 December 1963.
Beautiful Gardens: Australian House & Garden Homemaker Specials No. 42, date unknown.
Sydney Morning Herald, 27 September 1950.
Sydney Morning Herald, 1 December 1936. *The Home*
Walkabout, September 1964.



Invergowrie, Exeter (1936)
Beautiful Gardens: Australian House & Garden Homemaker Specials No. 28, date unknown.



Pine Hills, Bathurst (1950)
Vogue Living, September 1985.

The garden articles were primarily photo spreads with little garden description or critique.

Fernhill, Mulgoa (1969) Refer to 2.3.2 page 11 below.

Sydney Morning Herald, 22 March 1980. (auction) & Raine & Horne, 1980. (auction brochure)

2.2.2 Published Resources

The Oxford Companion to Australian Gardens (Aitken & Looker 2002) is the renowned publication on Australian gardens, garden designers, garden types, styles and periods, and of many matters of gardens' context and features. The entry on Paul Sorensen was written by Richard Aitken the editor. Only two of Sorensen's gardens have entries, namely *Everglades* and *Invergowrie* which are both on the NSW heritage register. Sorensen as a garden designer is mentioned in several entries on other subjects such as "Blue Mountains" and "Modernism" but without reference to specific gardens.

Australia's Master Gardener Paul Sorensen and His Gardens, by Richard Ratcliffe in 1990, appears to be the definitive book to date on Paul Sorensen's garden design career and the body of his works. In addition, this book refers to the majority of publications about Sorensen's gardens up to 1990 the date of its publication. It has been used as the primary published reference on Sorensen's garden designs for this report.

2.2.3 Other Writings on Sorensen's Gardens

At the **Australian Garden History Society** (AGHS) **Conference,** Bowral 2008 "*From wilderness to pleasure ground: discovering the garden and horticultural history of the Southern Highlands*" Stuart Read, a Sydney based horticulturalist and garden heritage professional, presented a talk on 'Paul Sorensen in the Southern Highlands and the Illawarra'. The talk included a history and description of all the Sorensen projects in these two regions: the *AIS office gardens* Port Kembla; *Invergowrie*; *Greenhill* and *Hillside*; *Gleniffer Brae*; *Mt Keira Scout Camp*; *Southern Portland Cement Co* garden Berrima; *Redlands*; the *Remembrance Driveway* (not designed by Sorensen); and *Mereworth*, Berrima. (Read, 2008, pp. 13-21.)

AGHS Southern Highlands In 2015 the Southern Highlands branch of the AGHS undertook a recording of the Sorensen garden at the Boral Cement (formerly Southern Portland Cement) grounds at New Berrima. Their recording of the garden's condition and the trees and other plants there was published in the December 2015 issue of their newsletter *Inflorescence*. In July 2019, the AGHS Branch presented to Boral management their report of this recording and management proposals: *Boral New Berrima Sorensen garden tree management plan and tree identification plan*. (AGHS Journal 2019)

Further modest references to Sorensen and some of his gardens are to be found in on-line information on some gardens, in the Local Environmental Plan entries of the listed gardens, and in publications noted in sections 4.4, 4.5.2 and 4.5.3 of this report.

2.2.4 Gardens Open for Public View

There are very few Sorensen designed gardens open to the public. Those which are generally accessible (to varying degrees), are noted here.

- The *Everglades* (1933-1936) garden is open to the public as it is in National Trust ownership.
- *Gleniffer Brae* (1938) is now within the Wollongong Botanic Garden.
- The *Mt. Keira Scout Camp* (1939) is still in use by the Scouts and can be visited.
- *Mahratta,* (1941) now owned by the School of Practical Philosophy, has a *Friends of Mahratta* group which holds open 'Garden Days'.

Generally, in 2020, it appears all the other Sorensen designed gardens are private gardens and are not, or rarely, open to the public. Garden interest groups, such as *The Australian Garden History Society*, may occasionally arrange a garden visit for members, likely in association with a garden conference or organised tour of gardens.

In the late 20th century, some of the Paul Sorensen designed and constructed gardens were opened to the public as part of the Open Garden Scheme (now defunct). When there were Sorensen gardens open, the role of Sorensen as designer was generally noted in the Scheme's guide publication. Some examples are included here.

> ***La Vista*** Wentworth Falls "*This elegant garden, hidden behind a high wall, will come as a complete surprise to the visitor. Laid out by Paul Sorensen in the 1930s, and considered to be one of his best, the design of the garden takes full advantage of the superb site. Stone stairways and paths link a series of lawn terraces, laid out in a grand style, which descends the hillside. Wonderful old trees, believed to be the best collection in the mountains, and woodland planting frame the terraces which are retained by impressive sandstone walling. At the bottom of the garden is a brick-lined dam, the original water reservoir for the garden*." (ABC 1993. p 38)
>
> ***Invergowrie*** Exeter "*This grand old garden was designed in 1938 by the late Paul Sorensen, who was called upon again in 1968 by the present owners to revitalise and upgrade the garden. As seen today this spacious park-style garden is the work of both these periods, and is maintained in sympathy with Sorensen's design. Wonderful trees - cedars, firs, elms, ash, and catalpa - in sweeping lawns form the backdrop of the garden. A curving drive through copses of dogwoods, rhododendrons and spreading oaks lead to the house beyond which is in a quiet dell reached along a camellia walk.*" (ABC, 1993. p. 52)
>
> ***Pitlochry*** Mulgoa This 1993 / 94 Open Garden Scheme entry does not mention Sorensen.
> "*Set back from the road, this twenty-year-old house and garden have been designed with the utmost respect for the natural landscape. A retaining wall at the front entry is softened by spillover ground covers, roses and perennials; to the side, massed ground cover plantings of vinca, acanthus and agapanthus provide a low-maintenance solution under shade trees. The rear garden is wonderfully simple with its well-defined semi-circular lawn area, punctuated by two Chinese elms which frame the vistas beyond and provide shade to the house in summer. A delightful country garden*!" (ABC, 1993. p. 35)

In October 2019 the annual Southern Highlands Open Gardens / "Spring Gardens 2019" scheme did not include a Sorensen garden though there are several in the Southern Highlands.

2.3 The 21st Century Heritage Status of Sorensen Gardens

2.3.1 National Heritage Status

There are no Sorensen designed gardens recognised at the national level as of heritage significance.

2.3.2 NSW Heritage Register

There are four Sorensen designed gardens on the NSW Heritage Register. (*Duntryleague* (00318), which has an association with Sorensen, though has no extant Sorensen designed garden, is also listed on the NSW Heritage Register.) The four gardens are listed here alphabetically with extracts of the register statements of significance.

Everglades (01498)

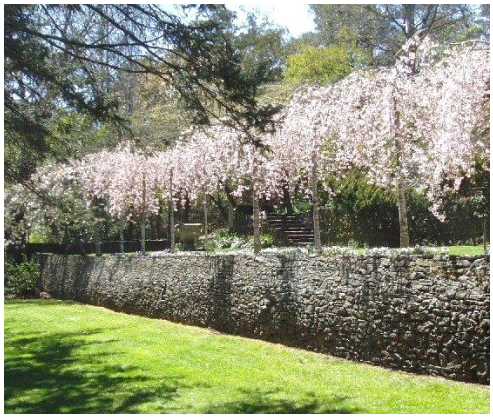
> "Everglades is significant as a largely intact modernist garden, as an important development in garden design in Australia and as reputedly the most important garden of Paul Sorensen, a notable garden

designer, in collaboration with Henri van de Velde the owner. It has significance due to its unusually rich collection of exotic flora."

"It has significance as an example of a mountain retreat illustrating the way of life of its period. It has significance due to the aesthetic regard held for the garden in the local community. It has significance through the technical excellence of its construction, particularly the stonewalling, and through its design quality. The house has significance as one of only a few buildings attributed to Paul Sorensen."

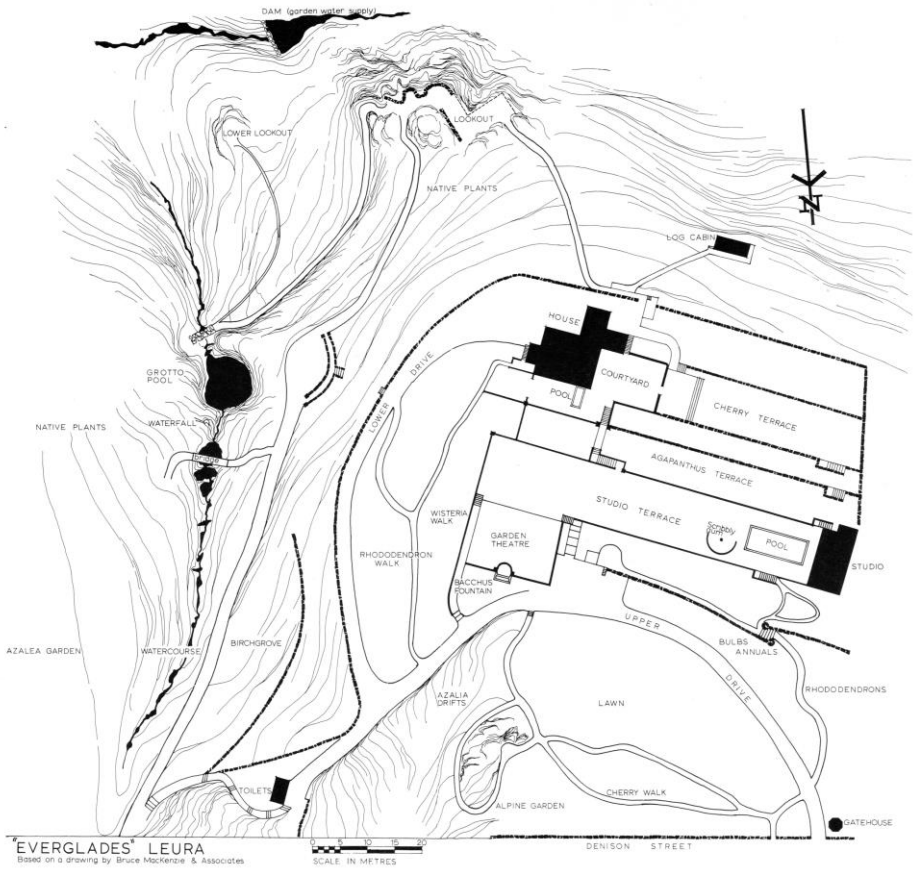
NSW heritage register (online).





photos source: National Trust (online), 2019

"Composed of 'outdoor rooms' - in this case separated by level change rather than hedges or walls - it is a pioneering Modernist design. The garden comprises terraces stepping down the slope, supported by drystone retaining walls - the most dominant feature of the design - constructed from ironstone collected on site . . . The view over the valley is deliberately hidden from most of the garden, with its dramatic impact revealed fully only from the house and from a lookout on the path to the lower gardens, where mostly native plants are used." (Ratcliffe, in Aitken & Looker, 2002. p. 206.)



Site plan of the *Everglades* property showing the house, garden and driveway

source: Ratcliffe, 1990. p. 42.

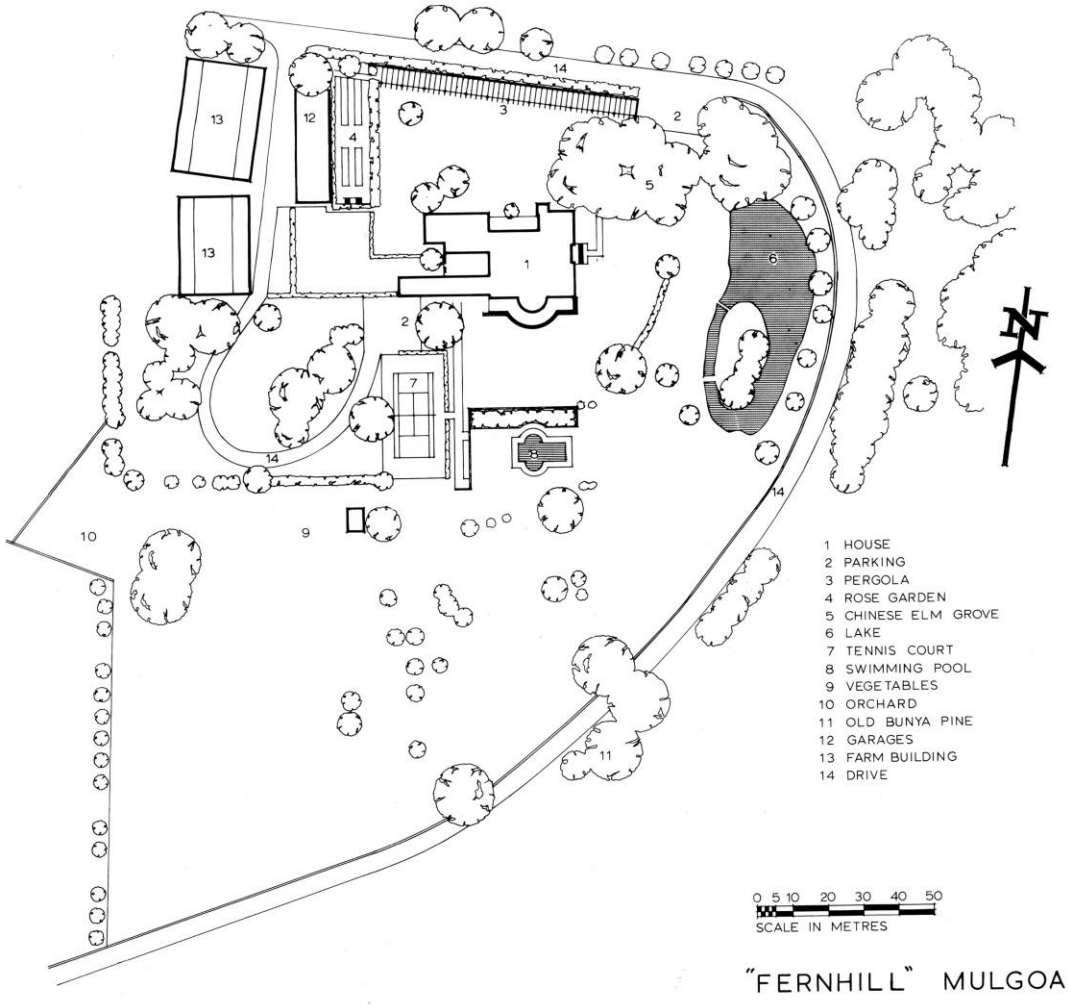
Fernhill (00054)



photo source: Blue Mountains Association of Cultural Heritage Organisations Inc newsletter, July-August 2017. p. 1.

The Register entry for *Fernhill* does not refer to Sorensen's garden component or contribution.

> "The Fernhill estate comprises an extensive area of modified and natural landscape which provides the setting for a house completed c.1845 for Edward Cox.
>
> "The estate is primarily significant for its landscape which is a rare Australian example of the English landscape school's practice of modifying the natural landscape to create a romanticised natural appearance embellished by a richness of cultural features; . . . "
>
> "The landscape contains a richness of cultural features such as:
>
> - long vistas to the Homestead; - vistas to St. Thomas' (the family) Church spire from the Homestead;
> - use of water as a foreground for vistas and views; - ornamental bridges to articulate enframed views; and clumps of trees carefully created by thinning of native bushland." NSW heritage register (online).



Site plan of the *Fernhill* property showing the house, garden and driveway

source: Ratcliffe, 1990. p. 95.

Gleniffer Brae (00557)




photo source: Hume Coal, 2019.

"Gleniffer Brae forms a well-designed residential estate in sympathy with the surrounding site which was selected for its topographical setting. It is associated with architect Geoffrey Loveridge and landscape designer Paul Sorensen."

"The grounds' original garden design are very attractive in their own right. The gardens constitute an integral part of the design and setting of the house and show the outcome of an integrated association between architect and landscape designer. The grounds' original garden design is representative of designer Paul Sorensen's ability to incorporate the surrounding landscape and flora into the overall design and to capture and extend the dramatic effect of the natural landscape through spatial planning, planting and construction of hard landscape elements."

"Gleniffer Brae together with Invergowrie at Exeter are a unique pair, both estates being the outcome of the collaboration between architect Geoffrey Loveridge and landscape designer Paul Sorensen, both built for two brothers Cecil and Sidney Hoskins family who each married a sister of Geoffrey Loveridge. Their rarity is heightened by the fact that the pair of estates survive as relatively intact outstanding examples of Interwar period architecture and landscape design."

NSW heritage register (online).



Sketch Site plan source: Gleniffer Brae CMP - Tropman & Tropman 2001

Mahratta (00708)



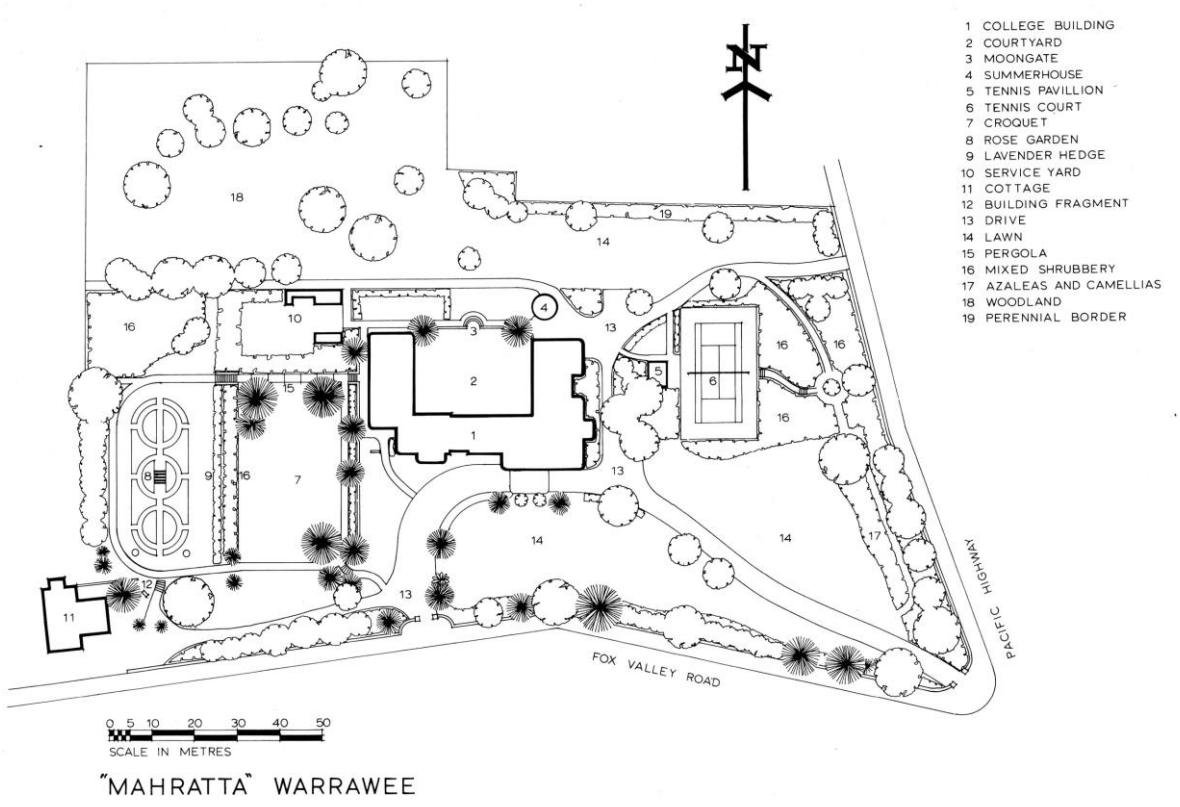

photos source: Friends of Mahratta (online), 2019.

"Mahratta is a large, intact, 2 storey mansion erected in 1941 in an unusual style which combines Art Deco and Classical Georgian Revival elements. It is perhaps the largest and finest property of its type erected in wartime Sydney."

"The property has historic associations and aesthetic values due to the involvement and advice of landscape designer Paul Sorensen in its garden. The open landscaped setting and mature plantings provide a fine setting and backdrop to the house. Red gravel driveways snaking through the open lawns reinforce the colour and texture of the house."

"The open lawns and gardens to the north, east and south of the main house are an essential component in achieving a fine open setting for the house. To the west the Croquet Lawn and Rose Garden with their backdrop of dense mature trees and shrubs are a key component of the cultural and historic setting having survived almost intact from the original (Federation era) house."

NSW heritage register (online).



Site plan of the *Mahratta* property showing the house, garden and driveway

source: Ratcliffe, 1990. p. 95.

2.3.3 Local Heritage

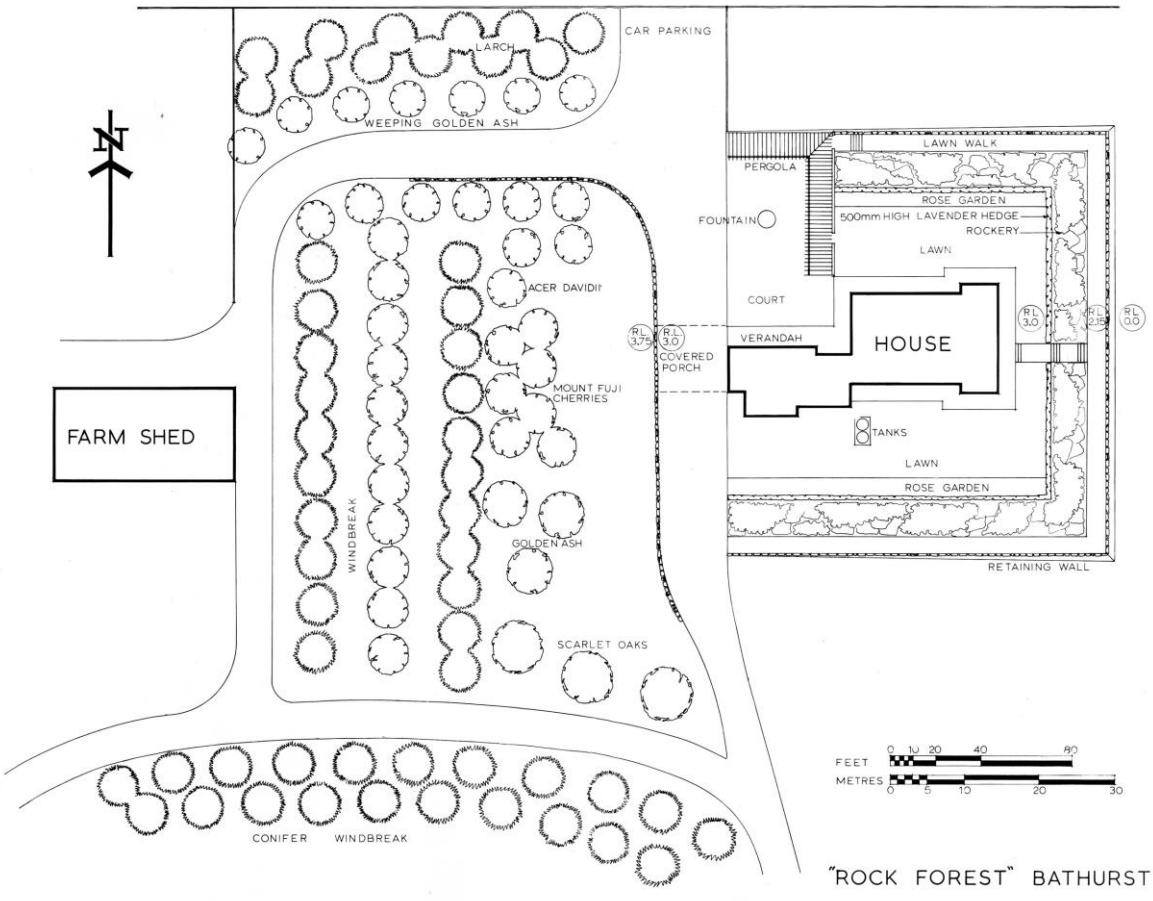
The following Sorensen designed gardens are registered under Local Environment Plans (LEP).
The places are listed here with extracts of the LEP statements.

Bathurst LEP

Rock Forest Station (Bathurst Regional LEP)

The gardens are not mentioned in the statement of significance as they were destroyed by fire at some point in the early 1970s. The historical notes of the heritage register states:

> "The garden at Rock Forest was designed by the Master Gardener Paul Sorensen. It is said in the book Australia's Master Gardener, by Richard Ratcliffe, that Sorensen tended not to stick to his plans on paper, as the design tended to change as the garden was built. The garden at Rock Forest is an exception to this. Here, the garden was constructed as drawn. The design was a radical departure from Sorensen's usual flowing lines, the layout being one of concentric rectangles expanding out from the house. Closest to the house were lawns with boarders of roses backed by lavender hedges beyond which rockeries and shrub areas dropped to a lawn walk immediately above the retaining walls which formed the platform on all but the western side. To the west typical Sorensen windbreaks also screened farm buildings from the formal entrance of the house." NSW heritage register (online)



Site plan of part of the *Rock Forest* property showing the house, garden and driveway
source: Ratcliffe, 1990. p. 107.

Blue Mountains LEP

La Vista **and Garden** (Blue Mountains LEP - WF074)

> "La Vista has what is arguably the finest garden designed by Paul Sorensen. While the garden does not have the views of the better known garden at Everglades, it displays the fine qualities of Sorensen's design providing splendid the house with [*sic*] a splendid prospect to the east and an array of outdoor spaces with ever-changing colours and character." NSW heritage register (online).

***Leuralla*, Garage, Outbuilding, Amphitheatre and Gardens** (Blue Mountains LEP - La 015)

"The grounds of Leuralla are a good example of a formal garden laid out by the original owner, Harry Andreas, and later improved by the important landscape designer, Paul Sorensen. The sculpture gardens on the south side of Olympian Parade provide a popular public space as a complement to the gardens. The amphitheatre on edge of the escarpment is a fine early example in the mountains of using a simple restrained design to take advantage of a spectacular setting."

NSW heritage register (online).

***Westella* Garden** (Blue Mountains LEP - K158)

"Criterion (a): Cultural and Natural History The significance of the site of Westella, a major boarding-house under the control of well-known sisters for over forty years, is now severely compromised, except for the garden, one of Paul Sorensen's earliest commissions on the Mountains after he had ceased to be employed at the Carrington.

Criterion (b): Persons Paul Sorensen is the most important of landscape designers in the Blue Mountains and this is one of his earliest designs.

Criterion (c): Aesthetic The garden remnants at Westella, the retaining walls, steps, tennis lawn, name plaque and the three mature grafted weeping elms are of aesthetic significance at a local level as evidence of Sorensen's early work in the Blue Mountains." NSW heritage register (online).

Lithgow LEP

***Lidsdale* House Gardens (*Neubeck* House)** (Lithgow LEP)

No statement of significance is recorded in the NSW heritage register.

Wingecarribee LEP

Invergowrie (Wingecarribee LEP)

"A grand parkland setting of exotic species and mature trees. Former home of Badgery family and Yates (seeds) family. The garden consists of strong edge plantings of Cedrus along road boundary with open central area extending from in front of house. The property was originally owned by the Yates family of seed fame, and was acquired by Sir Cecil Hoskins in the 1930s. At the time he demolished the original house he had new grounds laid out by landscape architect, Paul Sorenson, between 1937 and 1938. Sorenson's design was formed around the large conifers and tall hedges planted by the Yates family. After several changes of ownership, Invergowerie [*sic*] was bought by its present owners in the 1960s. Paul Sorenson was then invited to return and substantially to reverse his earlier planting; for while the Hoskins preferred to have trees and shrubs around the house leaving the boundaries open, the new owners wanted the main plantings to be on the boundaries. This involved moving a large number of mature trees. The garden is a landmark feature of the village of Exeter and dominates the southern approach to the village which is of extreme importance to the streetscape and character of the village." NSW heritage register (online).



source: News Pty Ltd (online), 2019

In the *Oxford Companion to Australian Gardens* just two Sorensen designed gardens have entries, namely *Everglades* and *Invergowrie*. "Invergowrie, Exeter, NSW, has a substantial garden established from 1937 by steel manufacturer Cecil Hoskins (1889-1971), laid out by Paul Sorensen, and restored c. 1980 by the Fieldhouse

family. . . Dogwoods and oaks accent the curving entry drive. The wisteria-draped, Tudor-style house overlooks wide lawns set with specimen trees. To the east, banks of rhododendrons and other intensively planted areas conclude in the Dell, a secluded valley with flowering cherries, azaleas, and tree ferns in a woodland setting."
(Tanner, in Aitken & Looker, 2002. p. 328.)

***Mereworth* House and Garden** (Wingecarribee LEP)
Statement of Significance: "1965 house with important early nineteenth century historical connections.
SHR Criteria b) [Associative significance] The garden is important for its connection with Paul Sorensen, the renowned cold-climate garden designer." NSW heritage register (online).



photo: C Brouwer 2019

Wollongong City LEP

Green Hill and ***Hillside*** (Wollongong City LEP)

> "Greenhill and Hillside properties are of significance for the local area for their historical and aesthetic qualities, for associations with the work of Paul Sorenson and as representative examples of this type of corporate accommodation and conference development with associated gardens, created in the late 1930s. The property is important in demonstrating the history of the steel industry in Australia. Both Greenhill and Hillside are visible from a distance and they present major regional landmarks. The buildings and gardens have major aesthetic qualities in their own right and retain some potential to contribute to the understanding of the social role of the steel industry in Australia. A corporate garden and houses on an estate of this size are rare in Illawarra and relatively rare in NSW context." NSW heritage register (online).



Port Kembla Steelworks seen from the gardens



The Sorensen stone walls

photos source: Hume Coal, 2019.

Viewing points in both gardens present views out to the Port Kembla Steelworks. This reinforces the historical relationship between the original owner Sir Cecil Hoskins who was general manager of the Australian Iron & Steel Ltd at the time which had these two houses built for the company executives.

> "When Australian Iron and Steel decided to build two houses, Green Hill and Hillside, for use by executives of the company the site they chose was an exposed south-easterly facing slope at Figtree. . . . . To ensure privacy between the two houses, Paul Sorensen began to develop a dense woodland between them, treating the site as one rather than as two separate design exercises."
> Ratcliffe 1990 p 62

Mt Keira Scout Camp (Wollongong City LEP)

"The Mount Keira scout camp complex is of significance for Wollongong area for historical, aesthetic, social and reasons of representativeness. The site is continuously associated with the Scout movement since 1939 and has associations with the local community through a number of local families whose members were using the site. The complex demonstrates evidence of Sorensen's original design, which is of heritage value in its own right. The site is a local landmark that strongly contributes to the community's sense of place. The integrity of original landscape design presents as very high. Paul Sorensen was commissioned by the Hoskins family to design the Mount Keira Scout Camp and some of the features of the camp, including the preservation of landmark trees, the integration of the architecture into the surrounding setting and reuse of onsite materials, are considered fine examples of the techniques used by Sorensen in his work."

NSW heritage register (online).



Part of Sorensen's design with stone walls



photos source: Hume Coal, 2019.

"The Mount Kiera [sic] Scout Camp . . . remains almost pure Sorensen in planting, planning and character. Apart from memorial gates erected to Sidney Hoskins in 1959, the camp exhibits a unity of concept rare anywhere let alone in a camp site." Ratcliffe 1990 p 60

Other Sorensen Associated Places

Other places with recognised local heritage significance and with some association with Sorensen include: Benison and Garden (La022); Deloraine (La064); Duntryleague (00318); Hoskins Memorial Presbyterian Church; Leura Uniting Church; Market Place; Massey Park Golf Course and Sanders Reserve; Queen Victoria Sanitorium; Sunray and Garden (La042); The Braes (La025).

3.0 Paul Sorensen's Garden Projects

3.1 Introduction

This study uses the 1990 Richard Ratcliffe book, *Australia's Master Gardener: Paul Sorensen and his gardens,* as the primary source of information on the body of Sorensen's garden projects over his lifetime.
Reference to the Ratcliffe book is necessary as there is little documentation of Paul Sorensen's designs, his design approach or his opinions on the relative quality of his work. Ratcliffe wrote:

> "*Sorensen tended to design in his head, communicating his ideas to the client in discussions on site and then carrying out the construction himself, giving him total control over all stages of development*" (p 12). Nor did Sorensen write about his work. "*When asked shortly before his death why he had not written about his work, Sorensen said that he had been too busy learning all his life to be able to write."* (p 11)

Ascertaining which gardens are extant and the designed content and design quality of all the gardens is not achievable due to the time and costs required in such a comprehensive study. In addition, it should be noted that Ratcliffe's visits to the Sorensen gardens were 30 years ago and in that time many changes have occurred, not only in garden content but garden ownership.

3.2 The Gardens

The majority of Sorensen's gardens are listed in chronological order, and with some notations, in the following table. The separate periods of Sorensen's body of work, as observed by Ratcliffe, are included.
In the following table:

- The majority of the information is from Ratcliffe 1990. Dates, names, locations, and owners / clients and extant situation are as recorded by Ratcliffe.
- Information has also been sourced from: *Gleniffer Brae* Draft CMP 2016 (GB CMP), and Read 2008.
- The types of gardens are broadly classified as: Urban, Urban outer, Rural.
- The Ratcliffe map number indicated as: '14' refers to the map on his book's the endpapers, and the map number indicated as: '(14)' refers to the map after the contents page. (These are included as researchers may also have available Richard Ratcliffe's book.)

table 1 **Sorensen's Garden Projects**
- a chronological assessment list

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers & notes from Ratcliffe & /or comments*
1916 to 1920s - Blue Mountains gardens, guesthouse gardens and other private gardens						
1916	*Shenstone,* Leura		Urban	Unknown	-	In GB CMP
1917, 1918 - 1919	*Westella Guest House,* Katoomba		Urban	No (only walls)	4	On Blue Mountains LEP LEP No K158
1920	*Sylvan Mists*, Katoomba		Urban	No	5	
1920	*Mt. Edgecombe*		?	Unknown	-	In GB CMP
1923	*Gabo,* Leura		Urban	Yes, ("substantially modified" 1990)	14	

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers / LEPs & notes from Ratcliffe & /or comments*
1924	*Metcalfe Garden*, Leura	Metcalfe	Urban	No	16	
1925	*Board Residence*		?	Unknown	25	
1926	*Thomson Garden*, Leura	Thomson	Urban	No	9	
1926	*Tralee,* Leura		Urban	"Yes, (substantially modified" 1990)	26	
1928	*Leuralla,* Leura	Harry Andreas		Unknown	-	In GB CMP. On Blue Mountains LEP LEP No La015
1928, 1931	*La Vista,* Wentworth Falls		Urban	Yes ("unaltered" 1990)	40	On Blue Mountains LEP No Wf074
1929, 1931	*Cheppen,* Leura, Blue Mountains	Ernest Trigg	Urban	("Yes, unaltered" 1990)	19	
1926, 1928-early 1930s	*Dean Park,* Leura	RJ Wilson	Urban	No	20	Mr. & Mrs. White were owners in 1937.
1930s, 1937	*Moreton,* Bangalla St, Warrawee	Smith		("Yes, unaltered" 1990)	(25)	
1930s to WW2 - Country gardens began, including Invergowrie & Southern Portland Cement, Illawarra region gardens, *Everglades* and more Blue Mountains gardens						
1932	*Heaton Lodge,* Mudgee	Lonergan	Rural	("Yes, unaltered" 1990)	(6)	
1932	*Holmwood,* Leura	Mr Warner	Urban	("Yes, but derelict / not maintained" 1990)	12	
1932	*Jemalong,* Blackheath		Urban	("Yes, but derelict / not maintained" 1990)	(17)	
1933	*Sospal,* Leura	Fairfax	Urban	("Yes, substantially modified. " 1990)	34	
1933	*Fjellheim*	Storakkers		("Yes, unaltered" 1990.).	21	

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers / LEPs & notes from Ratcliffe & /or comments*
1933-1936	*Everglades,* Blue Mountains		Urban large	Yes, "unaltered" 1990. Open regularly	18	Now a National Trust property. NSW Register No 01498
late 1930s	*Feltex House* roof garden		Urban	No	-	from GB CMP
c.1936	*Australian Iron & Steel Office Gardens,* Port Kembla	Sir Cecil Hoskins	Urban	Unknown	-	On Wollongong City LEP
1936	*Invergowrie,* Exeter	Sir Cecil Hoskins	Urban	Yes, ("unaltered" 1990)	(19)	1968 Sorensen returned for new owner. On Wingecarribee LEP. John Hewson AM owner 2004-19
1936	*Fjellheim II,* Wentworth Falls		Urban	("Yes, unaltered." 1990)	39	Mr Niels Storaker
1937	*Green Hills* and *Hillside,* Figtree 170-190 Princes Highway, Figtree, NSW	AIS & BHP	Urban	Yes ("unaltered." 1990)	(24)	Entry on NSW Heritage Register. The house locations were decided by Cecil Hoskins (of Aust Iron & Steel).
1937	*Beresford Grant Gardens* Warrawee			("Yes, unaltered"1990).	(25)	
1938	*Gleniffer Brae* outside Wollongong	Sidney Hoskins	Urban outer	Yes, ("substantially modified" 1990).	(23)	Within Wollongong Conservatorium of Music / Botanic Gardens. NSW Register No 00557
1938	*Hoskins Memorial Church,* Lithgow		Urban	Yes, ("unaltered" 1990)	(16)	A garden not recorded. On Lithgow LEP
1938	*Boral New Berrima Cement Works* garden (formerly Southern Portland Cement), Berrima	Southern Portland Cement	Urban outer	Yes, ("unaltered." 1990)	(20)	in Wingecarribee Shire Heritage Inventory
1936 / 1946	*Redlands*, Mittagong		Urban	Yes, ("unaltered." 1990)	(21)	John Hewson AM owner 1977 to 1985.
1939, 1940	*Mt. Keira Scout Camp*, Mt Keira		Rural	Yes, "unaltered." Open regularly.	(22)	on Wollongong City LEP

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers / LEPs & notes from Ratcliffe & /or comments*
1939	*Feltex House,* Sydney		Urban	Unknown	-	from GB CMP
1941, 1960s	*Mahratta (Heatherlee),* Wahroonga	Thomas Alfred (T.A.) Field	Rural	Yes, ("unaltered." 1990)	(25)	NSW Register # 00708
Mid 1940s - post War / 1950s - Smaller gardens - Blue Mountains, & regional, rural gardens - Lithgow, Bathurst, Orange						
1946	*Cherry Dell*, Greenslopes, Blue Mountains	Mrs. Becker	Urban	("Yes, unaltered." 1990)	17	
1946	*Saskatoon*, Leura	Mr. Mendl	Urban	("Yes, unaltered." 1990)	35	
1946	*Greenslopes*, Leura		Urban	("Yes, but derelict / not maintained. (trees only)" 1990)	30	
1946	*Neubeck House*, Lidsdale	Frank Neubeck	out-of-town garden	("Yes, but derelict / not maintained" 1990)	(14)	on Lithgow LEP
1946	*Trevlyn,* Wentworth Falls		Urban	Unknown	-	from GB CMP
1950	*Pine Hills*, Bathurst	Henry (Theo) Thomson	Rural	Yes, ("unaltered." 1990)	12	Jim Thomson took ownership after his father Henry.
1950, 1960s	*Boogadah,* Binnaway	Renshaws	Rural	Yes, ("unaltered." 1990)	(2)	Renshaw family (1969)
1950	*Cherry Bank,* Leura		Urban	("Yes, unaltered." 1990)	24	
1950-1952	*Ballantyre,* Cassilis	John Thomson (Theo's brother)	Rural	("Yes, unaltered. 1990)	(3)	
1951	*Blue Mist,* Leura, near Sublime Point	Mrs. Raz	Urban	("Yes, unaltered." 1990)	36	Mr & Mrs Gummerson purchased in 1960s and, after a second owner had neglected the garden, restored it with Sorensen's assistance.

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers / LEPs & notes from Ratcliffe & /or comments*
1951	*Bethune*, - now *Oatleigh,* Orange	Gordons	Rural	Yes, ("unaltered." 1990)	(8)	
1951	*Rannock* (also known as 'Rannoch') (now *Allonby*), near Orange	Hendersons	Rural	Yes, ("unaltered." 1990)	(10)	On Blayney LEP. Noted as *Rannock* in GB CMP
ca. 1954	*Remembrance Driveway*, Hume Highway south of Berrima		Rural	Yes	-	On LEP - a Sir Cecil Hoskins project: Sorensen planted the trees. (Read, 2008)
1954	*Black Rock*, near Merriwa	Shannons	Rural ?	No	(5)	
1955	*Whispering Pines,* Blackheath		Urban	Yes, ("unaltered." 1990)	(17)	
1955	*Pitlochry,* Merriwa / Mulgoa	Horderns	Rural	Yes, ("unaltered" 1990)	(4)	
1960s - "most productive period" (Ratcliffe p 92) Southern Highlands, Illawarra regions and inland NSW gardens.						
1960, 1966	*Calleen,* Cowra		Rural	("Yes, unaltered." 1990)	(11)	
1960	*Talltrees,* Leura	Adnams	Urban	("Yes, unaltered." 1990)	31	
1961	*Hoskins Garden / Proctor Garden,* Wahroonga	Mrs. Sidney Hoskins, Proctors	Urban	("Yes, unaltered." 1990)	(26)	Noted as Proctor Garden in GB CMP.
1961	*Field Garden,* Pymble	Fields	Urban	("Yes, unaltered." 1990)	(27)	
1966	*Mereworth*, Berrima	Oxleys	Rural	Yes, ("unaltered." 1990)	(20)	On Wingecarribee LEP
1969	*Fernhill*, Mulgoa	Darlings, later Andersons	Rural	Yes, ("unaltered." 1990)	(18)	NSW Register No 00054
1969	*Rock Forest*, Bathurst		Rural	No	(9)	On Bathurst LEP
	Lanyon Canberra		Rural	Yes	-	Tree planting & tree surgery
	Yarralumla		Urban	Yes	-	Tree surgery works

Year/s started	*Garden name, locality &/or region*	*Owner at start - from Ratcliffe*	*type / scale*	*Extant (with notes from Ratcliffe 1990)*	*Ratcliffe map No.*	*Heritage registers / LEPs & notes from Ratcliffe & /or comments*
1970s "Sorensen was approaching his eightieth birthday" (Ratcliffe p 108)						
1970	*Aola,* Peats Ridge		Rural	("Yes, unaltered." 1990)	(29)	
1971	*Barakee*, Orange	Winkworth	Rural	("Yes, unaltered." 1990)	(7)	
1971	*Goollooinboin*, Glen Davis, Capertee Valley	Meloccos	Rural	("Yes, unaltered." 1990)	(13)	
1971	*Ulinda*, near Binnaway	Suttons	Rural	("Yes, unaltered." 1990)	(1)	
1971	*Rogers Garden,* Mt. Wilson		Urban outer	No	(15)	
	Camp Cove	Ludowici	?	Unknown	(28)	
1980s	*Forest Park,* Kulnura		Rural	("Yes, unaltered." 1990)	(30)	

Other Blue Mountains Gardens - on Ratcliffe's 1990 map but not in the book's text (so no date is available) are listed here with Ratcliffe's endpaper map number and name:

1 Carrington Hotel; 2 Alcorn Residence; 3 Warrilda; 6 Dodds Residence; 7 Biarra; 8 Macintosh Residence; 9 Thompson Residence; 10 Greenbaum Residence; 11 Mort Residence; 12 Holmwood; 13 McFarland Residence; 15 Haggerty Residence; 16 Metcalfe Residence; 22 McLellan Residence; 23 Sorensen's Nursery (Leura); 27 Clifflands; 28 Armstrong Residence; 29 Stranraer; 32 Moore Residence; 33 Street Residence; 37 Cottem Residence; 38 Frankel Residence; 40 La Vista; 41 Steadman Residence.

4.0 Sorensen's Garden Designs - an Analysis

4.1 Introduction

This chapter presents Paul Sorensen's general periods of garden work, his garden design principles, and characteristics and features of his gardens. The garden design approaches of his contemporary, Edna Walling, are outlined for comparison. The possible Sorensen influences and critiques, or absence of, from garden design professionals are explored. The significance of Sorensen as a garden designer, as appraised by experts, is briefly explored through their writings, as well as the expressed opinions of his garden designs both by experts and Sorensen himself.

This chapter then outlines the design characteristics of some of Sorensen's rural homestead gardens, to establish the context for the assessment of *Mereworth* in Chapter 5.0.

4.2 Sorensen's Work - periods through his life

Paul Sorensen worked in the fields of plant propagation, tree management, and garden design and construction throughout his more than 60 years long career from his arrival in Australia and establishment of a nursery business in Katoomba in 1917 through to his death in 1983.

Ratcliffe's outline of a substantial amount of Sorensen's body of work groups it by periods which encompass differences in Sorensen's work base, garden locations, the scale of gardens and the changes through his life's work. These periods can be briefly summarised as follows:

- 1920s Guesthouse gardens and, subsequently, private gardens
- 1930s to WW2 Country gardens began: *Invergowrie* & *Berrima Cement*, Illawarra region gardens, Blue Mountains gardens incl. *Everglades* Leura (1932)
- Mid 1940s to 1950s Smaller gardens -Blue Mountains, and Lithgow, Bathurst, Orange regions
- 1960s & 1970s "probably the most productive period" (Ratcliffe p 92) Blue Mountains, and inland NSW gardens.

4.3 Sorensen's Design Principles and the Garden's Characteristics

4.3.1 Introduction

The body of Sorensen's garden work encompasses a wide range of localities, scales, and differences in style and character as his design approach was responsive to each garden's location and landscape environs. Ratcliffe reiterates this site-responsive approach throughout his book and also describes, through his text, the principles of Sorensen's design approach. The key aspects of Sorensen's design approach as distilled by Ratcliffe are included below in 4.3.2. Also included are the related "techniques and details" as outlined by Ratcliffe in Chapter 9 of his book.

4.3.2 Design Principles & Features

The **principles** of Sorensen's design approach, as determined by Ratcliffe, can be distilled as including the following:

1. Take advantage of existing site features - including retaining useful trees, interesting landforms, and salvage rock or other materials for re-use.
2. Use both native and exotic plants.
3. Trees and large shrubs are the most important elements of a garden - creating a feeling of mystery as to what is behind, and giving a visual sense of enclosure and shelter.
4. Incorporate beautiful scenery into designs wherever possible.
5. Use broad sweeps of colour when planting flowering shrubs.
6. Be conscious that a garden requires development over time.

There are likely to be features in Sorensen's gardens still in existence which were not designed by Paul Sorensen personally, but the continuing development of gardens after his work was a main theme in his philosophy.

Noticeable **features** of Sorensen's garden design approach and principles, as assessed by Ratcliffe:

The Driveway

- The surface appearance to be made of very minor visual importance.
- Where full-width drives were provided the preference was for a relatively light-coloured gravel.

The property or garden proper entry

- Sorensen "liked to mark the entrance to the property." - usually with walling.

"At *Mereworth* he used a different ploy. Each side of the drive has a masonry lion sitting atop a boulder at the point when the bitumen drive gains brick kerbing to denote that one has arrived at the homestead." (pp. 147 & 148) (These lions are no longer present. They were absent when the current owners purchased *Mereworth*.)

Paths

- Paths were usually of stone.

Walls

- Sorensen "took great delight in the use of natural stone for walling and considered that it was far superior to all other materials for this purpose." (p. 146)
- "Compared with his stone walls, Sorensen's brick walls were even more simple." (p. 146)

Pergolas

- The design of pergolas was one area where Sorensen used many differing approaches, from the rough bush timber structure at Cheppen to the extremely refined one at Fernhill. The pergola was seldom merely support for vines such as wisteria, but was also used to frame a view, divide an area or provide screening. The supports varied considerably, . . . " (p. 147)

Crossing Water

"where the water feature was very small, Sorensen chose to use simple methods such as stepping stones." With larger water elements the crossing became more elaborate . . " - timber bridges, logs, stone bridges.

Planting

- "The quality of planting in Sorensen gardens is the result of his insistence on adequate preparation of the soil before planting commenced . . . " (p. 147)

Fences

- Sorensen "had very definite ideas on the fencing of country gardens. Always he recommended that the simplest of farm-type wire fencing be used so that the view out of the garden was in no way impeded."

Views to the Setting

- Sorensen used retaining walls to form terraces at the house and allow views to the setting.
- He used the ha-ha wall to achieve an outlook to the setting, particularly on rural properties, uninterrupted by a fence.

Sorensen's garden design approach is also explained by Richard Aitken in The Oxford Companion to Australian Gardens:

> "Paul Sorensen's gardens were based on the idea of creating outdoor rooms defined by the use of large trees and shrubs or with walls and changes of level. He was not particularly interested in smaller flowering plants . . . Wherever possible he would borrow views from outside the garden to expand its boundaries but was always conscious that the scale of some scenery, such as in the Blue Mountains, was such that these borrowed views had to be achieved with great care to avoid conflict of scale between nature and the garden." Aitken and Looker 2002 p 559

> "With more than forty known gardens in the Blue Mountains and at least thirty more around other parts of NSW and ACT, his was an important contribution to landscape gardening in Australia. . .
> His style . . . was distinctive, being more closely attuned to modern landscape architecture than to garden design ideas of his age." Aitken and Looker 2002 p 559

4.4 Context of 20th Century NSW Garden Design

4.4.1 Introduction

The contemporary Australian garden design context for the period of Sorensen's work, the contemporary appreciation of his gardens, and the degree of any influence on the garden design field of his time and later years, can be investigated to understand the calibre of the designs. This section describes this contemporary context, including a comparison with his contemporary, Edna Walling. The writings of definitive garden design author Howard Tanner are analysed for the legacy or influences of Walling and Sorensen into the 1970s. In addition, a highly regarded reference book of 2003 by the National Trust of Australia (NSW) *Interwar Gardens* is reviewed for references to Sorensen and his gardens. The period covered by this publication, 1915 to 1940, encompasses Edna Walling's garden design projects and a significant part of Sorensen's garden design and making projects including *Everglades*. The references to Sorensen's gardens in *The Oxford Companion to Australian Gardens* (2002) also provides indications of Sorensen's garden design calibre or standing.

4.4.2 Garden Design Principles of Sorensen's Contemporary Edna Walling

Edna Walling practised garden design in Australia from the early 1920s to the early 1970s and became well known and highly regarded through her gardens and her writing. Her principles or guidelines for garden design in her book *Gardens in Australia: their design and care* include the following:

On Garden-Making "They know too that a house with a background of trees is more appealing than one whose roof line is unrelieved against the sky, and that a garden screened from the hot north light and the fierce western sun is more liveable and refreshing than one without trees. Those who long for such gardens will give some time and study to the selection of their favourite trees, then (if they are fortunate to find one), they seek the advice of an experienced arboriculturist, one who knows and loves trees and is well versed in their culture and habits." (p. 3)

The Starting Point "How important it is to take advantage of anything unusual about the site, and to guard it against any interference. " (p. 4)
"Low stone walls, pergolas, and colonnades relieve the flatness of level ground when alteration of the contour is not practicable or desirable. " (p. 5)

The Lesson of the Natural Country "The garden maker soon becomes keenly observant and by cultivating a watchful eye learns much that cannot be found in books... All this will be stowed away in your mind ready to be recalled for inspiration in the placing of plants and boulders. " (p. 11)

Landscaping the Small Garden "The smaller the area the more imperative it becomes to devise some means of making it appear larger. To do this we must conceal the boundaries as much as possible, and break up the remainder with groups of trees and shrubs which form vistas, creating a sense of distance which does not really exist.
One always hopes to find a garden full of surprises, grassy glades leading to pools, outcrops of mossy boulders clothed with soft coloured rock plants, a little lawn of thymes growing happily on coarse sand, an alpine path where an occasional shrublet makes it twist and turn, a dry-built wall shielding primroses, and a lawn bounded and shaded by trees.
Trees come first in the making of garden pictures, then the larger growing shrubs, followed by the low-growing shrubs, and finally the real ground covers in the form of thyme and other mat forming plants."

"In planning the landscape garden it will be found that trees have two values, an intrinsic value as individual or single specimens, or a value as part of the structure of the garden - part of the landscape so to speak. " (p. 16 & 17)

The Natural Rock Garden "Except at vast expense we can hardly hope to achieve anything so impressive as the natural out-crops where each stone sometimes weighs many tons, but it is possible, and much better, to enjoy plenty of labour, and the necessary gear for lifting, to secure a few very big rocks, rather than a quantity of those of a size limited to the strength of one or two men. Without these huge boulders it is difficult to achieve a natural effect." (p. 32)

"In dealing with an existing outcrop one must go cautiously, hardly daring to touch what already is there; introducing any necessary footpaths with the greatest care and restraint, scattering the sand or gravel promiscuously along the track, meticulously declining to define it in the slightest degree, but allowing the little creeping plants to wander across it here and there." (p. 33)

Country Gardens "That the natural grass should roll up to the house on at least two sides is often the most pleasing setting for the country house. Just a few trees and some low-growing plants to help tie house to grounds, and then the garden drifts off into the surrounding landscape quite happily." (p.42 & 43)
"To achieve several points of interest to which one's friends may wander so that a walk around the garden will take them on and on to fresh discoveries is perhaps the unconscious aim of all who plan gardens."

Steps & Stairways "Semicircular and segmental steps are used with the greatest restraint, for when there must be more than three risers the appearance may assume that of a cone with the top cut off." (p.49)

The Approach "Above all places the driveway is one where the greatest restraint will be exercised, for it is so desirable that it should be entirely presentable and pleasing at all times of the year. Limestone toppings or crushed rock form the best and cheapest of driveways." (p. 60)
"The screening of objects is one of the first considerations in garden design. This is accomplished in a number of different ways, either with plants or with some form of construction." (p. 69)

Water in the Country Garden "Away from the river, lake and sea, the gleam of water gives to any country garden the qualities of tranquility and coolness. The tinkle of falling water as it ruffles the surface of a little garden pool, and the splash of plunging bathers into the tree reflected water of the larger swimming pool, enliven the dullest garden on a hot summer's day." (p. 95)

The House Setting "The architecture of the house so depends upon the setting given to it by the garden that it is safer to fully realise this while the house plans are still under discussion - even before the site for the building is selected." (p. 124)

4.4.3 Sorensen's Design Approach and the Context of Walling's Design Principles

While they were 20th Century contemporaries (Edna Walling practised and wrote on gardens from the 1920s to the 1960s and Paul Sorensen practised from 1917 to about 1982), there has been very little comparison of the two garden designers in relation to their influences, or of the calibre of their designs. Nor has there been a comparison to assess the relative quality of their work or relative contribution to Australian garden design.

Ratcliffe dismissed similarities of Sorensen to Walling somewhat, writing:

> "The design philosophies of Sorensen and Walling were quite different, but in this pair Australia had in a very few years been presented with probably the two most influential garden designers of the early twentieth century . . . Their differences in style can be attributed to several factors, the first being that of influences." (p. 11)

At the same time Ratcliffe also highlighted the differences in their approach to garden design:

> "Perhaps their different philosophies are best revealed in how they thought of themselves. Edna Walling preferred to call herself a garden designer while Paul Sorensen used the terms landscape artist or landscape architect, being one of the first persons in Australia to use the latter term. With such differing approaches to gardens, comparisons become rather pointless. Which style is preferred can only be a matter of personal taste." (p. 12)

However, there is a high degree of similarity in their design approaches and their gardens content and character, having consideration of the differences in the scale of their garden designs - Sorensen appearing to have more larger and more rural garden projects than Walling as a proportion to the totality of their works.

Walling's Design Approach - A Comparison with Sorensen, Analysis

Edna Walling's garden design principles correspond remarkably the same as Ratcliffe's explanation of Sorensen's garden design approach.
Walling writes more on the plants for the garden, however, these guidelines were not included above for a comparison with Sorensen as Sorensen's work now is primarily appreciated for the layout and structure of the spaces and the use of trees. He often left the masses of small and flowering understorey and ground cover plants to his clients and, because these plants being more ephemeral or vulnerable to change than the trees, they are often changed or are absent from Sorensen's gardens now.

4.4.4 Garden Design Principles from Howard Tanner - following the Sorensen and Walling Period

Howard Tanner, the eminent heritage professional, in the introduction of his influential 1983 book 'Towards an Australian Garden', outlines the design principles to be applied for a 'successful garden'.

> "*Every successful garden is based on a clear plan. This recognises the existing features of topography and vegetation and introduces new elements to heighten their effect. A garden should exploit the natural contours: traditional gardens used steps, walls and terraces to emphasise each change in level. Improvement is rarely achieved by a bulldozer, which damages topsoil and tree trunks. The garden's basic form can be a central open space, or various open spaces linked like a series of outdoor rooms. From the entry to the garden, or from the house, or from space to space, a series of outlooks or vistas can guide the eye towards specimen plants, an urn, a statue, a pond or perhaps some architectural feature. These devices should be used to entice a visitor onwards through the garden, with architectural or planted incidents at each change in direction*."
>
> (Tanner, 1983. pp. 9-10)

He could be writing about Paul Sorensen's design approach. This book continues with further exposition of his *Principles of Garden Design*. Amongst them are the following:

Form /Relationship to Site "On a sloping site a garden becomes a series of platforms, linked by stairs and ramps, with walls, hedges and fences offering selected glimpses of territory beyond. Many sites have no outlook, so a carefully-studied introversion must be pursued, with fences, walls, pergolas, and paving architecturally channelling the interest between planting incidents...

Outlooks Where a site has an effective outlook the garden, or some part of it, should be oriented in this direction. A mountain, a river, some buildings in the landscape can be drawn into the garden composition, providing a distant focus . . .

Plants The careful selection of plants is an essential prerequisite for a successful garden. These should be largely evergreen near the boundaries, with (in southern Australia) deciduous trees near the house, terraces and lawns, to allow winter sun to penetrate... Trees are the key elements in any garden, their shape and foliage dominating the design." (p. 10)

Integration with the Existing Landscape "The transition between the intimacy of the garden and the outside world, whether open stands of eucalypts in grassland or urban sprawl, requires careful handling. The most successful garden vistas provide three areas of accent: foreground, middle ground, and distant ground, with simple sweeps of lawn or open ground between them. Usually the foreground is the intimate gardens and a screen of foliage to the house, the middle ground provides a tightening of the vista that frames a view to the distant landscape features." "Dramatic sites require an understated and direct approach, for an overly elaborate garden will vie for attention with a view that encompasses elements of natural grandeur. The garden beds and specimen trees can be either subordinate to such a vista or placed in secondary gardens separate from the axis." (p. 17)

To be noted is that Tanner includes a photo of the *Everglades* lookout to the distance hillsides without reference to Sorensen, and that is the only photo of a Sorensen garden in the book.

Plantations of Mature Trees and Shrubs "A mature stand of trees is one of the greatest assets a garden can have. A dense line of trees may define a drive, a grove can provoke an open canopied space or, when densely underplanted, form woodland, and an orchard can provide an attractive geometry of flowering trees." (p. 18)

Openings and Vistas "Openings in walls and hedges provide an element of surprise and temptation. They hint at hidden gardens, concealed vistas, and draw the visitor's attention.
Informal vistas are often contained by the foliage of the garden itself. Interest can be provided by a veiled outlook - through a copse, or a cleft between major trees, or by architectural incident." (p. 29)

Wild and Woodland Gardens "Wild and woodland gardens occur naturally, or over time, as introduced plants settle into a comfortable co-existence with the species native to the area." (p. 42)

Walled Gardens "Walled or hedged gardens work best on open, generous sites where they can form a series of compartments - separate rooms as it were - leading one to another. The openness of the countryside is forgotten, in fact the whole garden cannot be grasped at any one time, for the openings which lead from one compartment to the next should be small." (p. 44)

Fences, Boundary Walls and Gates "Where total retention of the view was paramount, a ha-ha, or concealed wall and ditch, was introduced." (p. 51) "Gates are the point of entry to a garden or courtyard and with the related opening form the transition point between two spaces." (p. 51)

The Approach: Avenues and Driveways "Gates and perhaps a lodge designated the beginning of the drive which passed through clumps of trees, affording from time to time a picturesque view of the house in its garden setting. " (p. 54)

Specimen Trees "Deciduous trees offer enormous variety throughout the year; they lose their leaves during winter, presenting a tracery of boughs against the sky; gain crisp new foliage and occasionally flowers in the spring, and over summer provide a shady canopy before the leaves colour and fall in the autumn, letting the sun penetrate to the ground. These are the most spectacular of trees responding as they do to each individual season. Evergreen trees offer an element of permanence in the ever-changing variety of the typical garden, and year-round they can shelter and screen the immediate environment." (p. 56)

Sorensen's late 20th century Garden Design Context / Influence - analysis

The garden design principles espoused by Howard Tanner, and the garden character that would be derived from them, are remarkably similar to those seen by Ratcliffe as characteristics of Sorensen's garden design approach and his designs.

Tanner has not written specifically whether he was influenced by Sorensen or Walling. It appears it may have been both those garden designers, however with Walling to the fore.

Sorensen's late 20th century Garden Design Context - a conclusion

Conclusions can be drawn that both Edna Walling and Paul Sorensen:

- were reputable and influential designers in their working lives, with Walling having considerably more prominence and recognition both during and after their lives; and that
- the garden designs of both are generally of a high calibre;
- the garden designs of both are still appreciated in the 21st Century, though Edna Walling's work is more widely recognised and acclaimed; and
- the garden design principles of both included as highly important that: a garden should be responsive to the site and the wider setting.

It is difficult to designate one as a superior garden designer above the other for the whole body of their respective works. Some of Sorensen's gardens are recognised as more notable than others, and a few hold a level of heritage significance.
In popular opinion one garden designer may be favoured over the other generally for a particular garden or period or place of their work, and likely this would be based on preference of style, planting content, or other aspects of either Sorensen's or Walling's gardens.

Comparison of Paul Sorensen with Edna Walling in regard to their garden design principles or approaches, and the features of their gardens, indicates they are remarkably similar. However, Paul Sorensen's body of garden design work does not appear to have the status or recognition given to Edna Walling by authorities such as Howard Tanner in the 1970s, or by scholars, critics and other garden writers in Sorensen's lifetime and to today. Edna Walling and a few other contemporaries appear to be considered more eminent and significant garden designers than Paul Sorensen.

4.5 Critical Assessments of Sorensen's Garden Designs

4.5.1 Ratcliffe's Assessments & Sorensen's Ratings

Richard Ratcliffe (Ratcliffe, 1990) wrote of some of Sorensen's gardens at greater length and with greater praise than others. This may have been done in part to his having had the opportunity to visit them, to observe the condition and degree of intactness of the garden, and the scale of the garden and its landscape setting.

Gardens that appear to be assessed by Ratcliffe as of a higher quality of design, or best exemplifying the design approach Ratcliffe analysed from Sorensen's body of work, and as assessed by Sorensen himself are listed here in chronological order:

Dean Park - 1926, 1928 "Paul Sorensen always considered this to be one of his best gardens." (p. 23)

Cheppen - 1929 "Despite the acclaim Everglades has received in several articles and publications over the years, many people, including Sorensen, considered that some of his smaller gardens were better, particularly Cheppen." (p.19)

Heaton Lodge - 1932 "Heaton Lodge is truly a great garden." (p. 22)

Everglades - 1930s It should be noted that of this garden, which is on the state heritage register, Ratcliffe did not record any specific assessments or opinions from Sorensen. This may reflect the comment Ratcliffe included on *Cheppen*.

Redlands - 1936 "the retention of its integrity makes Redlands an important example of Sorensen's work." (p. 66)

Mahratta - 1941 "This garden, possibly more than any other, shows Sorensen's ability to combine exotic and native trees into a cohesive design." (p. 94)

Blue Mist -1951 "...he has created a garden which can only be described as magical." (p. 133)
"From the street the property is totally secluded by a tall *Cupressus torulosa* hedge which also gives total protection from the westerly winds. The drive sweeps through generously proportioned lawns studded with eucalypt (*Eucalyptus sieberi*), birch (*Betula pendula*), cedars (*Cedrus deodara*) and (*C. atlantica*) and claret ash (*Fraxinus oxycarpa 'Raywoodii'*), leading to the simple bungalow...while the torulosa hedge is backed by flowering cherries including *Prunus 'Amanogawa'."* (pp. 133 & 137)

"The partnership which developed between Sorensen and the Gummersons was one which brought Blue Mist to its peak as one of, if not the most beautiful garden in the Blue Mountains." (p. 137)

"The fact that planting on this scale is no longer carried out by the present owners yet the garden retains its beauty is further proof of Sorensen's philosophy on the use of trees and shrubs as the main design elements in a garden." (p138)

Tall Trees, Leura - 1960 "Sorensen was often heard to say that this was among his favourite gardens as he had managed to achieve a more restful environment here than in any other." (p. 138)

Mereworth, Berrima - 1966 "Among all of Sorensen's gardens, the landscape he contrived at *Mereworth* near Berrima on the New South Wales southern highlands must rank among his best and could be considered to be among the great cultural landscapes of Australia." (p. 96)

Fernhill, Mulgoa - 1969 "the gardens remain a tribute to both Sorensen's genius and the high standards of the maintenance team" (Ratcliffe p. 106)

Forest Park - 1970s "...the most brilliant success has been the placing of the previously mentioned honey locust in front of the pine and cedar wattle windbreak so that its delicate tracery and golden foliage becomes almost luminous against the deep green of the windbreak." (p. 115)

"Sorensen loved visiting the garden at Forest Park because he thought it an example of complete harmony of man and nature." (p. 115)

Goollooinboin - 1970s "A much more successful project . . . is one which truly demonstrates that Paul Sorensen was more than just a garden designer and could more realistically be called a landscape architect." (p. 109) "house and landscape are at one with each other." (p. 110)

4.5.2 Sorensen in 'Interwar Gardens'

The National Trust of Australia (NSW) 2003 publication *Interwar Gardens: a guide to the history, conservation and management of gardens of 1915 - 1940* is a highly regarded and much referred book. It should be noted that this publication was 13 years after Ratcliffe's detailed book on Sorensen was published. In the preface we can read, "some of Australia's most eminent landscape designers and horticulturalists such as Edna Walling, Max Shelley, Olive Mellor and Paul Sorensen worked in the interwar years." However, Sorensen is essentially not mentioned again.

In the chapter, *Up the Garden Path*, in which Colleen Morris surveys the major garden publications of the period, she links houses and their architects and includes items on landscape architects and garden designers: Edna Walling, Jocelyn Brown, Hardy Wilson, Olive Mellor, Betty Begg, and Molly Shannon. She gives essentially no mention of Paul Sorensen. The one exception being of one garden, as she writes "It is fair to argue that few intact interwar gardens survive . . . some of the more easily identified . . . such as Everglades . . . " No acclaim is given to Sorensen.

Stuart Read in the chapter*, Typical Elements,* does not refer to Sorensen for examples for the styles presented in the chapter.

In the chapter*, Interwar Garden Layout*, by Susie Hoppe, the garden designers Edna Walling, Olive Mellor, Max Shelley, and Jocelyn Brown are recognised. The garden writers and garden designers Olive Mellor, Mollie Shannon, Betty Begg, Max Shelley, and Edna Walling are noted as influential. Paul Sorensen is not mentioned, so it appears was assessed as having had no influence in the period.

The timeline in the book notes that in 1933 "Landscape gardener Paul Sorensen (1890 - 1983) starts work on Everglades garden at Leura." That is the only mention of a Sorensen garden.

It appears from the scholars and consultants writing in *Interwar Gardens* that Sorensen was, and likely still is, not as highly regarded as all the other designers of that period, nor was his work noticeably influential.

4.5.3 Critical Appraisals in 21st Century Garden Publications

The Oxford Companion to Australian Gardens (Aitken and Looker, 2002) includes an entry by Richard Aitken on Paul Sorensen, but just two of his gardens, *Everglades* and *Invergowrie,* and a mention of *Gleniffer Brae* in the Wollongong Botanic Gardens entry. The entry presents an outline history of Sorensen's European background, his practice in Australia, and a brief outline of his design approach and characteristics. Of *Everglades*, Aitken writes "Everglades showed mastery in articulation of spaces, an appreciation of scale and texture, immaculate craftsmanship in the stonework of retaining walls that divide the garden into terraces, and an extensive understanding of plants and their requirements."
Significantly, no other garden is given a critical appraisal in this entry. The *Mereworth* garden is mentioned, though not with any detail or acknowledgement of any calibre of the garden design.

In *The Garden of Ideas Four Centuries of Australian Style* (Aitken, 2010) Everglades is briefly included with a photo and caption,

> " *. . a collaboration between the design interests and ambitions of its owner, Belgian born Sydney business identity Henri van der Velde, and the horticultural skills of his landscape designer Paul Sorensen, exploited the garden's dramatic site in the Blue Mountains with terracing and framed vistas. The crisply delineated pool terrace incorporated an ancient specimen eucalypt, set on a discus podium, wittily rotated as if the tree was exerting some primeval force."* (p 170)

No other Sorensen garden is given a mention in this book.

In the *Australian Dictionary of Biography* Sorensen's biography (ADB, 2012) records him as a "nurseryman and gardener" not as a garden designer or garden architect. His designs are not described or critiqued, however his horticultural skills are recorded: "*Sorensen excelled at pruning trees and with theatrical gestures, extolled the virtues of bringing out the 'spirit' of a tree. Stone walls and paving were features of his work; keeping within budget was not.*"

Appraisals of Sorensen's Gardens - analysis from published sources

Sorensen expressed that he most highly favoured these gardens:
Dean Park, *Cheppen*, *Tall Trees*, and *Forest Park*.

Ratcliffe appeared to rank highly:
Blue Mist, *Heaton Lodge*, *Mahratta*, *Mereworth*, *Goollooinboin*.

The 2003 publication *Interwar Gardens* by garden authorities, gave virtually no recognition or reference to the body of Sorensen's work in that period, nor its calibre, nor of a particular garden except briefly to *Everglades*.

Garden design authoritative assessments in the Oxford Companion: There is only mention of *Everglades* and *Invergowrie* and a mention of *Gleniffer Brae* in the Wollongong Botanic Gardens entry; *Mereworth*, though mentioned in the Sorensen entry, is not given an assessment.

In *The Garden of Ideas Four Centuries of Australian Style* Sorensen's garden design body of work is not appraised.

Sorensen's Garden Design Status / Recognition in the 20th & 21st Centuries

In 2003 Sorensen was not widely renowned, and not considered by many experts as an eminent garden designer.

The authoritative garden and national reference publications: *The Oxford Companion to Australian Gardens, The Garden of Ideas Four Centuries of Australian Style,* and the *Australian Dictionary of Biography* do not credit Paul Sorensen as one of Australia's or New South Wales' eminent garden designers, nor do they assess his designs of high calibre, with the exception of *Everglades* receiving attention. It should be noted that the designs of Sorensen's homestead gardens are not given any recognition.



Cheppen Source: The Home, 1937. p. 49.

4.6 Sorensen's Rural, Homestead Gardens

4.6.1 The Rural, Homestead Gardens, including *Mereworth*

This report is prepared to address the IPC recommendation R17 which encompasses a comparative assessment of Sorensen's body of work including *Mereworth* House and Gardens. The *Mereworth* garden is the rural, homestead or villa garden type.

An understanding of the context of Sorensen's gardens of the same type and of a similar scale is necessary to understand the relative value of a particular Sorensen garden of that type. Table 2 has been prepared to document aspects of some of Sorensen's rural, homestead gardens which are understood to be extant.

The reliability of this assessment is low as there was no access for visitation to these gardens (except to *Mereworth* House and Gardens) as they are not open to the public. The typical design characteristics of Sorensen's designs are noted.

table 2 Sorensen's Rural Homestead Gardens

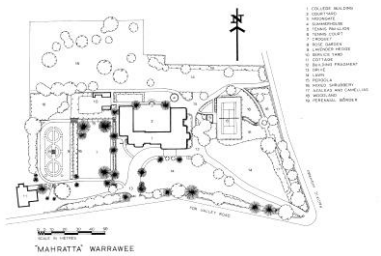
Sorensen Garden	*Sorensen Design Characteristics*	*Indication of Garden Design Quality*
Mahratta Wahroonga 1941  'MAHRATTA' WARRAWEE	**Driveway**: - Sinuous drive **Garden rooms**: - Croquet lawn, - Rose garden in a formal layout, - Tennis court, service yard, - South Lawns, - Woodland **Land shaping / terraces**: sunken terraces for croquet lawn and rose garden **Windbreaks / Tree belts:** Trees used "to delineate and articulate the house" (Ratcliffe p. 96) **Planting**: - Combination of exotic and native trees into a cohesive design of a high standard. - hedge near house.	Listed on the NSW Heritage Register # 00708. "This garden, possibly more than any other, shows Sorensen's ability to combine exotic and native trees into a cohesive design." (Ratcliffe p. 94)
Pine Hills Bathurst 1950  image: Ratcliffe	**Driveway**: - Curving driveway through woodland / 'arboretum' to house. **Garden rooms**: - Side terrace with vista. **Land shaping / terraces**: - Lawn terrace above curving ha-ha walls - view to field. - Focused views to farm dam & distance framed by *Ulmus glabra 'Pendula'* **Windbreaks / Tree belts:** - Tree belts **Planting**: - Formal hedges	
Boogadah Binnaway 1950  image: Ratcliffe	**Garden rooms**: - Lawns and focused view to north. **Stone walls:** Used to form terraces /level lawn 'rooms'. **Land shaping**: - Reshaped creek banks and grassed there giving a "natural transition from garden to watercourse" (Ratcliffe p. 93) **Windbreaks:** - Tree belt along west. **Planting**: - Specimen trees in lawns with contrasts of colour, form and texture. **Setting**: - Park-like setting around house. - A tree plantation beyond garden to provide a background to the view from the house.	

table 2 Sorensen's Rural, Homestead Gardens continued

Sorensen Garden	*Sorensen Design Characteristics*	*Indication of Garden Design Quality*
Rannock (renamed 'Allonby') 1951 Orange  image: Ratcliffe	**Driveway**: - Entrance drive redesigned - Drive loop curves through garden. **Land shaping / terraces**: - Site at house shaped to a level platform - soil from nearby river flats. - Evergreen tree belts on the north and west, with openings on north for vistas to distant willows. **Garden rooms**: - formal rose garden, - vegetable garden separated by *Prunus* hedges. **Feature:** - Colonnade - with wisteria **Planting**: - Mixed tree species **Setting**: - Park-like setting.	Listed on the Blayney LEP as a heritage place -#166.
Bethune Orange 1951  image: Ratcliffe	**Driveway**: - Drive understated -curving. **Land shaping**: - Stone weirs forming 3 ponds - water in view from house. **Windbreaks:** - Windbreak planting - *Cupressus torulosa* **Planting**: - Woodland of mixed species **Setting**: - Vista between 2 golden elms to woodland	
Mereworth Berrima 1966 	**Driveway**: - Entrance drive redesigned - Curving drive & avenue. **Land shaping / terraces**: Site at house and north reshaped to a level platform behind retaining wall - The ha-ha. **Windbreaks / Tree belts:** - Tree windbreak / screens on west, south, east with opening for vista to near setting. **Garden Rooms**: - Swimming pool not seen from other parts of the garden. **Feature:** - Pergola with wisteria **Setting**: - Focused views to farm dam framed by *Ulmus glabra 'Pendula'*	Listed on the Wingecarribee LEP as a heritage place.
Fernhill Mulgoa 1969  photo source: Fernhill Estate (online), 2019.	**Driveway**: Driveway with carriage loop re-planned. **Land shaping / terraces**: Retaining walls to form level lawns. **Garden rooms**: Rose garden, -Tennis court, - Swimming pool and not seen from other parts of garden. - Ornamental pool. **Features**: - Large pergola with Wisteria - arrival point in garden. **Planting**: - Large magnolia tree transplanted to garden. - Hedges.	Listed on the NSW Heritage Register # 00054. "the gardens remain a tribute to both Sorensen's genius and the high standards of the maintenance team" (Ratcliffe p. 106)

table 2 Sorensen's Rural, Homestead Gardens continued

Sorensen Garden	*Sorensen Design Characteristics*	*Indication of Garden Design Quality*
Forest Park Kulnura 1970s 	**Driveway**: - Driveway with avenue planting. **Windbreaks / Tree belts**: - Windbreak along west and road. - Lawn from house. **Garden rooms**: - Tennis court, - Woodland garden. - Trees make a sense of enclosure. **Setting:** - View to distance is from one side of garden. **Planting**: - Wide range of trees - Feature trees & contrast of deciduous trees to evergreen backdrop.	"Sorensen loved visiting the garden at Forest Park because he thought it an example of complete harmony of man and nature." (Ratcliffe p. 115)
Barakee Orange 1971 	**Driveway:** -Altered, indirect approach not in key view. - Curving drive & avenue. **Land shaping / terraces**: - Field stone gathered and used for retaining wall 100 metres along curving to follow contours. - Grassed terrace along north of house. - Existing eucalypt tree preserved in the terrace by stonework. **Windbreaks / Tree belts**: - Tree belt screens. - Windbreaks to the west and south **Garden rooms**: - Tree grove of evergreens with a single contrasting tree. **Feature:** - A monumental-scale stone feature. **Setting:** - Focused view to property and valley beyond.	
Goollooinboin Capertee Valley 1971 	**Driveway**: - Planned driveway curving across the pastures occasionally revealing glimpses of the house roof. - Curving form. **Land shaping / terraces**: - Field stone retaining walls around the hill to form the lawn terraces. **Garden rooms**: - Terraces, -Swimming pool - Existing tree saved by stonework surround. **Setting**: - Focused view to property. - Tree groves to limit / orchestrate views to setting. **Planting**: - Wisteria at one corner of house. - Hedges along top of walls.	" . . . house and landscape are at one with each other." (Ratcliffe p. 110)

table 2 Sorensen's Rural, Homestead Gardens continued

Ulinda Binnaway 1971 Bathurst  image: Ratcliffe	**Driveway**: - Driveway altered to a sinuous line. - Curving tree-lined drive. **Windbreaks / Tree belts**: - Tree belt screens (cypress). **Land shaping / terraces**: - Terrace with viewpoint to vista along creek formed from stone on site. - Northern lawn. **Features**: - Timber pergola with wisteria and banksia rose. **Garden rooms** / character differences: - North lawn, - Swimming pool, - East garden, - Courtyard. **Setting:** - Immediate setting treated as parkland with widely spaced groups of trees. - Views screened in part and focused vistas over farmland-. - Focused view to property.	

Sorensen's Rural, Homestead Gardens & *Mereworth*

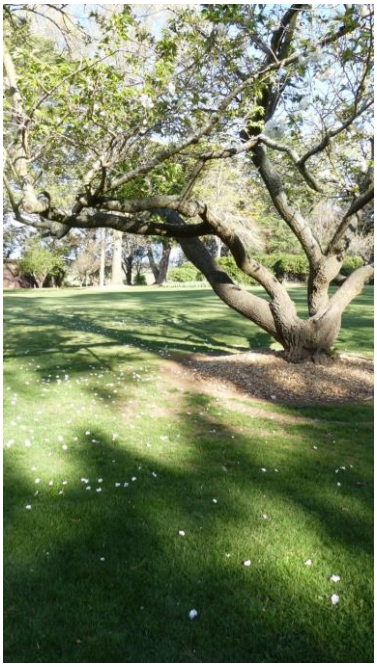
The rural gardens appear to have many similarities in the design features and characteristics used by Sorensen even as he responded specifically to each site and locality. The design responses appear to have changed little over the period of his work.

With consideration of the design characteristics, the design complexity, and the relationship to the rural setting, *Mereworth* appears typical or not uncommon, though one of the more modest in scope and scale of the rural homestead gardens, and with a minimal relationship established with the rural setting for the house and its garden surround.

part two

Analysis
of
Mereworth, Berrima





5.0 The *Mereworth* Driveway and Garden

5.1 *Mereworth*

The *Mereworth* property, with the *Mereworth* house and garden, is situated in the Southern Highlands region of New South Wales in the Wingecarribee River catchment, about 3.5 kilometres south west of Berrima. It lies immediately west of the Hume Highway with large, rural, grazing holdings to the north, east and south. A brief chronology pertaining to the *Mereworth House and Garden* is in Table 3. The history of the Atkinson - Cowley estates and Mereworth is detailed in the *Historical archaeological assessment and SoHI* (EMM, 2020). The owner of *Mereworth*, from 2014 is Hume Coal Pty Ltd.

table 3 Brief Chronology of *Mereworth* House and Garden

date	*event*
c. 1823	John Atkinson establishes *Mereworth* estate.
1858 - 1909	Sometime after 1858 Robert Cowley ceased operating as an inn keeper and the name of the property was changed to *Mereworth House*; the Cowley family living there until 1909. The Cowleys may have also been running the property as an unlicensed guest house. c. 1874 - Robert Cowley purchases the *Three Legs of Man* property.
1903	*Mereworth* estate portioned for sale after John Lackey's death.
1912 - 1963	From 1912 to 1963 the current property was owned by William Cowley a grazier. The Cowleys owned the property for 100 years.
1927 1928	Southern Portland Cement operation established - kilns to produce clinker -1st tower height: ? (unknown at this stage). New Berrima village established as employee housing
c. 1963	*Mereworth* estate sold to Tony and Amber Oxley of the Bushell's Tea family purchased under the name *'Mereworth Pty Ltd'*.
c. 1963 - 1965	Buildings demolished to make way for the current house.
1965	House designed by John Armoury.
1966	Sorensen designed and built the gardens.
1983	Sorensen's death.
1985 - 1989	*Berrima Bypass* - construction of the Hume Highway duplication works (now known as the Hume Motorway)
1991	*Mereworth* and gardens listed on the Wingecarribee Local Environment Plan
2001	Wingecarribee Shire Council Tree Preservation Order Amended 12 September 2001 - Tree Appendix 1: Significant Tree Register #168 *Mereworth*: "Bhutan Cypress, Elms, Cherry, Himalayan Cedar - excellent examples of a mixed species Driveway Plantings."
ca 2000s to 2014	Ownership with companies under the Oxley's directorships: PBF 2 Pty Limited, S F Pastoral Holdings Pty Ltd, PBF1-4 Pty Ltd
Sept. 2014	Hume Coal Pty Ltd purchased property, and the paddocks were licensed to Princess Pastoral.
2014 - 2019	*Strata Gardens* undertook garden maintenance works for the Hume Coal properties.
2016	Hume Coal prepared a *Mereworth* Garden Management Plan.

Dec. 2016	Arborist Bradley Hawthorne (the gardening contractor for *Mereworth* in 2016) prepared an *Arboricultural Hazard Assessment* report for *Strata Gardens* for Hume Coal.
2019	SEMMS Property Services

5.2 Sorensen at *Mereworth*

Paul Sorensen was engaged by Mr and Mrs A Oxley in 1966 to design the garden at *Mereworth* which they had purchased about 1963. The Oxleys had a new house built in a French provincial style in 1965. When Sorensen began the garden design and implementation in 1966 there was windbreak plantings of pine trees around the west south and south east of the house which he retained in his design.

There are no plans by Sorensen of his design or records of his work at *Mereworth*. Richard Ratcliffe visited the garden ca 1989. The plan drawn by Ratcliffe shows the house and garden with its dense nearly full enclosure of windbreak evergreens and the relationship to the Hume Highway as it was at the time of Sorensen's garden design and implementation. Sorensen designed the new driveway route, the tree planting along the drive and the avenue planting on the straight approach to the house and its garden surround.



Ratcliffe's plan of part of the *Mereworth* property showing the house, garden, avenue, and the driveway which was a key part of Sorensen's design. Source: Ratcliffe, 1990. p. 97.

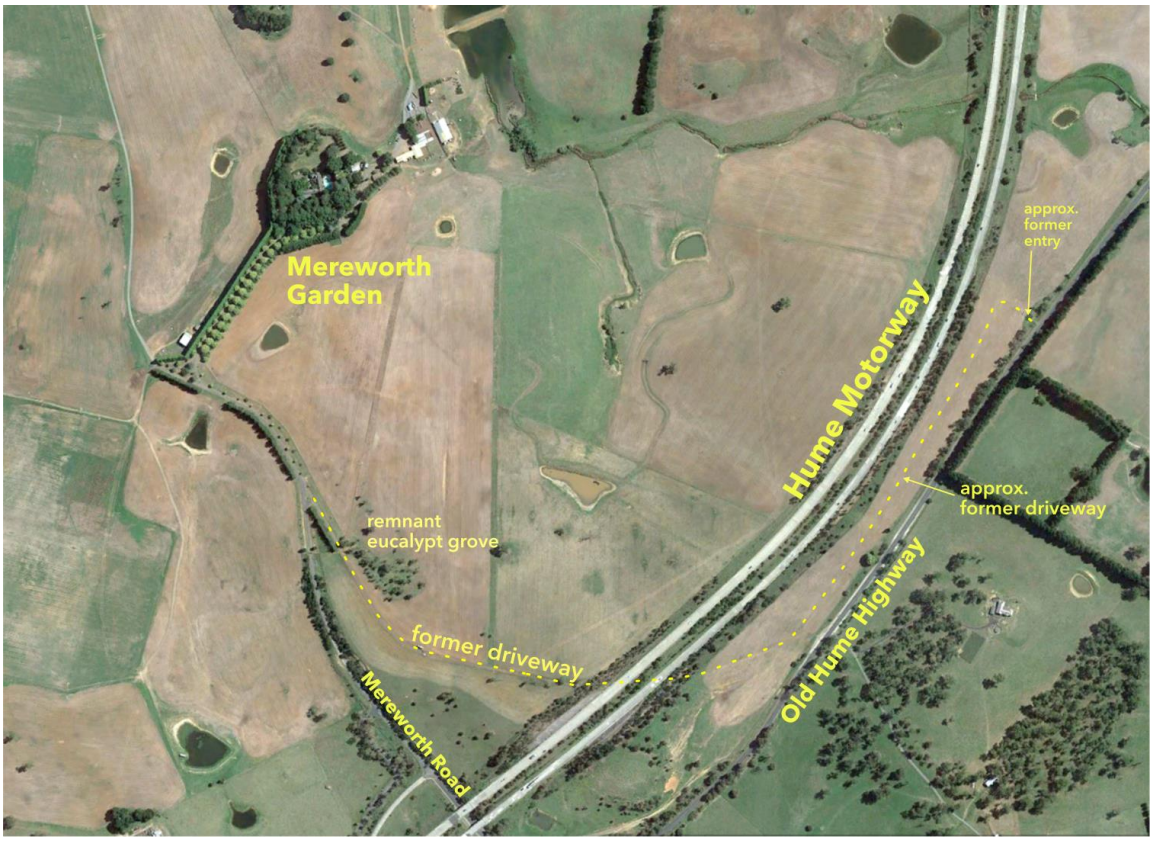
5.3 The Driveway and Garden at *Mereworth*

5.3.1 The Driveway and the Arrival Experience

Sorensen designed the driveway from the Hume Highway to curve south and follow a wide ridge with a curve to the west and a further bend to the north and onto a straight approach of approximately 320 metres to the house. This route responded to the landform and the existing remnant tree groves, and the potential outlooks over the property and beyond to the wider rural setting. The drive experience, with views out to the rural setting and the tree grove that denotes the house location, was further orchestrated with planting of lines of trees alongside the drive - pines along the southern part, and a palette of pines, elms, and flowering cherries on the straight house approach.

Ratcliffe identified only two driveway outlook viewpoints in his plan of *Mereworth* and these he describes as significant features of Sorensen's design. Refer to the previous page Ratcliffe plan.

The drive was altered c. 1985 by the construction of the Berrima Bypass section of the Hume Highway, now called the Hume Motorway, through the eastern part of the property and a new driveway was formed off the newly formed 'Mereworth Road'. This is southwest of the drive entry designed by Sorensen.



2019 aerial with the former driveway location indicated.

aerial source: Google Earth, 2019.

This meant the removal of two thirds of the Sorensen driveway and gave rise to loss of:

- the first key entry viewpoint;
- an important aspect of the second key view point (see Ratcliffe's site plan) through additional road infrastructure and widening to form Mereworth Road;
- the drive along the eastern ridge and then west through the remnant eucalyptus grove;
- about 100 metres of drive alongside the row of planted pines; and
- a quality of the view from the elm and flowering cherry avenue and drive, as the view now includes the Hume Motorway with its noticeable traffic movements (heavy vehicle use including large trucks).

"Through this change all the artistry of the original approach concept has been lost and the arrival experience degraded." (Ratcliffe 1990 p. 104.)

Thus, the drive as a whole experience, as Sorensen designed it, is substantially altered from its original design. The remaining substantially intact section extends from the junction between the farm drive which continues to the west, and the straight approach, the elm and flowering cherry avenue (as identified by Ratcliffe), which becomes the circular drive at the house garden. That transition from the straight avenue to the circular garden interior driveway was marked by a pair of masonry lions atop large boulders (the boulders remain however the lions were removed prior to purchase by Hume Coal), and the bitumen drive becomes brick kerbed.

The elm and flowering cherry avenue, the remaining whole section of the arrival experience designed by Sorensen, holds a high degree of intactness in:

- the location and alignment;
- the width and materials;
- the avenue trees, though not fully intact; and
- the manicured lawn under the eastern side avenue trees extending out to the paddock fence.



The elm and flowering cherry avenue driveway section Photo: C Brouwer 2019

5.3.2 The Garden

Sorensen designed the *Mereworth* garden for the Oxley family in 1966. The garden proper, situated within the wider rural property curtilage still holds (in 2019) much of the structure and the elements as designed by Sorensen, including:

- retention of the extant *Pinus radiata* wind break planting along the west and south sides which were present prior to Sorensen's involvement;
- a tree grove south of the house contiguous with the windbreak plantings of the east, south, and west, forming a full canopy cover over the drives and southern forecourt space and a dense visual screen of any outlooks from this area to the property beyond;
- the near-full visual enclosure of the garden achieved by evergreen tree windbreaks, tree groves and hedges;
- the drive layout, visitor parking space and associated hedges at the north from the house walls;
- the courtyard with its trees, pond, flagstone paths, large rocks and ground carpeting plants;
- the stone flagged "cherry walk" and gazebo with fountain, and rose garden area;
- the swimming pool and garden surrounds; (The addition of a pool fence was a modification to the Sorensen design required for compliance with the *Swimming Pools Act 1992*.)
- the expansive level lawn north of the house and the majority of the evergreen framing and decorative, flowering trees there; and
- the ha-ha walls and the curved line of weeping elms along its top.

Sorensen may have utilised the dam as a source of fill to form the levelled north terrace lawn area, or to form the island in the dam. He characteristically generally utilised earth and rocks from the property in his rural garden works.

5.3.3 The Outlooks and Rural Setting with Yards

Mereworth has been maintained as an actively managed rural property: pastures are managed; cattle graze generally over the property (excluding the house and garden, new driveway and cherry and elm avenue); the remnant woodland patches and creek corridor are retained and managed; and the stockyards, fences, dams,

and farm processes infrastructure are maintained. The landscape character established over *Mereworth* at the time of purchase by the current owner is essentially similar to that of a Southern Highlands region, rural grazing property.

The foreground setting The rural setting or surrounds of the structured garden comprise:

- the *Mereworth* paddocks with historical pine tree belts (from ca 1940s);
- the *Mereworth* north dam with island (mid-late 1960s), and the other dams and gullies;
- the yards (in 1949 aerial); and,
- the service tracks through the area of the yards, dams, and paddocks (in 1949 aerial - the present).

Documentary evidence indicates these components to be substantially unaltered from the 1940s and 1960s.

Also present in the foreground setting are the property work areas including the storage container, power line and generator west of the avenue, however, these are not seen from the driveway or avenue due to the dense pine belt planted by Sorensen.

Sorensen may have planned the few specimen trees in the paddock north of the ha-ha wall and on the far side of the dam in the line of the selected vista, and similarly the planted island in the dam. These are possibilities that have not been able to be established as part of his garden design or works. Sorensen design style shows characteristics of the English Romantic design style, including use of the 'borrowed landscape' and some orchestration of the setting beyond the inner garden.

The midground setting Visible and prominent in the rural setting outlooks from the avenue, the yards and open fields of *Mereworth* property, and beyond *Mereworth*, are:

- the elevated Hume Motorway;
- the Boral Cement tower - top part seen above the wooded ridge to the east;
- the road to Medway in the north midground;
- the elevated rail line to Medway - alongside Medway Road, in the north midground.

5.4 *Mereworth* Garden Design Analysis

5.4.1 The Garden Design Analysis

The *Mereworth* garden design can be analysed in two contexts:

1. *Mereworth's* relative design quality and intactness in relation to Sorensen's intent, and
2. The *Mereworth* garden's relative design quality in comparison to Sorensen's oeuvre of a similar type of garden - the rural homestead garden.

This chapter covers these analyses, having regard to considerations of the limitations with the lack of documentation of Sorensen's garden oeuvre and the restrictions to visiting all the extant rural, homestead gardens.

Analysis of the *Mereworth* garden in relation to Sorensen's other extant gardens is of benefit to increase understanding of its heritage significance. The areas of analysis include the:

- Management and condition (section 5.4.2);
- Garden intactness (sections 5.3 & 5.4.3);
- Garden type - rural, homestead garden (sections 4.6 & 5.4.4); and a
- Design appraisal and in context of Sorensen's homestead gardens. (section 5.4.5)

This analysis is not as comprehensive as it could be if the ideal situation existed in which all Sorensen's gardens were available to visit. The majority of extant gardens are not open to the public and so an up-to-date assessment of their condition, intactness and the relative design quality is unable to be undertaken. Aerial photography appraisals are not fully suitable, not only due to tree canopies obscuring garden spaces and components but this form of assessment does not convey the experiential qualities of the garden, nor fully the relationships between house, garden and the wider landscape setting. Nevertheless, the analysis achieved here is comprehensive following the feasible research and assessments.

5.4.2 Management and Condition

5.4.2.1 Garden Management

The *Mereworth* garden is under management of the property owner, Hume Coal Pty Ltd, and on-site management is undertaken by a skilled horticulturalist.

5.4.2.2 Condition of the Driveway, Avenue and Garden

The Entrance Driveway The historical driveway is no longer intact in its entirety. The remaining driveway with lines of pine trees is in very good condition.

The Avenue & Garden It is apparent on a visit to *Mereworth* that the drive avenue and garden proper have been maintained to a high standard by the owner. The garden, the drive avenue, and the driveway portion in use, are maintained by a skilled grounds maintenance contractor, horticulturalists and arborists.

Maintenance works include:

- Tree management, including arborist inspections and implementation of recommended monitoring and care;
- Lawn mowing and care;
- Horticultural care including light pruning as required.

The present good condition of the garden, including the trees, can only have been reached through consistent management, maintenance, and the necessary expenditure this has entailed over the years of Hume Coal Pty Ltd ownership. It appears this generally unseen conservation of the heritage place over many years has been driven by an understanding of the garden's significance in the Wingecarribee Shire, its aesthetic and historic values, and a care about those values. It is highly reasonable to expect this conservation, including repairs, replacements, and restorations as the need arises, will continue into the future.

Condition Summary:
The *Mereworth* garden is in good condition and under informed management which should ensure its good condition into the future.

5.4.3 The Garden Intactness - a photographic comparative assessment

Assessment of the changes of a garden through time, or the degree of intactness, is a highly useful assessment for an understanding of how much of the garden as designed is present today.

No plans or photographic record of the *Mereworth* garden in the 24 years from its establishment by the Oxleys and Sorensen from 1966 to Richard Ratcliffe's visit ca 1990 have been found.

Ratcliffe's photos provide a good basis for comparison to the current garden appearance in order to understand the Sorensen garden design. The following pages have the photos of *Mereworth* included by Ratcliffe in *Australia's Master Gardener* in 1990, and each is presented in comparison to a contemporary photo taken in approximately the same location, and with some notes of the garden features and intactness.

It appears from Ratcliffe's photos that he visited in spring or early summer. The author's photos were taken in October and likely at a different time of day.



"The a*venue of elms and flowering cherries."* (a morning photo) source: Ratcliffe, 1990. p. 100.



2019 The elm and flowering cherry avenue. (an afternoon photo) Photo: C Brouwer 2019

This is the view on departing *Mereworth*. The *Cupressus torulosa* windbreak along the west still forms a continuous and virtually 'solid' visual screen even though the lower branches have thinned. The golden elms along both sides of the avenue and the flowering cherries in the mown grass, level 'field' of the avenue remain today, and form a beautiful display in spring.

No record has been found of changes the owners after the Oxleys may have made to the garden, so one cannot state definitively that the spaces and planting Ratcliffe photographed during his visit were as designed by Sorensen. However, it appears highly likely that between 1966 and 1990 the Sorensen garden was conserved, as Ratcliffe writes, "*Mereworth has been fortunate in that Peter Holmes, the man responsible for the garden upkeep, was in fact employed by Paul Sorensen on the building of the garden. This continued link has ensured that the integrity of the design has been in the main unimpaired*." (p. 104.)
Now, in 2019 -2020, the garden structure, the character of the garden rooms and the view to the rural setting appear to be highly characteristic of Sorensen's work and likely not considerably altered.



The courtyard of *Mereworth*. Photo source: Ratcliffe, 1990. p. 100.



2019 The courtyard -eastern part. Photo: C Brouwer 2019

The courtyard's trees, large rocks, stone flagged paths and low, carpeting planting remain intact.

"*Upon rounding the hedge the visitor obtains his first view of the elegant house and is admitted to a large courtyard carpeted with ground covers and furnished with weeping birch and cherry trees. The ground cover plants include deep purple violets, white flag irises and iberis, white daffodils, Ajuga reptans and a deep blue double-flowered Vinca minor so that in spring the appearance is a spectacular mosaic of white, blue and purples.*" (Ratcliffe pp 97 -98)



"*The courtyard.*" source: Ratcliffe, 1990. p. 101.



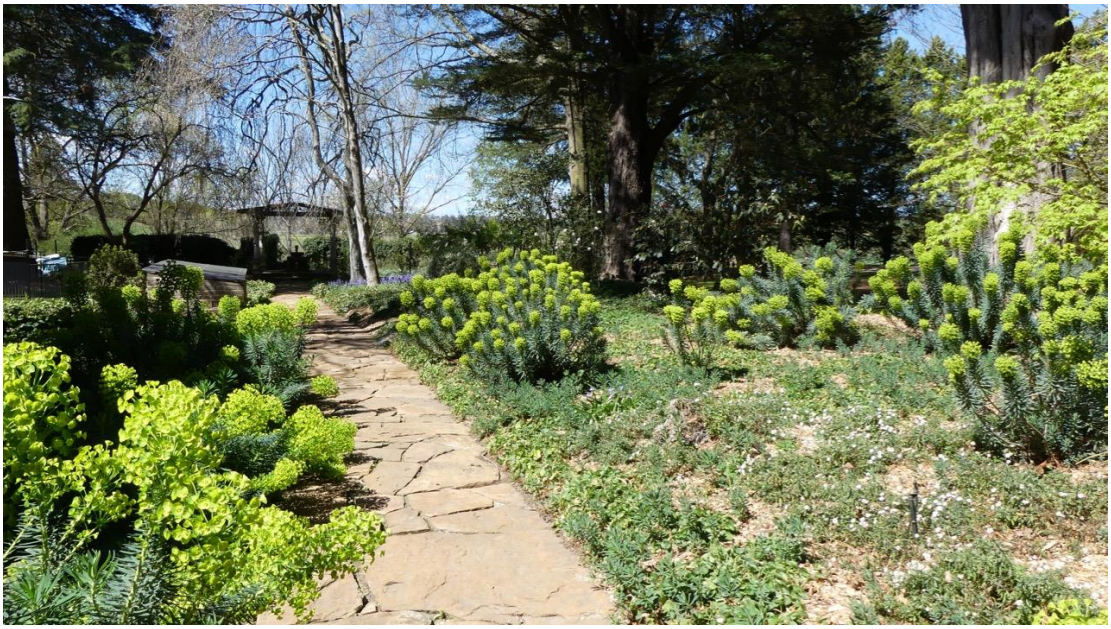
2019 The courtyard -eastern part. Photo: C Brouwer 2019

This photo is of the eastern side of the courtyard taken from the opposite angle to the previous Ratcliffe photo. The front door can be seen in this view. The courtyard extends across the driveway seen in this photo. The garden's form and character can be seen to be substantially intact. The constructed elements of large rocks, stone flagged paths, small pond, and the planting of trees and low carpeting plants are substantially intact.

"At the southern end of the house a stone-flagged pathway gently curving between rows of weeping white cherries underplanted with masses of hellebore leads to a formal rose garden and wisteria-covered gazebo containing a small fountain. This is backed by tall hedges of climbing rose and Chinese star jasmine (Trachelospermum jasminoides) supported on a curving wire fence and giving excellent enclosure." (Ratcliffe pp 97-98)



"The c*herry walk to the rose garden and gazebo."* source: Ratcliffe, 1990. p. 101.



2019 The cherry walk. photo: C Brouwer 2019

Sorensen's stone flagged path, fountain and pergola remain intact. At the gazebo the enclosing hedge planting and vine covered trellis / fence are present though not as densely planted as evidently intended by Sorensen as seen in Ratcliffe's photo. There are a few pine trees now gone from the south side (RHS of photo) so the area appears not as enclosed as previously.



"The c*edar (since removed) on the island in the swimming pool."* source: Ratcliffe, 1990. p. 103.



2019 The pool with island today. photo: C Brouwer 2019

The pool 'garden room' is generally intact in its form and extent, and is visually screened from the north lawn and any outlook to the rural setting by a dense hedge. The mixed evergreen windbreak and visual screen around the lawn can be seen beyond this part of the garden.
(The pool is empty of water in the 2019 photo due to maintenance and drought considerations.)

There may not have been a pool fence in Sorensen's design, however, the formation of a separate 'garden room' within the overall garden was characteristic of Sorensen, and often by the use of hedges, as here. The separation of this eastern side of the house from the 'front' /north lawn by a high, clipped hedge is paired on the west by the clipped *Camellia sasanqua* hedge well-established ca. 1990 when Ratcliffe visited.



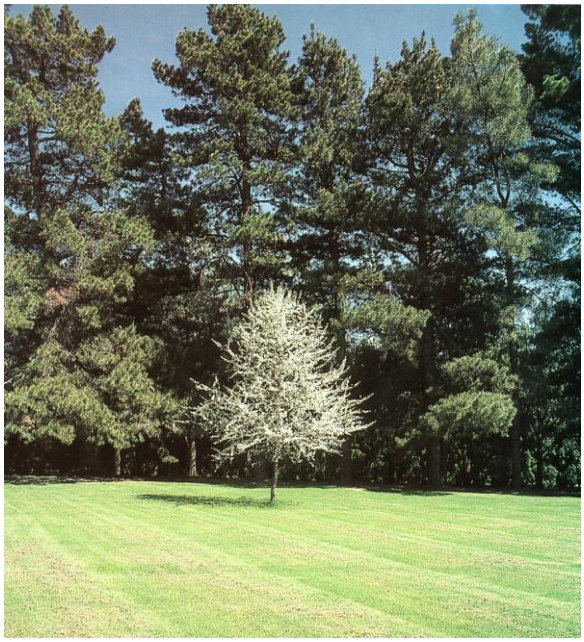
"The house viewed *from the ha-ha."* source: Ratcliffe, 1990. p. 103.



2019 The view to the house from the north lawn between the flowering cherries several metres in from the ha-ha wall photo: C Brouwer 2019

The pear tree on the terrace, the wisteria over the pergola, the camellia hedges separating the garden areas east and west of the house from the northern garden, the northern lawn, and the small grove of flowering cherries at its northern edge, are all still present.

The mixed evergreens forming windbreaks, visual screens and forming a near full enclosure of the garden remain with just a few trees no longer present.



"The white flowered a*lmond (since removed) against the backdrop of pines."*
Photo source: Ratcliffe, 1990. p. 102.



2019 Lawn to backdrop of pines. A 'witches hat' marks the former almond tree location.
photo: C Brouwer 2019

The windbreak and visual screen Sorensen designed is still present though the trees have become more open through their canopies, no doubt due to age and the climatic conditions. There are several rows of trees forming this intended visual screen to the west and north west from the northern lawn. The several rows of *Pinus radiata* in the foreground are apparently the earlier planting which Sorensen retained. He added the close planting of tall *Cupressus torulosa* around the west of these trees to form a dense screen, the same as along the west side of the drive approach avenue.

> *"From the semi-circular terrace the view, restricted between the radiata pine windbreak, which returns partially across the northern edge of the lawn . . ."* (Ratcliffe, 1990. p. 98)



"The v*iew from the house over the ha-ha to the farmland."* source: Ratcliffe, 1990. p. 103.



2019 The view north over the lawn and the ha-ha. photo: C Brouwer 2019

This outlook from the north lawn is the only designed house and garden outlook to the *Mereworth* paddocks and to a small extent to the distant hills. In winter, and partly in spring, the deciduous trees along the ha-ha wall allow a less screened view beyond the house lawn. Once the weeping elms are in full leaf the view to the dam is only available if one walks close to the ha-ha wall and looks from there. (Ratcliffe's photo is angled further north so the island is not showing) The single line of pinnate birch trees that were growing on the terrace between the two ha-ha walls, as seen in Ratcliffe's c. 1990 late winter /spring photo above, were removed ca 2016-19 due to the earlier death of some and the very poor condition of the remainder.[1] With those trees restored around the ha-ha across this view to the rural setting, the view would be more semi-screened and limited in its scope. This highly orchestrated narrow outlook between the screening evergreens is a characteristic feature of Sorensen's design.

This garden room with the evergreens, and the flowering cherry trees in the lawn, which together restrict the view north to the rural setting is generally intact. The rural setting as seen in this outlook is also substantially intact from Sorensen's time there.

[1] Replacement of these trees was recommended in Appendix A of the 2016 Arboricultural Hazard Assessment report (Hawthorne 2016): Trees No 14 - 11 *Betula sp.* Comments / Recommendations: "*11 Birch trees, the majority in advanced decline. Dead trees and dead leaders. Consider replacement planting. Remove dead trees and prune dead leaders within 2 years (low target rating).*" (p. 2) This would be considered for a policy of a *Mereworth* CMP.

Substantial Changes to the *Mereworth* Garden

The substantial change to the Sorensen designed driveway, which in Sorensen's rural and large garden designs is a very important part of the design and a signature element of his oeuvre, has substantially diminished the design intactness.

> "*Through this change all the artistry of the original approach concept has been lost and the arrival experience degraded."* Ratcliffe p.104

Other changes which involved a loss of the Sorensen design features include:

- the loss of the lions at the entry;
- the death and removal of trees including major contributing trees: the evergreens in the NE lawn edge, the flowering cherry accent tree in the north west lawn, the birch trees along the ha-ha; the tree in the pool island; and camellias
- the rose garden and its surrounds are compromised as most of the roses have died, possibly due to shading and root zone competition with the pines nearby.;
- the courtyard pond is no longer in use / good condition;

If the driveway had remained unaltered, and fewer changes of the garden, *Mereworth* would have had a higher degree of intactness.

Garden intactness summary:
The *Mereworth* cherry and elm avenue and internal driveway, but excluding the entry driveway designed by Sorensen, hold a high degree of intactness.
The *Mereworth* garden has had a noticeable amount of losses and modest changes and appears to hold a moderate to high degree of intactness.

5.4.4 The Sorensen Rural Homestead Garden at *Mereworth*

Sorensen's homestead / rural villa gardens were generally outlined for comparative analysis in Part One section 4.6 page 33. *Mereworth* is a rural homestead / rural villa garden.

Some typical features of Sorensen's work at homestead gardens include the following.

- A new, realigned, long driveway through the property laid out to reveal selected views and hide other outlooks sequentially according to the terrain, and landscape character.
- The drive near the house often makes a sweeping circular approach to the house front door.
- The end of the drive through the property, at the house garden area, is marked by large rocks (with lions atop)
- Enclosure and visual separation of many parts of the garden from the surrounding property.
- Garden 'rooms' are formed and visually separated from the setting and each other, and the movement between is orchestrated.
- Windbreaks and hedge screens are planted to manage the outlooks and form the garden 'rooms'.
- A terrace, usually lawn, from the house north is formed by levelling and retaining walls, for example, at *Mereworth* formed with a ha-ha wall.
- An outlook from the north lawn terrace to the rural property landscape, is focused / framed by trees.
- The swimming pool, in a 'garden room' is visually separate to the other parts of the garden.
- Pergolas are used to separate areas, or next to the house, and covered with wisteria or a climbing rose.
- An enclosed or semi-enclosed courtyard with a small pond / water in the garden.
- Paths are stone flagged, where stone can be sourced from within the property or nearby, or made with fine gravel to be unobtrusive.

All these characteristics of Sorensen's garden design style, in particular for the larger and homestead gardens, are at *Mereworth*. There are no stone walls. The garden's location on a generally level rise on the property, and the absence of a good stone source no doubt led to Sorensen forming the ha-ha walls of brick. The path to the fountain is a stone flagged path but that stone is not utilised elsewhere.

***Mereworth* in Sorensen's Homestead Gardens Context -summary**:
The *Mereworth* garden is a relatively small and simple design with fewer 'garden rooms', minor relationship to the landscape setting and minor incorporation of potential views in relation to Sorensen's other homestead gardens.
The tree planting contributes to the garden's texture, contrasts and character, however there is not the richness in the plants palette, and thus the design character, as in most other Sorensen homestead gardens.
There are two of Sorensen's other rural gardens listed on the NSW heritage register, *Fernhill* and *Mahratta* (as well as *Everglades* which was a semi-rural /non-urban garden when established), however, *Mereworth* is not listed. Other Sorensen designed homestead gardens that appear to have potential for state listing include Barakee made 5 years after Mereworth, Forest Park, Goollooinboin and Ulinda, his homestead gardens made in the 1970s. *Mereworth* is assessed to not be amongst Sorensen's highest calibre homestead gardens based on the information available to this author.

5.4.5 The *Mereworth* Garden Design Appraisal

The straight avenue approach and the simplicity and modest scale of *Mereworth*'s garden area together form a cohesive, legible garden. The modest scaled garden relative to the size of the property and the potential garden area cannot clearly be explained except to speculate that the Oxleys desired only a small garden.

The near-full dark evergreen, screening enclosure around the modest garden space around the house appears at times visually heavy, even oppressive. There is only the relief inwards in the intimate courtyard or to the open sky from the north lawn space. That space also has a limited outlook to the setting especially in summer when the deciduous elms are in full leaf. The heavy enclosure may have been driven by Sorensen's clients, the Oxleys, for the house itself is essentially a house with only modest outward looking designed rooms. Nevertheless, the tree belts provide welcome shelter on cold, windy days. The garden was not designed for wide views to the rural setting. It is clearly a garden designed to avoid outlooks except for a selected, narrow and filtered outlook to the north.

The design appraisal is summarised here:

- *Mereworth* is a small rural homestead or villa garden and appears to be one of the smallest and simplest of the gardens of Sorensen's rural homestead type.
- The garden, separate to the drive and approach avenue, comprises predominantly just five 'garden rooms': - the south entry area; - the courtyard; - the cherry tree walk to the gazebo, fountain and rose garden; - the swimming pool; and - the north and north west lawn.
- The garden is nearly fully enclosed and visually separated or screened from its rural property. This is a modest scaled garden purposefully closed off from its rural setting of the surrounding grazing paddocks, apparently not only because of the strong winds often to be experienced there, whether cold or hot and dusty, but as a clear design expression.
- The outlook from the north lawn over the ha-ha, which is a narrow view window, is the single garden outlook. The views from the upstairs balcony, and the terrace below outside the living and dining rooms, are essentially that same aspect direction and the same view. This view is to the dam with island in the paddock where there are a few specimen trees. This aspect of near full enclosure by dense, high evergreen windbreaks and visual screens is the fully intended, primary character of Sorensen's design.
- The driveway as designed by Sorensen from the Hume Highway to the house entry is the more outstanding feature of the garden design, as outlined by Ratcliffe, and this has been drastically altered and substantially lost in its use, fabric and character.
- The tree planting shows skilfully selected combinations though there is little demonstration of Sorensen's full skills in both planting design, mix of species, and integration with the natural landscape or rural surrounds.

It has not been recorded (as far as can be ascertained to date) that Sorensen considered his design for *Mereworth* of a particular high calibre within the body of his work. What has been recorded are his views favouring other gardens including other rural gardens, *Forest Park*, *Goollooinboin*, and *Mahratta* (section 4.5.2).

Garden design experts writing both in the mid to late 20th and the 21st centuries have generally not selected *Mereworth* for its design calibre from the body of Sorensen's work, either for entry in such comprehensive publications as *The Oxford Companion to Gardens*, or in discourses on garden styles, and influences throughout that long period.

Ratcliffe did write: "*Among all of Sorensen's gardens, the landscape he contrived at Mereworth . . . must rank among his best and could be considered to be among the great cultural landscapes of Australia."* (Ratcliffe 1990 p 96) He then describes over several paragraphs the driveway from the Hume Highway which Sorensen designed and the features of that design which he noticed and apparently admired.

> *"Immediately through the gates the drive turned sharply to the left, heading southwards parallel with the highway and slowly ascending to just below the brow of a ridge before again sharply turning, this time to the right. As the top of the ridge was reached a new windbreak - Sorensen chose deodars (Cedrus deodara)- shielded any view to the south until a gap deliberately left in the planting allowed panoramic views of magnificent rural scenery in the next valley before it was again screened by the cedars in the windbreak.*
> *The driveway then again turned right between a double avenue, the inner rows of trees being golden elms (Ulmus procera 'Vanhoutteri') with the outer rows of double white flowering cherries (Prunus serrulata 'Shirofugen'). On the western or left-hand side the cherries are in turn backed with a very tall Cupressus torulosa hedge. At the end of the avenue the driveway tends left to a small parking area for visitors before continuing to loop through a porte-cochere and past the garages before rejoining the drive at the end of the avenue."* *(Ratcliffe 1990 p 96)*

The experience along the Sorensen designed, long, wide curving driveway through the pastoral landscape from the Hume Highway to the garden has been removed and that high calibre design fully lost.

***Mereworth* Design Quality Summary**:
The *Mereworth* garden and remnant portion of the original driveway is an accomplished design in which some of Sorensen's typical and often used garden design characteristics and features can be seen.
The tree planting design contributes the strongest structure and character to the garden, however there is not the richness in the plants palette, and thus the diversity and contrast in the design character, as in many other Sorensen gardens.
The land formation, in particular the north lawn terrace formed by the ha ha walls, is the other design component which brings Sorensen's typical orchestration of the relationship of the house to an expansive lawn and then to a focused view to the rural setting.

5.5 *Mereworth* Garden's Rural Setting

5.5.1 Condition of the Garden's Rural Setting

The *Mereworth* property is professionally managed as a rural property operation including cattle grazing, pasture management, fence and yards repairs, and so on. The appearance of this rural setting around the house and garden is of an attractive fairly typical rural landscape of the locality, according to the season and rainfall. In October 2019 the pastures appeared healthy (having regard to the particular agricultural practices in place), the open woodland covered areas appeared as semi-naturalistic, occasionally grazed paddocks typical of the district. There were no noticeable weed invasions, including no hawthorn wild strike over the fields as is not uncommon in the Oldbury Creek catchment.

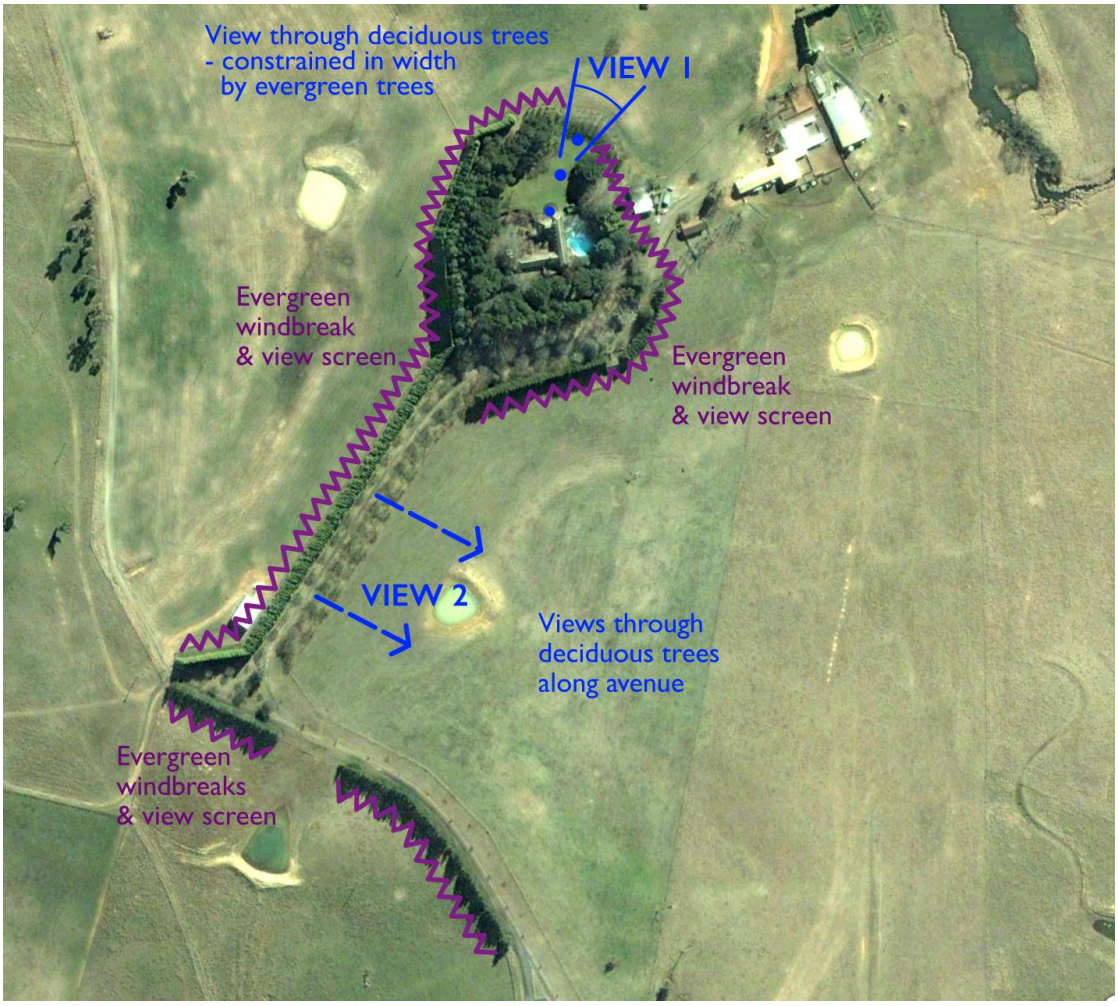
Condition Summary:
The *Mereworth* garden rural setting is in good condition and under informed management which should ensure its good condition into the future.

5.5.2 The Views to the Rural Setting

A consistent and highly characteristic of Sorensen's garden designs, and therefore important to understand, was his planned orchestration of the views from the garden to its setting and the shaping of the garden and each selected view corridor, and the detailed planting design, in particular the use of dense, screening tree belts to focus and feature his selected viewpoints and views.

The LEP entry for *Mereworth* House and Garden notes the outlook to the rural landscape: "On the northern side of the house a raised terrace gives views across the lawn to grazing land and a large dam, lawn and grazing land being separated by a double stepped retaining wall, along the top of which runs a double row of elms." In addition, Sorensen's contribution through the design of the original driveway off the Old Hume Highway, and the view after the visitor had left the highway to the garden's trees, was a valued aspect of the garden though it is now no longer present. These views and the relationships between *Mereworth* and its rural surrounds are addressed in the following sections to assist in understanding these aspects of the place.

There appears to be no historical, ground level photographic record available of the views from the garden when Sorensen formed the *Mereworth* garden in the mid 1960s, nor through the next twenty years until ca 1990 and Richard Ratcliffe's visit.



The Sorensen designed views to the rural setting from the garden and avenue - View 1 and View 2.
aerial photo source: Google Earth, 2006 aerial.

The outlook to the east and south east from the avenue is a continuous view available all along the avenue approach to the house garden until one reaches the dense, evergreen tree grove of the southern garden area. In the figure above this view is indicated just by the two arrows.

The part of the original driveway remaining after the change that arose with the new entry from the new Mereworth Road following the Hume Highway bypass and Hume Motorway construction is seen in the lower part of the aerial image above. The former driveway outlooks are addressed in section 5.5.2.

View 1 - View from Sorensen's garden out to the north, north-east

In the Heritage Council (NSW) letter of August 2018 to the Department Planning & Environment, they advise that a plan of *Mereworth* and the Hume Coal Project area be prepared which "*should also clearly indicate the location of the open vistas from Sorensen garden to the rural landscape.*" (This is the same view as in the earlier Heritage Council (NSW) 2017 letter: "*View from Sorensen's garden out to the north and east.*") View 1 indicates that view.

(The plan of Mereworth and the Hume Coal Project has been prepared as part of the Supplementary VIA report EMM2020a)

There are no 'open vistas' from the house and garden to the rural setting. The north views from the "*Sorensen garden to the rural landscape*" which can readily be assessed as planned or anticipated by Sorensen in his design are:

- from the upstairs balcony;
- from the ground level north facing rooms and, similarly, the patio outside those rooms;
- from the north lawn central parts between the house and the ha-ha.

These outlooks generally are all in the same direction and encompass the same viewshed with variations only from the viewpoint elevation, and the location on the patio or the lawn. The only view out from the enclosed garden and lawn is towards the dam with the island.



View 1 The view north over the lawn and the ha-ha. photo: C Brouwer 2019

Key points of the patio and lawn views:

- This view is recognisable today to the view when Ratcliffe visited and photographed it in 1990, except for the row of birch trees (*Betula* sp.) removed ca. 2017. (Refer section 5.4.3 for Ratcliffe's photo)
- This is essentially the only view from the garden (excluding the avenue and driveway) to the rural setting as apparently designed by Sorensen.

"From the semi-circular terrace the view, restricted between the radiata pine windbreak, which returns partially across the northern edge of the lawn, and a grove of conifers to the right, centres on a large lake formed by a farm dam. The view, again reminiscent of the English landscape school, is further enhanced through its interruption by the almost Gothic framework of evenly spaced weeping elms (Ulmus glabra 'Pendula') which extended across the opening between the conifers. There is no doubt that Sorensen intended that these trees be regularly pruned to keep the view open but this practice has not been continued with the result that the view is almost lost when the trees are in full leaf."

(Ratcliffe, 1990. p. 98)

Garden Outlook View Summary:

This viewpoint (central, north lawn viewpoints) can be regarded as of importance as it appears as the garden outlook to the rural setting designed by Sorensen, and the framework of tree planting which establishes the view corridor and semi-screened / filtered view is generally still in place.

View 2 - View from Sorensen's avenue to the east



The view east from the avenue to the rural setting. photo: C Brouwer 2019

Key aspects of this viewpoint /view route and views are listed here.

- The avenue, its west side, dense tree belt and the east side foreground of lines of trees in lawn up to the paddock fence appears essentially the same in structure and character as Sorensen intended in his design.
- This is essentially the view(s) to the rural setting of *Mereworth* paddocks, as would have been appreciated by Sorensen and achieved through his design.
- The Boral Cement Works tower is prominent above the trees in all the views east from the avenue and the driveway. The tower has been present in the view since Sorensen designed the garden, avenue and driveway.

Avenue View Summary:
This avenue / dynamic viewpoint and view are assessed as having moderate to high importance for appreciation of the *Mereworth* garden as it appears similar to the avenue outlook to the rural setting as designed by Sorensen, and the framework of tree planting which establishes the view foreground character and semi-screened / filtered view is generally still in place.

5.5.2 Analysis of the Views Designated by Ratcliffe

For his 1990 book "Australia's Master Gardener Paul Sorensen and His Gardens" Ratcliffe prepared a plan (section 5.1) showing the house and garden and the driveway from the Old Hume Highway. On this plan he indicated the two important views from the driveway which he assessed Sorensen had planned and formed in the driveway design and the tree planting. These viewpoints and view directions are indicated on the aerial image here.



2019 aerial with the locations of Ratcliffe's 1990 views as per his site plan in chapter 5.1.
aerial source: Google Earth, 2019.

The first view is that at the bend of the former driveway after the entry from the Old Hume Highway. Key points of this viewpoint and view:

- The view from the driveway near the Old Hume Highway is no longer available as this drive entry and driveway section no longer exist due to the new Hume Motorway.
- This was a key driveway viewpoint in Ratcliffe's assessment.
- This drive entry is no longer used and does not exist anymore. It is private property and access to the former drive location is not permitted.
- It is not possible to reconstruct the view from the Old Hume Highway at this former entry due to the new Hume Motorway.



This is a view from the Old Hume Highway verge at the former entry.



The view west towards *Mereworth* from on the former driveway. (This is private land.) The motorway planting now fully screens the view.



The view to the southwest and south with the Hume Motorway seen within the rural cultural landscape.
photo: C Brouwer 2019

The second Ratcliffe assessed key viewpoint and view to the south west remains available and that viewshed is broadly unaltered as a rural landscape, except for a part where there is the junction of the Hume Highway with the Hume Motorway, and for the view of the widened Highway corridor, which are a noticeable change or visual intrusion of the former historical landscape.

- This was a key driveway viewpoint as identified by Ratcliffe.
- This former driveway location is private property and access is not permitted to the general public.
- The new drive approach on Mereworth Road joins the former driveway about at this viewpoint so the role and sequential experience Sorensen designed are lost and the view south more fleeting for the visitor.

Driveway Views Summary:
The first driveway viewpoint, at the former Old Hume Highway entry, is assessed as having some modest importance to an understanding of the Sorensen design for the *Mereworth* garden and its rural setting. The significance has been substantially diminished as the relationship between this location and the Sorensen designed, sequential experience on the former driveway from the Old Hume Highway to *Mereworth* is lost. The location has some importance as identified as a part of that sequential appreciation. The viewpoint and view can only be interpreted as part of the now lost historical design.

The second driveway viewpoint and view of the rural setting, as designated by Ratcliffe, is assessed as holding a degree of heritage significance as it remains part of the visitors' driveway experience though it has lost the value as designed by Sorensen.

5.6 *Mereworth* in Context - a Comparative Analysis

5.6.1 Limitations

It should be noted that this is an assessment based primarily on desktop appraisals of Sorensen's other gardens, and visits to *Mereworth* and a few of Sorensen's other gardens, and is an assessment that could be revised following visits to all of Sorensen's extant works with documentation of all of them completed to provide a sound and fully accessible /open basis of for assessment. Nevertheless, the comparative analysis of this section, and the report as a whole, are a highly contributory part of a professional understanding of the relative importance of Sorensen in the field of NSW garden design and of his design at *Mereworth.*

5.6.2 The Scope of a Comparative Analysis of Sorensen's Gardens

A comprehensive, scholarly, comparative analysis of all of Sorensen's gardens requires research beyond that undertaken by Ratcliffe whose work is now 29 - 30 years ago and who did not visit all of Sorensen's existing gardens at that time. A comparative analysis is possible at a couple of levels. At a realistic yet still contributory level it would be based on a literature search and visits to open gardens. A much longer research study would include the above and include visits to all of Sorensen's gardens existing today. As the majority of the extant gardens are in private ownership and most of the present owners, now mostly different to Ratcliffe's recording of owners, are either unknown or, if known, are not readily contactable to request a visit, this latter study would likely require a year or so to undertake. The publicly accessible Sorensen designed gardens are only: the *Everglades* (National Trust ownership); Wollongong Conservation / Botanical Gardens - *Glennifer Brae*; and the Mt Kiera Scout Camp.

This study is a desk-top research and analysis of Sorensen's body of work, of the *Mereworth* garden, and a comparative analysis of *Mereworth* within that context.

5.6.3 Comparative Analysis of *Mereworth* in Relation to Sorensen's Gardens

A comparative analysis of the *Mereworth* garden and driveway within the body of Sorensen's garden works includes:

a) the design of *Mereworth* garden in comparison to Sorensen's other garden deigns. This encompasses the design itself and the relationships between house, and garden, the garden and its rural setting views, and includes the landscape character of the environs.
b) the comparison of the garden within a group of Sorensen's gardens of similar garden typology. For *Mereworth*, this is the rural homestead garden context.
c) the rarity and / or representativeness of the garden to the body of Sorensen's design work within a substantial period of his working life. For *Mereworth* this period is the 1960s, his “most productive period” according to Ratcliffe, when his work was predominantly in the Southern Highlands and Illawarra regions, and on inland NSW gardens.

Mereworth has been analysed and assessed, as:

- a highly attractive garden in good condition where some of Sorensen's design principles and features can be seen.
- having tree planting which contributes a strong structure and character to the garden, though there is not the richness in the plants palette and thus the design character as in many other Sorensen gardens.
- a relatively small and simple design with fewer 'garden rooms', minor relationship to the landscape setting and minor incorporation of potential views in relation to Sorensen's other homestead gardens.
- a garden which had a very high calibre design component by Sorensen in the driveway but which has lost the majority of the key features and viewpoints of that driveway.

***Mereworth* Garden Design in Sorensen's Gardens Context**

This comparative analysis indicates:

- The *Mereworth* garden around the house, and with the avenue, holds a good level of integrity or intactness.
- The important consideration in the comparative analysis of the *Mereworth* House and Garden as a whole heritage place is the loss of much of the driveway, a major component which contributed substantially to the calibre of Sorensen's overall design.
- In addition, the scope of the garden design, including the planting appears to not hold the greater degree of expression of skilful responses to site and setting challenges as addressed in other of his finest gardens.
- Appraisal by garden experts of Sorensen's work has not given widespread or high acclaim to the *Mereworth* garden.
- The *Mereworth* garden design as it exists now appears to lie in the mid to upper range of Sorensen's body of garden design work in its design calibre and intactness, based on the information available in this report.

***Mereworth* in Sorensen's Rural Homestead Gardens Context**

This comparative analysis is based on this report, and particular sections: section 4.6 which analysed the design characteristics of many of Sorensen's homestead gardens, section 5.4.4 which assessed the *Mereworth* avenue and garden in the homestead garden context, and 5.4.5 the design analysis and 5.5 the setting.

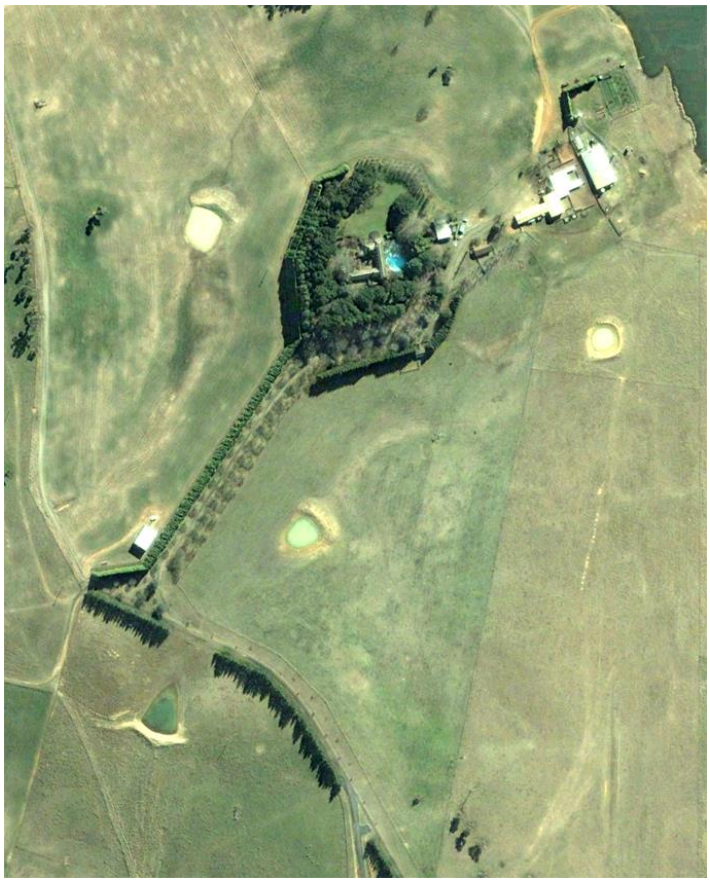
The comparative analysis indicates:

- The *Mereworth* garden is a relatively small and simple design, expressing fewer design responses to the house and the potential garden surround such as Sorensen's garden rooms', having less local responsiveness and richness in the trees and other planting design, and having just one focused view relationship from the gardens around the house to the rural landscape setting, in comparison to Sorensen's other homestead gardens.

part three

Mereworth

- Heritage Significance



6.0 The *Mereworth* Garden Heritage Significance

6.1 Introduction /Purpose

Parts One and Two of this report have encompassed research findings, assessments and analysis on Paul Sorensen's garden designs, and of the *Mereworth* garden. Sorensen's standing in the garden design field both through the long period of his life's work in the mid and later half of the 20th century and in contemporary times. *Mereworth* has been presented in some detail, a view analysis undertaken and analysis of *Mereworth* in relation to many of Sorensen's rural homestead gardens.

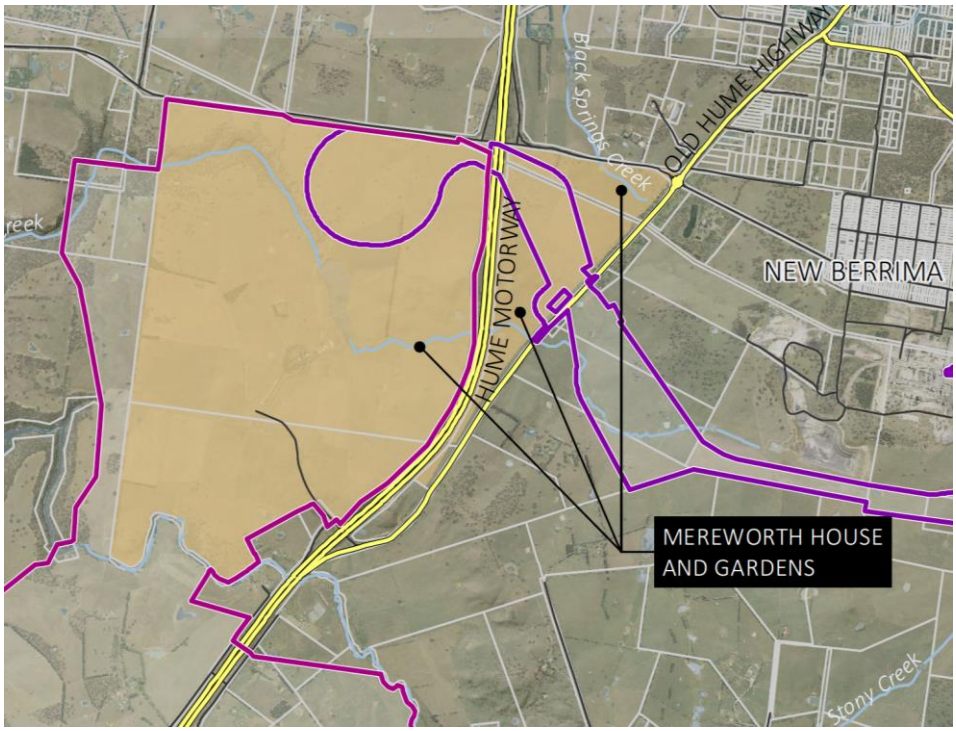
To meet the purpose of this report it addresses the NSW Heritage Council's 2017 letter which recommended that: *"• The EIS should firstly include a comparative analysis of Sorenson's design at Mereworth within his whole body of work for an up-to-date understanding of Mereworth's level of significance, ie state or local."* This chapter draws some conclusions on the comparative analysis of Sorensen's design at *Mereworth* and from this a discussion of heritage significance of *Mereworth*.

Limitations of this analysis It is to be noted that this is an assessment based primarily on desktop appraisals of Sorensen's gardens, a visit to *Mereworth* and a few of Sorensen's other gardens. The assessments herein could be revised following visits to <u>all</u> of Sorensen's extant works with documentation of all of them completed to provide a fully accessible and sound basis for a comprehensive comparative assessment. Nevertheless, the considerations of the heritage significance of *Mereworth* in this section, and the report as a whole, are contributory to an understanding of the relative importance of Sorensen in the field of NSW garden design and of *Mereworth.*

6.2 *Mereworth* and Heritage Significance

6.2.1 Local Heritage Significance

In 1991 *Mereworth House and Garden* were registered on the Wingecarribee Shire Local Environment Plan (LEP), listing number I351. The LEP entry does not mention the driveway. Over the period of the planning and construction of the new Hume Motorway section through the *Mereworth* property, built 1985 to 1989, the garden and driveway design quality and heritage significance appear to have not been recognised to the extent that the Hume Motorway route design would avoid the loss of the driveway.



The *Mereworth House and Garden* place is the brown shaded area. Extract of Figure 2.2 EMM, 2020c.

Wingecarribee Shire Council (WSC) LEP listed area The LEP listed place boundary covers the full extent of the *Mereworth* property, east to Old Hume Highway, and north to Medway Road. The heritage significance does not lie equally over the whole area. The garden holds the substantive heritage significance.

WSC LEP Statement of Significance The heritage significance of the garden is stated as follows:

> *"1965 house with important early nineteenth century historical connections. The garden is important for its connection with Paul Sorensen, the renowned cold-climate garden designer."*

WSC LEP significance criterion *Mereworth House and Garden* is assessed as having significance according to "Assessing Heritage Significance" (OEH 2015) Criteria b) [Associative significance]: *"The garden is important for its connection with Paul Sorensen, the renowned cold-climate garden designer."* NSW heritage register (online).

It is to be noted regarding the above WSC LEP entry that the 1965 house does not hold "early nineteenth century historical connections", nor did the Oxleys who engaged Paul Sorensen.

6.2.2 EIS and IPC Response Reports' Assessments

Mereworth House and Garden have been assessed in the Hume Coal Project EIS as follows:

> "*Mereworth house and garden is a group of items including a house built in 1965 and its associated garden. The significant elements include the house and the surrounding garden, which includes the avenue of trees and the original section of driveway. It has local historical and associative significance as a house designed by John Armoury and a garden designed by Paul Sorensen, a renowned cold climate garden designer. The house is also associated with the Oxley family, the first tea merchants (Bushells) in Australia. The lands on which the house and garden are situated are connected to the Atkinsons, a prominent settler family in the district. The garden is of local significance as a rare and representative example of cold climate garden design and vacation home construction from the twentieth century. It is able to provide research information on the history of garden design.*
> *It is an item of local heritage significance*." (EMM 2017 EIS Appendix T SoHI pp. 93-94)

Mereworth House and Garden were also assessed in the Hume Coal Project IPC Response report by EMM 2018, section 25.7, and in the Supplementary history and archaeological assessment report (EMM 2020c).

6.2.3 Considerations for Relative Heritage Significance

Assessment of the relative heritage significance of the *Mereworth* garden should be an assessment with regards to the criteria set out in "Assessing heritage significance" (OEH, 2015) and first at the local level of significance.

Assessment as to whether the garden meets the criteria at a state level requires consideration of whether the garden contributes to an understanding of historical 20th century garden design in NSW and has a design calibre and aesthetic quality at a state level, as well as how it meets the other criteria for heritage significance. In addition, it should be noted that a comprehensive assessment of a state level of heritage significance of the *Mereworth* garden would include a comparison to all other 20th Century gardens on the Heritage Register of similar typology. This report encompasses a desk-top analysis of Sorensen's body of garden design work plus understandings from recent visits to *Mereworth* and some of his other gardens. All the significant NSW 20th century gardens, in particular homestead gardens on the NSW heritage register, have not been able to be visited or assessed.

6.2.4 Assessment to the Local and State Heritage Criteria

The following assessment is of the *Mereworth* garden and not of the house itself. Assessment of the garden takes into account the relationships between the house and garden, however, the historical and architectural characteristics and qualities of the house are not assessed here.

The NSW heritage assessment criteria and the assessment process are presented in the document "Assessing heritage significance" (OEH, 2015). The assessment is based on this and the research and findings of this report.

Table 4 sets out an outline of matters related to the heritage assessment of the place according to the seven criteria for assessment. An assessment for each criterion is included.

table 4 Heritage Significance Assessment - *Mereworth* Garden

criterion & matters related to significance	*assessments*
Historical Significance **Local:** a) an item is important in the course, or pattern, of the cultural or natural history of the local area. **State**: a) an item is important in the course, or pattern, of NSW's cultural or natural history.	
• The *Mereworth* property is part of one of the early pastoral properties established by John Atkinson in the mid 1800s. (Atkinson's *'Three Legs of Man*' inn was on a now separated south eastern portion of the property, not at the location of the *Mereworth* house and its Sorensen garden.) • From 1912 to 1963 the current property was owned by William Cowley a grazier. The Cowleys owned the property for 100 years.	**Local:** The historical value of the *Mereworth* property plays some part of the local area historical narrative. **State**: The historical value of the *Mereworth* property is assessed as not holding a state level of heritage significance.
Associative Significance **Local:** b) an item has strong or special association with the life or works of a person, or group of persons, of importance in the cultural or natural history of the local area. **State:** 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.	
• There is an association of the place with John Atkinson, of the original land grant, however, the garden is not located where he had his first house or his inn (see in criterion a) above). • The LEP heritage entry for *Mereworth* recognises only the association with Paul Sorensen. Paul Sorensen, a nurseryman, garden designer and constructor, is recognised as a garden designer whose style shows characteristics of contemporary, early 20th Century garden design, with aspects of the English romantic style, and with Modernist tendencies. Four of his large, rural or semi-rural gardens are on the NSW state heritage register. The current *Mereworth* house was built in 1965. The garden was designed and established by Paul Sorensen in 1966. Sorensen was at a mid to late period in his long working life, had designed over 10 rural gardens previously, and designed 8 after he designed *Mereworth*. • The expert appraisals of 20th century garden design in NSW have not accorded to Sorensen a status in the quality of his work to support assessment of a state level of significance of his works not on the Heritage Register. Not all of Sorensen's gardens would meet the state level of heritage significance because the calibre of his work in evidence at the places varies, sometimes due to the lesser opportunities of the project. However, there appears to be evidence that other of Sorensen's rural, homestead gardens, other than *Mereworth*, have potential for state level listing.	**Local:** The LEP assessment according to this criterion is supported - in regard to the association with Paul Sorensen. **State**: The association of Paul Sorensen, the designer in 1966 of the *Mereworth* garden, with the *Mereworth House and garden place* is assessed as not contributing a state level of heritage significance.

table 4 continued

criterion & matters related to significance	*assessments*
Aesthetic Significance **Local:** c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area. **State:** c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW.	
• The garden is small and compact with a simple design in comparison to others of Sorensen's rural homestead gardens. • The design components of an accomplished design calibre in regard to aesthetics are: - the approach avenue; and, - the north lawn, with a dense tree enclosure and a narrow vista to the rural setting semi-screened by deciduous trees.	**Local:** The addition of this criterion to the LEP listing entry for the local area is indicated by the Sorensen garden design. **State**: The aesthetic qualities present in the *Mereworth* garden are assessed as not holding a state level of significance. Refer to the notes in criterion b) above.
Social Significance **Local:** d) an item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons. **State:** d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.	
• *Mereworth*, a private garden, was not established with anticipation of community visits, nor has that association arisen since. • The *Mereworth* garden has not been used as part of a series of an 'open garden scheme' or similar. • The Oxleys did not regularly open their garden for public fetes, fundraising or other charity events involving the local community.	**Local:** This criterion is considered not applicable at a local level of significance. **State**: This criterion is considered not applicable at a local level of significance.
Research Significance **Local: e)** an item has potential to yield information that will contribute to an understanding of the cultural or natural history of the local area. **State: e)** an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history.	
• The driveway, avenue and the garden proper may provide a researcher with information on the designs of gardens, particularly those by Paul Sorensen. • While there may be revealed information about the garden's soils originally developed by Sorensen, and about excavation undertaken by Sorensen in forming the north terrace, obtaining such information is not imperative for the garden conservation. • It is understood there is no documentary or fabric evidence on the garden design, or of Sorensen himself, present at *Mereworth*. • Archaeological evidence survives of the earlier homestead and is discussed in EMM, 2020c Table 5.3.	**Local:** The addition of this criterion to the WSC LEP listing entry is indicated at a local level of significance. **State**: This criterion is considered not applicable for the garden at a state level of significance.

table 4 continued

Rarity **Local:** f) an item possesses uncommon, rare or endangered aspects of the cultural or natural history of the local area. **State**: f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history.	
• *Mereworth* is not a rare or uncommon example of Sorensen's garden designs, in particular, of his rural homestead or rural villa gardens. The features and trees Sorensen used in the garden design and construction are very similar to his use of them in both earlier and later designs. • The *Mereworth* garden is not the only Sorensen designed garden in the Southern Highlands region.	**Local:** The assessment of the WSC LEP to not apply this criterion is supported. **State**: This criterion is considered not applicable for the garden at a state level of significance.
Representativeness **Local:** g) an item is important in demonstrating the principal characteristics of a class of the local area's: • cultural or natural places; or • cultural or natural environments. **State:** g) an item is important in demonstrating the principal characteristics of a class of NSW's: • cultural or natural places; or • cultural or natural environments.	
• The *Mereworth* garden is typical of Sorensen's rural homestead garden designs - with consideration that each garden was tailored to the landscape of the property and the setting and its potential viewscapes. However, *Mereworth* does not present the range of Sorensen's design characteristics, or of the more skilful ways he formed a garden around the house and a vital part of the garden's beauty for the owners' and visitors' enjoyment. • The integrity of the Sorensen design was considerably diminished when most of the driveway was removed and the Hume Motorway was located through the east part of the *Mereworth House and Garden* place - the *Mereworth* property. • Mereworth has not been assessed by the many garden design experts who have assessed gardens throughout the 20th and 21st centuries to be an outstanding or even exemplar example of a garden, or homestead garden, that is important in demonstrating the principal characteristics of NSW designed gardens. It has not been assessed as an important garden in the body of his work.	**Local:** The assessment of the WSC LEP to not apply this criterion is supported. **State**: The *Mereworth* garden is assessed as not demonstrating the principal characteristics of historic garden designs in NSW at a state level of heritage significance.

6.2.5 Conclusion

The *Mereworth* garden, the remaining portion of the former driveway used on the current approach, part of the yards, and the dam and the paddock between that and the ha-ha walls, in the foreground of the north outlook, hold heritage significance at a local level.

The comparative analysis, as undertaken through parts one and two of this report, has indicated that the *Mereworth* House and Garden, which now is not the whole place as designed by Sorensen, does not meet the heritage criteria for state level listing on the NSW Heritage Register.

Heritage Significance Assessment Consideration
The comparative analysis of the *Mereworth* garden in the context of Sorensen's body of garden design work indicates it has the typical Sorensen garden design features, but is not uncommon in a state context, and unlikely to be amongst his highest calibre, rural homestead garden designs.

Heritage Significance Assessment
Assessment of *Mereworth* in the context of Sorensen's body of garden design work confirms it is a place of local heritage significance and that additional criterion may be addressed in the register entry.
In addition, the assessment has indicated, that on the basis of this report it is not a place of state heritage significance. Garden design experts, from Sorensen's lifetime to current times undertaking widely based garden assessments did not assess *Mereworth* as holding a state level of heritage significance.

6.2.6 Commitment for Conservation of the Heritage Place

The Hume Coal Project has submitted the commitment to undertake a Conservation Management Plan (CMP) of the *Mereworth* property and the Sorensen designed garden as part of the Response to Submissions. A CMP follows guidelines in content and approach as set out by NSW Heritage and the Australia ICOMOS Burra Charter (2013) and Guidelines.

Another document which can be useful for heritage places over 50 years old, and therefore which would be appropriate for *Mereworth* in the next 10 to 20 years, is a Tree Replacement / Tree Succession Strategy.
This would ideally be undertaken either concurrently or after a CMP has been prepared in order that the trees of heritage significance and any missing trees have been identified to inform the scope of the strategy.

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Annexure D

Historical archaeological assessement













Historical archaeological assessment

Supplementary archaeological assessment prepared in response to the Independent Planning Assessment Report dated 27 May 2019

Prepared for Hume Coal Pty Ltd
April 2020









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Historical archaeological assessment

Supplementary archaeological assessment prepared in response to the Independent Planning Assessment Report dated 27 May 2019

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Client

Hume Coal Pty Ltd

Date

6 April 2020

Version

v2 Final

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Executive Summary

Hume Coal Pty Limited (Hume Coal) is seeking approval to develop and operate the Hume Coal Project (the Project), an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW). The Southern Coalfields coincide with the Southern Highlands region, which is rich in history and retains substantial evidence of the past in the form of adaptively re-used buildings, archaeological sites of significance, historical infrastructure such as bridges and rural landscapes.

This report is a response to the Independent Planning Commission (IPC) recommendation to provide additional information that was requested by the NSW Heritage Council. The scope of the historical archaeological assessment and statement of heritage impact is limited to responding to the *recommendations for appropriate archaeological assessment* as required by the Heritage Council of NSW's correspondence to the Department dated 17 August 2018.

The findings of the historical heritage assessment undertaken for the Hume Coal Project EIS, and the associated mitigation measures have not changed; this is a supplementary report which provides additional information as requested by the IPC assessment report. Where necessary, this study also addresses items presented in the IPC assessment report that the applicant feels are erroneous, unsubstantiated or are otherwise worthy of response.

EMM Consulting Pty Limited, has been engaged to provide the additional information requested.

Additional research and fieldwork have provided a clearer understanding of the significance of potential relics on *Mereworth* and on the *Three Legs of Man Inn* site as well as the piers of the Three Legs o' Man Bridge. In addition, primary sources were sought to locate now demolished structures across the Project area.

New relics in and around the Project area include:

- sandstone flagging (HCR1);
- a sandstone drain feature (HCR2);
- an artefact scatter (HCR3);
- dry-stone wall that may be associated with the *Kentish Arms/Three Legs of Man Inn/Mereworth House* and located outside the Project area (HCR4); and
- the piers of the 1860 rebuild of the Three Legs o' Man Bridge (HCR5), originally built in 1834, located outside the Project area.

Other areas of potential archaeological sensitivity include:

- the possible location of Atkinson's three employees' housing (PR1, PR2 and PR3), outside the surface infrastructure area; and
- the location of a structure on an 1863 plan of *Newbury*, which was demolished in 2018.

The assessment of significance was revised to include these additional items and updated research. Impacts to these items have also been assessed with subsidence data. Relics were not identified in areas of project impact.

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1 Introduction

1.1 Overview

Hume Coal Pty Limited (Hume Coal) proposes to construct and operate an underground coal mine and associated mine infrastructure in the Southern Coalfield of New South Wales (NSW) (the Hume Coal Project). The mine will produce metallurgical coal with a secondary thermal coal product. Around 50 million tonnes (Mt) of run-of-mine coal will be extracted from the Wongawilli Seam via a non-caving mining system, resulting in approximately 39 Mt of saleable coal over a project life of about 23 years, including construction and rehabilitation. The Project area is located to the south of Berrima and west of Moss Vale, in the Wingecarribee local government area (LGA).

Hume Coal is also seeking approval in a separate development application for the construction and operation of a new rail spur and loop, known as the Berrima Rail Project. Coal produced by the Hume Coal Project will be transported to port by rail for export or to domestic markets also by rail via this new rail spur and loop. The Hume Coal Project and the Berrima Rail Project together form 'the Project'.

A full description of the Hume Coal Project, including the location at a regional scale, the Project areas and the indicative mine and surface infrastructure plans, is provided in the EIS report (EMM 2017a).

Approval for the Project is being sought under Part 4 Division 4.1 (State significant development) of the NSW *Environmental Planning and Assessment Act* 1979 (EP&A Act) and has been under assessment from 2015 to present. A detailed description of the environmental assessment process to date provided in Hume Coal's response to the IPC assessment report (EMM 2020), to which this updated historical archaeological assessment is appended.

The Independent Planning Commission (IPC) released a report in relation to the Hume Coal Project and Berrima Rail Project (collectively, the Project) on 27 May 2019 titled *Independent Planning Assessment Report in relation to the Minister for Planning's request dated 4 December 2018 under Section 2.9(1)(d) of the Environmental Planning and Assessment Act 1979* (IPC 2019) and herein referred to as 'the IPC assessment report'.

1.2 Scope and purpose of this report

1.2.1 Purpose

The purpose of this historical archaeological assessment and statement of heritage impact report is to respond directly to relevant portions of the IPC assessment, findings and recommendations as described in Table 1.1. Specifically, it addresses parts of the IPC considerations, findings and recommendations for historic heritage that necessitated the completion of a revised historical archaeological assessment and statement of heritage impact.

The findings of the historical heritage assessment undertaken for the Hume Coal Project EIS (EMM 2017b) have not changed; this is a supplementary report which provides additional information as requested by the IPC assessment report. Where necessary, this study also addresses items presented in the IPC assessment report that the applicant feels are erroneous, unsubstantiated or are otherwise worthy of response.

This report has been prepared to respond to relevant portions of the IPC's considerations, findings and recommendations as summarised below.

1.2.2 Commission's finding and recommendations

The scope of this historical archaeological assessment is limited to responding to the *recommendations for appropriate archaeological assessment* as required by the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 (HCNSW 2018) and the preparation of a revised SoHI as required by R17 and R18 respectively. Table 1.1 identifies where these items are addressed and responded to within this report.

Table 1.1 Response to IPC recommendations

Reference number	IPC's recommendations	Location where addressed
R17	*The Applicant should address the recommendations of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 as referenced in paragraph 283.* Please note, not all of the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 is considered relevant to this historical archaeological assessment and statement of heritage impact study. The relevant recommendations from the Heritage Council of NSW's correspondence to the Department dated 17 August 2018 are described below.	
	• *The EIS should be supplemented with a detailed historical archaeological assessment prepared by a suitability [sic] qualified and experienced historical archaeologist. The assessment should be prepared in accordance with Heritage Council NSW guidelines including Archaeological Assessments 1996 and Assessing Significance for Historical Archaeological Sites and Relics 2009.*	This report is the response to the requirement
	• *This Assessment should address, in sufficient detail through historical investigation of primary records, the potential for other historical archaeological sites within the subject area and reassess the significance of the sites it identifies.*	Section 3, historical analysis
	• *The Assessment should clarify how archaeological sites of the 1820s associated with the Atkinson Family and other early settlers in NSW, would not be of potential state significance, rather than local*	A reassessment of significance has been prepared in Section 5.10
	• *The Assessment should also clearly outline what the impact would be to these sites, both within the study area subject to the coal mining works below and above ground and how mitigation of relics may or may not be required. This impact should be clearly explained so that conditions of consent can be reasonably imposed to manage such impacts to these significant archaeological deposits.*	Addressed in Section 6
	• *The detailed historical archaeological assessment should be provided to the Heritage Council for review prior to any determination of the application. Based on this supplementary assessment to address these elements in sufficient detail, the Heritage Council would be able to provide more specific advice for recommended conditions of approval to manage this resource.*	Noted
R18	The Statement of Heritage Impact Assessment should be updated in response to recommendations R16 and R17, and the visual impact of the Project on the significance of the above items and the cultural landscape in accordance with an updated visual impact assessment.	See section 6.10

1.3 Project area definitions

The project area is located in the Southern Highlands, a scenic area containing many established rural enterprises, and historic towns. It is evident that the historic character of the Southern Highlands remains an important aspect of the place to residents and visitors and is recognised as such by statutory authorities and non-government run organisations alike. Classification by the National Trust of Australia in the 1960s promoted the popularity of places like Berrima in the tourist market. History and heritage are two of the drawcards of the Southern Highlands as a holiday destination (Destination NSW). The township of Berrima contains a substantial number of heritage items; the Project will not impact heritage items in the township of Berrima.

The project area is approximately 100 km south-west of Sydney and 4.5 km west of Moss Vale town centre in the Wingecarribee LGA (refer to Figure 1.1 and Figure 1.2). The nearest area of surface disturbance associated with the surface infrastructure area, which will be 7.2 km north-west of the Moss Vale town centre. It is in the Southern Highlands region of NSW and the Sydney Basin Biogeographic Region. The indicative project layout is presented in Figure 1.3.

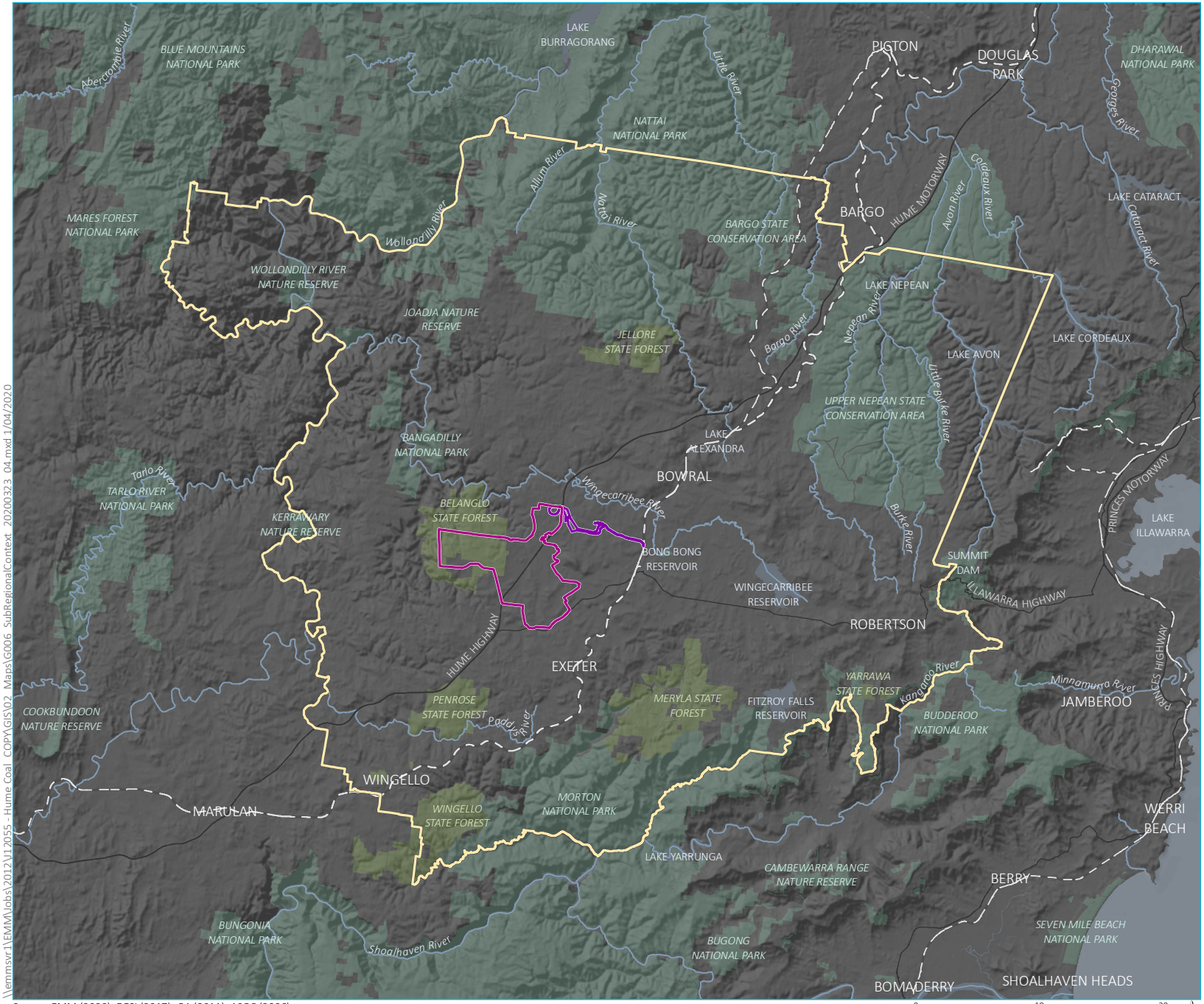
The project area is in a semi-rural setting, with the wider region characterised by grazing properties, small-scale farm businesses, natural areas, forestry, scattered rural residences and villages and towns. Most of the central and eastern parts of the Project area have very low rolling hills with occasional elevated ridge lines. Steep slopes and deep gorges occur in the west in Belanglo State Forest.

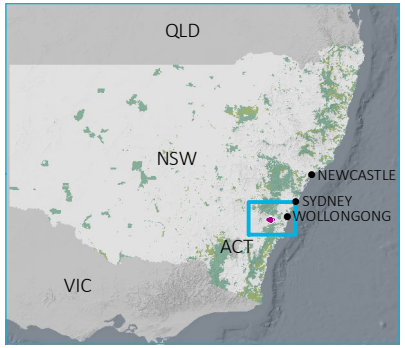
Industrial and manufacturing facilities adjacent to the Project area include the Moss Vale Enterprise Zone the Berrima Cement Works, Berrima Feed Mill and Omnia Limestone facility, serviced by the Berrima Rail branch line.

Existing built features across the Project area include scattered rural residences and farm improvements such as outbuildings, dams, access tracks, fences, yards and gardens, as well as infrastructure and utilities including roads, electricity lines, communications cables and water and gas pipelines. Key roads that traverse the Project area are the Hume Highway and Golden Vale Road. The Illawarra Highway borders the south-eastern section of the Project area.

Surface infrastructure is proposed to be developed on predominately cleared land owned by Hume Coal or affiliated entities, or for which there are appropriate access agreements in place with the landowner. Over half of the remainder of the Project area (principally land above the underground mining area) comprises cleared land that is, and will continue to be, used for livestock grazing and small-scale farm businesses. Belanglo State Forest covers the north-western portion of the Project area and contains introduced pine forest plantations, areas of native vegetation and several creeks that flow through deep sandstone gorges. Native vegetation within the Project area is largely restricted to parts of Belanglo State Forest and riparian corridors along some watercourses.

The project area is traversed by several drainage lines including Oldbury Creek, Medway Rivulet, Wells Creek, Wells Creek Tributary, Belanglo Creek and Longacre Creek, all of which ultimately discharge to the Wingecarribee River, at least 5 km downstream of the Project area. The Wingecarribee River's catchment forms part of the broader Warragamba Dam and Hawkesbury-Nepean catchments. Medway Dam is also adjacent to the northern portion of the Project area.





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Wingecarribee Shire local government area
- Rail line
- Motorways and primary roads
- River
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

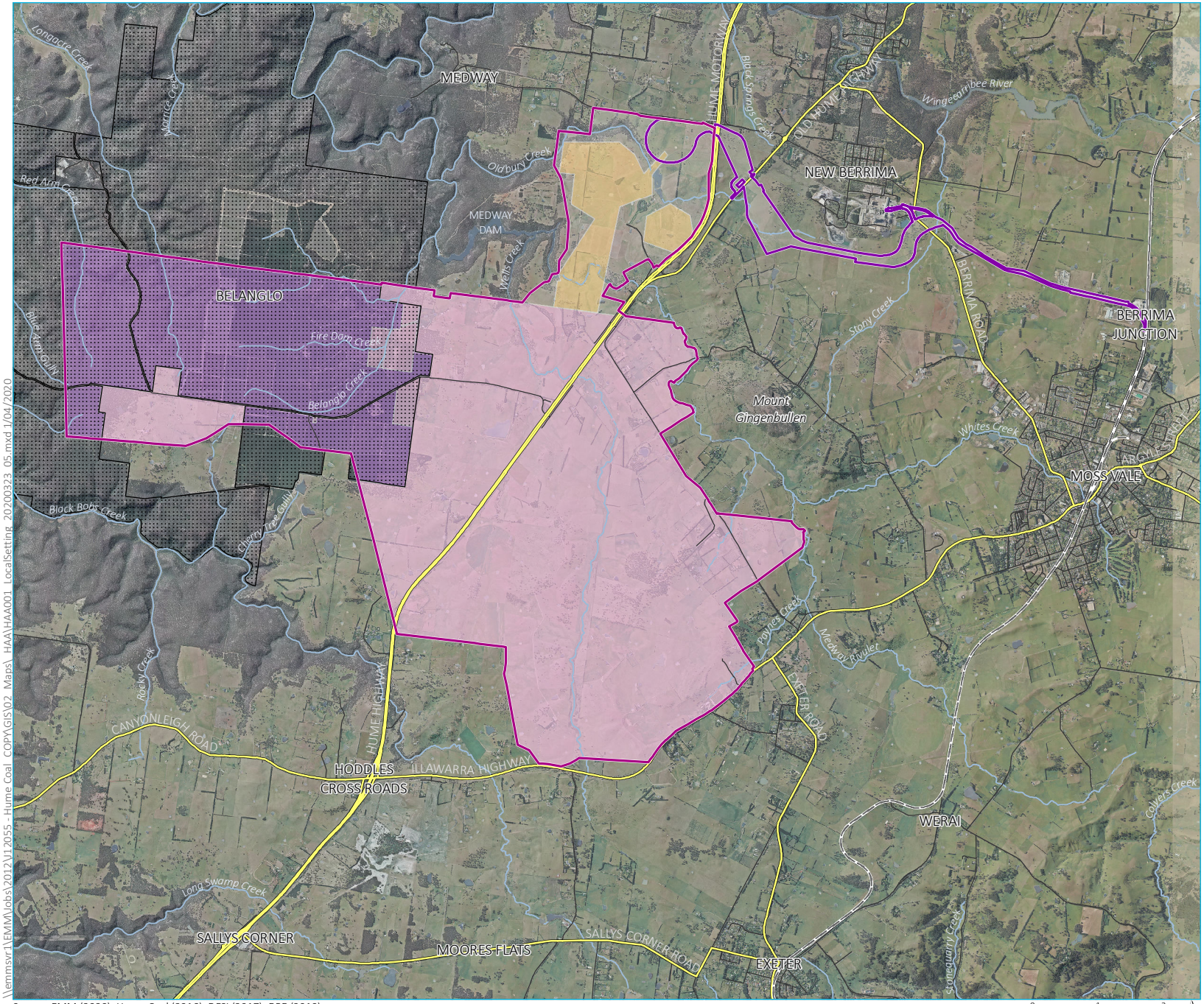
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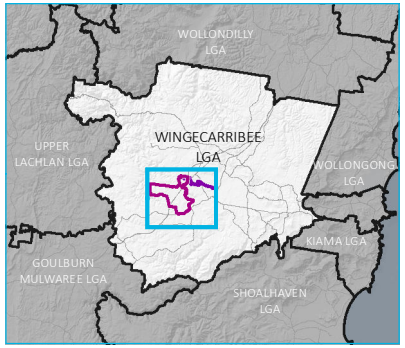
Regional setting

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 1.1

HUMECOAL PROJECT

EMM creating opportunities





KEY

- Hume Coal Project area (5,051 ha, 44,740 m perimeter)
- Berrima Rail Project area (181 ha, 23,201 m perimeter)

Mining lease application area

- MLA 527
- MLA 528
- MLA 529

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 56

N

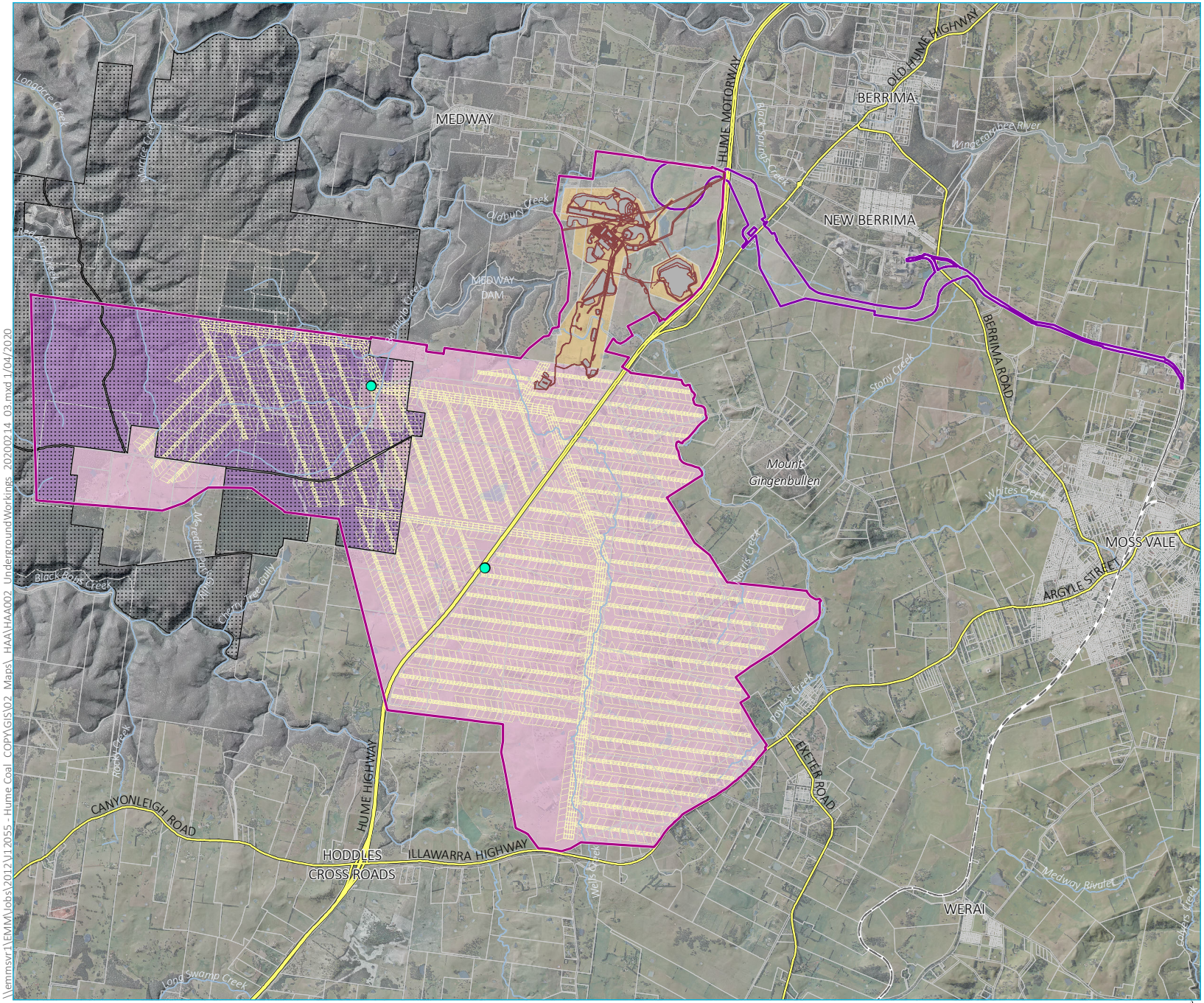
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Local setting

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 1.2

HUMECOAL PROJECT

EMM creating opportunities



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Downcast ventilation shaft (3 m diameter, not shown to scale)
- Indicative surface infrastructure footprint
- Underground mine workings (indicative)

Mining lease application area

- MLA 527
- MLA 528
- MLA 529

Existing environment

- Rail line
- Major road
- Named watercourse
- Waterbody
- Cadastral boundary
- Belanglo State Forest

Indicative project layout

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 1.3

HUMECOAL PROJECT

EMM creating opportunities

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1.4 Objectives and research methods

1.4.1 Objectives

In accordance with the SEARs and leading practice, the objectives of the historical archaeological assessment are:

- to investigate the potential for items of historic heritage value, including relics, to exist in the Project area;
- to assess the significance of historic heritage items in the study area;
- to assess the potential impacts of the Project on items of historic heritage in the study area;
- to address the comments provided by the IPC Table 1.1; and
- to formulate management measures for the protection of historic heritage items in the Project area.

1.4.2 Guidelines

This assessment was conducted using the principles of *The Australian International Council on Monuments and Sites, Charter for Places of Cultural Significance* (also known as the *Burra Charter*, Australian ICOMOS 2013) and the New South Wales (NSW) Heritage Manual (Heritage Office 1996 and 2006). Use of these documents satisfies the requirements of the SEARs.

The Burra Charter defines the concept of cultural significance as 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Burra Charter 2013, Article 1.2). It identifies that conservation of an item of cultural significance should be guided by the item's level of significance.

Heritage NSW, Department of Premier and Cabinet, (Heritage NSW) more recently the Heritage Division of the Office of Environment and Heritage, provides guidelines for the assessment of heritage significance and the listing of heritage items in local environmental plans (LEPs) or on the State Heritage Register, known as the *Heritage Manual* (Heritage Office 1996 and updates). The components of the *Heritage Manual* are informed by the values and definitions in the Burra Charter. OEH provides other leading practice guides which have informed this report including:

- *Statements of Heritage Impact Guidelines* (Heritage Office 2006);
- *Investigating Heritage Significance* (Heritage Office 2004);
- *Assessing Heritage* Significance (Heritage Office 2001);
- *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch Department of Planning 2009); and
- *Archaeological Assessments* (Heritage Office, Department of Urban Affairs and Planning 1996).

1.4.3 Identifying listed heritage items

Statutory and non-statutory registers were reviewed. Listing on statutory registers provides a legal basis under which the item or place is protected, and change is managed through conditioned approvals.

Non-statutory listing is an acknowledgment of a site's or place's importance to sections of the community. Listings on such registers do not place legal requirements on development but nevertheless influence the future of such listed items.

For the purpose of this assessment all registers were searched online as described below:

- Statutory:
  - The National Heritage List (NHL). The register is made under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
  - The Commonwealth Heritage List (CHL). The register is made under the EPBC Act.
  - The State Heritage Register (SHR). This register is made under Part 3A of the *Heritage Act 1977* (Heritage Act). Items on the SHR undergo a rigorous assessment process and must reach a high significance threshold to be included. Inclusion on the SHR is directed by the Minister of the agency that administers the Heritage Act.
  - The Heritage and Conservation Register (s170 register). This register is made under Section 170 of the Heritage Act and is also referred to as the Section 170 (s170) register. It is a register of heritage items that are owned or managed by state government authorities. Items on the s170 register may also be listed on other registers. Demolition, change to fabric, and change of ownership require notification to the Heritage Council of NSW.
  - Schedule 5 of the *Wingecarribee Local Environmental Plan 2010* (WLEP 2010). The EP&A Act sets the provisions for the making of LEPs. Most LEPs are prepared to a standard template, which includes environmental heritage in Schedule 5 (the heritage schedule). Where an item is included in the heritage schedule, development applications must include an assessment of impacts to the item. Where a project is being assessed as a state significance development application, approval by the relevant council is not required but the items require assessment and management if they are affected by a proposal.
  - The State Heritage Inventory (SHI), which was cross-checked with Schedule 5 of the WLEP and the s170 register. The SHI is not a single statutory register, but a central database, maintained by Heritage NSW, of listed statutory heritage items .
- Non-statutory:
  - National Trust of Australia, NSW (NT). The National Trust of Australia is made up of autonomous state chapters. Each chapter is a community-based and non-government organisation, with a mandate to conserve and promote Australia's natural and cultural heritage. Classification by the National Trust is a strong acknowledgment of heritage significance and while statutory constraints are not applicable, classification offers protection through visibility and community action.
  - Register of the National Estate (RNE). The RNE is an archived list of heritage items that were protected under the now repealed *Australian Heritage Commission Act 1975*, which was replaced by the EPBC Act. While many items were transferred from the RNE to the NHL or CHL, those that were not remain on the RNE as an indication of their heritage value.

1.4.4 Primary research

Primary research was also undertaken. It included investigating archives that may hold original material such as:

- newspaper articles (Trove);
- photographs (Trove and other online sources);
- land titles information (Land and Property Information – LPI);
- maps, plans, sketches (State Library NSW);
- diaries (National Trust of Australia – NSW);
- current aerial photography (LPI); and
- historic aerial photography (LPI).

1.4.5 Secondary research

Secondary research was conducted using published material such as books, journals and interpretive material, as well as unpublished sources such as university theses. The references section at the end of this report contains citations for all sources used.

1.4.6 Research facilities

The facilities used in research for this historic heritage assessment were as follows:

- Berrima District Historical & Family History Society Inc.;
- Land and Property Information (LPI);
- National Library of Australia Trove Online;
- National Trust of Australia – NSW;
- Sydney University Rate Books Collection;
- State Library (Mitchell Wing); and
- Wingecarribee Local Studies Library.

1.4.7 Local knowledge

In addition to the archival research that was conducted for this report, local knowledge from residents was also sought through face to face interviews undertaken in 2015/2016. The purpose of these interviews was to ascertain if unrecorded structures or potential relics were present on properties that residents knew of, or if long-term residents remembered the existence of now-demolished structures.

1.4.8 Field survey

Targeted field survey was undertaken in locations where access was permitted, namely the *Mereworth* property– including the house and gardens and the paddocks on which project infrastructure is proposed – and public land west of the Hume Motorway around the Medway Rivulet. Survey for historic period sites was also undertaken in conjunction with the Aboriginal heritage survey in 2017 (EMM 2017b). Additional field survey in October 2019 aimed to revaluate potential historical sites identified in the period from 2017 to the present. Other heritage items were viewed from the public domain, where possible.

1.5 Authorship

This report was prepared by Pamela Kottaras with extensive assistance and inputs by Amelia O'Donnell and Anthony Dakhoul. The figures were prepared by Peter Tolley (Senior GIS Analyst) and reviewed by Pamela Kottaras and Dylan Falconer.

1.6 Acknowledgements

EMM would like to thank the people and organisations that assisted with this report including:

- The Berrima District Historical & Family History Society Inc (Moss Vale branch);
- Hume Coal Pty Ltd:
  - Rod Doyle;
  - Ian Wiskin;
  - Robyn Johnson;
  - Grieg Duncan; and
  - Chris Kim.

1.7 Limitations of the study

Access was not gained to many of the properties in the study area. Where possible, the field team inspected the landscape from the public domain.

2 Statutory framework and heritage context

2.1 Heritage items

2.1.1 Listed heritage items

The project area is in a region that has a number of listed heritage items that have been assessed to be of either State or local significance, or both. Listed heritage items of local significance are located within the Project boundary; however, no items of state significance are within the Project boundary which was designed to avoid items on the SHR.

2.2 Statutory listings

2.2.1 Listed properties and sites

Eight properties that are listed on the WLEP are situated either wholly or partially within the Project area; none are listed on the SHR (Figure 2.1). Another 113 listed properties occur within the study area, that is, in the vicinity of the Project area.

2.3 Relics

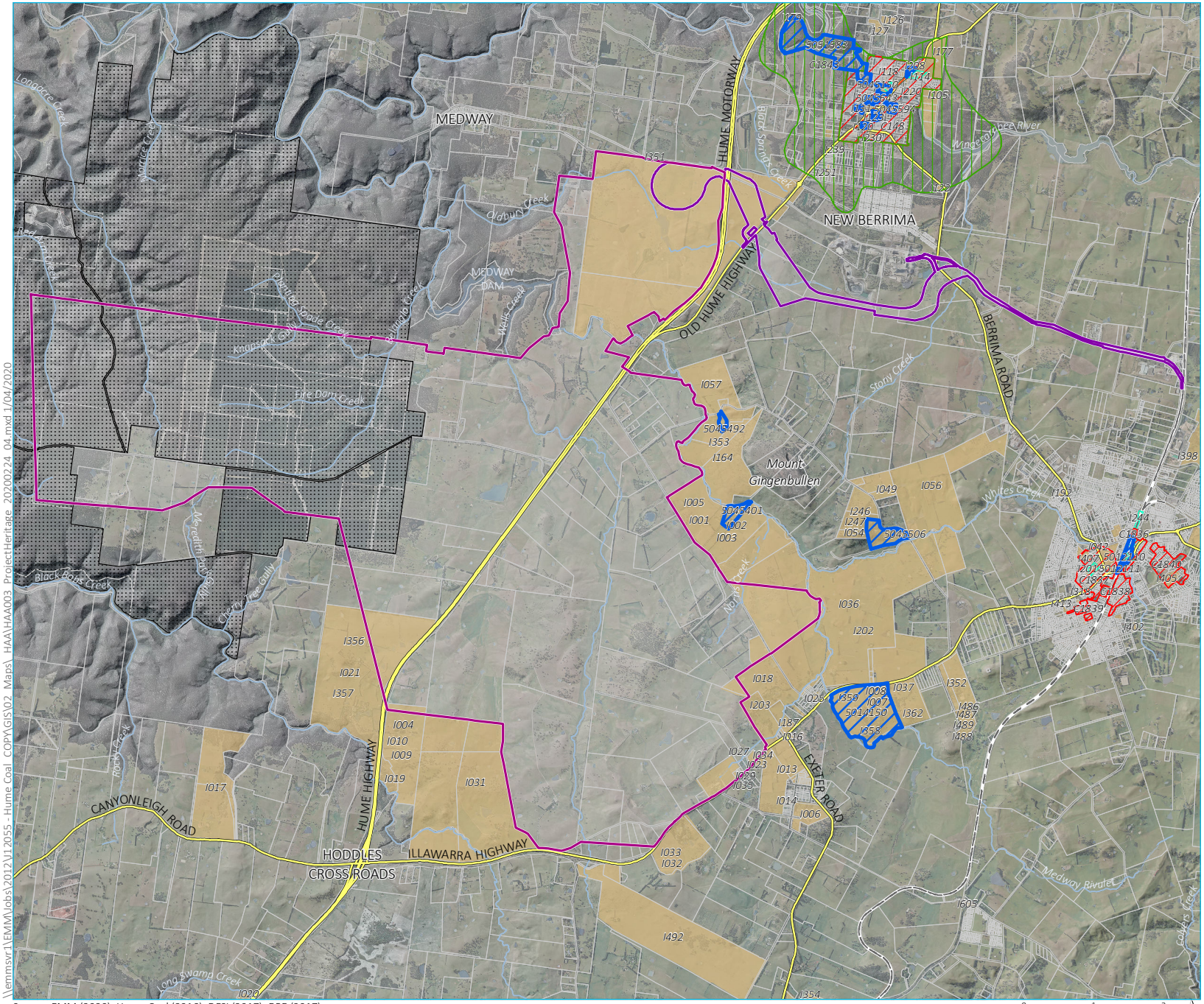
Archaeological sites are protected by Section 139 of the Heritage Act if they are assessed to be relics, that is, if they are archaeological resources of local or State significance. A formal listing is not required for protection, and disturbance can only occur with approval, either under the Heritage Act, or through the Minister's conditions of consent for Major Projects.

Archival research, local community consultation and field surveys were undertaken to identify potential archaeological sites across the Project area and determine their status as relics. Relics (HCR1, HCR2 and HCR3) from the Cowley phase (c.1912–1964) were recorded behind the large machinery shed, outside the development footprint. These relics are in the form of a sandstone floor, or flagging, and a two rows of parallel sandstone bricks, possibly a drain with an artefact scatter within 3 m.

HC_127, which includes a scatter of glass, ceramic and metal amongst Aboriginal stone artefacts is another site where historical and Aboriginal artefacts were recorded. Although it was assessed to fall below the threshold for relics, the Aboriginal objects identify this as an Aboriginal site and as such, it has been recorded on the Aboriginal Heritage Information Management System (AHIMS) and will be avoided by any impacts.

Areas of potential archaeological sensitivity were also identified through archival research but access to these areas was not possible and the sites are outside the Project boundary. Those sites are: PR1, PR2, PR3 and PR4.

Adits related to early mining endeavours exist in the wider study area; with one adit, the Longacre adit, in the north-west of the Project area.



KEY

- Hume Coal Project area
- Berrima Rail Project area

Heritage Act 1977

- State Heritage Register
- s170 Register

Wingecarribee LEP 2010 heritage

- Conservation Area - General
- Conservation Area - Landscape
- Item - General

Existing environment

- Rail line
- Major road
- Named watercourse
- Waterbody
- Cadastral boundary
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2017)

0 1 2 km

GDA 1994 MGA Zone 56

N

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Listed heritage items in the local context

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 2.1

HUMECOAL PROJECT

EMM creating opportunities

3 Historical analysis

3.1 Introduction

The Australian and NSW heritage systems employ a series of historic themes to guide the understanding of history and historical investigation. Two sets of themes are used below: State and National. The National themes are no longer officially in use (they have been archived), but a comparison between the two demonstrates that they are comparable and have the same focus, albeit expressed in different detail.

Themes provide historical, technological and social context and as such, they are an important guide when assessing an item's heritage significance.

Finally, historic themes help to develop interpretation and management strategies for items of heritage significance. A full list of these themes can be found on the Heritage NSW website (HCNSW 2001). Historic themes in the study area were identified based on the historical background (as described below) and the results of the historical survey (Section 4). The Australian and NSW historic themes relevant to the study area that have been used in this report are listed in Table 3.1.

Table 3.1 Historic themes

NSW historic themes	Australian historic themes
2. Peopling Australia	Aboriginal cultures and interactions with other cultures
	Convict
	Migration
3. Developing local, regional and national economies	Agriculture
	Commerce
	Communication
	Events
	Exploration
	Forestry
	Industry
	Mining
	Transport
	Pastoralism
	Technology
	Transport
4. Building settlements, towns and cities	Towns, suburbs and villages
	Land tenure
	Accommodation
5. Working	Labour
	Education
	Law and order
8. Developing Australia's cultural life	Domestic life
	Leisure
	Religion
	Birth and death

3.2 History of the study area

3.2.1 Summary

The first land grants in the Southern Highlands occurred after 1819. Three large land grants, *Newbury, Oldbury* and *Mereworth*, were part of the initial settlement of Sutton Forest. Within twenty-five years, convict gangs had built the South Road which later became the Great Southern Road, one of the three main roads in the colony. With the coming of the railway in the 1860s, European settlement in the area began in earnest. Being well suited for grazing, dairy farming gradually intensified and gave rise to subsidiary industries such as butter and cheese. Crops were predominantly grown for animal feed, although by the turn of the century, orcharding had also become important.

The discovery of coal deposits near Berrima around 1845 signalled the start of the mining industry in the district, which continues today. Along with mining, sawmilling was an important industry and the first sawmill was established in Sutton Forest in 1881, then at nearby sites in the following decades. The region became popular as a tourist destination early in its history and was considered quite fashionable by the late nineteenth century.

3.2.2 Exploration and early settlement

The first explorers to visit the Southern Highlands area were John Wilson, John Price aged 19, and a man known as "Roe" in 1798 (Jervis 1986, p.5). Despite extensive searches undertaken for this study, Roe has not been identified. The three were part of a larger group of Irish prisoners sent to quash rumours that China, and an escape from the colony, lay to the south (Jervis, 1986, p.4-5). Wilson was an ex-convict who had spent a considerable amount of time living with Aboriginal people and he obviously was comfortable travelling through the bush (ADB Online Wilson, John); John Price, also transported to the colony, had been Governor Hunter's servant and "Roe" was possibly another convict. They were all part of a party consisting of another three convicts provided by Hunter, and guards. Soon after the expedition began, three of the convicts and their guards made their way back to the settlement at Port Jackson, while Wilson, Price and Roe pushed on to the Wingecarribee River (ADB online, Wilson, John (?-1800); Jervis, 1986, p.5). When John Wilson, Roe and John Price returned from this first expedition in February of 1792 they travelled through what is believed to be the area around Bong Bong, which Price, in his journal, describes:

> The country still runs very fine, full of large meadows and some thousands of acres of land without any timber on it, except here and there one tree, and some very large lakes of water some three miles large...
>
> Price in Jervis, 1986, p.5

The second expedition led by Wilson was ordered by Hunter again, this time with Price and another man called Collins (Discover Collection State Library NSW). They reached what is now known as Marulan in February 1798 and continued to Mt Towrang (ADB online, Wilson, John (?-1800)). A description of the expedition was captured in the journal of John Price (Discover Collection State Library NSW).

More explorations followed. In 1802 Ensign Barralier explored the area around the Wollondilly River and north of Mittagong (McColgan 1995 p.6). Hamilton Hume and his brother, along with their uncle, John Kennedy, passed through the area and reached the Bong Bong flats in 1814 just prior to the settlement of the area by pastoralists (McColgan 1995 p.6). A road from Sutton Forest to Jervis Bay was surveyed by James Meehan and Charles Throsby in 1818 (ADB *Meehan, James 1744-1826*).

Land grants in the area were delayed because wild cattle, descendants of the domesticated stock that had escaped in 1788, were to be found in this area (Higginbotham 1992 V1, p.13). The slaughter or exploitation of the cattle was forbidden by Governor Hunter after they were found in 1795 (Higginbotham 1992, V1 p.13) and Macquarie was unwilling to allow settlement at Cowpastures or beyond even as late as 1819, because he wanted the cattle rounded up (or at least all attempts made).

However, drought, and possibly predation, reduced the cattle numbers enough for Macquarie to allow passage with a permit on a named basis through, and access to, the Cowpastures. Civil and military officers were exempt as were the families and employees of John Macarthur and Walter Davidson who already held sheep farms in the area. Previous infringements were pardoned but new illegal activity would incur the death penalty (Higginbotham 1992, V1, p.14).

Despite land not being released until after 1819, settlement was occurring sporadically in the County of Argyle (Higginbotham 1992, Vol 1 p.13). The earliest pastoralist to lay claim to areas in the Southern Highlands was John Oxley. Although it is unlikely that he ever lived in the area, Oxley's stockmen moved cattle herds south from Camden to the Southern Highlands in 1815 (ADB *Oxley, John Joseph 1784–1828*) and he was granted 2,400 acres (971.2 ha) in 1819 to legitimise the presence of his stock in the area. Though many people obtained leases over the land, few buildings were constructed during this time as the lessees themselves did not live there but left the raising of the cattle to stockmen who built basic huts for themselves as required (Jervis 1986, p.14). Other early settlers included the Atkinson brothers James and John (1821 and 1822 respectively although James' land grants were made in 1822 and John's in 1839).

It was not until 1864 that settlement in the region began in earnest. Difficulties borne of regular flooding and diseased wheat in the Sydney region sent settlers south to the park-like landscape of the County of Argyle. Wheat rust and flooding were being reported as early as 1805 on farms from the Hawkesbury, the government farm at Castle Hill and farms at Prospect, Baulkham Hills, Toongabbie and the banks of South Creek (The *Sydney Gazette and New South Wales Advertiser*, Sunday 1 December 1805, p.1 and 17 November 1805, p.1). The opening of the rail line in 1867 facilitated movement south, and by 1870 the railway had shifted its main route from the old road through Berrima to Bowral, Moss Vale and Mittagong (DMR n.d, p.9).

3.2.3 Aboriginal – settler contact

Historical sources, while providing a partial snapshot in time, indicate that the cultural group based on language was the Gundungurra people who inhabited the land from Goulburn to Berrima and Camden (Tindale 1974). The Tharawal and Wodi Wodi people bordered the area, while the Ngunawal people inhabited the area south of Goulburn. The Southern Highlands region appears to have been an area where Aboriginal groups came together for ceremonial and social reasons and Bong Bong features in some of the historical records. One account in May 1826, describes "a great concourse of natives, inhabitants of parts beyond Lake George" who returned from Bong Bong where they had been performing "certain ceremonies of their nation, particularly that of knocking out the front tooth" (*The Monitor*, Friday 29 December 1826, p.4). Lake George is less than 100 km to the south of the Project area and in Ngunawal country.

Louisa Atkinson, writing in the 1850s of her childhood memories in the 1830s and 1840s, discusses the interaction between Aboriginal people with the new settlers. Atkinson describes the Aboriginal people on whose land *Oldbury* had been built,

> ...with dispositions that are fitful, easily depressed or elevated, their feelings are quickly moved to tears or laughter. They attach themselves warmly to those who show them kindness, and are ready to exhibit their friendship in various ways.
>
> (Atkinson in Lawson 1989 p.48)

Her father, James Atkinson, who established the Agricultural Society with Hannibal Macarthur and built his homestead and property of *Oldbury*, wrote that hostilities between Aboriginal people and Europeans were usually instigated by Europeans:

> In all the country eastward of the Blue Mountains, and in the county of Argyle, and country to the southward, not the slightest disturbance has taken place for many years; and from the manner in which the Natives are now intermixed and connected with the Settlers, there is not the most remote cause to fear that any serious difference will arise.
>
> (Atkinson 1975 p.146)

It is important to read contemporary settler accounts of Aboriginal peoples' activities with an understanding that they were heavily biased and with little or no understanding of Aboriginal culture and socio-political structure. Activities undertaken by Aboriginal people that were recorded can, however, provide an insight to life in the Southern Highlands when the new settlers first appeared. Of the roles of women and men, Louisa Atkinson notes:

> If they require the skin for cloak-making it is stripped off and pegged out on a small sheet of bark, the fur within, warm ashes are rubbed over it to expedite its drying; after that it is carefully scraped with a sharpened flint or bit of glass, and then carved by being folded in peculiar forms, and the inner skin removed, so that the pattern, usually angles or curves, is rough; into these, red ochre is rubbed; so slow is the process that a single skin will occupy a woman all day to cure. They are squared and neatly sown together with sinews – a slender piece of bone constituting the needle in former days...
>
> The hunting of kangaroo, emu, and native dog is confined to the men; near streams the men are expert in spearing fish; the women will stand all night in water fishing or eeling: they employ a hook.
>
> (Atkinson in Lawson 1989 p.12).

3.3 Expansion

The economic benefits of pastoralism initiated and boosted expansion outward from the colonial centre. The year 1815 saw the expansion of pastoralism beyond the Great Dividing Range, allowing settlers to establish a highly profitable wool industry. The high value of wool contributed to the pastoral/wool industry becoming the colony's dominant exporter and as a result the major pastoralists swiftly became a formidable political force in the colony during the nineteenth century (RailCorp 2009, p.19). The pastoral expansion spurred the development of towns south of Sydney. The project area overlaid on a map of the County of Camden from 1895 showing land grants is presented in Figure 3.1.

3.3.1 Bong Bong

Bong Bong was one of the earliest towns in the Southern Highlands. After Macquarie visited in 1820 the site, where Bong Bong Common is now, was chosen and Bong Bong was developed as a Government town. The town was laid out in 1821 adjacent to the line of the original "south road", which by 1820 had been completed as far as Sutton Forest (Jack 1993, p.1). The former Old Argyle Road alignment passed through the site. Buildings to maintain law and order were erected and included a barracks (1829), a gaol (1826) and a commissariat store (1829) (Jack 1993, p.2). A schoolhouse was erected, and William Bowman built and licensed an inn called the "Argyle Inn" in 1827 (now "Briars") (Jack 1993, p.3).

The difficult micro-environment that prevailed at Bong Bong – driving winds and high rainfall - made it an undesirable place to reside and construction of the "south road" west of Bong Bong opened up a new area to which the government buildings were moved, and residential development took hold. This new town was Berrima (Jack 1997, p.36). The town of Bong Bong is now a low-lying field on the north side of the Wingecarribee. The cemetery cultivated enclosures are not discernible in aerial photography and the alignment of the Old Argyle Road is barely traceable.

Bong Bong was a place where new settlers interacted to some degree with the Aboriginal people who lived in the area and with those who passed through. The ceremonial grounds at Bong Bong were visited by people from the Lake George region (*The Monitor*, 29 December 1826, p.3) and oral sources include groups from the South Coast as well.

3.3.2 Berrima

Berrima was an alternative location for a town given Bong Bong's unsuitability. Laid out by Surveyor General Sir Thomas Mitchell in 1829, Berrima grew quickly and in 1837 the post office and magistrate's functions were moved there (Makin Cottage SHR 00104). In 1843 the area of the town was sold to Charles Throsby (nephew of the builder of Throsby Park) and became part of his large estate (Jack 1993, p.5).

In 1841 the population of Berrima was 249, but by 1851 the population had decreased to 192 (Makin Cottage SHR 00104). The discovery of gold enlivened the town but when the rail line bypassed Berrima, the population declined again. Berrima grew again as tourism increased, resulting in the emergence of tourist accommodation and maintenance of the character that invites day-trippers and longer stay visitors.

3.3.3 Sutton Forest

Sutton Forest is likely to have been established after dissatisfaction with the location of Bong Bong, and in the early years, was the name given to the surrounding region. At the suggestion of James Atkinson, a spot on the Medway River opposite Charles Wright's farm was considered for Sutton Forest. It was named by Governor Macquarie when he passed through the area in 1820 in honour of Sir Charles Manners Sutton, Speaker in the House of Commons (Emery 2008, p.17). A church and cemetery were established by 1830 before residential buildings went up in the surrounding area. A schoolhouse was built in 1831. The village itself was well established by the time the Government surveyor surveyed the town and Sutton Forest was officially recognised in 1854
(Jervis 1986, p.143). Early inns included *The Talbot* in 1834 (demolished), *The Harp in 1834*, and *The Red Cow* in 1835. In 1882 Sutton Forest was described as a small but picturesque village with its main road passing some of the finest residences in the colony. Nearby were the estates of *Hillview*, *Vine Lodge* and *Ivy Hall* (Jervis 1986, p.30).

3.3.4 Exeter

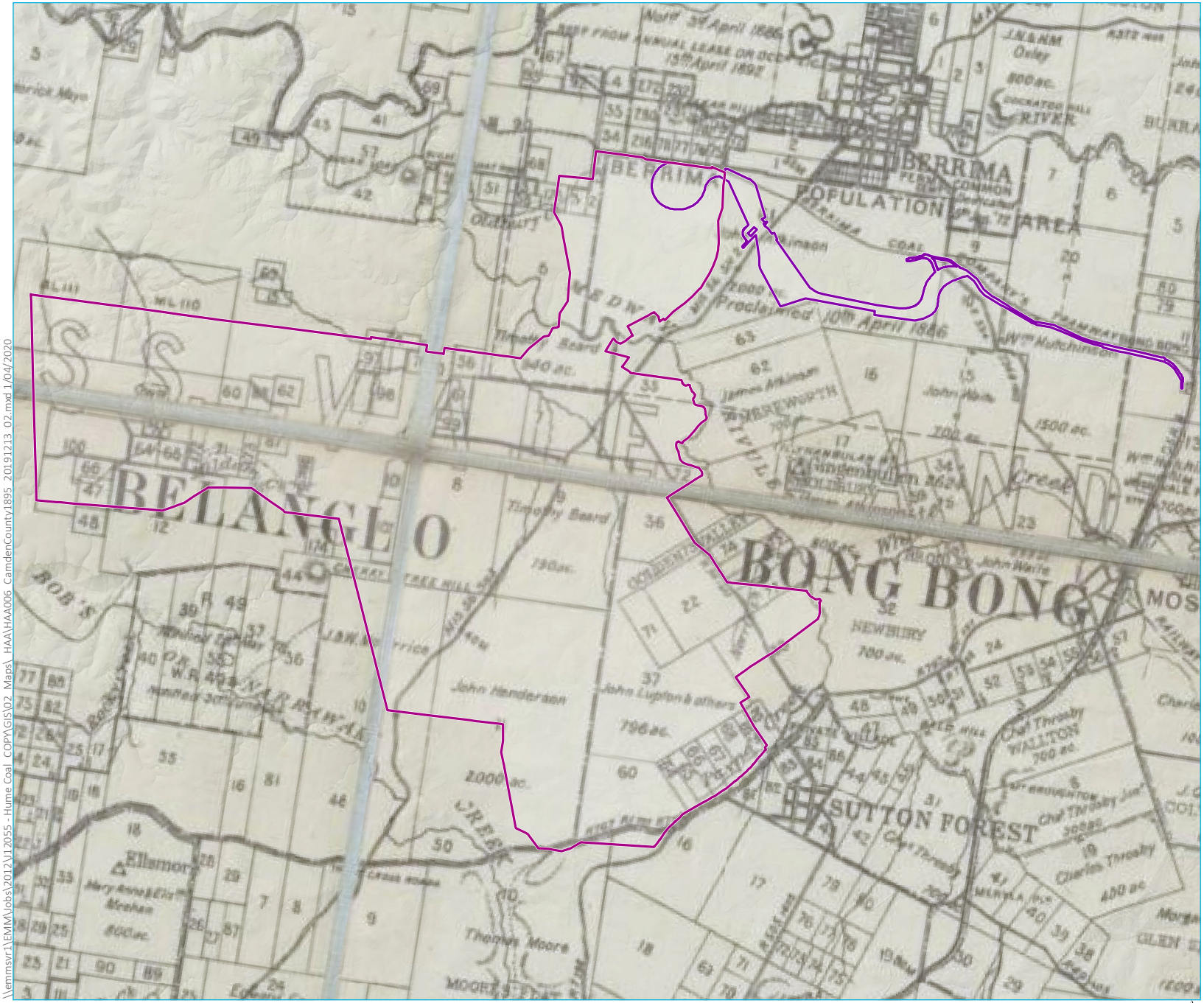
Exeter was established on land belonging to the Badgery family and named after the city of Exeter in England where they originated. James and Elizabeth (née Lundie) Badgery named their homestead *Spring Grove* (WHS 2009, p.28) after the land was granted by Governor Macquarie in 1822 (R2218, p.4). To either side of the homestead, the sons of James and Elizabeth established their properties – Henry with *Hamletville* to the east and Andrew with *Kirby's Meadows* to the north of that (R2218, p.5). During the early years of colonial settlement, the Badgerys were neighbours to James and Charlotte Atkinson at *Oldbury* and John and Eliza (née Hunter) Nicholson at *Newbury.*

Badgery's Siding was opened in 1878 and renamed *Exeter Station* in 1890. Exeter was divided into lots and sold in 1891; Exeter public school was opened the same year and St Aiden's Church and a brick store were erected in 1894.

3.3.5 Moss Vale

Moss Vale grew out of the subdivision, starting around 1864, of land that was granted to Charles Throsby (JRC 1991, p.119). As with the surrounding settlements, Moss Vale grew slowly, and it was not until the railway in 1867 that the town started to grow. Initially, the line was to stop in Berrima but the gradient through Mittagong, Bowral and Moss Vale was better suited to a railway line and this route was chosen (Freeman & Jackson-Stepowski 2006, p.7). It was plans for a train station at Moss Vale that influenced the earlier subdivision (JRC 1991, p.119).

Moss Vale, along with its surrounding towns, became a tourist destination and 'country retreat' for wealthy Sydney residents. Tracts of land to the east toward Robertson that were originally determined to be undesirable for farming were soon cleared and farming, particularly potatoes and cattle, contributed to the growth of the town. Moss Vale was large enough to service surrounding farming communities and thus benefitted from the expanding agricultural industry (JRC 1991, p.119). Early subdivision and road patterns are still discernible in the town today.



KEY

- Hume Coal Project area
- Berrima Rail Project area

Source: EMM (2019); Hume Coal (2016)

0 1 2 km

GDA 1994 MGA Zone 56

N

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Hume Coal Project area overlaid on County of Camden map c1895 showing land grants

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 3.1

HUMECOAL PROJECT

EMM creating opportunities

3.4 Land use

3.4.1 Farming and pastoralism

Governor Macquarie described the region near Throsby Park "particularly beautiful and rich (Jervis, 1986, p.15). In his report to the House of Commons in the United Kingdom (1822) Commissioner Bigge commented on the richness of the soil in Sutton Forest (Jervis 1986, p.15). James Atkinson who settled in Sutton Forest described the County of Argyle, to the south of the Project area, Antrim and the land to the west of the Blue Mountains as being open forest of white and blue gum on a granite soil. He described "large blocks of granite, of a coarse texture, and grey colour, are seen lying about upon the surface". James Atkinson describes most of the land as poor for cultivation but well suited for grazing. In areas where whinstone[1] predominated, the land was suitable for grazing and cultivation (Atkinson 1975, p.5–6). John Price, in his journal describing the expedition to find China described the land around Bong Bong as "fine".

The most recent review of the soil conditions in the Project area identified three classes described by the NSW Department of Primary Industries (NSW DPI), which accord with Atkinson's description of the land. They are Class 3: suited to grazing and pasture improvement; Class 4: suited to grazing but not cultivation; and Class 5: at best suited to light grazing but not for agriculture (EMM 2017c).

Where crops were grown, they included wheat, maize, barley, rye, peas, potatoes and turnips. Most of these crops were used for animal feed, particularly peas and potatoes to feed the pigs and cattle (Jervis 1986 p.14). Orcharding was taken up in earnest in the 1870s and was one of many agricultural industries, which included cattle, dairy, wheat and vegetables, in the region. After the turn of the century orcharding became important and in 1918 it was recorded that there were 50,000 fruit trees in the district (Jervis 1986, p.66–67).

In tandem to some cropping, the dairy industry was successful for a time. Three factors contributed to the intensification of dairy farming. First, the railway to Mittagong opened in 1867. Then TS Mort opened a milk-chilling plant at Mittagong in 1875 and eight years later the Fresh Food Co installed the first cream-separators in NSW; this led to butter factories opening in Robertson, Kangaloon and Glenquarry. Cheese factories were also established. Pig-breeding developed to utilise the skimmed milk by-product (JRC Planning 1991, p.31). Mills were constructed to process the wheat grains. The most well-known was Throsby's Mill erected at Throsby Park in 1849. Another mill was erected on *Oldbury* in 1837 and the charge for grinding was one shilling and three pence per bushel. A steam powered flour mill was built at Burrawang and ran between 1879 and 1880.

John Atkinson established *Mereworth* as a dairy farm and the *Mereworth* estate continues to function as a pastoral property with some agricultural activity. Atkinson and his family occupied the *Mereworth* estate from c. 1822 but given Atkinson's social status it is unlikely he was involved in the daily minutiae of the dairy farm. Work at Atkinson's dairy farm was performed by labourers some of whom were convicts (*The Sydney Gazette and New South Wales Advertiser* 9 August 1832, p. 1; 17 May 1834, p.4). The 1841 census notes Atkinson's household consisted of ten adults and four children, suggesting an arrangement where the landowner and employees shared living quarters (or perhaps resided in separate buildings on the homestead), especially given that John and Jane Atkinson had three children. This was typical for the time and it is likely that living arrangements were similar over Atkinson's occupation (Higginbotham 1992 vol 2, p.39–40). The *Mereworth* estate mortgage defaulted to John William Hillas around 1843.

[1] Whinstone is defined as a "popular term for any dark, fine-grained igneous rock" in Kearey 2001 p. 293.

John Hillas, and later his son Matthew Woodward Hillas, leased the 2,672 acres (1081.3 ha) of the *Mereworth* estate to various tenants from c. 1850 to 1887 (*The Sydney Morning Herald* 25 September 1852, p. 4; *Goulburn Evening Penny Post* 21 June 1887, p.3; Higginbotham 1992 Vol 2, p.47). The specific farming and pastoral activities of the *Mereworth* tenants is not clear. A list of sales, however, suggests James Johnson Warren, a tenant on *Mereworth* from c. 1859 to the 1880s, was raising sheep for wool production (*Australian Town and Country Journal* 22 January 1881, p.37). It is not clear of the Hillas family themselves ran stock on, or worked, *Mereworth*– in 1887 the family was living in Bannaby (*The Sydney Morning Herald* 16 July 1887, p.5). In 1887 the property was sold to New South Wales Legislative Council member Sir John Lackey for £8,500.

John Lackey was a well-known colonial pastoralist and owned several cattle stations in Queensland and New South Wales. Lackey ran meat cattle on *Mereworth*, specifically using the property as a fattening station (*Evening News* 7 October 1899, p.3). John Lackey and his family resided at their Moss Vale property known as *Austermere,* meaning farm labourers were the likely occupants of *Mereworth* at this time. The Lackey's unsuccessfully attempted to sell 1,800 acres (728.4ha) of the *Mereworth* estate in 1901. Even so, the advertisements described the property as:

> "…fenced, and a large proportion has been ring barked and improved. The climate is one of the most favourable in the State for stock raising, feeding, or dairying, as well as being delightful for residential purposes… has a double frontage to the Main Southern Road."
>
> (*The Sydney Stock and Station Journal* 31 May 1901 p.6).

The *Mereworth* estate was portioned for sale and/or lease after John Lackey's death in 1903 (*The Scrutineer and Berrima District Press* 9 May 1903, p.3). Eight hundred (323.7 ha) of the 1,800 acres were sold to farmer A. Reynolds but there are no reports of further sales from this 1903 sub-division (*The Sydney Stock and Station Journal* 12 June 1903, p.2). The present acreage of *Mereworth* was purchased by grazier William Thomas Cowley sometime around 1912 (Vol 2232 Fol 143 LPI).

Cowley, who was born at the *Kentish Arms* in 1851, had run dairy cattle on various properties around the Southern Highlands but sold his heard and changed to rearing sheep around 1912 (*The Scrutineer and Berrima District Press* 29 August 1928, p.2). William T. Cowley and his sons Albert William (Bertie) and Arthur Thomas Cowley ran sheep on *Mereworth,* and their wool clip bore the Mereworth name. The Cowley's *Mereworth* herd had been sourced from Merinos bred in Winton Tasmania and their fleece (70s spinning count type) was noted for its fine quality (*The Scrutineer and Berrima District Press* 10 December 1932, p.2). William Cowley gained the reputation as 'one of the best-known sheep men of the Illawarra Tablelands in his day' (*The Scrutineer and Berrima District Press* 10 December 1932, p.2). The Cowleys also leased parts of *Mereworth* for bee keeping and Eucalyptus oil production at various times over their occupation (*Goulburn Evening Penny Post* 27 April 1916, p.2; *The Sydney Morning Herald* 19 April 1935, p.8). The *Mereworth* estate was sold to Tony and Amber Oxley of the Bushell's Tea family around 1963.

The Oxleys purchased the property under the name "Mereworth Pty Limited'. Earlier buildings visible on the 1949 aerial photographs were demolished between 1963 and 1965 to make way for the current house. The Oxleys had the current Mereworth house and garden constructed as a holiday home for their family (*The Australian Women's Weekly* 21 September 1966, p.22). In 2014 ownership of the *Mereworth* estate was transferred to PBF 2 Pty Limited, then to S F Pastoral Holdings Pty Ltd in 2015. Hume Coal Pty Ltd purchased the property on 15 February 2015 and the paddocks have been licensed to Princess Pastoral, which is raising cattle, sheep, and fodder crops.

3.4.2 Commerce and roads

The location of *Mereworth* (the property) with frontage to the South Road, one of the major early roads of the colony of New South Wales, offered Atkinson the opportunity for commercial activity beyond pastoralism. When Atkinson first came to the Southern Highlands the primary road was the Argyle Road, (now the Old Argyle Road). The Argyle Road, the earliest alignment through the region, ran south from the County of Cumberland, through the County of Camden and the County of Argyle from around 1810 (Jack 1997, p.36) possibly as early as 1805. The Argyle Road, south from Sydney, ran roughly parallel and east to the present Old Hume Highway (and Atkinson's property), crossing over the Mittagong Range at "the Gib", through Bong Bong and south over the Cookbundoon Range to just north of the Goulburn Plains (DMR n.d).

A few other early alignments heading south from Sydney were surveyed including one by William Harper (for Governor Macquarie) in 1821, James Ralfe in 1826 and another in 1829 by H F White. Not all alignments followed the same path, but in 1830, Surveyor General Thomas Mitchell reported that a line of road had been marked to the west of the Old Argyle Road (RMS 2013, pp. 4, 5; Jack 1997, p.36). This was the South Road. The South Road was renamed the Great Southern Road with the *Main Roads Management Act 1858* and became one of the three main roads in the colony. It was also known as the "Argyle Road" as well as "Port Phillip Road" and "Sydney Road" in the south. The current alignment of the Hume Highway crosses earlier versions of the alignment.

Convict gangs were occupied with building the South Road in 1834 to open up the area to pastoralists and settlers, and convict stockades were established along the route. Convict stockades were also present along the South Road at Berrima, Black Bobs Creek and Wingello "some miles from the present township" (Jervis 1986, p.149). *The White Horse Inn* at Wingello was built on the site of old stockades (Emery 2008 p.125).

At the same time the South Road was being laid down, Superintendent of Bridges David Lennox was overseeing the construction of the various bridges along the route (DMR n.d, pp.6-7). Lennox had a wooden bridge with three masonry piers built over the Medway Rivulet a few meters south west of Atkinson's *Kentish Arms* (DMR n.d, p.7). The bridge was constructed by convicts under the supervision of George Tasker (sub-supervisor of roads) between 1834 and 1835 (Bell 1834, p.210).

The Lennox bridge was destroyed by a flood in 1860 and the current piers, and possibly a retaining wall, were rebuilt. The wooden deck of the bridge was demolished c.1934 to make way for a new concrete bridge. Examination of the 1949 aerial photograph depicts the piers and the concrete bridge resting on the eastern portion of the structure (Plate 3.5).

3.4.3 Mining

i Coal and Cement

Although *Mereworth*'s history is based in pastoralism, mining was and is also an important aspect of the Southern Highland economic development. The presence of coal in the Southern Highlands was well known as the Southern Highlands lie over the Wongawilli and Tongarra Seams, and since the mid nineteenth century, various attempts to mine it were made. Coal deposits near Berrima were reportedly accidentally discovered in 1845 by a Mr Atkinson, possibly John Atkinson of *Mereworth* as James died in 1834. The coal was in "a peninsula formed by the tortuous river and a tributary named the Medway Rivulet, and is exposed to view and touch in a gorge varying from 200 to 450 feet (70–137 m) in depth" (*Sydney Mail and New South Wales Advertiser* 25 March 1882, p.481).

In 1853 William Keene, a mining surveyor, made a report to identify the extent of the deposits and their viability. The area near Black Bobs Creek was considered the most promising (Emery 2008, p.16; ADB Online *Keene, William 1798-1872*). Black Bobs Creek, located south of the Project area, was the earliest coal mine in the district. It opened in 1854 to supply the Fitzroy Ironworks at Mittagong (1848 to c.1877) but only operated for a few years because transportation over 18 miles (29 km) of rough roads proved too difficult. The iron works, having opened 20 years before the railway, had an inconsistent history of success and changed hands a number of times. The importance of the iron works to Australian industry, however, is recognised by heritage listings and the volume of research it has generated.

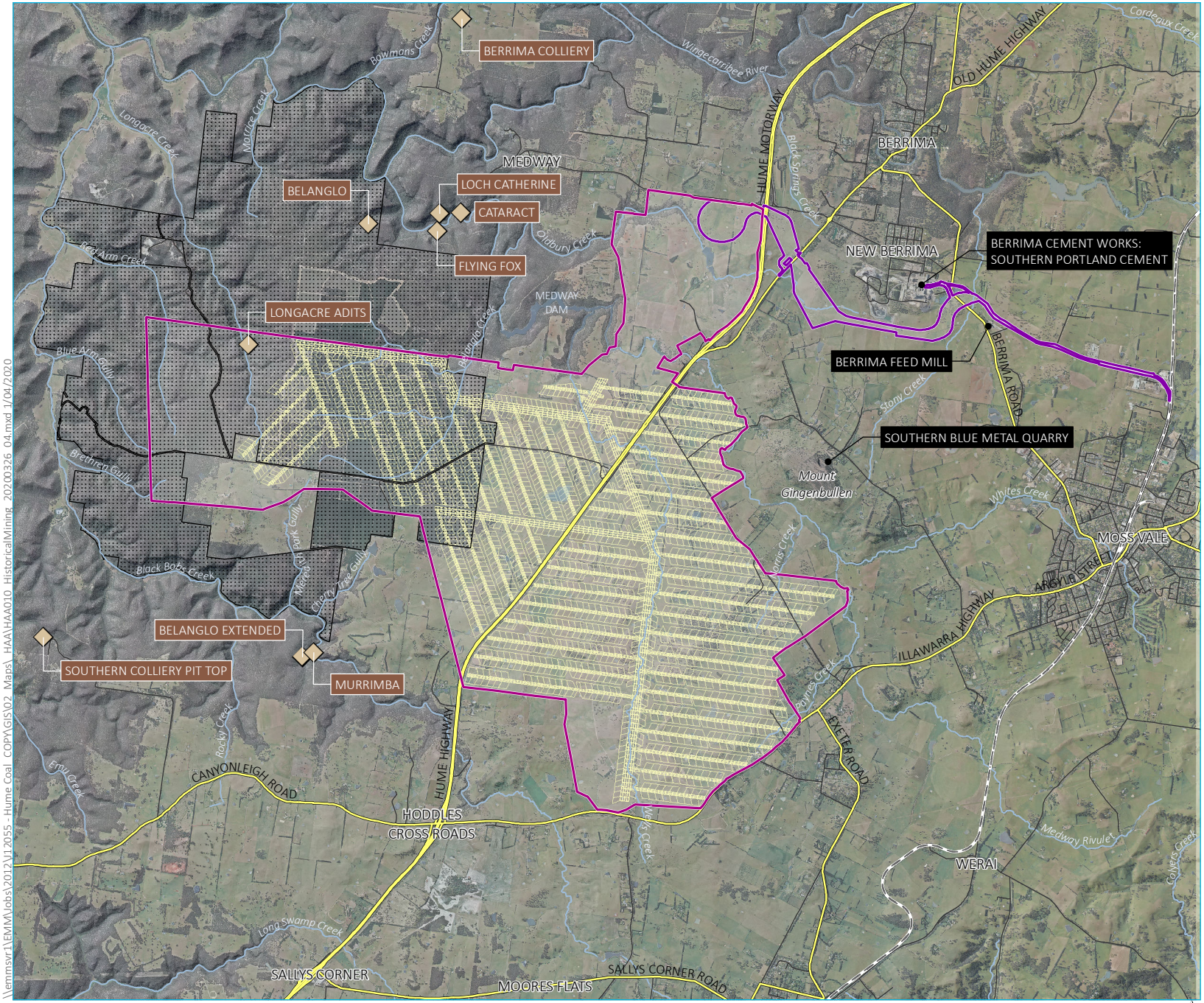
In 1867, the Cataract mine was opened on the banks of the Medway Rivulet by AR Huntley and JR Brereton. The mine supplied the Fitzroy Ironworks until the late 1860s when the iron works closed (various dates are given for the closure of the iron works including 1869 (SHI ID 2681711) and the 1890s (Fitzroy Iron Works 2014). The Cataract mine, which was on the Medway Rivulet, relieved the burden on the Black Bobs Creek mine, which was at best intermittent with its supply of coal to the ironworks. Adits from the Cataract mine, and possibly others, still exist in the study area and across the region.

A mine was opened at Medway in 1880 by James John Atkinson (son of James Atkinson who built *Oldbury*). It primarily supplied coal to the NSW Railways for their steam locomotives. The company became official on 31 March 1881, when an act called "The Berrima Coal-mining and Railway Company (Limited)" was created so that a railway from the Berrima Coal mine to the Great Southern Railway near Moss Vale could be built. The rail line was built on a standard gauge and connected the coal mine at a gorge of the Wingecarribee River to the Government rail line at Bong Bong. The formal opening of the Berrima coal mine and railway took place in March the following year (SMH 2 March 1882, p.6) but was forced to close after less than a decade due to the high cost of transport and low profits. The equipment and rail line fell into disrepair (Illawarra Coal 2001) and the rail line lay unused. During the first decade of the twentieth century the rails were lifted, leaving only the sleepers.

During the 1920s, three new mines opened in the West Berrima area (now Medway). The Loch Catherine Colliery (1923), the Flying Fox Mine and the Medway Colliery. The Medway Colliery was opened in 1924 Arnold Stanley "Stan" Taylor who also took over the Loch Catherine mine. Taylor also rebuilt the line to Berrima Junction near Moss Vale in 1927, on the original 1881 rail spur built for the Berrima Coal mine (Oberg, 1980). The coal from his mine was used mainly for Taylor's cement works. He also owned limestone leases in Marulan, as limestone is a significant component in Portland Cement manufacture. The Township of Medway is a result of Taylor's Medway mine and railway (refer Government Gazette 19 February 1932, p.729).

Taylor was a local industrialist – his first company was Australian Blue Metal Quarries Pty Ltd established at the base of Mount Gingenbullen, which was serviced by a short rail line that joined the Berrima rail line and then the Southern Railway at Berrima Junction (*Southern Highland News* 30 July 2012; Plate 3.1). The branch line ran from a siding on the Southern Portland Cement Railway line and turned south to the quarry. Even though it only operated for a few years and was largely dismantled in 1942 (Matthews 1959, p.23), it is visible on the 1949 aerial photograph (Plate 3.2) as well as current aerial photography.

Another of Taylor's enterprises, the Southern Portland Cement and Coal Company was floated in 1926 and construction of 'The New Works at Berrima' was announced in 1927. The works manufactured low heat cement to the Sydney Metropolitan Water, Sewerage and Drainage Board and to Warragamba Dam. This enterprise was built on land that had had previously supported Taylor's timber mill (Read and AGHS 2008), recently moved to New Berrima from Berrima. The location of the plant was said to be favourable because it was "only ninety miles from Sydney by rail, and only thirty-eight miles by rail for shipment to interstate markets through Port Kembla" (*The Farmer and Settler*, 30 September 1927, p.3). The rail line from Medway Colliery serviced the cement works before it went on to Moss Vale via the Berrima Junction at Lackey Road (to the east of the Boral Cement Works). The current and historical mines and industrial sites in the region are presented in Figure 3.2.



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Underground mine workings (indicative)
- Historical coal mine

Existing environment

- Rail line

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); Palaris (2016)

\\emmsvr1\EMM\Jobs\2012\J12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA010 HistoricalMining 20200326 04.mxd 1/04/2020

Current and historical industry in the region

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 3.2

HUMECOAL PROJECT

EMM creating opportunities

3.4.4 Timber-getting and forestry

Sawmilling was an important industry in the Southern Highlands district and sawmills were established at Sutton Forest in 1881, Burrawang in 1885 and Robertson in 1905. It does not appear that commercial timber cutting occurred on *Mereworth,* however, illegal timber removal seems to have been a problem (*The Scrutineer and Berrima District Press* 1 January 1898, p.5). Even though timber felling was not of key interest to John Atkinson, he would have set about clearing the land soon after his arrival to make it suitable for grazing. Tree and brush clearing continued throughout the history of the property (*The Scrutineer and Berrima District Press* 23 May 1900, p.5).

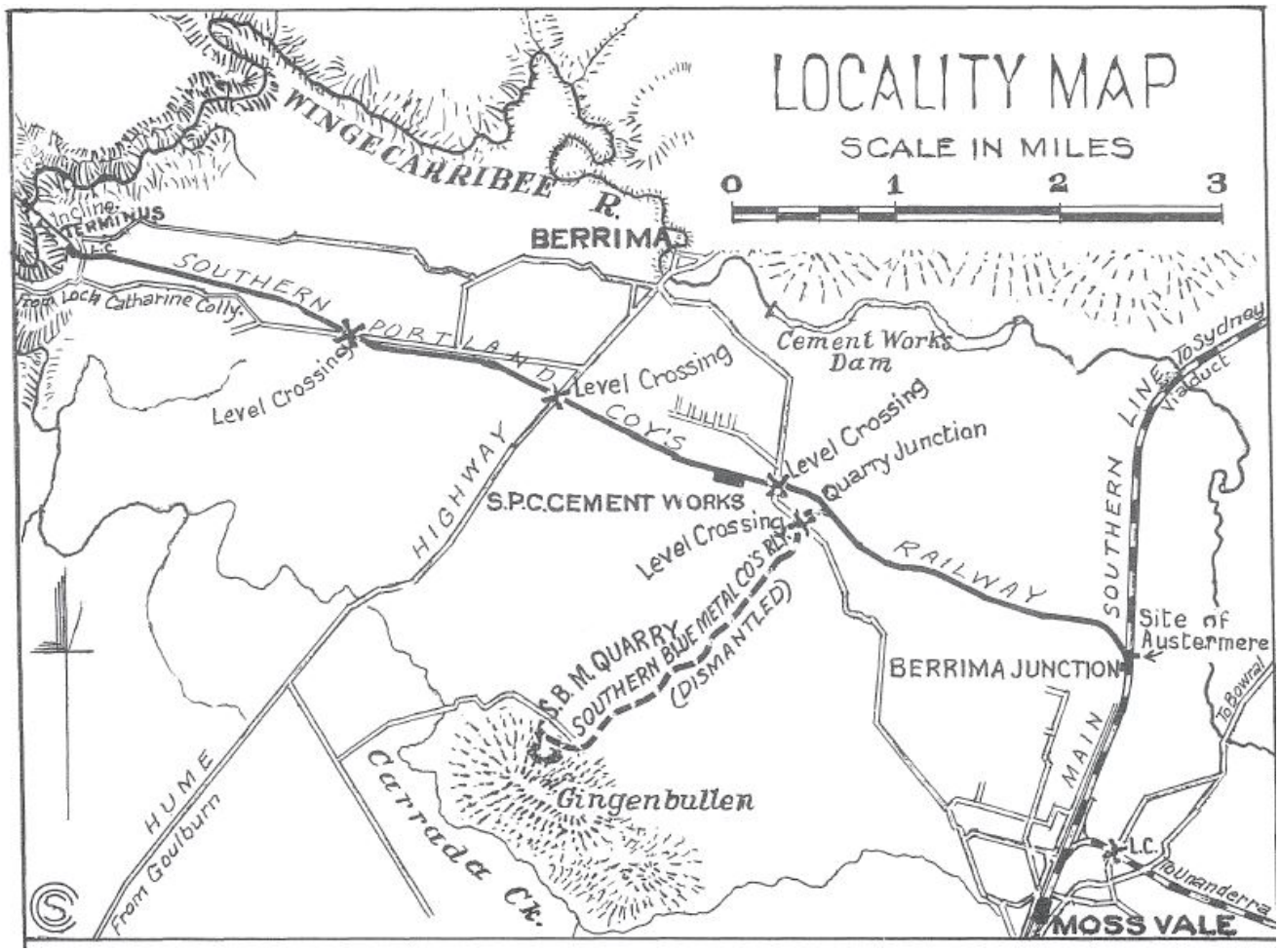


Plate 3.1 **Rail lines associated with local industry. Source: *The Australian Railway Historical Society,* Bulletin no.256 February 1959.**

To the west, Loch Catherine Colliery, also owned by Taylor, was used as a source of kiln fuel for the Malden Cement Works. The Loch Catherine Mine was closed in 1959 when an alternative source of supply for the Malden works was found.

The onset of the Great Depression (October 1929-1939) forced Taylor to sell the Southern Portland Company Limited to Southern Portland Cement Limited, (headed by Sir Cecil Hoskins), which also purchased the Medway Colliery and Railroad Company (*Sydney Morning Herald* 17 December 1927, p.19).

The Broken Hill Proprietary Company (BHP) acquired Southern Portland Cement Limited in 1935 as a result of a financing arrangement (Ozark 2015, p.11) with Cecil Hoskins remaining as chair until the 1950s (*Southern Highland News* May 20, 2012).

Until the 1960s, pit ponies hauled coal from the coal face to a clipping where it was transported out on a rope skipway over the river by bridge and up to the railhead. The mine became mechanised in 1968 when modern mining machinery, conveyor belts and electrically hauled cable shuttle cars were introduced, and transportation changed from rail to road. Some foundations of the winder house and steam drive traction engine still exist at the Loch Catherine Mine, approximately one kilometre south west of Medway village (*Southern Highland News* 13 November 2013).



Plate 3.2 **A section of the Australian Blue Metal Quarries rail line (indicated) servicing Taylor's Gingen Bullen Quarry (1949).**

Blue Circle Southern purchased the company in 1974. Blue Circle Southern was an amalgamation of a number of Australian cement companies (including Portland Cement) in a joint venture between BHP and United Kingdom Company, Blue Circle. The company was then sold to Boral Limited in 1988, who leased the mine to Centennial Coal in 1994. Delta SBD Limited then ran the colliery as a contractor to Boral from 2009 (Ozark 2015, p.11). Berrima Colliery, formerly Medway Colliery, was closed in 2014 after production halted in 2013. So ended operations at what has been described as the smallest and one of the oldest collieries in NSW (Ozark 2015, p.12; Boral 2002 online).

ii Kerosene shale

Kerosene shale was important in the region starting with its discovery by Edward Carter in the Joadja Valley. The eldest son of Ann and Benjamin Carter, Edward took over his father's job of grazing stock in the region and so became familiar with the landscape. It was after the kerosene shale industry became established at American Creek at Mount Kembla and Hartley Vale in the 1860s that Edward realised the land's potential and took out mining leases and land grants (Jack 1995, p.32-32). Carter started mining kerosene shale in 1873 and in 1878; he sold the rights to a consortium that later became the Australian Kerosene Oil and Mineral Co (AKO) (Jack 1995, p.33). AKO bought other mining leases in the area and went on to find success in the industry until the resource ran out in 1903 and the family turned to orcharding.

The kerosene shale industry developed in the USA, Scotland, Wales and France at the same time that the oil industry took off in the USA. The additional processing methods required for kerosene oil meant that industry favoured crude oil extraction where the resource existed in the USA, and the more labour-intensive kerosene shale industry floundered. Exploration and extraction of kerosene shale continued in the Lothian region of Scotland and in New South Wales (Jack 1995, p.31).

A private railway was constructed linking Mittagong to Joadja, a distance of 25 km. A winding engine that controlled skips on the single-track incline is still in place at the end of the railway line (Jack 1997, p.40).

3.4.5 Wine production

Governor Macquarie was first to suggest that the volcanic soils of the Sutton Forest region resembled those of famous European wine-growing regions (*Southern Australian* 4 October 1844, p.4). The establishment of vineyards in New South Wales was understood to be a difficult task due to damaging hot winds and storms - common features of the Australian climate (*Southern Australian* 4 October 1844, p.4). As such, small-scale wine production in the Southern Highlands began in the 1860s (*Sydney Morning* Herald 12 May 1865, p.8). From 1861 storekeeper Friedrich Bingmann cultivated 4 acres (1.6 ha) of Riesling vines at *Hochhiem* producing approximately 60 gallons (273 litres) per quarter acre (*The Sydney Morning Herald* 9 December 1864, p.5; 12 May 1865, p.8). Wine making increased slightly during the 1880s with 1,135 gallons (4,300 litres) produced over the region (Wine Australia 2019). Larger scale wine production in the Southern Highlands only began in the 1980s with the establishment of the Joadja vineyards (Wine Australia 2019). Riesling, Chardonnay, Sauvignon Blanc, and Cabernet Sauvignon wines are produced in the region (Wine Australia 2019). It is possible that occupants of *Mereworth* estate or the inn grew wine grapes for personal production. Table grapes were also commonly grown in the region during the 1880s and may have been present in the orchards of the two properties (Wine Australia 2019).

Beer production may have also occurred on *Mereworth*. Atkinson's later career as a brewer suggests that beer cereals may have been cultivated on *Mereworth* for use in the *Kentish Arms*. Moreover, a sale of items from *Mereworth House* in 1911 includes a grinding mill, which could have been used for beer production as well as bread making (*The Scrutineer and Berrima District Press* 2 September 1911).

3.4.6 Tourism

The region's strong resemblance to the English and Scottish countryside, and the presence of the vice regal residence at Hillview, were significant factors in the Southern Highlands becoming a tourist destination.

In 1865 tourism in the region received a boost when the NSW Governor, the Earl of Belmore leased Throsby Park in Moss Vale as his summer residence. By 1890, it was said that Bowral "held its own as a fashionable resort". According to the *Illustrated Sydney News*, the appeal lay in the leafy trees that imparted an English feel in the Australian landscape (SHI, 1999). With improvements to road and rail, the area became more accessible and from the 1870s tourism started to flourish along with partner industries such as accommodation, restaurants and gift shops.

The earliest use of the name "Southern Highlands" found in research was published in *The Argus* on 10 September 1891 (p.6) in the weather forecast: "New South Wales. – Cloudy and threatening rain on southern highlands, elsewhere fine and clear; variable winds and calms".

3.4.7 Notable local families and individuals

i Dr Charles Throsby

Dr Charles Throsby was one of the earliest settlers to arrive in the area in 1817 along with his friend Hamilton Hume. He travelled through the region twice in 1817, first with Hume and later, with James Meehan. Throsby was one of the earliest new arrivals to settle in the Moss Vale area (ADB online *Throsby, Charles 1777-1828*) and his land eventually became the town of Moss Vale (Architectural Projects, 2009, no page number; p.17 on PDF). Throsby had a hut on the north side of the Wingecarribee River before the town of Bong Bong was established; his cattle grazed both sides of the river in this location (Jack 1997, p.39). His nephew, Charles Throsby also lived in the locality of Bong Bong and after the town was moved, Throsby (the younger) purchased the land and also ran his cattle on it.

ii James Atkinson

James Atkinson (1795–1834) arrived in the colony as a free settler in 1820 aboard the *Saracen* (Higginbotham 1992, Vol 2 p.1). He arrived in May and by July had obtained the position of principal clerk in the colonial secretary's office (ADB online *Atkinson, James 1795-1834*). In 1822 he received a permit to occupy an area of land, for grazing purposes, on the right bank of Medway Rivulet. The permit was converted to grants totalling 1,500 acres along the Medway Rivulet and built the estate known as '*Oldbury*', named after his birthplace in Kent, England. Atkinson named the other grant *Mereworth* (located west of the Hume Motorway, see Figure 3.1) after the Kentish town of the same name that his family was from. He was a sheep and cattle farmer who was able to extend his grant to 2,000 acres by the late 1820s.

After his marriage to Anne Waring, James moved to *Oldbury* full time (Berrima District Historical Society 1991, p.24). James travelled back to the United Kingdom to publish a book on agriculture in the colony of New South Wales (*An account of agriculture and grazing in New South Wales and of some of its most useful natural productions, with other information, important to those who are about to emigrate to that country, the result of several years' residence and practical experience,* originally published 1825 and republished a number of times after). Some of his observations are reproduced in this assessment. He fathered four children before he died age 39. James' obituary in the *Sydney Monitor*, describes him as "a gentleman of great energy and considerable talent; and his frugality and economy on his farm and his family, while it did not descend to meanness, operated as a most useful example to the generally extravagant and even profligate habits of all ranks in this Colony" (*Sydney Monitor* 3 May 1834, p.3).

iii Louisa Atkinson

James and Anne Atkinson's youngest daughter Caroline Louisa Warring Atkinson (Louisa Atkinson) gained some fame as a novelist, journalist and botanist. Louisa had a number of her writings published in newspapers, writing about life in the colony and native flora. She wrote about daily life and her prose on interaction with Aboriginal people is enlightening if read critically. Louisa viewed Aboriginal people and their interrupted culture much the same way that it was viewed by the paternalistic newcomers.

Louisa's contributions to Australian botany are commemorated in the names of plants: *Atkinsonia ligustrina* (a rare shrub endemic to the Blue Mountains NSW); *Erechtites atkinsoniae* (Australian fireweed, also known as *Senecio bipinnatisectus*); *Epacris calvertiana* (after her married name "Calvert"); and *Doodia atkinsonii* (a fern).

iv John Atkinson

John Atkinson (b. 1798), the younger brother of James, arrived in the colony as a free man on the *Mariner* in 1822. On arrival, John moved to Sutton Forest close to his brother James and requested a 500-acre grant to add to an existing 2000 acres, with which to accommodate his increasing stock. The 2000 acres had not in fact been granted yet but was promised on 6 November 1823 and granted on 27 September 1839 (Higginbotham 1992, Vol 2, p.36). The official date of the grant did not hinder Atkinson's claim on the land, and he set about clearing and building so that by early in his tenure he had built a cottage and an inn.

John travelled back to England in 1823 and married Jane Martin at Gillingham in Kent. On his return to the colony John was entrusted with the management of *Oldbury* while James went back to England to attend to business (including publishing his book on agriculture and grazing) until 1827, while also managing his own holdings *Mereworth*. The name *Mereworth* was used by both brothers on their respective land but the name eventually referred to John's property only. The question of where John Atkinson's first house was built arose through this investigation. It was previously surmised that Atkinson built a homestead on the hill with surrounding buildings in the location of the current Mereworth house (1965-present). Additional research indicates that the Atkinson's first dwelling, a cottage, was built beside the Medway Rivulet, and not in the location of the current Mereworth house and garden.

John Atkinson then built a public house (or an inn), known as *the Kentish Arms* beside Medway Rivulet on the western side of the Great South Road (outside the proposed surface infrastructure area). The inn was sold in 1839 (with the 20 acres of land it stood on) and renamed the *Three Legs of Man* (refer to Section 3.6.2). After he lost his land to a defaulted mortgage, John Atkinson and family moved south-west to Tumut, a town at the foot of the Snowy Mountains, sometime before 1849. Atkinson was a brewer in Tumut until his death on the 12 of January 1858 (*Empire* 26 January 1858, p.4; *The Sydney Morning Herald* 12 November 1849, p.2).

v John Nicholson

John Nicholson and his wife, Eliza Hunter, settled on 1,200 acres known as *Newbury* in 1821. He was first the Harbourmaster at Port Jackson, later appointed Magistrate of the Berrima Bench and Coroner of the District Court for 15 years. The *Newbury* estate included *Arolla*, a brick cottage built for the widow of one of the Nicholson family in 1898 and a wooden cottage known as "Auntie's Cottage" which was occupied by two of Charles Nicholson's unmarried daughters after 1907. The family sold the property after the death of Charles Lindsay Nicholson in 1907 (Berrima District Historical Society, p.16).

vi James and Elizabeth Badgery

James and Elizabeth (née Lundie) Badgery arrived in New South Wales aboard the *Walker* as free settlers in 1799 (Emery 2008, p.106; Western Sydney Libraries) and were some of the earliest European settlers in the district (Architectural Projects, 2009, p.28). James and Elizabeth were from Exeter in Devonshire, England and arrived with their first surviving child, Ann (b. 1800). Elizabeth went on to have four sons, Henry, William, James and Andrew.

James worked with Sir Joseph Banks at Spring Grove in Chelsea and he and his wife left England with Captain William Patterson and his wife Elizabeth. As the Badgerys were not wealthy, they were not eligible for a land grant, so they went about building a milliner's and then bakery business in Sydney. In 1803, Badgery was granted land in the Hawkesbury district and then in 1809 at Bringelly on South Creek (Western Sydney Libraries). Exeter Farm was built in Bringelly and produced high quality cattle and horses, sheep and grain and the Badgerys continued to expand their holdings.

The Badgery family became strongly linked to the Exeter area after James obtained 500 acres at Sutton Forest in 1821 (Architectural Projects 2009, p.28). The Badgerys also built *Vine Lodge* and *Spring Grove* as well as *Boscobel* and *Ivy Hall* in the Southern Highlands. *Vine Lodge* was built by Henry Badgery in 1836. *Summerlees* was built by a grandson of Henry Septimus Badgery.

The Badgery family remained prominent landowners in the district after James' death in 1827. Henry Badgery's son, Henry Septimus (1840–1917) was elected to the Legislative Assembly as member for East Maitland in 1878 and at the 1880 general elections he won a position in the district of Monaro and was returned to Monaro again in 1882 (ADB Online *Badgery, Henry Septimus 1840–1917*).

vii Edward and Benjamin Carter

The Carters were a local family who lived in the Joadja Valley, about 16 km (9 miles) north-east of Berrima. Originally from Nottinghamshire England, Ann (née Holmes) and Benjamin Carter settled at Sherwood to the south-west of Berrima. They brought their three children, Jane, Edward and Sarah, with them; another two children, John and Charles, were born in New South Wales. Benjamin took the job of overseer of *Newbury* before settling himself and his family in Canyonleigh and building *Sherwood*. He later built *Golden Vale* at Sutton Forest for his family. *Golden Vale* is still standing and is listed on the State Heritage Register (SHR 00489). The Carters were a prominent family in the region and eventually moved to Crookwell to take up breeding sheep, cattle and fine horses (Golden Vale SHR 00489).

viii Arnold Stanley Taylor

Arnold Stanley Francis Taylor was born November 13, 1895 in Berrima NSW, son of Alfred Leslie and Annie Regina Taylor (née Bender) also of Berrima. Taylor was educated at Berrima Public school.

Taylor began his successful business career in 1910 with the Government Railways, Mittagong. After three years he joined Howard Smith Ltd., Sydney, as a junior. In 1914 Taylor resigned from Howard Smith Ltd and joined Farmers Ltd., Sydney, as a shipping clerk. 1915 saw Taylor appointed as senior clerk to George Wall Ltd., Sydney, and by 1918 he had founded his own business of A. T. Taylor & Co., Shipping Agents. During the period of World War I, Taylor capitalised on the internment of skilled German-Australians at Berrima gaol becoming "friendly with many of them, and as most were professional men was able, through them, to assess the great mineral possibility of this district. Subsequently, through this knowledge, Taylor established the Southern Portland Cement Company with a capital of over £1,000,000, mainly from British sources" (*The Southern Mail* 30 May 1952, p.2).

Taylor's numerous entrepreneurial pursuits included:

- preparing plans of a hydro-electric scheme capable of supplying Mittagong, Bowral and Moss Vale with electricity;
- interest in the extraction of petrol from shale oil at Berrima;
- sponsor of the Atlas Cement Company at Parramatta River;
- the development of the lime deposits at Marulan and the establishment of the Metropolitan Cement Company at Maldon; and
- purchasing of "Bullio South" property and successfully conducted sheep and fat stock raising there.

Taylor died in 1952 leaving behind his widow Ethel May Taylor (née Pike), five sons and one daughter.

3.5 The Kentish Arms/The Three Legs of Man/Mereworth

Mereworth was officially alienated from the Crown in 1839 but the land had been settled several years earlier. The property was established by John Atkinson (b. 1798) who arrived in the colony in 1822 as a free man on the *Mariner*. John made his home in the Sutton Forest region close to his brother James Atkinson who resided at *Oldbury*. Upon arrival John proceeded to claim a 2,000 acre (809.4 ha) parcel of land just south of the town of Berrima. John named the property *Mereworth* (also Merryworth, Merriworth) and established a dairy farm. The name *Mereworth* was used by both brothers on their respective land but the name eventually referred to John's property only.

The 2000 acres had not in fact been granted but were promised on 6 November 1823 and granted on 27 September 1839 (Higginbotham 1992, Vol 2, p.36). The official date of the grant did not hinder Atkinson's claim and he set about clearing and building so that by early in his tenure, he had built a cottage and an inn known as *The Kentish Arms* (after the county of his birth, Kent) beside Medway Rivulet on the western side of the South Road. Atkinson also requested a 500 acre (202.3 ha) grant to add to an existing 2,000 acre grant to accommodate his increasing stock. He married in 1823 and managed his brother's property and his own until 1827 (refer to section 3.4.7iii).

John travelled back to England in 1823 and married Jane Martin at Gillingham in Kent. On his return to the colony John was entrusted with the management of *Oldbury* until 1827 while James went back to England to attend to business (including publishing his book on agriculture and grazing). Atkinson was also managing his own holdings at *Mereworth* during this time.

Atkinson mortgaged his property to John Hillas in 1839, and then again in 1843. The first mortgage was for the 2000 acres, which included the 20 acres (8.1 ha) of land on which the inn was built. The second mortgage, taken out during the height of the depression, excluded the 20 acres that was sold off with the *Kentish Arms*. This sale did not help Atkinson with his debts and the property defaulted to John Hillas. A description of the defaulted land was of a "capital messuage with premises thereon" (Higginbotham 1992 Vol 2, p.47).

John Atkinson's frontage on the South Road may have influenced his decision to invest in the construction of the two-storey brick house with cellars and outbuilding which was to become his *Kentish Arms* inn (*Southern Highland News* 2 May 2011). Atkinson held the inn's license from 1836. Yet, even though the inn was constructed on a major transport link Atkinson had to sell the *Kentish Arms* and 20 acres of attached land in 1839. The 1839 advertisement of sale describes the inn as having:

> "Five Parlours – Tap Room – Nine Bed Rooms – Kitchen – Stable for fourteen Horses – Men's Huts – Stock Yards. &. a beautiful Garden of One Acre and a Half, in a high state of cultivation, planted with the choicest Apple and Pear Trees. The extend of the Land is Twenty Acres, being part of the magnificent Estate *of* MERRYWORTH [*sic*]… fully watered on two sides by the never-failing and pure stream known by the name of MIDWAY RIVULET…"
>
> (*The Australian*, 5 September 1839, p.4).

James Comer purchased the *Kentish Arms* for £1000 in 1839 (Higginbotham 1992 Vol 2, p.40) and the inn had a number of short-term licensees over the next decade. Thomas Loseby held the license 1839 to 1842. Thomas Wilmott had the license from 1843 to 1846 and held the mortgage for the *Kentish Arms* until 1874 (*The Sydney Morning Herald* 5 March 1874, p.7). Iris Finedley was licensee in 1847 and John Sundley had was the last licensee of the inn under the name the "*Kentish Arms*".

The *Kentish Arms* had a name change in 1849 with licensee and publican Thomas Ryan renaming it *The Golden Fleece Inn* (*The Sydney Morning Herald* 16 July 1849, p.1). As well as locals and travellers, key clientele for Ryan's inn appear to have been itinerant shearers and stockmen (*The Sydney Morning Herald* 16 July 1849, p.1). In 1850 Ryan was shot during a dispute over a horse at his inn and moved away soon after, as Robert Cowley takes the license over from c. 1853 (*The Goulburn Herald and County of Argyle Advertiser* 10 August 1850, p.3).

The Cowleys were a large family and Robert Collister Cowley was part of a family where he was one of nine siblings (three of them born to Hanna Frances Bonser) and many of whom are recorded as having died in the Southern Highlands (Ancestry.com), suggesting that this is also where they had lived at least for some of the time.

Robert Cowley (father of William Thomas Cowley, see above) changed the name of the inn once more to the *Three Legs of Man*. The *Three Legs of Man* references the flag of the Isle of Man, Cowley's birthplace. The inn remained mortgaged under the name *Kentish Arms* long after the name changes (*The Sydney Morning Herald* 5 March 1874, p.7).

Robert Cowley also ran a tannery from the *Three Legs of Man* property calling the business "*Mereworth* Tannery" (*The Sydney Morning Herald* 8 January 1868, p.8). Cowley purchased the property sometime around 1874 and converted the building into a family home renaming the building "Mereworth House" (*The Sydney Morning Herald* 5 March 1874, p.7; *The Sydney Morning Herald* 10 September 1881, p.1). Robert died in 1881 and the family attempted to sell the property. The listing describes it as:

> … house is built of brick, iron tin roof, contains 11 rooms; brick kitchen, store, and servant's rooms, stone cottage, stone stable, with 7 stalls; tannery and plant complete; splendid orchard with choice fruit trees…
>
> (*The Sydney Morning Herald* 9 May 1883, 'Advertising', p.11).

In a drawing by Isabel Farran (Plate 3.3) and another by Katherine Farran (not shown here but similar), the building is depicted as a two-storey brick building on sandstone foundations and with a veranda to the front addressing the South Road (Hume Highway). A photograph of the inn from around 1875 after it had been converted to a family home clearly shows the size of the building and appears to depict at least three generations of the Cowley family (Plate 3.4).



Plate 3.3 **"The Three Legs of Man on the Southern Road near Berrima", Isabel Farran 1900-1909. The inn is built right on the edge of the road and has probably been removed by later upgrades (Isabel Farran, National Library of Australia, nla. obj-135789431).**

The 1883 sale was unsuccessful, and it appears that William Thomas Cowley moved back to the family home to help his mother and sisters. From then on *Mereworth House* functioned as a family home and guest house run by "Miss Cowley" (*The Daily Telegraph*, 18 January 1890, p.8). The Miss Cowley was likely one of William's younger sisters; either Emily Agatha Cowley or Ada Killip Bird Cowley, both of whom were married in 1891. Ada married Charles H Caple and had moved to Mittagong by 1892 (Ancestry.com). Emily married grazier Albert Reynolds, the individual who purchased a portion of the *Mereworth* estate in 1903. It appears Emily remained closely associated with *Mereworth House* as her first child (b. 1892) was named Albert Mereworth (Ancestry.com). William's mother Myra Cowley died in 1909 (*The Scrutineer and Berrima District Press* 26 June 1909, p.2). The buildings on the property were demolished in 1918 though it appears that the Cowley had not occupied the property for some time prior to the demolition (*The Scrutineer and Berrima District Press* 17 April 1918, p.3; *The Sydney Morning Herald* 19 August 1939, p.13).

The *Three Legs of Man* property was not entirely abandoned after 1918. There was a cottage and a small number of outbuildings on the property in 1949 (Plate 3.5). The house was occupied by Charles David Lyons prior to his murder in November 1949 (*The Sun* 10 November 1949, p.2). The house is described as a five-roomed cottage with a hallway, and rear kitchen which was accessed by a gate near a culvert on the Hume Highway (*The Daily Telegraph,* 10 November 1949, p.1; *The Sun,* 10 November 1949, p.2). The 1983 seismic plan shows the cottage and another building to the east on the property (Plate 4.19). The cottage and the building in the east of the property were demolished c. 1985. There is currently a post-1980s dwelling on the property.

The demolition raises the question of why. Perhaps the capital needed to be raised to build a new working farm whereas the old building was needing more maintenance and using up money that was needed elsewhere. By the late nineteenth century, the usefulness of inns had diminished as the train brought visitors into, or close to, towns, where accommodation, victuals and stables were readily available. Clearly the Cowleys did not, or could not, continue profitable innkeeping and in order to earn a living another way, started anew on the hill and sold what they could of the old house.

This was also the end of the war to end all wars and building materials were needed for returning soldiers. The importance of reusing good building fabric was not lost on the community.

The final sale notice for the old inn was published in the local newspaper, *Robertson Advocate*, two days before the auction on Tuesday 23 April 1918. By this time, the buildings were derelict (Plate 5.3 and Plate 5.4). The view in Plate 5.3 is probably from the old *Mereworth House* (the inn) towards smaller buildings on the property. Plate 5.4 is assumed to be an outbuilding of some sort, such as a stable, as the roof clearly marks this building as one-storey with no similar features to the house.

The importance of the *Three Legs of Man* as a landmark on the Great South Road and the impact of the Cowley's long occupation of the site is recorded in place names. During the Cowley family's occupation (and beyond) the Medway Rivulet was known locally as "Cowley's Creek" (*New South Wales Government Gazette* 9 April 1888, p.2,517). Further, the current highway bridge crossing the Medway Rivulet, which was constructed above the old bridge, is called the "Three Legs o' Man Bridge".



Plate 3.4 The former "Three Legs of Man" in around 1875 after it was converted back to a family home. Source: Southern Highland News, 2 May 2011



Plate 3.5 The 1949 aerial photograph over the Three Legs of Man property, and what may have been Lyons' cottage indicated by blue arrow. Former Three Legs o' Man bridge piers indicated by circle

Further historical research has determined a more complete owner/occupant/subdivision history for Atkinson's *Mereworth*:

Table 3.2 Timeline for the occupation of John Atkinson's Mereworth

c.1822-1839	***Mereworth* (the property)** Established by John Atkinson		
1836-1839	***Kentish Arms*** John Atkinson: owner and licensee	***Mereworth*** John Atkinson: owner	
1839	20 acres sub-divided from *Mereworth* James Comer purchases the *Kentish Arms* for £1000	20 acres sub-divided for *Kentish Arms* sale M.W. and J.W. Hillas purchase *Mereworth*	
1839-1842	Thomas Loseby: licensee		
1843-1846	Thomas Wilmott: licensee		
1847	Iris Finedley: licensee		
1849	John Sundley: licensee		
c.1849-c.1851	***The Golden Fleece Inn*** (name changed from *Kentish Arms* to *The Golden Fleece Inn*) Thomas Ryan: publican		
1851	***Three Legs of Man***		
c.1852	(name changed *The Golden Fleece Inn to Three Legs of Man*)	William Moore: leaseholder	
c.1859-1865	Robert Cowley: licensee and occupant Mereworth Tannery	James Johnson Warren: leaseholder	
Pre 1874	Thomas and Maria Wilmott and their son Jasper: mortgage holders		
1874	Wilmott's default on mortgage Robert Cowley purchases the *Three Legs of Man*		
1883	***Mereworth House***		
1887-1901	(name changed *Three Legs of Man* to *Mereworth House*)	Hon. John Lackey purchases *Mereworth*	
1903	Robert Cowley dies	***Mereworth* subdivided**	
1912	Function changes from Inn to family home/ unlicensed guest house	William Thomas Cowley (previously of *Three Legs of Man/Mereworth House)*: purchases *Mereworth* William Thomas Cowley and descendants: owners and occupants	A. Reynolds purchases 800 acres

Table 3.2 Timeline for the occupation of John Atkinson's Mereworth

1918	***Mereworth House* and buildings demolished**	
c.1942		*Mereworth* is included the *Southern Portland Cement Estate* subdivision No.108
1947		21st November 1947 *Mereworth* is included in land proclaimed as a Bird and Animal Sanctuary
Pre 1949	**Construction of cottage and outbuildings** Charles Lyons: occupant (dies 1949)	
1963		**Mereworth House and Garden**
Pre 1986	**House** constructed on Hume Highway frontage	Tony and Amber Oxley: owners **Construction Mereworth House and Garden c. 1964**
1986	Construction of New Hume Highway/ Remembrance drive	
	Buildings demolished	
2014		PBF 2 Pty Limited: purchases Mereworth House and Gardens
2015		S F Pastoral Holdings Pty Ltd: purchases Mereworth House and Gardens
		Hume Coal Pty Ltd: purchases Mereworth House and Gardens 15/02/2015
Pre 2017	**House and outbuildings constructed**	
Present		

4 Field survey

4.1 Survey method

Field surveys are an important aspect to assessing the potential and significance of heritage items and is used to either verify the existence of sites or to discover sites that archival research was not able to identify. Survey methods are adapted to the type and size of project area and the outcomes of archival research. The most common survey method is one that is targeted to areas identified in historical research, visual information such as remnant buildings and landform.

The survey strategy for this project was developed using the information gathered in the background research for this report including the historical summary and the heritage listings. Field survey was conducted on foot and targeted areas that were predicted to hold tangible evidence of the historical development of the Project area as well as the locations that will be physically impacted by the Project. The areas that were extensively surveyed for the historical assessment are the surface infrastructure area, the drift entry and exit points and the two ventilation shafts. Further survey for historical values was conducted in tandem with the Aboriginal survey.

Items and places were recorded through digital photography, GPS coordinates and written descriptions.

The purpose of the field survey was to:

- identify the potential relics or known relics in the Project area;
- ascertain the existence of structures across or in close proximity to the Project area;
- identify significant cultural landscapes within the Project area, and in particular, above the underground mining area;
- assess views and vistas relating to heritage listings and to the cultural landscape; and
- identify potential historical sites suggested by exotic plantings, glass and ceramic where survey was undertaken.

Field survey associated with the Aboriginal heritage survey was completed on various dates in 2014 and 2015 with supplementary site visits undertaken in 2016. The final survey effort was undertaken on 30 September to 2 October 2019 by Pamela Kottaras (EMM), Amelia O'Donnell (EMM) and Rod Doyle (Hume Coal). This additional field survey was undertaken on the request of the IPC and was conducted only on sites where access permission was provided or from the public domain.

The focus of this 2019 field survey was:

- the site of the *Three Legs of Man* Inn viewed from the public domain;
- the site of the former Three Legs o' Man Bridge;
- additional survey on *Mereworth*;
- repeat inspection of properties on the Illawarra Highway viewed from the public domain;
- repeat inspection of Black Bobs Bridge to compare with Three Legs o' Man Bridge piers;
- visual inspection of *Newbury* viewed from the public domain; and
- visual inspection of rows of elms from *Oldbury* viewed from the public domain.

4.2 Survey results

4.2.1 Summary

The results of the field survey are presented below and are divided into property units rather than landform units, as the main focus was on the areas of surface impacts. The results are discussed below. Generally, the highest heritage values were found to be on the *Mereworth* property. The main focus of heritage significance is the house, the garden surrounding it and the avenue of trees; these items will not be physically impacted by the Project.

While the main homestead and farm buildings visible on the 1949 aerial photograph have been demolished and renewed with modern stock yards and buildings, one area of archaeological sensitivity was recorded during the last field survey (2 October 2019). This area will not be affected by the Project as it will remain a stockyard. Details of the find are included below.

The other focus for surface infrastructure will be on Evandale, which was also surveyed. Evandale did not display any areas of archaeological sensitivity, and the cluster of farm buildings does not demonstrate heritage values other than conforming to the landscape values identified by JRC (1991) and the National Trust of Australia (NSW) (1998).

Elsewhere, relics are likely to occur above the mine plan. Potential impacts to these items are described in Section 7.

4.2.2 Mereworth House and Garden

i Oxley phase to present (1964–2019)

The present house is at 80 Mereworth Road, on the western side of the Hume Motorway, south of Medway Road. The Mereworth house and garden is an item of local heritage significance listed on the WLEP as item I027. The last archaeological survey conducted at *Mereworth* was on 2 October 2019. Prior to this, the house and grounds were surveyed on 26 March 2015 and again on 29 April 2016, by the EMM heritage team. Survey was undertaken in the vicinity of the farm buildings to ascertain if any evidence of the fabric visible in the 1949 aerial photograph could be seen on the ground; this was in addition to other dates when access due to stock was not possible.

Mereworth house and garden comprises of a house surrounded by an established garden accessed from Mereworth Road by a long driveway that turns into an avenue of trees lined with conifers and golden elms on both sides, ending at a porte-cochere.

The existing house was built in 1965 and was designed by John Amory. It is a two-storey brick building with associated outbuildings. Stylistically, the closest architectural style is French Provincial (Plate 4.2).

John Amory, American born and trained at Princeton University (USA), served in the US Navy and was the Assistant Director of National Art Gallery, Washington DC. Amory married an Australian, Judy Mills, and moved to Sydney in 1954, after an earlier visit in 1950. His works include the conservation of stables at Point Piper and the conversion of stables into a villa at Bellevue Hill in 1957 (Woollahra Council). Amory also designed another French Provincial style house in Pibrac Avenue Warrawee and a house at Bellevue Hill for Caroline Simpson (1960) (Noni Boyd Heritage Officer AIA pers. comm.).

The dwelling is separated from the larger pastoral landscape that surrounds it by a double-level ha-ha[2], on the northern side of the grounds, designed by Paul Sorensen, which creates a physical boundary from the surrounding paddocks but maintains the visual continuity with the landscape to the north.

[2] A ha-ha is barriers created by retaining walls or ditches to allow for uninterrupted views across a landscape while keeping livestock out.

Most of the ancillary buildings on *Mereworth* are outside of the nucleus created by the main dwelling and garden (Plate 4.1). A stable block dating from the 1965 construction is located on the perimeter of the garden on the southern side and is therefore considered to be within the core garden area (Plate 4.4). The farm buildings just beyond the main garden to the north-east are operating work sheds and structures such as stock yards and a residence that it presently unoccupied.

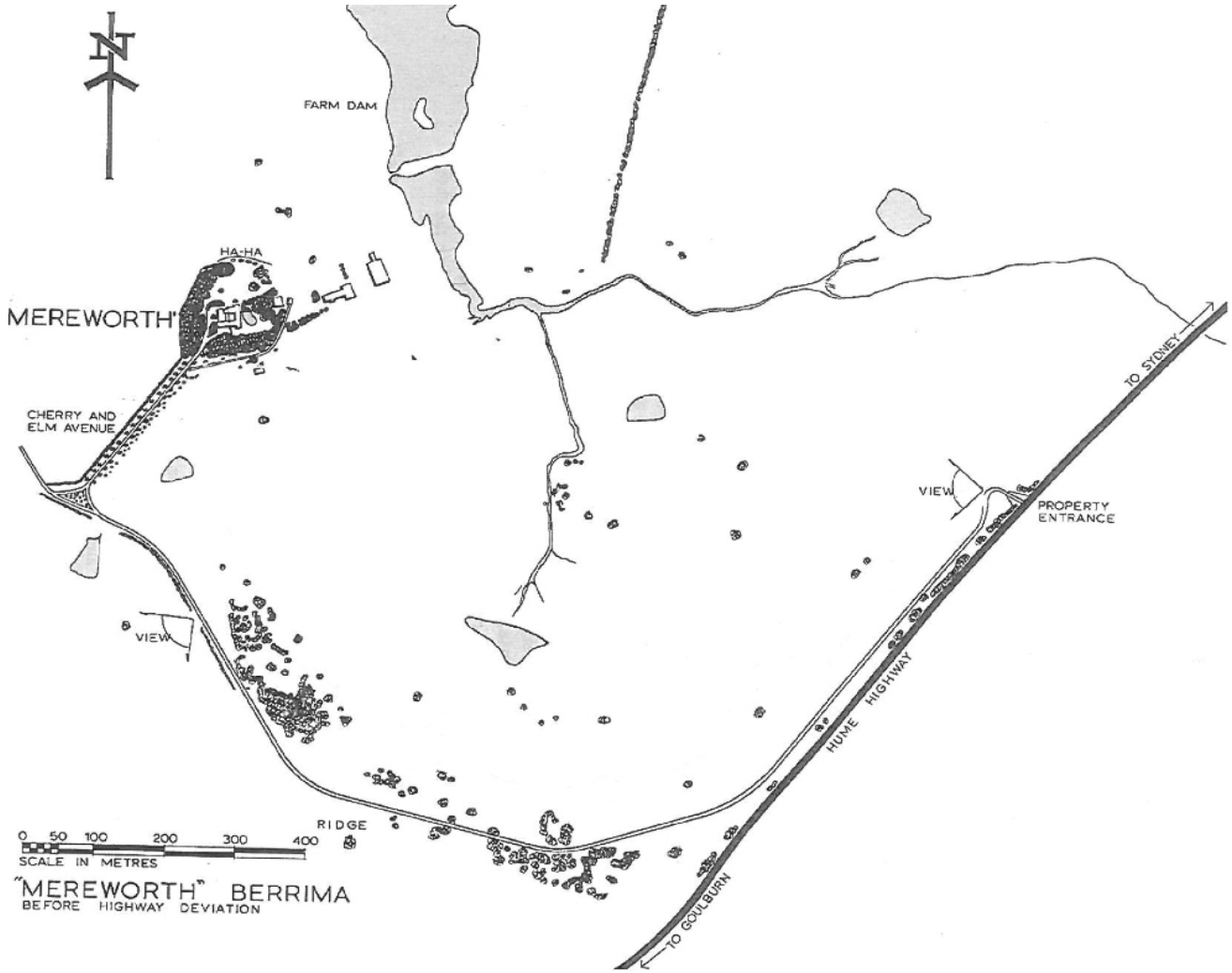
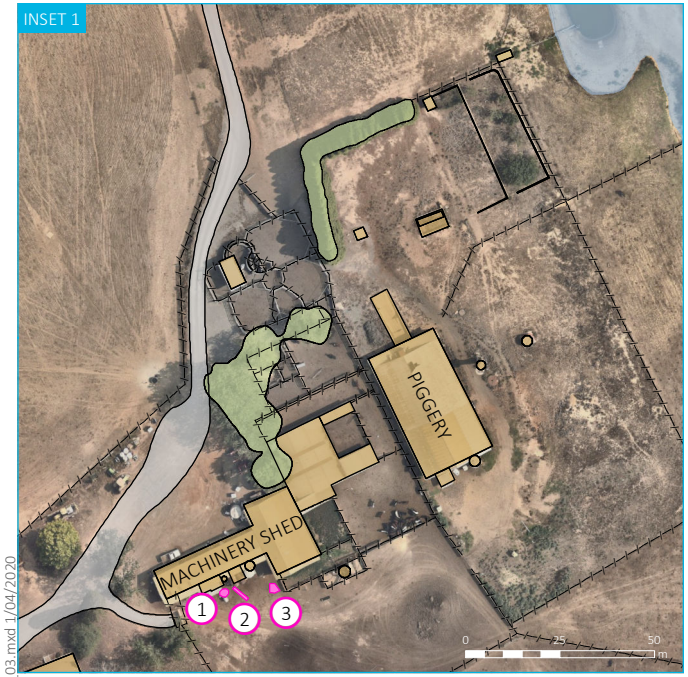
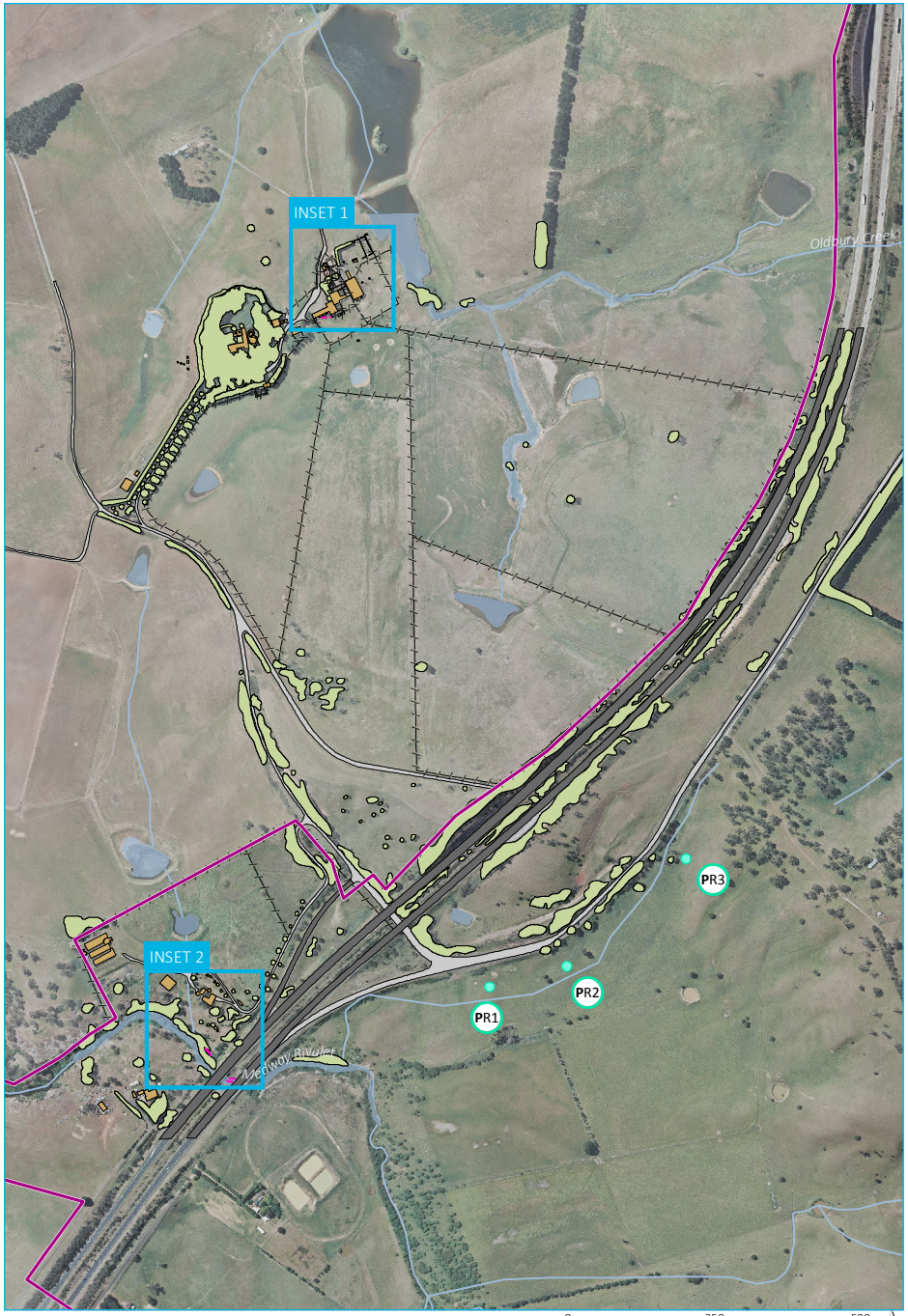
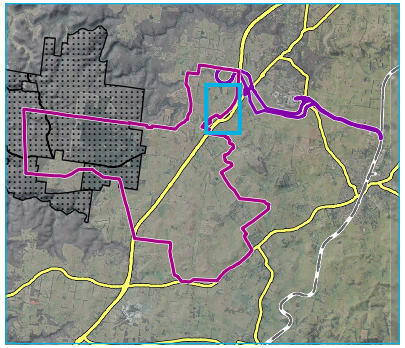


Plate 4.1 **Plan of Mereworth with driveway and avenue of trees before the Hume Highway deviation in 1985. Source: Ratcliffe 1990, p.97**









KEY

- Hume Coal Project area
- Berrima Rail Project area (refer to inset)
- Known relic
- 1 Sandstone flagging
- 2 Sandstone drain feature
- 3 Artefact scatter
- 4 Drystone wall
- 5 Three Legs O'Man bridge piers (reconstructed 1860)
- Potential relic
- PR Employee residence
- Fence
- Building/structure
- Vegetation
- Motorway
- Road
- Watercourse/drainage line
- Waterbody
- Major road (refer to inset)
- Rail line (refer to inset)
- Belanglo State Forest (refer to inset)

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Source: EMM (2020); NearMap (2019); Hume Coal (2016); DFSI (2017)

Areas of known and potential relics in and adjacent to the project area

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 4.1

HUMECOAL PROJECT

EMM creating opportunities



Plate 4.2 **The John Amory designed house at *Mereworth* (b.1965). The cold climate garden is behind the house and the sunken lawn at the front. View south-east.**

The house was built on this location to "take advantage of the existing mature cypress and radiata pine windbreaks" (Ratcliffe 1990, p.96), and also because there would have been an existing building platform on which to place a new structure.

The garden surrounding the house, the avenue of trees and driveway were designed by the landscape architect, Paul Sorensen (refer to Section 3.4.7viii). Sorensen's tree-lined driveway and surrounding garden is a combination of native and exotic plantings that incorporated existing plantings (Brouwer 2020a).



Plate 4.3 **Rows of golden elms and flowering cherries lining the avenue to the house at *Mereworth* (Ratcliffe 1990, p.98). View north.**



Plate 4.4 **The north-west corner of the stable on the southern perimeter of the garden. View south-east.**

The yard to the south of the dwelling is planted with cold-climate trees, separated by manicured lawns, creating a space of filtered light. On the eastern side, an in-ground pool separates the house from a formal rose garden designed by Sorensen, with a fountain inside a wisteria covered stone gazebo (Plate 4.5). It is the location of the inground swimming pool that the Cowley's farmhouse once stood; no evidence of the dwelling is visible in this area.



Plate 4.5 The gazebo and fountain surrounded by the rose garden. View east

A long section of the driveway that originally led from the Hume Highway (now the Old Hume Highway) to the house was curtailed by the Hume Highway duplication in 1985 and *Mereworth* is now entered from Mereworth Road, which joins a remaining section of the original driveway closer to the house. This change moved the entrance to the property from just south of Oldbury Creek to the end of the motorway slip road just north of Medway Rivulet, a distance of approximately 1 km to the south. Mereworth Road can also be accessed from the Old Hume Highway.

The garden beds (Plate 4.6) to the north of the piggery are part of the Oxley family phase of the property. The landform in this location has been raised and levelled to create two levels of garden. Some cherry blossoms survive to the east on the lower level closest to the dam on *Oldbury* Creek and a wind break of conifers is located to the north-west corner. The upper level of the garden is currently grassed. Plans of the property indicating the functions of features have not been found but it is not difficult imagining this section as a kitchen garden.

The retaining wall on both levels is constructed with the same brick and brickwork as the ha-ha surrounding the house.



Plate 4.6 The garden beds to the north of the farm buildings

4.2.3 Cowley phase (1912–1964)

This phase was referred to as "Mereworth 1" in the statement of heritage impact (2017) and additional research has determined that the homestead was not built by John Atkinson but by William Thomas Cowley, the son of Robert Cowley, owner and licensee of *The Three Legs of Man*.

William Cowley purchased the property in 1912. The main homestead building (the house) was demolished to make way for the current dwelling and garden surrounding the house c.1964. No evidence of pre-1964 elements were located in or around the dwelling, which is not surprising as a significant amount of landscaping was undertaken for the Oxley family and those plantings are now mature trees.

The working farm buildings were visited again and found to be constructed for the Oxley phase of the property and upgraded for current farming. This time, the yard behind the machinery shed was free of stock and grass for the inspection. Three features of note were recorded in this location: a feature of sandstone flagging (HCR1), a linear feature that appears to be a sandstone drain (HCR2) and a scatter of early twentieth century artefacts (HCR3).

i HR1 Sandstone flagging: Zone 56, 252053E 6178203N

The sandstone flagging comprises two sections that are divided by soil that may be the result of the removal of flagging or simply because the sandstone is obscured. The dimensions of this feature are approximately 1,200 mm by 2,000 mm and is made of roughly hewn, flat sandstone pieces, between approximately 3,000 to 4,000 mm long and wide (Plate 4.7). Based on the inspection, the flagging appears to run beneath the existing machinery shed and may be the result of levelling fill placed over earlier features to accommodate the modern farm buildings.



Plate 4.7 Sandstone flagging south of *Mereworth* ancillary buildings. View northwest.

ii HR2 Possible drain: Zone 56, 252057E 6178204N to 252060E 6178200N

The linear feature is visible for approximately 6 m with a terminus to the south-east (Plate 4.8). It is oriented at 320° and is flush with the ground. It is comprised of linear sandstone blocks, between 80 and 200 mm wide and 450 mm long. Depth was not determined. The rough dimensions of the 'drain' feature are: inside width of 200 mm; and outside with of 350 mm.



Plate 4.8 Sandstone drain feature south of *Mereworth* ancillary buildings. View northwest.

iii HR3 Artefact scatter: Zone 56, 252068E 6178200N

In addition to these two structural features, artefact scatters and disused domestic elements were also noted. The artefact scatter is located close to the sandstone features and is comprised of fragmented pieces of glass and ceramic that dates to the pre-1960s occupation period (Plate 4.9). The majority of the fragments were relatively large given their location in an active stockyard suggesting their exposure may have been recent. The artefact scatter consisted of:

- Glass

  Fragments from green and colourless automatic machine-moulded bottles. Ribbing was not present around the bottom of a colourless bottle base fragment, which suggests a pre-1950s date (Plate 4.9 row 1 item 1) (Burke & Smith 2004, 360).

  A large fragment of aquamarine (light blue/green) bottle glass was also found (Plate 4.9 row 1 item 3). The fragment was thick and flat and, while aqua glass was used for windows, the fragment likely came from a square/rectangular bottle. The fragment had large air bubble inclusions. Such inclusions are from the manufacturing process and may represent either the late nineteenth century mould-blown technology or an early (c. 1915-1920s) machine-made technology (Miller & Sullivan 2000). Miller & Sullivan (2000 p. 165) note that early automatic glass blowing machines could cause “stringy” texture and /or “entrapped air blisters”. Aquamarine glass, however, tends to lean towards a nineteenth century date due to developments in colourless glass technology in the early twentieth century.

  Thick fragments of colourless window glass were also present.

The glass typologies suggest a late nineteenth to early twentieth century date.

- Ceramics

  Fragments of a refined earthenware known as whiteware were present (Plate 4.9 row 1 item 4, row 2 items 2-5). It must be noted other ware types such as porcelain or stoneware were not observed. The majority of fragments were plain or had blue and white transfer print decoration. A few different patterns were observed including Willow/Willow style, which has been popular since its introduction in 1790 (Samford 2000, p.63).

  A base fragment of blue and white transfer print was notably different from others. The fragment had a blue tint to the glaze, which was particularly visible around the foot ring. A blue tinted glaze is a feature of “Pearlware”, invented in 1779 by Wedgewood (Sussman 2000, p.38). The fabric of the early pearlware ceramic was commonly cream coloured and the blue tinted glaze was used with blue designs in order to make the ceramic body appear whiter (in imitation of Chinese porcelain) (Sussman 2000, p.38); the fabric of pearlware ceramics did become whiter in the nineteenth century.

  Shell-edge decoration is the most common form of pearlware, however, transfer printed pearlware was also manufactured in the nineteenth century with the transfer colour moving from grey-toned blue to royal blue around 1820 (Sussman 2000, p.40-41). It is also possible the blue tint occurred during the manufacture of a decoration style known as “flow blue”. Flow blue was a style of whiteware decoration where the ink of the transfer was encouraged run in order to create a blue “shadow” around the design. The print on the ceramic, however, does not suggest a flow design but weathering may have faded the flow.

Ceramics suggest a mid-late nineteenth century date. Ceramics do have a long use-life so detailed analysis would be required for a more accurate assessment.

- Metal

  Metal artefacts were also observed. The metal objects were more recent in date and included a modern ferrous “spike” and spanner (Plate 4.9 rows 3 and 4).

  A footed (claw) enamelled iron bathtub was leant against the machine shed (north of the sandstone features). The feet were missing but the moulded attachment points were visible (Plate 4.10).



Plate 4.9 **Sample of artefacts (glass, domestic ceramic, ceramic tile, metal) from around *Mereworth* sandstone features**



Plate 4.10 Cast iron bath south of *Mereworth* ancillary buildings. View north-east

iv Miscellaneous

- Timber

  Timber items were found east of the piggery and included two turned “spindles” and boards. One of the spindles appears to be chair leg, the other perhaps a cross-bar (Plate 4.12). The timber items were painted turquoise, white and yellow. These were not in association with other artefacts. The items were collected during the field trip and are stored in piggery with the window frame and wagon wheel.

  These timber elements are being housed in the piggery with the window frame and wagon wheel recorded and collected in 2016 (Plate 4.11).



Plate 4.11 **Window frame and wagon wheel fragment dating from the early twentieth century. View north-west**

An old gate, possibly from the Cowley phase of the property, was noted tied to an extension along a stockyard fence. The fence is the boundary of a stockyard with a stamped concrete floor. The gate may be machine cut but its outdoor location has weathered it so ascertaining its manufacture is difficult. The gate was constructed with horizontal upper and lower supports, vertical “slats”, and diagonal cross bar. Two iron hinges with squared at cylindrical loop opposite (for post/pin) and squared ends with four bolt holes are on one side (at “top” in current position). Both possibly had been painted white. The gate seems small for keeping livestock, like cows, in place (Plate 4.13).



Plate 4.12 Turned timber spindle from near *Mereworth* piggery



Plate 4.13 Old gate in the fencing of the *Mereworth* stockyards. View north-east

Tiles for the roof of the current 1965 dwelling are also stored behind the machinery shed (Plate 4.14).



Plate 4.14 Roof tiles for the current Mereworth house south of the ancillary buildings. View north-west

Development of the existing property has destroyed much of the archaeological resource related to the homestead that was built on the site by the Cowleys c.1912, with the exception of a sandstone drain and sandstone flagging recorded south of the large machinery shed to the north-east of the house and gardens.

Since Atkinson first took over the land, changes have included the removal of trees, stock grazing, damming *Oldbury* Creek and its tributaries. Atkinson built his first home, possibly on the northern side of the Southern Road (Old Hume Highway (refer to Section 3.4.7iii), then the brick house, which was converted to an inn for a time before it was converted to a family home again. The inn, variably known as "The Kentish Arms", "The Golden Fleece" and finally as "The Three Legs of Man" was demolished in 1918 after the owners, the Cowleys, moved to the homestead they built on the rise c. 1912, where Mereworth house and gardens are now. Examination of the 1949 aerial photograph reveals that the shape of the garden at *Mereworth* today follows the pattern set down by the Cowleys (Plate 5.2). While the accuracy of a georeferenced photograph cannot be verified without excavation, the information it provides strongly suggests that the current swimming pool was built over the former homestead house. Further, the landscaping to create the garden, now with mature trees and utilities infrastructure, would have caused damage to the former homestead building directly beneath the most actively developed areas.

The land to the rear (north) of the existing Mereworth house and garden (north-west), which was also the rear of the main homestead building, has, and is being, used for activities directly related to farming. As all the buildings have been renewed in the last 50 years, it is unlikely that any structures relating to the Cowley family phase exist in usable condition.

4.2.4 Former Kentish Arms Inn/Three Legs of Man Inn/Mereworth House

Analysis of the former inn site, *The Kentish Arms*, later *The Three Legs of Man*, and later still, *Mereworth House*, was initially completed using archival sources as the inn was found to be outside the Project area. It has been included in this report because of its proximity to the Project boundary and its association with other potential relics within the Project area, in particular to one of the earliest settlers in the region. Its legal boundary is Lot 1 DP 780173.

An additional archaeological survey was undertaken in October 2019, as a result of a request in the IPC report, to view the south-east corner of the property that the inn stood on at one time. Aerial photography indicates a linear feature in the south-east corner of the current property, which may be a remnant of the stone fence shown in a photograph of the building after it was converted from an inn to a house (Plate 3.4).

Inspection of the linear feature (refer to Plate 4.15) and the landscape in the vicinity was undertaken from the public domain. The feature runs along the south-western fence line adjacent to the Medway Rivulet (Plate 4.15). A maximum of six courses of sandstone block survive in a random rubble formation, although the integrity of the wall is poor (Plate 4.16). It has evidence of patching with concrete, stone blocks, corrugated iron and star pickets and is further strengthened by iron pipes.

This feature is not the wall shown in the image of the Cowley family in front of *Mereworth* House (as the inn became known) but if it is part of the property, it would be the return from the front wall; it is unfortunate that a historical photograph facing south-west from the front of *Mereworth* House does not capture the landscape as it drops down to the Medway Rivulet (Plate 4.17).



Plate 4.15 Linear stone feature on the south-eastern border of the Three Legs of Man property. Taken from the southern bank of the Medway Rivulet. View north



Plate 4.16 **Close up dry-stone wall (HCR4) on the south-eastern border of the Three Legs of Man property. Taken from the southern bank of the Medway Rivulet. View north**



Plate 4.17 ***Mereworth* House, the former *Kentish Arms* and *Three Legs of Man* Inn early twentieth century. View south-west. Source: Berrima District History Society**

What the photograph in Plate 4.18 illustrates is that the road was cut into a sloped landform and the stone fence was a retaining wall. Comparison of the photographs in Plate 4.17 and Plate 4.18 supports this description as the house was not built high off the ground.

Other landscape features that were noted include mounds that may represent the site of the former inn and house or, more likely, represent the post mid-century dwelling that was demolished for the motorway a driveway that was accessed from the Old Hume Highway alignment. Modern extruded bricks were also scattered in the verge between the highway and the property fence line. The location of the dwelling that was demolished for the Hume Motorway is was surveyed for the "Seismic Survey and Drilling Preliminary Report No. 1100" prepared in 1983 by the Materials & Research Laboratory, Department of Main Roads (DMR). The report's focus was on the Medway Rivulet bridge site to inform the F5 South Western Freeway – Berrima Bypass. The dwelling that was demolished for the Hume Motorway is indicated by a blue arrow (Plate 4.19); the driveway in use at the time, but is now blocked, is also shown.

The historical demolition of the inn, development of motorway, and development of the current property has destroyed and obscured much of the archaeological resource related to the *Kentish Arms*/*Three Legs of Man* Inn, with the possible exception of the portion of dry-stone wall on the south-east of the property.



Plate 4.18 ***Mereworth*** **House after it stopped trading as The Three Legs of Man. Note the stairs leading into the property. Source: Berrima and District Historical Society**

Since Atkinson first took over the land, changes have included the removal of trees, stock grazing, damming *Oldbury* and tributaries, and the construction of the South Road c.1834. Atkinson built his *Kentish Arms* on the western side of the South Road (Old Hume Highway). Atkinson's brick inn, variably known as "The *Kentish Arms*", "The Golden Fleece", and "The Three Legs of Man" changed hands a number of times. It is likely the various occupants of the inn made changes to the site. The function of rooms in the inn likely changed when the Cowleys converted the building to a family home. Further, outbuildings may have been demolished or re-worked depending on the needs of the occupants. The inn and standing outbuildings were demolished in 1918 after the owners, the Cowleys, moved to the homestead they built on the rise where *Mereworth* and gardens are now. The stone wall bordering the front of the property survived the demolition.

Examination of the 1949 aerial photograph reveals a house set back from the road and a small number of outbuildings on the property (Plate 3.5). It appears the house survived until recently, the 1983 Hume Motorway plan (Plate 4.19) identifies a building its location. The aerial photograph also suggests a linear construction in the location of the dry-stone wall.

Another house was built on the property prior to 1983. It was located north east of the cottage and had a frontage on the Hume Highway. The house was demolished to make way for the current motorway c.1983. Significant earthworks occurred on the eastern edge of the property during the motorway construction.

The current dwelling was built after 1983, directly north of the 1949 cottage (Plate 4.19). Survey from the public domain could not verify if sub-surface archaeological remains are visible on the property. Construction, landscaping, and utilities infrastructure would have caused damage to the remains of the former *Kentish Arms*/*Three Legs of Man* structures directly beneath the most actively developed areas.

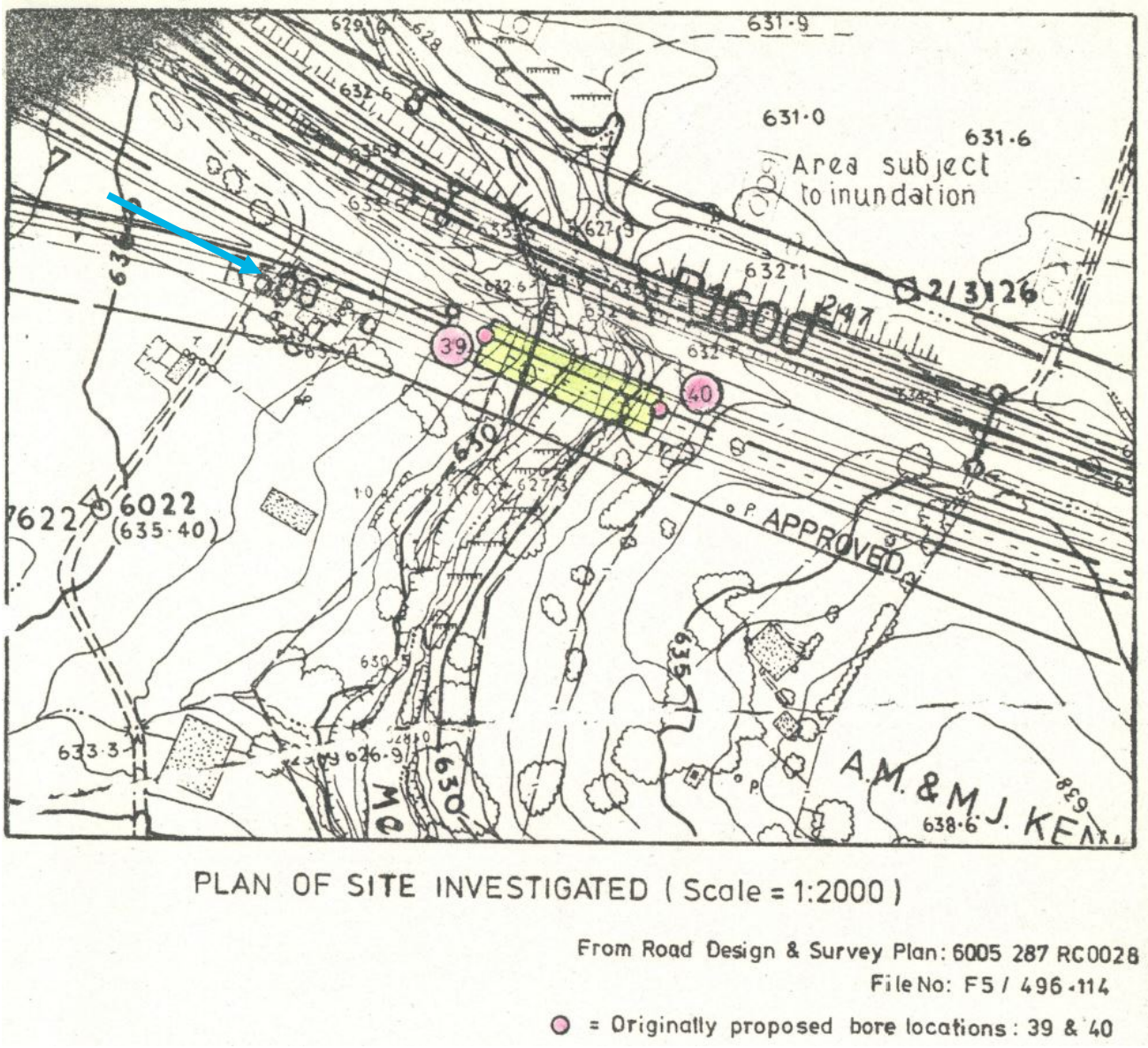


Plate 4.19 Survey of the Medway Rivulet and adjacent buildings 1983. Source: Hume Coal Pty Ltd

Although original material on the *Three Legs of Man* was not visible (unless the stone wall is part of the original wall) during the October 2019 survey, it is likely that relics are present. Advertisements from 1918 indicates that all of the standing buildings on the property were deconstructed and Frank Walker noted in 1939 that the inn's "…whole superstructure has gone, and all that remains today is a section of stone wall which originally stood in front…" (*Robertson Advocate*, 23 April 1918; *The Sydney Morning Herald* 19 August 1939, p. 13). Evidence of this deconstruction should still be archaeologically visible. The robbed footings of buildings or flagged surfaces as well as stray nails and non-saleable demolition materials may survive below ground. Moreover, even with the deconstruction of the main house, total deconstruction of a sub- surface structures, such as cellars or privies, may not have been feasible, and they may have been infilled and covered over. The footings or post holes for structures that had been removed prior to the 1918 demolition may also survive.

It is probable some evidence of general domestic waste will also be present on the property. Organised rubbish removal was not common until the twentieth century and household waste was removed from circulation by burying, burning, or dumping somewhere on the property, generally in the garden.

Disturbance to the site during the c.1983 Hume Motorway redevelopment combined with the subsequent redevelopment of a homestead on the property have likely impacted the archaeological potential. Nevertheless, the archaeological potential of the Three Legs of Man property will only be determined through thorough archaeological survey within the property boundaries.

4.2.5 Former Three Legs o' Man Bridge

The Three Legs o' Man Bridge is not in the Project area. This two-lane bridge superstructure of the current Three Legs o' Man Bridge passes over two sandstone linear piers and a sandstone retaining wall that belonged to an earlier crossing of the Medway Rivulet. The piers are comprised of picked rectangular blocks approximately 900 x 300 x 350 mm in size. Both piers are approximately 9,000 mm long and 900 mm wide and oriented roughly east west and ended with bevelled blocks (Plate 4.20, Plate 4.21). Both piers have iron bars protruding from the top (Plate 4.20). The pick marks on the sandstone vary in style from block to block and the mortar is a cement with visible components being mineral lime (black spots), small quartz inclusions and large sand grains. The mortar was roughly pointed with patches of overflow (Plate 4.22).

The northernmost course has suffered a higher degree of damage of the two, and survives only to six courses high but was likely to be the shorter of the two as it is placed higher on the bank of the rivulet (Plate 4.20, Plate 4.21).

The southernmost pier is the more intact of the two. It is approximately 4,000 mm high (13 courses high – one being submerged in the rivulet) and 9000 mm in length. Two blocks are engraved and set into the structure. One block on the northern elevation is inscribed with either [HD] (interconnected) or [IDC] (if upside-down) or an interconnected [CH] if the right way up (Plate 4.22). Another block, at the angled terminus has an upside-down [1834] on the sixth course up on a bevelled block (Plate 4.23). The presence of a granular cement mortar, the inverted inscriptions, and the history of the bridge, suggest the piers have been re-built and stabilised.

The retaining wall was not accessible and was photographed from afar (Plate 4.24). It was constructed of sandstone blocks similar to the bridge piers, but does not have any visible mortar. The current height of the retaining wall is approximately 600 mm high, indicating that it is comprised of two courses of sandstone built over bedrock. At most, only three blocks could be seen laid end to end. This feature has the appearance of being in its original form suggested by the location, the lack of mortar in the structure and the fact that the landform it was built in would have provided it with more stability than the free-standing piers.

Development of the Hume Motorway has destroyed portions of the archaeological resource related to the South Road and the former Three Legs o' Man bridge around the Medway Rivulet with the exception of the sandstone piers on the Medway Rivulet. The current motorway was constructed c.1985. Heavy land formation earthworks were employed to raise the level of the motorway and overpass. Large areas around the Rivulet have been covered by basalt boulders meaning the level of ground disturbance was not visible. There was evidence of machine scraping in the sandstone on the northern bank of the Medway Rivulet.



Plate 4.20 **Former Three Legs o' Man bridge piers. View east**



Plate 4.21 **Former Three Legs o' Man bridge piers. View west**



Plate 4.22 **“initials” inscription former Three Legs o’ Man bridge southern pier. View south**



Plate 4.23 **Date inscription “1834” former Three Legs o’ Man bridge southern pier. View south-west**



Plate 4.24 **Sandstone block retaining wall south bank of the Medway Rivulet. View south-east**

4.2.6 Evandale

Evandale, located to the south of *Mereworth*, was inspected with no results of archaeological nature around the main dwelling and farm building cluster.

Evandale (Lot 2 DP 751251) is part of three land grants to Timothy Beard between 1834 and 1837. Evidence that Beard developed the land has not been found but land titles records show part of the property as being reserved for water supply and access in 1886 (revoked in 1939), subject to a mining lease application by Loch Catherine Mine in 1924; in 1927 it was converted to Crown Lease Area 4454, revoked in 1930, after which it was reserved for village purposes. Again in 1934, the lot was reserved from alienation or lease for mining purposes (revoked in 1940) after it was leased by Douglas Burns Reid (Merchant) in 1938 and transferred to him by conditional purchase in 1945. Reid remained on the land until 1978 after which it came into the ownership of Evandale Pty Limited (still owned by Douglas Burns Reid). In 2014, the lot was purchased by Cavalier Rural Properties Pty Limited.

The lower portion of Evandale that is currently with a dwelling, farm buildings and gardens, was also granted to Timothy Beard and purchased in part by Edward Carter (Grazier) in 1882 who then purchased the remainder in 1889. The property was transferred to Edward Alfred Hanslow Carter (Grazier) in 1931 who sold it to Douglas Burns Reid in 1938. It was transferred to Evandale Pty Limited in 1959 after which it was sold, in 2014, to Cavalaire Rural Properties Pty Limited.

Based on the architectural style, aerial photography and ownership history, the main dwelling is likely to date from early to mid-twentieth century. Plans of the property could not be found.

The north-western corner of *Evandale* (Lot 2 DP 751251) was surveyed on 10 February 2014. This area was surveyed specifically because it will be impacted by mine infrastructure. While historical research did not indicate previous structures in this area, there is potential for unrecorded relics to exist. The surveyed area is a large paddock that has been historically ploughed over the last 150 years.

A scatter of historical and Aboriginal artefacts was identified in February 2015 and is physically associated with three Aboriginal artefacts, located on the edge of a ploughed paddock. This deposit was identified in the field as discard and does not represent a former structure. It shares the Aboriginal archaeological site name HC_127. This site, HC_127, comprises glass fragments, a metal buckle and ceramic sherds with Aboriginal artefacts made of indurated mudstone, quartz and silcrete (three Aboriginal artefacts recorded by survey; refer to Plate 4.26). A mature yucca plant was recorded within 4 m of the scatter (Plate 4.27). Verification of HC_127 as a relic has not been possible as records of structures in this area have not been located and no other suggestion of fabric was visible (refer to Plate 4.27). However, as this paddock has been ploughed regularly, the most likely scenario is that the yucca is self-seeded and has been avoided in subsequent ploughs as it is too close to the edge of the bushland. The glass, ceramic and metals are likely to be redeposited refuse.

The southern extent of *Evandale* was surveyed over four days, as a higher concentration of the mine infrastructure area was initially proposed to be located south of Medway Rivulet and north of the main homestead. The revised mine design now locates the majority of the infrastructure on *Mereworth* with only two drifts, conveyors and an upcast shaft in proximity to the cluster of buildings on *Evandale*.



Plate 4.25 HC_127 (also an Aboriginal site) with a ceramic tea cup handle, a plate fragment and a metal buckle



Plate 4.26 HC_127 (also an Aboriginal site) with a collection of glass from the surface



Plate 4.27 **HC_127 (also an Aboriginal site) is in the middle ground in the photograph close to the deep green plant (yucca). View north**

The area was found to be consistent with the surrounding land: cleared land used for cultivation and grazing. Trees are a mix of natives, endemics and exotic plantings along the main driveway surrounding the primary dwelling. Since 1949, windbreaks have been planted (which have now matured) and are recognisable features of the area. These lines of trees are visually pleasing and important to the aesthetic appeal of the Southern Highlands today.

Survey confirmed that the areas where infrastructure that is associated with the underground/surface transition are proposed, are cleared paddocks with no evidence of former structures or archaeological sites. Photographs of the main areas of impact are shown Plate 4.28– view to the north-west across Medway Rivulet to the goods and personnel drift portal; Plate 4.29 – view to the south-east across the laydown area and conveyor with Mount Gingenbullen in the distance; Plate 4.30 – view to the north-east with the Mereworth farm buildings to the left; and Plate 4.31 the view to the Mereworth avenue of trees.



Plate 4.28 View across the location for the proposed conveyor and sediment dam at the southern extent of the surface infrastructure area. The tree line indicates the Medway Rivulet. View north-west



Plate 4.29 View east-south-east from the gate dividing Mereworth from Evandale. Mereworth garden and Mount Gingenbullen are visible in the distance



Plate 4.30 View to the north-east. The Mereworth farm buildings are to the left. No evidence of historical archaeological sensitivity was found



Plate 4.31 View to the avenue of trees on Mereworth. This paddock has been surveyed but no evidence of historical archaeological sensitivity was found

4.2.7 *Oldbury*

The road that separates the main dwelling at *Oldbury*, that is, the Georgian mansion that James Atkinson built, from the paddocks to the front (north-west) was visited to gain a better understanding of the landscape and to photograph the avenue of elm trees that was planned by the Atkinson brothers to create an avenue from *Oldbury* to the *Kentish Arms/Mereworth* House. Many of the trees survive and the trajectory of the avenue, which includes a dog-leg, points to the site of the former *Kentish Arms*/*Three Legs of Man*/*Mereworth House*.

Access onto the property did not occur as permission was not obtained; a detailed survey of *Oldbury* is not required given that it is not inside the proposed mine plan area (Figure 2.1).

4.2.8 *Newbury*

Newbury was established by John Nicholson on a land grant at the same time as James Atkinson's *Oldbury* and John Atkinson's *Mereworth*. Only part of the property is located within the propose mine plan where subsidence has been assessed to be negligible; refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.

Access to *Newbury* did not occur as permission was not acquired, and the team viewed the property from Golden Vale Road (Plate 4.32).



Plate 4.32 **Newbury from the gate on Golden Vale Road. This area of the property is in the Project area. View north-east**

The area on the corner of Golden Vale Road and the Illawarra Highway was also inspected to view what has survived from early Newbury and the items that are on the WLEP environmental heritage schedule. In this location, the alignment of the Old Main Southern Road leaves the Illawarra Highway to the east where it arcs to the south and terminates where it meets Golden Vale Road. The junction road (still considered part of Illawarra Highway) passes the church and cemetery as well as a number of dwellings of various ages from the Victorian period to what appears to be the 1980s. The small cottage with a frontage to the unnamed road was demolished in 2018 (Nearmap) but remains visible on Google Maps for the time being (Plate 4.34); this cottage remains on the WLEP environmental heritage schedule (I028) and is the only building that may have survived from 1862 (Plate 4.33 and Plate 4.34).

Aerial photographs taken during time of water scarcity show features visible that may indicate the presence of relics as well as ploughing and drainage; these photographs have not been reproduced in this report as permission has not been provided but access to Nearmap will support this statement.

A plan of the portion of *Newbury* that is in the proposed mine plan was not found; however, comparisons between the current landscape and that which was captured in 1949 can be made.



Plate 4.33 **As titled 1862. The only building that may have survived from this period to 2018 is the structure indicated by the blue arrow. NSWSL M2 811.319/SUTTON FOREST/1862/1**



Plate 4.34 **A Google maps aerial photograph showing this part of the study area as it was in July 2018. The cottage that may be the same on the 1862 plan (above) is indicated by a blue arrow**

4.2.9 Sutton Farm

Sutton Farm was observed from the public domain so if relics exist, and are visible on the surface, they were not recorded. There is no doubt however, that relics related to the early occupation of this property exist here. The main house is a brick and stucco two-storey coaching inn dating from the 1830s. It is currently a residence with a riding school. A derelict building exists to the northeast of the former inn. One structure of interest was photographed (Plate 4.35), which may be a reconstruction or may be a well-preserved historical building.

The structure is located on the southern frontage of *Sutton Farm,* west from the road (7530 Illawarra Highway, DPI783660). The building is a timber framed structure with veranda and corrugated iron gable roof (Plate 4.35). The lower quarter of the walls are made of brick, painted white in places, and the upper three quarters are wood panel. A partial wall return (brick and timber also) runs south from the north eastern corner. The structure is divided into two rooms by a wood panelled wall that stretches to the sub-facia of the veranda. The interior of the structure does not appear to be lined. The building appears to function as a stable/store as the southern room is open and the northern room is enclosed with chicken wire. The structure has been tentatively identified as a possible converted slab house but based on the appearance of the brick (from a distance) it is more likely to date from the mid-twentieth century. This does not however, exclude this as being the location of an earlier similar building. Refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.



Plate 4.35 Timber building on the southern frontage of the Sutton Farm property. View northwest

4.2.10 The Pines

The main cottage (Plate 4.36) stands on their original lots of Portion 67, Parish of Bong Bong. The SHI listing mentions an additional two cottages to the north, but these were not recorded as The Pines was viewed from the public domain only. Two large pine trees either side were removed many years ago. The Pines was an early slab cottage on the Great Southern Road, but the whole cottage was covered in fibro and painted in the 1970s, but the original slabs remain underneath. It has a high roof of iron, and handmade brick chimneys. The cottage has four rooms with a detached kitchen, the area between these two buildings now being enclosed. Windows at the back of the house have iron bars. Originally the two 12 pane windows either side of the front door had wooden shutters, without louvres, but they were removed and stored by the owners in the 1970s (SHI 2680029).

The Pines was not accessed for this report. The property is within the Project area (but the building is not), where subsidence has been assessed to be negligible and the building will not be undermined. Refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.



Plate 4.36 The Pines viewed from the Illawarra Highway. View north-west.

4.2.11 The Harp

Built of small sandstock bricks in the 1830s as an inn, The Harp was previously known as *Bindagundra.* The house is 45 ft x 24 ft, with gabled roof and attics in the gables, reached by a small stairway leading from one of the rear rooms. The dormer window which lights the attic rooms has been enlarged. Twelve feet from the rear of the house is the detached kitchen, 16 ft x 12 ft, also built of the same bricks. All the joinery appears to be original and is of cedar except for the joinery on a four-panel door and the dormer window mentioned above. Doors are six panelled with fine mouldings and casement windows have fine glazing bars. The veranda is paved with bricks in a diagonal pattern. The fireplaces retain their cedar mantelpieces. The house is also set in a garden which features several fine mature trees including oaks.

Alterations include enlarging the original attic dormer, a weatherboard addition to the east of the house and a new bathroom added to the west of the kitchen (SHI).

The Harp was not accessed for this report; therefore, it was not photographed. The property is within the Project area, where subsidence has been assessed to be negligible and the building will not be undermined; Refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.

4.2.12 Bunya Hill House

Built in the 1870s, *Bunya Hill House* is a large, two-storey free-standing house. The rear section of the house and the outbuildings, including what is understood to be a bakehouse, may be older. The property is highly likely to contain relics.

Bunya Hill House was not accessed for this assessment report; therefore, it was not photographed. Only part of the property is located within the underground mining area where subsidence has been assessed to be negligible; refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.

4.2.13 Eling Forest Winery, house, ground and outbuilding

The *Eling Forest Winery* group consists of an earlier homestead site, which is now an archaeological site. The homestead was built in 1834. A later home (1840), another stone cottage and a sandstone quarry all make up the listing for this property. The property was named after the town of Eling in Hampshire. The property is highly likely to contain relics.

Eling Forest Winery was not accessed for this report; therefore, it was not photographed. Part of it is located within the underground mining area where subsidence has been assessed to be negligible; refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.

4.2.14 Comfort Hill

The *Comfort Hill Group* is listed as an LEP item on the Wingecarribee LEP. The group includes the main house (single storey sandstone cottage with attic, rear kitchen block, extensive 1948 additions to rear of house, internal sculpture by Tom Bass) and outbuildings, garden including mature trees, stone walls and a pond, aviaries as well as extensive remnant natural bushland. The original single storey homestead was constructed from locally quarried sandstone in c.1840. This stage of the property's development is significant as an example of the local area's early homesteads. In 1949 extensive additions were made to the sandstone structure and display highly sympathetic design and aesthetic elements in relation to the original residence. The additions contribute to the significance of the site due to the high level of integrity and association with prominent architects Stephenson & Turner (SHI 2680356). A property of this age is highly likely to contain relics.

Comfort Hill was not accessed for this report; therefore, it was not photographed. Only part of it is located within the underground mining area where subsidence has been assessed to be negligible; refer to Table 6.1 for the total area (ha) of the heritage items in the Project area.

4.2.15 Belanglo State Forest

The Belanglo State Forest was surveyed extensively although the focus was on landforms that would have been conducive to providing shelter and resources for Aboriginal people. Only one location within the state forest will be affected by surface infrastructure, being a ventilation shaft, close to the inside edge of the plantation. Although recent graffiti was noted and a number of rock shelters were recorded, no evidence of historical European use was evident within the forest.

5 Site evaluation

5.1 Introduction

The evaluation of sites is developed from an understanding of their historical context and relies on a number of factors including their geographical location, occurrence and the site's condition (refer to assessment of significance; section 5.2.3ix). One part of the evaluation is the historical analysis (Section 4), the presence and condition of sites and/or features (Section 5) and a comparison of similar sites (Section 6.2).

5.2 Comparative analysis

The summary presented below compares like sites in terms of function and current form (standing or archaeological). The information collected for this section informs the discussion of archaeological potential and the assessment of significance.

5.2.1 Mereworth/Cowley's Homestead – comparative standing sites

i *Oldbury* 1822-1828

(SHR 00488)

Oldbury (*Oldbury* Road, Moss Vale) is an 800 acre (324 ha) property established by James Atkinson in 1822. The main homestead was constructed on a rise and features a two-storey sandstone house in the Colonial Georgian style, its lack of veranda mirrors the English style. Associated buildings include a detached kitchen, dairy, outbuildings, and a secondary overseer's cottage known as *Oldbury* cottage located downhill from the main house. Stables, service yards, a carriage loop and landscaped gardens are also present. The house and surrounding grounds have been slightly modified over time to suite changing lifestyles (e.g. the addition of a pool). Atkinson raised cattle on *Oldbury*.

ii Newbury c.1821

(Wingecarribee LEP 2010, I202)

Newbury (7300 Illawarra Highway, Sutton Forest) is a 1,200 acre (486 ha) property established by John Nicholson in 1821. The main homestead is located in an open valley and the group featured a brick cottage and a timber cottage in gardens. A number of buildings were associated with the main farmhouse but have been demolished since the property was subdivided in 1907. All Saints Anglian church, established in 1832, survives on the property.

iii The Harp c.1830

(Wingecarribee LEP 2010, I027)

The Harp, previously known as *Bindagundra* (Illawarra Highway, Sutton Forest), is located property established by John Sewell in 1822. The homestead features an 1830s single-storey sandstock brick and timber cottage with attic and brick paved veranda. Associated buildings include a detached kitchen. Landscaped gardens are also present. The site has been modified over time.

iv Eling Forest Winery Homestead 1834

(Wingecarribee LEP 2010, I009)

The *Eling Forest Winery Homestead* (12587 Hume Highway, Sutton Forest) is a 1,000 acre (405 ha) property established by John Morrice in 1834. The original house no longer remains but is marked by hawthorn bushes. A brick house with stone foundations was constructed in 1840. Associated buildings include a stone cottage and stable. A sandstone quarry is also located on the property. The current house has been altered over time.

v Comfort Hill 1840

(Wingecarribee LEP 2010, I021, I356)

Comfort Hill (Hume Highway, Sutton Forest) is a 1,000 acre (406 ha) property established by John and William Morrice c. 1840. The original homestead features a single storey cottage with attic, constructed from stone quarried on the property. Associated buildings include a kitchen block, outbuildings, and aviary. Landscaped gardens are also present. The site has been modified over the twentieth century.

vi Austermere c.1821

(Wingecarribee LEP 2010, I398)

Austermere (Oldbury Road, Moss Vale) is a 700-acre property established by William Hutchinson in 1821. Wheat was grown on the property in the 1830s. The original homestead featured a cottage. Original parts of the landscaped gardens are also present. The site has been modified over time and was converted to an orphan school in the 1920s.

vii Browley 1821

(Wingecarribee LEP 2010, I056)

Browley (146 Oldbury Road, Sutton Forest) is a property established by John Waite in 1821. The homestead features a single-storey cottage with verandah built in two phases. The first timber weatherboard phase was constructed in c.1826. The later brick phase was constructed c. 1829. Associated buildings include a brick outbuilding, stone barn, granary, small church (demolished) and later brick stable block. The site has been modified over time.

5.2.2 Mereworth/Cowley's Homestead – comparative archaeological sites

i Cooma Cottage 1833

(SHR 00102)

Davies, M. 1988, *Cooma Cottage Yass, N.S.W. Excavation Report*, Prepared for the National Trust of Australia (N.S.W).

Cooma Cottage (at the Junction Hume and Barton Highways, Yass) was 100 acre (40 ha) pastoral property established by Rebecca O'Brien in 1833. The property was originally part of the 960 acres (388 ha) granted to Henry O'Brien. Hamilton Hume lived in the homestead from 1839 to 1873. The homestead, located on a rise, features a brick and weatherboard cottage, brick stables, outbuildings, a small two-room cottage and gardens. Archaeological excavation by Martin Davies in 1986 and 1987 revealed bedding for pavers outside the stables, and a mid-nineteenth century drainage system with cistern. Continuous occupation meant much of the site had been disturbed.

ii Vine Lodge 1840

(Wingecarribee LEP 2010, I204, 354, 355)

Varman, R.V.J.P. 2001, *Vine Lodge Exeter: Report on Site Visit of February 9, 2001*, Prepared for Jennifer Hill, Architectural Projects.

Vine Lodge (Exeter Road, Exeter) is an early homestead connected to the Badgery family. The homestead consists of a brick house with a gable roof, two brick barns, detached kitchen, timber and slab shed, and cistern. An archaeological building survey by Robert Varman in 2001 found the house had been heavily altered during the mid-1900s but the original house survives in parts. The outbuildings were found to have few alterations. The fireplace of the detached kitchen was thought to be earlier than the building surrounding it. No artefact scatters were observed.

iii Lucan Park Homestead 1822 to 1939

Thorpe, W. 2005, Archaeological Investigation: Lucan Park Homestead Site M17 Motorway Eastern Creek, prepared for Abigroup Leighton Joint Venture.

Lucan Park Homestead (Wallgrave Road, Eastern Creek) was a 200+ acre (81 ha) pastoral property established by William Hayes in 1822. The property was subdivided in 1861 and became a leasehold in 1895 before being demolished around 1939. In addition to the house the property also had substantial outbuildings. Hayes cleared and fenced the property. Archaeological excavation by Cultural Resources Management in 2003 and 2004 revealed post holes and paved surfaces representing a cattle shed and three outbuildings from the 1895 to 1914 occupation period. A shallow drain and cistern were also found. A small artefact scatter of domestic and farm objects was found in association with the southern building.

iv "The Homestead" Georges Hall 1837 (1797)

(SHR 00448)

Thorpe, W. 1990, *Archaeological Survey: "The Homestead" Georges Hall*, prepared for Meldrum Burrows.

Bairstow, D. & Johnson, W. 1991, *"The Homestead" Georges Hall Archaeological Excavation Report*, prepared for the Church of the Four Square Gospel.

"The Homestead" (Lionel Street, Georges Hall) was a 100 acre (40 pastoral property established by George Johnson 1837. The homestead consisted of a brick house on sandstone foundations, substantial outbuildings, a carriage loop, and gardens. Archaeological excavation by Wendy Thorp in 1990 and Damaris Bairstow, and Wayne Johnson in 1991, revealed extensive sandstone foundations representing servants' quarters as well as outbuildings. Paths, drains and a privy were also uncovered. Domestic and farm objects was found in association with the structures. The majority of the evidence dated after 1850.

v Caboonbah Homestead 1888

Terry, L. 2013, Caboonbah: The Archaeology of a Middle Class Queensland Pastoral Family, *International Journal of Historical Archaeology*, Vol. 17, pp. 569-589.

Caboonbah (Mount Stanley, QLD) was a 15,000 acre (6,070 ha) pastoral property established by Henry Plantagenet Somerset in 1888. The Somersets raised dairy cattle and horses. The homestead, located on a cliff above the Brisbane River, consists of a timber house with verandas and single roof (still standing), and a services building including a bakery, warehouses, washhouse and storeroom. The family had a small number of servants living with them on the property. Archaeological excavation by the Caboonbah Homestead Archaeological Project (CHAP) in 2006 and 2009 revealed an undisturbed rubbish dump in a gully south of the house. Artefacts relating to daily life on the homestead including objects of food preparation and consumption, health and hygiene, and leisure dating to the late nineteenth and early twentieth century were recovered.

5.2.3 Kentish Arms/Three Legs of Man/Mereworth House comparative standing sites

i Mail Coach Inn (Former) c.1835

(SHR 00102)

The *Mail Coach Inn* (24 Jellore Street, Berrima) was a licenced public house and staging post for travel and delivery of mail built by Bryan McMahon between the 1833 and 1841. Michael Doyle was the first licensee. The single storey building is in the Georgian style, constructed of rendered masonry incised to resemble ashlar stone. Unlike the other inns from the same time it has an asymmetrical front elevation. Associated buildings include a single storey detached kitchen, a two-storey brick barn, privy, and a weatherboard cottage. The Inn is now called the Coach and Horses Inn.

ii Berrima Inn 1848

(SHR 00103)

The *Berrima Inn* (Jellore Street, Berrima) was a purpose-built licenced Inn built by Bryan McMahon c. 1834. McMahon was the licensee until 1848. From 1848 to 1850 the Inn was the McMahon's family home and became the Breen family home in 1862. The single storey building is in the colonial Georgian style, constructed of brick with a front verandah. A twentieth century garage is present on the site. The Inn was also known as McMahon's Inn.

iii White Horse Inn 1834-1854

(SHR 00106)

The *White Horse Inn* (3 Market Place, Berrima) was a licenced coaching Inn built by Edward Davies between the 1834 and 1854. The two-storey building is in the colonial Georgian style, constructed of ashlar sandstone. It has a timber verandah on both levels. Associated buildings include a sandstone barn, coach house and late twentieth century outbuildings. The Inn was also known as *Oldbury's Inn, Holsberry Inn, Mail Coach Inn*, and the *Royal Mail Coach Inn*. The building is part of the Berrima Jellore Street group, which also includes the *Victoria Inn* (SHR 00094).

iv Crown Inn 1845

(Wingecarribee LEP 2010, I141)

The *Crown Inn* (Old Hume Highway, Berrima) was a licenced Inn turned residence that was built by William Taylor in 1845. The two-storey building is in the Colonial Georgian style, constructed of brick with sandstone on the window and door surrounds. It has a flagged veranda on the lower level, facing the road. Associated buildings include a late twentieth century outbuilding. The Inn was also known as *Courthope*, and *Taylor's Inn*.

v Breen's Inn (Old) (Former Colonial Inn) 1840

(Wingecarribee LEP 2010, I140)

Breen's Inn (24 Old Hume Highway, Berrima) was a licenced Inn built by Francis Breen in 1840. The single storey building is in the Colonial Georgian style and constructed of sandstone. The building has a hipped roof and flagged veranda. The Inn was formerly known as the *Colonial Inn*.

vi Surveyor General Inn 1834

(Wingecarribee LEP 2010, I139)

The *Surveyor General Inn* (26 Old Hume Highway, Berrima) was a licenced public house built by James Harper in 1834. The Inn remained in the Harper family for three generations. John Atkinson was a licensee c 1850. The two-storey building is in the colonial Georgian style, constructed of sandstone and brick with three rendered brick chimneys. The building has been heavily altered.

vii Prince Albert Inn 1844

(Wingecarribee LEP 2010, I160)

The *Prince Albert Inn* (95 Hume Highway, Braemar) was a licenced Inn Bartholomew Rush. The Inn was named the Prince Albert Inn around 1844 by first licensee William Green. The building became a family home from 1891 and was a guest house from 1906 until the 1920s. The two-storey building is in the Georgian style and constructed of brick in a Flemish bond. The Inn has an asymmetrical front elevation and is surrounded by a single storey veranda. Associated buildings include twentieth century extensions. The Inn is known as *Poplars Inn*.

viii Fitzroy Inn 1845

(Wingecarribee LEP 2010, I099)

The *Fitzroy Inn* (1 Ferguson Crescent, Mittagong) was a licenced inn commissioned by Ann Cutter and built by Alexander Brand in 1845. The inn was constructed to take advantage of travellers on the great south road and those travelling to the Fitzroy Iron Works. The single storey building in the colonial Georgian style with cellars and attic space is constructed of rendered stone and brick. Associated buildings include a large stone outbuilding and a stone wall remains. The Inn was formerly known as *Oaklands* and in the 1870s the building became a school before becoming a family home/boarding house in 1919.

ix Sutton Farm c.1830

(Wingecarribee LEP 2010, I035)

Sutton Farm, previously known as *The Red Cow Inn* (Illawarra Highway, Sutton Forest) was a licenced coaching inn built in the 1830s. The two-storey building is constructed of rendered brick. Associated out buildings are also present, however earlier structures may have been demolished.

5.2.4 Kentish Arms/Three Legs of Man/Mereworth House - comparative archaeological sites

i White Hart Inn 1827

(SHR 02007)

The *White Hart Inn* (Old Windsor Rd, Beaumont Hills) was built by James Gough in 1827 on the overland transportation route between Parramatta and Windsor. It was one of several inns along the road to Windsor that provided food and lodging to travellers. Archaeological excavations by EMM in 2014 revealed that it was constructed of brick and sandstone with substantial sandstone footings, the existence of a cellar, cistern and separate kitchen.

ii The Red Cow Inn c.1862

The *Red Cow Inn* (Penrith) was built between 1862 and 1863 on Western Road. It was one of the several inns along the Western road that provided food and lodging to travellers. Archaeological excavations by Casey and Lowe Pty Ltd in 2005 revealed footings associated with inn structures, a cistern, well and blacksmith's shop. Artefacts recovered demonstrated the inn's function as a place of accommodation and the provision of meals. The artefacts from the blacksmith's shop illustrated that maintenance of rural machinery and transport was performed on site.

iii Weatherboard Inn 1822 (1814)

(SHR 00595)

The *Weatherboard Inn* (Wentworth Falls) was built by William Cox between 1827 and 1829. A camping/military depot had been on the site from 1814 to 1822. The Weatherboard was on the Bathurst Road and functioned as a coaching inn until the licence lapsed in 1867. The inn was demolished in the 1880s. Archaeological investigation by Wendy Thorpe in 1985 revealed sandstone footings and an artefact deposit in an area accidently exposed by council work. No further investigations were undertaken but the site was noted to have a high potential for further remains.

5.2.5 Former Three Legs o' Man Bridge – comparative standing structures

i Lennox Bridge, Mitchells Pass 1833

(SHR 00024)

The Lennox Bridge, also known as Horseshoe Bridge, spans Lapstone Creek Gully at Mitchells Pass on the Old Great Western Highway, Glenbrook. David Lennox designed the bridge and supervised the construction, which was performed by 20 convicts in 1832. The bridge is a single horseshoe arch bridge constructed of ashlar sandstone blocks and coursed rubble. It spans 6 m but has a total length of 15m including the revetments. The keystones of the bridge feature inscriptions with "DAVID LENNOX" on the south-facing stone and "AD 1833" on the north -facing stone. The sandstone for the bridge was sourced near the site of construction. The bridge was restored in 1976 but this minimally effected its outward appearance.

ii Lansdowne Bridge 1834-1836

(SHR 01472)

The Lansdowne Bridge spans Prospect Creek on the Hume Highway at Lansvale. David Lennox designed the bridge and supervised the construction, which was performed by convicts between 1834 and 1836. The bridge is a single arch bridge constructed of ashlar sandstone blocks. It spans 33.5m and has a clearance of 23.2 m. Convict arrow inscriptions are present. The sandstone for the bridge was sourced approximately 11 km downstream and transported by punt to the site.

iii Lennox Bridge, Paramatta 1835-1839 (twentieth century modifications)

(SHR 00750)

The Lennox Bridge spans the Paramatta River on Church Street, Paramatta. David Lennox designed the bridge and supervised the construction, which was performed by convicts in between 1835 and 1839 at a cost of £1797. The bridge is a semi-elliptical arch bridge constructed of ashlar sandstone blocks. It spans 27.73 m. The bridge was heavily modified over the early twentieth century.

iv Duck Creek Bridge 1835-1838 (twentieth century modifications)

(Parramatta LEP 2010, RTA Bridge No. 316)

The Duck Creek Bridge spans Duck Creek on the Old Sydney Road (Great Western Highway) at Granville. The bridge was designed by David Lennox and built under the supervision of Robert Gooch between 1835 and 1838. The bridge is a semi-circular arch bridge constructed of locally fired brick and ashlar sandstone blocks. The foundations, corbels, and decorative parapets are sandstone. It spans over 12.2 m. The downstream keystone features an inscribed open pair of compasses on a segmented circle, the symbol of a master mason. The bricks were fired locally and the sandstone for the bridge was mined from the Orphan School Quarry. The bridge was rendered and modified over the twentieth century.

v Towrang Bridge 1836-1839

(Towrang Convict Stockade, Associated Sites and Road Formations SHR 01905)

The Towrang Bridge spans Towrang Creek, Towrang, NSW. The bridge is thought to have been designed by David Lennox and is likely to have been constructed by convicts from the Towrang Convict Stockade between 1836 and 1839. The bridge is a single segmented arch bridge constructed of dressed sandstone blocks. The quoins of the arch piers feature carved plait-style decoration. The keystone of the bridge featured the inscribed date “1839” but it has been destroyed.

vi Lennox Bridge, Berrima: Stonework 1834-36, 1860, 1897 (modified)

(Wingecarribee LEP 2010, I474)

Stonework from the bridges that once spanned the Wingecarribee River near Berrima can be found in Market Place Park, Berrima, NSW. The first Berrima bridge was a sandstone single arch bridge designed by David Lennox and constructed by convicts under the supervision of George Tasker between 1834 and 1836. It spanned 15.1 m and had a clearance of around 5m. The bridge was damaged beyond repair from flooding in 1858 and 1860.

The second Berrima bridge, known as the Martindale Bridge, was a wooden truss bridge with two sandstone piers. The bridge was designed by Captain Ben Hay Martindale and was constructed 38m downstream from the Lennox bridge. It measured 7.7 m high. Martindale Bridge was partially deconstructed for expansion works in 1896, the Martindale abutments and piers remained. The bridge was replaced in 1963.

The stonework present in Market Place Park includes the foundations stone from the 1836, 1860 and 1897 constructions. Stone from the bridges has also been used for curbing around the park.

vii Black Bob's Bridge 1837 modified 1896

(Wingecarribee LEP 2010, I019)

The Black Bob's Bridge, also known as Crawford's Creek Bridge, spans Black Bob's Creek on the Great Southern Road, Sutton Forest, NSW. David Lennox designed the original bridge, which was completed in 1837, however, the Lennox's bridge was replaced in 1896. The bridge is a single arch bridge constructed of ashlar sandstone blocks and moulded concrete.

Lennox's bridge featured a timber span with sandstone abutments. The extant 1896 bridge was constructed of an in-situ moulded concrete arch and abutments, with sandstone piers and curving sandstone wing walls. It is possible the sandstone wing walls or abutments were part of Lennox's construction. Sandstone quarrying from the Lennox period is evident to the north east and south east of the bridge.

viii Nattai Creek Bridge 1898

(Wingecarribee LEP 2010, I1885)

The Nattai Creek Bridge spans Nattai Creek at Mittagong, NSW. The bridge was designed by the Roads and Bridges Branch of the Department of Public Works and was built under the supervision of G.E. Fraser in 1898. It replaced an earlier structure. The bridge is a beam bridge constructed of sandstone and timber with concrete additions.

ix Stonequarry Creek Bridge Piers 1899

(Wollondilly LEP 2011, I140)

The Stonequarry Creek Bridge spans Stonequarry Creek on the Old Hume Highway at Picton, NSW. The bridge was constructed by W. Davidson in 1899. Davidson's bridge replaced structures from 1827 and 1860. The bridge is a plate girder beam bridge constructed of sandstone, metal and concrete. It spans up to 12.2 m. The stone abutments are inscribed with the date "1899" and holes for fence rungs are present in the columns. The bridge was heavily modified over the twentieth century.

5.3 Discussion of archaeological sensitivity

5.3.1 Summary

Given the history of the area it is possible that unrecorded relics exist, particularly where they may be associated with the larger estates or where early industry may have left the ruins of ephemeral structures. The historical development of the region includes structures related to industries, the footprints, of which may survive only in archaeological form: timber getting and sawyer's huts and small mills by rivers; mining and huts or adits, mullocks or rail corridors; and agriculture with timber structures for dwellings and sheds. Other industries developed around mining and agriculture, and then later around tourism include accommodation and related services.

As with the observable cultural landscape that exists today, the majority of structures that have survived the effects of time and an increase in affluence are those made of masonry – brick and stone. Environmental heritage listings tend to show a bias towards the larger buildings such as the large homesteads, inns and churches. Moreover, archaeological sites are generally invisible, and listings are made infrequently.

The potential for archaeological sites in the Project area is moderate but without plans or other documents their location is difficult to predict. Comparative analysis and review of other similar sites can provide information with which to develop a predictive model, which has been the case in this investigation. Field survey identified relics, all of which were located in predictable locations around previously identified dwelling spaces (Figure 4.1).

5.3.2 Land use patterns

Much like predictive models used in Aboriginal archaeological assessment, patterns can be observed in the settlement of the colony by the early settlers. In general, the availability of water, the predominantly gentle slopes and the natural resources in the form of timber and soils conducive to grazing uses, combined with the temperate climate, made the region desirable to settlers starting on their commercial endeavours.

In his 1992 doctoral thesis, Higginbotham defines topographic features that would have been desirable for settlers to acquire by firstly identifying locations that were not. Hawkesbury Sandstone was avoided for its paucity of soil nutrients; slopes of greater than 8 degrees were likewise avoided, if flatter land was available, for easier farming. Preference was given to land that was lightly timbered (as it was expensive to remove), had access to fresh water, and possessed alluvial soils and gravels (Higginbotham 1992, Vol 1, p.7). The preference for land in these areas is understandable as life depends on abundant water supply for people, stock and irrigation.

Availability of fresh water is a factor in the selection of land by Aboriginal people as well; but Aboriginal people were also able to live in a landscape that required less modification than that occupied by the settlers. Rock shelters were sought out and impacts to the surrounding environments by the Aboriginal groups inhabiting the area were more visually subtle than the changes made by the settlers. The possibility that early settlers could use rock shelters was also considered but survey of these sites (EMM 2017b) did not yield evidence of historical significance.

Generally, settlement in the early colonial period up to the 1850s followed the pattern of granting land along rivers and where common rights to water were available (Higginbotham 1992, Vol 1, p.8). Higher population densities were established in the more favourable areas leading to the establishment of towns (Higginbotham 1992, Vol 1, p.7). The availability of Crown land also influenced land tenure as landowners who were locked by other landowners and could only move their stock across their neighbour's property with permission (Higginbotham 1992, Vol 1, p.8).

The landscape of the Project area is influenced by the Wingecarribee River, a fourth-order water course (using the Strahler system) and a number of smaller water courses such as Oldbury, Medway and Wells creeks and their tributaries.

John Atkinson's observations of the County of Argyle, to the south of the Southern Highlands and which includes the Southern Tablelands describes it as possessing *large tracts of open forest where the basis of the soil is granite...though pleasing to the eye, having a beautiful park-like appearance, is poor and seldom adapted for cultivation* (Atkinson 1975 p.5–6). Lachlan Macquarie also described the region as pretty and resembling a fine extensive pleasure ground in England (Jervis 1986, p.15). Conditions attached to land grants saw wide-scale clearing of land and a heavily wooded area would require higher capital outlay and physical effort and so it was the less wooded areas that were most attractive to settlers, who moved in and displaced the incumbent Aboriginal communities. Trees were removed by various methods depending upon the financial capabilities of the landowner, with grubbing being the preferred method (Atkinson 1844, p.125) but also the most expensive. Other, less costly methods involved cutting the tree low to the ground, ringbarking it and covering it with either branches or sods (turf) and burning it – a practice that can occasionally be seen in the archaeological record.

Huts were one of the first dwelling structures in newly opened areas, housing recent landowners and contractors alike:

> Many persons first taking possession of land, content themselves with the shelter afforded by a bark hut, while they put in their first crop, or carry on their first and most important operation; and may having once accustomed themselves to living in this way, will rest content with no better habitation for perhaps several years, until absolutely compelled, by the advancing state of population around them, to think of erecting a better (Atkinson 1844 p.135 – 137).

> Brick buildings are now becoming very general throughout the colony; but new settlers can seldom make use of that style of building at their first commencement ... Sawyers usually construct a temporary hut in the bush where there is plenty of timber, and reside there while the job they are hired for is in hand (Atkinson 1844, p.139 – 140).

In Atkinson's account, even though the cost of stocking the land could delay building a more substantial home, the owner should consider the building of a permanent, secure home, of modest proportions as soon as practicable. He provides a plan of a house showing a sitting room, three bedrooms, a kitchen and storeroom, and a milking yard (Plate 5.1). A loft should cover the entire building (house) for "stowing away many articles in perfect security" (Atkinson 1844, p.137) and skillions on either side provide space for additional bedrooms, which can be extended, if need be, under the veranda (Atkinson 1844, p.137).

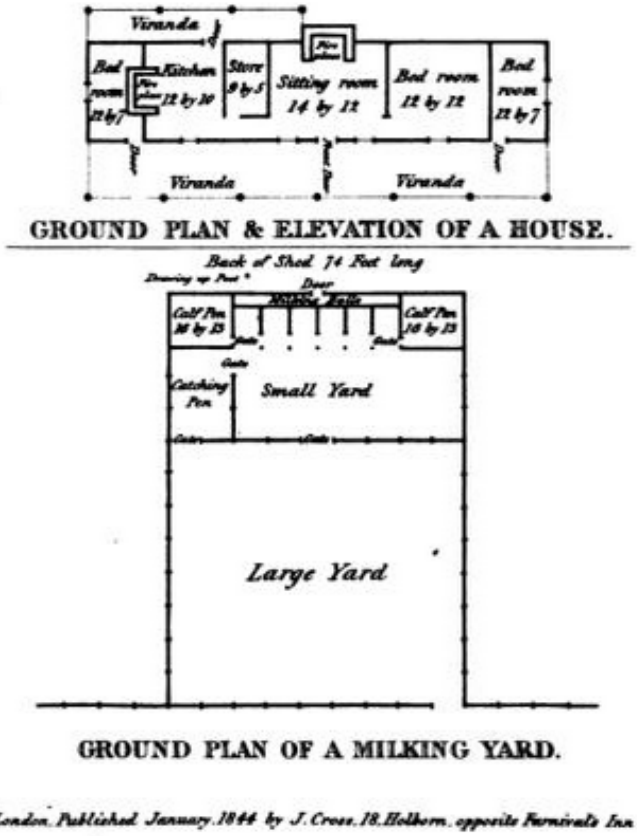


Plate 5.1 Atkinson's template for building a home and milking yard in the early years of taking possession of a property (Atkinson 1844, page between 136 & 137, ie, no page number).

To the west, the Belanglo State Forest has mainly been used as a pine plantation since 1919 (Forestry Corporation 2015) (Plate 5.2), but there are large tracts of remnant native vegetation where steep and rocky terrain has made it inaccessible to machinery and unsuitable for timber plantations. This has left most of the scarps and sandstone landscapes protected from historic clearing. There are also corridors of remnant vegetation surrounding Medway Rivulet, Oldbury Creek and Wells Creek in the north and north-western part of the Project area where the underlying Hawkesbury Sandstone is found to outcrop occasionally. Outside of these areas, only small pockets of remnant or regrowth vegetation exist, which are generally discrete and isolated.

It is possible that relics related to historic period activities such as timber-getting, or camps may survive in the Belanglo State Forest in areas that have been unaffected by plantation works. The Longacre Creek adits in the Wongawilli and Tongarra seams is evidence of this.

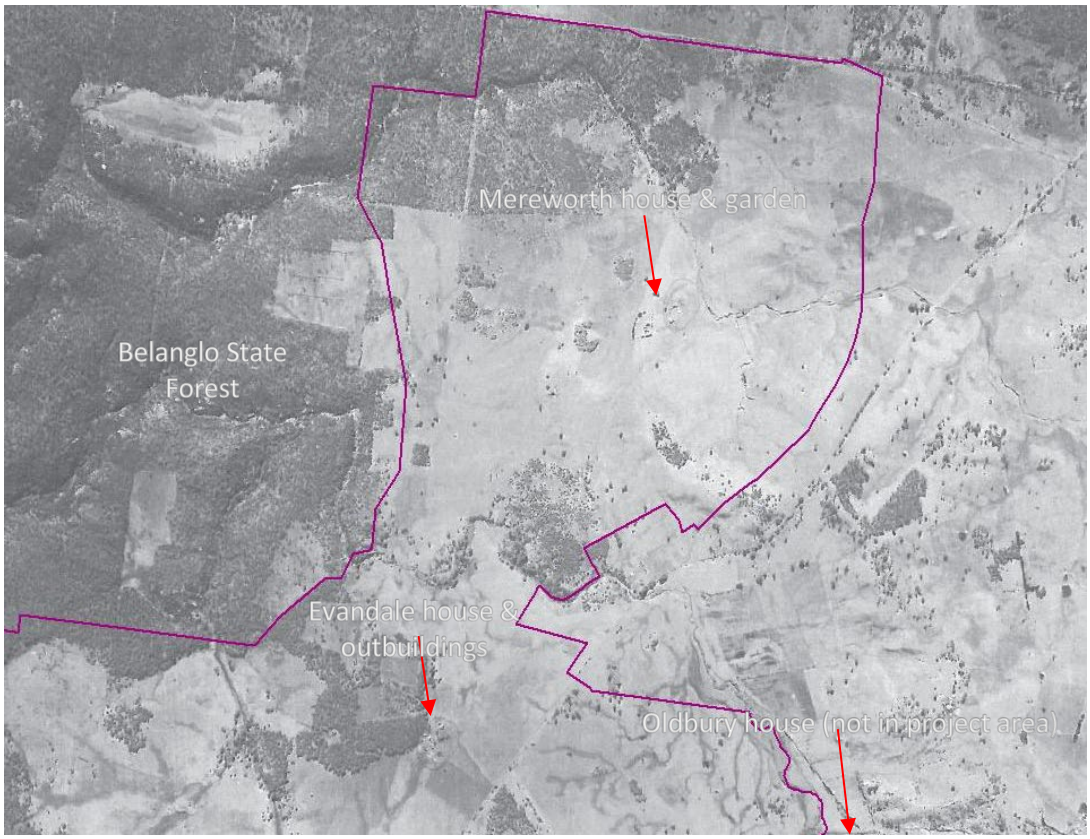


Plate 5.2 The 1949 aerial photograph over the northern side of the Project area.

5.3.3 The Cowley homestead 1912–1963/Mereworth house and garden

The earliest available aerial photography of the location of Mereworth House and gardens today dates from 1949 and shows that the Project area has undergone little development after it was initially cleared (Plate 5.2 and Figure 5.1). The most obvious changes are the removal of what appear to be native trees from around Oldbury Creek, Medway Rivulet and Wells Creek, the growth of tree-lined windbreaks and the increase in the number of dams across the landscape. Comparison of the aerial photographs also clearly illustrates that the mature garden plantings, windbreaks and privacy screens on property boundaries and fence lines are more recent aspects of the characteristic landscape in this area. The relative newness of the plantings does not detract from the significance of the place but does add another layer to its development as a rural landscape, the character of which has almost completely dominated the industrial aspects of its history.

The land surrounding the homesteads has largely been subject to repeated ploughing and used for agriculture for the last 150 years. Now much of the land continues to be used for grazing cattle, cultivation of animal fodder and vineyards.

The present acreage of the *Mereworth* estate was purchased by grazier William Thomas Cowley sometime around 1912. *Mereworth* remained in the Cowley family until 1963 when it was sold to Tony and Amber Oxley. Earlier buildings were demolished, and the Oxley's had the current Mereworth House and gardens constructed c. 1965. In 2014 ownership of the *Mereworth* estate was transferred to PBF 2 Pty Limited, then to S F Pastoral Holdings Pty Ltd in 2015. Hume Coal Pty Ltd purchased the property on 15 February 2015 and the paddocks have been licensed to Princess Pastoral, which is raising cattle, sheep and fodder crops.

Archaeological survey on the *Mereworth* property focused on the area around the stockyards/outbuildings. An historical window and cartwheel were recovered from a paddock north of the current house. Sandstone flagging and a sandstone drain feature were found to the south of the modern sheds (southwest of the piggery). An artefact scatter was present around the sandstone features. The artefacts included ceramic and glass fragments typical of Australian domestic historical sites of the late nineteenth to early twentieth century.

In the Wingecarribee Council area a number of homesteads built in the early nineteenth century are listed as heritage items on the local environment plan (LEP), including *Mereworth* (Wingecarribee LEP 2010, Item I351). A comparative analysis of homesteads established in the first half of the nineteenth century in the Wingecarribee area, and NSW more broadly has been completed in order to make predictions about possible archaeological remains and significance. A late nineteenth century Queensland property is also included as the occupants were of likely of similar background to the occupants of *Mereworth*.

The potential for relics around the 1965 house on *Mereworth* was investigated through an analysis of aerial photographs, historical research and a number of field visits, the last one being in October 2019. During the previous site visits, relics were not noted in or around the farm buildings or the main house, gardens or ha-ha but two items were discovered in the most recent field trip. A small section of sandstone flagging, and two lines of small sandstone blocks were recorded south of the machinery shed (refer to Section 4.2.3).

These items were not recorded on previous survey programs because they were not visible being under grass. Their presence indicates that relics may have survived in other areas that have not been built over by post-1960s changes.

Figure 5.1 is a detail of the current aerial photograph showing the house and gardens at *Mereworth* and the ancillary farm buildings. Note that it is likely that the Cowley homestead was where the swimming pool is now, and the modern ancillary buildings overlie the area that the historic ancillary buildings were shown in the 1943 aerial photograph.

One other area of interest was surveyed in the vicinity of the Mereworth house and garden. A small rise approximately 160 m from the northern edge of the garden was initially thought to be a possible location of the earlier homestead (Figure 5.2). Survey and the 1949 aerial photograph indicate that it is a rise in the landscape that appears to be the result of land preparation in the surrounding area. A corrugated iron shed that occupied the north-western edge of the rise was not present in 1949 but present until 2017 has been removed. A timber window frame with mullioned glass and fragments of a wagon wheel that were leaning against this shed (Plate 4.18), have been moved to the piggery and are covered with a tarpaulin. The manufacturing style of six-pane sashes, the simple joinery profile and the transom mechanism suggests that it dates to the early nineteenth century, although may be later as it is a vernacular style. These may be fragments related to the earlier homestead but as they were not found in their original context, it is not possible to positively identify them as such.

The comparative survey of early nineteenth century pastoral homesteads in the Wingecarribee council area and beyond reveals a number of patterns useful for understanding the significance and archaeological potential of the *Mereworth* property.

Homesteads in the Wingecarribee region were established soon after the first land grants. Unlike other locations where stockmen inhabited the property, it appears that those granted land in the Wingecarribee region were quick to settle there.

The main house of the homesteads dating from the 1820s to 1850s vary in their construction. Materials brick, stone, and timber were all commonly employed in construction and use of local materials appears to have been popular (e.g. *Eling Forest Winery, Comfort Hill*). Although varied in their layout, the designs of houses of this period do (at least loosely) reflect the colonial Georgian style. The main house also tended to be placed in a prominent position on the property, such as a rise in the landscape (e.g. *Oldbury*, *Cooma Cottage, Caboonbah Homestead*).

A feature of pastoral homesteads is a long occupation history. Unless subdivided (like *Newbury*), the main house and outbuildings are continually used by the occupants and many survive to the present and modification of standing buildings over time is extremely common. The archaeological sites show that a long occupation history affects the survivability of earlier evidence. The artefacts recovered from both *Lucan Park* and *Georges Hall* were associated with later occupation phases.

Pastoral homesteads of the early nineteenth century were a complex of domestic and agricultural structures. As well as the main house detached kitchens, privies, stores, laundries, and workers' quarters were necessary for the daily workings of the homestead. Complexes relating to pastoral or agricultural activities would also dot the property including animal pens, yards, sheds and fencing. Specialised structures such as the granary at *Browley* and dairy at *Oldbury* would have also been necessary and dependent on the type of farming occurring on the property. Other structures associated with water use and management including wells, cisterns, dams, and drains would also feature throughout the property.

Gardens and landscaping were also important features of a homestead. Gardens were planted for the aesthetic value, but they also separated the main house from the paddocks and produced food for the household.

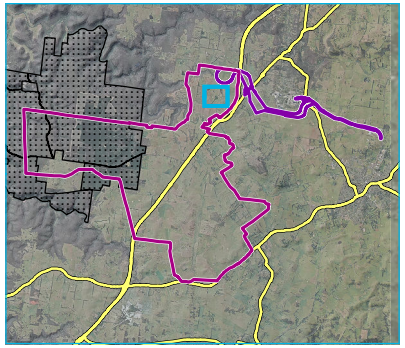
Archaeologically, farm buildings/outbuildings survive as footings, paved surfaces, and postholes depending on their construction. Drains and drainage channels are also visible archaeologically and may indicate the location of an outbuilding complex.

The early buildings on the original *Mereworth* grant, which is now a separate property, no longer survive and it is unclear where Atkinson's original home was located. The 1949 aerial photograph shows a cottage with landscaped gardens located on a rise in the landscape with a complex of outbuildings further down the slope. The buildings shown in the 1949 aerial photograph belong to the Cowley family and Atkinson's house may have originally been located close to the Great Southern Road, and where his employees resided.

Two subsequent phases of residential buildings have been constructed on the original grant before it was subdivided. A survey of the property found a section of dry-stone wall. It is possible the surviving dry-stone feature is the return of the original wall at the front of the property.

In the Wingecarribee Council area, many of the inns listed as heritage items on the local environment plan (LEP) were built in the early to mid-nineteenth century, coinciding with the construction of the Great Southern Road. A comparative analysis of Inns that were established along the Great Southern Road, and NSW more broadly c.1836 has been completed in order to make predictions about possible archaeological remains and significance.





KEY (refer to inset)

- Hume Coal Project area
- Berrima Rail Project area
- Major road
- Belanglo State Forest

\\emmsvr1\EMM\Jobs\2012\12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA009 MereworthSite1949 20200227 02.mxd 1/04/2020

Source: EMM (2020); DFSI (2017); Hume Coal (2016); NearMap (2019)

0 100 200 m

GDA 1994 MGA Zone 56

N

1949 aerial photograph overlay on current aerial photograph of Mereworth

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 5.1

HUMECOAL PROJECT

EMM creating opportunities

5.3.4 Former Kentish Arms/Three Legs of Man Inn/ Mereworth House

Contemporary descriptions of the property that was variably a house, an inn and then a house again, accord with photographs while it was still in use and after it fell into ruin (Plate 3.2) before its demolition in 1918.

The 1839 auction notice in *The Sydney Gazette and New South Wales Advertiser* Thursday 19 September 1839, p.4 describes the inn property as containing:

> ...five Parlours, Tap Room, nine Bed Rooms Kitchen, Stable for fourteen Horses, Men's Hut, Stock Yards, &c, a beautiful Garden of One Acre and a Half, in a high state of cultivation, planted with the choicest APPLES AND PEAR TREES.
>
> The extent of the Land is 20 Acres, being part of the magnificent Estate of the Property of John Atkinson, Esq. It is beautifully watered on two sides by the never-failing and pure stream known by the name of Midway Rivulet [*sic*], which bounds the Estate from the trespass of the Neighbourhood.
>
> *The Sydney Gazette and New South Wales Advertiser* (Thursday 19 September 1839, p.4)

The sale was made to James Comer and John Atkinson moved to Tumut (Higginbotham).

The comparative survey of nineteenth century inn built around the same time as the *Kentish Arms* and/or on a main road reveals a number of patterns. The presence of such patterns can assist in understanding the significance and archaeological potential of the *Kentish Arms*/*Three Legs of Man* property.

There was a proliferation of inns constructed along the Great Southern Road from 1832 to 1845. The explosion of inn buildings in the small town of Berrima attests to this pattern. There is a notable pattern in the reduction of inns in the middle of the nineteenth century with the buildings becoming family homes and/or guest houses (e.g. Berrima Inn, Breen's Inn, Prince Albert Inn, and Fitzroy Inn). This coincides with the development of the southern railway from 1855. The development of a railway line leading to the decline of licensed inns can also be seen in Western NSW and the Blue Mountains.

Inns built around the 1830s were most often constructed in the colonial Georgian style with a central doorway and hall. The buildings could be either single or double storey but generally had a veranda facing the road. The buildings along the Great Southern Road tended to be made from sandstone or brick. Foundations were also of brick or stone and stone flagging was also a common feature.

Inns are also expected to have cellars for storing provisions and alcohol for guests. The cellars of the White Horse Inn and Fitzroy Inn are noted to have held convicts during travel. Archaeologically, cellars are usually deeper than the foundations of the main building and are therefore less likely to have been destroyed by subsequent development or land use. They are also often built of durable material such as stone or brick which makes survival more probable.

Most inns in the nineteenth century were made up of a complex of structures. Detached kitchens, privies, stores, laundries, animal pens, and workshops would have dotted the yard behind the main Inn structure. Horses and coaches were the main forms of travel during the early days of the Great Southern Road and inns needed to accommodate horses and coaches meaning stables were an essential building on an inn property. Other structures associated with water use and management could include wells, cisterns, and drains. Gardens and landscaping would have also been an important feature of an inn site to attract customers and supply food.

A description of materials for sale at demolition appeared in a number of publications including the *Robertson Advocate:*

Building Materials

DEMOLITION SALE

Another Old Landmark Gone.

Mereworth House,

Originally known as "The Three Legs of Man."

Main Southern Road, 7 miles from Moss Vale. THURSDAY, April 25th,

AT II AM.

H. RICHARDSON

Will sell by auction (the whole of the BUILDING MATERIALS) including-

600 Sheets of Galvanised Iron, in splendid condition.

MANY THOUSANDS OF FEET Flooring, Lining. Skirtings, Joists, Rafters, also Solid Cedar Doors, Window Sashes, Railings, all the Materials in the Stables and Loose Boxes. All these timbers are in exceptionally well-preserved condition. All builders' sizes.

100,000 Bricks, in lots to suit purchasers.

1000 Tons of Squared Sandstone, Flagging, etc.

The above should claim the attention of all builders and others requiring Building Materials. Within 7 miles of the railway, by easy roads. Arrangements will be made for conveyance to the sale at a moderate charge on the day of sale if prospective buyers will notify the auctioneer not later than 24th inst., at his office, Moss Vale.

Any farther particulars may be obtained on application to the auctioneer.

Robertson Advocate, Tuesday 23 April 1918

The dry-stone wall of the *Kentish Arms* would have directed patrons to the appropriate building and entrance. It may have also served as an identifier for the inn within the wider landscape. A section of dry-stone wall was recorded from the public domain. It is possible the surviving dry-stone feature is the return of the original wall at the front of the property.

Other business venture could be attached to Inns offering necessary services for travellers and associated township, eg the blacksmith at the Red Cow Inn (Penrith). It is known that Robert Cowley ran his tannery from the *Kentish Arms* and artefact deposits associated with such ventures are possible.

Inns were located at regular intervals along the Great Southern Road and the other main roads out of Sydney. Inns played an important role in the development of NSW during the nineteenth century by providing accommodation and meals for travellers, acting as staging posts for horses, and functioning as a community hub.

The *Kentish Arms* was located on the Great Southern Road, one of the major early roads of the colony of New South Wales and offered the opportunity for commercial activity beyond pastoralism. John Atkinson built the *Kentish Arms* on his *Mereworth* property c.1836. Twenty acres of *Mereworth* were subdivided for the Inn. The *Kentish Arms* was a two-storey brick house with cellars, a variety of outbuildings and one acre of gardens (*Southern Highland News* 2 May 2011; *The Australian*, 5 September 1839, p.4). The Inn passed through a number of hands until it was demolished in 1918.

A document sourced from the Berrima District Historical Society (Moss Vale Branch) is without citations but provides some interesting information that is consistent with information obtained from other sources. The writer makes one error in stating that Robert Cowley purchased The *Kentish Arms*, which was on a section of "James Atkinson's Mereworth grant at Berrima" but also admits that the transfer of land had not been completed at the time of writing. The writer goes on to say:

> The inn was a stone building and larger than any of the hotels at Berrima. It has two stories [*sic*] and a shingle roof which was later covered with galvanized iron. The stair case [*sic*] and much of the woodwork was cedar. A memory some of the grandchildren recall was the aroma of the cedar as soon as you walked into the building. There was a stone wall facing the main road which remained after the building was demolished in 1918. Sometime after 1858 Robert ceased operating as an inn keeper and the name of the property was changed to Mereworth House; the Cowley family living there until 1909.

The derelict inn building was demolished in 1918 (*Scrutineer and Berrima District Press* 24 April 1918, p.3; SHI Mereworth House and Garden; Higginbotham 1992).



Plate 5.3 **View to outbuildings on the *Kentish Arms/Three Legs of Man/Mereworth House* property c.1918 (Source: Berrima and District Historical Society)**



Plate 5.4 One of the outbuildings, possibly a stable, belonging to *Kentish Arms/Three Legs of Man/Mereworth House* c1918 (Source: Berrima and District Historical Society)

5.3.5 Employee residences

The 1841 census names another four households, all living in timber buildings and all recorded as living on *Mereworth*, suggesting the tenant settlement arrangement. The households were recorded as those of John Hancock, George Kemp, James Parmenter and Charles Sculthorpe. The likely location of three of the timber buildings have been recorded by Higginbotham on the eastern side of the Old Hume Highway and shown as Plate 5.5. They are labelled as *PR1, PR2 and PR3* in Figure 4.1*;* they are all outside the Project boundary and will not be impacted.

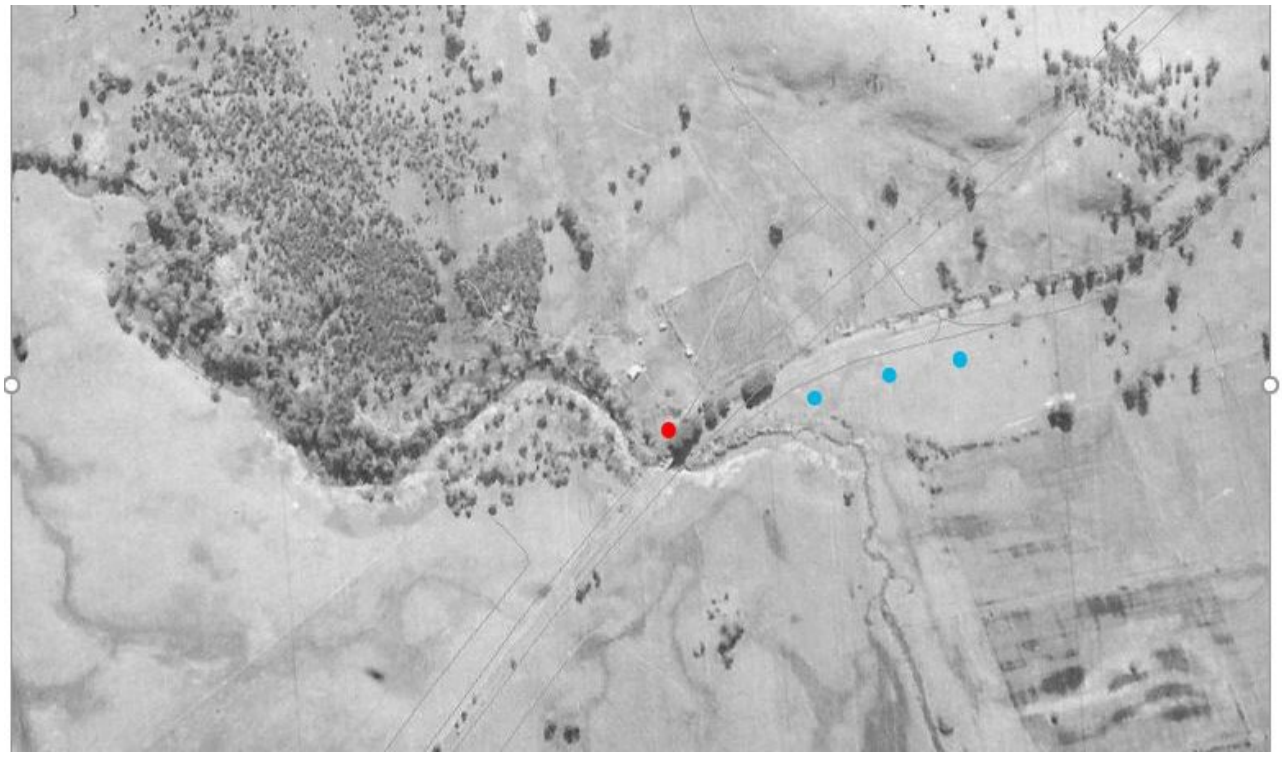


Plate 5.5 The possible location of the inn, *The Three Legs of Man,* (red dot) and the general location of three employees' houses (blue dots)

5.3.6 Three Legs o' Man Bridge

The Great Southern Road was one of the three major colonial transport networks connecting Sydney to the southern reaches of the colony and bridges were a necessary part of this construction (Roads and Maritime Service 2013, p. 5). The bridges of the Great Southern Road were designed by the Superintendent of Bridges David Lennox. The former *Three Legs of Man* Bridge was one small part of the 1830s Great Southern Road campaign.

The former Three Legs o' [of] Man Bridge was a masonry and timber road bridge located on the Medway (Midway) Rivulet underneath the current Hume Highway/Remembrance Drive overpass near Berrima, NSW. The original bridge over the Medway Rivulet was a simple beam bridge constructed of three dressed sandstone piers with a timber deck. This bridge was designed by Colonial Superintendent of Bridges David Lennox and constructed by convicts under the supervision of George Tasker (sub-supervisor of roads) between 1834 and 1835 (Bell 1834, p.210; RMS 2013: 6-7). The bridge was damaged during floods in 1860 and rebuilt in the same year (*The Sydney Morning Herald* 8 November 1860, p.10). An article in *The Sydney Morning Herald* (8 November 1860, p.10) describes the reconstructed Midway [*sic*] Rivulet Bridge as a 'simple beam' bridge with stone piers, and two bays spanning 20 ft. The 1860 bridge was replaced by a concrete bridge around 1934 (*Goulburn Evening Penny Post* 3 January 1934, p.5).

The extant remains of the bridge include two elongated hexagonal piers constructed of a double skin of sandstone blocks measuring approximately 90 cm x 30 cm x 35 cm bonded with cement mortar. Steel "rebar" is present in the top of both piers. The northern pier is on the north bank of the rivulet and stands approximately 2 m high. The southern pier stands in the Rivulet and is approximately 4m high. The southern pier appears to survive to its original height in places. A small section of ashlar sandstone block wall also survives in the south bank of the Rivulet. The sandstone features masons' marks and "pick up" depressions. Inscriptions are present on the south-most pier. The bridge has also historically gone by Midway Bridge and Cowley's Bridge. The Remembrance Drive (Hume Highway c.1985 to present) alignment straddles the Great Southern Road/Old Hume Highway and the connection of the piers to the continual pattern of the road use is still visible both on the ground and in satellite images.

In the Wingecarribee Council area, most bridges listed as heritage items of the local environment plan (LEP) were built in the nineteenth century (the Lennox Bridge Stonework 1834-1897, Black Bobs Bridge 1837 and Nattai Bridge 1898). Therefore, a comparative analysis of other nineteenth century stone pier road bridges from NSW and other extant Lennox bridges has been completed to make predictions about possible heritage potential of the former Three Legs o' Man Bridge.

The potential for relics around the former Three Legs o' Man Bridge was investigated through an analysis of aerial photographs, historical research and a field visit in October 2019. The present condition of the bridge piers and surrounding landscape of the Medway Rivulet was recorded.

The southern pier of the former Three Legs o' Man bridge has two inscriptions in unusual positions. The date inscription, which reads "1834", is located on one of the triangular end blocks and was placed upside down. The second inscription which appear to be initials, either "CH", "[interconnected] HD C", or "I D C", also appear to be upside down and while they are located on the northern face of the pier the block is close to the waterline of the Rivulet. This suggests the possible re-use/reworking of stone during the 1860 post-flood reconstruction with the "1834" date inscription suggests the stone came from the Lennox designed bridge.

A sandstone block wall, possibly of the same period of the bridge, was recorded set into the south bank of the Rivulet. Scrape marks from the bucket of a modern excavator or loader were observed in the natural sandstone of the northern bank of the Rivulet. The scraping was determined to be from recent works, likely the construction of the motorway c. 1985.

No other area of interest was observed in the vicinity of the former Three Legs o' Man Bridge. Possible heritage items may have been obscured by the dense vegetation around the Rivulet and the geotextile and rock used to stabilise the highway earthworks.

From the comparative survey of masonry pier road bridges and David Lennox designed bridges a number of patterns revealed. These can assist with understanding the significance of the Three Legs o' Man Piers.

David Lennox bridges constructed around the same period as the original Three Legs o' Man Bridge were arched structures generally built from sandstone. Lennox's Black Bobs Creek and Berrima Bridge over the Wingecarribee River, which were also constructed as part of the Southern Road campaign, were sandstone arch bridges.

The original 1834/1835 bridge over the Medway Rivulet would have been unique among Lennox's Southern Highway bridges. The construction of the bridge was supervised by George Tasker rather than Lennox and this could have been the reason for the simple design, however, Tasker also supervised the construction of the 1834-1836 Berrima arch bridge (Bell 1834, p. 208-210). It is more likely an arch bridge was not suited for the landscape of the Medway Rivulet. Lennox did design a variety of simple structure bridges in Victoria later in his career, but none survive (Road Traffic Authority 2005, p.11). As such, there are no Lennox designed models with which to compare the extant *Three Legs of Man* piers. The general appearance of the original *Three Legs of Man* bridge was probably similar to the Nattai Creek Bridge.

All of Lennox's bridges were constructed from locally sourced material. Evidence of quarrying has been found close by Black Bob's Bridge, as well as the Mitchells Pass, Landsdowne and Duck Creek Bridges. It is probable that the sandstone for the original *Three Legs of Man* Bridge was sourced nearby. The Medway Rivulet is lined with sandstone outcrops but there are no records of a quarry identified on the Rivulet. Stone fell out of favor for bridge building with the cessation of transportation in NSW in 1852 (Road Traffic Authority 2005).

A number of the bridges have inscriptions and if the bridge does have an inscription it will be in a prominent location. The inscriptions of the Lennox Bridge at Mitchells Pass, Towrang Bridge, and the Stonequarry Creek Bridge Piers are located pride of place on the keystone or in a position easily seen by those crossing the bridge.

Later modification or reconstruction is a common feature of bridges from the nineteenth century. The Mitchells Pass, Duck Creek, Lennox Bridge Paramatta, Stonequarry creek, and Nattai Creek Bridges have all been modified overtime. Moreover, the bridges at Black Bobs Creek and Berrima were rebuilt during the late nineteenth century and materials from the earlier bridges were used in the reconstructions.

Of particular significance is the reconstruction of the Berrima Bridge in 1860 and 1897. The shape of the extant Three Legs o' Man piers is similar to the 1860/1897 Berrima Martindale Bridge piers. While there are differences in the form, the visual connection between the 1860 Berrima piers and *Three Legs of Man* piers could indicate that they were part of the same reconstruction campaign. It is not clear when stone wall in the southern bank was constructed.

The cement pointing and reinforcing steel bars also illustrate that the Three Legs o' Man piers were modified over time. The 1896 sandstone abutments of Black Bobs Creek are also pointed with cement mortar. The stonework and pointing of the Medway bridge was compared to Black Bobs Creek bridge and was noted to be of a poorer quality. Unfortunately, the Martindale Bridge piers no longer remain so the pointing cannot be compared to a bridge that was constructed in 1860. Aerial photographs taken in 1949 show the alignment of the concrete bridge is to the east of the piers. It is possible the rebar was added during the 1860s reconstruction, but it may also represent later repairs to the bridge deck (Prentice 2004). The "little old wooden bridge" was replaced by concrete bridge c.1934 (*Goulburn Evening Penny Post* 3 January 1934, p.5).

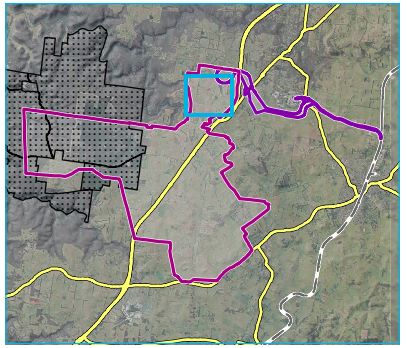
It is possible that unrecorded relics exist, particularly where they may be associated with the larger estates or where early industry may have left the ruins of ephemeral structures. The historical development of the region includes structures related to industries, the footprints, of which may survive only in archaeological form: timber getting and sawyer's huts and small mills by rivers; mining and huts or adits, mullocks or rail corridors; and agriculture with timber structures for dwellings and sheds. Other industries developed around mining and agriculture, and then later around tourism include accommodation and related services. As with the observable cultural landscape that exists today, the majority of structures that have survived the effects of time and an increase in affluence are those made of masonry – brick and stone. Environmental heritage listings tend to show a bias towards the larger, more "stately" buildings such as the large homesteads, inns and churches. Moreover, archaeological sites are generally invisible, and listings are made infrequently.

Consultation was undertaken with members of the community to collect information about potential archaeological sites or structures that have not been listed but fall within the Project area. The individual members that were interviewed were asked about old buildings such as sheds and old houses that they remember from their childhood. Areas of potential archaeological significance were not identified through consultation.

The *Hume Coal Phase 3 Exploration Activity Review of Environmental Factors* report prepared by Hume Coal (August 2014) identified a short adit in the valley of Longacre Creek and workings at Black Bobs Creek as surviving evidence of nineteenth century mining operations in the area (Hume Coal 2014, p.1-2). Although it is in the vicinity, Black Bobs Creek and associated features are at a substantial distance outside the Project area.

The existence of archaeological sites across the landscape should not be discounted and should be recorded when encountered. Conservation or protection of such features is only possible if their location is known, and in many cases, small or vernacular structures were not recorded.





KEY

- Hume Coal Project area
- Berrima Rail Project area
- Cowley's homestead
- Potential relic
- Fence
- Building/structure
- Vegetation
- Motorway
- Road

Existing environment

- Rail line (refer to inset)
- Major road (refer to inset)
- Named watercourse
- Waterbody
- Cadastral boundary
- Belanglo State Forest (refer to inset)

Source: EMM (2020); Hume Coal (2016); DFSI (2017)

0 250 500 m

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2012\V12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA011 KnownRelics 20200326 04.mxd 1/04/2020

Relics and potential relics on Mereworth 2020

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 5.2

HUMECOAL PROJECT

EMM creating opportunities

5.4 Defining heritage significance

In NSW, the assessment of heritage significance is based on the Burra Charter (Australia ICOMOS 1999) and further expanded upon in the Heritage Manual's *Assessing Heritage Significance* (Heritage Office 2001). It lists seven criteria to identify and assess heritage values that apply when considering if an item is of state or local heritage significance as set out in Table 5.1.

The assessment of significance is for archaeological resources, some of which are relics and some of which are works, such as the *Three Legs o' Man* bridge piers. While archaeological significance is usually assessed under criterion e, in this assessment, research potential is considered across all criteria.

Table 5.1 NSW heritage assessment criteria

Criterion	Explanation
a)	*An item is important in the course or pattern of NSW's (or the local area's) cultural or natural history (Historical Significance).*
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 (or the local area's) cultural or natural history (Associative Significance).*
c)	*An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area) (Aesthetic Significance).*
d)	*An item has a strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons (Social Significance).*
e)	*An item has the potential to yield information that will contribute to an understanding of NSW's (or the local area's) cultural or natural history (Research Significance).*
f)	*An item possesses uncommon, rare or endangered aspects of NSW's (or the local area's) cultural or natural history (Rarity).*
g)	*An item is important in demonstrating the principle characteristics of a class of NSW's (or the local area's) cultural or natural places or environments (Representativeness).*

The following section presents the statements of significance for each historic heritage item identified in the Project area.

5.5 Assessment of significance

5.5.1 Assessment against the criteria – Mereworth House and Garden

Table 5.2 Mereworth House and Garden (archaeological)

Criterion	Assessment
a) Historical	The current house and garden do not fulfil this criterion.
b) Associative	The current house and garden do not fulfil this criterion.
c) Aesthetic	The current house and garden do not fulfil this criterion.
d) Social	The current house and garden do not fulfil this criterion.
e) Research	The current house and garden do not fulfil this criterion. Archaeological evidence survives of the earlier homestead and is discussed in Table 5.3.
f) Rarity	The current house and garden do not fulfil this criterion.
g) Representativeness	The current house and garden do not fulfil this criterion.

5.5.2 Assessment against the criteria – Cowley's homestead

Table 5.3 Cowley's homestead site (archaeological)

Criterion	Assessment
a) Historical	*Mereworth* was one of the early parcels of land settled in the Southern Highlands and has a continuous history of pastoral activity. Pastoralism contributed to colonial expansion in New South Wales and to the development and character of the Southern Highlands region. The below ground fabric related to Cowley's homestead has the potential to reveal strong associations to the past customs and practices associated with colonial pastoralism as well as shifting pastoral technologies and ways of life. The item is of local significance under this criterion.
b) Associative	The old homestead (Cowley's homestead) was strongly associated with the Cowley family. The Cowley's were a prominent family in the region from the 1850s and were notable wool producers during the early twentieth century. Sir John Lackey (President of the New South Wales Legislative Council, 1892-1903) is possibly associated with the homestead and the site has a possible association to early settler John Atkinson. The item is of local significance under this criterion.
c) Aesthetic	Does not fulfil this criterion.
d) Social	As an early pastoral property in the Southern Highlands Cowley's homestead has the potential to contribute to the history of pastoralism in the Southern Highlands which may be valued by community groups. The item is of local significance under this criterion.
e) Research	Archaeological evidence of Cowley's homestead has the potential to yield archaeological information that may contribute to an understanding of the evolution of pastoralism in the Southern Highlands and ways of life of pastoralist families from 1822 until the 1960s. The only surviving features that were noted and recorded during field survey are a patch of sandstone flagging and what appears to be a drain, leading downhill from the main machinery shed An understanding of day to day life of the occupants of long-lived pastoral properties in New South Wales is not readily available through other sources. The item is of local significance under this criterion.
f) Rarity	What survives of the Cowley's homestead archaeological site is unlikely to be rare example of its type in the Southern Highlands. The item does not fulfil this criterion.
g) Representativeness	Cowley's homestead has the potential to demonstrate the principle characteristics of a pastoral homestead in New South Wales and the Southern Highlands. The below ground fabric has revealed evidence of historical farm structures and domestic artefacts. The property has the potential to contain further below ground features typical of pastoral homestead complexes, such as outbuildings foundations. The item is of local significance under this criterion.

5.5.3 Mereworth house and garden/Cowley's homestead

Mereworth house and garden is listed as an item of heritage significance on the Wingecarribee LEP (2010, Item I351) under criterion "b" for the property's strong association with garden designer Paul Sorenson. Recent investigations have revealed a potential archaeological site on the property (Cowley's homestead), which is the relevant value in this report.

The original property has a strong association with early settler John Atkinson, albeit in a now excised section and later, three generations of the Cowley family. *Mereworth* also has significant associations with Legislative Assembly president Sir John Lackey. The house and gardens have significant historical and associative connections to architect John Amory and cold-climate garden designer Paul Sorensen as well as the Oxley family of Bushells tea fame, who commissioned the work. It is of local significance.

5.5.4 Assessment against the criteria - Kentish Arms/ Three Legs of Man/Mereworth House Site

Table 5.4 Kentish Arms/ Three Legs of Man/Mereworth House Site archaeological site

Criterion	Assessment
a) Historical	The *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* site was modified during the construction of the Hume Highway c.1985 and no historical buildings survive on the property. A small section of a dry-stone retaining wall suggests the site may hold archaeological potential, but it is unclear if this alignment is part of the property boundary. The potential below ground fabric could reveal associations to the past customs and cultural practices associated with early nineteenth century inns in the Southern Highlands and along the route of the Great Southern Road. Moreover, the *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* was a part cultural history of road-side inns. Inns proliferated in the Southern Highlands after the construction of the Great Southern Road but the installation of the Southern railway line around 1869 caused many inns, including the *Kentish Arms*/*Three Legs of Man* Inn to change in function. These patterns of historical change have the potential to be present in the below ground fabric. The item is of potential State significance under this criterion**.**
b) Associative	The site is on land granted to John Atkinson and Atkinson was the first licensee. While John's brother James Atkinson is a historically important figure in New South Wales' cultural history, John did not reach the same influential position. The site also has a strong association with Robert Cowley and the Cowley family. The Medway Rivulet, which borders the inn property to the south, was known colloquially as Cowley's Creek long after the Cowleys had ceased occupation of the site. Further, the modern highway bridge over the Medway Rivulet is known as the Three Legs o' Man Bridge reflects the name of the inn under Cowley's license. The site also has the potential to demonstrate a strong association to the historical themes of colonial expansion and rural colonial ways of life. The item is of local significance under this criterion.
c) Aesthetic	What may be surface historical fabric of the *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* site was demolished in 1918 and subsequent modifications to the site over the twentieth century have changed the landform that the inn was built on. The remnant of the dry-stone wall may, however, demonstrate a style of colonial rural landscaping and colonial building technology. Moreover, the below ground historical fabric has the potential to demonstrate the distinctive aesthetic attributes related to the individualisation of the colonial Georgian Architectural building style. The *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* site still retains landmark qualities given its connection to the name of current highway road bridge. The item does not fulfil this criterion at this stage.
d) Social	Historically, The *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* would have had a special association with the community of the Southern Highlands for social and cultural reasons. The site lost much of its significance through demolition in 1918 and subsequent modifications when the Hume Motorway was built. The item does not fulfil this criterion at this stage.

Table 5.4 Kentish Arms/ Three Legs of Man/Mereworth House Site archaeological site

Criterion	Assessment
e) Research	The presence of a portion of what appears to be historical dry-stone wall does indicate there is potential for below ground historical fabric to survive despite the disturbance from recent building and land forming activities. The site, therefore, has the potential to yield archaeological information that will contribute to understandings of the early years of John Atkinson's *Kentish Arms* and the Cowley family's *Three Legs of Man* Inn and later, *Mereworth House*, as well as the ways of life experienced by the occupants of a roadside inn from the 1830s until around 1918. There is also the potential to yield information relating to Robert Cowley's tannery and, now demolished mid-twentieth century buildings on the site. An understanding of day to day life of the occupants of colonial-era inns in New South Wales is not readily available through other sources. The item is of potential State significance under this criterion**.**
f) Rarity	As a potential archaeological site, the *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* site is an uncommon example of its type in New South Wales, and a rare example of its type in the Southern Highlands. The below ground fabric has the potential to represent the now defunct way of life of a roadside inn. Moreover, inn sites were often a place where multiple commercial ventures were based yet few examples have been investigated. Rural inn sites in New South Wales have been subject to archaeological investigation but below ground investigations in the Southern Highlands have not been found. The item is of potential State significance under this criterion**.**
g) Representativeness	The *Kentish Arms*/*Three Legs of Man* Inn/*Mereworth House* site had the potential to demonstrate the principle characteristics of a nineteenth century road-side inn in the Southern Highlands. The history of the *Kentish Arms*/*Three Legs of Man* Inn site reflects the proliferation and subsequent decline of inns in the Southern Highlands connected to the development of transports routes in New South Wales. The site has the potential to contain below ground features typical of inns such as building foundations, cellars, outbuildings, gardens, and landscaping features. Moreover, there is also the potential for the recovery of material culture that will yield further understanding of daily life at a rural roadside inn over the nineteenth century. The item is of potential State significance under this criterion**.**

5.5.5 Statement of significance - Kentish Arms/Three Legs of Man/Mereworth House

The *Kentish Arms*/*Three Legs of Man/Mereworth House* site is a potential archaeological site. The *Kentish Arms*/*Three Legs of Man/ /Mereworth House* site (1 Mereworth Road, Berrima) is not listed on the Wingecarribee LEP or the State Heritage Register.

The site has local and potential significance as the location of the *Kentish Arms*/*Three Legs of Man* Inn and was one of many that were established in connection with the construction of the South Road. The site was associated with early settler John Atkinson and the Cowley family. The inn site is also associated with the themes of colonial expansion and rural colonial life. The site has the potential to yield archaeological evidence relating to daily life at an early nineteenth century inn and rural ways of life through time. The *Kentish Arms*/*Three Legs of Man* Inn site is a potentially rare site in the Southern Highlands and has the potential to yield archaeological information representative of nineteenth century roadside inns.

The *Kentish Arms*/*Three Legs of Man* Inn site has the potential to be of State significance.

5.5.6 Assessment against the criteria – Former Three Legs O' Man Bridge piers

Table 5.5 Former Three Legs o' Man Bridge piers

Criterion	Assessment
a) Historical	The former Three Legs o' Man Bridge piers are strongly associated with the construction of the Great Southern Road and the continual human use of this transport route from 1834 to the present day. The current Hume Highway Three Legs o' Man Bridge overpass overlays the former Three Legs o' Man Bridge piers marking a significant association between the old and new transport routes. The former Three Legs o' Man Bridge piers were constructed in 1860 after the 1834 Lennox bridge was destroyed by flood. As such, the piers also have a strong association with the damaging floods recorded in New South Wales during the La Niña weather event of 1860 to 1864. And, although no longer in the original form, the stonework of the former Three Legs o' Man Bridge piers still retains an association with the practice of convict labour in the construction of colonial public works. The item is of local significance under this criterion.
b) Associative	The original bridge over the Medway Rivulet was one of the three Southern Highlands bridges designed by renowned colonial bridge builder David Lennox, for Major Thomas Mitchell's 1830s South Road building campaign. The reconstruction of the bridge in 1860 does lessen the connection to Lennox. Even so, the date 1834 remains inscribed on a stone on the southern pier which directly connects the extant piers to the Lennox construction. Several Lennox bridges have been heavily altered overtime but the connection to Lennox is still understood to be significant (e.g. Black Bob's Bridge, and Lennox Bridge, Berrima: Stonework). The item is of State significance under this criterion.
c) Aesthetic	The bridge piers demonstrate distinctive aesthetic characteristics among nineteenth century stone pier bridges. Nineteenth century sandstone pier bridges in New South Wales are commonly tiered or are column-like in their form with little decorative finishing to the termini. The former Three Legs o' Man Bridge piers are simplistic and rectangular in form but have a unique triangular bevelled finish on the eastern and western termini. The former Three Legs o' Man Bridge piers also demonstrate innovative adaptive reuse of materials after a natural disaster. The item is of local significance under this criterion.
d) Social	The piers did have a special association to the community identity in the Berrima region prior to the construction of the current highway around 1985. The bridge was chosen as a landmark in the negotiation of the Moss Vale municipality in 1888. Members of the community also expressed a sense of loss when the concrete bridge replaced the old wooden deck in the 1930s. Does not fulfil this criterion at this stage.
e) Research	The area surrounding the former Three Legs o' Man Bridge piers has the potential to yield new archaeological information regarding the changing practices of public works constructions in New South Wales from c.1834 to the 1980s. The site has the potential to yield information about both the Lennox bridge and 1860 construction phases. Moreover, there is also a possibility that sub-surface evidence is present which may provide an insight into the construction of the Great Southern Road. Archaeological investigations around bridges are not common, as such, investigations of the former Three Legs o' Man Bridge piers and surrounds have the potential to yield a greater understanding of the practices and experience of the people who worked on road constructions in New South Wales from the convict era to the present. It must be noted that the banks of the Medway rivulet and, therefore, the area surrounding the piers were heavily impacted by the c.1985 Hume Highway construction. The item is of local significance under this criterion.

Table 5.5 Former Three Legs o' Man Bridge piers

Criterion	Assessment
f) Rarity	The piers represent rare examples of an *in-situ* masonry pier bridge construction in the Southern Highlands region. At present the Nattai Creek Bridge is the only standing example of a working masonry pier road bridge in the Southern Highlands. Tangentially, the stones from the 1860 and 1897 Berrima Bridges, which were masonry stone pier bridges, are no longer in situ. With a construction date of 1860 the former Three Legs o' Man piers are also the earliest extant bridge piers of their type in New South Wales. The Nattai Creek Bridge and Stonequarry Creek Bridge Piers were constructed in 1898 and 1899 respectively. The Nattai Creek Bridge and Stonequarry Creek Bridge Piers, however, still function as road bridges. The item is of local significance under this criterion.
g) Representativeness	The piers demonstrate some of the principle characteristics of a New South Wales Road bridges and Lennox designed bridges. Even though there was reconstruction in 1860, the piers illustrate the heavy use of (likely locally sourced) sandstone in New South Wales public works during the convict era. Moreover, the use of sandstone also is typical of Lennox designed bridges. The later modifications are also a typical feature of New South Wales bridges constructed during the nineteenth century. The former Three Legs o' Man Bridge piers, however, are a example of adaptive reuse which can inform on the environmental adaptations of colonial peoples in the face the Australia's shifting climate patterns. The former Three Legs o' Man Bridge piers are a fine example of their type. The piers have a high level of intactness of the physical fabric despite the demolition of the bridge deck and subsequent construction of the modern highway above. Given the condition there is the potential to carry out detailed comparative analyses with other bridge sites along the Great Southern Road, and across New South Wales. The item is of local significance under this criterion.

5.5.7 Statement of significance - Former Three Legs o' Man Bridge Piers

The former Three Legs o' Man Bridge piers are two sandstone bridge piers located on the Medway Rivulet crossing under the current Hume Motorway overpass (Three Legs o' Man Bridge) near Berrima. The former Three Legs o' Man Bridge Piers (Medway Rivulet, Berrima) are not listed on the Wingecarribee LEP or the State Heritage Register.

The piers have local historical significance as a public work on the Great Southern Road and in particular, the extant piers are associated with the 1860s La Niña floods. Although reconstructed in 1860, the piers also still retain an association with colonial bridge designer David Lennox. The piers are aesthetically distinct and are a rare example of *in situ* masonry road bridge piers. The former Three Legs o' Man Bridge piers are a fine example of their type due to their form and their historically rebuilt intactness.

The former Three Legs o' Man Bridge piers are of local heritage significance.

5.5.8 Evandale

HC_127 is a scatter of glass, ceramic and iron artefacts near an exotic plant (yucca) identified on the Evandale property. This may have been a workers' camp or remains of a timber structure but equally may have been discarded refuse. Should archaeological remains be present they would be of historical and research significance for their ability to provide information about workers camps and the ways in which early settlers managed their land through the construction of ephemeral dwellings. The site has been repeatedly ploughed over 100 years, which would have affected the integrity of the archaeological site in the approximately upper 20–30 cm of soil.

Archaeological sites are rare in the local area. It may be an item of local heritage significance if the scatter represents a historic structure, and if it survives intact within deeper deposits. Unless it is determined to be a relic, the current significance of this site is nil.

5.5.9 Oldbury

The listing for *Oldbury* on the SHR is *Oldbury Farm* (SHR 00488). The property is not within the Project area and has therefore not been reassessed. The statement of significance for *Oldbury* is available on the Office of Environment and Heritage website (https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx).

5.5.10 Newbury

Access to Newbury was not obtained but the property was viewed from the public domain from over the fence on Golden Vale Road.

5.5.11 Assessment against the criteria – Newbury

Table 5.6 Newbury (Wingecarribee LEP I202)

Criterion	Assessment
a) Historical	Newbury was one of the first three parcels of land settled in the Southern Highlands and has a continuous history of pastoral activity. Pastoralism contributed to colonial expansion in New South Wales and to the development and character of the Southern Highlands region. The land was subdivided in 1907 but much of the subdivided land has been reincorporated. Possible below ground fabric has the potential to reveal strong associations to the past customs and practices associated with colonial pastoralism as well as shifting pastoral technologies and ways of life. The item is of potential State significance under this criterion.
b) Associative	Newbury has a strong association with the Nicholson family, specifically John Nicholson was a prominent member of the local community. John Nicholson established a dairy on the site and was a producer of salt butter. The item is of local significance under this criterion.
c) Aesthetic	John Nicholson cultivated Newbury to create a picturesque feature on the landscape. The elms that line the driveway are among the earliest plantings in the Southern Highlands and Newbury retains significant aesthetic qualities of an early farming property.
d) Social	As an early pastoral property in the Southern Highlands, Newbury has the potential to contribute to the history of pastoralism in the Southern Highlands which may be valued by community groups. Does not fulfil this criterion at this stage.
e) Research	Newbury represents an uncommon example of a colonial homestead in the Southern Highlands. The house has the potential to represent the now defunct way of life of colonial dairy farms. The standing structures have the potential to increase understanding of rural farm architecture. The potential archaeological evidence of Newbury may yield archaeological information that will contribute to an understanding of the evolution of farming in the Southern Highlands. The item is of potential State significance under this criterion.
f) Rarity	Newbury is a rare example of its type in the Southern Highlands. The above and below ground historical fabric has the potential to represent a now defunct way of life and show rare evidence of significant dairying activity important to the cultural history the Southern Highlands community. Pastoral homesteads New South Wales have been subject to archaeological investigation, but no below ground investigations have occurred in the Southern Highlands. The item is of potential State significance under this criterion.

Table 5.6 Newbury (Wingecarribee LEP I202)

Criterion	Assessment
g) Representativeness	Newbury demonstrates the principle characteristics of a pastoral/dairying homestead in New South Wales and the Southern Highlands. The site contains features typical of pastoral homestead complexes, and additions typical of a site with a long history of occupation. The property has the potential to contain further below ground features typical of pastoral homestead complexes, such as outbuildings foundations. Moreover, there is also the potential for the recovery of further material culture that will yield further understanding of daily life at *Newbury* from the 1820s to the present. The item is of potential State significance under this criterion.

5.5.12 Statement of significance - Newbury

Newbury is of local significance for its ability to demonstrate the aesthetic qualities of an early historic period farming property. It is associated with the Nicholson family, and specifically with John Nicholson who was a prominent member of the local community. The property is likely to contain relics from the early historic period in NSW and analysis of these as well as the standing structures are likely to have a high level of research potential.

Newbury is of local and potentially of State significance.

5.5.13 Assessment against the criteria – Sutton Farm

Table 5.7 Sutton Farm" house, grounds and outbuildings (former Red Cow Inn) (Wingecarribee LEP I035)

Criterion	Assessment
a) Historical	Sutton Farm is a brick and stucco building constructed in the 1830s as a coaching inn. Sutton Farm has a strong association with associations to the past customs and cultural practices associated with early nineteenth century travel and inns in the Southern Highlands. The item is of local significance under this criterion.
b) Associative	Sutton Farm demonstrates a strong association to the historical theme of migration. The item is of local significance under this criterion.
c) Aesthetic	Does not fulfil this criterion at this stage.
d) Social	Does not fulfil this criterion at this stage.
e) Research	Sutton Farm has the potential to yield archaeological information that will contribute to understandings of the development of the coaching trade and then the re-use of buildings with the change of use. The item is of local significance under this criterion.
f) Rarity	Sutton Farm represents a rare example of a coaching inn in the Southern Highlands. The house has the potential to represent the now defunct way of life represented by a coaching inn. The item is of local significance under this criterion.
g) Representativeness	Sutton Farm demonstrates the principle characteristics of a coaching inn in New South Wales and the Southern Highlands. Moreover, there is also the potential for the recovery of material culture that will yield further understanding of daily life at a rural roadside inn over the nineteenth century. The item is of local significance under this criterion.

5.5.14 Statement of significance - Sutton Farm

The house at *Sutton Farm* is a brick and stucco building likely built in the 1830s. It has historical and research significance for its ability to provide information on the development of the coaching trade and then the re-use of buildings with the change of use. Coaching inns are rare in the local area and Sutton Farm is a good representative example.

Sutton Farm is of local heritage significance.

5.5.15 Assessment against the criteria – The Pines

Table 5.8 "The Pines" slab cottage (Wingecarribee LEP I029)

Criterion	Assessment
a) Historical	The timber slab cottage known as "The Pines" was constructed in the 1820s. As an example of the first house types adopted by settlers. The Pines is strongly associated with colonial expansion and the settlement of the Southern Highlands. The item is of local significance under this criterion.
b) Associative	Does not fulfil this criterion at this stage.
c) Aesthetic	The timber slab cottage has been covered by renovations. Nevertheless, the cottage exemplifies the slab cottage colonial building style. The item is of local significance under this criterion.
d) Social	Does not fulfil this criterion at this stage.
e) Research	The Pines has the potential to yield information regarding the construction of early colonial domestic structures. Moreover, as timber slab cottages were the first buildings erected privately by settlers The Pines is an important reference site within the Southern Highlands. More broadly, The Pines has the potential to yield information on the historical development of Sutton Forest and the Southern transport links. Timber slab cottages rarely survive into the present, so an understanding of their construction and functions are not readily available through other sources. The item is of local significance under this criterion.
f) Rarity	The Pines is a rare example of a standing timber slab cottage within the Southern Highlands and New South Wales. The item is of local significance under this criterion.
g) Representativeness	The Pines demonstrates the principle characteristics of an early nineteenth century timber slab cottage. The item is of local significance under this criterion.

5.5.16 Statement of significance – The Pines

The Pines is a timber slab cottage built in the 1820s. Despite renovations which have covered the original timber slabs the cottage remains a rare and representative example of timber slab cottages the majority of which have been removed. Timber slab cottages were the first buildings erected privately by settlers and are of historical significance for their ability to provide information on the historical development of Sutton Forest and the Great Southern Road.

It is an item of local heritage significance.

5.5.17 Assessment against the criteria - The Harp

Table 5.9 The Harp (Former Bindagundra House, Grounds and Outbuildings) (Wingecarribee LEP I027)

Criterion	Assessment
a) Historical	The Harp (formerly known as *Bindagundra*) is a sandstock brick inn built in the 1830s. The inn building has a continuous history of occupation and the fabric of the structure has had little alteration. The Harp is strongly associated with the cultural history of road-side inns in the Southern Highlands. The item is of local significance under this criterion.
b) Associative	The Harp was constructed on a portion of land granted to John Sewell in 1822. The Harp demonstrates a strong association to the historical themes of colonial expansion and recreational pastimes. The item is of local significance under this criterion.
c) Aesthetic	The Harp has had little alteration over time and the building exemplifies early colonial house construction in the Southern Highlands. The item is of local significance under this criterion.
d) Social	As an inn, The Harp would have had a special association with the community of the Southern highlands for social and cultural reasons. Does not fulfil this criterion at this stage.
e) Research	The Harp has the potential to yield information relating to colonial building techniques. Moreover, it is likely the property has the potential to yield archaeological information that will contribute to understandings of the ways of life experienced by the occupants of a roadside inn from the 1830s. An understanding of day to day life of the occupants of colonial-era inns in New South Wales is not readily available through other sources. The item is of potential State significance under this criterion.
f) Rarity	The Harp is an uncommon example of its type in New South Wales, and a rare example of an inn which pre-dates Mitchell's Great South Road in the Southern Highlands. Rural inn sites in the Southern Highlands are considered of local significance with some examples considered to be of State significance. The item is of potential State significance under this criterion.
g) Representativeness	The Harp demonstrates the principle characteristics of a nineteenth century road-side inn in the Southern Highlands. The item is of local significance under this criterion.

5.5.18 Statement of significance -The Harp

The Harp (formerly known as *Bindagundra*) is a sandstone brick building built in the 1830s. It has historical significance for its ability to provide information on the recreational pastimes of the Southern Highlands communities during the nineteenth century. It is also able to provide historical information on the development of the settlement in this area through its connections with the road network. The building is in fair condition with few alterations from its original state, providing local research potential and aesthetic significance. The Harp is a good representative example of inns built and operated in the nineteenth century.

It is an item of local heritage significance with the potential to have State significant archaeological research potential.

5.5.19 Assessment against the criteria – Bunya Hill

Table 5.10 Bunya Hill House, Grounds and Outbuildings (Wingecarribee LEP I035)

Criterion	Assessment
a) Historical	Bunya Hill is a large Victorian House constructed in the 1870s. The item is of local significance under this criterion.
b) Associative	Does not fulfil this criterion at this stage.
c) Aesthetic	Bunya Hill exemplifies the Victorian architectural style which developed in the area around Sutton Forest in the late nineteenth century. The integrity of the internal staircase and joinery is poor. The item is of local significance under this criterion.
d) Social	Does not fulfil this criterion at this stage.
e) Research	Bunya house has the potential to yield information regarding the construction of Victorian domestic structures and changes in building function over time. It is a benchmark of its type in the Southern Highlands. The item is of local significance under this criterion.
f) Rarity	Bunya Hill is an uncommon example of its type in the Southern Highlands. The property demonstrates design of exceptional interest in the region. Pastoral homesteads New South Wales have been subject to archaeological investigation, but no below ground investigations have occurred in the Southern Highlands. The item is of local significance under this criterion.
g) Representativeness	Bunya Hill demonstrates the principle characteristics of a large Victorian home in New South Wales and the Southern Highlands. The property has attributes typical of Victorian architecture. The item is of local significance under this criterion.

5.5.20 Statement of significance - Bunya Hill

Bunya Hill is one of the large Victorian houses which were built around the village of Sutton Forest, settled in 1822 (SHI 2680018).

It is an item of local heritage significance.

5.5.21 Assessment against the criteria – Eling Forest Winery Group

Table 5.11 Eling Forest Winery Group (I004, I0009, I0010, I0011, I0012)

Criterion	Assessment
a) Historical	Eling Forest Winery Group consists of a number of structures and potential archaeological sites. The homestead was constructed in the 1840s and the house has later weatherboard additions. Other standing buildings include a stone cottage, former schoolroom and stables. A stone quarry is also present on the property. The original c. 1834 homestead is no longer standing, but the location of the site is still known. Eling Forest was one of the early parcels of land settled in the Southern Highlands and has a continuous history of pastoral activity. Pastoralism contributed to colonial expansion in New South Wales and to the development and character of the Southern Highlands region. The below ground fabric has the potential to reveal strong associations to the past customs and practices associated with colonial pastoralism and shifting land use. The item is of local significance under this criterion.
b) Associative	Eling Forest Winery was granted to John Morrice. Does not fulfil this criterion at this stage.
c) Aesthetic	The standing homestead has been altered over time. The former homestead site has the potential to reveal the technology of early domestic buildings in the Southern Highlands. The item is of local significance under this criterion.
d) Social	As an early pastoral property in the Southern Highlands, Eling Forest has the potential to contribute to the history of pastoralism in the Southern Highlands which may be valued by community groups.
e) Research	The Eling Forest standing buildings have the potential to yield information relating to the historical development of Sutton Forest. Moreover, the standing buildings also have the potential to increase understandings of the changing technologies and fashions of a variety of building types (e.g. education spaces). There is also a potential to yield archaeological information from the first homestead, as well as in the former school rooms and stables and the sandstone quarry. The item is of potential State significance under this criterion.
f) Rarity	Eling Forest is an uncommon example of a pastoral homestead in the Southern Highlands, and a rare example of its type in the Southern Highlands. The below ground historical fabric has the potential to represent a now defunct way of life and show rare evidence of significant pastoral activity important to the cultural history the Southern Highlands community. Pastoral homesteads in New South Wales have been subject to archaeological investigation, but no below ground investigations have occurred in the Southern Highlands. The item is of local significance under this criterion.
g) Representativeness	Eling Forest demonstrates the principle characteristics of a pastoral homestead in New South Wales and the Southern Highlands. The site contains features typical of pastoral homestead complexes, and additions typical of a site with a long history of occupation. The site also has unique elements not found in other homesteads such as the school room and quarry. The property has the potential to contain further below ground features typical of pastoral homestead complexes, such as outbuilding foundations. Moreover, there is also the potential for the recovery of material that will yield further understanding of daily life at Eling Forest from the 1830s to the present, with the potential to demonstrate the principle characteristics of a pastoral homestead in New South Wales and the Southern Highlands. The item is of local significance under this criterion.

5.5.22 Statement of significance - Eling Forest Winery Group

The *Eling Forest Winery Group* has historical significance for its ability to demonstrate, through surviving buildings on the property, the historical development of Sutton Forest. It possesses research potential embodied in the archaeological site of the first homestead, as well as in the former school rooms and stables and the sandstone quarry.

The *Eling Forest Winery Group* is of local significance with the potential to hold State significant archaeological research potential.

5.5.23 Assessment against the criteria – Comfort Hill

Table 5.12 Comfort Hill (Wingecarribee LEP I021, I0356, I0357)

Criterion	Assessment
a) Historical	Comfort Hill is one of the early parcels of land settled around Black Bob's Creek and has a continued history of occupation. The group consists of the main house and outbuildings (I0356) and gardens (I03578). The 1840s house is a single-story sandstone cottage made from sandstone quarried on-site. The house also features sympathetic 1948 extensions. The modern gardens contain some old plantings and is in the tradition of the English landscape school. The homestead itself is set in a landscape that has changed little from the initial occupation phases. Comfort Hill has strong associations to the settlement and expansion of the Southern Highlands. The item is of local significance under this criterion.
b) Associative	Comfort Hill are situated on the land granted to John and William Morrice. The 1948 additions were designed by architect firm Stephenson & Turner. Does not fulfil this criterion at this stage.
c) Aesthetic	The 1948 additions demonstrate a high degree of aesthetic and technical achievement through the sympathetic relationship to the original 1840s house. The modern gardens demonstrate important aesthetic characteristics with the combination of built and planted elements create views and visual diversity. The gardens demonstrate the style of the English landscape school over a large area. The item is of local significance under this criterion.
d) Social	Does not fulfil this criterion at this stage.
e) Research	Comfort Hill has the potential to yield information regarding the construction of colonial domestic structures in the Southern Highlands. The property also features an area of remnant bushland. This area of bushland has the potential to further understandings of native Australian fauna and flora, as well as environmental changes caused by land use in the region. The item is of potential State significance under this criterion.
f) Rarity	Comfort Hill is an uncommon example of a colonial homestead in the Southern Highlands, and a rare example of its type in the Southern Highlands. Pastoral homesteads in New South Wales have been subject to archaeological investigation, but no below ground investigations have occurred in the Southern Highlands. The item is of local significance under this criterion.
g) Representativeness	Comfort Hill demonstrates the principle characteristics of a pastoral homestead in the Southern Highlands. The site contains features typical of pastoral homestead complexes, and additions typical of a site with a long history of occupation. The item is of local significance under this criterion.

5.5.24 Statement of significance - Comfort Hill

Comfort Hill is of local significance for the existing house, gardens and other features that make up the property. The statements of significance below are from entries in the SHI. There are no statements of significance on the SHI for the gardens (SHI 2680357; WLEP I10357) or the listing for *Comfort Hill* including outbuildings, trees, stone wall and pond", which is the Illawarra Regional Environmental Plan No.1 listing. The earliest elements of the *Comfort Hill* group include potential relics dating from the 1820s. The statement of significance is reproduced below:

> Comfort Hill House is significant within the local area as an early and important component of the area's stock of 19th century homesteads and as a building which still retains much of its original setting of natural and human made landscape. The 20th century changes to the house illustrate the importance of the region as a desirable place to live at a time when properties were being sought as "rural retreats". The extensive 1948 additions to the house also contribute to its significance through the high degree of integrity of their aesthetic qualities and sympathetic relationship to the original structure and their association with a prominent firm of architects.
>
> SHI 2680356; WLEP I0356

> Comfort Hill Group is significant within the local area and region as one of the original large pastoral properties which spread around Black Bob's Creek. The 1840's house is an important and early component of the area's significant stock of early buildings and the site retains mature early tree plantings. The extensive 1948 additions to the house display a high degree of integrity in their aesthetic qualities and a sympathetic relationship to the original building. The site also has significance as a wildlife refuge and area of remnant natural bush which provides rare evidence of the changes to the environment created by clearing, agricultural practice and tree planting in the region.
>
> SHI 2680021; WLEP ID I0021

5.5.25 Assessment against the criteria – Former Berrima Coal rail corridor

Table 5.13 Significance assessment – Former Berrima Coal rail corridor

Criterion	Assessment
a) Historical significance	The former Berrima Coal rail corridor has some historical significance as a demonstration of the region's coal mining history. The item does not meet the threshold for local significance under this criterion.
b) Associative significance	The former Berrima Coal rail corridor has some associative significance in its relationship to Arnold 'Stan' Taylor, an important industrialist in the Southern Highlands who owned the Medway Mine, the Southern Blue Metal Quarry, and Southern Portland Cement. The rail line connected them all to the government-owned Southern Railway. The rail corridor also has associations with Boral, which purchased many of Taylor's industrial ventures and has a long history in Australian building manufacturing. The item does not meet the threshold for local significance under this criterion.
c) Aesthetic significance	The former rail corridor is a remnant on a landscape that is a palimpsest of uses dating from the first Australians, through to colonial Australia and the industrial revolution of the nation. It is a reminder of the many elements that combine to create the landscape as it is today. The item does not meet the threshold for local significance under this criterion.
d) Social significance	There is no information to support significance under this criterion. The item does not meet the threshold for local significance under this criterion.

Table 5.13 Significance assessment – Former Berrima Coal rail corridor

Criterion	Assessment
e) Technical/research significance	The research significance of the former rail corridor does not reach the threshold for this criterion.
f) Rarity	The former rail corridor is one of many smaller branch lines that serviced local industry in the past and connected them to the Main Southern Rail Line. The item does not meet the threshold for local significance under this criterion.
g) Representativeness	The former rail corridor is representative of decommissioned rail lines in NSW. The item does not meet the threshold for local significance under this criterion.

5.5.26 Summary statement of significance – Berrima Coal rail corridor

Whilst the former Berrima Coal rail line responds to some of the criteria for local significance, it does not meet the threshold, and therefore is not considered to be of local significance. It is also noted that reusing the former rail corridor for its original intended purpose is considered to be a positive aspect of the proposal.

6 Assessment of impacts

6.1 Background to assessing impacts

6.1.1 Introduction

The assessment of a project's impacts to the heritage significance of a place or an item is to understand change, if it is beneficial to the place or item, and how changes can be managed to best retain significance. The historical landscape in Australia, be it rural or urban, is by social agreement, a significant aspect of our identity (refer to Section 6.1.2). That agreement is codified in legislation, the intent of which is to encourage the conservation of cultural heritage by incorporating it into development where feasible. In many situations avoiding impacts is impossible, but the aim is to reduce those impacts by either project re-design or managing the loss of information through methods that reduce and/or record significance, before it is removed.

The framework around assessing significance and therefore suitable levels of impact is to understand how the place or item came to be, how important it was (and may be still) in the development of the local area or the state (the colony at the time) and providing guidance on its management.

6.1.2 Inter-generational equity

Aboriginal cultural heritage management is based on the principle of inter-generational equity, the intent of which is to ensure present generations consider future generations when making management decisions about culture. This principle is possibly the most relevant part of the notion of ecologically sustainable development (ESD) when considering Aboriginal cultural heritage management.

The same philosophy is applied to historical heritage management and is covered under the ICOMOS *Burra Charter:*

> Article 1.2 Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present and future generations (Australia ICOMOS 2013, p.2).

The Burra Charter continues:

> Places of cultural significance enrich people's lives, often providing a deep and inspirational sense of connection to community and landscape, to the past and to lived experiences. They are historical records, [sic] that are important expressions of Australian identity and experience. Places of cultural significance reflect the diversity of our communities, telling us about who we are and the past that has formed us and the Australian landscape. They are irreplaceable and precious.
>
> These places of cultural significance must be conserved for present and future generations in accordance with the principle of inter-generational equity.
>
> The Burra Charter advocates a cautious approach to change: do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.
>
> (Australia ICOMOS 2013, p.1)

This assessment of historical heritage impact was prepared with the notion of intergenerational equity as a guiding principle.

6.2 Source of potential impacts

6.2.1 Overview

The project has been carefully planned to minimise impacts to environmental heritage, including historic and Aboriginal heritage. Potential impacts through subsidence have been eliminated or minimised through the use of a non-caving coal extraction method. Similarly, the infrastructure areas have been designed with the smallest footprint possible to minimise the physical and visual impacts on the surrounding environment and the decision not to undermine items on the SHR was made early in the design process.

The main changes have been to move impacts associated with construction away from the riparian corridors and vegetated edges of paddocks and to constrain those impacts within paddocks, which have been historically modified by successive ploughing activities.

Impacts that will have a significant effect on heritage values will primarily be visual. They will be long-term, but not permanent, and will cease when the mine is closed, and the landscape is rehabilitated and returned to its current state.

The following activities have the potential to impact known and unknown historic heritage items:

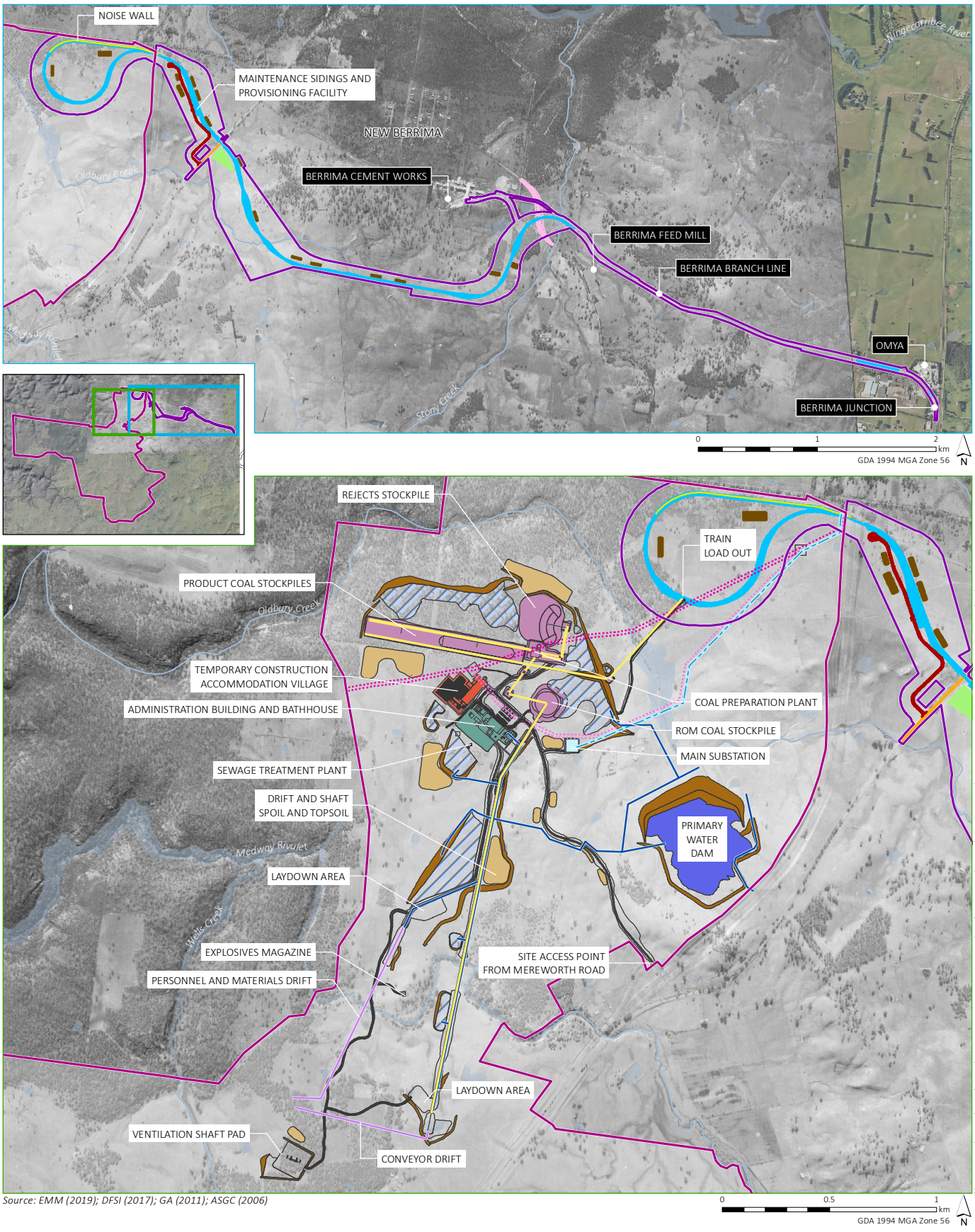
- the construction and operation of mine infrastructure which includes mine access and ventilation systems, surface and groundwater management and treatment facilities, the CHPP, an overland conveyor system and communication and electricity infrastructure; and
- negligible or imperceptible subsidence from the underground mining (Mine Advice 2016).

This impact assessment has been prepared in accordance with the document *Statements of heritage impact* (Heritage Office *et al*, 2002). The questions posed in the guidance document are implicit in the discussion of impacts in this section of the report.

6.2.2 Mine infrastructure

Mine infrastructure (refer to Figure 6.1 for detailed information on individual infrastructure areas and Figure 6.2 for the indicative design and identified heritage values) will be predominantly placed on cleared land owned by Hume Coal, which has been selected through extensive study, as it has low environmental constraints. The final location of the surface mine infrastructure has been modified throughout the investigation period to reduce impacts to environmental values such as Aboriginal and historical heritage, biodiversity and groundwater. The design also aims to avoid rows of mature trees, which contribute to the current pastoral landscape and definitively avoids physical impacts to the Mereworth house and garden.

The other built elements of the Project will be on Evandale where two drifts comprising the exit portal and the personnel and materials portal, access roads and the upcast ventilation shaft will be located. This access point will be used for entry and exit the underground mine area by personnel and vehicles. The exit portal will be located to the north-east and within 230 m of the main house. A spillway/diversion drain will be constructed on the south-eastern and south-western sides to divert water away from the entrance to the portal.



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Source: EMM (2019); DFSI (2017); GA (2011); ASGC (2006)

KEY

- Named watercourse
- Waterbody
- Berrima Rail Project area

Berrima Rail Project elements

- Noise wall
- New rail line
- Rail maintenance facility access road
- Berrima Road relocation (works by Wingecarribee Shire Council)
- Topsoil stockpiles
- Rail temporary construction facility
- Turning lane/shoulder
- Hume Coal Project area

Hume Coal Project elements

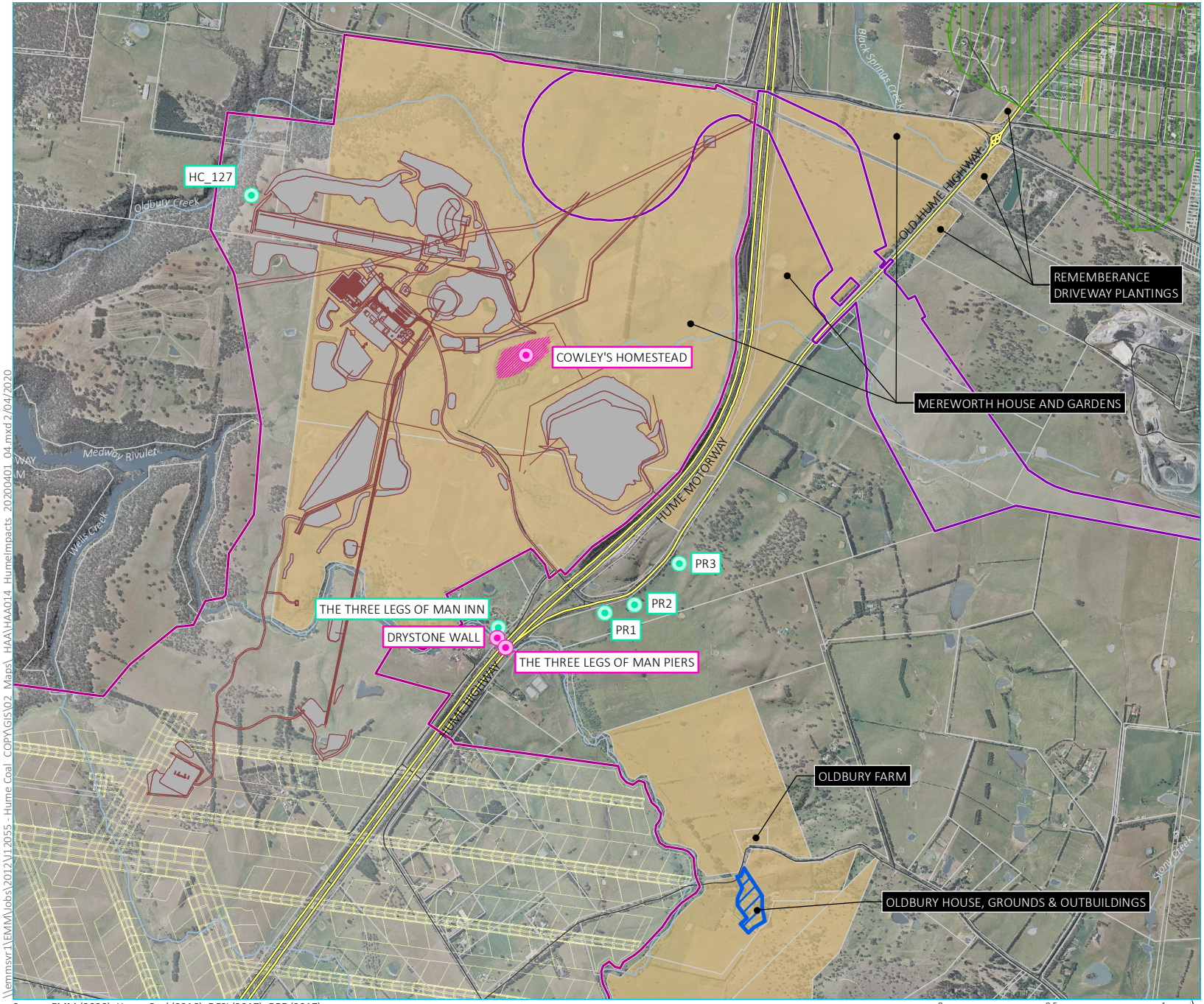
- Conveyor
- Drift (underground)
- Powerline route
- Water pipeline
- Proposed powerline and pipeline easement
- Existing WSC easement
- Temporary construction accommodation village
- Administration/bathhouse/workshop
- Main substation
- Internal road
- CPP and stockpiles
- Topsoil stockpiles
- Stormwater management earthworks
- Water management area
- Top water level

Indicative mine infrastructure overlaid on the 1949 aerial photograph

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 6.1

HUMECOAL PROJECT

EMM creating opportunities



KEY

- Known relic
- Potential relic
- Historic Mereworth 1949
- Hume Coal Project area
- Berrima Rail Project area
- Indicative surface infrastructure footprint
- Underground mine workings (indicative)

Heritage Act 1977

- State Heritage Register

Wingecarribee LEP 2010 heritage

- Conservation Area - General
- Conservation Area - Landscape
- Item - General

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary

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Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2017)

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Project impacts – Hume Coal Project

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 6.2

HUMECOAL PROJECT

EMM creating opportunities

6.2.3 Subsidence predictions for the Project area

In order to manage the effects of mining on subsidence, the mining method to be used will leave long-term stable coal pillars in place. Mine Advice Pty Ltd (2016) has estimated the predicted subsidence, tilt and horizontal strain arising from the proposed underground mining method. The maximum predicted subsidence above mine panels is 20 mm.

The Mine Advice report concluded that "the predicted maximum subsidence parameters are sufficiently low such that any associated impacts fall into the 'imperceptible' or 'negligible' category for all of the surface features that can be evaluated according to pre-set or established numerical criteria" (Mine Advice 2015, p.85). All impact assessment in this report are based on the predictions from Mine Advice (2015).

6.2.4 Underground mine area

i Underground mining

The underground mine area is shown in Figure 6.2. The proposed locations of the surface infrastructure areas at *Mereworth* and *Evandale* were surveyed in the field and analysed using documentary sources. One area where relics may be present in the Project boundary was the house and farm buildings at *Mereworth*. These relics are associated with the earlier homestead that was built and inhabited by the Cowley family. The discussion of impacts per site is presented from Section 6.3 below.

Other areas of archaeological sensitivity have not been identified in areas above the underground mining area. As the maximum predicted level of subsidence is 20 mm, noticeable impacts to the ground's surface and therefore to deposits beneath the ground are not predicted. Consequently, impacts to heritage items and relics on the surface due to the underground mining activities are anticipated to be nil to negligible.

ii Downcast shafts

The disturbance footprints of both downcast shaft locations were surveyed and are not considered to be in areas of archaeological sensitivity. The footprint of the downcast shaft in the Belanglo State Forest is within a highly disturbed section of pine plantation and the downcast shaft on Carlisle Downs is in a cleared and ploughed paddock.

Historical heritage impacts in relation to the downcast shafts are not anticipated.

iii Upcast shaft

One upcast shaft will be constructed on *Evandale* approximately 450 m from the main house. The shaft will be placed on the western side of a row of trees, shielding views from the homestead buildings and the Hume Motorway.

Historical heritage impacts in relation to the upcast shaft are not anticipated.

6.3 Potential impacts to relics

6.3.1 Overview

A total of thirteen sites with relics or the possibility of relics are located in the Project area.

They are:

- Former Cowley homestead 1912-1963 on *Mereworth*;
- *Kentish Arms/ Three Legs of Man/Mereworth House;*
- Former *Three Legs o' Man* Bridge piers;
- *Evandale* scatter HC_127;
- *Newbury;*
- *Sutton Farm;*
- *The Pines;*
- *The Harp;*
- *Bunya Hill;*
- *Eling Forest Winery;*
- *Comfort Hill;*
- Former Berrima Coal rail corridor; and

Former Southern Blue Metal rail-bridge and rail corridor (see Figure 6.3).

6.4 Analysis of impacts

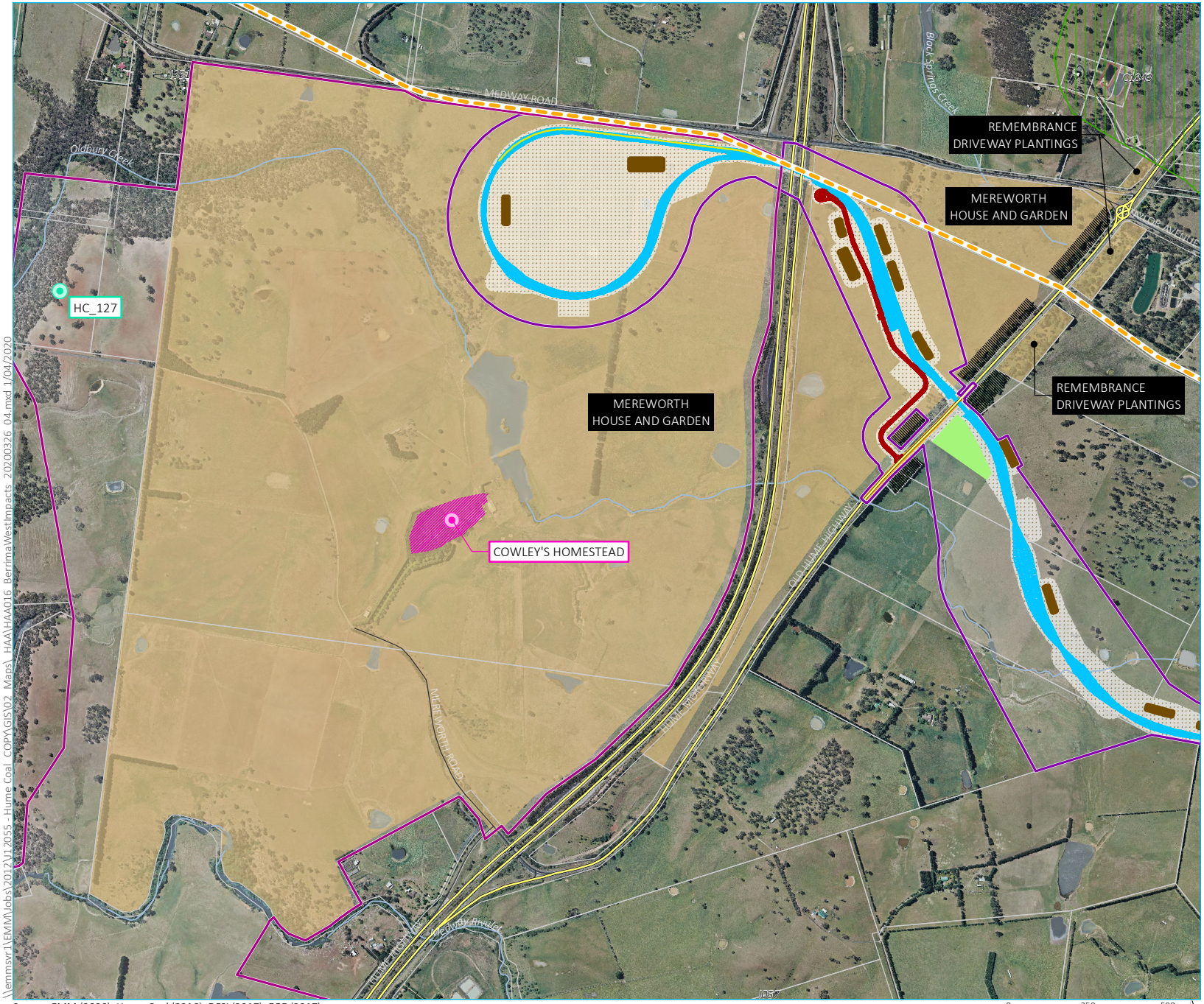
Table 6.1 presents heritage items inside the Project boundary and the affected areas. The areas were calculated by transecting the property boundary with the Project and mine plan boundary. The mine plan boundary includes the main roads, panels and plunges, that is the mined voids but not the strata left in situ.

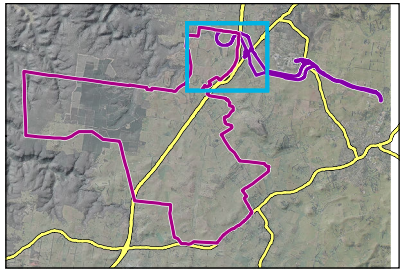
Table 6.1 Heritage item area (ha)

Item	Total area	Project boundary	Mine plan
Rosedale house and grounds	269.49	0.08	0.00
Comfort Hill	216.58	59.01	18.97
Golden Vale	124.03	0.05	0.00
Clover Hill	23.26	2.46	0.04
The Pines	0.86	0.86	0.36
Newbury	162.03	72.04	34.37

Table 6.1 Heritage item area (ha)

Item	Total area	Project boundary	Mine plan
Eling Forest Winery	64.45	5.80	1.66
Bunya Hill	51.37	13.87	9.03
Sutton Farm	19.29	19.29	12.96
The Harp	2.00	1.94	1.14





KEY

- Hume Coal Project area
- Berrima Rail Project area

Berrima Rail Project elements

- Noise wall
- Rail maintenance facility access road
- New rail line
- Topsoil stockpiles
- Rail temporary construction facility
- Turning lane/shoulder
- Construction buffer zone

Unlisted sites

- Known relic
- Potential relic
- Former Berrima Coal Rail corridor
- Historic Mereworth 1949
- Remembrance Driveway plantings

Wingecarribee LEP 2010 heritage

- Conservation Area - Landscape
- Item - General

Existing environment

- Major road
- Minor road
- Named watercourse
- Waterbody
- Cadastral boundary

\\emmsvr1\EMM\Jobs\2012\12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA016 BerrimaWestImpacts 20200326 04.mxd 1/04/2020

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2017)

0 250 500 m

GDA 1994 MGA Zone 56

N

Project impacts – Berrima Rail Project (west)

Hume Coal and Berrima Rail Project
Historical archaeological assessment
Figure 6.3

HUMECOAL PROJECT

EMM creating opportunities

6.4.1 The former Cowley homestead

Research indicates that a timber homestead built by William Cowley was built in the location of present-day *Mereworth*, with the pool appearing to be directly over the old house (refer also to Higginbotham 1992, p.49). Moreover, there is no development proposed for the core building and garden, and any relics, should they survive in this location, would not be impacted by the Project.

The relics (sandstone flagging-HC1, drain feature-HC2, and the artefact scatter-HC3) that were discovered in October 2019 are outside the infrastructure footprint and access through this area of sensitivity will be restricted to mine construction and operations. Access to stock and other farm uses will continue as normal as they have for the last few decades. A cover of grass with recent rain will protect these relics from potential harm.

The earlier homestead complex extends to the north-east of the existing house at Mereworth and in the direction of the mine water pipeline. The location of the pipeline is shown in Figure 6.1, away from areas of archaeological sensitivity. The pipeline will be bored under the raised garden beds and will therefore not cause impacts to the structure.

Other relics that may exist away from the main complex are likely to be ephemeral with little structure or integrity due to more recent changes associated with the modern farm. As a result, it is considered that an archaeological test excavation prior to a decision on the final location of the pipeline would be unjustified at this time and not a suitable method for discovering relics in this instance.

The general location of the mine water pipeline is appropriate because of the flexibility Hume Coal has in determining its exact location within the construction corridor. The pipeline excavation works in the vicinity of the earlier homestead elements will be accompanied by archaeological monitoring which will make route changes should any relics be uncovered.

The relics identified in this area, that is, the sandstone flagging, and sandstone drain-like feature, are inside the Project area but away from new construction. These features are in what is currently used for farming and will continue to be so for the life of the mine. As the area has been used as a stockyard for a long period of time, and will regrow with grass, substantial protection is not necessary for their protection.

Impacts to the archaeological site the former Cowley homestead are very unlikely to occur as a result of the underground mine, the surface infrastructure area or associated activities.

6.4.2 The Kentish Arms/Three Legs of Man/Mereworth House

Possible evidence of the former inn and later, the family residence was recorded during field survey. This evidence was in the form of a stone wall, which may have been part of the dry-stone wall, and which showed a number of repairs with concrete and timber. No other archaeological evidence was noted, despite close survey of the land in the public domain. If relics related to the former inn existed on the southern side of the property boundary, it will have most certainly been destroyed during the construction of the Hume Motorway in the mid-1980s.

If the stone wall that was recorded during field survey does belong to the original building, it would be a relic and signify the potential for other relics on the property. A visual assessment (during survey) of the property suggests that while building impacts have occurred, it is likely that relics from the Atkinson's, and later, Cowley's ownership, survive intact.

This item is outside the Project area, with the closest project boundary approximately 150 m to the west. The closest component of the Project is the underground mine, which will extract coal using the pine feather technique that has been modelled to show that subsidence is zero to 20 mm. A subsidence reading at this level normally assessed as 'nil'.

Impacts to the archaeological site the former *The Kentish Arms/ The Three Legs of Man/Mereworth House* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.3 Former Three Legs O' Man Bridge

The piers of the former Three Legs O' Man Bridge are not in the Project area.

The piers survive in the position they were rebuilt after the 1860's flood; a retaining wall that is considered to be part of the bridge piers also survives on the south-western bank (Plate 4.20 to Plate 4.24). The piers and retaining wall have been robustly made and do now show evidence of weakness; the piers have been partially demolished but retain height and structure.

This item is outside the Project area, with the closest project boundary approximately 200 m to the west. The closest component of the Project is the underground mine, which will extract coal using a technique that has been modelled to show that subsidence is zero to 20 mm. A subsidence reading at this level normally assessed as 'nil'. Impacts are not anticipated

Impacts to the archaeological site the former *Three Legs O' Man Bridge* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.4 Evandale scatter HC_127

The Evandale scatter (HC_127) is in the Project boundary.

Evidence that the HC_127 is anything but discarded refuse has not been discovered during research. Nevertheless, as the historical artefacts are combined with a small number of Aboriginal stone artefacts, the area will be avoided by construction impacts.

The scatter is in an area that will be developed as part of the indicative surface infrastructure area in the north-western Project area. However, the Project has been designed to avoid the Evandale scatter HC_127, and as a result, this item will not be subject to surface or subsurface impacts as a result of the Project.

Impacts to HC_127 are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.5 Newbury

Newbury is listed on the WLEP as an item of *local* significance. The total area of *Newbury* is 162.03 ha and of this, 34.37 ha is within the proposed mine plan area (Figure 2.1).

While access permission to *Newbury* was not obtained, the visible portion of the paddock that sits over the underground mine was viewed from the public domain, over the fence on Golden Vale Road. Based on current and historical aerial photography, there are no substantial buildings in this area other than a large shed; the expanse of land is a paddock with some stands of trees.

The subdivision along the Old Main Southern Road (unnamed and looping from the Illawarra Highway) was viewed from the road. Only one building that appears on the 1862 plan (Plate 4.33) was extant until September 2018 but has since been demolished and replaced with a modern build.

Some of the surrounding paddocks are within the underground mining area, but the main structures are not, with the exception of one shed visible in aerial photography. Mine infrastructure will not cause impacts and subsidence is predicted to be negligible, therefore there are no predicted subsidence related impacts as a result of the Project. Views to the surface infrastructure area are not possible from this item.

While part of *Newbury* is located over the mine plan, the underground mine will extract coal using a technique that has been modelled to show that subsidence is zero to 20 mm. A subsidence reading at this level normally assessed as 'nil'.

Impacts to relics on *Newbury* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.6 Sutton Farm

The entirety of *Sutton Farm* is in the Project area, with 12.96 ha over the mine plan, approximately 7 km from the surface infrastructure area at *Mereworth* and approximately 5 km from the surface infrastructure area at *Evandale.*

The underground mine will extract coal using a technique that has been modelled to show that subsidence is zero to 20 mm. A subsidence reading at this level normally assessed as 'nil'.

Impacts to relics on *Sutton Farm* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.7 The Pines

The total area of *The Pines* is 0.86 ha, all of which is inside the Project boundary and of this, 0.36 ha is within the proposed mine plan area. There are no built structures within the proposed mine plan area.

The Pines was not surveyed due to access restrictions.; mine infrastructure will not cause impacts and therefore there are no predicted subsidence related impacts as a result of the Project.

Impacts to relics on *The Pines* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.8 The Harp

In total *The Harp* property is 2 ha in size; 1.94 ha is within the Project boundary and 1.17 ha is in the proposed mine plan area.

The Harp was not surveyed due to access restrictions. Mine infrastructure will not cause impacts and subsidence is predicted to be negligible, therefore there are no predicted subsidence related impacts as a result of the Project. Views to the surface infrastructure area are not possible from this item.

Impacts to relics on *The Harp* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.9 Bunya Hill

Some of the surrounding paddocks belonging to *Bunya Hill* are within the underground mining area, but the structures are not. The total area of *Bunya Hill* is 51.37 *Bunya Hill* was not surveyed due to access restrictions. Mine infrastructure will not cause impacts and subsidence is predicted to be negligible, therefore there are no predicted subsidence related impacts as a result of the Project.

Impacts to relics on *Bunya Hill* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.10 Eling Forest Winery

Of the total 64.45 ha of the *Eling Forest Winery,* approximately 5.6 ha is located inside the Project area and 1.66 is located over the proposed mine plan.

Eling Forest Winery was not surveyed due to access restrictions, but it is considered unlikely that impacts to, as yet, unidentified relics on the property would occur. Subsidence predictions by Mine Advice (2015) are so low as to be negligible. Relics that may occur over the mine plan are unlikely to be affected by subsidence.

Impacts to relics on *Eling Forest Winery* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

6.4.11 Comfort Hill

Comfort Hill (216.58 is partially inside the Project boundary (59.01 ha) and is partially over the mine plan (18.97 ha).

Comfort Hill was not surveyed due to access restrictions. Some of the surrounding paddocks are within the underground mining area, but the structures are not. Mine infrastructure will not cause impacts and subsidence is predicted to be negligible, therefore there are no predicted subsidence related impacts as a result of the Project. Views to the surface infrastructure area are not possible from this item.

Impacts to relics on *Comfort Hill* are very unlikely to occur as a result of the underground mine, surface infrastructure area or associated activities.

7 Management of impacts

The overriding objective in managing heritage significance is the avoidance of impacts. Avoidance removes the need for mitigation or amelioration and is in keeping with the philosophy of the *Burra Charter 2013*.

In all cases where significant heritage values may be affected by a project, it is prudent to take a precautionary approach by excising the construction disturbance footprint where it intersects with heritage items or with areas that have been identified as having potential to contain relics. This has been the approach accepted in planning the Hume Coal Project.

The following overarching strategy to protect the significance of heritage items within the Project area has been followed to date and will be updated as needed:

1. A precautionary approach will be followed for all activities that could impact on heritage items or potential heritage items. That is, the items will either be completely excluded from the disturbance footprint or its heritage values will be investigated and recorded prior to the works.

2. Impacts to heritage items including relics will be avoided through the Project design.

3. Following project approval and prior to any work commencing, a historical heritage management plan (HHMP) will be prepared to guide the conservation of heritage items and unexpected finds for the duration of the Project. The relevant measures in the HHMP will be incorporated into the Project construction environmental management plan (CEMP) to avoid inadvertent impacts during the construction phase of the Project. The HHMP and CEMP will include actions in the event that unexpected relics and human skeletal material are unearthed.

4. Management measures will be specified in a detail in the HHMP.

5. The Department of Planning, Industry and Environment (DPIE) as well as the Heritage NSW will be consulted on the content of the HHMP and the relevant sections of the CEMP.

7.1 Specific management

The heritage management measures below will be included in the HHMP. Site-specific measures are listed in 7.1.2 and Annexure E of the Supplementary SoHI (EMM 2020).

7.1.1 Historic heritage management plan

A HHMP will be prepared for the Project that identifies heritage items and addresses processes and protocols for managing known and potential relics. The HHMP will incorporate provisions for all items of heritage significance in the Project boundary; relics will be addressed specifically to include:

- avoidance;
- archaeological monitoring of mine water pipeline;
- monitoring of standing relics outside the Project boundary; and
- unexpected finds including human skeletal remains.

i Avoidance

Avoidance is the best way of protecting an item and its heritage values. Construction and operation activities will not occur within the heritage curtilage of the item where those activities do not need to occur. Mine activities will not occur within the identified significant curtilage of the *Mereworth* house and garden complex. Where there is potential for surface infrastructure to physically impact on the curtilage of a heritage item, modifications to the design will be made to avoid those impacts.

ii Archaeological monitoring of mine water pipeline

Prior to commencing construction of the mine water pipeline where it will be installed adjacent to the existing farm building, a CMP will be developed, which will consider development of an archaeological research design to support an archaeological monitoring program, if deemed required. The archaeological monitoring program would focus on investigating the association of relics (if they exist) in the area. It is likely that relics in this area, should they survive, will be ephemeral.

iii Unexpected finds

If unexpected finds are unearthed, assessment will be required to ascertain their significance and, if necessary, archaeological excavation will be undertaken. Salvage excavation is a last resort where an item of archaeological value will be destroyed by the Project. Excavation will be used to obtain as much information as possible from a site before it is destroyed and will require research and a research design as a framework for the excavation. Should unexpected finds be discovered, consultation will be undertaken with the Department of Planning and Environment.

Human skeletal remains will be addressed in detail in the HHMP, so all actions are tied to the statutory requirements governing human remains.

iv Known relics in the Project area

Three discrete locations of relics were recorded inside the Project boundary (but outside of the area to be impacted by proposed surface infrastructure); they are HCR1 – sandstone flagging; HCR2 – sandstone drain-like features; and HCR3 – artefact scatter. All of these sites are likely to belong to a group related to farming practices and stock keeping practiced by the Cowley family. They have been inside a stock yard since they were constructed and have weathered times of drought in the past, therefore management of these relics is to continue using the space as a stock yard, but to ensure that damage from machinery or other means does not occur. Princess Pastoral should be informed of the presence of these relics and avoid earthworks in this stock yard.

7.1.2 Site-specific management

These site-specific management measures will be expanded upon in the HHMP to include agreed amelioration.

i *Mereworth*, Cowley phase (HCR1 sandstone flagging, HCR2 sandstone drain feature, CHR3):

- Use of the stockyard may continue as it has done for the last 100 years;
- construction vehicles and heavy plant must not be driven or parked in the stockyard with the identified relics (HCR1, HCR2 and HCR3);
- monitor condition during any work in proximity otherwise monitor on a yearly basis for duration of mine works. Protective will be needed if the relics are exposed for long periods of time and damage is observed;

- notify Heritage NSW in accordance with section 146 of the *Heritage Act 1977;* and
- conserve moveable heritage stored in the piggery and manage as described in the CMP.

ii Former Three Legs O' Man Bridge piers

- Monitor for 2 years on a six-monthly basis.

iii Evandale HC_127

- Development of surface infrastructure will avoid the area containing HC_127 and the Aboriginal artefacts;
- create an exclusion zone around HC_127; and
- works to proceed in the vicinity with caution.

iv Newbury

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works

v Sutton Farm House.

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works

vi The Pines

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works

vii The Harp

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

viii Bunya Hill House

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

ix Eling Forest Winery

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

x Comfort Hill House

- Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

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Annexure E

Summary table of archaeological sites









E.1 Summary table of archaeological sites

Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Coordinates: 252057E 6178200N	
Project area:	Zone 56, Lot 200 DP 839314. 80 Mereworth Road Berrima. See Above. The location of the Cowley homestead and associated farm buildings is indicated by the dark blue oval.
Description:	This site was originally identified as *Mereworth 1* in EMM 2017. I351 WLEP Relics are of local significance *Mereworth* was established by John Atkinson in 1822. The current phase is Mereworth House and garden (c.1964 to present), located at least 1 km from the early structures. Remains of sandstone flagging, sandstone drain, and an artefact scatter, from the Cowley phase (1912-1964), are in the vicinity of farm buildings east of the main house.
Survey results:	The site was inspected on the 10 October 2019 by Pamela Kottaras (EMM) and Amelia O'Donnell (EMM). This phase was referred to as "Mereworth 1" in the statement of heritage impact (2017) and additional research has determined that the homestead was not built by John Atkinson but by William Thomas Cowley, the son of Robert Cowley. William Cowley purchased the property in 1912. The main homestead building (the house) was demolished to make way for the current dwelling and garden surrounding the house c.1964. No evidence of pre-1964 elements were located in or around the dwelling, which is not surprising as a significant amount of landscaping was undertaken for the Oxley family and those plantings are now large, mature trees and established gardens. Landscaping to the level the house platform and build the ha-ha is also likely to have disturbed or covered any remnants of the dwelling. The continual use and improvement of the working farm components of the property would have also affected the integrity of early twentieth century relics and landscape features. The working farm buildings were visited again and found to be constructed for the Oxley phase of the property and upgraded for current farming. This time, the yard behind the machinery shed was free of stock and grass for the inspection. Two features of note were recorded in this location: a feature of sandstone flagging and a linear feature that appears to be a sandstone drain.

Table 6.1 *Mereworth*, Cowley Phase (1912-1964)



i (1) HCR1 - Sandstone flagging: Zone 56, 252053E 6178203N

HCR1 is sandstone flagging comprising two sections that are divided by soil that may be the result of the removal of flagging or simply because the sandstone is obscured. The dimensions of this feature are approximately 1,200 mm by 2,000 mm and is made of roughly hewn, flat sandstone pieces, between approximately 300 to 400 mm long and wide (Plate 6.1). Based on the inspection, the flagging appears to run beneath the existing machinery shed and may be the result of levelling fill placed over earlier features to accommodate the modern farm buildings.

ii (2) HCR2 - Possible drain: Zone 56, 252057E 6178204N to 252060E 6178200N

This linear feature (HCR2) is visible for approximately 6 m with a terminus to the south-east (Plate 6.2). It is oriented at 320 and is flush with the ground. It is comprised of linear sandstone blocks, between 80 and 200 mm wide and 450 mm long. Depth was not determined. The rough dimensions of the 'drain' feature are: inside width of 200 mm; and outside with of 350 mm.

iii (3) HCR3 - Artefact scatter: Zone 56, 252068E 6178200N

In addition to these two structural features, artefact scatters and disused domestic elements were also noted. The artefact scatter is located close to the sandstone features and is comprised of fragmented

Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

pieces of glass and ceramic that date to before the 1960s occupation period (Plate 6.3). The majority of the fragments were relatively large given their location in an active stockyard suggesting their exposure may have been recent. The artefact scatter consisted of glass, and ceramic fragments typical of Australian domestic sites dating to the late nineteenth and early twentieth centuries, as well as a and more recent metal artefacts (Plate 6.3). A footed (claw) enameled iron bathtub was leant against the machine shed (north of the sandstone features). The feet were missing but the moulded attachment points were visible (Plate 6.4).

Disused domestic elements included:

- A wooden window frame and wagon wheel fragment dating from the early twentieth century were found during a previous survey (Plate 6.5). These items were wrapped in a tarp and stored in the piggery (refer to image above).
- two turned "spindles" and boards found east of the piggery. One of the spindles appears to be chair leg, the other perhaps a cross-bar (Plate 6.6). The timber items were painted turquoise, white and yellow. These were not in association with other artefacts. The items were collected during the field trip and are stored in piggery with the window frame and wagon wheel.
- An old gate, possibly from the Cowley phase of the property, was noted tied to an extension along a stockyard fence. The fence is the boundary of a stockyard with a stamped concrete floor. The gate may be machine cut but its outdoor location has weathered it so ascertaining its manufacture is difficult. The gate was constructed with horizontal upper and lower supports, vertical "slats", and diagonal cross bar. Two iron hinges with squared at cylindrical loop opposite (for post/pin) and squared ends with four bolt holes are on one side (at "top" in current position). Both possibly had been painted white. The gate seems small for keeping livestock, like cows, in place (Plate 6.7).
- Tiles for the roof of the current 1965 dwelling are also stored behind the machinery shed (Plate 6.8).

Development of the existing property has destroyed much of the archaeological resource related to the homestead that was built on the site by the Cowleys c.1912, with the exception of a sandstone drain and sandstone flagging recorded south of the large machinery shed to the north-east of the house and gardens.

Since Atkinson first took over the land, changes have included the removal of trees, stock grazing and damming Oldbury Creek and its tributaries. Atkinson built his first home, probably on the northern side of the Southern Road (Old Hume Highway), then the brick house, which was converted to an inn for a time before it was converted to a family home again. The inn, variably known as "The Kentish Arms", "The Golden Fleece" and finally as "The Three Legs of Man" was demolished in 1918 after the owners, the Cowleys, moved to the homestead they built on the rise c. 1912, where Mereworth house and gardens are now. Examination of the 1949 aerial photograph reveals that the shape of the garden at *Mereworth* today follows the pattern set down by the Cowleys. While the accuracy of a georeferenced photograph cannot be verified without excavation, the information it provides strongly suggests that the current swimming pool was built over the former homestead house. Further, the landscaping to create the garden and the garden itself, now with mature trees and utilities infrastructure would have caused damage to the former homestead building directly beneath the most actively developed areas.

The land to the rear (north-east) of the existing Mereworth house and garden (north-west), which was also the rear of the main homestead building, has, and is being, used for activities directly related to farming. As all the buildings have been renewed in the last 50 years, it is unlikely that any structures relating to the Cowley family phase survive.

Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Plate 6.1 Sandstone flagging south of *Mereworth* ancillary buildings. View north.



Plate 6.2 Sandstone drain feature south of *Mereworth* ancillary buildings. View north.

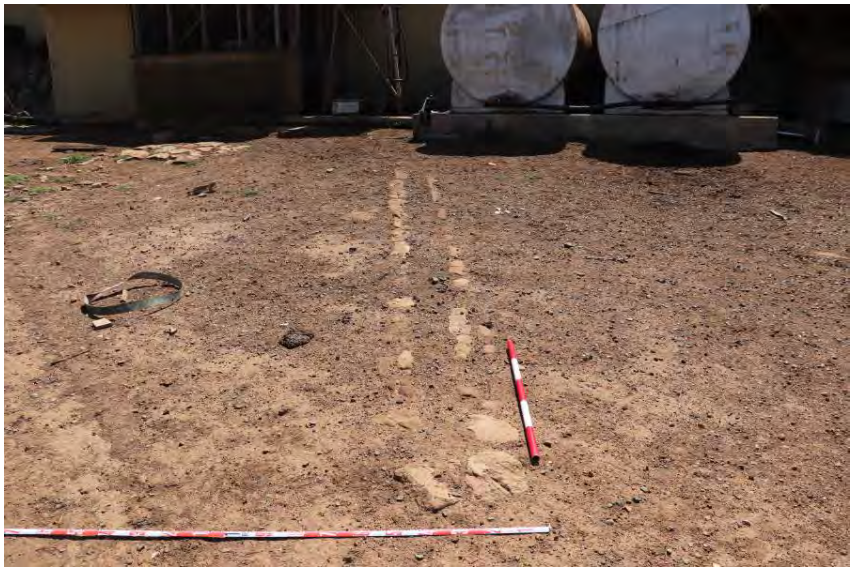


Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Plate 6.3 Sample of artefacts (glass, domestic ceramic, ceramic tile, metal) from around *Mereworth* sandstone features.



Plate 6.4 Cast iron bath south of *Mereworth* ancillary buildings. View north-east.



Plate 6.5 Window frame and wagon wheel fragment dating from the early twentieth century. These items have been stored in the piggery. View north-west



Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Plate 6.6 Turned timber spindle from near *Mereworth* piggery.



Plate 6.7 Old gate in the fencing of the *Mereworth* stockyards. View north-east.



Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Plate 6.8 Roof tiles for the current Mereworth house south of the ancillary buildings. View north-west.



Comparisons

Standing homesteads with occupation histories similar to that of *Mereworth* are listed below. The occupation history relates to the earliest phases of Mereworth, which was John Atkinson's first home and then the brick building that was converted to the inn.

- *Oldbury* 1822-1828 (SHR 00488)
- *Newbury* c.1821 (Wingecarribee LEP 2010, I202)
- *The Harp* c.1830 (Wingecarribee LEP 2010, I027)
- *Eling Forest Winery* Homestead 1834 (Wingecarribee LEP 2010, I009)
- *Comfort Hill* 1840 (Wingecarribee LEP 2010, I021, I356)
- *Austermere* c.1821 (Wingecarribee LEP 2010, I398)
- *Browley* c.1821 (Wingecarribee LEP 2010, I056)

Archaeological sites of homesteads include:

- Cooma Cottage 1883 (SHR 00102), Davies, M. 1988, *Cooma Cottage Yass, N.S.W. Excavation Report*, Prepared for the National Trust of Australia (N.S.W).
- Vine Lodge 1840 (Wingecarribee LEP 2010, I204, 354, 355)
- Lucan Park Homestead 1822 to 1939
- "The Homestead" Georges Hall 1837 (1797) (SHR 00448)
- Caboonbah Homestead 1888 (QLD)

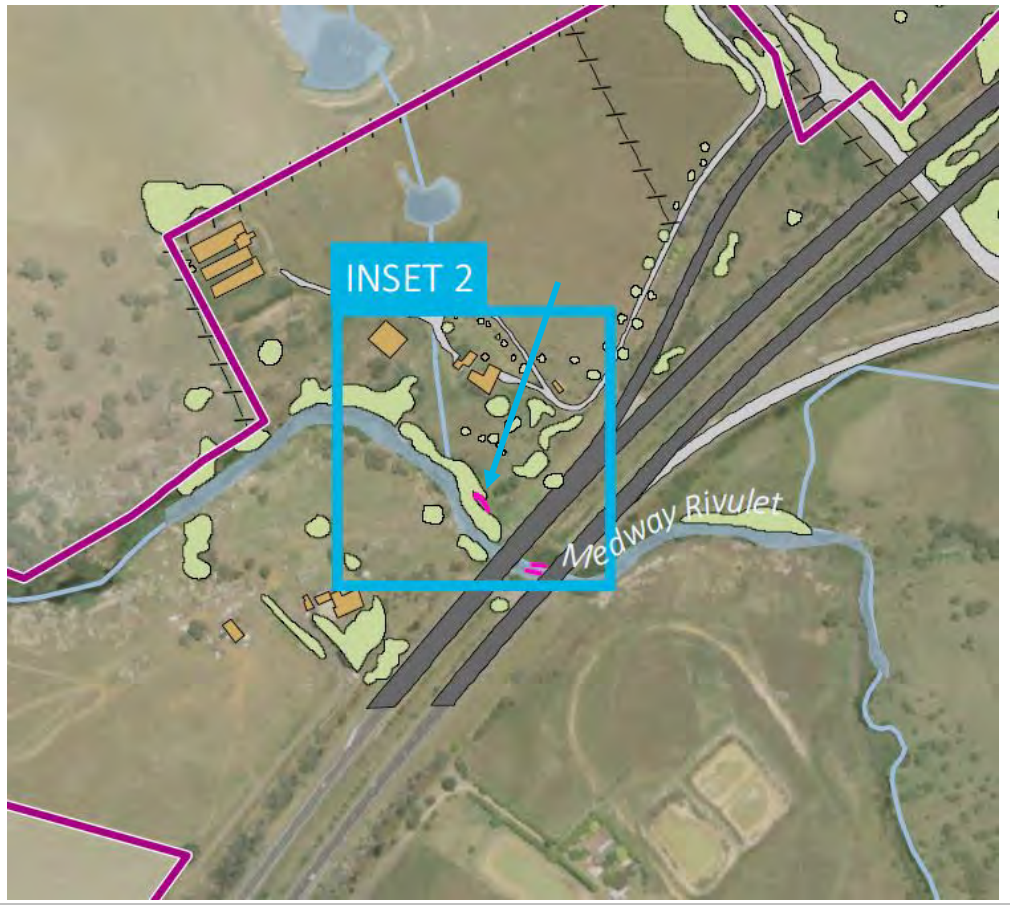
The properties listed above are relevant to the early configuration of *Mereworth*, when it was owned and lived on by the Atkinson family. The original house and the later brick house (and inn) were built and demolished on a part of the property that was subdivided from the original 2000 acre (809 ha) grant. The Cowley homestead does not fit into the early homestead framework and is likely to have been a vernacular arrangement of buildings, which holds research significance at a local level.

The earliest phase of *Mereworth* has strong associations with early settler John Atkinson and later, three generations of the Cowley family. *Mereworth* also has significant associations with Legislative assembly president Sir John Lackey. These areas of the original grant were excised by John Atkinson and are not in the Project area.

Table 6.1 *Mereworth*, Cowley Phase (1912-1964)

Statement of significance	Mereworth house and garden is listed as an item of heritage significance on the Wingecarribee LEP (2010, Item I351) under criterion "b" for the property's strong association with garden designer Paul Sorenson. The house has historical and associative connections to architect John Amory, a North American architect residing in Australia. The current house is also associated with the Oxley family of the Bushells tea establishment. Recent investigations have revealed relics on the property dating from the Cowley family phase, which is the relevant value in this report.
Assessment of impacts	None identified
Management measures	Use of the stockyard may continue as it has done for the last 100 years. Construction vehicles and heavy plant must not be driven or parked in the stockyard with the identified relics (HCR1, HCR2 and HCR3). Monitor condition during any work in proximity otherwise monitor on a yearly basis for duration of mine works. Protective will be needed if the relics are exposed for long periods of time and damage is observed. Notify Heritage NSW in accordance with section 146 of the *Heritage Act 1977.* Conserve moveable heritage stored in the piggery and manage as described in the CMP.

Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

Coordinates: 251860E 6176942N	
Project area:	Not in the Project area. Lot 1 DP 780173. 1 Mereworth Road, Berrima. See Above.
Description:	Not listed. Local significance with potential to be of State significance. Modern residence with farm buildings (post 1983). Remnant of drystone wall of potential heritage value. Potential for archaeological remains relating to the *Kentish Arms/Three Legs of Man/Mereworth House* (1836-1918).
Survey results:	The site was viewed from the public domain on the 10 October 2019 by Pamela Kottaras (EMM) and Amelia O'Donnell (EMM). Analysis of the former inn site, *The Kentish Arms*, later *The Three Legs of Man*, and later still, *Mereworth House*, was initially completed using archival sources as the inn was found to be outside the project area. It has been included in this report because of its proximity to the project boundary and its association with other potential relics within the project area, in particular to one of the earliest settlers in the region. Aerial photography indicates a linear feature in the south-east corner of the current property, which may be a remnant of the stone fence shown in a photograph of the building after it was converted from an inn to a house. Inspection of the linear feature and the landscape in the vicinity was undertaken from the public domain. The feature runs along the south-western fence line adjacent to the Medway Rivulet (Plate 6.9). A maximum of six courses of sandstone block survive in a random rubble formation, although the integrity of the wall is poor (Plate 6.10). It has evidence of patching with concrete, stone blocks, corrugated iron and star pickets and is further strengthened by iron pipes. This feature is not the wall shown in the image of the Cowley family in front of *Mereworth House* (as the inn became known) but if it is part of the property, it would be the return from the front wall; the

historical photograph facing south-west from the front of *Mereworth House* does not capture the landscape as it drops down to the Medway Rivulet (Plate 6.11).

What the photograph in Plate 6.12 illustrates is that the road was cut into a sloped landform and the stone fence was a retaining wall. Comparison of the photographs in Plate 6.11 and Plate 6.12 supports this description as the house was not built high off the ground.

Other landscape features that were noted include mounds that may represent the site of the former inn and house or, more likely, represent the post mid-century dwelling that was demolished for the motorway a driveway that was accessed from the Old Hume Highway alignment. Modern extruded bricks were also scatted in the verge between the highway and the property fence line. The dwelling that was demolished for the Hume Motorway is indicated by a blue arrow (Plate 6.15); the driveway in use at the time, but is now blocked, is also shown.

The historical demolition of the inn, development of highway, and development of the current property has destroyed and obscured much of the archaeological resource related to the *Kentish Arms/ Three Legs of Man* Inn, with the possible exception of the portion of drystone wall on the south-east of the property.

Since Atkinson first took over the land, changes have included the removal of trees, stock grazing, damming *Oldbury* and tributaries, and the construction of the South Road c.1834. Atkinson built his *Kentish Arms* on the western side of the South Road (Old Hume Highway). Atkinson's brick inn, variably known as "The *Kentish Arms*", "The Golden Fleece", and "The Three Legs of Man" changed hands a number of times. It is likely the various occupants of the inn made changes to the site. The inn and standing outbuildings were demolished in 1918. The stone wall bordering the front of the property survived the demolition.

Examination of the 1949 aerial photograph reveals a house set back from the road and a small number of outbuildings on the property (Plate 6.13). It appears the house survived until recently, the 1983 Hume Highway plan (Plate 6.15) identifies a building its location. The aerial photograph also suggests a linear construction in the location of the drystone wall.

Another house was built on the property prior to 1983. It was located north east of the cottage and had a frontage on the Hume Highway. The house was demolished to make way for the current highway c. 1983. Significant earthworks occurred on the eastern edge of the property during the highway construction.

The current dwelling was built after 1983, directly north of the 1949 cottage. Survey from the public domain could not verify if sub-surface archaeological remains are visible on the property. Construction, landscaping, and utilities infrastructure would have caused damage to the remains of the former *Kentish Arms/ Three Legs of Man* structures directly beneath the most actively developed areas.

Although original material on the *Three Legs of Man* was not visible (unless the stone wall is part of the original wall) during the October 2019 survey it is likely that relics are present. Advertisements from 1918 indicates that all of the standing buildings on the property were deconstructed and Frank Walker noted in 1939 that the inn's "…whole superstructure has gone, and all that remains today is a section of stone wall which originally stood in front…" (*Robertson Advocate*, 23 April 1918; *The Sydney Morning Herald* 19 August 1939, p. 13). Evidence of this deconstruction should still be archaeologically visible. The robbed footings of buildings or flagged surfaces as well as stray nails and non-saleable demolition materials may survive below ground. Moreover, even with the deconstruction of the main house, total deconstruction of a sub- surface structures, such as cellars or privies, may not have been feasible, and they may have been infilled and covered over. The footings or post holes for structures that had been removed prior to the 1918 demolition may also survive.

It is probable some evidence of general domestic waste will also be present on the property. Organised rubbish removal was not common until the twentieth century and household waste was removed from circulation by burying, burning, or dumping somewhere on the property, generally in the garden.

Disturbance to the site during the c.1983 Hume Highway redevelopment combined with the subsequent redevelopment of a homestead on the property have likely impacted the archaeological

Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

potential. Nevertheless, the archaeological potential of the Three Legs of Man property will only be determined through thorough archaeological survey within the property boundaries.

In addition to the drystone wall that may represent remnants of the former inn and residence, three potential archaeological sites were identified through documentary research. These potential archaeological sites are those that belong to three of John Atkinson's employees (and families); they are identified as PR1, PR2 and PR3. They have not been assessed for significance or impacts as they are well beyond the project area and separated from it by the Hume Motorway (refer to

Plate 6.9 Linear stone feature on the south-eastern border of the Three Legs of Man property. Taken from the southern bank of the Medway Rivulet. View north-west.



Plate 6.10 Drystone wall on the south-eastern border of the Three Legs of Man property. Taken from the southern bank of the Medway Rivulet. View north-west.



Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

Plate 6.11 *Mereworth* House, the former *Kentish Arms* and *Three Legs of Man* Inn early twentieth century. View south-west. Source: Berrima District History Society.



Plate 6.12 *Mereworth* House after it stopped trading as The Three Legs of Man. Note the stairs leading into the property. View east. Source: Berrima and District Historical Society.



Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

Plate 6.13 The 1949 aerial photograph over the Three Legs of Man property, and what may have been Lyons' cottage indicated by blue arrow.



Plate 6.14 The estimated locations of Atkinson's employee housing – PR1, PR2 and PR3. Source: Higginbotham 1992.

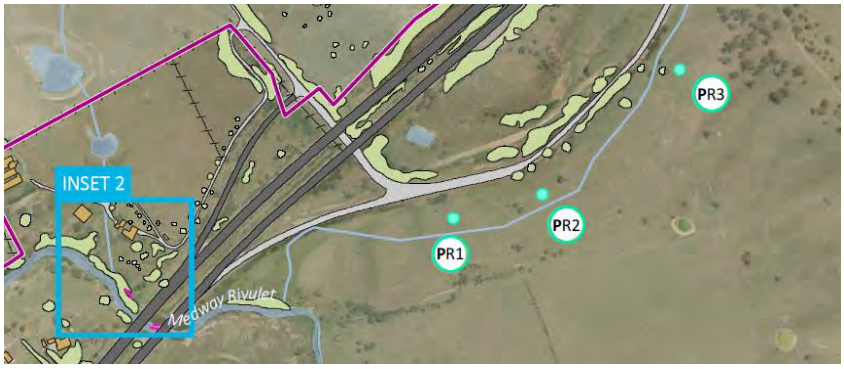
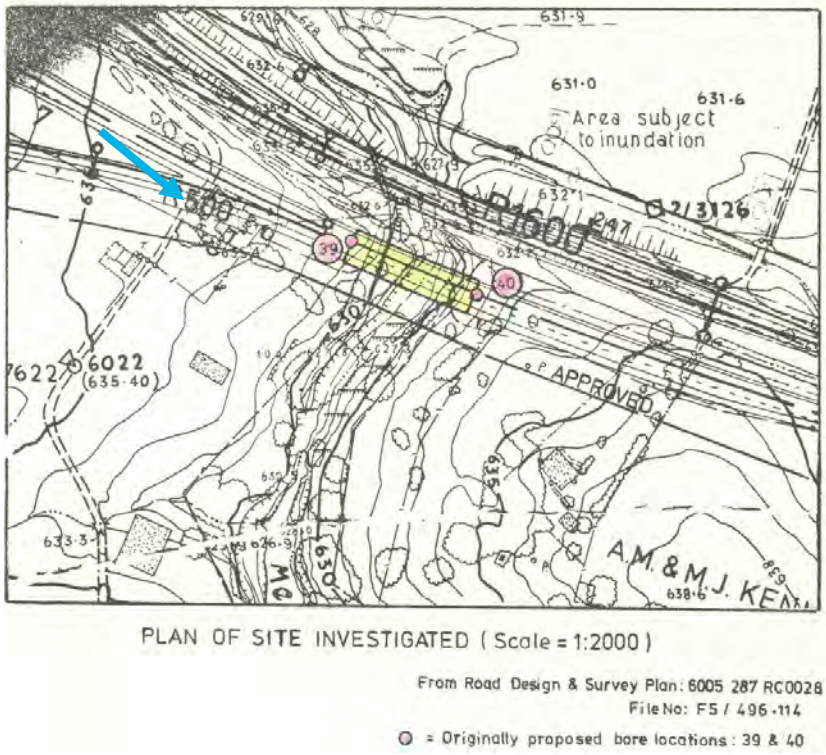


Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

Plate 6.15 Survey of the Medway Rivulet and adjacent buildings 1983. Demolished Pre 1983 building indicated by blue arrow. Source: Hume Coal Pty Ltd



Comparisons	Comparative standing inn sites include: • Mail Coach Inn (Former) c.1835 (SHR 00102) • Berrima Inn 1848 (SHR 00103) • White Horse Inn 1834-1854 (SHR 00106) • Crown Inn 1845 (Wingecarribee LEP 2010, I141) • Breen's Inn (Old) (Former Colonial Inn) 1840 (Wingecarribee LEP 2010, I140) • Surveyor General Inn 1834 (Wingecarribee LEP 2010, I139) • Prince Albert Inn 1844 (Wingecarribee LEP 2010, I160) • Fitzroy Inn 1845 (Wingecarribee LEP 2010, I099) • Sutton Farm c.1830 (Wingecarribee LEP 2010, I035) Archaeological investigations of inns similar date and/or location to the *Kentish Arms/Three Legs of Man/Mereworth House* include: • White Hart Inn 1827 (SHR 02007) • The Red Cow Inn c.1862 • Weatherboard Inn 1822 (1814) (SHR 00595)

Table 6.2 *Kentish Arms/Three Legs of Man/Mereworth House*

Statement of significance	The *Kentish Arms/Three Legs of Man/Mereworth House* site is a potential archaeological site. The *Kentish Arms/ Three Legs of Man/ /Mereworth House* site (1 Mereworth Road, Berrima) is not listed on the Wingecarribee LEP or the State Heritage Register. The site has local significance as the location of the *Kentish Arms/Three Legs of Man* Inn. The inn was one of many that were established in connection with the construction of the South Road. The site was associated with early settler John Atkinson and the Cowley family. The inn site is also associated with the themes of colonial expansion and rural colonial life. The site has the potential to yield archaeological evidence relating to daily life at a nineteenth century inn and rural ways of life through time. The *Kentish Arms/Three Legs of Man* Inn site is a potentially rare site in the Southern Highlands and has the potential to yield archaeological information representative of nineteenth century roadside inns. The *Kentish Arms/Three Legs of Man* Inn site has the potential to be of state significance.
Assessment of impacts	None identified
Management measures	None required.

Table 6.3 5 - Former Three Legs o' Man Bridge piers (HCR5)

Coordinates: 251896E 6176897N

ID 5



Project area:	Not in the Project area. Medway Rivulet, Hume Highway. Lot 1 DP 780173, 556488 and Lot 10 DP 245227; adjacent. Refer to image above. Approximately 40 m to the boundary of Lot 1 DP 780173 (northwest), approximately 40 m to boundary of Lot 10 DP 245227 (southeast). See Above.
Designer/maker:	Current phase (post 1860): unknown. Original phase (1834): designed by David Lennox, constructed by convicts under the supervision of George Tasker.
Date built:	1834
Date/s modified:	1860, c. 1939, c.1983

Table 6.3 5 - Former Three Legs o' Man Bridge piers (HCR5)

Description:	Not listed. Local significance. The site was inspected on the 10 October 2019 by Pamela Kottaras (EMM) and Amelia O'Donnell (EMM). The two-lane bridge superstructure of the current Three Legs o' Man Bridge sits over two sandstone linear piers and a sandstone retaining wall that belonged to an earlier crossing of the Medway Rivulet. The piers are comprised of picked rectangular blocks approximately 900 x 300 x 350 mm in size. Both piers are approximately 9000 mm long and 900 mm wide and oriented roughly east west and ended with bevelled blocks (Plate 6.20, Plate 6.16). Both piers have iron bars protruding from the top (Plate 6.20). The pick marks on the sandstone vary in style from block to block and the mortar is a cement with visible components being mineral lime (black spots), small quartz inclusions and large sand grains. The mortar was roughly pointed with patches of overflow (Plate 6.17). The northernmost course has suffered a higher degree of damage of the two and survives only to six courses high but was likely to be the shorter of the two as it is placed higher on the bank of the rivulet (Plate 6.20, Plate 6.16). The southernmost pier is the more intact of the two. It is approximately 4000 mm high (13 courses high – one being submerged in the rivulet) and 9000 mm in length. Two blocks are engraved and set into the structure. One block on the northern elevation is inscribed with either [HD] (interconnected) or [IDC] (if upside-down) or an interconnected [CH] if the right way up (Plate 6.17). Another block, at the angled terminus has an upside-down [1834] on the sixth course up on a bevelled block (Plate 6.18). The presence of a granular cement mortar, the inverted inscriptions, and the history of the bridge indicate the piers have been re-built and stabilised. The retaining wall was not accessible and was photographed from afar (Plate 6.19). It was constructed of sandstone blocks similar to the bridge piers but does not have any visible mortar. The current height of the retaining wall is approximately 600 mm high, indicating that it is comprised of two courses of sandstone built over bedrock. At most, only three blocks could be seen laid end to end. This feature has the appearance of being in its original form suggested by the location, the lack of mortar in the structure and the fact that the landform it was built in would have provided it with more stability than the free-standing piers. Development of the Hume Highway has destroyed portions of the archaeological resource related to the South Road and the former Three Legs o' Man bridge around the Medway Rivulet with the exception of the sandstone piers on the Medway Rivulet. The current highway and overpass were constructed c. 1983. Heavy land formation earthworks were employed to raise the level of the highway and overpass. Large areas around the Rivulet have been covered by basalt boulders meaning the level of ground disturbance was not visible. There was evidence of machine scraping in the sandstone on the northern bank of the Medway Rivulet.

Table 6.3 5 - Former Three Legs o' Man Bridge piers (HCR5)

Plate 6.16 Former Three Legs o' Man bridge piers. View west.



Plate 6.17 "initials" inscription former Three Legs o' Man bridge southern pier. View south.



Table 6.3 5 - Former Three Legs o' Man Bridge piers (HCR5)

Plate 6.18 Date inscription "1834" former Three Legs o' Man bridge southern pier. View south-west.



Plate 6.19 Sandstone block wall south bank of the Medway Rivulet. View south-east.



Table 6.3 5 - Former Three Legs o' Man Bridge piers (HCR5)

Plate 6.20 Former Three Legs o' Man bridge piers. View east.	
Comparisons:	Bridges with similar histories, design, and/or methods of construction include: • Lennox Bridge Mitchells Pass 1833 (SHR 00024) • Lansdowne Bridge 1834-1836 (SHR 01472) • Lennox Bridge Paramatta 1835-1839, with twentieth century modifications (SHR 00750) • Duck Creek Bridge 1835-1838, with twentieth century modifications (Parramatta LEP 2010, RTA Bridge No. 316) • Towrang Bridge 1836-1839 (part of Towrang Convict Stockade, Associated Sites and Road Formations SHR 01905) • Lennox Bridge, Berrima: Stonework 1834-36, 1860, 1897, modified (Wingecarribee LEP 2010, I474) • Black Bob's Bridge 1837, modified 1896 (Wingecarribee LEP 2010, I019) • Nattai Creek Bridge 1898 (Wingecarribee LEP 2010, I1885) • Stonequarry Creek Bridge Piers 1899 (Wollondilly LEP 2011, I140)
Statement of significance	The former Three Legs o' Man Bridge piers are two sandstone bridge piers located on the Medway Rivulet crossing under the current Hume Highway overpass (Three Legs o' Man Bridge) near Berrima. The former Three Legs o' Man Bridge Piers (Medway Rivulet, Berrima) are not listed on the Wingecarribee LEP or the State Heritage Register. The piers have local historical significance as a public work on the Great Southern Road and in particular, the extant piers are associated with the 1860s La Niña floods. Although reconstructed in 1860 the piers also still retain an association with colonial bridge builder David Lennox. The piers are aesthetically distinct and are a rare example of *in situ* masonry road bridge piers. The former Three Legs o' Man Bridge piers are a fine example of their type due to their form and their historically rebuilt intactness. The former Three Legs o' Man Bridge piers are of local heritage significance.
Assessment of impacts	None identified
Management measures	Monitor for 2 years on a six-monthly basis

Table 6.4 Evandale HC_127

Coordinates: 250754E 6178934N	
Project area:	Lot 2 DP1009075. 11974 Hume Highway, Sutton Forest. See Above.
Description:	HC_127 not listed no significance *Mereworth house and garden* I351 WLEP Property (purchased from crown c.1834) contains a mid-twentieth century homestead to the south of this site. Historical and Aboriginal artefacts are present in an area of high disturbance.
Survey results:	Evandale was inspected with no results of archaeological nature around the main dwelling and farm building cluster. Evandale (Lot 2 DP 751251) is part of three land grants to Timothy Beard between 1834 and 1837. Evidence that Beard developed the land has not been found but land titles records show part of the property as being reserved for water supply and access in 1886 (revoked in 1939), subject to a mining lease application by Loch Catherine Mine in 1924; in 1927 it was converted to Crown Lease Area 4454, revoked in 1930, after which it was reserved for village purposes. Again in 1934, the lot was reserved from alienation or lease for mining purposes (revoked in 1940) after it was leased by Douglas Burns Reid (Merchant) in 1938 and transferred to him by conditional purchase in 1945. Reid remained on the land until 1978 after which it came into the ownership of Evandale Pty Limited (still owned by Douglas Burns Reid). In 2014, the lot was purchased by Cavalier Rural Properties Pty Limited. The lower portion of Evandale that is currently with a dwelling, farm buildings and gardens, was also granted to Timothy Beard and purchased in part by Edward Carter (Grazier) in 1882 who then purchased the remainder in 1889. The property was transferred to Edward Alfred Hanslow Carter (Grazier) in 1931 who sold it to Douglas Burns Reid in 1938. It was transferred to Evandale Pty Limited in 1959 after which it was sold, in 2014, to Cavalaire Rural Properties Pty Limited. Based on the architectural style, aerial photography and ownership history the main dwelling is likely to date from early to mid-twentieth century. Plans of the property could not be found. The north-western corner of *Evandale* (Lot 2 DP 751251) was surveyed on 10 February 2014. This area was surveyed specifically because it will be impacted by mine infrastructure and while historical research did not indicate previous structures in this area, the potential for unrecorded relics exists as in any area that has the history of the project area. The surveyed area is a large paddock that has been historically ploughed over the last 150 years.

Table 6.4 Evandale HC_127

A scatter of historical and Aboriginal artefacts was identified in February 2015 and is physically associated with three Aboriginal artefacts, located on the edge of a ploughed paddock. This deposit was identified in the field as discard and does not represent a former structure. It shares the Aboriginal archaeological site name HC_127. This site, HC_127 (Figure 5.1), comprises glass fragments, a metal buckle and ceramic sherds with Aboriginal artefacts made of indurated mudstone, quartz and silcrete (three Aboriginal artefacts recorded by survey; refer to Plate 6.22). A mature yucca plant was recorded within 4 m of the scatter (Plate 6.23). Verification of HC_127 as a relic has not been possible as records of structures in this area have not been located and no other suggestion of fabric was visible (refer to Plate 6.23). However, as this paddock has been ploughed regularly, the most likely scenario is that the yucca is self-seeded and has been avoided in subsequent ploughs as it is too close to the edge of the bushland. The glass, ceramic and metals are likely to be redeposited refuse.

The southern extent of *Evandale* was surveyed over four days, as a higher concentration of the mine infrastructure area was initially proposed to be located south of Medway Rivulet and north of the main homestead. The revised mine design now locates the majority of the infrastructure on *Mereworth* with only two drifts, conveyors and an upcast shaft in proximity to the cluster of buildings on *Evandale*.

Plate 6.21 HC_127 (also an Aboriginal site) with a ceramic tea cup handle, a plate fragment and a metal buckle.



Plate 6.22 HC_127 (also an Aboriginal site) with a collection of glass from the surface.



Table 6.4 Evandale HC_127

Plate 6.23 HC_127 (also an Aboriginal site) is in the middle ground in the photograph close to the deep green plant (yucca). View north.	
Comparisons	Comparisons to this site do not apply
Statement of significance	HC_127 is a scatter of glass, ceramic and iron artefacts near an exotic plant (yucca) identified on the Evandale property. This may have been a workers' camp or remains of a timber structure but equally may have been discarded refuse. Should archaeological remains be present they would be of historical and research significance for their ability to provide information about workers camps and the ways in which early settlers managed their land through the construction of ephemeral dwellings. The site has been repeatedly ploughed over 100 years, which would have affected the integrity of the archaeological site in the approximately upper 20–30 cm of soil. Archaeological sites are rare in the local area. It may be an item of local heritage significance if the scatter represents an historic structure, and if it survives intact within deeper deposits. Unless it is determined to be a relic, the current significance of this site is nil.
Assessment of impacts	None identified
Management measures	• Development of surface infrastructure will avoid the area containing HC_127 and the Aboriginal artefacts. • Create an exclusion zone around HC_127. • Works to proceed in the vicinity with caution.

Table 6.5 Newbury

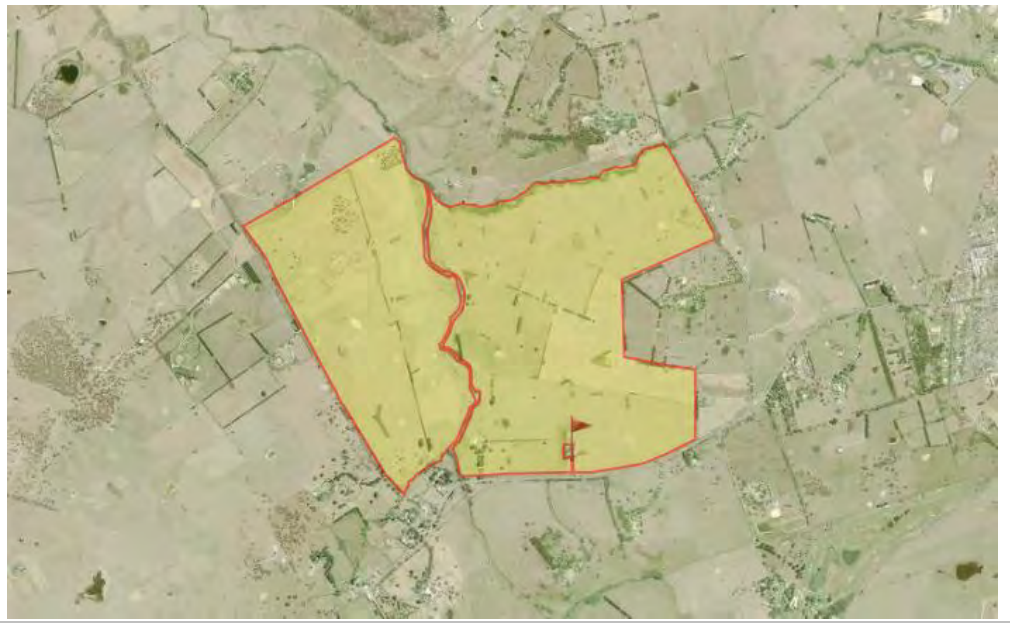
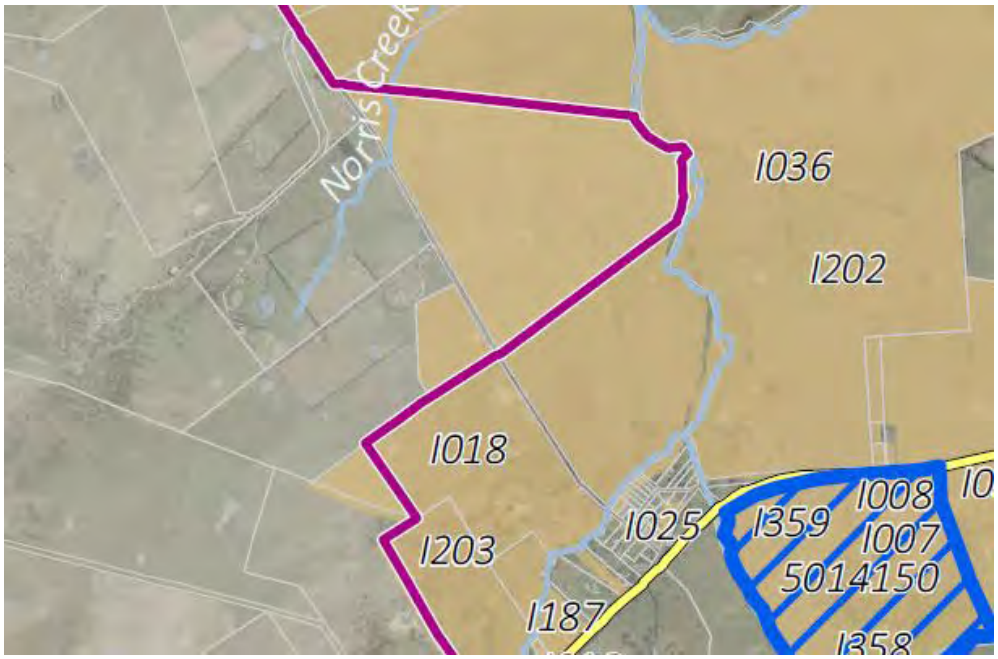
Coordinates: 255125E 6172245N (dwelling)	
	
Project area:	Partially within project area. Lot 32 DP 665400. 7300 Illawarra Highway, Sutton Forest (primary). See Above.
Description:	I202, I036 WLEP Local significance Newbury was established by John Nicholson c. 1822. The property was subdivided in 1962 and the area bordered by Golden Vale Road, the Old Main Southern Road, Medway Rivulet and Paynes creek was portioned for sale. *Newbury* contains a homestead with outbuildings, gardens and farmland.

Table 6.5 Newbury

Survey results:	*Newbury* was established by John Nicholson on a land grant at the same time as James Atkinson's *Oldbury* and John Atkinson's *Mereworth*. Only part of the property is located within the propose mine plan where subsidence has been assessed to be negligible. Access to *Newbury* did not occur as permission was not acquired. The team viewed the property inside the project area from Golden Vale Road The area on the corner of Golden Vale Road and the Illawarra Highway was also inspected to view what has survived from early Newbury and the items that are on the WLEP environmental heritage schedule. In this location, the alignment of the Old Main Southern Road leaves the Illawarra Highway to the east where it arcs to the south and terminates where it meets Golden Vale Road. The junction road (still considered part of Illawarra Highway) passes the church and cemetery as well as a number of dwellings of various ages from the Victorian period to what appears to be the 1980s. The small cottage with a frontage to the unnamed road was demolished in 2018 (Nearmap) but remains visible on Google Maps for the time being (Plate 6.25); this cottage remains on the WLEP environmental heritage schedule (I028) and is the only building that may have survived from 1862 (Plate 6.24 and Plate 6.25). Aerial photographs taken during time of water scarcity show features visible that may indicate the presence of relics as well as ploughing and drainage; these photographs have not been reproduced in this report as permission has not been provided but access to Nearmap will support this statement. A plan of the portion of *Newbury* that is in the proposed mine plan was not found; however, comparisons between the current landscape and that which was captured in 1949 can be made.
Plate 6.24 As titled 1862. The only building that may have survived from this period to 2018 is the structure indicated by the blue arrow. NSWSL M2 811.319/SUTTON FOREST/1862/1	

Table 6.5 Newbury

Plate 6.25 A google maps aerial photograph showing this part of the study area as it was in July 2018. The cottage that may be the same on the 1862 plan (above) is indicated by a blue arrow. It is approximately 1 km from the project boundary.



Comparisons	Homesteads with similar histories include: • Mereworth • Oldbury
Statement of significance	*Newbury* is of local significance for its ability to demonstrate the aesthetic qualities of an early historic period farming property. It is associated with the Nicholson family, and specifically with John Nicholson who was a prominent member of the local community. The property is likely to contain relics from the early historic period in NSW and analysis of these as well as the standing structures are likely to have a high level of research potential.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on a yearly basis for duration of mine works

Table 6.6 Sutton Farm House

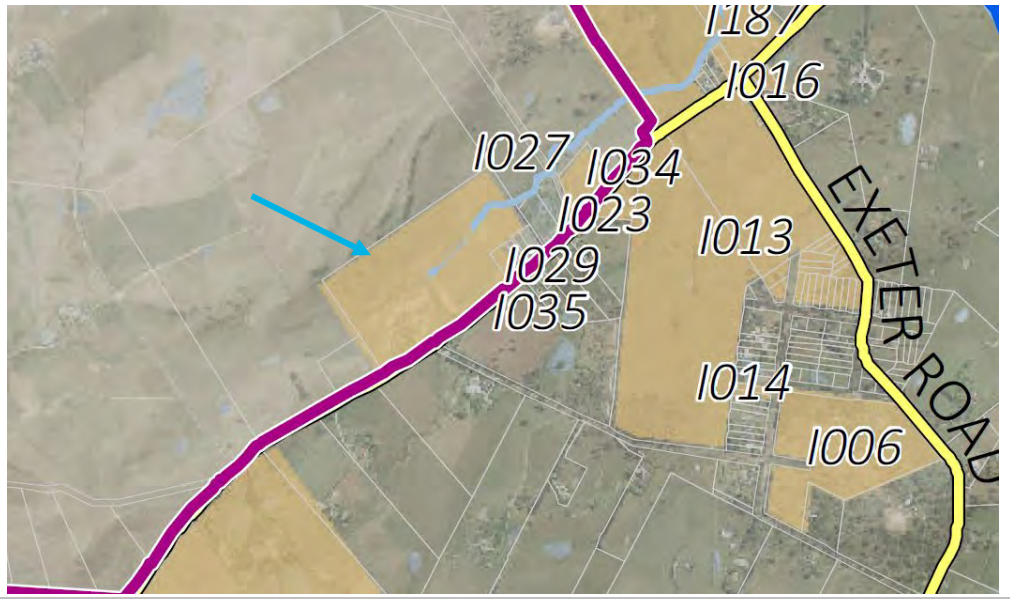
Coordinates: 252909E 6170471N	
Project area:	Inside project area. Lot 1, DP 783660. 7530 Illawarra Highway.
Description:	I035 WLEP local significance Sutton Farm (formerly the Red Cow Inn) was established in the 1830s. A two-story brick and stucco building, and outbuildings are within the grounds.
Survey results:	*Sutton Farm* was observed from the public domain so if relics exist, and are visible on the surface, they were not recorded. There is no doubt however, that relics related to the early occupation of this property exist here. The main house is a brick and stucco two-storey coaching inn dating from the 1830s. It is currently a residence with a riding school. A derelict building exists to the northeast of the former inn. One structure of interest was photographed (Plate 6.26), which may be a reconstruction or may be a well-preserved historical building. The structure is located on the southern frontage of *Sutton Farm,* west from the road (7530 Illawarra Highway, DPI783660). The building is a timber framed structure with veranda and corrugated iron gable roof (Plate 6.26). The lower quarter of the walls are made of brick, painted white in places, and the upper three quarters are wood panel. A partial wall return (brick and timber also) runs south from the north eastern corner. The structure is divided into two rooms by a wood panelled wall that stretches to the sub-facia of the veranda. The interior of the structure does not appear to be lined. The building appears to function as a stable/store as the southern room is open and the northern room is enclosed with chicken wire. The structure has been tentatively identified as a possible converted slab house but based on the appearance of the brick (from a distance) it is more likely to date from the mid-twentieth century. This does not however, exclude this as being the location of an earlier similar building.

Table 6.6 Sutton Farm House

Plate 6.26 Timber building on the southern frontage of the Sutton Farm property. View northwest	
Comparisons	Comparative inn sites include: • Mail Coach Inn (Former) c.1835 (SHR 00102) • White Horse Inn 1834-1854 (SHR 00106) • Breen's Inn (Old) (Former Colonial Inn) 1840 (Wingecarribee LEP 2010, I140) • Surveyor General Inn 1834 (Wingecarribee LEP 2010, I139)
Statement of significance	The house at *Sutton Farm* is a brick and stucco building likely built in the 1830s. It has historical and research significance for its ability to provide information on the development of the coaching trade and then the re-use of buildings with the change of use. Coaching inns are rare in the local area and Sutton Farm is a good representative example. It is an item of local heritage significance.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on an annual basis for the duration of mine works

Table 6.7 The Pines

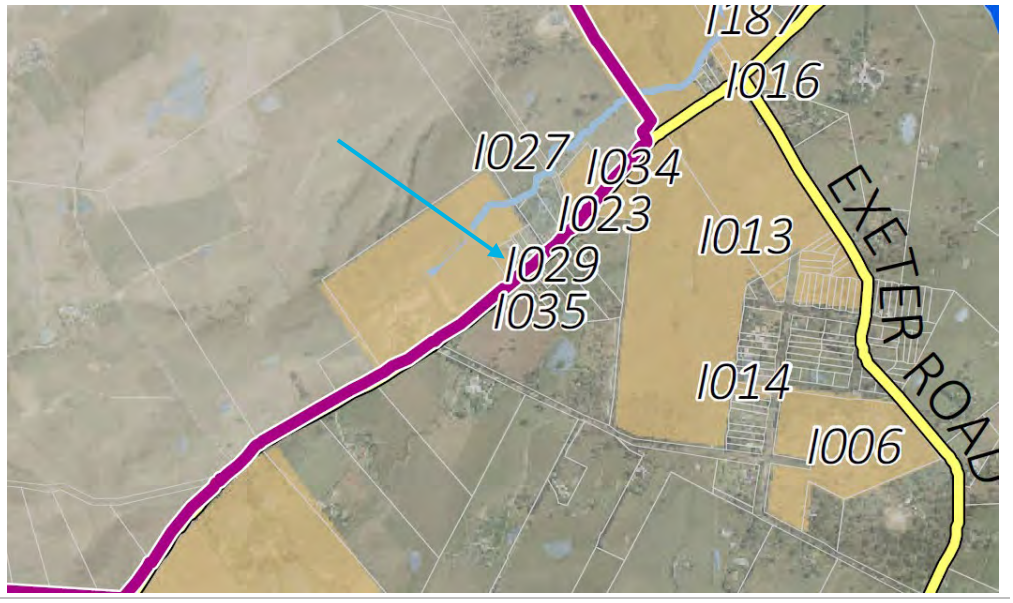
Coordinates: 253216E 6170663N	
Project area:	Partially within project area. Lot 1, DP 160149. 7500, Illawarra Highway, Sutton Forest.
Description:	I029 WLEP Local significance The Pines is a timber slab cottage constructed in the 1820s. The slab cottage has been covered by renovations but remains intact.
Survey results:	The main cottage (Plate 6.27) stands on their original lots of Portion 67, Parish of Bong Bong. The SHI listing mentions an additional two cottages to the north, but these were not recorded as The Pines was viewed from the public domain only. Two large pine trees either side were removed many years ago. The Pines was an early slab cottage on the Great Southern Road, but the whole cottage was covered in fibro and painted in the 1970s, but the original slabs remain underneath. It has a high roof of iron, and handmade brick chimneys. The cottage has four rooms with a detached kitchen, the area between these two buildings now being enclosed. Windows at the back of the house have iron bars. Originally the two 12 pane windows either side of the front door had wooden shutters, without louvres, but they were removed and stored by the owners in the 1970s (SHI 2680029). The Pines was not accessed for this report. The property is within the project area (but the building is not), where subsidence has been assessed to be negligible and the building will not be undermined.

Table 6.7 The Pines

Plate 6.27 The Pines viewed from the Illawarra Highway. View north-west.



Comparisons	Similar timber slab cottages include: • Slab Cottage, Berrima (WLEP I230)
Statement of significance	*The Pines* is a timber slab cottage built in the 1820s. Despite renovations which have covered the original timber slabs the cottage remains a rare and representative example of timber slab cottages the majority of which have been removed. Timber slab cottages were the first buildings erected privately by settlers and are of historical significance for their ability to provide information on the historical development of Sutton Forest and the Great Southern Road.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

Table 6.8 The Harp

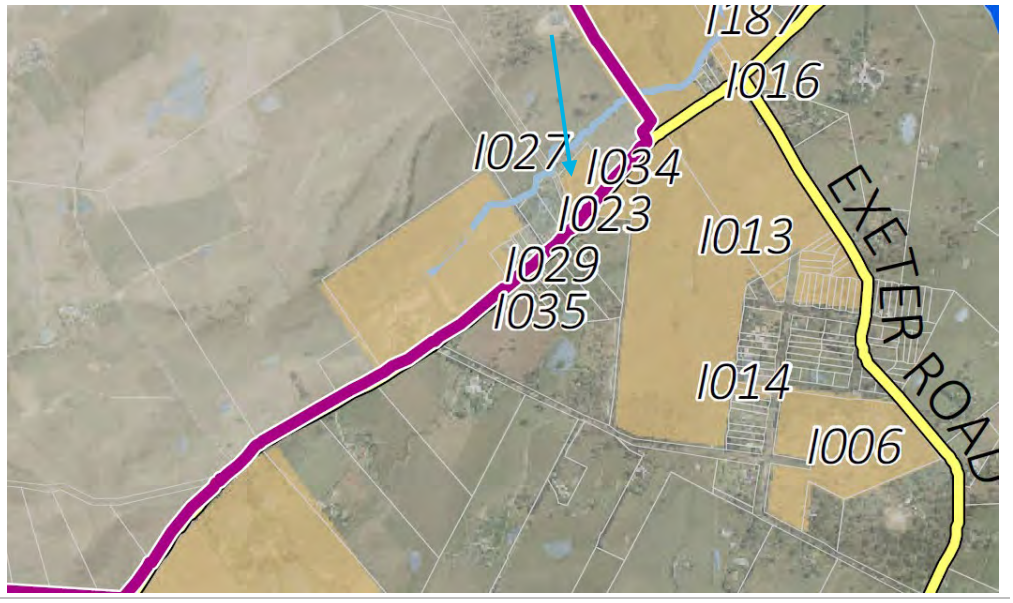
Coordinates: 253403E 6170879N	
Project area:	Inside project area. Lot 1 DP 1028147. 2 Red Cow Lane (off the Illawarra Highway), Sutton Forest.
Description:	I027 WLEP Local significance The Harp (formerly Bindagundra House) was established in 1830. A brick building with attic, and timber outbuildings are within the grounds.
Survey results:	Built of small sandstock bricks in the 1830s as an inn, The Harp was previously known as *Bindagundra.* The house is 45 ft x 24 ft, with gabled roof and attics in the gables, reached by a small stairway leading from one of the rear rooms. The dormer window which lights the attic rooms has been enlarged. Twelve feet from the rear of the house is the detached kitchen, 16ft x 12ft, also built of the same bricks. All the joinery appears to be original and is of cedar except for the joinery on a four-panel door and the dormer window mentioned above. Doors are six panelled with fine mouldings and casement windows have fine glazing bars. The veranda is paved with bricks in a diagonal pattern. The fireplaces retain their cedar mantelpieces. The house is also set in a garden which features several fine mature trees including oaks. Alterations include enlarging the original attic dormer, a weatherboard addition to the east of the house and a new bathroom added to the west of the kitchen (SHI). The Harp was not accessed for this report; therefore, it was not photographed. The property is within the project area, where subsidence has been assessed to be negligible and the building will not be undermined.

Table 6.8 The Harp

Plate 6.28 The Harp (2006). Source: Peter Kabaila, Wingecarribee Shire Council, from https://www.environment.nsw.gov.au/heritageapp/HeritageItemImage.aspx?ID=2680027#ad-image-0.	
Comparisons	Comparative inn sites include: • Mail Coach Inn (Former) c.1835 (SHR 00102) • Berrima Inn 1848 (SHR 00103) • White Horse Inn 1834-1854 (SHR 00106) • Crown Inn 1845 (Wingecarribee LEP 2010, I141) • Breen's Inn (Old) (Former Colonial Inn) 1840 (Wingecarribee LEP 2010, I140) • Surveyor General Inn 1834 (Wingecarribee LEP 2010, I139) • Prince Albert Inn 1844 (Wingecarribee LEP 2010, I160) • Fitzroy Inn 1845 (Wingecarribee LEP 2010, I099) • Sutton Farm c.1830 (Wingecarribee LEP 2010, I035)
Statement of significance	*The Harp* (formerly known as *Bindagundra*) is a sandstone brick building built in the 1830s. It has historical significance for its ability to provide information on the recreational pastimes of the Southern Highlands communities during the nineteenth century. It is also able to provide historical information on the development of the settlement in this area through its connections with the road network. The building is in fair condition with few alterations from its original state providing local research potential and aesthetic significance. The Harp is a good representative example of inns built and operated in the nineteenth century. It is an item of local heritage significance.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

Table 6.9 Bunya Hill House

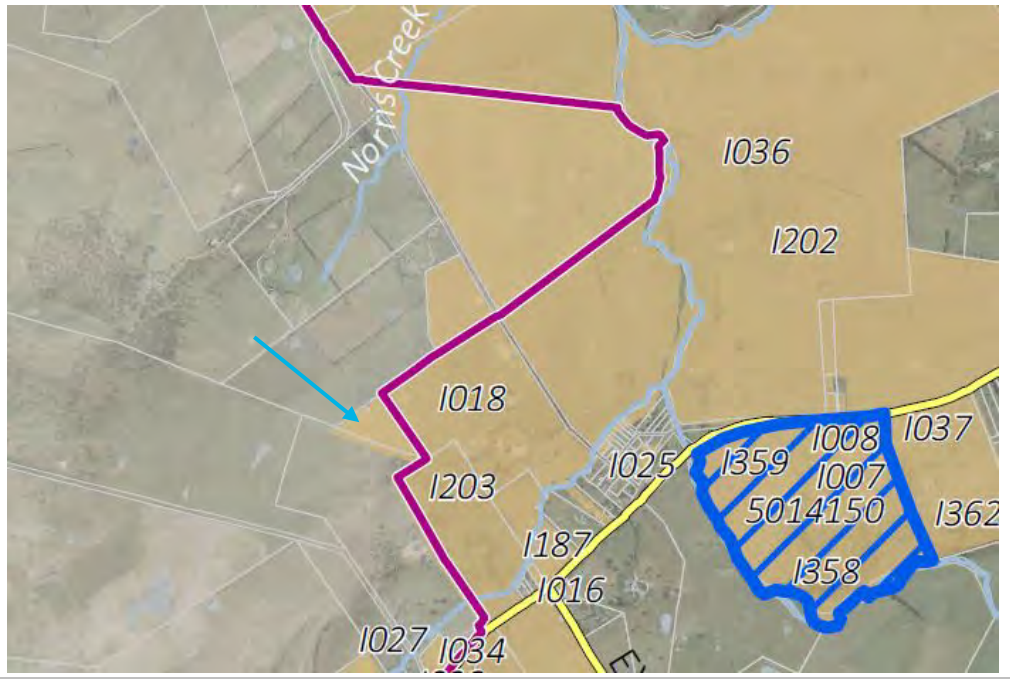
Coordinates: 253606E 6171876N	
Project area:	Partially within project area. Lot 1 DP 995642, Lot 1 DP 130301, 43 Golden Vale Road, Sutton Forest. See Above.
Description:	I018 WLEP Local significance Bunya Hill is a large Victorian House built in the 1870s.
Survey results:	Built in the 1870s, *Bunya Hill House* is a large, two-storey free-standing house. The rear section of the house and the outbuildings, including what is understood to be a bakehouse, may be older. The property is highly likely to contain relics. *Bunya Hill House* was not accessed for this assessment report; therefore, it was not photographed. Only part of the property is located within the underground mining area where subsidence has been assessed to be negligible.

Table 6.9 Bunya Hill House

Plate 6.29 Bunya Hill House (2015). Source: https://www.propertyobserver.com.au/forward-planning/advice-and-hot-topics/celebrity-property-news/44268-nicole-kidman-shows-off-bunya-hill-sutton-forest-for-first-time.html	
Comparisons	Comparative Victorian houses include: • Abergeldie House (WLEP 2010 I501) • Argyle House (WLEP 2010 I040) • Boscobel House, Ground and Outbuildings (WLEP 2010 I013) • Hopewood House (WLEP 2010 I532) • Lynthorpe House (WLEP 2010 I077) • Sylvan Glen Guest Farm House and Grounds (WLEP 2010 I611) • Wensleydale House and Outbuildings (WLEP 2010 I176)
Statement of significance	*Bunya Hill* is one of the large Victorian houses which grew up around the village of Sutton Forest, settled in 1822 (SHI 2680018). It is an item of local heritage significance.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

Table 6.10 Eling Forest Winery

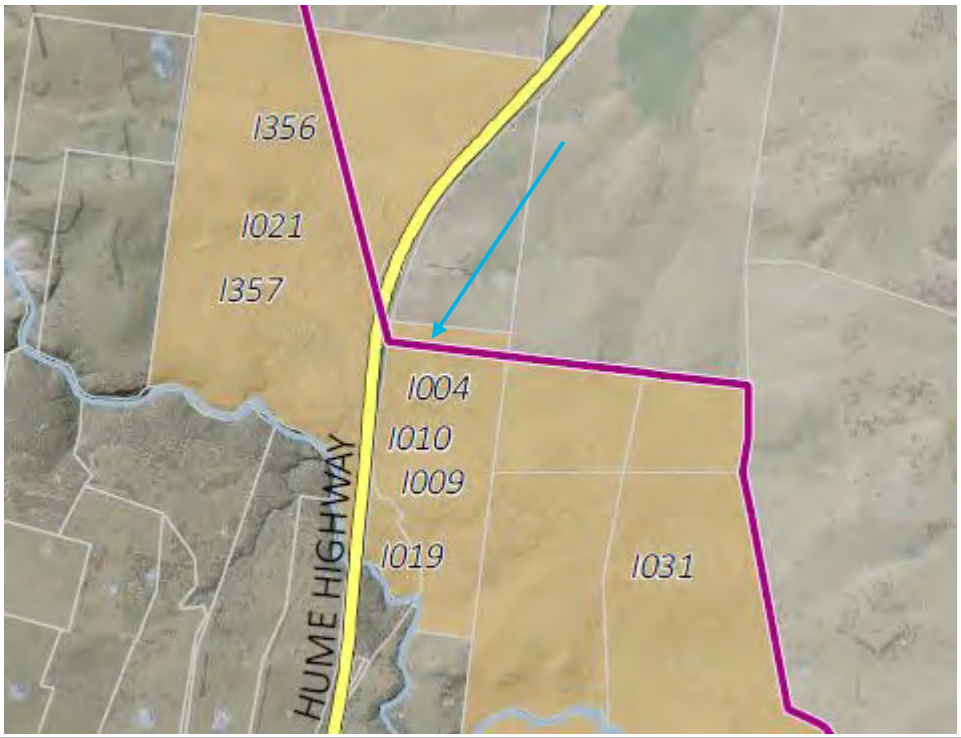
Coordinates: 248333E 6171308N	
Project area:	Partially in the project area. Lot 2 DP 806934, 12587 Hume Highway, Sutton Forest.
Description:	I004, I009, I010 WLEP Local significance Eling forest contains the remains of an early homestead constructed in 1834 as well as an 1840 brick and stone building, stone cottage, and quarry.
Survey results:	The *Eling Forest Winery* group consists of an earlier homestead site, which is now an archaeological site. The homestead was built in 1834. A later home (1840), another stone cottage and a sandstone quarry all make up the listing for this property. The property was named after the town of Eling in Hampshire. The property is highly likely to contain relics. Eling Forest Winery was not accessed for this report; therefore, it was not photographed. Part of it is located within the underground mining area where subsidence has been assessed to be negligible.

Table 6.10 Eling Forest Winery

Plate 6.30 Eling Forest Winery. Source: Wingecarribee Shire Council https://www.environment.nsw.gov.au/heritageapp/HeritageItemImage.aspx?ID=2680004#ad-image-0	
Comparisons	Standing buildings similar to Eling Forest: • *Comfort Hill* 1840 (Wingecarribee LEP 2010, I021, I356) Archaeological sites of homesteads include: • Cooma Cottage 1883 (SHR 00102), Davies, M. 1988, *Cooma Cottage Yass, N.S.W. Excavation Report*, Prepared for the National Trust of Australia (N.S.W). • Vine Lodge 1840 (Wingecarribee LEP 2010, I204, 354, 355) • Lucan Park Homestead 1822 to 1939 • "The Homestead" Georges Hall 1837 (1797) (SHR 00448) Caboonbah Homestead 1888 (QLD)
Statement of significance	The *Eling Forest Winery Group* has historical significance for its ability to demonstrate, through surviving buildings on the property, the historical development of Sutton Forest. It possesses research potential embodied in the archaeological site of the first homestead, as well as in the former school rooms and stables and the sandstone quarry. The *Eling Forest Winery Group* is of local significance.
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on a yearly basis for duration of mine works.

Table 6.11 Comfort Hill House

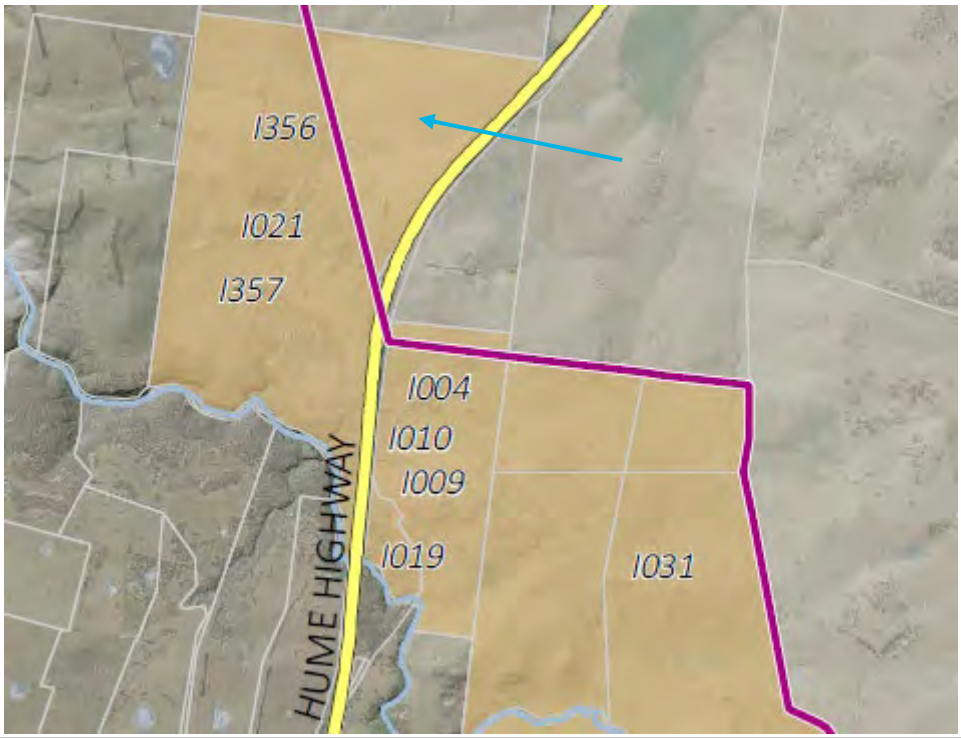
Coordinates: 247830E 6171660N	
Project area:	Partially within project area. Lot 1 DP 744544, 12588 Hume Highway, Sutton Forest.
Description:	I356, I357, I021 WLEP Local significance. Comfort Hill was established in 1840. A single-story sandstone cottage with attic and rear kitchen are within the grounds. The cottage features twentieth century additions.
Survey results:	The *Comfort Hill Group* is listed as an LEP item on the Wingecarribee LEP. The group includes the main house (single storey sandstone cottage with attic, rear kitchen block, extensive 1948 additions to rear of house, internal sculpture by Tom Bass) and outbuildings, garden including mature trees, stone walls and a pond, aviaries as well as extensive remnant natural bushland. The original single storey homestead was constructed from locally quarried sandstone in c.1840. This stage of the property's development is significant as an example of the local area's early homesteads. In 1949 extensive additions were made to the sandstone structure and display highly sympathetic design and aesthetic elements in relation to the original residence. The additions contribute to the significance of the site due to the high level of integrity and association with prominent architects Stephenson & Turner (SHI 2680356). A property of this age is highly likely to contain relics. Comfort Hill was not accessed for this report; therefore, it was not photographed. Only part of it is located within the underground mining area where subsidence has been assessed to be negligible.

Table 6.11 Comfort Hill House

Plate 6.31 Comfort Hill. Source: JRC Planning https://www.environment.nsw.gov.au/heritageapp/HeritageItemImage.aspx?ID=2680356#ad-image-0



Comparisons	Standing buildings similar to Comfort Hill: • *Eling Forest Winery group* (WLEP 2010 I004, 009, 010)
Statement of significance	*Comfort Hill* is of local significance for the existing house, gardens and other features that make up the property. There are no statements of significance on the SHI for the gardens (SHI 2680357; WLEP I10357) or the listing for *Comfort Hill* including outbuildings, trees, stone wall and pond", which is the Illawarra Regional Environmental Plan No.1 listing. The earliest elements of the *Comfort Hill* group include potential relics dating from the 1820s. The complete statement of significance for *Oldbury* is available on the Office of Environment and Heritage website (https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2680356).
Assessment of impacts	None identified
Management measures	Monitor areas within mine plan footprint on an annual basis for duration of mine works.

Annexure F

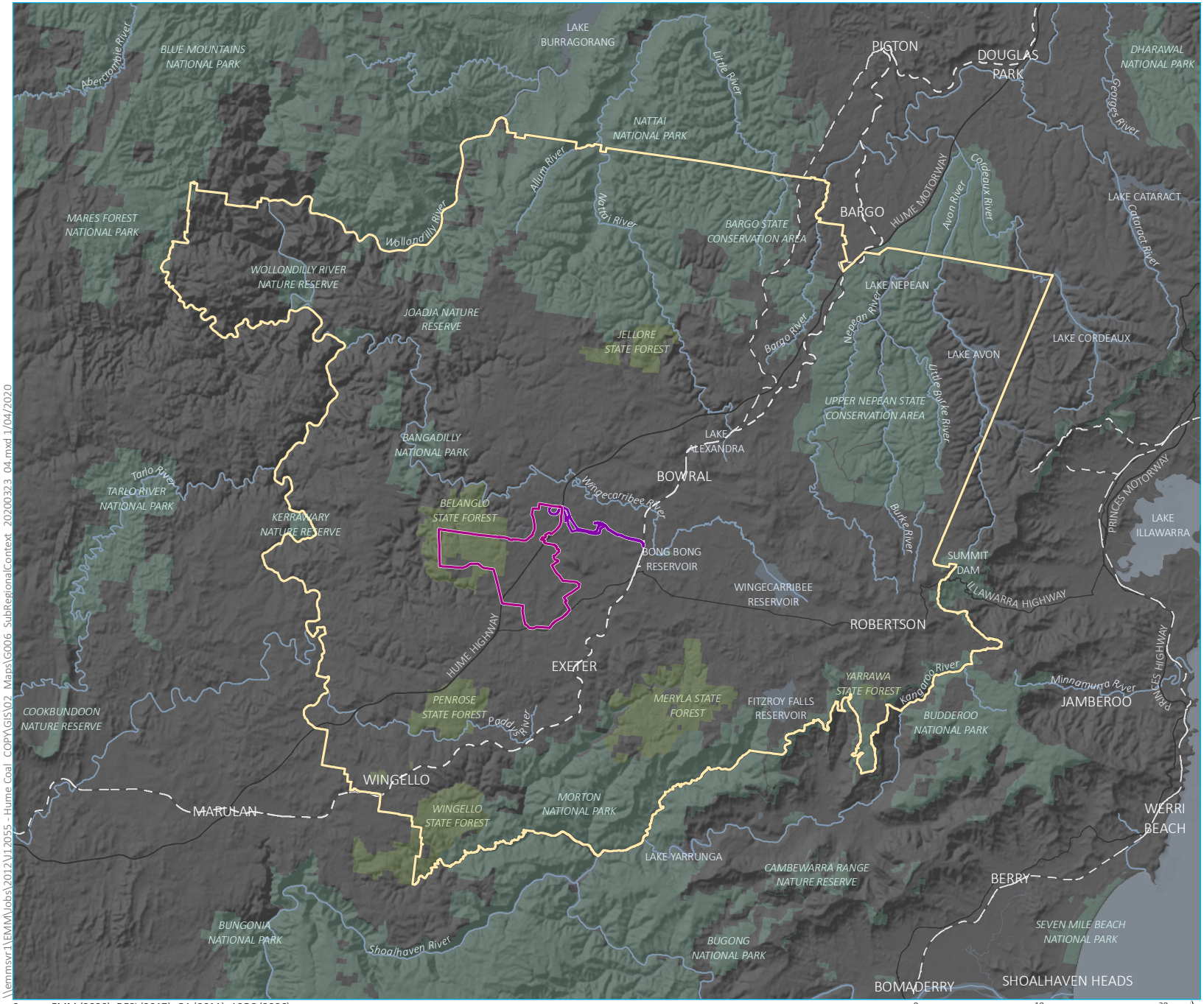
Figures

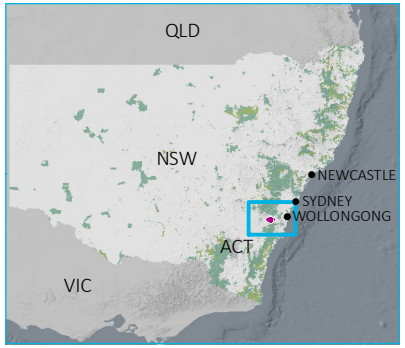












KEY

- Hume Coal Project area
- Berrima Rail Project area
- Wingecarribee Shire local government area
- Rail line
- Motorways and primary roads
- River
- Named waterbody
- NPWS reserve
- State forest

Source: EMM (2020); DFSI (2017); GA (2011); ASGC (2006)

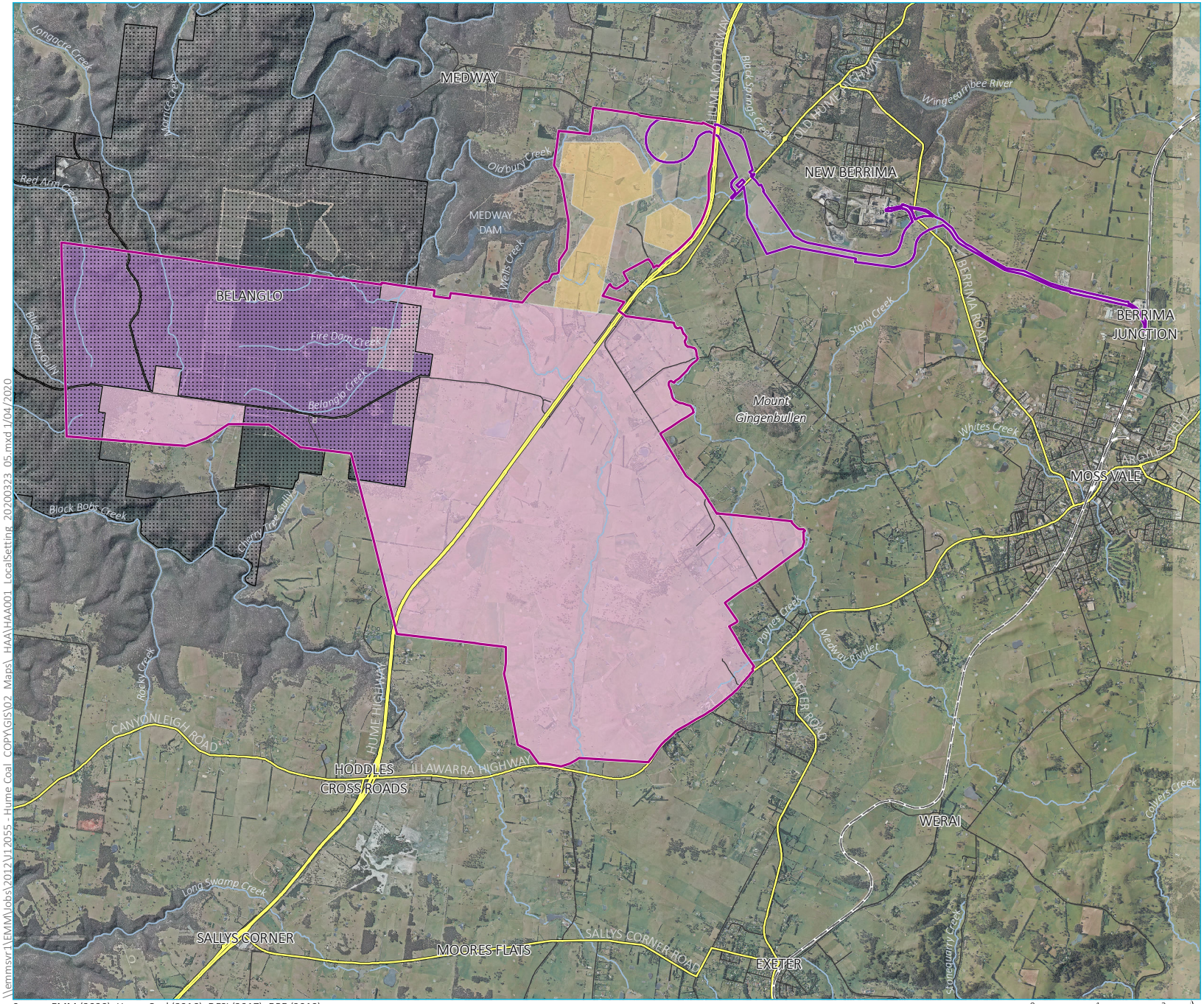
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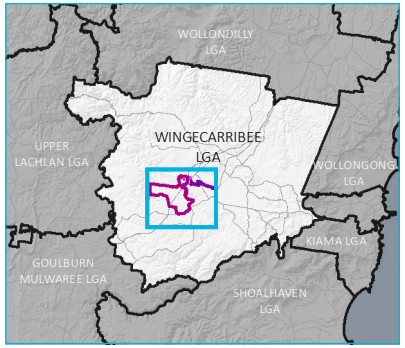
Regional setting

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.1

HUMECOAL PROJECT

EMM creating opportunities





KEY

- Hume Coal Project area (5,051 ha, 44,740 m perimeter)
- Berrima Rail Project area (181 ha, 23,201 m perimeter)

Mining lease application area

- MLA 527
- MLA 528
- MLA 529

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

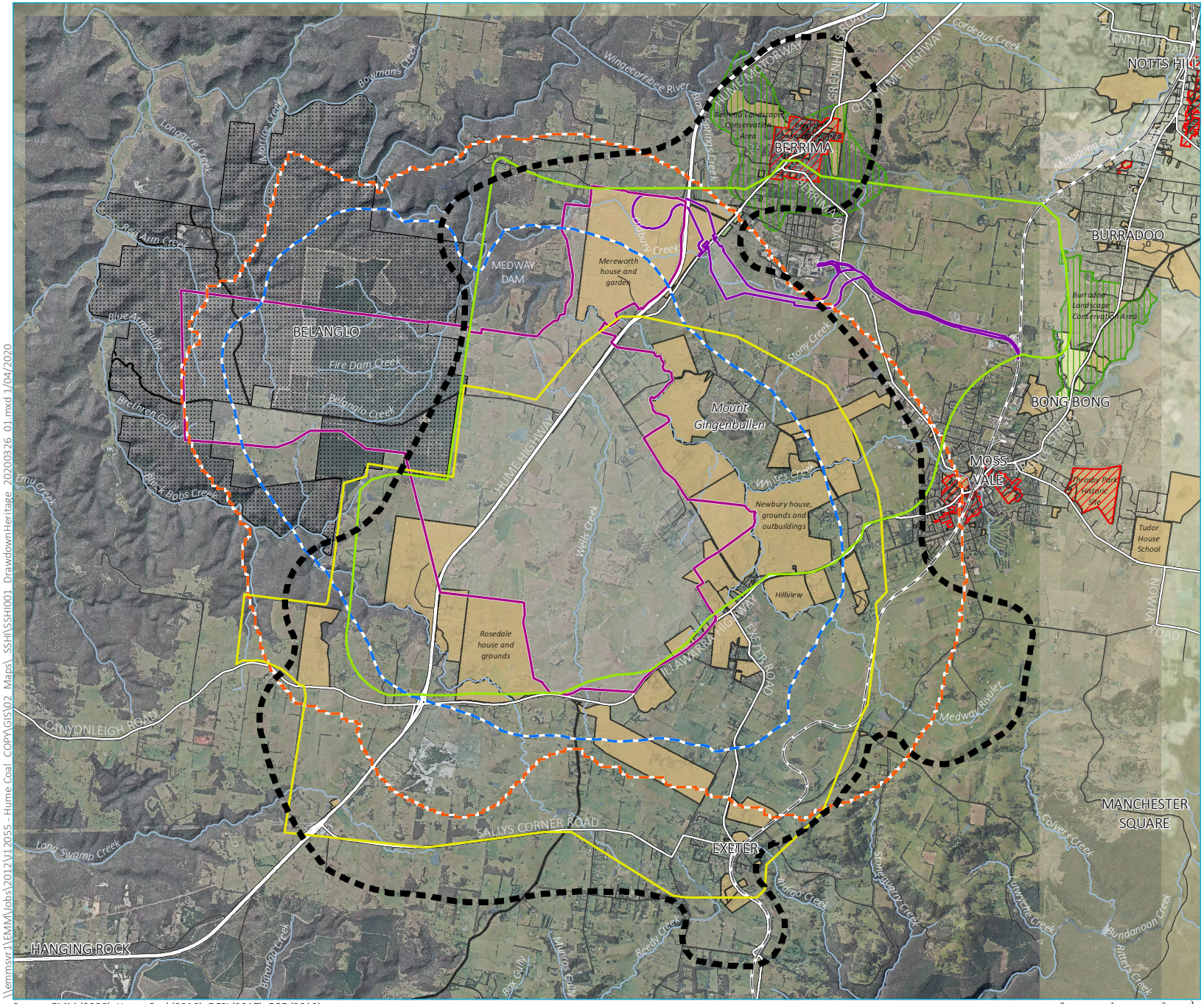
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Local setting

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.2

HUMECOAL PROJECT

EMM creating opportunities



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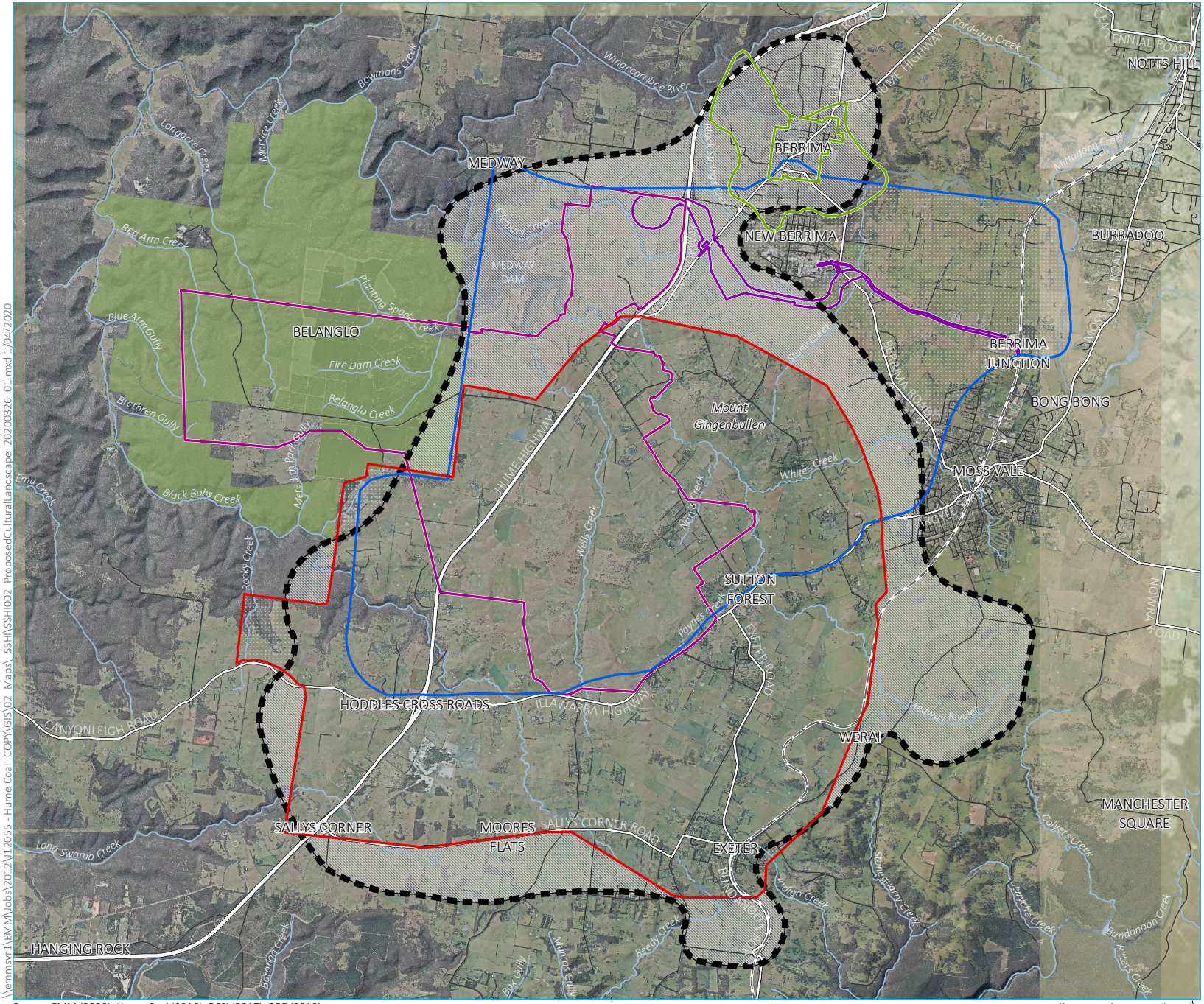
Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

Groundwater drawdown area and heritage items

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.3

HUMECOAL PROJECT

EMM creating opportunities



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Berrima Conservation & Landscape Conservation Area (WLEP 2010)
- Exeter/Sutton Forest Landscape Conservation Area
- Key Historic Unit 6 Sutton Forest
- Proposed B, SF & E Cultural Landscape (Catherine Brouwer Landscape Architects)
- Additional area (compared to Exeter/Sutton Forest Landscape Conservation Area)
- Reduction from both past cultural landscape areas

Existing environment

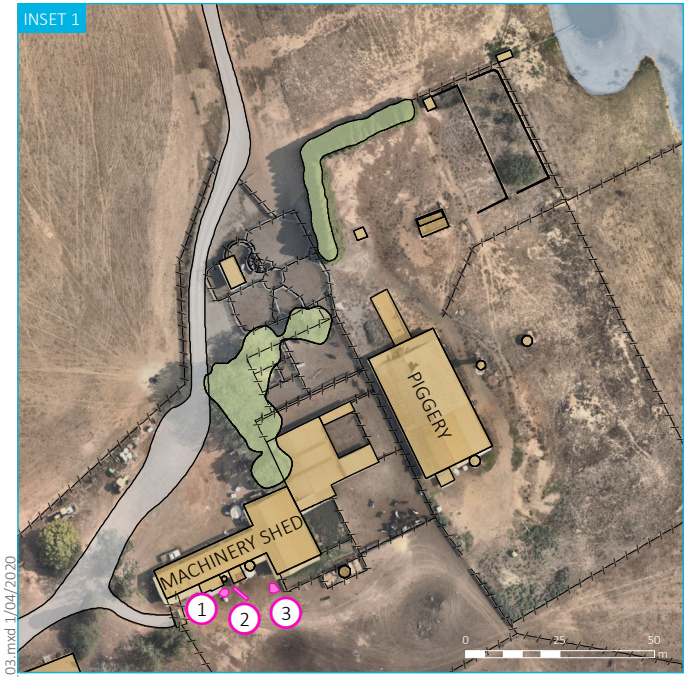
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); DFSI (2017); DPE (2019)

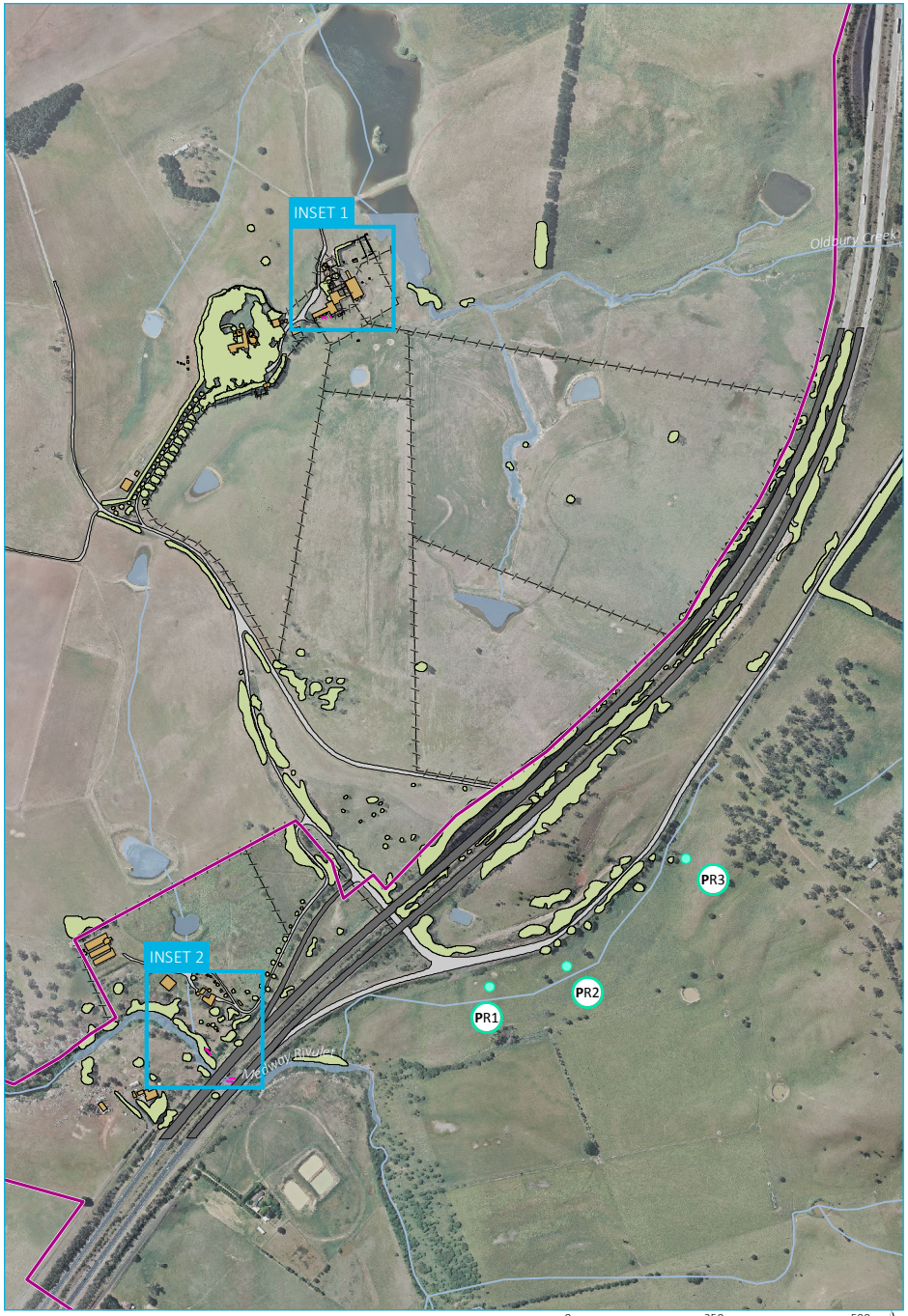
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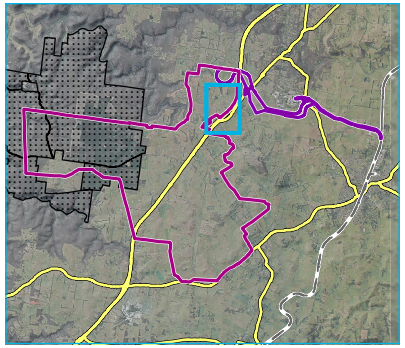
Cultural landscape boundaries

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.4









KEY

- Hume Coal Project area
- Berrima Rail Project area (refer to inset)
- Known relic
- (1) Sandstone flagging
- (2) Sandstone drain feature
- (3) Artefact scatter
- (4) Drystone wall
- (5) Three Legs O'Man bridge piers (reconstructed 1860)
- Potential relic
- (PR) Employee residence
- Fence
- Building/structure
- Vegetation
- Motorway
- Road
- Watercourse/drainage line
- Waterbody
- Major road (refer to inset)
- Rail line (refer to inset)
- Belanglo State Forest (refer to inset)

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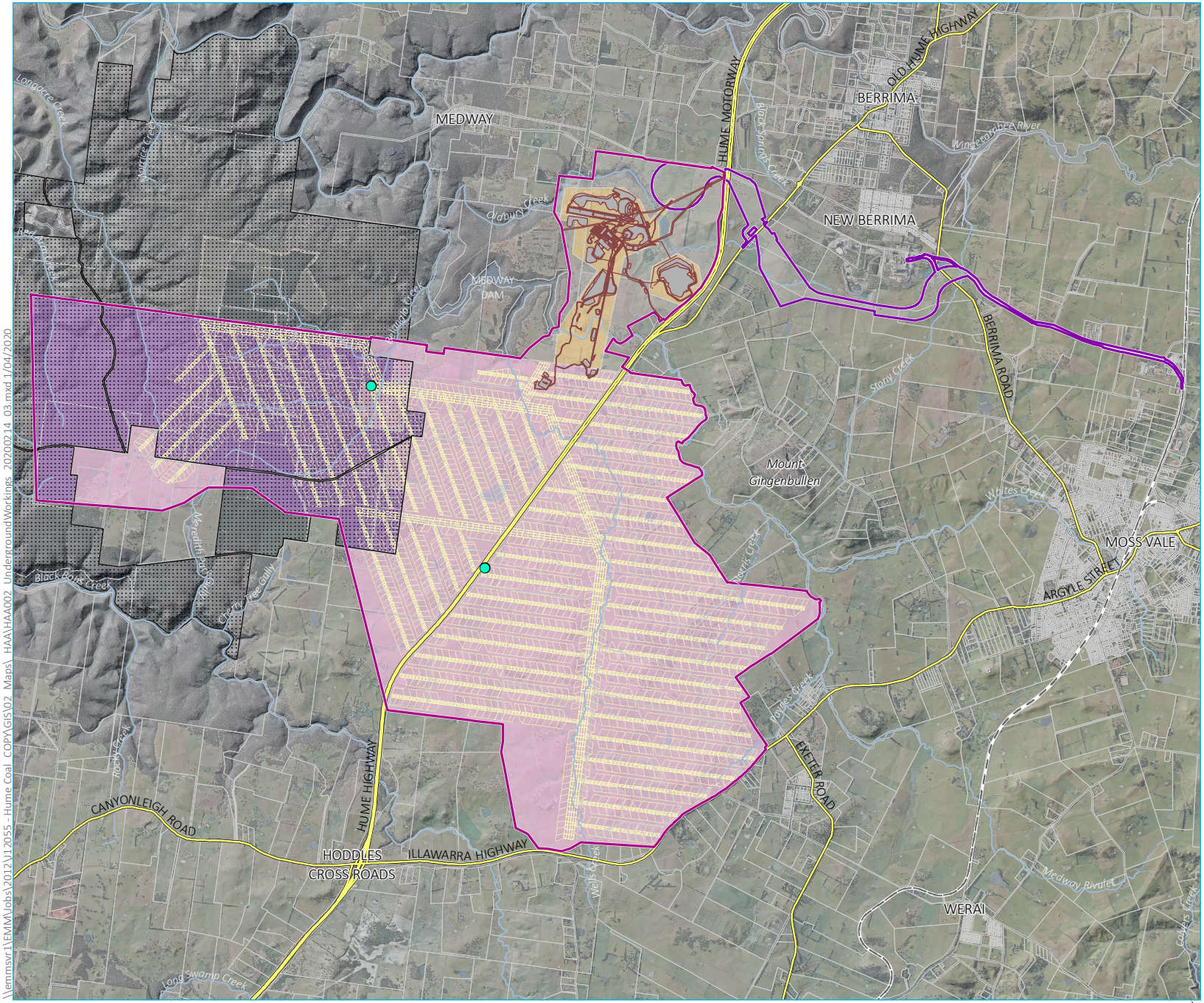
Source: EMM (2020); NearMap (2019); Hume Coal (2016); DFSI (2017)

Known and potential relics

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.5

HUMECOAL PROJECT

EMM creating opportunities



KEY

- Hume Coal Project area
- Berrima Rail Project area
- Downcast ventilation shaft (3 m diameter, not shown to scale)
- Indicative surface infrastructure footprint
- Underground mine workings (indicative)

Mining lease application area

- MLA 527
- MLA 528
- MLA 529

Existing environment

- Rail line
- Major road
- Named watercourse
- Waterbody
- Cadastral boundary
- Belanglo State Forest

Source: EMM (2020); Hume Coal (2016); Palaris (2016); DFSI (2017); DPE (2019)

0 1 2 km

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2012\V12055 - Hume Coal COPY\GIS\02 Maps\ HAA\HAA002 UndergroundWorkings 20200214 03.mxd 1/04/2020

Indicative project layout

Hume Coal and Berrima Rail Project
Supplementary statement of heritage impact
Figure F.6

HUMECOAL PROJECT

EMM creating opportunities












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