



JACOBS NSW SPATIAL - GIS MAP file : IA086100_TNR456_PestEIS_F004_NonAbHer_r1v1 | 25/10/2017

- | | |
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| <ul style="list-style-type: none"> The Northern Road upgrade - Mersey Road to Glenmore Parkway The Northern Road (Existing) Warragamba Dam to Prospect Reservoir pipeline EIS Construction footprint Revised design construction footprint | <ul style="list-style-type: none"> Chaffey Brothers Irrigation Scheme Canal Orchard Hills Cumberland Plain Woodland Defence Establishment Orchard Hills (Commonwealth Land) Construction compound sites |
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0 200 400 m



Figure 6-2 | Location of Orchard Hills Cumberland Plain Woodland showing extent of Chaffey Brothers Irrigation Scheme Canal (item 2) in relation to proposed works

Item 3: Warragamba Dam to Prospect Reservoir pipeline (Lot A DP341629 & Lot A DP341893)

Proposed works

Construction of carriageway and fill slope to the west of The Northern Road (current) overlaps with the pipeline alignment to the west of The Northern Road (Figure 6.3).

Impact assessment

The following aspects of the project respect or enhance the heritage significance of the item for the following reasons:

The carriageway is located over the section of pipeline that is below the ground to the west of The Northern Road and would avoid direct impact to the pipeline. The study area is located 5-10 m to the east of four cement building footings associated with the pipeline. In addition, the proposed works include fill slopes within the pipeline corridor.

The following aspects of the project could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts:

Potential for physical damage to the pipeline from road construction machinery, vehicles or other activities accidentally occurring outside the construction footprint. *The Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines* (Sydney Catchment Authority 2012) sets out guidelines when designing, planning or assessing development on land adjacent to this pipeline. The document outlines risks to the pipeline through construction works in the vicinity and includes measures such as:

- Consultation with the Sydney Catchment Authority (SCA) to identify key issues relevant to particular locations to ensure the proponent or authority has the information needed to implement SCA requirements or recommendations
- Access to the Upper Canal and Warragamba Pipelines 'Controlled Areas', outlining access approvals and site inspections and access for SCA staff and contractors
- Risks during construction and site preparation – including vibration caused by jack hammering, pile driving or rock breaking, cut and fill works, erosion, sedimentation and stormwater impacts, dust, windblown rubbish and other airborne pollutants and illegal storage of construction materials. The SCA recommends that consent authorities require a Construction Environmental Management Plan be completed as a condition of consent for new large subdivisions and major development adjacent to the Upper Canal and Warragamba Pipelines corridors. The Construction Environmental Management Plan should identify any potential impacts of the corridors and the range of controls to be implemented during the construction phase to avoid these impacts.
- Erosion and sediment control – management of eroded sediment during any construction phase when the removal of vegetation and disturbance of groundcover in the currently predominately rural areas
- Stormwater management – the SCA requires that no stormwater beyond pre-development levels enters the corridors.
- Public safety and security of water supply, including security fencing
- Road and pedestrian crossings
- Land uses and landscaping along corridor boundaries (Sydney Catchment Authority 2012:7-17).

The guidelines also outline guiding principles for development proposed within and adjacent to the Warragamba Pipeline corridor:

1. The Upper Canal and Warragamba Pipelines corridors are essential public infrastructure whose key purpose is the supply of drinking water to the Greater Metropolitan Sydney region. Water supply infrastructure must always be safe and serviceable.
 - a. The SCA will not approve development proposed by external parties within the corridors unless:
 - i. the development is for the purpose of essential infrastructure and services that cannot be feasibly located elsewhere; and
 - ii. the proponent can ensure to the satisfaction of the SCA that there will be no adverse impact on the Upper Canal and Warragamba Pipelines infrastructure. Infrastructure and services must not compromise the SCA's future proposals for canal and pipeline infrastructure.
 - b. The SCA will not support development or planning proposals adjoining the corridors unless it can be shown that there will be no adverse impact on the Upper Canal and Warragamba Pipeline infrastructure.
2. Water quality and quantity within the Upper Canal and Warragamba Pipelines corridors must be maintained and protected.
 - a. The SCA will not approve infrastructure and services proposed by external providers within the corridors unless the providers can ensure to the satisfaction of the SCA that there will be a neutral or beneficial effect on water quality and quantity.
 - b. The SCA will not support development or planning proposals adjoining the corridors unless it can be shown that there will be a neutral or beneficial effect on water quality and quantity.
3. Proponents of development or activities within or adjoining to the Upper Canal and Warragamba Pipelines corridors should bear any additional costs to the SCA arising from requirements under the above principles. This may include, but not be limited to, costs for technical or specialist studies, additional security measures, additional stormwater management measures, construction requirements, the planning and registration of easements and financial compensation for access rights and easements (Sydney Catchment Authority 2012:19).

The concrete culvert located within a proposed access track would be directly impacted by the proposed works. However, removal of the culverts would not impact on the significance of the pipeline because they do not contribute to the historical significance of the site, nor demonstrate the technological significance of the pipeline. The building footings adjacent to the proposed access track would be protected with exclusion fencing to ensure no impact occurs to these items as a result of the proposed works.

The following impacts have been assessed as follows:

- vibration – unlikely due to the application of the measures outlined in *The Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines* (Sydney Catchment Authority 2012) and the guidelines and associated safe working distances to be adhered to for heritage structures as outlined in the Noise and vibration assessment (**Appendix H** of the EIS)
- demolition – the pipeline would not be demolished. A concrete culvert would be demolished but would not impact on the significance of the heritage item.
- archaeological disturbance – not applicable

- altered historical arrangements and access – the heritage item is located within WaterNSW land and is therefore subject to restricted access
- landscape and vistas – the landscape and vistas of the heritage item would not be impacted
- architectural noise treatment – not relevant to this heritage item

There would be no overall impact to Item 3 during construction.

There would be no operational impacts to Item 3.



Figure 6-3 | Location of Warragamba Dam to Prospect Reservoir Pipeline (Item 3) in relation to proposed works The Northern Road Upgrade - Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park Submissions and Preferred Infrastructure Report

Item 9: Miss Lawson’s Guesthouse site (Lot 1 DP90157)

Proposed works

- Construction of dual carriageway and cut slopes
- Construction of an intersection off the new The Northern Road onto Eaton Road (Figure 6.4).

It is noted that although the location of the proposed ancillary facility C8 overlaps with this item, construction and operation of this ancillary facility would not result in any additional impact to the site that would not already be impacted by construction of the road alignment at this location.

Impact assessment

The following aspects of the project respect or enhance the heritage significance of the item for the following reasons:

While the project would have a direct impact on archaeological deposits of the Guesthouse site, the opportunity for undertaking a detailed archaeological investigation of the site prior to its destruction may enhance its significance through the realisation of its research potential. Undertaking archaeological investigation of the site under a well-structured research design by an appropriately qualified historical archaeologist would reveal information and answer questions particularly in relation to the early settlement of Luddenham and the hotel and inn industry in the early 20th century.

The Northern Road Upgrade is proposed for the newer section of The Northern Road and will avoid the original The Northern Road section (now Eaton Road). This allows for the retention of the relationship between Miss Lawson’s Guesthouse site and the original The Northern Road alignment to remain legible in the landscape.

The following aspects of the project could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts:

The construction of The Northern Road upgrade would have a direct impact on all surface features identified at the site, and on potential subsurface archaeological deposits from the construction. By following the mitigation measures as much information as possible can be obtained which contributes to our knowledge and significance of the heritage item. To minimise impacts and maximise the opportunity for realising research potential at the site the following actions would be undertaken:

- Archaeological investigation in the form of test and salvage excavation to be undertaken in accordance with the Heritage Division of OEH guidelines including an appropriate research design and methodology in order to best realise the research potential of this area of the site
- Archaeological investigation in the form of test and salvage excavation would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist.
- In response to the two dot points above a research design was developed by Pamela Kottaras (Heritage Services Manager, EMM Consulting) (Kottaras 2017a) (refer to Appendix B). The research design states the following:

As the site will be removed in total, the questions will be focused on extracting the maximum information from its removal. One obvious avenue of investigation is the connection between Miss Lawson’s Guesthouse and Lawson’s Inn (Item 10, approximately 75 m south over Eaton Road); for instance, how did the inn access fresh water? Was it from one of the wells identified on the guesthouse site?

The research questions begin with a broad scope and focus in where they have been guided by the research and the archaeological test excavation:

1. *What is the nature and extent of the archaeological resource? Can it shed light on the building materials used for the various buildings?*
2. *Does the archaeological resource support the documentary evidence and its analysis or can it provide information that is not available elsewhere?*
3. *What were the spatial arrangements of the complex? Can the 'platforms' be ascribed a spatial function?*
4. *Can the establishment be reconstructed using archaeological evidence?*
5. *Do the wells contain information about the place? Is one or both associated with Lawson's Inn 75 m to the south?*
6. *What species of tree is the dead fruit tree? Was it part of the guesthouse garden?*
7. *Did the guesthouse have a kitchen garden?*
8. *How self-sufficient was the establishment, e.g. did it possess a kitchen garden, animal pens, cool rooms and killing sheds?*

The following impacts have been assessed as follows:

- vibration – this heritage item would not be impacted by vibration due to the archaeological nature of the site
- demolition – the entire heritage item would be demolished; however, mitigation measures would minimise these impacts
- archaeological disturbance – the entire heritage item would be subject to archaeological disturbance; however, mitigation measures would minimise these impacts
- altered historical arrangements and access – not relevant to this heritage item, as the entire site would be impacted
- landscape and vistas – relationship to road and guesthouse site retained
- architectural noise treatment – not relevant to this heritage item

Construction impacts to Item 9 would be physical damage to the whole site.

There would be no operational impacts to Item 9.

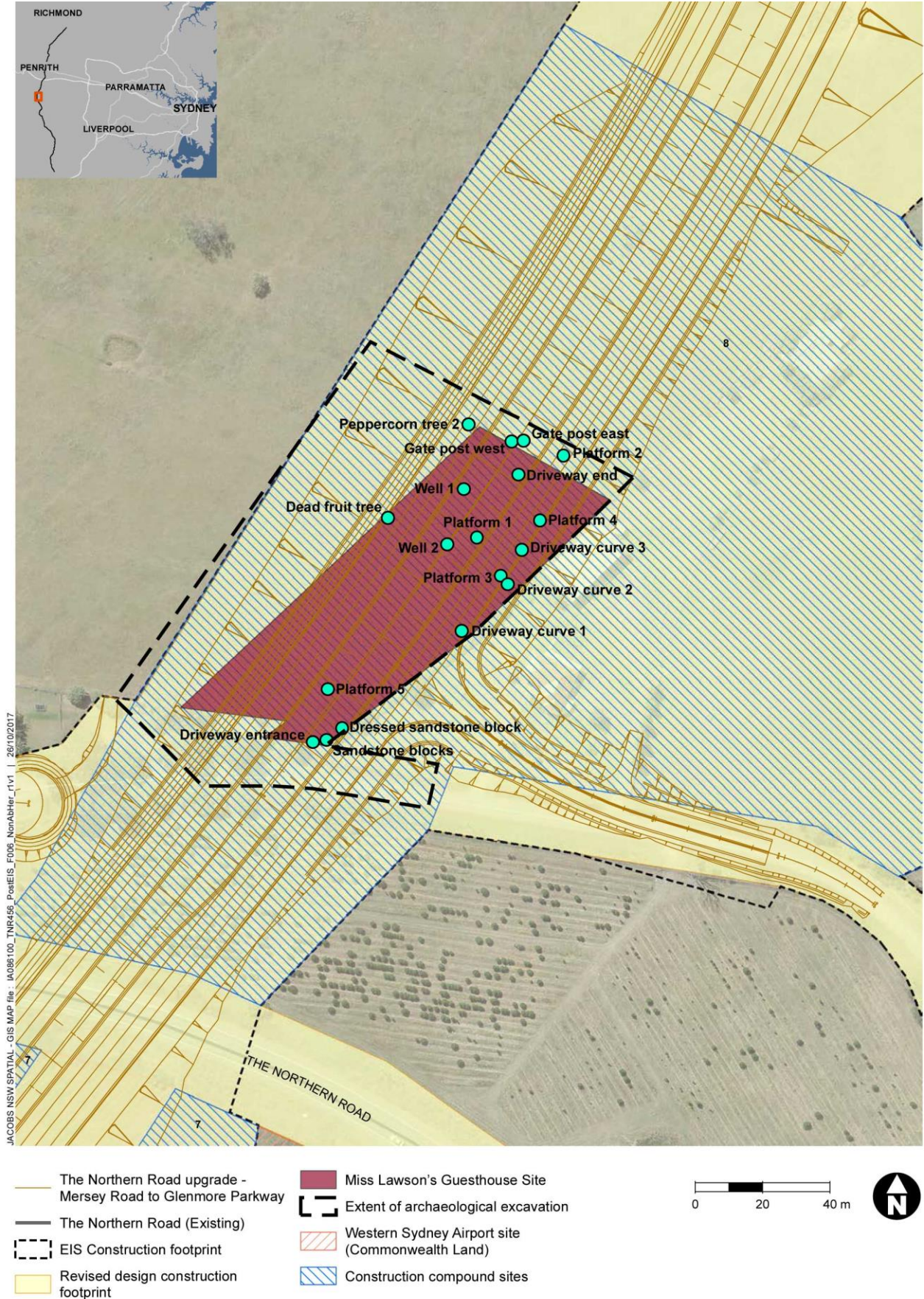


Figure 6-4 | Location of Miss Lawson's Guesthouse Site (Item 9) in relation to proposed works

Item 10: Lawson’s Inn Site (Lot 2 DP623457) (LLEP 53)

Proposed works

- Construction of new dual carriageway (The Northern Road)
- Construction of a cul-de-sac on the existing Eaton Road, to the west of the new The Northern Road. The southern section of the cul-de-sac extends into the inn site.
- Construction of an intersection off the new The Northern Road onto Eaton Road
- Cut slopes for all of the above
- Construction compound and laydown site (Figure 6.5).

Impact assessment

The following aspects of the project respect or enhance the heritage significance of the item for the following reasons:

The potential for substantial and intact relics related to Lawson’s Inn has been assessed as low within the construction footprint and moderate to high adjacent to the construction footprint.

It is not anticipated that the project would have a direct impact on the potential main archaeological features related to the former Inn as historical plans and photographs indicate the actual inn site is outside the project boundary. An area of low archaeological potential has been identified along the northern edge of the Inn site to account for any peripheral relics that may be associated with the Inn site.

It is also unknown, without archaeological investigation, whether the area at the western end of the lot, containing the artefact scatter, is related to the use of the Inn. The area containing the artefact scatter is located within the project boundary. All areas within the project boundary have been designated as being of low archaeological potential.

The opportunity for undertaking further archaeological investigation of the site prior to its destruction may realise its research potential. Undertaking archaeological investigation of the site under a well-structured research design by an appropriately qualified historical archaeologist would reveal information and answer questions particularly in relation to the early settlement of Luddenham, and the hotel and inn industry related to use of early roads in NSW. An archaeological test excavation has been proposed for the construction footprint directly to the north of the historical location of the Inn to capture peripheral features that may relate to the Inn as well as the road. An archaeological testing program is also proposed for the construction footprint to the west of the lot (the location of the surface artefact scatter) to provide assurances that when construction begins, it will not be halted by unexpected finds. The expectation that relics exist in this area of the construction footprint is low but features such as post-holes for huts, fences and outbuildings may exist in this area and this evidence would be lost (Desic and Kottaras 2017).

The proposed Northern Road Upgrade would follow the newer section of The Northern Road and will largely avoid the original alignment of The Northern Road section (now Eaton Road). This allows for the retention of the relationship between Lawson’s Inn and the original The Northern Road alignment to remain legible in the landscape.

The following aspects of the project could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts:

The construction of The Northern Road upgrade would directly impact on around one quarter of the entire curtilage of the site. Based on historical photographs and maps it is expected that potential archaeological deposits relating to the Inn building are located outside the project impact area. In contrast, the surface artefact scatter is located within the impact area. By following the mitigation measures as much information as possible can be obtained which contributes to our knowledge and significance of the heritage item. To minimise impacts and maximise the opportunity for realising research potential at the site the following actions would be undertaken:

- Archaeological investigation in the form of initial test excavations, followed by salvage excavation where required, will be undertaken in areas identified as low archaeological potential within the project boundary. This investigation will be undertaken in accordance with the Heritage Division of OEH guidelines including an appropriate research design and methodology in order to best realise the research potential of this area of the site. The investigation is detailed in *Item 10 - Lawson's Thistle Inn and Store archaeological site, Archaeological Assessment and Research Design* (Desic and Kottaras 2017) (refer to Appendix B). The area of the heritage item to be subject to test excavation is provided in Figure 6.5.
- Archaeological investigation would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist.

The research questions developed by Desic and Kottaras (2017) for the archaeological investigation are as follows:

As the likely location of Thistle Inn will be avoided, only areas that were peripheral to and in front of it are to be disturbed, along the margins of a road that was itself in use from the 1820s, and whose travellers generated their own refuse zone. If they exist, the most likely remains within the project area will therefore be low density artefact scatters, which are archaeologically of negligible value due to their poor provenance, and lack of spatial, stratigraphic and temporal controls. Once any such material is identified, it will be recorded but will not be subject to further analysis and may be discarded.

The following research questions assume at least some level of integrity can be demonstrated for the archaeological finds or deposits.

- Are land boundaries such as yards, fences or different surfacing materials used to demarcate the boundary between public and private space along the road?
- Can any activity areas relating to use of the inn be identified along its road frontage?
- Does archaeological refuse indicative of the inn occur in front of the site or is the material recovered along the road margins consistent?
- Are the sandstone blocks currently marking a vehicle track likely to be the remnants of the inn building? If so, what insight does it provide about the materials used for various buildings?
- Has the road margin remained constant or shifted over time?

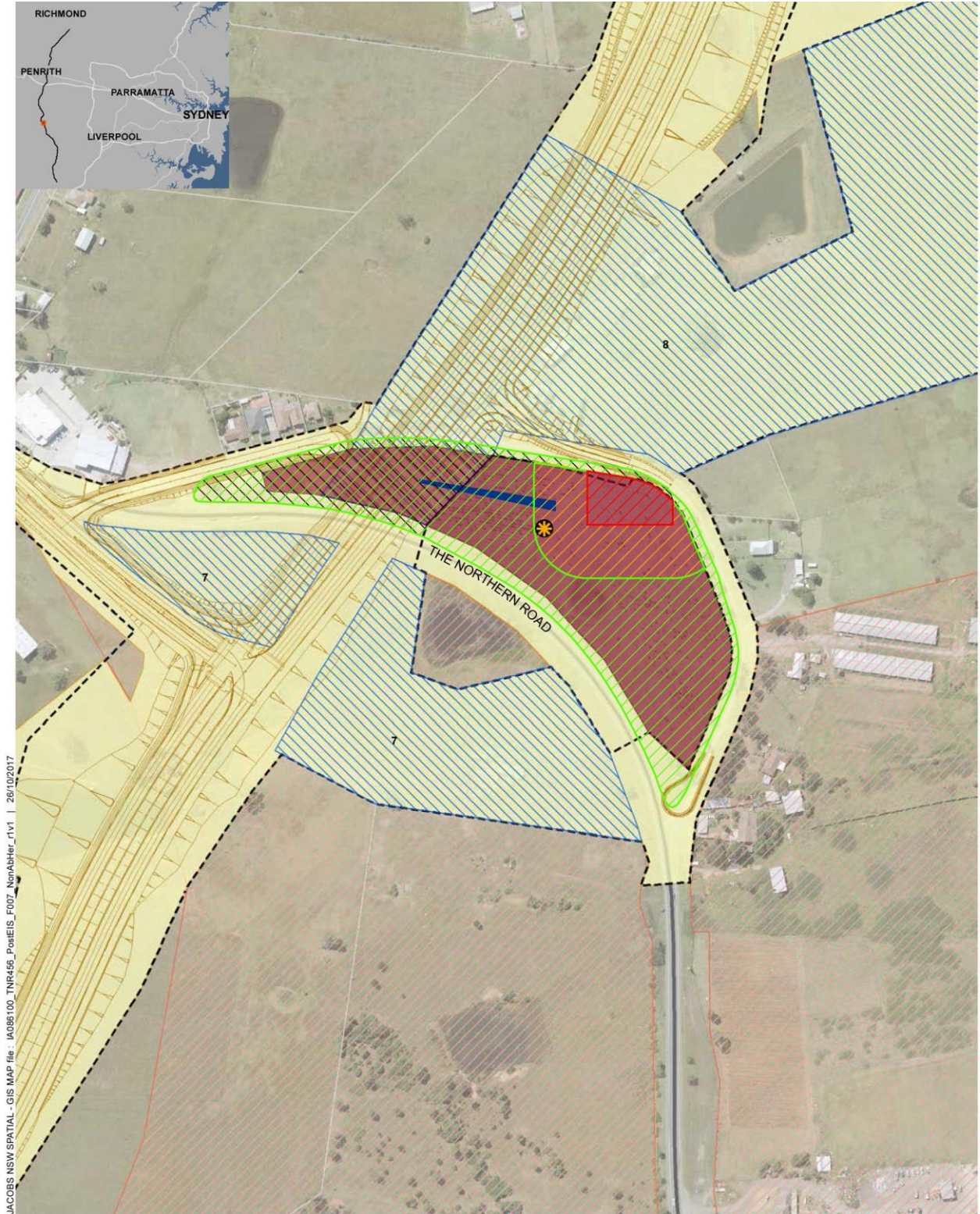
The following impacts have been assessed as follows:

- vibration – this heritage item would not be impacted by vibration due to the archaeological nature of the site
- demolition – part of this heritage item would be demolished; however, mitigation measures would minimise these impacts
- archaeological disturbance – part of the heritage item would be subject to archaeological disturbance; however, mitigation measures would minimise these impacts
- altered historical arrangements and access – the historical arrangements and access would not change for the remaining part of the heritage item which would not be impacted

- landscape and vistas –relationship to road and inn site retained
- architectural noise treatment – not relevant to this heritage item

Construction impacts to Item 10 would be physical damage to part of the site.

There would be no operational impacts to Item 10.



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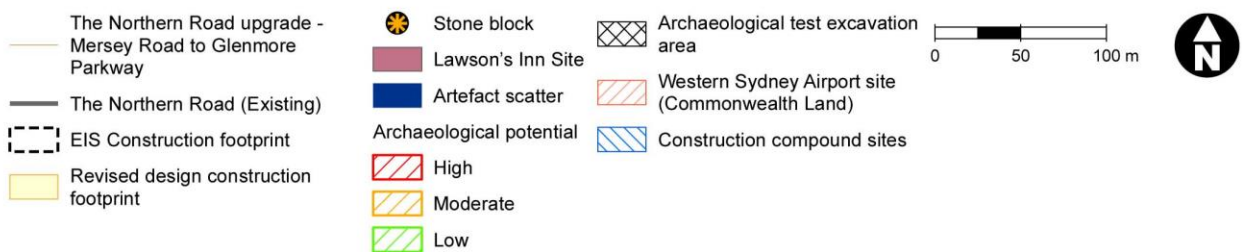


Figure 6-5 | Location of Lawson's Inn Site (Item 10) in relation to proposed works

7. Mitigation measures

Table 7.1 provides an updated summary of the mitigation measures for the project, including revised mitigations based on the outcomes of this assessment. These measures would inform the revised environmental management measures for the project (refer to Chapter 6 of the submissions and preferred infrastructure report).

Table 7.1 : Updated summary of mitigation measures

Heritage item name	Potential impacts during construction	Impact	Proposed mitigation	Impact after mitigation	Potential impacts during operation	Impact during operation
Orchard Hills Cumberland Plain Woodland	<p>Clearing of native vegetation (9.28 ha), including regrowth areas of critically endangered ecological communities</p> <p>Changed hydrological conditions within the Blaxland Creek catchment</p>	<p>Low to medium. Clearing impacts would be permanent, irreversible and intense, however these impacts would be limited to areas ranked as low to moderate significance in the HMP for the DEOH (Godden Mackay Logan 2013)</p> <p>Negligible. Increased volume and rate of flow discharged to waterways, increased scour, erosion and sedimentation along waterways and wetter ground conditions. However these would not impact areas ranked as moderate to high significance in the HMP for the DEOH (Godden Mackay Logan 2013)</p>	<p>Relevant mitigation measures as per the Biodiversity Assessment (Appendix I of the EIS), Hydrology and Flooding Assessment (Appendix K of the EIS) and the Soils, water and contamination assessment (Appendix L of the EIS) would be implemented to appropriately manage potential impacts to the natural heritage values of the site.</p> <p>Archaeological investigation in the form of test excavation of the extent of the canal to be impacted by the works would be</p>	<p>Minor (or negligible) changed hydrological conditions within the Blaxland Creek catchment,</p> <p>Minor (or negligible) weed and pathogen impacts</p> <p>Minor light impacts to fauna</p>	<p>Moderate. Changed hydrological conditions within the Blaxland Creek catchment</p> <p>Degradation of ecological condition by proliferation of weed species at the CHP</p> <p>Light pollution due to increased road lighting</p>	<p>Relevant mitigation measures as per the Biodiversity Assessment (Appendix I of the EIS), Hydrology and Flooding Assessment (Appendix K of the EIS) and the Soils, water and contamination assessment (Appendix L of the EIS) would be implemented to appropriately manage potential impacts to the natural heritage values of the site.</p>

Heritage item name	Potential impacts during construction	Impact	Proposed mitigation	Impact after mitigation	Potential impacts during operation	Impact during operation
	<p>Degradation of ecological condition by proliferation of weed species</p> <p>Introduction / disturbance of pathogen and/or disease vectors</p> <p>Light pollution</p> <p>Physical damage to northern section of canal adjacent to The Northern Road</p>	<p>Low. Weed invasion degrades biodiversity values</p> <p>Low. Pathogens and disease presence to be tested / confirmed. Impact includes degradation of ecological resources.</p> <p>Low. Light impact includes habitat unsuitability for some native fauna</p> <p>Low. Only small section of overall canal system would be removed.</p>	<p>undertaken.</p> <p>Archival photographic recording, surveying and archaeological investigation of the canal, and erection of protective barrier fencing</p>	<p>Recording and investigation of northern section of canal allows for interpretation and understanding of site even though partially destroyed.</p>	<p>No impact as operation would be confined to road which is located adjacent to remaining canal section.</p>	<p>Negligible. Traffic use of the road is located adjacent to the remaining canal and separated by fill slope.</p>

Heritage item name	Potential impacts during construction	Impact	Proposed mitigation	Impact after mitigation	Potential impacts during operation	Impact during operation
Warragamba Dam to Prospect Reservoir pipeline	Potential for accidental impact	Low. A concrete culvert would be impacted by the proposed works; however, this item does not contribute to the overall significance of the pipeline. The pipeline would not be impacted. Impact to the building footings would be avoided.	The construction contractor would identify suitable measures to be incorporated into the CEMP to prevent physical damage to the pipeline in accordance with <i>The Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines (Sydney Catchment Authority 2012)</i> . These measures would be developed in consultation with Roads and Maritime and the Sydney Catchment Authority and include measures for the management of potential vibration impacts, erosion and sediment controls and agreed site access protocols. An exclusion zone would be established to protect the depot building footings adjacent to the pipelines.	Negligible. Guidelines (Sydney Catchment Authority 2012) set out measures when designing, planning or assessing development on land adjacent to the pipeline. Impact to the building footings would be avoided.	No impact as Guidelines (Sydney Catchment Authority 2012) would be followed during operation.	Negligible. Guidelines (Sydney Catchment Authority 2012) would be followed during operation.

Heritage item name	Potential impacts during construction	Impact	Proposed mitigation	Impact after mitigation	Potential impacts during operation	Impact during operation
Miss Lawson's guesthouse site	Physical impact to entire site	High. The construction would have a direct impact on all surface features identified at the site and on potential subsurface archaeological deposits.	Archaeological investigation of the item including test excavation and salvage excavation where required in accordance with Kottaras (2017a).	Medium. Archaeological excavation allows for data to be collected about the site which contributes to our knowledge and understanding of site	No impact as site would have been removed through archaeological excavation and subsequent construction.	Negligible as site would have been removed through archaeological excavation and subsequent construction.
Lawson's Inn site	Physical impact to potential artefacts and relics associated with the Inn site	Medium. The potential for substantial and intact relics related to Lawson's Inn has been assessed as low within the construction footprint and moderate to high adjacent to the construction footprint. It is not anticipated that the project would have a direct impact on the potential main archaeological features related to the former Inn as historical plans and photographs indicate the actual inn site is outside the project boundary. An area of low archaeological potential has been identified	Archaeological test investigation of areas of low archaeological potential within the project impact area in accordance with Desic and Kottaras (2017). Protection of area of high archaeological potential (former Inn site) with barrier fencing along the project boundary in the vicinity of the area of high potential.	Low. Archaeological excavation allows for data to be collected about the site which contributes to our knowledge and understanding of site	No impact as main Inn site would have been avoided and any potential artefacts or relics would have been removed through archaeological excavation and subsequent construction.	Negligible as site would have been avoided and any artefacts or relics would have been removed through archaeological excavation and subsequent construction.

Heritage item name	Potential impacts during construction	Impact	Proposed mitigation	Impact after mitigation	Potential impacts during operation	Impact during operation
		<p>along the northern edge of the Inn site to account for any peripheral relics that may be associated with the Inn site.</p> <p>It is also unknown, without archaeological investigation, whether the area at the western end of the lot, containing the artefact scatter, is related to the use of the Inn. The area containing the artefact scatter is located within the project boundary. All areas within the project boundary have been designated as being of low archaeological potential.</p>				

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1950 PLAN Showing land to be acquired in Liverpool on with the proposed widening and deviation of part of Bringelly Road between Luddenham and Narellan. MAIN ROAD N9154 Parish of Bringelly County of Cumberland, MS 14004-3000.

Appendix A – Historical Research

**HISTORICAL RESEARCH
INTO SIX SITES IN
LUDDENHAM, NSW**



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**HISTORICAL RESEARCH
INTO SIX SITES IN
LUDDENHAM, NSW**

REPORT BY JCIS CONSULTANTS

Prepared for: Jacobs and Road and Maritime Services

JCIS Consultants Report 17-035

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Date: 27th September 2017

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1 INTRODUCTION

1.1 Background to this report

JCIS Consultants was commissioned by Jacobs to undertake documentary research, particularly related to land records, for several properties in Western Sydney to assist in completing some significance assessments for potential heritage items.

A very limited time was available to undertake this research.

1.2 Study Area

The list of items provided by Jacobs is set out in the table below:

Item	Lot/DP	Address
Item 5: Weatherboard House, Slab Hut and Old Dairy, Luddenham	Lot 502 DP580982	2787 The Northern Road, Luddenham
Item 6: Weatherboard House and Sheds, Luddenham	Lot A DP160890	2825 The Northern Road, Luddenham
Site 7: Pleasant View	Lot 100 DP846962	2422-2430 The Northern Road, Luddenham
Site 8: Luddenham Village Area (one site)	Lot 21 DP614481	12-26 Eaton Road
Item 9: Miss Lawson's Guesthouse Site	Lot 1 DP90157	26 Adams Road, Luddenham
Item 10: Lawson's Inn Site	Lot 2 DP623457	

The location of these items was provided by Jacobs as a shapefile and the location of the items is shown in Figure 1.

1.3 Limitations

This report is based on historical research. The sites we have been asked to research are located in the periphery of the Cumberland Plain at Luddenham. The location of the sites means that historical records are not created at the same rate as places such as Circular Quay in Sydney. Therefore there are important gaps in the historical narrative of the places within the study area. It is not clear whether further historical research will close these gaps or whether other sources such of physical evidence may resolve them.

In any case it is possible that further historical research or the emergence of new historical sources may support different interpretations of the evidence in this report.

The maps in this report are for informational purposes and are not suitable for and were not prepared for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

1.4 Sources

JCIS Consultants were specifically asked to look at land titles information. Most of the lots were held until recently in a form of Title known as “Old System” and have only recently been converted to the Torrens system introduced in 1861. It might be helpful clarify what we mean by “Old System” vs Torrens titles.

In the first years of the NSW colony there were no provisions for recording land transactions. In some cases brief particulars of a sale were written on the back of a land grant and in many cases ownership changed without any documentary evidence at all. It was left for Governor Macquarie (in 1817) to establish a formal system of registration of deeds relating to land.

This system, based on English Common law, had manifest inadequacies. Each time land was sold or mortgaged, a separate deed was drawn up. Proof of title required the tedious examination of a series of deeds, known as a chain of deeds, mostly written in longhand. To follow a chain of title one establishes the grantee of the land and then using a set of index of vendors (again mostly written in longhand) search the grantees name looking for transactions that involve the land. Then the Conveyance Number and Book need to be accessed, (some are on line some are in the Lands Title Office and some are being scanned in Bathurst) copying the information from that volume which allows you to move on to the next search starting at the indexes.

The Old System was cumbersome, expensive, uncertain and not guaranteed by the State – particularly as there was no statutory requirement to register deeds. Additionally, it was not mandatory to register plans of subdivision of Old System land prior to 1961.

In 1863 the Torrens Title designed by Robert Richard Torrens for the South Australian land title registry, was introduced to NSW with the commencement of the Real Property Act on 1 January 1863. Since then all land granted by the Crown is subject to the provisions of that Act; however, the Old System continued in parallel to the Torrens system.

The system used a single register for each land holding and recorded all details and interests affecting that land. The greatest advantage of Torrens Title is that it is a single document guaranteed by the State Government (of New South Wales in this case). A Certificate of Title (CT) is a copy of the related Folio of the Torrens Land Title Register.

From a historian’s point of view the Torrens title is easy to read, gives details of prior and on-going titles and has a plan of the land referred to. Moreover, all Torrens Titles are available online and copies are easily purchased.

Crown Plans are plans produced for the use of the Crown (i.e. the State of NSW) in the course of its activities such as granting land, reserving land, resuming land and so on. At the small scale there are County and Parish plans these record details of grants and of alterations to grants such as subdivisions, reservations and some dealings. At a larger scale are various types of Crown Plans

Various Parish maps and some Plans were used to record changes to land status over time. This is called charting where the base map is manually updated and when sufficiently encumbered with annotations a new edition is lithographed and put into use. Hard copy charting maps were used to record changes to land boundaries in NSW, until manual updates ceased in 2002.

1.5 Authorship

The Historical research was prepared by Dr Iain Stuart (Member, PHA) and Jane Cummins Stuart of JCIS Consultants.

2 HISTORICAL REPORT

Some level of historical research needs to be undertaken for a place or landscape and for individual components of a place or landscape in order to understand how the fabric expresses the site's history and to provide a foundation for understanding the significance of a place or landscape and, ultimately, how to manage the historic values of a site or landscape.

The land in the study area was occupied by Aboriginal people for eons but with the settlement at Sydney Cove the British Government allowed Governor Phillip through the second letter of instructions to him "full power and authority" to dispose of lands to "any person or persons" for "such terms and under such moderate quit rents services and acknowledgments to be thereupon reserved" as set out in his instructions (George Rex III 1786).

These instructions were considerably expanded in 1794 when with Governor Hunter arrived as they covered the question of land grants to free settlers as opposed convicts (George Rex III 1794). These instructions allowed a second phase of post-contact settlement of the Cumberland Plain focusing on the alluvial soils of the Hawkesbury-Nepean River. Later under Lieutenant-Governor Patterson (c1809) settlement was encouraged to move away from the flood prone areas into what was termed forest land (Perry 1963:23-25).

These changes also reflected the change in attitudes to settlement which reflect an on-going debate about whether Australia or, more particularly NSW, should be a convict settlement or develop as a free society. If a free society then the question of how land was to be disposed of became an important one. Small land grants were given to former convicts to encourage agriculture. Larger grants were given to Government Officials as a reward for services or compensation for losses. However with the development of free settlement in NSW came a new class of individuals eligible for grants incipient capitalists.

2.1 John Blaxland

The first of this new type of free settlers were the Blaxland brothers – John Blaxland and Gregory (the Blaxland Lawson and Wentworth one). Their arrival was preceded by the following dispatch from Lord Castlereagh to Governor King

It being deemed expedient to encourage a certain number of Settlers in New South Wales of responsibility and Capital, who may set useful Examples of Industry and Cultivation, and from their property and Education be fit persons to whose Authority the Convicts may be properly entrusted, Permission has been given to Mr. John Blaxland and his Brother Mr. Gregory Blaxland to establish themselves and their Families in the Colony.

... I am induced to flatter myself that the exertions of these Gentlemen will not only Answer the Sanguine Expectations they have themselves formed, but will also contribute in an essential Degree to the benefit and prosperity of the Colony.

(Castlereagh to King, 13th July, 1805 HRA, Series 1, Vol V p490)

A brief summary of the agreement with John Blaxland was enclosed as follows:

MEMORANDUM that an agreement has been entered into at Lord Camden's Office by James Chapman, Esq., that, provided John with John Blaxland engages a Capital of £6,000 in the Colony of New South Wales, he is to have his passage out for himself, his wife, four or five children, and two or three servants, in the same manner as his Brother, Gregory Blaxland, is now going out; that he is to be allowed fifteen tons to take out necessaries for himself and family; when he arrives there, that he is to have a Grant of Land given him of eight thousand acres, with one convict for every hundred acres to clear and cultivate it; to be Cloathed and Victual'd for eighteen months according to the custom of the Colony; but provided he should not be possessed of so large a sum he is then to have Land and Convicts in proportion to the capital advanced.

(Castlereagh to King, 13th July, 1805 HRA, Series 1, Vol V p491)

In the event Castlereagh was wrong; the Blaxland's arrived with more or less the required capital but also with a sense of entitlement and querulous natures.

Gregory Blaxland arrived in Sydney on the *William Pitt* on 14th April 1806 and was immediately involved in legal action with the ship's Master. Nevertheless Governor King allowed Gregory Blaxland to purchase livestock from the Government as well as granting him land and access to convict labour

John Blaxland arrived on the 4th of April, 1807, on the ship *Brothers*, belonging to himself and the Messrs. Hullets, which was also used for whaling and sealing ventures. His arrival coincided with the arrival of Governor Bligh. For a while Bligh socialised with Blaxland but Blaxland's attitudes quickly alienated him from Governor Bligh. In particular Bligh objected the Blaxland pursuing grazing cattle rather than cultivating land and noted

The Blaxland's, in a partnership, seem to turn their minds principally to grazing and selling the Milk of their Cows and Butcher's Meat, which is attended to by Mr. J. Blaxland, in a House at Sydney where he resides, while his brother remains in the Country purchasing Live Stock from those who can be tempted to sell it. The former is very discontented with what Government has granted him, although it is in itself a Fortune.

(Bligh to The Right Hon. William Windham, 31st October, 1807, HRA, Series 1, Vol VI p144)

In a later dispatch to Windham, Bligh stress his compliance with his instructions regarding the Blaxland's noting, regarding his land grant, that he had received twelve hundred and ninety acres of land, "The remaining quantity of Land I have ordered to be measured out for him" (Bligh to The Right Hon. William Windham, 31st October, 1807, HRA, Series 1, Vol VI p182).

Blaxland joined the groups agitating against Bligh and was a strong supporter of the overthrow of Bligh by the Rum Corp officers but then fell out with them as well and in 1808 began to travel to Great Britain to seek redress for his wrongs. He was arrested on the orders of Governor Bligh and was transported to Great Britain as a witness in the court martial of Major Johnston. He returned to Sydney in 1812 (Irving 1996).

Blaxland's arrival was followed by a dispatch from Lord Liverpool to Governor Macquarie reaffirming the British Government's commitment to honouring its original agreement (Liverpool to Macquarie 26 July, 1811 HRA, Series 1, Vol VII p 367-368).

Macquarie, like his predecessors as Governors, found it difficult to deal with the Blaxland's particularly when it came to determining whether the Blaxlands has indeed provided the capital they claimed to have. He eventually got them to swear affidavits and once they did so provided the remaining resources commenting to Lord Liverpool

“With the Services of 120 men from Government, and the command of a still more unlimited extent of soil than even that number of men could cultivate, the Messrs. Blaxland have continued a burthen on the Government, restless and dissatisfied notwithstanding all they have derived from its liberality”.

(Macquarie to Liverpool 17 Nov 1812, HRA, Series 1, Vol VII p557-560)

2.2 The Luddenham Estate

Blaxland clearly had some substantial land grants prior to 1812 but it seems clear that these were not properly surveyed – this was a function of the poor quality of the Surveyor Generals Department rather than any slight to Blaxland. In 30th May, 1812 Blaxland wrote to Macquarie:

Having, Sir, met with much difficulty and expense in selecting a tract of land that would suit the purposes of Agriculture and grazing, and also having sustained considerable losses in its not being confirmed to me by Grant, I hope and trust that you will not object to my taking that which was marked out by Mr. Maihan, previous to my leaving the Colony, for which I applied when in England, and was informed it was left for your Excellency's determination.

(Macquarie to Liverpool 17 Nov 1812. HRA, Series 1, Vol VII p561)

This may have been the land that Bligh referred to. However it was clearly not the Luddenham Estate for on 1st June, 1812 Blaxland wrote to Macquarie

In the course of my excursion up the country, I have seen some Land which appears unappropriated, lying at a place called Cobbitty, and a further tract at Mulgowe and Stony range, at which place I hope your Excellency will not object to my taking what remains due to me, having already expended £15,000 in this Colony.

(Macquarie to Liverpool 17 Nov 1812. HRA, Series 1, Vol VII p562)

It seems that the land at Cobbitty was already set aside for the location of a Common (a cause of yet another dispute between the Governor and Blaxland) but the land at Luddenham was granted to John Blaxland on the 30th November 1813.

Curiously though on his tour of inspection of the interior which covered the settlements on the edges of the Cumberland Plain in 1810 Macquarie had passed what appears to have been the Luddenham Estate. On the 28th November 1810 Macquarie and a small party which included Gregory Blaxland set out from Parramatta and after visiting Badgery's farm

“Thence we proceeded to Mr. Blaxland's own Farms, about 5 or six miles distant from the South Creek in a westerly direction. — This is entirely as yet a grazing Farm, with only a miserable Hut for the Stock keepers, and Stock-Yards for the Cattle. — The Land in some parts is tolerably good, and pretty well watered, but is better adapted to grazing than Tillage. We rode back, a different way to what we came, to Mr. G. Blaxland's Farm on the South Creek, through his second large Farm, and a Farm belonging to Doctor Wentworth in the Bringelly District; the Country through this last ride was pretty to look [at] but the Soil generally bad; at 1. P.M. arrived at Mr. Blaxland's Hut, where we rejoined our Friends again”.

(Macquarie 28th November 1810)

Clearly the second large farm is most likely to be the Luddenham estate due to its proximity to Wentworth's farm. It may seem odd that farms were occupied without formal grants. Apart from Blaxland, D'arcy Wentworth for example did not receive a formal grant until 1818.

The survey of the grants consisted of simply marking boundaries and roads. It seems likely that the Northern road was not formerly surveyed until the mid-1820s. None of the early surveys have buildings or structures marked on them. This is typical of the times and of Crown Plans generally covering land grants.

Figure 2 is by far the best of the early roll plans in that it has survived more or less intact and is quite legible and it shows the sheer size of John Blaxland's grant and as well the grant to Darcy Wentworth immediately to the south of the Luddenham Estate. On the northern boundary of the Luddenham estate was a 600 acre grant to John Blaxland Jnr which dates to 31st August 1819.

Except for a small section of land – part of Wentworth's Estate all the land containing the properties which are part of this report was owned by the Blaxland family.

It seems from the research of O'Sullivan (1977) that John Blaxland was focusing the development of his estate on the banks of the Nepean River at what is now Wallacia. Blaxland had previously developed his Newington Estate on the Parramatta River with a salt works, distillery, blanket factory and meatworks as well as building his own residence. At Luddenham, Blaxland built a water powered flour mill by 1834 and by 1839 had established a brewery (1977:4). These were located on the Nepean River near the Warragamba River junction so that Blaxland could use water power.

Sullivan reproduced an 1840's inventory of Blaxland's assets (sourced from the Blaxland papers in the State Library of NSW). The inventory lists the buildings at Wallacia but also the remaining land at Luddenham as grazing land (1977:3). If the land had been subdivided into tenanted farms by this time then they would have been listed in the inventory.

It seems therefore, unlikely that any of the buildings that are part of this study date from the early part of Blaxland's ownership. This pattern is also shown in Figure 3 which although it is general shows the buildings being located at Wallacia.

The early 1840s was a period of economic depression in Australia brought on by a severe drop in the wool market combined with drought which caught speculators in the pastoral industry which has expanded rapidly. Thus all pastoralists were under pressure and as well the banks that provided finance were also stressed. There was a great rush of insolvencies (see (Abbott 1971, Butlin 1968). So from c1840 the Blaxland enterprises began to falter.

John M Blaxland (Jnr) Blaxland oldest son died on the 29th May 1840 and his property was administered by his family but remained separate from the Luddenham Estate.

In 1842 Blaxland mortgaged his properties to the Australian Trust Company. In 1851 The Australian Trust Company conveyed the Luddenham Estate to Sir Charles Nicholson. This much is established by the Old System Titles. John Blaxland died in August 1845 but there is little readily available information about how his estate was managed but presumably they defaulted on the mortgage allowing the Australian Trust Company to sell the Estate to Nicholson.

2.3 Nicholson’s sale of the Luddenham Estate

In around 1858 Nicholson had the Luddenham Estate surveyed and subdivided by Surveyor Samuel Jackson. The plan of the Estate was widely circulated and several copies have survived. Importantly the lithograph was used by the Land Titles Office as a carting plan of the Estate – Roll Plan 4 which covers the Eastern part of the Estate (see Figure 4). The plan shows existing buildings and structures as well as the subdivision superimposed on them. It appears that the land in this area was leased for small farms presumably by Nicholson, and the buildings and structures are shown on Jackson’s plan.

The auction of the Luddenham Estate was extensively advertised in September 1859:

The EASTERN DIVISION, containing upwards of 4000 acres, extending from Badgery Creek to the Bringelly Road, and subdivided into Farms, containing from 30 to 320 ACRES EACH, a great proportion of which are cleared, fenced, and in cultivation; with good homesteads thereon.

In this division also the VILLAGE OF LUDDENHAM has been laid out and most eligibly situated on the high road, about equidistant between Penrith and Camden, opposite LAWSONS, INN and STORE.

(“Advertising” *The Sydney Morning Herald*, 8 September 1859: 7)

It appears from a close study of the plan that the Village of Luddenham – a private village was mostly a few scattered building along the road except for the Chapel, School and Lawson’s Store and Inn.

Details of the land subject to this study in 1859 are set out in the table below based on Roll Plan 4 and the Advertisement in the Sydney Morning Herald (8 September 1859).

Site 7 Pleasant View	Lot 2	Cleared with some fences but no house is shown. It was described as “Clear and partly cultivated”
Site 8 Luddenham Village Area	This land was not for sale as it was part of the Wentworth estate	Chapel and School but these are located away from the land that is now Lot 21 DP614481. If there was more development it is likely it would have been shown to encourage buyers
Item 9: Miss Lawson’s Guesthouse Site	Lot 2 Block 1 Luddenham Village	The land is vacant
Item 10: Lawson’s Inn Site	Not included	Lawson’s Inn and Store is identified as a local landmark and noted on the plan.

Despite the Luddenham Estate being a “magnificent and truly valuable agricultural property” sales were not particularly vigorous and the land was slowly sold off in small lots.

The break-up of Blaxland’s holdings by 1859 means necessitates that the history of each lot now has to be followed on its own.

2.4 Item 5: Weatherboard House, Slab Hut and Old Dairy, Luddenham

Lot 502 DP580982 at 2787 The Northern Road, Luddenham County of Cumberland Parish of Mulgoa. As mapped the study area covers two lots Lot 502 DP 580982 which covers the weatherboard house and Lot 506 DP 587193 which covers the sheds.

This land was part of John M Blaxland Jnr’s 600 acres. After John M Blaxland Jnr died, on the 29th May 1840, his executor appears to have been George Blaxland and they conveyed the land to John Blaxland and John Dobie on 18th June 1845. The transactions seem a little confused no doubt because of John Blaxland’s death in August 1845, however it seems that the land remained in the Blaxland family until 1855 (PA24415).

The next series of transactions are difficult to understand as the land is not clearly described but the land goes from the Blaxland family to Andrew McGaritty in 1856 and then to the McKnight family in 1868. After the death of Mrs Abigail McKnight on 1st October 1884 (she was described as a very old and respected resident by the *Nepean Times* 4 October 1884, p. 2) the land was sold to John Colwell in April 1885 (PA24415)..

Colwell built up a successful business but moved out of the district for several years returning in c1902 at which point he seems to have sold his properties (PA24415).

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is shown in the same area as the study area. The owner/tenants name is hard to read but may be Dove.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office, General Staff, Australian Section, 1927). A building is shown in the same area as the study area.

It is not clear how he obtained title but a Mr William Wardell owned the land in the late 1930’s. Wardell mortgaged the land to a Nellie Mary Hall and in February 1941 she foreclosed on the property (Conveyance no 114 Book 1887). Prior to this in 1939 Wardell had a clearance sale

HAVING received instructions from Mr Wardell, of "Harripool," Bringelly Road, Luddenham, next door Mr Jim Roots, on SATURDAY, NOVEMBER II, at 2 p.m., the following will be offered at Auction:

Furniture, Horses, etc.-2 Pony Mares, 4 and 6 years old; 1 Bay Gelding, 1½ years (by Herico from Lady Lsa Curn); Three-piece Lounge Suite (good order), Double Beds, Dressing Tables, Wardrobes, Chest Drawers, Overmantle, Sideboard, Wireless Set (world reception, excellent condition), Sofa, Kitchen Chairs and Table, Dining Room Chairs.

E. F. RULE, Auctioneer

("Advertising" *Nepean Times* (Penrith, NSW: 1882 - 1962) 2 November 1939: 5.)

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army Royal Australian Survey Corps 1955) A building is shown in the same area as the study area. The property name is identified as "Harripool".

This land was owned by a Reginald W Hamilton (Conveyance no 918 Book 2231). Other than the fact that his family came from nearby Wallacia little else has been enabled to be unearthed.

In 1976 the then owners Donald McKellar, David Nagle Asimus, Denis Mansour and Douglas MacLaren applied to convert the title to Torrens by way of a Part IVA action under the Real Property Act. Their application contains no detail of prior land ownership but notes that the property was called Hamilton's Cottage (IVA 18480).

The land was subdivided and the larger portion was sold to Chatris Pty Ltd in 1977.

2.5 Item 6: Weatherboard House and Sheds, Luddenham

Lot A DP160890 at 2825 The Northern Road, Luddenham County of Cumberland, Parish of Mulgoa

As mapped the study area covers two lots Lot A DP160890 which covers the weatherboard house and sheds and Lot 505 DP 581138 which covers the yards and associated rubbish pit.

This land was part of John M Blaxland Jnr's 600 acres. After John M Blaxland Jnr died, on the 29th May 1840, his executer appears to have been George Blaxland and they conveyed the land to John Blaxland and John Dobie on 18th June 1845. The transactions seem a little confused no doubt because of John Blaxland's death in August 1845, however it seems that the land remained in the Blaxland family until 1855 (PA24415).

The next series of transactions are difficult to understand as the land is not clearly described but the land goes from the Blaxland family to Andrew McGaritty in 1856 and then to the McKnight family in 1868. After the death of Mrs Abigail McKnight on 1st October 1884 (she was described as a very old and respected resident by the Nepean Times 4 October 1884, p. 2) the land was sold to John Colwell in April 1885 (PA24415)..

Colwell built up a successful business but moved out of the district for several years returning in c1902 at which point he seems to have sold his properties (PA24415).

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is shown in the same area as the study area. The owner/tenants name is Morehead. The Nepean Times reported a gathering at 'Sunnyside' by Mr J Morehead and his family, ("Luddenham" *Nepean Times* 4 August 1906: 4).

Morehead seems to have been a leading character in the district although little is known about him. He was appointed a magistrate ("Government Gazette Appointments and Employment" New South Wales Government Gazette, 28 September 1900: 7649). A notice in the NSW Government Gazette of 1900 shows that he was a tenant elsewhere ("NOTIFICATION OF RESUMPTION OF LANDS UNDER THE PUBLIC ROADS ACT OF 1897." 10 January 1900: 235.). In 1913 a newspaper article gives his address as Ferndale Luddenham.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office, General Staff, Australian Section, 1927). A building is shown in the same area as the study area. The property is identified as "Sunnyside".

By this time the property was owned by James Root and his family. A report of a car and cyclist, accident in the *Sun* to James Root (son) identified that his residence was "Sunnyside" (*The Sun* 16 May 1932: 7).

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army Royal Australian Survey Corps 1955) A building is shown in the same area as the study area. The property name is identified as "Sunnyside"

Mrs Elizabeth Roots, wife of Mr James Roots died at "Sunnyside," Luddenham, on Saturday, July 28 at the age of 58years. She was born at Luddenham, where she lived all her life, highly esteem by all who knew her. She was the daughter of the late William and Elizabeth Bray (*Nepean Times* Thursday 2 August 1945, page 1).

The land was still in the Roots family at least into the 1950s but as the land was still held as an Old System title until quite recently there is little detailed information as the form of conversion to Torrens title (CA 23374) does not give an extensive list of dealings.

Overall it is established that there was a building on the property from at least 1906 and possibly earlier if Colwell resided on the land.

2.6 Item 7: 'Pleasant View' House 1, Luddenham

Lot 100 DP846962 at 2422-2430 The Northern Road, Luddenham, County of Cumberland Parish of Bringelly

This land was put up for sale as Lot 2 of the Luddenham Estate in 1859. It was described as "Clear and partly cultivated" (Roll Plan 4; "Advertising" *The Sydney Morning Herald*, 8 September 1859: 7).

The earliest mention of "Pleasant View" found to date is from the 1891 Census (District No. 32, Sub-District Penrith, County of Cumberland) that refers to Agnes Hughes (who was Edwin Hughes' mother) as being the owner of the locality Pleasant View. The Electoral Rolls of 1903 and 1930 list members of the Hughes family simply as living in Luddenham; however, the Electoral Roll of 1932 lists Agnes Lily Louisa Hughes as living at Pleasant View, Luddenham with other family members simply being listed as living in Luddenham.

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is not shown in the same area as the study area. It is assumed that the current building was not constructed at the time this map was compiled.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office, General Staff, Australian Section. 1927). A building is not shown in the same area as the study area. It is assumed that the current building was not constructed at the time this map was compiled.

In 1936 Edwin Victor Hughes, Alwyn James Hughes, John Rex Hughes and Norman Henry Hughes – who are all listed as being of Luddenham and dairy farmers – purchased land from the Executors of the Estate of the Late John Ratcliffe Parnell, Snr (who had run hotels around various parts of NSW) (No. 639, Book 1964). There does not seem to be any indication that Parnell Snr. lived on the land or used it for any other purpose other than investment. The Old Systems deeds list earlier owners of the land without any indication that the land was owned for anything other than investment.

The Messrs. Hughes were the sons of Edwin Hughes (1867-1946) who is listed as being a farmer at Luddenham from the 1913 Electoral Roll and in the Sands Directories from at least 1919. Edwin and his wife, Adeline, had the four sons (listed above) and also four daughters who, for the most part married into Luddenham families. As regards the connection between the Hughes family and "Pleasant View", it has proved difficult to assess whether the building Item 7: Pleasant View House was the residence of the Hughes family at the time they purchased the land, or whether their residence was a different building or whether Pleasant View was the name of the property (which seems highly likely).

The Electoral Roll of 1934 describes the address of members of the Hughes family resident in Luddenham as being either Bringelly Road, Luddenham or Pleasant View, Luddenham.

From 1939 on there are numerous mentions of various members of the extended Hughes family of Pleasant View, Luddenham from engagements to weddings and births to deaths, and including the announcement in the Nepean Times that Mrs E V Hughes of Pleasant View, Luddenham has won Fletcher's spelling competition prize of £2/2/- (2nd February 1939).

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army, Royal Australian Survey, Corps 1955) A building is shown in the same area as the study area. The property name is not identified. It seems likely that the present building was constructed between c1927 and 1955.

In 1961, Edwin Victor Hughes bought out his brothers and became the sole owner of Pleasant View before, in January 1972 conveying the property to the family company of E V Hughes & Sons.

The current title for "Pleasant View" is Lot 100 in DP846962 with the owner being listed as Kenneth John Hughes (DP 846962 was created in May 1995). The prior title to the current title had been brought about after a conversion action which recorded the conversion of this land from Old Systems to Torrens Title.

Kenneth Hughes, described as being an auto electrician of Luddenham, had purchased the land from the family company, E V Hughes & Sons Pty Limited in February 1975 (No. 689, Book 3190). Previously, Edwin Victor Hughes had been the sole owner but had conveyed the land into the family company three years earlier (January 1972) (No.11, Book 3046).

From the information to hand, it seems possible that the Hughes family may have leased the property before buying it in 1936; but whether Pleasant View is the name of the property as a whole (which seems more likely) or the name of the house is not possible to determine. The evidence from the maps suggests the house was constructed after 1927. In view of the Hughes family purchasing the property in the mid-1930s it is likely the house dates to that time.

2.7 Item 8: 'Luddenham Village' area: Chapel and School Site and Adams Road House

Lot 21 DP614481 County of Cumberland Parish of Bringelly

This land was part of a grant to D'Arcy Wentworth of 300 acres on 17th August 1818. The Wentworth's built this up to a large estate initially called Elmshall Park but later Greendale. Wentworth's will was particular about inheritance and the land remained in the Wentworth family until 1902.

In 22nd June 1902 the estate was purchased by John Thomas Colburn Mayne a grazier living at Denham Court for £17, 030 (Con 1 Book 715). He in turn sold lot "C:" – 4 acres of land to Henry Lewis Sale on the 4th September 1916 for £38-320s (Con 101 Book 1097).

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is not shown in the same area as the study area. It is assumed that the current building was not constructed at the time this map was compiled.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office, General Staff, Australian Section, 1927). A building is not shown in the same area as the study area. It is assumed that the current building was not constructed at the time this map was compiled.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army Royal Australian Survey Corps 1955) A building is not shown in the same area as the study area.

The area that was to become Lot 21 was mapped part of the construction of a new section of Bringelly road on the 20th December 1950 (MS 14004-3000). If a building or structure was located on the road frontage it would have been mapped – none were.

Sites 8 and 9 were held as a single parcel by Henry Lewis Sales which he brought under the provisions of the Real Property Act by Primary Application No 40157 on the 12 February 1963 (CT 83440 Fol 7).

Lot 21 DP614481 was created in October 1971 when the land was purchased by Carmelo and Maria Cambareri (CT 14354 Fol 3). The land was later sold on the 14th August 1988 to Vincenza and Giuseppe de Leo.

Given the mapping evidence that does not show a building in this location it is difficult to argue for there being a building on Lot 21 until the 1970s.

But what of the Chapel and School noted on the 1859 plan? According to a report in the *Nepean Times* "The new Primitive Methodist Church at Luddenham, which is almost complete, was formally opened by the Rev. J. B. Penman", on Sunday 14th November 1886. The *Nepean Times* reported the festivities and that "The young people, nothing daunted, then adjourned to another vacant plot and danced away to their hearts content. One or two of the young men had visited during the day a wine shop in the vicinity, and they were, to use a somewhat vulgar phrase, "slightly elevated," and their language was none of the choicest" ("Luddenham." *Nepean Times*, 20 November 1886: 4).

From the account this was the second Church and presumably the older church, the one on the 1859 plan was abandoned when the new one was eventually completed. Based on land titles information it is likely that the original church was simply on land leased from the Wentworth's as no separate title was created.

2.8 Item 9: Miss Lawson's Guesthouse Site, Luddenham

Lot 1 DP90157 at 26 Adams Road, Luddenham, County of Cumberland Parish of Bringelly

This land was part of the land John Lawson purchased from Abraham Meyers on 13th September 1862 (Con No 224 Book87). Meyers purchased the land from Sir Charles Nicholson but there are various transactions from 1860 which seem to cover a large amount of property but are poorly described and difficult to read.

John Lawson made a will on the 13th December 1881 leaving his estate to his wife Anne Lawson and his six young children namely: William, James Lachlan, Daniel, Caroline, Alice Lawson (later Alive Vickery) and Rose Ross (later Rose Ross Petith). He also stipulated that his wife should not sell the land but, after her death, the land should be unequally divided with the males getting double the quantity of land than the females (!).

Lawson died on 22nd June 1885 and letters of administration were granted to Anne Lawson his widow and James Lachlan Lawson one of his sons. Anne Lawson died on the 31st October 1894 intestate. James Lachlan Lawson died on the 16th April 1893 also intestate (Con No 129 Book 604).

James Lachlan Lawson's widow Kate Megarity (she had remarried) was granted administration of his estate in 12th April 1892.

Meanwhile Daniel Lawson became bankrupt in the 1890s and after one administrator of his estate died another Norman Frederick Gilliam was appointed in 1895. Gilliam and Megarity seem to have conveyed Daniel's share of Lawson's estate to him in 1895. At the same time the children partitioned the Supreme Court to appoint Kenneth Campbell as administrator of John Lawson's estate (Campbell was a leading member of the Methodist Church in Luddenham which the Lawson family was part of). The letters of administration were given on 23rd June 1897, and Campbell set to his task (Con No 129 Book 604).

Campbell transferred 12 acres 2 roods and 25 perches to Caroline Lawson on 3rd August 1897. The land transferred to Caroline Lawson was held in trust on her behalf and includes the study area (Con No 129 Book 604).

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is not shown in the same area as the study area. It is assumed that the current building was not constructed at the time this map was compiled.

Caroline Lawson made a will on the 4th May 1911 appointing her brother Daniel Lawson her Executor. She died on the 1st January 1930 and with probate granted Daniel because her Executor. However Daniel became of unsound mind and the Public Trustee took over administration in August 1938. Daniel died in the same month and by his will Frank Vickery and Wilfred Cecil Vickery became administrators of his estate and affairs (Con No 381 Book 1854). Vickery sold the land to Henry Lewis Sales in August 1939 (PA 40157).

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office, General Staff, Australian Section, 1927). A building is shown in the same area as the study area fronting the road.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army Royal Australian Survey Corps 1955) A building is shown in the same area as the study area but not otherwise identified.

Sites 8 and 9 were held as a single parcel by Henry Lewis Sales which he brought under the provisions of the Real Property Act by Primary Application No 40157 on the 12 February 1963 (CT 83440 Fol 7). The title wasn't issued until 1967 and the land was passed to Gloria Loraine Boots and Harry Colin Jessie Sales in 1971 (CT 8340-6) and the land remains with the Sales family.

The historical evidence points to a building on the site from before 1920 and presumably this was where Caroline Lawson lived. A search in Trove for more information about her life yielded little information. However this may reflect the lack of visibility of Luddenham in the activities reported in NSW newspapers.

2.9 Item 10: Lawson's Inn Site

Lot 2 DP623457 County of Cumberland Parish of Bringelly

John Lawson arrived in Sydney as a convict aboard the Guildford in 1822, having been convicted of larceny and sentenced to 14 years transportation (although some registers list his sentence as being for life). He gained his freedom somewhere between 1834 and 1838.

He married Anne Freeburn, a widow, at Mulgoa in March 1854 and is described in the church register as being a bachelor of Bringelly. A list from an annual meeting to grant publican's licences shows the name John Lawson, Luddenham (*Sydney Morning Herald* Tuesday 3 May 1859, p8) and he is listed on the New South Wales, Australia, Certificates for Publicans' Licences as being the publican of The Thistle, in Luddenham and remains listed as the Publican until September 1875 at least.

Lawson became a respected member of the Luddenham community and his name is mentioned many times in various newspapers whether by writing to petition the government for financial relief for local farmers in time of drought to supporting the foundation of local Methodist church and being one of a list of local citizens petitioning the government for a local public school.

Lawson also seems to have built up a large land holding around the Luddenham Village owning most of the lots as well as larger areas of grazing land.

Lawson's Inn and Store is depicted on the 1859 subdivision plan but clearly was not included in the property for sale. This suggests that Lawson had previously purchased the land presumably from Nicholson although the details of the conveyance have not yet been found

It has not been possible to determine the history of the Thistle Inn after John Lawson died, but an article from 1909 in the *Windsor and Richmond Gazette* notes that "Lawson's old 'Thistle Inn' has been long closed" which certainly implies that it was never known as anyone else's Thistle Inn (1909 'A Ramble Through Yarramundi.', *Windsor and Richmond Gazette* 2 October, p. 16).

Lawson died on 22nd June 1885 and letters of administration were granted to Anne Lawson his widow and James Lachlan Lawson one of his sons. Anne Lawson died on the 31st October 1894 intestate. James Lachlan Lawson died on the 16th April 1893 also intestate (Con No 129 Book 604).

James Lachlan Lawson's widow Kate Megarity (she had remarried) was granted administration of his estate in 12th April 1892.

Meanwhile Daniel Lawson became bankrupt in the 1890s and after one administrator of his estate died another Norman Frederick Gilliam was appointed in 1895. Gilliam and Megarity seem to have conveyed Daniels share of Lawson's estate to him in 1895. At the same time the children partitioned the Supreme Court to appoint Kenneth Campbell as administration of John Lawson's estate (Campbell was a leading member of the Methodist Church in Luddenham which the Lawson family was part of). The letters of administration were given on 23rd June 1897 and Campbell set to his task (Con No 129 Book 604).

Details of the transaction have not yet been searched but it is likely that this land was part of Lawson's inheritance obtained by Alice Vickery his daughter as Alice and Frank Vickery mortgage the land in 1900 (PA 56452).

This lot was covered by the map of the manoeuvre area Liverpool N.S.W. published in 1906 (Byrnes 1906). A building is not shown in the same area as the study area. This is in agreement with historical accounts that the Inn was demolished c1895.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1927 (Great Britain, War Office General Staff Australian Section, 1927). A building is not shown in the same area as the study area.

This lot was covered by the Liverpool inch to the mile topographic map dating from around 1955 (Australia Army Royal Australian Survey Corps 1955) A building is not shown in the same area as the study area and the area remains undeveloped.

The land was held in the Vickery family until 1960 and used for dairying. In December 1950 a new alignment of the Northern road was surveyed (Ms 14004-3000) and the land was resumed for the road. This left the site of the Inn on a sort of island between the two roads.

In the 1960s the land is owned by A.S. Clugston and seems to be used for dairying. Clugston becomes Blue Hills Investments in 1981 and the land is subsequently held waiting for development opportunities.

Although little is known in detail about Lawson's Inn and Store the site of the building is likely from the historical evidence to have been mainly grazing land since the buildings demolition.

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1950 PLAN Showing land to be acquired in Liverpool with the proposed widening and deviation of part of Bringelly Road between Luddenham and Narellan. MAIN ROAD N9154 Parish of Bringelly County of Cumberland, MS 14004-3000

B-214 or

Roll Plan 4 (Charting copy of Jackson 1859B)

Parish of Bringelly, County of Cumberland, New South Wales State Library 1850

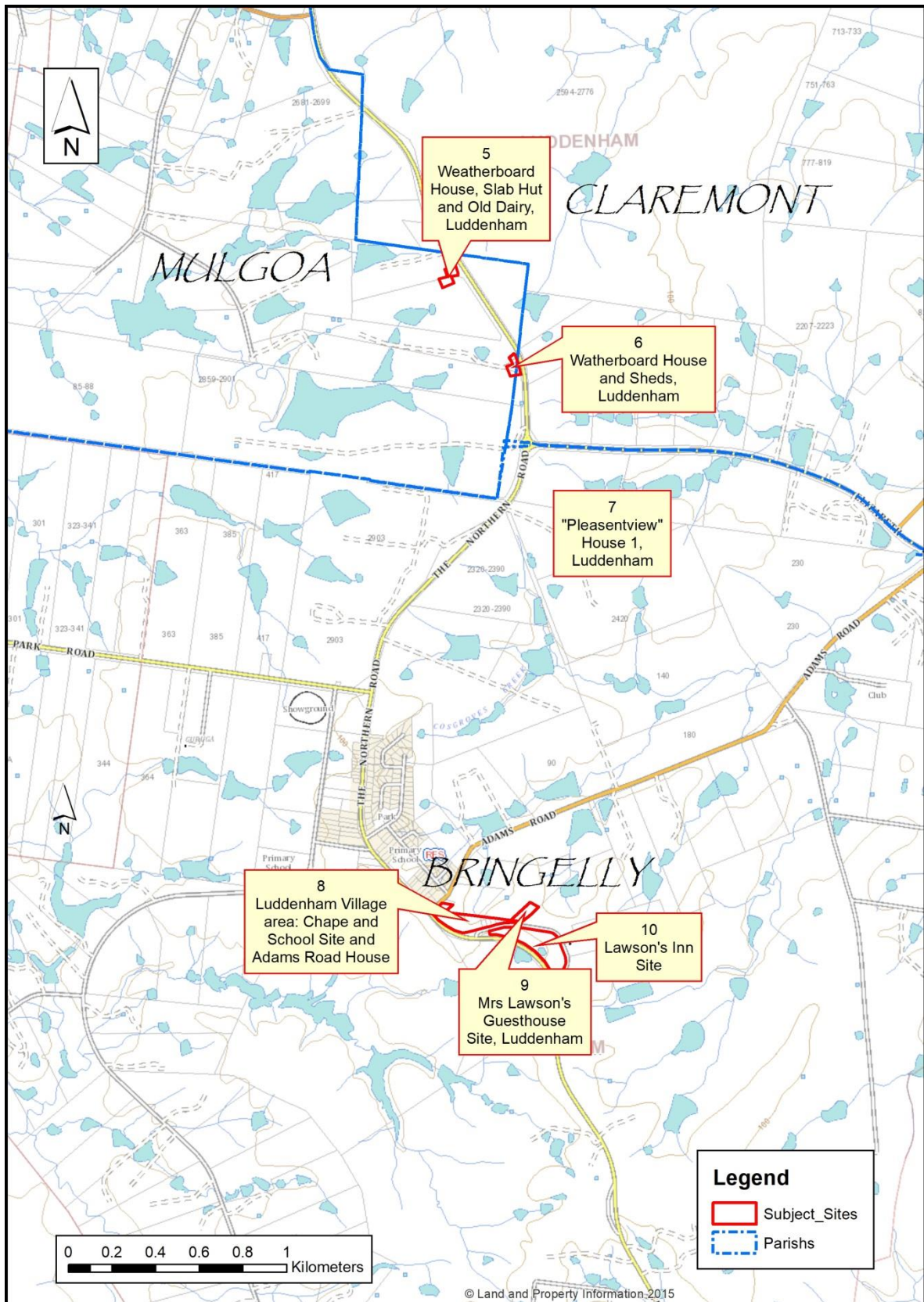


Figure 1: General location of the study area and items within it

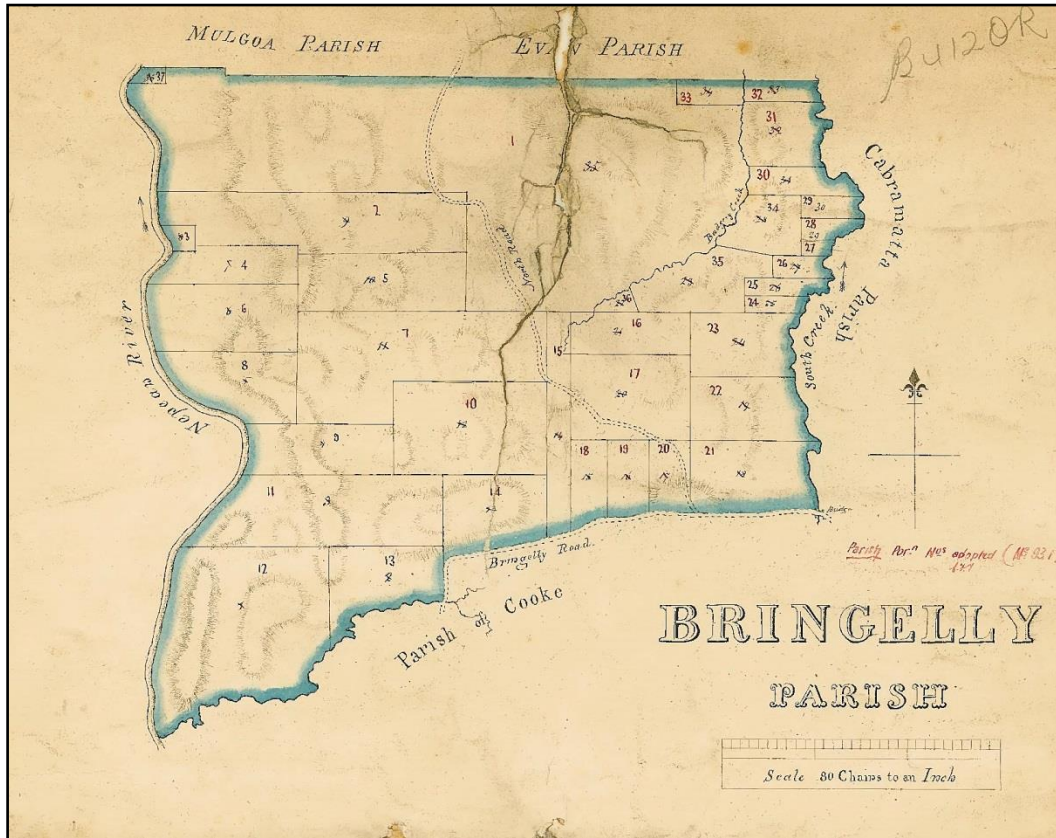


Figure 2: Parish of Bringelly 9 (c1820) Plan B. 214 or

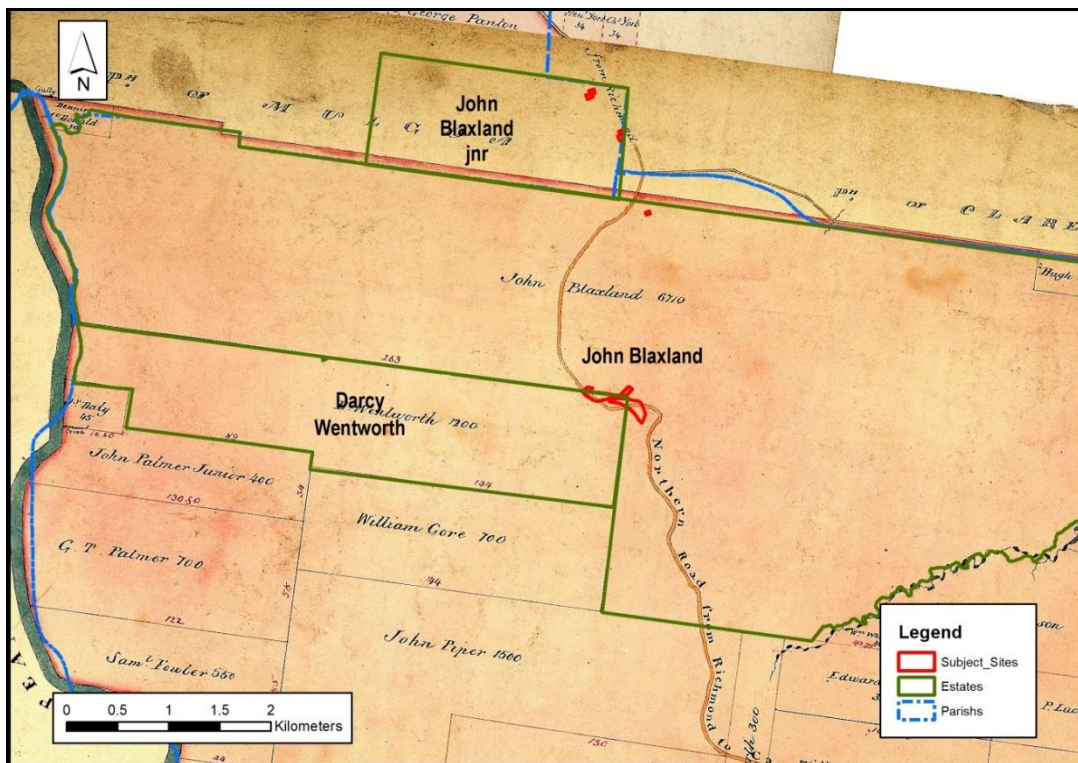


Figure 3: Location of the three Estates discussed in this report on an early plan of the Parishes of Bringelly and Mulgoa

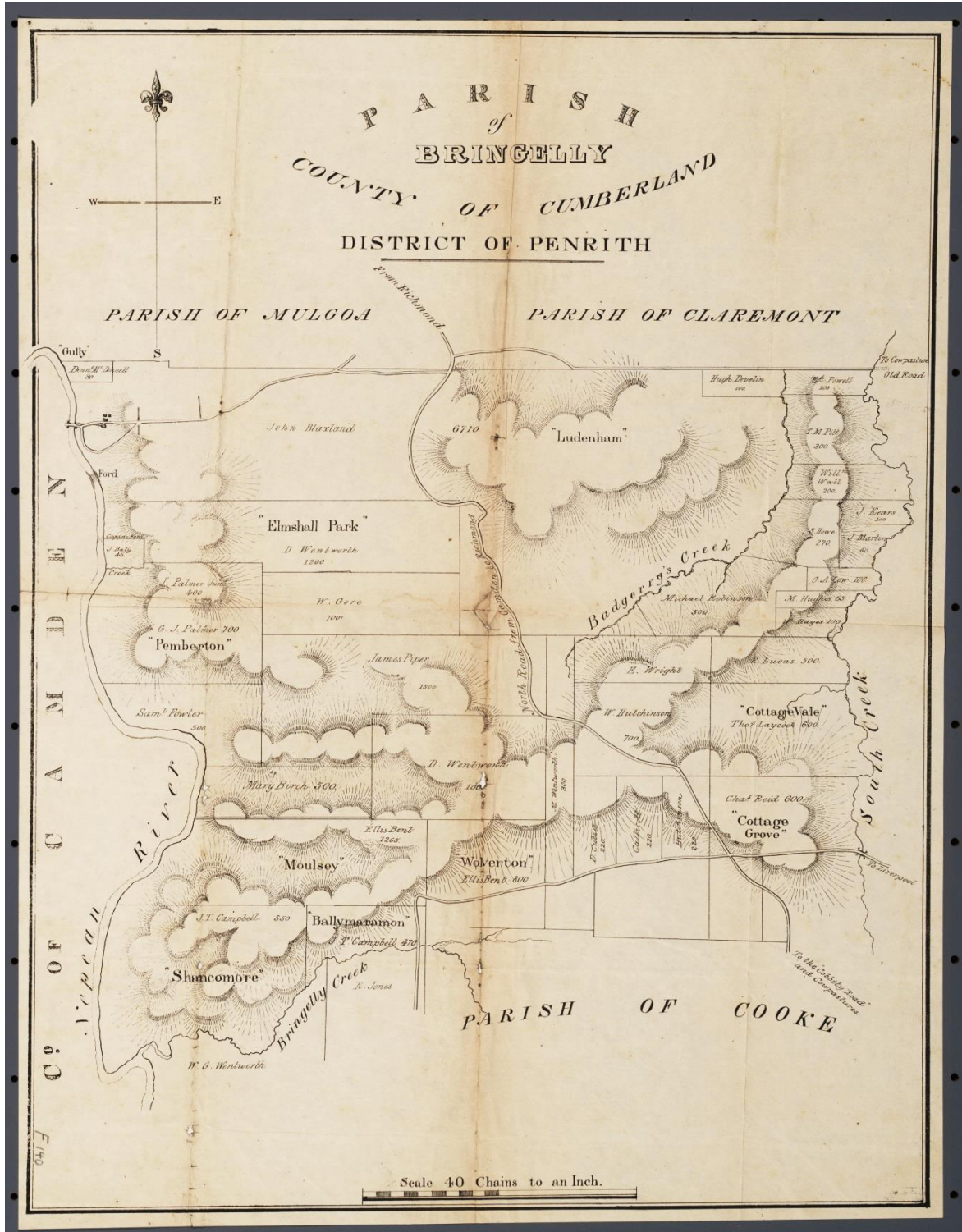


Figure 4: Parish of Bringelly showing the location of Blaxland's establishment art Wallacia (Parish of Bringelly, County of Cumberland. s.n, [s.l, 1850)

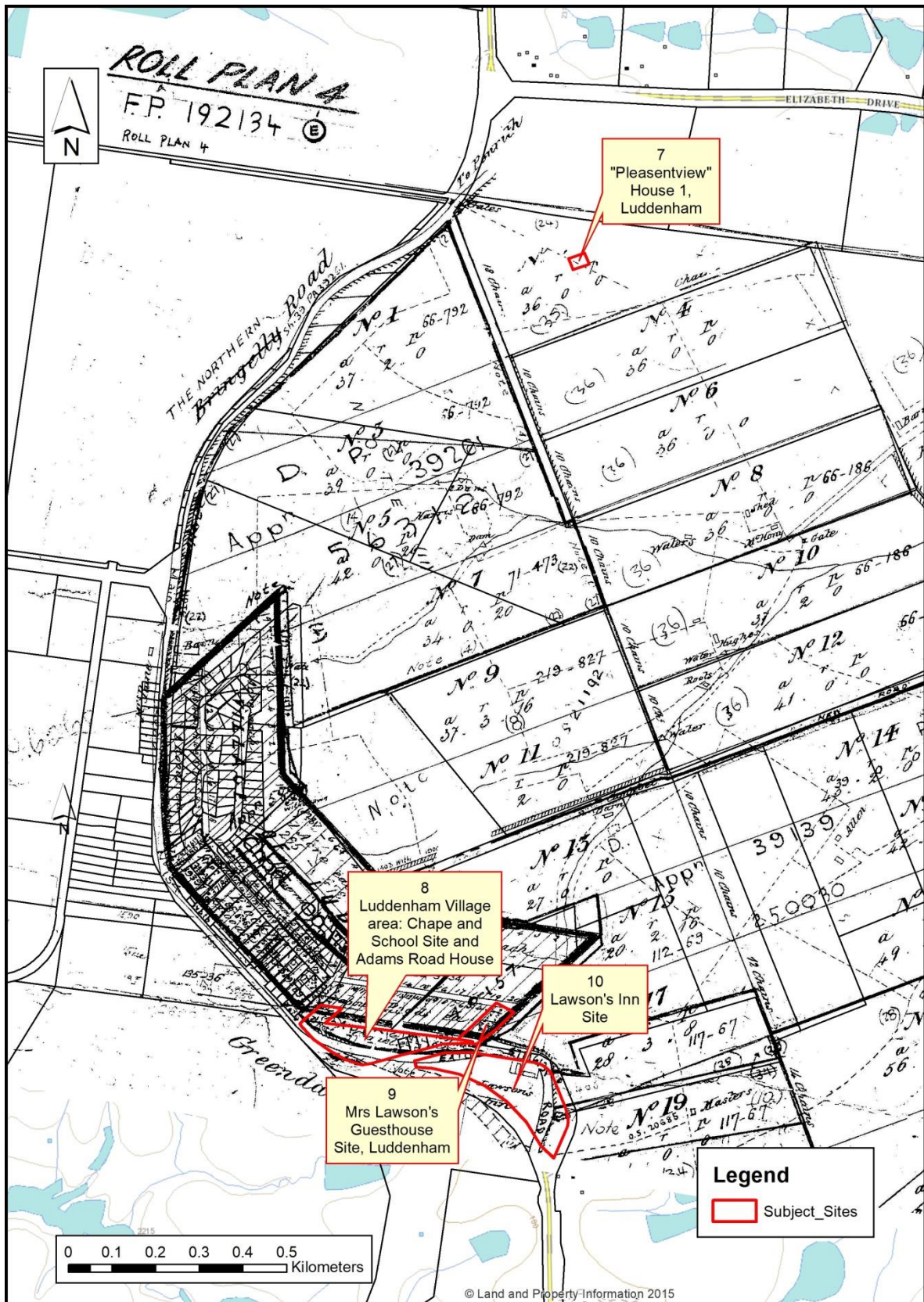


Figure 5: Detail from Roll Plan 4 showing the location of the study area

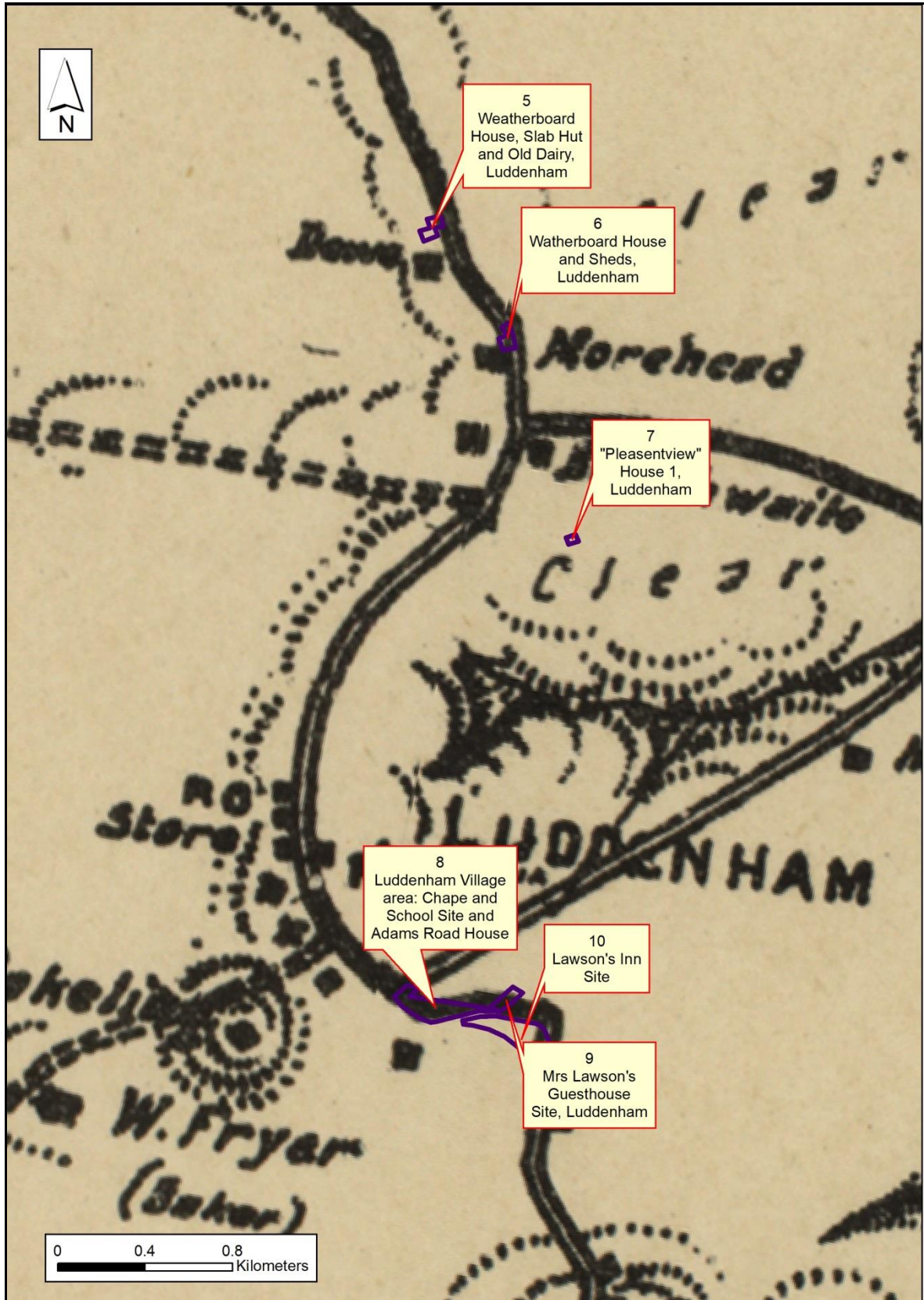


Figure 6: Detail from map of the manoeuvre area Liverpool

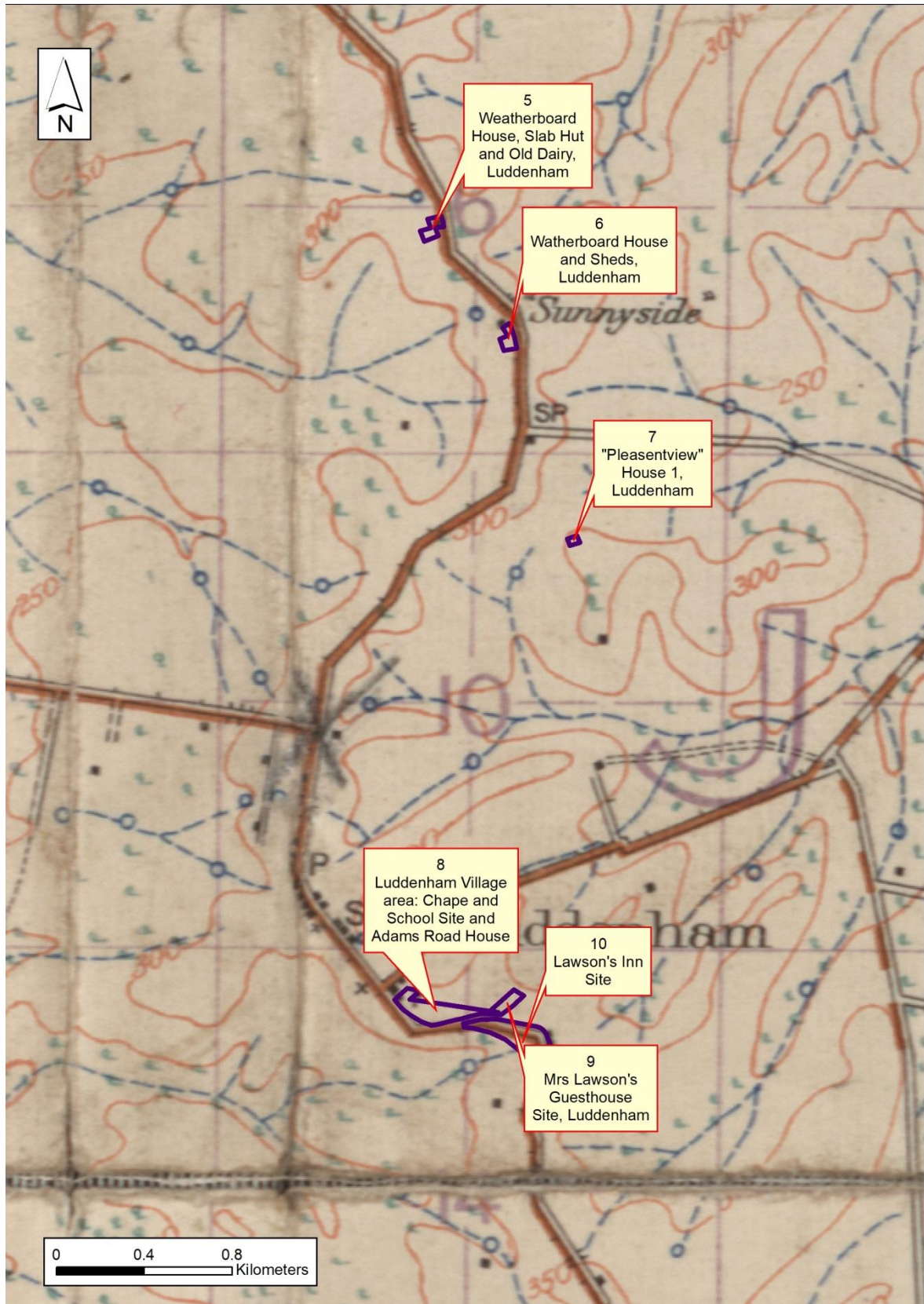


Figure 7: Detail from the Liverpool 1:63360 topographic map (1927)

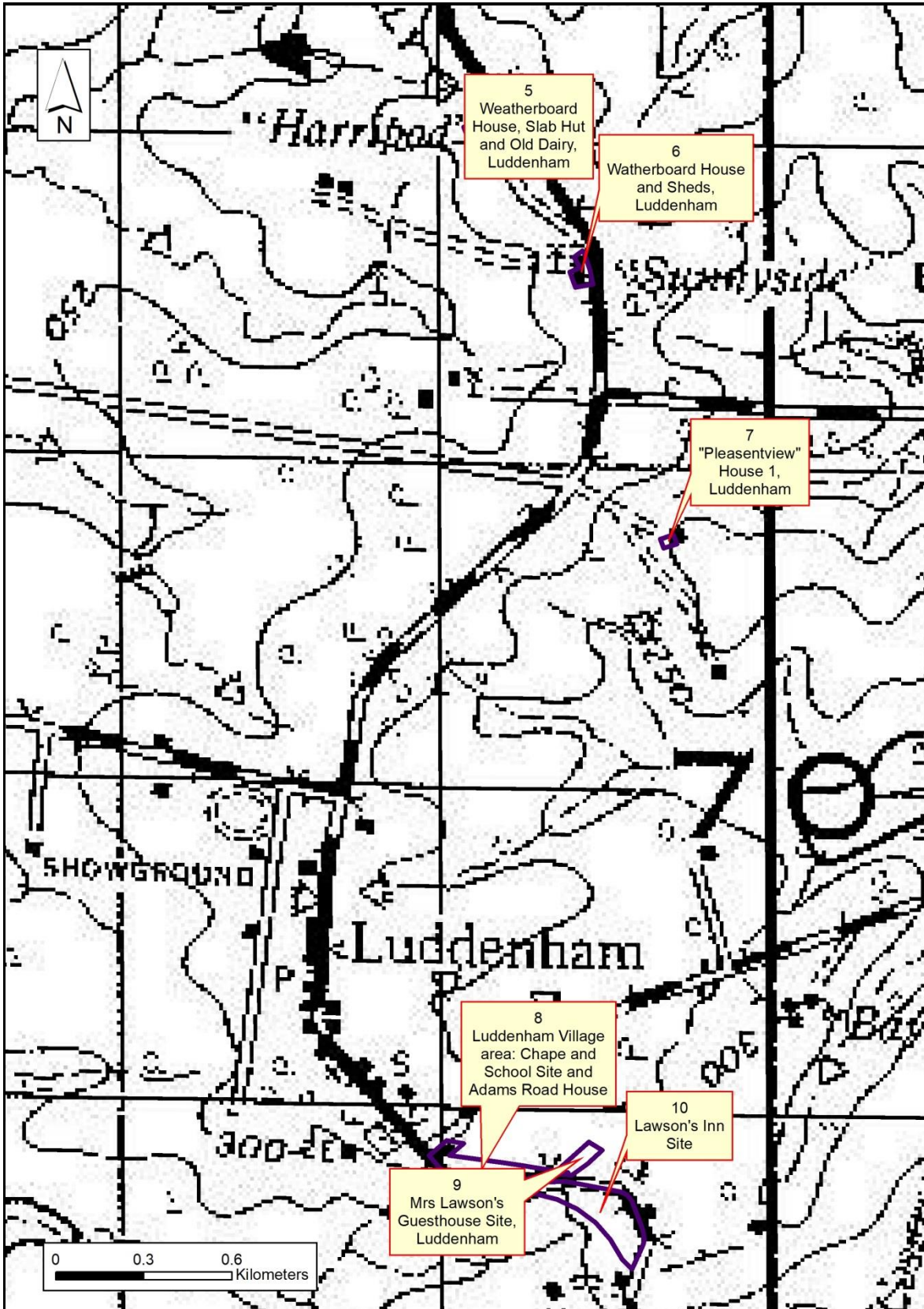


Figure 8: Detail of the Liverpool 1:63360 map (1955)

Appendix B – Research Designs and Excavation Methodologies

B.1) Item 2: Orchard Hills Cumberland Plain Woodland (Chaffey Brothers Irrigation Scheme Canal)

B.2) Item 9: Miss Lawson's Guesthouse Site

B.3) Item 10: Lawson's Inn Site

The Northern Road Upgrade

The Chaffey Brothers Irrigation Scheme Canal | Archaeological research design and excavation methods

Prepared for Roads and Maritime Services | 19 October 2017

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The Northern Road Upgrade

Final

Report J17228RP3 | Prepared for Roads and Maritime Services | 19 October 2017

Prepared by	Ryan Desic	Approved by	Pamela Kottaras
Position	Senior Archaeologist	Position	Heritage Services Manager
Signature		Signature	
Date	19 October 2017	Date	19 October 2017

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Document Control

Version	Date	Prepared by	Reviewed by
V01	16/10/2017	Ryan Desic	Pamela Kottaras
V02	18 October 2017	Ryan Desic	Pamela Kottaras
V03	19 October 2017	Pamela Kottaras	



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Executive Summary

EMM Consulting Pty Limited has been engaged by the Roads and Maritime Services to prepare an archaeological research design and excavation method to archaeologically investigate the site of the Chaffey Brothers irrigation scheme canal (the canal).

The canal was discovered during the preparation of the environmental impact statement for The Northern Road Upgrade project. The report *Appendix N – Technical working paper: Non-Aboriginal heritage* was prepared by Jacobs (15 May 2017). Following further discussion with the Commonwealth Department of Environment and Energy an archaeological excavation and study of the affected portion of the canal.

The area affected by the project is part of Lot 3 DP 238092 on the eastern side of The Northern Road at Orchard Hills NSW. The archaeological investigation indicates that remnants of the canal exist within the construction footprint. The archaeological features of the canal are likely to include the following on the eastern side of the Northern Road within Defence-owned property:

- evidence of the cut and trench for the canal;
- ephemeral, deflated or truncated evidence of the embankments on either side of the trench;
- evidence of natural sediment build-up post-construction; and
- evidence of imported fill to level the ground for vehicle access.

The remnants of the canal on the western side of the Northern Road were not accessed during the site inspection. However, aerial imagery indicates that the canal alignment has been in filled and possibly had a small portion destroyed by the development of house and sheds.

An archaeological research design program of archaeological test excavation has been proposed for the affected portions of the canal within Defence-owned property. The archaeological program would be scheduled prior to the start of the construction process.

The results of the archaeological excavation will be reported in an excavation report in accordance with the conditions of approval.

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1 Introduction

1.1 Overview

EMM Consulting Pty Limited (EMM) has been engaged by the Roads and Maritime Services (Roads and Maritime) to prepare an archaeological research design and excavation method to archaeologically investigate the site of the former Chaffey Brothers irrigation scheme canal (the canal) in Orchard Hills. The canal was partially constructed but never completed.

The canal is located within Department of Defence land and is within the curtilage of the Commonwealth Heritage List (CHL) item "Orchard Hills Cumberland Plain Woodland" (CHL 105317 and RNE 102211). It will be partially impacted by the proposed The Northern Road Upgrade project and was assessed in the report prepared by Jacobs *The Northern Road Upgrade Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park, NSW Environmental Impact Statement/Commonwealth Draft Environmental Impact Statement: Appendix N – Technical working paper: Non-Aboriginal heritage June 2017* (the technical report 2017b).

The technical report recommended that the sections of the canal that will be impacted should be photographically recorded in archival format and the boundary of the project area with the canal is demarcated by protective barrier fencing (Jacobs 2017b, p. 121).

The Commonwealth Department of Environment and Energy made the following request in response to the recommendations in the environmental impact statement (EIS) in relation to the heritage management measures for the canal:

- Archaeological excavation and study of the canal section to be destroyed (unless such studies have been done previously), with values documented before the action commences.

This report has been prepared to support the response to submissions in relation to the canal and anticipated impacts. It reaffirms the recommendation for photographic archival recording of those parts of the canal that will be removed by the project and provides an archaeological testing and recording method prior to removal.

1.2 Project description

Roads and Maritime propose to upgrade 16 km of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park (the project).

The project generally comprises the following key features:

- A six-lane divided road between Mersey Road, Bringelly and Bradley Street, Glenmore Park (two general traffic lanes and a kerbside bus lane in each direction). A wide central median would allow for an additional travel lane in each direction in the future, if required;
- An eight-lane divided road between Bradley Street, Glenmore Park and just south of Glenmore Parkway, Glenmore Park (three general traffic lanes and a kerbside bus lane in each direction separated by a central median);
- About eight kilometres of new road between Mersey Road, Bringelly and just south of the existing Elizabeth Drive, Luddenham to realign the section of The Northern Road that currently runs through the Western Sydney Airport site;

- About eight kilometres of upgraded and widened road between the existing Elizabeth Drive, Luddenham and just south of Glenmore Parkway, Glenmore Park;
- Access to the Luddenham town centre from north of the realigned The Northern Road and the existing The Northern Road;
- Twin bridges over Adams Road, Luddenham;
- Four new traffic light intersections and new traffic lights at existing intersections;
- Local road changes and upgrades to current access arrangements for businesses and private properties; and
- A new shared path for pedestrians and cyclists on the western side of The Northern Road and footpaths on the eastern side of The Northern Road where required.

A detailed description of the project, including design refinements is provided in Jacobs 2017a and 2017b.

1.3 Site definition

The canal is part of a larger agricultural construction program called the Chaffey Brothers Irrigation Scheme Canal but was also referred to as the Mulgoa Irrigation Canal, or as being part of the Mulgoa Irrigation Scheme, in historical document and more recent heritage studies (GML 2013).

It is referred to in this report as ‘the canal’ because it is only the canals that will be affected by the road upgrade project. The canal is in Lot 3 DP 238092 on the eastern side of The Northern Road at Orchard Hills (Figure 1.1 and Figure 1.2).

The Register of the National Estate (RNE) is now a static register, superseded by the introduction of the CHL and the National Heritage List (NHL) when the *Environmental Protection and Biodiversity Act 1999* came into force. Many items, including the Orchard Hills Cumberland Plain Woodland, were transferred to the appropriate register. In the case of the current heritage item, as it is not of National significance, and it is Commonwealth property, the most appropriate register is the CHL.

1.4 Proposed impacts

The proposed works will involve clearing of vegetation and construction of carriageway and associated fill slope as well as associated drainage and flood retardation. Jacobs completed an updated impact assessment for the project on the canal which is provided below:

The entire length of the canal within the CHP is around 2,632 m and is ranked as being of high significance in the HMP (Godden Mackay Logan 2013). There would be minimal impact to the canal as much of its extent is situated outside the construction footprint. The construction footprint (and therefore, area of impact) only overlaps with around 2.43% of the entire canal. Furthermore, around 36 m of the part of the canal located within the construction footprint is in poor condition as it is extremely shallow from erosion. The section within the construction footprint which is in better condition is very similar to those sections that are outside the construction footprint. The wooden features of the canal structure that have the potential to yield information about the construction of the canal are located outside the construction footprint.

In summary, impacts to the canal will be limited where it occurs within the project construction footprint as shown in which is shown Figure 1.2 and in Figure 4.1 which shows the project construction footprint in relation to the predicted remains of the canal.

1.5 Author identification

This report was prepared by Ryan Desic (EMM Senior Archaeologist). The survey results were written by Pamela Kottaras (Heritage Services Manager) who conducted it. Sources used were provided by Jacobs (2017a and 2017b). Quality assurance was provided by Pamela Kottaras. The figures were produced by Antony Edenhofner (EMM GIS Services Manager).

1.6 Acknowledgements

This report was prepared with the assistance of Suzette Graham and Denis Gojak (Road and Maritime), Kelly Thomas, Jennifer Chandler and Karen Murphy (Jacobs). Special thanks to security representatives at DEOH for escorting the site inspection.

1.7 Limitations

The limitations associated with this report are associated with timeframes for the response to submissions to the environmental impact statement (EIS).

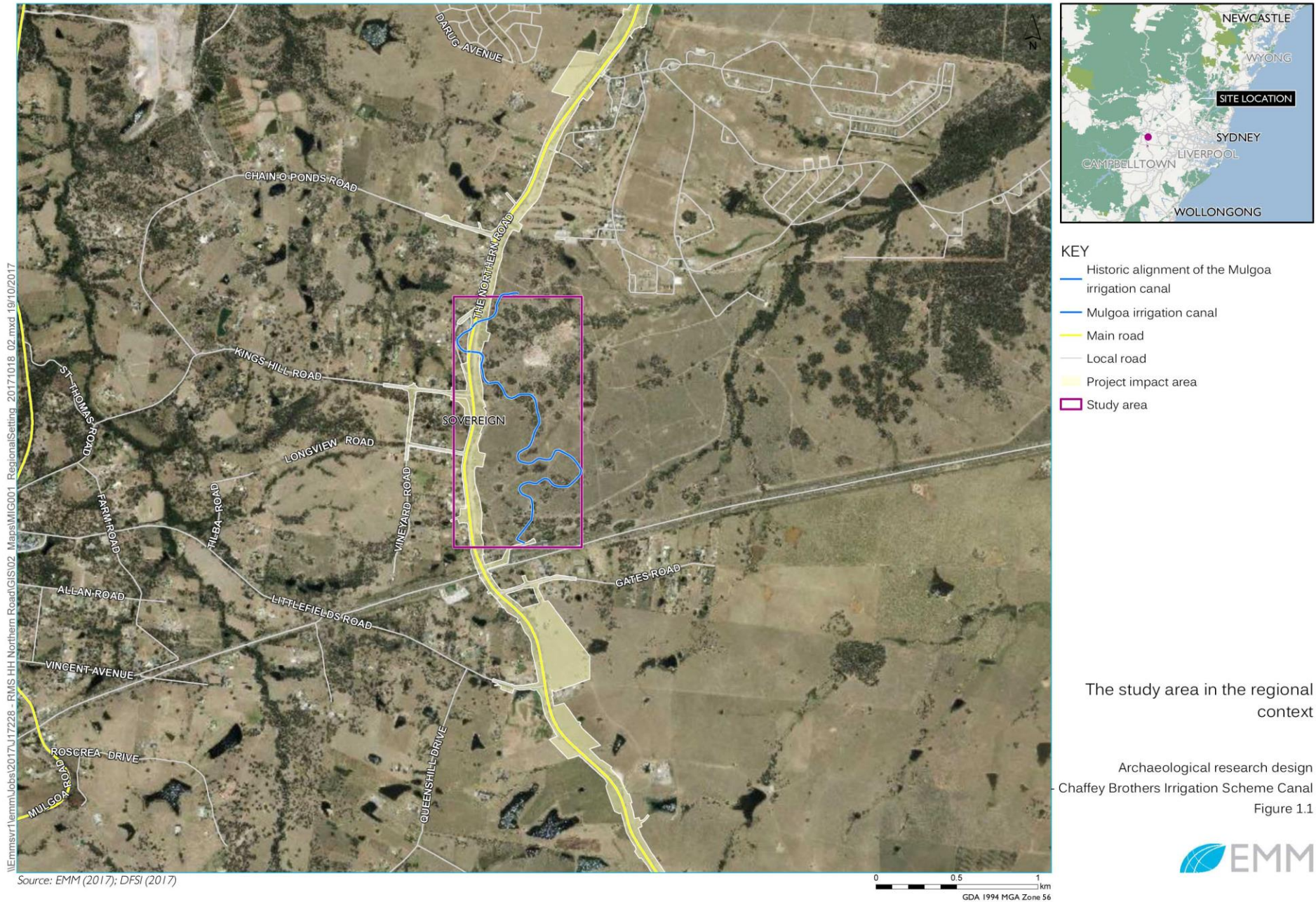


Figure 1.1 The study area in the regional setting



Figure 1.2 The study area

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2 Historical summary

This section of the report focuses on the Mulgoa Irrigation Scheme, which resulted in the construction of the canal. The information presented below has been extracted from sections of *Defence Establishment Orchard Hills, NSW Heritage Management Plan*, prepared by GML in 2013 (pp. 19–25):

The Mulgoa Irrigation Scheme was an attempt to create an irrigation settlement at Mulgoa, near Penrith. The settlement was to comprise 20,000 acres of fruit-growing and horticultural lands irrigated from the Nepean and Warragamba rivers. The scheme was proposed by George Chaffey, a Californian irrigator, and Henry Gorman, Estate Agent Chaffey, along with his brother William, had recently overseen the Mildura Irrigation Scheme in Victoria. The Mildura scheme was hailed a success by contemporary newspapers for turning a 'barren and worthless country' into a farming region that had the potential to produce '£750,000 worth of fruit and other produce'. The newspapers reported on hopeful anticipation of the general public for the Chaffey Brothers to produce similar results in New South Wales. The scheme was established in 1890, when Parliament passed an act to allow for its construction.

The Mulgoa Irrigation Bill allowed for the promoters to acquire 19,000 acres of land, construct a pumping station that was designed by Chaffey and construct a 4,000,000 gallon reservoir within Mulgoa. The water was to be redistributed across the Nepean region to as far north as St Marys through a network of canals.

The land would then be subdivided and sold as five acre lots for growing vegetables and fruit and 10 acre lots for cattle and sheep grazing. This scheme was expected to bring about 1,600 families into a poorly populated region. The company proposed to sell the land and water together and each landowner would have a personal canal available at the highest point of their lot. The Chaffey brothers also proposed to supply water to adjoining towns for domestic purposes. Construction of the main channel, including the portion within the study area, and the pumping station (outside the study area) was already underway when the scheme stalled in 1893.

The Chaffey brothers were bankrupted by the economic depression in NSW in the 1890s and withdrew their support for the scheme. Subsequent representations to the NSW government to take over the scheme in 1895 were without success and the works were never completed. Following the collapse of the Mulgoa Irrigation Scheme, the original Blaxland land grants were subdivided and sold in several portions (Certificate of Title 6394-28). The Cooper family's land was not part of the irrigation scheme and remained in their ownership up until the late 1910s, when parts of their estate began to be sold off. In 1919 William Moore, Grazier, purchased a portion of the Cooper Estate that contained parts of the land granted to Oakes, Rutter, Nash, Snowden, Smith, Wood, and Piper. Other portions of the Cooper Estate continued to be sold but remained agricultural land until purchased by the Commonwealth of Australia in the early 1950s.

The study area formed part of the area owned by The Department of Defence since 1942.

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3 Field survey

3.1 Introduction

Field survey was undertaken on Friday 15 September by Pamela Kottaras (EMM) and Suzette Graham (Roads and Maritime) with the assistance of a representative from Department of Defence Security.

For the purposes of this report, where the canal enters the project area, it has been divided into the northern and southern sections to reflect the impact of the existing vehicle track on the continuity of the feature; this definition applies only to this report. It includes the section of the canal at its northernmost recorded extent east of the former alignment that was renamed Grover Crescent when the road was straightened (Figure 4.1). At this point the canal crosses what is now a vehicle track and the newer alignment of The Northern Road and loops around within the space created by Grover Crescent and The Northern Road and then turns to the east again, crosses The Northern Road and the vehicle track on Department of Defence land and continues southward (Figure 1.2).

The team drove to the location of the northern arm of the canal in Orchard Hills on the eastern side of The Northern Road and then to the southern arm within the area of impact. No environmental constraints were encountered on the day as it was clear and sunny. Ground surface visibility varied from full ground cover in the form of grasses, mature trees and leaf and bark litter obscuring the landscape to introduced fill to create the vehicle track within the lot.

3.2 Canal northern section

Ground surface visibility varied, with the northern arm not at all visible as it is now obscured by tall eucalypts where it crosses into the project area. The canal was not visible in the project area but the landscape amongst the trees was undulating and showed evidence of modification despite not clearly representing the canal (Plate 3.2 and Plate 3.3).

A part of the northern arm of the canal is visible in current aerial photography with parts of the canal visible on historical aerial photography (Plate 4.2), and in its entirety in historical plans (Plate 4.1). On current aerial imagery, the canal alignment is visible crossing the vehicle track but disappears beneath a tree and does not reappear on the western side of The Northern Road, most likely because of later developments on the land.

3.3 Southern Section of the canal

The southern section of the canal is evident in the landscape to the east of the existing vehicle track as it is a clearly defined and incised feature in the ground. The canal is approximately 3 m wide and 0.5 m deep with gently sloping sides at approximately 50 degrees. The canal is habitat for sedges (*Juncus sp.*), which visually separates it from the surrounding landscape. Approximately 22 m from the edge of the vehicle track to the east the canal has been filled in to create a walkway that is approximately 4 m long before it dips down into an identifiable canal again. The site survey did not go beyond the filled in area as this represents the inner edge of the project area.

Directly to the south of the canal alignment, another shallow linear depression was noted (Plate 3.6) and photographed. The shallow depression is not clear in the photograph but is apparent on the ground and in aerial photography (Figure 4.1 and Figure 5.1). It may be related to the canal and have been used to direct surface water or it may indicate the planned but unexecuted width of the canal. This depression is approximately 2 m wide and approximately 10 cm deep but consistently so and visible when on site. This area will be investigated archaeologically.

This section of the canal has been isolated from the section to the north by the vehicle track within Department of Defence land as well as by general fill on the western side of the vehicle track to the fence. The construction of the existing alignment of The Northern Road would have destroyed evidence of the canal in that location and land modification on the western side of The Northern Road is likely to have filled in and/or destroyed the form of the canal there. Whatever the destructive process on the western side of The Northern Road, it is not visible in current aerial imagery.

The canal appears to be constructed out of the natural ground with no introduced materials visible in the general area. Fabric such as concrete or brick is not expected to form part of the construction, nor is it known if any building fabric was intended to create these features. A plan and section of the irrigation scheme showing the 'earth tank' suggests that the canal and other water holding features were also likely to have been constructed using earthen banks without introduced building materials (Plate 3.1).

No other potential historical features were noted in the landscape in this area during the field survey undertaken by EMM (Section 3).

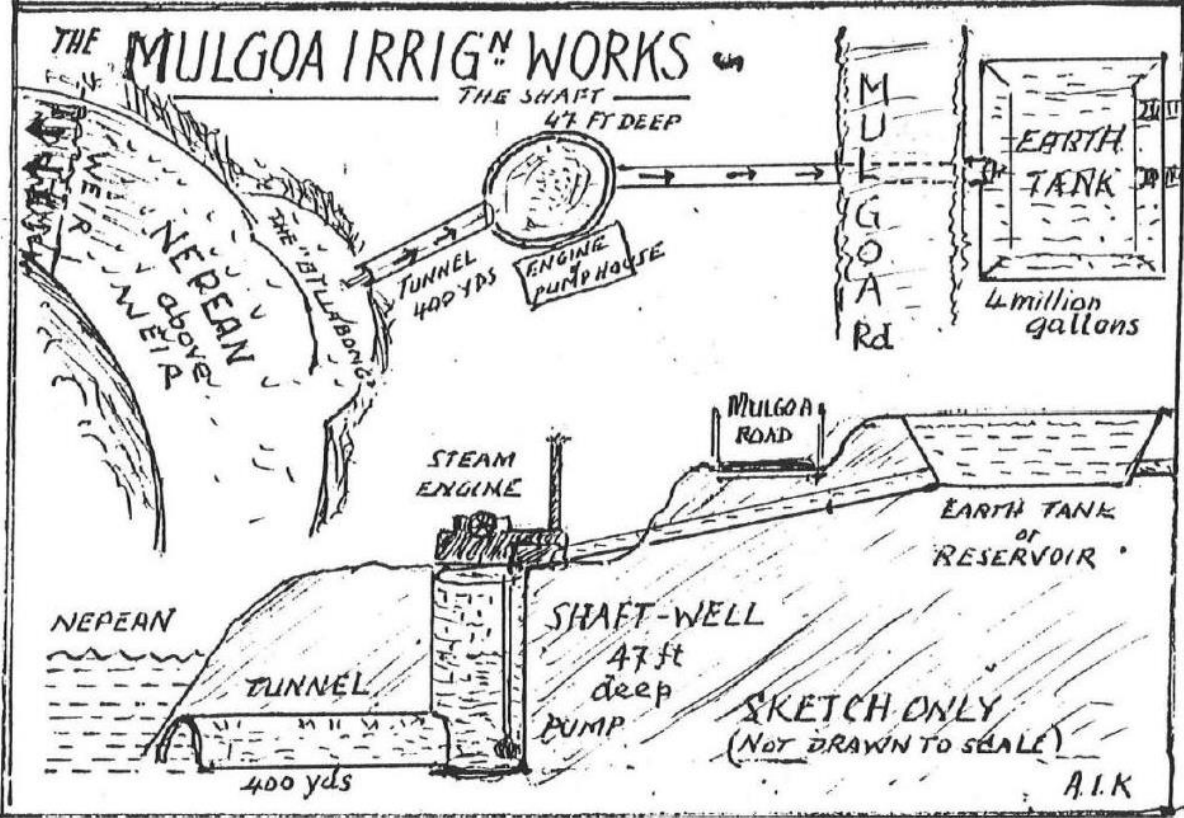


Plate 3.1 Sketch of the Mulgoa Irrigation Scheme. Source: Keenan, AI 24 October 1984 in Godden Mackay Logan 2013, p.24).



Plate 3.2 Location of northern arm of the canal. View south-east.



Plate 3.3 The northern arm of the canal. View north; photograph taken on the other side of the clump of trees shown in Plate 3.2



Plate 3.4 Southern section of the canal. View east.



Plate 3.5 Southern section of the canal. View west toward The Northern Road.



Plate 3.6 The shallow linear depression to the south of the canal (visible on the left).