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 Northern Road Upgrade – Mersey Road to Glenmore Parkway
Prepared for Roads and Maritime Services by Jacobs Australia

Non-Aboriginal Heritage Assessment

Final
15 May 2017
Non-Aboriginal Heritage

The Northern Road Upgrade (Mersey Road to Glenmore Parkway)

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Executive Summary

Introduction

This document presents the results of a non-Aboriginal heritage assessment for the Northern Road Upgrade – Mersey Road, Bringelly to Glenmore Parkway, Glenmore Park (the project).

Roads and Maritime is seeking approval to upgrade 16km 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). The 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 about 100 m south of Glenmore Parkway, Glenmore Park (three general traffic lanes and a kerbside bus lane in each direction separated by a 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 bisects the Western Sydney Airport site and to bypasses Luddenham
- About eight kilometres of upgraded and widened road between the existing Elizabeth Drive, Luddenham and about 100 m south of Glenmore Parkway, Glenmore Park
- Closure of the existing The Northern Road through the Western Sydney Airport site
- Tie-in works with the following projects:
  - The Northern Road Upgrade, between Peter Brock Drive, Oran Park and Mersey Road, Bringelly (to the south)
  - The Northern Road Upgrade, between Glenmore Parkway, Glenmore Park and Jamison Road, South Penrith (to the north)
- New intersections including:
  - A traffic light intersection connecting the existing The Northern Road at the southern boundary of the Western Sydney Airport, incorporating a dedicated u-turn facility on the western side
  - A traffic light intersection for service vehicles accessing the Western Sydney Airport, incorporating 160 m of new road connecting to the planned airport boundary
  - A traffic light intersection connecting the realigned The Northern Road with the existing The Northern Road (west of the new alignment) south of Luddenham
  - A ‘give way’ controlled intersection (that is, no traffic lights) connecting the realigned The Northern Road with Eaton Road (east of the new alignment, left in, left out only)
  - A four-way traffic light intersection formed from the realigned Elizabeth Drive, the realigned The Northern Road and the existing The Northern Road, north of Luddenham
  - A traffic light intersection at the Defence Establishment Orchard Hills entrance, incorporating a u-turn facility
- New traffic lights at four existing intersections:
  - Littlefields Road, Luddenham
  - Kings Hill Road, Mulgoa
  - Chain-O-Ponds Road, Mulgoa
  - Bradley Street, Glenmore Park incorporating a u-turn facility
- Modified intersection arrangements at:
  - Dwyer Road, Bringelly (left in, left out only)
Non-Aboriginal Heritage

- Existing Elizabeth Drive, Luddenham (left out only)
- Gates Road, Luddenham (left in only)
- Longview Road, Luddenham (left in, left out only)
- Grover Crescent south, Mulgoa (left in only)
- Grover Crescent north, Mulgoa (left out only)

- Dedicated u-turn facilities at:
  - The existing The Northern Road at Luddenham, south-west of Elizabeth Drive
  - The existing Elizabeth Drive, Luddenham around 800 m east of The Northern Road
  - Chain-O-Ponds Road, Mulgoa

- Twin bridges over Adams Road, Luddenham

- Local road changes and upgrades, including:
  - Closure of Vicar Park Lane, east of the realigned The Northern Road, Luddenham
  - Eaton Road cul-de-sac, west of the realigned The Northern Road, Luddenham
  - Eaton Road cul-de-sac, east of the realigned The Northern Road, Luddenham
  - Elizabeth Drive cul-de-sac, about 300 m east of The Northern Road with a connection to the realigned Elizabeth Drive, Luddenham
  - Extension of Littlefields Road, east of The Northern Road, Mulgoa
  - A new roundabout on the Littlefields Road extension, Mulgoa
  - A new service road between the Littlefields Road roundabout and Gates Road, including a ‘give way’ controlled intersection (that is, no traffic lights) at Gates Road, Luddenham
  - Extension of Vineyard Road, Mulgoa between Longview Road and Kings Hill Road
  - A new roundabout on the Vineyard Road extension at Kings Hill Road, Mulgoa

- A new shared path on the western side of The Northern Road and footpaths on the eastern side of The Northern Road

- The upgrading of drainage infrastructure

- Operational ancillary facilities including:
  - Heavy vehicle inspection bays for both northbound and southbound traffic, adjacent to Grover Crescent, Mulgoa and Longview Road, Mulgoa respectively
  - An incident response facility on the south-western corner of the proposed four-way traffic light intersection at Elizabeth Drive, Luddenham

- New traffic management facilities including variable message signs (VMS)

- Roadside furniture and street lighting

- The relocation of utilities and services

- Changes to property access along The Northern Road (generally left in, left out only)

- Establishment and use of temporary ancillary facilities and access tracks during construction

- Property adjustments as required

- Clearance of undetonated explosive ordinance (UXO) within the Defence Establishment Orchard Hills as required.
The project assessed in this EIS does not include surveys, test drilling, test excavations, geotechnical investigations or other tests, surveys, sampling or investigation for the purposes of the design or assessment of the project.

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Roads and Maritime Services (Roads and Maritime) to undertake an assessment of the potential environmental impacts of the project, and prepare an Environmental Impact Statement (EIS) in accordance with the Environmental Planning and Assessment Act 1979 (EP&A Act) and the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) that adequately addresses the requirements of those Acts.

As part of preparing the EIS, this non-Aboriginal heritage impact assessment identifies the non-Aboriginal heritage items within and immediately adjacent to the project (ie the study area), assesses the potential impacts on the heritage items from the proposed project activities, and develops measures to address impacts. The non-Aboriginal heritage impact assessment addresses archaeology, heritage items and conservation areas, in accordance with NSW Heritage Branch guidelines, and the Australia ICOMOS Charter for Places of Cultural Significance (Burra Charter).

For proposed actions situated on Commonwealth land or which may impact on Commonwealth land, the guidelines Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2) have been applied.

Desktop assessment and field survey

A review of previous heritage studies for the study area and a search of relevant heritage registers was undertaken. There are two registered heritage items within the construction footprint - Lawson's Inn site is listed on the Liverpool Local Environmental Plan (LLEP), and Orchard Hills Cumberland Plain Woodland is listed on the Commonwealth Heritage List (CHL). The CHL listing includes natural heritage values as well as historic heritage values with reference to evidence of canals associated with the Chaffey Brothers irrigation scheme.

The Heritage Management Plan (HMP) (Godden Mackay Logan 2013) for the Defence Establishment at Orchard Hills (DEOH) incorporates the Orchard Hills Cumberland Plain Woodland Commonwealth Heritage Place (CHP). This report includes an assessment of the heritage significance the site and its tolerance for change.

Another previous heritage assessment identified two heritage items previously nominated for inclusion on the Penrith Local Environmental Plan (PLEP) (The Northern Road, and the Warragamba Dam to Prospect Reservoir pipeline (otherwise referred to within the EIS as the WaterNSW supply pipelines) and two previously nominated heritage items relating to rural landscape in the west of the Orchard Hills locality and along The Northern Road (Orchard Hills Rural landscape (area) – OH-01 and Orchard Hills Rural landscape (roadside) – OH-04). All four heritage items were nominated for inclusion on the PLEP, but were subsequently not listed. One heritage item, The Northern Road alignment, identified in a previous report is located immediately adjacent to the construction footprint. There is the potential for previously unidentified historical heritage items to be situated in the study area, based on the review of aerial imagery, and the relatively limited nature of previous heritage assessments in the study area.

Based on the desktop assessment, the following types of historical heritage items may be found in the study area:

- Houses, homesteads and other buildings associated with the settlement of the region
- Past rural uses related to agriculture and orcharding, including stockyards, fences, sheds and outbuildings, orchard trees, and wells.

A historical heritage field survey was undertaken on 22-23 February 2016 and 5-6 April 2016 by Amanda Goldfarb (Project Archaeologist, Jacobs) and Jennifer Chandler (Project Archaeologist, Jacobs). Priority areas for survey were identified using background information including aerial images, the predictive statement for historical site types, previous studies and field surveys, and historical heritage register listings. Six
known/registered historical heritage items were inspected during the field survey. A further four previously unidentified potential historical heritage items were identified during the survey.

Subsequent to the historical heritage field surveys in February and April 2016, the construction footprint was revised adding new areas for historical heritage assessment. A desktop assessment of these new areas, including review of aerial imagery, background information and consideration of field results from other areas already assessed in the vicinity was undertaken. No areas were identified as having potential for previously unidentified historical heritage items during the desktop assessment. Two new study areas were situated within the heritage boundary of the Warragamba Dam to Prospect Reservoir pipeline. These two new areas were surveyed together with an additional two new areas associated with drainage works at the pipeline site. The survey results are included in Section 4.3.

No field surveys were conducted in assessing potential impacts to natural heritage values. Rather, field-based information identified in the Biodiversity Assessment Report for this EIS (Appendix I of the EIS) as well as the Heritage Management Plan for the DEOH site was interpreted from a natural heritage perspective.

**Significance assessment**

None of the previously unidentified potential historical heritage items have been found to have historical heritage significance. The significance assessment of the known/registered natural and historical heritage items has been reviewed and updated.

Table 1 summarises the significance of each of the heritage items. Statements of Heritage Impact are provided for each of the four historical heritage items in Section 5.

<table>
<thead>
<tr>
<th>Heritage item number</th>
<th>Source</th>
<th>Heritage item name</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>Artefact Heritage (2015)</td>
<td>Remnants of The Northern Road</td>
<td>None</td>
</tr>
<tr>
<td>Item 2</td>
<td>CHL, RNE</td>
<td>Orchard Hills Cumberland Plain Woodland</td>
<td>Commonwealth</td>
</tr>
<tr>
<td>Item 3</td>
<td>Penrith Heritage Study (Paul Davies Pty Ltd 2007)</td>
<td>Warragamba Dam to Prospect Reservoir pipeline</td>
<td>Local</td>
</tr>
<tr>
<td>Item 4</td>
<td>NA</td>
<td>Fruit Orchard, Luddenham</td>
<td>None</td>
</tr>
<tr>
<td>Item 5</td>
<td>NA</td>
<td>Weatherboard House, Slab Hut and Old Dairy, Luddenham</td>
<td>None</td>
</tr>
<tr>
<td>Item 6</td>
<td>NA</td>
<td>Weatherboard House and Sheds, Luddenham</td>
<td>None</td>
</tr>
<tr>
<td>Item 7</td>
<td>NA</td>
<td>“Pleasantview” House 1, Luddenham</td>
<td>None</td>
</tr>
<tr>
<td>Item 8</td>
<td>Artefact Heritage (2015)</td>
<td>‘Luddenham Village’ area: Chapel and School Site and Adams Road House</td>
<td>None</td>
</tr>
<tr>
<td>Item 9</td>
<td>Artefact Heritage (2015)</td>
<td>Miss Lawson’s Guesthouse Site, Luddenham</td>
<td>Local</td>
</tr>
<tr>
<td>Item 10</td>
<td>Liverpool LEP</td>
<td>Lawson’s Inn Site</td>
<td>Local</td>
</tr>
</tbody>
</table>

**Impact assessment**

The proposed activities within or adjacent to each heritage item identified for this assessment and the potential impacts of these activities on heritage is presented in Table 2.
### Table 2: Potential impacts from proposed works for each heritage item

<table>
<thead>
<tr>
<th>Heritage item number</th>
<th>Heritage item name</th>
<th>Register number</th>
<th>Proposed activities</th>
<th>Potential impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 2</td>
<td>Orchard Hills Cumberland Plain Woodland</td>
<td>105317 (CHL) 102211 (RNE)</td>
<td>Clearing of vegetation and construction of carriageway and associated fill slope as well as associated drainage and flood retardation works</td>
<td>Potential impacts to the Orchard Hills Cumberland Plain Woodland Commonwealth Heritage Place (CHP) as a result of the project include impacts to the natural heritage values of the site through native vegetation removal and associated habitat loss, as well as impacts to the historic heritage values of the site as a result of impacts to the Chaffey Brothers Irrigation Scheme Canal (the canal). These potential impacts are summarised below. The main impacts to natural heritage are as a result of clearing of around 9.68 ha of native vegetation within the western periphery of the CHP (Sectors B and H). However this is equivalent to only around 1.3% of the total 726.32 ha of native vegetation within the CHP. The majority of these areas are made up of a mix of regrowth natural vegetation communities identified in the HMP for the DEOH as being of moderate natural heritage significance, as well as grassland areas ranked as being of low natural heritage significance (Godden Mackay Logan 2013). There is also a small patch of relic native trees associated with two trees located within the north-western portion of the CHP that would also be impacted by the project. This area is identified as having moderate natural heritage significance (Godden Mackay Logan 2013). Of the impacted areas, none are identified as remnant vegetation communities which are ranked as high natural heritage significance in the HMP. The regrowth natural vegetation communities have been identified as having a reasonable tolerance for change, being that this element and its key attributes have relatively little heritage value, but may contribute to the overall significance of the site. In general, the element can be altered to a reasonable degree provided it does not impact the heritage values of the site (Godden Mackay Logan 2013). In the context of the CHP overall, impacts to regrowth natural vegetation communities as well as grasslands are expected to be minimal and are therefore considered reasonable. Given this and the moderate to low heritage significance of these elements, impacts as a result of the project are not expected to be significant. Relic native trees have been identified as having a low tolerance for change,</td>
</tr>
</tbody>
</table>
### Non-Aboriginal Heritage Assessment

<table>
<thead>
<tr>
<th>Heritage item number</th>
<th>Heritage item name</th>
<th>Register number</th>
<th>Proposed activities</th>
<th>Potential impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 3</td>
<td>Warragamba Dam to Prospect Reservoir pipeline</td>
<td>-</td>
<td>Construction of carriageway and fill slope. Drainage infrastructure upgrades comprising a concrete drainage channel along the northern perimeter of the Water NSW Precinct (north of the pipeline) and an access track to the east of The Northern Road.</td>
<td>The Northern Road carriageway construction is confined to section of pipeline that is underground. No impact is expected. Proposed access track would impact on culvert located in Survey Area No. 4-26, but not on pipeline, as it is below the ground in this area. Proposed drainage works to the south of the pipeline would impact on culvert located in Survey Area No. 4-27.</td>
</tr>
</tbody>
</table>

being that this element and its key attributes embody heritage values, retaining a high degree of intactness with no major change or alterations, or only minor alterations that do not detract from the heritage values. In general, the element should be retained and conserved (Godden Mackay Logan 2013). Although impacts to relic native trees in the overall context of the CHP as a result of the project would be minimal, given their moderate natural heritage significance and low tolerance for change, impacts to this element as a result of the project are considered moderate.

The aquatic environment within the CHP that is ranked in the HMP as being of moderate to high significance (Godden Mackay Logan 2013) is not expected to be impacted by the project due to the distance from the works and the proposed application of effective mitigation measures.

Potential impacts to the historic heritage values of this item are related to impacts to the canal located within the south-western portion of the CHP (Sector H of the DEOH). The canal is ranked as high significance in the HMP (Godden Mackay Logan 2013). Construction would overlap with only 2.43% of the northern part of the canal, some of which is in poor condition as it is extremely shallow from erosion. The canal and the area in which is situated (Sector H) has a low tolerance for change in relation to new development and demolition/remediation. However, given the project is impacting a small proportion of the overall canal on DEOH land, and that the section being impacted is of relatively poor quality due to erosion, the overall impact on the historic heritage values are not considered to be significant.

Vibration is unlikely to impact the canal due to the structural nature of the canal and vegetation on the canal.
<table>
<thead>
<tr>
<th>Heritage item number</th>
<th>Heritage item name</th>
<th>Register number</th>
<th>Proposed activities</th>
<th>Potential impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 9</td>
<td>Miss Lawson's Guesthouse Site</td>
<td>-</td>
<td>Construction of dual carriageway, intersection and cut slopes</td>
<td>The full site would be directly impacted by construction</td>
</tr>
<tr>
<td>Item 10</td>
<td>Lawson's Inn site</td>
<td>53 (LLEP)</td>
<td>Construction of dual carriageway, a cul-de-sac, an intersection, cut slopes and construction compound and laydown site</td>
<td>Around a quarter of the site would be directly impacted by construction</td>
</tr>
</tbody>
</table>

A second concrete drainage channel 500 m in length along the southern perimeter of the 1940s pipeline, to the east of The Northern Road.

While there is a physical impact on the culvert, there is not impact on heritage significance.
The implementation of the general and site-specific mitigation measures listed below would minimise impacts on non-Aboriginal heritage to an acceptable level to proceed with the project as assessed.

**Item 2: Orchard Hills Cumberland Plain Woodland (Lot 3 DP238092)**

**Proposed works**

Proposed works that would interact with the Orchard Hills Cumberland Plain Woodland CHP include clearing of vegetation and construction of a carriageway to the east of the existing The Northern Road, including associated fill slope formations and alterations to existing drainage lines for road-serving drainage and flood retardation works. This would have potential impacts on the natural heritage values of the site (refer to Figure 7-1). These works would also overlap with the western-most section of the Chaffey Brothers Irrigation Scheme Canal (the canal) in two locations, which would have potential impacts on the non-Aboriginal heritage values of the site (Figure 7-2).

**Impact Assessment**

Potential impacts to the Orchard Hills Cumberland Plain Woodland Commonwealth Heritage Place (CHP) as a result of the project include impacts to the natural heritage values of the site through native vegetation removal and associated habitat loss, as well as impacts to the historic heritage values of the site as a result of impacts to the Chaffey Brothers Irrigation Scheme Canal (the canal). These potential impacts are summarised below.

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

The natural heritage values of the site are mainly focused on its natural vegetation, which includes areas of original native vegetation (including very old relic trees) as well as the natural regrowth of these original plant communities (Godden Mackay Logan (2013). This includes small remnants and regenerating areas of Cumberland Plain Woodland, Castlereagh Ironbark Forest and Sydney Coastal Riverflat Forest (River Flat Eucalypt Forest), particularly in the eastern portion of the CHP. It is noted that impacts from the project would be limited to the western periphery of the CHP.

Cumberland Plain Woodland is listed as a critically endangered ecological community at both state (Cumberland Plain Woodland in the Sydney Basin Bioregion) and Commonwealth levels (Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest). As such, the CHP is considered a core biodiversity area for the conservation of these communities, and the place comprises the least disturbed and largest remaining remnant of Cumberland Plain Woodland (Godden Mackay Logan 2013).

Although around 9.68 ha of native vegetation would be removed by the project, this is equivalent to only around 1.3% of the 726.32 ha of native vegetation on the CHP. These areas are made up of a mix of regrowth natural vegetation communities identified in the HMP as being of moderate natural heritage significance, as well as grassland areas ranked as being of low natural heritage significance (Godden Mackay Logan 2013). There is also a small patch of relic native trees associated with two trees located within the north-western portion of the CHP that would also be impacted by the project. This area is identified as having moderate natural heritage significance (Godden Mackay Logan 2013).

Additionally of the 9.15 ha of the Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CPWSGTF) and River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (REFCF) ecological communities that would be removed by the project, this would be equivalent to only around 1.5% of the total 610.60 ha of these communities within the CHP. None of the areas impacted by the project have been identified in the HMP as remnant vegetation communities of high natural heritage value.

Additionally since the area is already disturbed by fencing, roadside and edge effects, impacts to fauna within the CHP as a result of the project (eg edge effects, light pollution, etc.) are not considered to be significant. For impacts to fauna refer to the Biodiversity Assessment (Appendix I of the EIS).
The project would result in an increase in the rate and volume of flow discharging to three Blaxland Creek tributaries and existing dams within the Blaxland Creek catchment within the DEOH site. As a result, the scour potential along these drainage lines would increase and ground conditions would become wetter. However, these impacts are not expected to extend to the aquatic areas mapped as moderate to high significance within the CHP, therefore the impact on these areas would be negligible. This is due to the distance of the works from these areas and the implementation of effective mitigation measures outlined in the Hydrology and Flooding Assessment (Appendix K of the EIS) and the Soils, water and contamination assessment (Appendix L of the EIS).

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.

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:

As identified above, although around 9.68 ha of native vegetation would be removed by the project, this is equivalent to only around 1.3% of the 726.32 ha of native vegetation on the CHP and is mainly made up of a mix of regrowth natural vegetation communities identified in the HMP as being of moderate natural heritage significance, as well as grassland areas ranked as being of low natural heritage significance (Godden Mackay Logan 2013). The small patch of relic native trees within the north-western portion of the CHP that would also be impacted by the project, which has been identified as having moderate natural heritage significance (Godden Mackay Logan 2013).

The key attributes of natural heritage elements on DEOH are the floristics and structure of the ecological communities, and the existence of the isolated relic trees. Therefore, they have different levels of tolerance for change. The regrowth natural vegetation communities have been identified as having a reasonable tolerance for change, being that this element and its key attributes have relatively little heritage value, but may contribute to the overall significance of the site. In general, the element can be altered to a reasonable degree provided it does not impact the heritage values of the site (Godden Mackay Logan 2013). In the context of the CHP overall, impacts to regrowth natural vegetation communities as well as grasslands are expected to be minimal and are therefore considered reasonable. Given this and the moderate to low heritage significance of these elements, impacts as a result of the project are not expected to be significant.

Relic native trees have been identified as having a low tolerance for change, being that this element and its key attributes embody heritage values, retaining a high degree of intactness with no major change or alterations, or only minor alterations that do not detract from the heritage values. In general, the element should be retained and conserved (Godden Mackay Logan 2013). Although impacts to relic native trees in the overall context of the CHP as a result of the project would be minimal, given their moderate natural heritage significance and low tolerance for change, impacts to this element as a result of the project are considered moderate.

The project could potentially introduce invasive weed and pest species. There may be regular mobilisation of typical roadside maintenance fertilisers, herbicides or other chemicals that may stunt the regrowth of native vegetation. However this would be managed through the implementation of effective weed and pest management measures as outline in the Biodiversity Assessment (Appendix I of the EIS).

The project would result in an increase in the rate and volume of flow discharging to three Blaxland Creek tributaries and existing dams within the Blaxland Creek catchment within the DEOH site. As a result, the scour potential along these drainage lines would increase and ground conditions would become wetter. However as identified above, impacts to the aquatic areas mapped as moderate to high significance in the DEOH site would be negligible due to the distance of the works from these areas and the implementation of effective mitigation measures.
In relation to the canal, which is ranked as being of high significance in the HMP (Godden Mackay Logan 2013), only 2.43% of the entire canal extent associated with the DEOH is situated within the construction footprint and would therefore be subject to direct physical impact during construction. The remaining sections of the canal within the study area would potentially be subject to damage or destruction from the use of construction machinery and vehicles if not managed appropriately during construction; however this is not expected given the implementation of mitigation measures as outlined in Section 8.1.

Around 36 m of the canal within the construction footprint area is extremely shallow and eroded while the more intact section is similar to the other sections which would not be impacted, therefore it has limited potential to yield information just from that section. Overall the proposed works would have minimal impact to the significance of the site.

Furthermore, there are other remnants of the canal located to the west of The Northern Road about one kilometre south-west of the DEOH site which is listed on the PLEP as a locally significant archaeological heritage item (A-137).

The Heritage Management Plan for the DEOH site (Godden Mackay Logan 2013:152-155) outlines management guidelines for the DEOH, including those related to managing impacts to the natural heritage values within Sectors B and H and historic heritage values associated with the canal in Sector H as follows:

- This New development in Sectors B and H should be located so as to avoid impacts on natural heritage. These sectors have a low tolerance for change in relation to new development.
- New development in Sector H should not be planned for the southwest area where the Mulgoa Irrigation Scheme (the canal) is located. This southwest area of Sector H has a low tolerance for change in relation to new development.
- Demolition and remediation relating to whole of DEOH land – Remediation should aim to avoid all heritage items and values. If heritage sites cannot be avoided as a consequence of remediation, then heritage mitigation measures should be implemented. Remediation that impacts heritage values must be subject to assessment, development of a HIA, heritage impact mitigation and Defence approval.
- Demolition and remediation relating to Sector H (location of canal) - consideration of proposals for demolition of built elements should take into account the heritage value of the element and its tolerance for change, as well as its relationship to other, related elements of heritage value and the number of its type remaining. Demolition of elements of moderate and high heritage value should be avoided. Sector H has a low tolerance for change.

As discussed above, some impacts would occur as a result of the project which are unavoidable. Additionally, given the project is impacting a small proportion of the overall canal on DEOH land, and that the section being impacted is of relatively poor quality due to erosion, the overall impact on the heritage values are not considered to be significant.

However by implementing the relevant mitigation measures identified in the Biodiversity Assessment (Appendix I of the EIS), the Hydrology and Flooding Assessment (Appendix K of the EIS) and the Soils, water and contamination assessment (Appendix L of the EIS), impacts to the natural heritage values of the site are expected to be minimised and are not expected to be significant.

By implementing the following mitigation measures the potential impacts on the canal would be minimised:

- An archival photographic recording would be made of the extent of the canal to be impacted by the works, in accordance with the Heritage Division of the OEH guidelines (Heritage Council of NSW 2006) prior to its demolition.
- The section of the canal outside the construction footprint would need to be protected from accidental or incidental damage during construction. Protective barrier fencing would be constructed along the construction footprint boundary in the vicinity of the canal prior to construction commencing and would remain in place until the conclusion of the works, at which time it would be removed.

Implementing these mitigation measures would reduce the impact of the significance of the canal as much as possible given the other constraints in this area of the project.
Impacts for this item have also been assessed against the Significant Impact Guidelines 1.2 (Department of Sustainability Environment Water Population and Communities 2013) (SEWPaC) (refer to Section 7).

In summary, the project is not expected to have a significant impact on the natural or non-Aboriginal heritage values of the CHP given the heritage significance of these elements, their tolerance for change and proposed implementation of effective mitigation measures in accordance with this assessment (Section 8.1), 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).

**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.

**Impact assessment**

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

The proposed carriageway would be 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. 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 accidently occurring outside the construction footprint. However, measures outlined in 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. A Construction Environmental Management Plan is recommended for major development projects (Sydney Catchment Authority 2012:9).

The two concrete culverts located within a proposed access track and drainage works area would be directly impacted by the proposed works. However, removal of the culverts would not impact on the significance of the pipeline.

**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.

**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 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. To minimise impacts and maximise the opportunity for realising research potential at the site the following actions would be undertaken:

- 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
- Salvage excavation would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist in accordance with the Heritage Division of OEH criteria.

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

Proposed works

- 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.

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 inn, 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 related to use of early roads in NSW.

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 part of the curtilage of the site, including the potential archaeological deposits. 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 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 salvage excavation would be undertaken under the supervision of an appropriately qualified and experienced historical archaeologist in accordance with the Heritage Division of OEH criteria.

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

There would be no operational impacts to Item 10.

Mitigation measures

A summary of the mitigation measures discussed above in the Impact Assessment are provided in Table 3.
### Table 3: Mitigation measures for heritage items.

<table>
<thead>
<tr>
<th>Heritage item name</th>
<th>Number (if applicable)</th>
<th>Potential impacts</th>
<th>Mitigation measures</th>
</tr>
</thead>
</table>
| Orchard Hills Cumberland Plain Woodland | CHL 105317 RNE 102211 | Potential impacts to the Orchard Hills Cumberland Plain Woodland Commonwealth Heritage Place (CHP) as a result of the project include impacts to the natural heritage values and impacts to the historic heritage values of the site as summarised below:  
  Natural heritage impacts would be related to:  
  - Clearing of around 9.68 ha of moderate to low significance native vegetation within the western periphery of the CHP including two relic trees located within the north-western portion of the CHP  
  - The regrowth natural vegetation communities impacted have been identified as having a reasonable tolerance for change, while the relic trees have a low tolerance for change  
  - Additional potential impacts to natural heritage values may include degradation of ecological condition by proliferation of weed species at the CHP, Introduction / disturbance of pathogen and/or disease vectors and indirect impacts to fauna from light pollution (construction and operation).  
  Historic heritage impacts would be related to:  
  - Impacts to historic heritage as a result of physical damage to northern section of canal adjacent to The Northern Road, located within the south-western portion of the CHP. | 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  
  - Archival photographic recording would be undertaken of the canal. |
<p>| Warragamba Dam to Prospect Reservoir pipeline | - | No impact expected | None required |</p>
<table>
<thead>
<tr>
<th>Heritage item name</th>
<th>Number (if applicable)</th>
<th>Potential impacts</th>
<th>Mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miss Lawson’s Guesthouse site</td>
<td>-</td>
<td>Physical damage to entire site</td>
<td>Detailed salvage archaeological investigation of the site</td>
</tr>
<tr>
<td>Lawson’s Inn Site</td>
<td>LLEP 53</td>
<td>Physical damage to part of the site</td>
<td>Detailed salvage archaeological investigation of the site</td>
</tr>
</tbody>
</table>
Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to prepare a non-Aboriginal heritage assessment in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

The register searches undertaken for this report are current only at the date that a particular register was searched, as noted in the report. Heritage sites may be added to or removed from heritage registers at any time and users of this report should check that sites have not been added or removed from a particular register since the date the register was searched.

This report has been prepared on behalf of, and for the exclusive use of, Jacobs’s Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.
1. Introduction

1.1 Project background

Roads and Maritime Services (Roads and Maritime) is seeking approval to upgrade about 16 km of The Northern Road between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park (the project). The location and regional context of the project is provided in Figure 1-1. An overview of the project is shown on Figure 1-2.

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). The 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 about 100 m south of Glenmore Parkway, Glenmore Park (three general traffic lanes and a kerbside bus lane in each direction separated by a 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 bisects the Western Sydney Airport site and to bypasses Luddenham
- About eight kilometres of upgraded and widened road between the existing Elizabeth Drive, Luddenham and about 100 m south of Glenmore Parkway, Glenmore Park
- Closure of the existing The Northern Road through the Western Sydney Airport site
- Tie-in works with the following projects:
  - The Northern Road Upgrade, between Peter Brock Drive, Oran Park and Mersey Road, Bringelly (to the south)
  - The Northern Road Upgrade, between Glenmore Parkway, Glenmore Park and Jamison Road, South Penrith (to the north)
- New intersections including:
  - A traffic light intersection connecting the existing The Northern Road at the southern boundary of the Western Sydney Airport, incorporating a dedicated u-turn facility on the western side
  - A traffic light intersection for service vehicles accessing the Western Sydney Airport, incorporating 160 m of new road connecting to the planned airport boundary
  - A traffic light intersection connecting the realigned The Northern Road with the existing The Northern Road (west of the new alignment) south of Luddenham
  - A ‘give way’ controlled intersection (that is, no traffic lights) connecting the realigned The Northern Road with Eaton Road (east of the new alignment, left in, left out only)
  - A four-way traffic light intersection formed from the realigned Elizabeth Drive, the realigned The Northern Road and the existing The Northern Road, north of Luddenham
  - A traffic light intersection at the Defence Establishment Orchard Hills entrance, incorporating a u-turn facility
- New traffic lights at four existing intersections:
  - Littlefields Road, Luddenham
  - Kings Hill Road, Mulgoa
  - Chain-O-Ponds Road, Mulgoa
  - Bradley Street, Glenmore Park incorporating a u-turn facility
- Modified intersection arrangements at:
  - Dwyer Road, Bringelly (left in, left out only)
Non-Aboriginal Heritage

- Existing Elizabeth Drive, Luddenham (left out only)
- Gates Road, Luddenham (left in only)
- Longview Road, Luddenham (left in, left out only)
- Grover Crescent south, Mulgoa (left in only)
- Grover Crescent north, Mulgoa (left out only)

- Dedicated u-turn facilities at:
  - The existing The Northern Road at Luddenham, south-west of Elizabeth Drive
  - The existing Elizabeth Drive, Luddenham around 800 m east of The Northern Road
  - Chain-O-Ponds Road, Mulgoa

- Twin bridges over Adams Road, Luddenham

- Local road changes and upgrades, including:
  - Closure of Vicar Park Lane, east of the realigned The Northern Road, Luddenham
  - Eaton Road cul-de-sac, west of the realigned The Northern Road, Luddenham
  - Eaton Road cul-de-sac, east of the realigned The Northern Road, Luddenham
  - Elizabeth Drive cul-de-sac, about 300 m east of The Northern Road with a connection to the realigned Elizabeth Drive, Luddenham
  - Extension of Littlefields Road, east of The Northern Road, Mulgoa
  - A new roundabout on the Littlefields Road extension, Mulgoa
  - A new service road between the Littlefields Road roundabout and Gates Road, including a 'give way' controlled intersection (that is, no traffic lights) at Gates Road, Luddenham
  - Extension of Vineyard Road, Mulgoa between Longview Road and Kings Hill Road
  - A new roundabout on the Vineyard Road extension at Kings Hill Road, Mulgoa

- A new shared path on the western side of The Northern Road and footpaths on the eastern side of The Northern Road

- A new shared path on the western side of The Northern Road and footpaths on the eastern side of The Northern Road where required

- The upgrading of drainage infrastructure

- Operational ancillary facilities including:
  - Heavy vehicle inspection bays for both northbound and southbound traffic, adjacent to Grover Crescent, Mulgoa and Longview Road, Mulgoa respectively
  - An incident response facility on the south-western corner of the proposed four-way traffic light intersection at Elizabeth Drive, Luddenham

- New traffic management facilities including variable message signs (VMS)

- Roadside furniture and street lighting

- The relocation of utilities and services

- Changes to property access along The Northern Road (generally left in, left out only)

- Establishment and use of temporary ancillary facilities and access tracks during construction

- Property adjustments as required

- Clearance of undetonated explosive ordinance (UXO) within the Defence Establishment Orchard Hills as required.
The Northern Road upgrade - Mersey Road to Glenmore Parkway

Figure 1-1 | Location of the project

Legend
- The Northern Road upgrade - Mersey Road to Glenmore Parkway
- The Northern Road
- Western Sydney Airport site (Commonwealth Land)
- Defence Establishment Orchard Hills
- Western Sydney Priority Growth Area
- Western Sydney Employment Area
- South West Priority Growth Area
- Reserves and parklands
- Growth centres
- Built areas
BRINGELLY
Tie-in with The Northern Road Upgrade, Peter Brock Drive to Mersey Road

- Changed to left in, left out only to Campbelltown
- Six-lane divided road separated by a wide central median
- A signalised intersection for service vehicle access to the Western Sydney Airport
- Closure of the existing The Northern Road through the Western Sydney Airport
- Eight kilometres of new road between Mersey Road and just south of Elizabeth Drive
- A signalised intersection connecting the new The Northern Road with the existing The Northern Road
- Eaton Road - cul-de-sac west of The Northern Road
- Eaton Road - cul-de-sac east of The Northern Road
- A signalised intersection connecting the existing The Northern Road at the southern boundary of the Western Sydney Airport, incorporating a dedicated u-turn facility on the western side
- U-turn facility
- New bridge over Adams Road
- An un-signalised (give way controlled) intersection connecting the new The Northern Road with the Eaton Road (east of the new alignment, left in, left out only)
- Eaton Road - cul-de-sac east of The Northern Road
- Closure of Vicar Park Lane east of the realigned The Northern Road
- Eaton Road - cul-de-sac west of The Northern Road
- An incident response facility located on the southwestern corner of the proposed four-way signalised intersection at Elizabeth Drive (pending provision of funding)
- U-turn facility
- A four-way signalised intersection at Elizabeth Drive and the existing The Northern Road
Eight kilometres of upgraded and widened road between Elizabeth Drive and Glenmore Parkway

New traffic signals

A signalised intersection at Defence Establishment Orchard Hills incorporating a u-turn facility on the western side

Northbound heavy vehicle inspection bays

A new roundabout on the Vineyard Road Extension at Kings Hill Road

Grover Crescent north (left out only)

Un-signalised intersection (give way controlled)

A new service road connecting Littlefields Road roundabout and Gates Road

WaterNSW supply pipeline

Western Sydney Airport site (Commonwealth Land)

Defence Establishment Orchard Hills (Commonwealth Land)

Commonwealth Lands

The Northern Road upgrade - Mersey Road to Glenmore Parkway

The Northern Road (Existing)

WaterNSW supply pipelines

Figure 1-2 | Overview of the project
The project assessed in this EIS does not include surveys, test drilling, test excavations, geotechnical investigations or other tests, surveys, sampling or investigation for the purposes of the design or assessment of the project.

The upgrade of The Northern Road is part of the Western Sydney Infrastructure Plan (WSIP). The WSIP involves major road and transport linkages that would capitalise on the economic gains from developing the Western Sydney Airport whilst boosting the local economy and liveability of western Sydney. This EIS provides an assessment of the impact of The Northern Road Upgrade between Mersey Road, Bringelly and Glenmore Parkway, Glenmore Park.

Jacobs Group (Australia) Pty Ltd (Jacobs) was commissioned by Roads and Maritime Services (Roads and Maritime) to undertake an assessment of the potential environmental impacts of the project, and prepare an Environmental Impact Statement (EIS) in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) that adequately addresses the requirements of those Acts.

### 1.2 Location of the project and study area

The Northern Road is about 45 km west of the Sydney central business district and traverses the local government areas of Penrith in the north and Liverpool in the south.

The Northern Road is a key north–south road between Narellan and Richmond, connecting the North West and South West Priority Growth Areas (see Figure 1-1). The corridor intersects with a number of regional motorway, arterial and collector roads such as (north to south) Richmond Road, Great Western Highway, M4 Motorway, Elizabeth Drive, Bringelly Road, and Camden Valley Way.

South of Glenmore Parkway, the project is surrounded by rural residential zoned land as well as pastures and grasslands. Land to the east of The Northern Road in this section is occupied by the Commonwealth Defence Establishment, Orchard Hills. Further south, The Northern Road passes through the village of Luddenham (including a small number of residential and commercial properties), before continuing through agricultural grasslands to its junction with Mersey Road (the northern extent of The Northern Road Upgrade, between Peter Brock Drive, Oran Park and Mersey Road, Bringelly).

A three and half kilometre section of the existing The Northern Road alignment bisects the Western Sydney Airport site south-east of the Luddenham town centre.

The regional context and location of The Northern Road Upgrade is provided on Figure 1-1.

The study area for the purpose of this assessment is defined at different stages in the assessment process. In summary, the study area for the desktop assessment was based on previous studies undertaken in the area as well as a search radius of 500 m for all online database searches of heritage registers. This and a review of aerial imagery informed the identification of locations for the field survey (Figure 4-22). The assessment of impacts was based on areas where the construction footprint overlaps with the curtilage of identified heritage items (Section 7).
1.3 **Aim and scope of assessment**

As part of preparing the EIS, this non-Aboriginal heritage impact assessment identifies the non-Aboriginal heritage items within and immediately adjacent to the project (i.e., the study area), assesses the potential impacts on the heritage items from the proposed project activities, and develops measures to address impacts. The non-Aboriginal heritage impact assessment addresses archaeology, heritage items, and conservation areas, in accordance with NSW Heritage Branch guidelines, and the Australia ICOMOS Charter for Places of Cultural Significance (Burra Charter).

Table 1-1 lists the Secretary’s Environmental Assessment Requirements (SEARs) and Commonwealth EIS Guidelines of relevance to this report and where in the report they are addressed.

**Table 1-1: NSW and Commonwealth Environmental Assessment Requirements**

<table>
<thead>
<tr>
<th>Secretary’s Environmental Assessment requirement</th>
<th>Where addressed in this report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts to State and local historic heritage (including conservation areas, built heritage, landscapes and archaeology) should be assessed. Where impacts to State or locally significant historic heritage are identified, the assessment shall:</td>
<td>The methodology outlined for the assessment is provided in Sections 3.2.2, 4.1, and 5.1. Details of the qualifications of the heritage consultants undertaking this assessment are provided in Table 1-2.</td>
</tr>
<tr>
<td>• be undertaken by a suitably qualified heritage consultant(s) with relevant heritage expertise (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council’s Excavation Director criteria),</td>
<td></td>
</tr>
<tr>
<td>• Include a statement of heritage impact for all heritage items/conservation areas to be impacted (including significance assessment). This should include detailed mapping of all heritage items and how they are affected by the proposal,</td>
<td>Statements of heritage impact are provided in Section 0 and significance assessments are provided in Section 5. Heritage items located within the study area are shown on Figure 5-1.</td>
</tr>
<tr>
<td>• Include details of any proposed mitigation measures (architectural and landscape),</td>
<td>Proposed mitigation measures are outlined throughout Section 0 and summarised in Section 8.1.</td>
</tr>
<tr>
<td>• Consider impacts from, including but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant),</td>
<td>Statements of heritage impact which consider direct and indirect impacts are provided in Section 0.</td>
</tr>
<tr>
<td>• Detail proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures), which are developed consistent with the guidelines in the NSW Heritage Manual (Heritage Office and DUAP 1996),</td>
<td>Proposed mitigation measures are outlined throughout Section 0 and summarised in Section 8.1.</td>
</tr>
<tr>
<td>• Include provision of future mitigation strategies for all identified archaeological impacts that would arise from the proposal, and</td>
<td>Proposed mitigation measures are outlined throughout Section 0 and summarised in Section 8.1.</td>
</tr>
<tr>
<td>• Where physical archaeological test excavations are proposed, develop an appropriate archaeological assessment methodology, including research design, in consultation with the Heritage Council of New South</td>
<td>Mitigation measure, including the requirement for salvage excavation to be undertaken in accordance with the Heritage Division of OEH guidelines</td>
</tr>
</tbody>
</table>
1.4 Authorship of assessment

This report has been prepared by Jennifer Chandler (Project Archaeologist, Jacobs) and Sally Waller (Senior Ecologist and Spatial Consultant, Jacobs). The field survey was undertaken by Jennifer Chandler, and Amanda Goldfarb (Project Archaeologist, Jacobs). Overview of the assessment including a technical review of the report was undertaken by Dr Karen Murphy (Technical Leader (Historical Heritage), Jacobs). Additional historical research was undertaken by Robert Williamson (Legal Searcher). Mapping was prepared by Ajay Arcot (Senior Spatial Consultant, Jacobs).

Jennifer has over ten years’ experience in the cultural heritage industry, and has worked in Victoria, New South Wales, Western Australia and Thailand. She has conducted numerous cultural heritage assessments for state government departments, utilities companies and private developers. Jennifer has recorded Aboriginal and non-Aboriginal heritage places, completed and organised environmental pedestrian field surveys, undertaken manual sub-surface testing and salvage excavation, and has experience in artefact analysis. She is also skilled in liaising with stakeholders from all aspects of the community.

Sally has over 13 years’ professional experience in ecology and spatial science and has over ten years’ experience working on a variety of Commonwealth projects across Australia. Sally’s strengths include plant and landscape ecology, GIS and mobile mapping. She is experienced with the terrestrial ecology of inland, montane and coastal Australia (Qld, NSW, ACT, Vic, Tas, WA) and Papua New Guinea. Sally is also familiar with wetland and marine ecology. Sally is proficient in the application of Commonwealth and interstate legislation as relevant to Commonwealth land. Sally has contributed her project management and technical skills to a variety of single and multidisciplinary projects (e.g. ecological, heritage, noise, planning, spatial, infrastructure upgrade.
and land contamination disciplines). Sally’s technical experience includes flora and fauna (including threatened species) surveys, assessments, management, monitoring and related GIS (mapping), remote sensing and spatial data analyses. Sally has also produced various natural heritage assessments for activities on Commonwealth land.

Amanda has authored, co-authored and contributed to a variety of reports, including Environmental Impact Assessments, Environmental Effects Statements, Heritage Impact Assessments, Cultural Heritage Management Plans (CHMPs), Due Diligence Reports, and Archaeological Assessment Reports. She has recorded Aboriginal and historical sites, completed environmental field surveys, performed and supervised salvage and sub-surface excavations, and has experience in artefact analysis, liaising with stakeholders, archaeological photography and stratigraphic illustration.

Karen has 15 years’ experience in historical heritage management in government, academic and consultancy roles. She has comprehensive knowledge of Australian heritage legislative and policy frameworks, and experience in the development of heritage policy and legislative guidelines for the Queensland government. Karen has undertaken heritage projects in all states in Australia for local, state and federal government, and infrastructure development groups. Karen has skills and experience in historical heritage assessment, conservation management plans, impact assessment, historical research and the supervision and management of survey, excavation and artefact analysis. She has recently been appointed as the alternate archaeology member on the Heritage Council of Victoria.

The qualifications of each heritage consultant are provided in Table 1-2.

**Table 1-2: Heritage consultants undertaking this assessment**

<table>
<thead>
<tr>
<th>Name</th>
<th>Qualifications</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Karen Murphy</td>
<td>PhD (Historical Archaeology)</td>
<td>Management and direction of overall assessment</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Arts (Honours) (Archaeology)</td>
<td>Technical review of report</td>
</tr>
<tr>
<td>Jennifer Chandler</td>
<td>Master of Cultural Heritage</td>
<td>Field survey</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Archaeology (Honours)</td>
<td>Writing and preparation of report</td>
</tr>
<tr>
<td></td>
<td>Honours thesis: Historical heritage</td>
<td></td>
</tr>
<tr>
<td>Sally Waller</td>
<td>Masters GIS and Remote Sensing</td>
<td>Writing of natural heritage sections of report</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science (Environmental and Analytical)</td>
<td></td>
</tr>
<tr>
<td>Amanda Goldfarb</td>
<td>Bachelor of Arts/Bachelor of Science (Archaeology, English, Physics)</td>
<td>Field survey</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Arts (Honours – Archaeology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Masters of Arts (Archaeology)</td>
<td></td>
</tr>
</tbody>
</table>
2. Legislative framework

2.1 State legislation

2.1.1 Environmental Planning and Assessment Act 1979

The Environmental Planning and Assessment Act 1979 (EP&A Act) requires that environmental impacts are considered in land-use planning, including impacts on Aboriginal and non-Aboriginal heritage. Various planning instruments including Local Environmental Plans (LEP) prepared under the EP&A Act identify permissible land use and development constraints. The development of LEPs is governed under the provisions of Part 3, Division 4 of the EP&A Act. The Secretary of the NSW Department of Planning and Environment is required to issue SEARs upon receiving an application for approval of State Significant Infrastructure. The EIS prepared as part of this process must address impacts to heritage as required by the SEARs under Part 5.1 of the EP&A Act.

2.1.2 Heritage Act (NSW) 1977

The Heritage Act 1977 (the Heritage Act) provides a number of mechanisms by which items and places of heritage significance may be protected. The Heritage Act is designed to protect both listed heritage items, such as standing structures and potential archaeological remains or relics. Different parts of the Heritage Act deal with these different situations.

Approvals under Part 4 or an excavation permit under s139 of the Heritage Act are not required for an approved project under Part 5.1 of the EP&A Act, however, this assessment follows the intent of the Heritage Act and the conditions of the approval which are based upon the Heritage Act requirements.

2.1.2.1 State Heritage Register

The Heritage Council of NSW maintains the State Heritage Register (SHR). Only those items which are of state-level heritage significance in NSW are listed on the SHR. Listing on the SHR controls activities such as alteration, damage, demolition and development.

Approved projects to which Part 5.1 of the EP&A Act applies do not require approval under Part 4 of the Heritage Act (e.g. a Section 60 approval) for items on the SHR. However, Part 5.1 projects must assess impacts and outline proposed heritage management and mitigation measures.

2.1.2.2 Archaeological relics

Part 6 Division 9 of the Heritage Act protects archaeological ‘relics’ from being ‘exposed, moved, damaged or destroyed’ by the disturbance or excavation of land. This protection extends to the situation where a person has ‘reasonable cause to suspect’ that archaeological remains may be affected by the disturbance or excavation of the land. It applies to all land in NSW that is not included in the SHR. A ‘relic’ is defined by the Heritage Act as:

Any deposit, object of material evidence which relates to the settlement of the area that comprises NSW, not being Aboriginal settlement, and has local or state significance.

Section 139 of the Heritage Act requires any person who knows or has reasonable cause to suspect that their proposed works would expose or disturb a ‘relic’ to first obtain an Excavation Permit from the Heritage Council of NSW (pursuant to section 140), unless there is an applicable exception (pursuant to section 139(4)). In cases where a Section 139 permit is not required for projects assessed under Part 5.1 of the EP&A Act, works would need to be conducted in accordance with the intent of the Heritage Act.

Section 146 of the Heritage Act requires any person who is aware or believes that they have discovered or located a relic must notify the Heritage Council of NSW providing details of the location and other information required.
2.2 Commonwealth heritage legislation

2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act includes 'national heritage' as a matter of National Environmental Significance and protects listed places to the fullest extent under the Constitution. It also establishes the National Heritage List (NHL) and the Commonwealth Heritage List (CHL).

For proposed actions situated on Commonwealth land or which may impact on Commonwealth land, the guidelines *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2)* apply. The guidelines require the proponent to undertake a self-assessment process to decide whether or not the action is likely to have a significant impact on the environment, including the heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the the Australian Government Minister for the Environment and Energy (the Minister) for approval.

The following is a description of each of the heritage lists and the protection afforded places listed on them.

2.2.1.1 Commonwealth Heritage List

The CHL is established under the EPBC Act. The CHL is a list of properties owned by the Commonwealth that have been assessed as having significant heritage value. Any proposed actions on CHL places must be assessed for their impact on the heritage values of the place in accordance with *Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies (Significant Impact Guidelines 1.2)*. The guidelines require the proponent to undertake a self-assessment process to decide whether or not the action is likely to have a significant impact on the environment, including the heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

Additionally, the EPBC Act (s341Y) requires CHL places to be managed in accordance with the Commonwealth Heritage management principles, which encourages identification, conservation and presentation of a place’s heritage values through applying best available skills and knowledge, community (including indigenous) involvement and co-operation between various levels of government. The principles are set out in Schedule 7B of the EPBC Regulations.

2.2.1.2 National Heritage List

The NHL is a list of places with outstanding heritage value to Australia, including places overseas. This means that a person cannot take an action that has, will have, or is likely to have, a significant impact on the national heritage values of a national heritage place without the approval of the Minister. Any proposed actions on NHL places must be assessed for their impact on the heritage values of the place in accordance with *Management of National Environmental Significance (Significant Impact Guidelines 1.1)*. The guidelines require the proponent to undertake a self-assessment process to decide whether or not the action is likely to have a significant impact on a matter of National Environmental Significance, including the national heritage value of places. If an action is likely to have a significant impact an EPBC Act referral must be prepared and submitted to the Minister for approval.

2.2.1.3 Register of the National Estate

The Register of the National Estate (RNE) was formerly compiled as a record of Australia’s natural, cultural and Aboriginal heritage places worth keeping for the future. Places on the RNE that are in Commonwealth areas, or subject to actions by the Australian Government, are protected under the EPBC Act by the same provisions that protect Commonwealth Heritage places. The RNE was frozen on 19 February 2007, which means that no new places have been added or removed since that time. From February 2012 all references to the RNE were removed from the EPBC Act. The RNE is maintained on a non-statutory basis as a publicly available archive.
3. Background

3.1 Historical context

There are several towns and areas associated with the study area: Orchard Hills and Glenmore Park in the north of the study area, Mulgoa in the centre and Luddenham in the south.

Europeans first arrived in the Orchard Hills area around 1804 when large land grants were made available. The area was considered suitable for grazing but smaller agricultural grants in areas of alluvial soil near creeks were also available. The Reverend Samuel Marsden had acquired land in the area in 1794, and in 1804 he received a grant of 1,030 acres for the development of a wool industry in the colony. His estate was named Mamre and crops of hemp and flax were also grown here. The homestead had a fruit orchard that was 20 acres in size. Large and small land grants were also made available in 1809, the largest being 2,000 acres, which went to Gregory Blaxland. Blaxland had arrived in the colony in 1805 and later became known for his exploration of the Blue Mountains with William Lawson and William Charles Wentworth. These grants were made to free settlers, public servants and emancipists. The land in the northern half of Orchard Hills, except for Marsden and Blaxland’s land became part of the Regentville estate (Paul Davies Pty Ltd 2007:196-198). In 1904 a Methodist Church was built in Orchard Hills and in 1910 a public school was opened to service the community that had grown through subdivisions in the area in 1888-1889. Residents comprised of farmers, railway employees, a dairymen and an orchardist. Today this rural area is utilised for market gardening and orchards (Paul Davies Pty Ltd 2007:199).

In the southern part of Orchard Hills, and part of the study area, a large allotment of Commonwealth government acquired land was first used by the Royal Australian Air Force (RAAF) and Royal Australian Navy (RAN) in the mid-1940s in a limited capacity. In the 1950s the RAAF established the No. 1 Central Ammunition Depot. The depot, which is now called Defence Establishment Orchard Hills, currently stores munitions, contains development facilities and is a training centre (Paul Davies Pty Ltd 2007:199).

The Mulgoa Valley, to the west of the study area, was first explored by Europeans when Captain Tench led an expedition along the Nepean River in 1789. There were further expeditions into the region over the next few decades with the surveying of Mulgoa Valley occurring in 1809. Land grants were made in Mulgoa, to the west of the study area, from 1810 until 1816. These grants were large blocks of land given to men with financial or official status. A large estate called Regentville was established by Sir John Jamison and had reached a size of 3,890 ha by 1834 (Paul Davies Pty Ltd 2007:169). The carriage drive approach to the house from Penrith overlaps with present day Glenmore Park. The estate was sold in 1847, and in the early 1860s the central section of the estate was subdivided into farms ranging from 23 to 51 acres in size (Paul Davies Pty Ltd 2007:103). The more recent suburban development of Glenmore Park occurred in the late 1980s when the area was developed by Penrith City Council (Paul Davies Pty Ltd 2007:104).

In the Luddenham region, early settler John Blaxland (brother of Gregory Blaxland) was granted 6,710 acres in 1813. The land, which overlapped with the study area, was called ‘Luddenham’ and was used primarily for cattle and sheep grazing. The western portion of Blaxland’s property, near the Nepean River, was developed with buildings, water and grain storage structures and a brewery. However, the eastern portion, located near the current Luddenham township remained undeveloped. Another early settler, D’Arcy Wentworth (father of William Charles Wentworth), was granted 1,200 acres of land located between The Northern Road and the Nepean River. The property was called ‘Greendale’ and overlapped with part of the study area (Australian Museum Consulting 2014:21-23).

Initially, travel into the region would have been difficult, but became easier in 1815 when the Western Road began to be constructed (Thorp 1986:12). The Northern Road, also known as Bringelly Road, was important as it connected the town settlement at Richmond with rural estates at Cowpastures (Camden). Elizabeth Drive, originally called Orphan Creek Road, connected the town settlement of Liverpool with the Mulgoa Valley (Paul Davies Pty Ltd 2007:41).

By 1859 the land around Luddenham had been subdivided and was for sale. An area called ‘Luddenham Village’ was subdivided into one acre and half acre blocks and was located on the eastern side of The Northern...
3.2 Heritage context

3.2.1 Previous heritage assessments

Western Sydney Airport EIS (RPS Manidis Roberts 2015)

An EIS was undertaken for the Western Sydney Airport project (RPS Manidis Roberts 2015). The north-west section of the study area overlaps with the current study area. The study included background research, field survey and test excavation. A total of 41 non-Aboriginal heritage items were identified and assessed within the study area. No previously unregistered heritage items were located within the current study area. One registered heritage item is located within the current study area:

- Lawson’s Inn – Lot 2 DP623457 - Liverpool Local Environmental Plan 2008 (LLEP). This heritage item was not considered further in the report as it was located outside the airport site area.

One previously unregistered heritage item is located adjacent to the current study area:

- The Northern Road alignment within the airport site – ‘The Northern Road alignment is considered to be historically significant as one of the earliest roads in the area, predating the subdivision of early land grants in the area’ (RPS Manidis Roberts 2015:63). This heritage item boundary is located adjacent to the project current area; however, The Northern Road extends into the current study area.

The report assessed The Northern Road alignment within the airport site as meeting the following Commonwealth heritage significance criterion:

- Events and processes – ‘The Northern Road has been an important historic thoroughfare linking the nascent communities of Camden and Windsor. Although it has been upgraded and alignments in some sections have changed, it has followed the same basic route since the early nineteenth century’

- Research – ‘The alignment of the road has been well mapped since its construction. However there may be areas of original alignment that demonstrate early road building techniques and materials (RPS Manidis Roberts 2015:143).

The report recommended that archaeological investigations be undertaken for ‘former parts of The Northern Road alignment, particularly in the vicinity of St Francis Xavier Church, should be undertaken to identify whether early road construction technologies such as corduroy were used in the alignment’ (RPS Manidis Roberts 2015:77). The St Francis Xavier Church section of The Northern Road is located around 900 m south of the current study area.

The Northern Road Stage 4, Route Options Assessment (Artefact Heritage 2015)

A route options assessment was undertaken for Stage 4 of the study area (Artefact Heritage 2015). The report assessed the non-Aboriginal heritage constraints for 12 route options within a large study area which encompassed the Luddenham and Western Sydney Airport bypass area (north of the Warragamba Dam to Prospect Reservoir pipeline near Gates Road is not included). A total of 13 registered historical heritage items were identified within their study area. The following is located within the current study area:

- Lawson’s Inn Site (listed on the Liverpool LEP (LLEP)

The report identified five additional potential historical heritage items:

- Lawson’s Inn site – the consultants concluded from preliminary research that the LEP-listed site of Lawson’s Inn has been incorrectly located on the western side of The Northern Road. Eaton Road is therefore the original road alignment of the Northern Road, and the Lawson’s Inn site is actually located between Eaton Road and The Northern Road (i.e. to the east of The Northern Road). The consultants undertook a site inspection in 2015 and identified potential archaeological features including two in-filled
stone lined wells or reservoirs, European trees, worked sandstone blocks a potential former road cutting and possible sandstone gatepost base on a property to the north of Eaton Road (Artefact Heritage 2015: Figure 27). They also noted that the property owner had identified this site as the location of Lawson’s Inn, which was demolished in the 1940s (Artefact Heritage 2015:24-25). The report also mapped the potential site of the former Lawson’s Inn (Artefact Heritage 2015: Figure 27) but no survey results were provided for this particular location. Both the area north of Eaton Road and the area between Eaton Road and The Northern Road are located within the current study area

- Chapel and School site – the consultants concluded from preliminary research that a small chapel and school marked on a 1859 plan as being located near Lawson’s Inn is likely to be situated on the northern side of Eaton Road. This area overlaps with a number of current residences (Artefact Heritage 2015:28). Part of this area is located within the current study area with the remainder located immediately adjacent to the current study area

- Harris’s cottage – a subdivision plan from 1864 indicated that there was a single building located in the fork of a watercourse between two dams. After examining modern aerial photography the consultants concluded that there was potential for archaeological remains associated with the original homestead (Artefact Heritage 2015:29). This site area is located about 200 m west of the current study area

- Earlier alignments of The Northern Road – as Eaton Road represents an earlier alignment of The Northern Road there is potential for uncovering previous road structures in this location (Artefact Heritage 2015:33). Eaton Road is located within the current study area

- Dairy shed and well/cistern – originally identified in an earlier historical heritage report (Badgerys Creek Initial Environment Survey, Australian Museum Consulting 2014), it was noted that the location of these items were difficult to ascertain. A possible location was identified on the corner of Adams Road and Jamison Road however the consultants suggested that it may be further along Adams Road in a more rural setting (Artefact Heritage 2015:33). The location originally suggested by Australian Museum Consulting (2014) is 150m north of the current study area; however, Adams Road intersects with the current study area further away from Luddenham which corresponds with the location predicted by Artefact Heritage (2015).

**Western Sydney Infrastructure Plan. Northern Road Upgrade Preliminary Environmental Investigation (ngh environmental 2015)**

A Preliminary Environmental Investigation was undertaken for the Northern Road Upgrade as part of the Western Sydney Infrastructure Plan (ngh environmental 2015). The large study encompassed the current study area. Part of the assessment included an overview of the local historic areas, and a search of heritage registers. The register search identified:

- one Commonwealth Heritage item – Orchard Hills Cumberland Plain Woodland
- eight Liverpool LEP heritage items – Lawson’s Inn Site, Luddenham Public School, Vicary's Winery Group, Vicary's Winery Horse Shed (Former), Vicary's Winery Main House and Garden, Vicary's Winery Vineyard, Vicary's Winery Woolshed and Vicary's Winery, Wine Tasting and Cellar Door Sales Building
- eight Penrith LEP heritage items – two brick cottages in Luddenham, Luddenham Progress Hall, Luddenham Uniting Church, Luddenham Uniting Church Cemetery, St. James Church of England Cemetery, St. James Church of England, timber cottages in Luddenham.

Two of the listed historical heritage items are located within the current study area: Orchard Hills Cumberland Plain Woodland (CHL listed) and Lawson’s Inn site (LLEP listed). The report noted that many roads in the area are from the early settlement of the western Sydney area and there is potential of uncovering previous road structures in the current study area (ngh environmental 2015:53).

**Badgerys Creek Initial Environmental Survey: Historic Heritage (Australian Museum Consulting 2014)**

An Initial Environmental Survey for historical heritage was undertaken for Commonwealth-owned land at Badgerys Creek by Australian Museum Consulting in 2014 on behalf of the Western Sydney Unit of the Commonwealth Department of Infrastructure and Regional Development. Part of the study area overlaps with the current study area, south of Luddenham. The field survey for the assessment identified two potential heritage items, one of which is in the current study area:
• B9 – Former Lawson’s Inn Site (The Thistle site), 2155 The Northern Road, Luddenham. The assessment identified that there may be some confusion relating to the location of Lawson’s Inn and that the actual location of the inn is within land between The Northern Road and Eaton Road, instead of to the west of The Northern Road (where the LLEP site is mapped). The report noted that the archaeological remains of the inn would likely have some integrity due to lack of substantial development in the area and that the site would be considered to be a state significant archaeological site (Australian Museum Consulting 2014:56).

The following heritage item may also be located within the study area:

• L11 – Dairy Shed, Lot 10 Adams Road, Luddenham. The report noted that the dairy shed was originally identified in a previous report by Godden Mackay in 1997. The address in the report was not able to be re-located (see also Artefact Heritage 2015 discussion above). The report details dairy sheds and a cistern or well which are likely to have some archaeological potential. The authors concluded that the dairy should be located and an assessment undertaken to determine the extent, if any, of impacts arising from any future development in the vicinity (Australian Museum Consulting 2014:66). There is a possibility that the dairy is located within the current study area.

Heritage Management Plan for Defence Establishment Orchard Hills (Godden Mackay Logan 2013)

The Defence Establishment at Orchard Hills (DEOH) is Commonwealth land and has been identified on the CHL as a place with Commonwealth heritage values (natural, Indigenous and historic values), listed as ‘Orchard Hills Cumberland Plain Woodlands’. The western periphery of this Commonwealth Heritage Place (CHP) overlaps with the eastern portion of the project, adjacent to the eastern edge of the existing The Northern Road. The natural and historic values of the site are considered relevant to this assessment and are considered further throughout this report.

A Heritage Management Plan (HMP) (Godden Mackay Logan 2013) was undertaken for the DEOH. Site inspections were undertaken as part of the development of the HMP to verify and update the heritage values of the site and identify heritage features (Godden Mackay Logan 2013). The HMP includes an assessment of the heritage values of the site, including a significance ranking for both the natural and historic heritage values of the site. Further the HMP assigns a tolerance for change ranking to different elements of the natural and historic heritage of the site, including an overall whole of site approach in relation to any new development, demolition and remediation works on the site.

The HMP takes account of the requirements of the EPBC Regulations including Schedule 7B in relation to the Commonwealth Heritage management principles. Heritage management strategies and guidelines are outlined in the plan to address the principles and to ensure the conservation of heritage values across the site. Therefore by reviewing and incorporating relevant aspects of the HMP into this assessment, including the significance and tolerance for change rankings of potentially impacted areas, the Commonwealth Heritage management principles are considered to be complied with through this assessment.

The report outlines three phases of development that occurred on the land:

• Phase 1: Early European Settlement (1804-1880s);
• Phase 2: Orchards, Grazing and Irrigation (1880s-1940s);
• Phase 3: Defence Use (1942-2012).

The DEOH is currently still used as a defence site. Within the HMP, the DEOH is divided into eight sectors each with different functions. The project is located adjacent to and partially within the following three sectors along the western periphery of the site:

• Sector A – Domestic area, contains housing, the working and living accommodation areas
• Sector B – Northern buffer
• Section H - Southern buffer zone.

Sector A is one of the sectors where development is concentrated. This is part of the DEOH site but does not form part of the area covered by the CHL. Sectors B and H are included in the areas where remnant natural landscape is concentrated. A map of the sectors is shown in Figure 3-1 below.
The natural environment of the Orchard Hills Cumberland Plain Woodlands CHP includes gently undulating topographic relief, dissected by Blaxland Creek and associated tributaries that generally flow towards South Creek. The natural heritage values of the site are mainly focused on its natural vegetation, which includes areas of original native vegetation (including very old relic trees) as well as the natural regrowth of these original plant communities (Godden Mackay Logan 2013).

The CHP has experienced some historic and on-going disturbance. Native vegetation covers approximately 30% of the site and includes forest, woodland and regrowth thickets of good condition, despite weed incursion from the Defence Estate Orchard Hills, located in the centre of the CHP (Godden Mackay Logan 2013). This includes small remnants and regenerating areas of Cumberland Plain Woodland, Castlereagh Ironbark Forest and Sydney Coastal Riverflat Forest (River Flat Eucalypt Forest) persist, particularly in the eastern portion of the CHP. Cumberland Plain Woodland is listed as a critically endangered ecological community at both state (Cumberland Plain Woodland in the Sydney Basin Bioregion) and Commonwealth levels (Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest). The CHP is considered a core biodiversity area for the conservation of these communities, and the place comprises the least disturbed and largest remaining remnant of Cumberland Plain Woodland (Godden Mackay Logan 2013).

Historic tree clearing and introduction of improved pastures has caused a reduction in deep rooted tree cover and native grass cover across the CHP. The reduction in deep rooted trees and land management practices (e.g. mowing, slashing, overgrazing of opportunistic herbivores, such as stock, macropods and rabbits) has led to reduced surface water infiltration, increased runoff and raised groundwater levels, hence resulting in moderate to high saline soils that are prone to erosion and topsoil loss.

Figure 3-2 provides a map of the natural heritage significance of the CHP mapped within the DEOH site. The western periphery of the CHP which overlaps with the construction footprint, within Sectors B and H of the DEOH, has been identified to include areas of moderate to low natural heritage value being regenerating patches of vegetation occurring within largely cleared grasslands with a mixture of native and introduced species (Godden Mackay Logan 2013).

The natural heritage significance of aquatic fauna and its habitat has been ranked as moderate to high within areas of the DEOH, including areas within the CHP, as shown in Figure 3-3 (Godden Mackay Logan 2013).
Figure 3-2: Natural heritage significance of the Orchard Hills Cumberland Plain Woodland CHP (source: Godden Mackay Logan 2013)

Figure 3-3: Indicative aquatic habitat corridor on the DEOH site (source: Godden Mackay Logan 2013)
In relation to its historic heritage values, the HMP identifies the DEOH site as containing highly significant remnants of the Mulgoa Irrigation Scheme, located within the south-western section of the CHP. A survey was undertaken for the purpose of the HMP which investigated historical archaeological potential in seven sectors, including sectors H and B, some of which overlaps with the construction footprint along the western periphery of the CHP. During the survey it was noted that 95% of the irrigation canal still remains in comparison with a 1947 aerial of the canal. The remaining five per cent was impacted by straightening of The Northern Road. The following features were identified during the survey:

- Single and twin water channels, some with deep earth banking,
- Three terracotta culverts (across shallow first order water courses), and
- A bridge crossing a deeper second order water course (Godden Mackay Logan 2013: 70).

**Penrith Heritage Study (Paul Davies Pty Ltd 2007)**

A heritage study undertaken for the Penrith City Council in 2007 (Paul Davies Pty Ltd) included the current study area. The study found that despite the early development and history of the area, little physical fabric from this remains due to development (Paul Davies Pty Ltd 2007:24). Within the current study area the following suburbs were subject to the assessment: Glenmore Park, Mulgoa, Orchard Hills and Luddenham. The results for each suburb are summarised below and the heritage items within the current study area presented in Table 3-1.

- **Glenmore Park** - No potential heritage items were identified during fieldwork (Paul Davies Pty Ltd 2007:104).
- **Mulgoa** - Seven existing LEP heritage items, nine heritage items previously identified (Inventory of the Penrith Heritage Study 1987, and listed in Schedule 3 of the Sydney Regional Environmental Plan No.13 – Mulgoa Valley (gazetted 11 December 1987)) and six existing nominated heritage items were identified. None of these are within the current study area. During fieldwork four additional potential historical items were identified. One of these is located within the current study area.
- **Orchard Hills** - Six existing heritage items at the time of the fieldwork, and four existing nominated heritage items were identified. Three of these are relevant to the current assessment. During fieldwork seven additional potential historical heritage items were identified, with one being situated within the study area.
- **Luddenham** - Located in the southern section of the Penrith Heritage Study area, there were seven known heritage items, and one existing nominated heritage item identified. One of these is located within the current study area. During fieldwork an additional three potential heritage items were identified. One of these is located within the current study area.

<table>
<thead>
<tr>
<th>Suburb</th>
<th>Heritage item number</th>
<th>Heritage item name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulgoa</td>
<td>PC-07</td>
<td>Water Supply Pipelines</td>
<td>The water supply line between Warragamba dam and Prospect reservoir cuts across the southern half of the LGA. The dual pipelines of massive diameter set within a cleared easement are a prominent landmark in the region and demonstrate steel fabricating technology of their day. The pipeline however has no particular significance to the history of Penrith (Paul Davies Pty Ltd 2007:206).</td>
</tr>
<tr>
<td>Orchard Hills</td>
<td>PC-03</td>
<td>The Northern Road</td>
<td>The Northern Road was nominated for its historic interest as an early colonial road. While alignment of the road in following a narrow ridgeline continues to be of historic interest the road has been upgraded and roadside margin cleared of trees. The elevation of the road provides impressive views of the Blue</td>
</tr>
</tbody>
</table>
**Colonial Landscapes of the Cumberland Plain and Camden, NSW. A Survey of Selected Pre-1860 Cultural Landscapes from Wollondilly to Hawkesbury LGAs (Morris and Britton 2000)**

A heritage study of Colonial Landscapes of the Cumberland Plain and Camden was undertaken by Morris and Britton (2000). The study included a survey of selected pre-1860 cultural landscapes in the region. Early colonial landscapes are considered to be significant and they demonstrate the interaction between early European settlers with the Australian landscape. A number of potential heritage items relating to landscape heritage such as colonial farm estates in Mulgoa and Penrith were included in the study; however, none of these are located within the current study area.

**The Penrith Heritage Study (Thorp 1986)**

An earlier Penrith Heritage Study was undertaken by Thorp (1986). The study outlines a historical context for the Penrith region focussing predominantly on Penrith and St Marys. Five phases of development for the region were outlined comprising:

- 1789-1840: Discovery, exploration and the early settlement
- 1840-1863: Collapse and seeds of change
- 1863-1914: Expansion, subdivision and consolidation
- 1914-1939: Hiatus

Thorp (1986:51) noted that the new growth period, in which new industry and military presence created a housing demand, resulted in the development of large rural areas. This has impacted on remnants of old farms and orchards, such as old tracks, roads and agricultural plantings.

The report lists 47 heritage items in the suburb of Mulgoa which is located in the north-west of the study area. However, full addresses and/or property identifiers are not provided for the items in the report version available to the consultant for this current assessment.

The report outlines the types of historical sites present in the Penrith study area which includes service sites for the provision of particular services such as water. Irrigation areas created in the 1890s are listed as one of these site types. As well as dams, reservoirs, weirs and floodgates, a series of canals were also excavated. Thorp (1986:93-96) noted that these are still visible on the ground as a landscape modification.
3.2.2 Heritage register search results

A search of all available non-Aboriginal heritage registers was undertaken to identify heritage places within or immediately adjacent to the project (i.e. the study area). The following registers were searched using a combination of online databases and where available using spatial data in Global Information System format by Jennifer Chandler on 13 January 2016:

- NSW State Heritage Inventory
- NSW State Heritage Register (SHR)
- Roads and Maritime section 170 Heritage and Conservation Register
- National Trust of Australia (NSW) Register
- Register of National Estate (RNE)
- Commonwealth Heritage List (CHL)
- National Heritage List (NHL)
- World Heritage List
- Penrith Local Environmental Plan 2010 (PLEP)
- LLEP.

There are two registered heritage items within the study area - Lawson’s Inn site is listed on the LLEP, and Orchard Hills Cumberland Plain Woodland is listed on the CHL and RNE. The CHL listing includes reference to evidence of canals associated with the Chaffey Brothers irrigation scheme. There are no items listed on the SHR, section 170 registers, National Trust register, NHL or World Heritage List, within the study area. A list of registered heritage items located within the project is presented in Table 3-2. Table 3-3 lists registered heritage items located within 500 m of the project. The registered heritage items considered as part of this impact assessment are mapped in Figure 3-4.

<table>
<thead>
<tr>
<th>Heritage item name</th>
<th>Register</th>
<th>Number</th>
<th>Significance</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawson’s Inn site (former ‘The Thistle’ site)</td>
<td>LLEP</td>
<td>53</td>
<td>Local</td>
<td>2155 The Northern Road, Luddenham. Lots 1 and 2 DP 851626</td>
</tr>
<tr>
<td>Orchard Hills Cumberland Plain Woodland</td>
<td>CHL</td>
<td>105317</td>
<td>Commonwealth</td>
<td>The Northern Road, Orchard Hills</td>
</tr>
<tr>
<td></td>
<td>RNE</td>
<td>102211</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heritage item name</th>
<th>Register</th>
<th>Number</th>
<th>Significance</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willmington Reserve</td>
<td>LLEP</td>
<td>50</td>
<td>Local</td>
<td>17 Jamison Street, Luddenham Lot 7004, DP 93052</td>
</tr>
<tr>
<td>Luddenham Progress Hall</td>
<td>PLEP</td>
<td>119</td>
<td>Local</td>
<td>The Northern Road, Luddenham</td>
</tr>
<tr>
<td>Luddenham Uniting Church</td>
<td>PLEP</td>
<td>120</td>
<td>Local</td>
<td>The Northern Road, Luddenham</td>
</tr>
<tr>
<td>St James Anglican Church and Cemetery</td>
<td>PLEP</td>
<td>122</td>
<td>Local</td>
<td>The Northern Road, Luddenham</td>
</tr>
</tbody>
</table>
### 3.2.3 Review of aerial imagery

Current aerial imagery was viewed to identify areas of heritage potential prior to the field survey. A number of properties were identified where the nature of visible features or buildings were unable to be identified and may have some heritage potential. These identified areas formed the basis of the focus of the field survey.

Subsequent to the field surveys in February and April 2016, the project construction footprint was revised adding new areas for assessment. A desktop assessment of these new areas, including review of aerial imagery, background information and consideration of field results from other areas already assessed in the vicinity was undertaken. No areas were identified as having potential for previously unidentified heritage items during the desktop assessment. Two new study areas were situated within the heritage boundary of the Warragamba Dam to Prospect Reservoir pipeline. These two new areas were surveyed together with an additional two new areas associated with drainage works at the pipeline site. The survey results are included in Section 4.

### 3.2.4 Summary

Previous studies and heritage register searches have indicated that there are two registered heritage items located within the project construction footprint (Lawson’s Inn site and the Orchard Hills Cumberland Plain Woodland). A previous heritage assessment identified two previously nominated but unlisted heritage items (The Northern Road, and the Warragamba Dam to Prospect Reservoir pipeline) and two previously nominated heritage items relating to rural landscape in the west of the Orchard Hills locality and along The Northern Road. There are no registered heritage items immediately adjacent to the project. One heritage item, The Northern Road alignment, identified in a previous report is located immediately adjacent to the project. Those registered heritage items situated within 500 m of the project (Table 3-3) are a sufficient distance from the construction footprint to be unlikely to be impacted by the project, and are therefore not considered further in this assessment.

There is the potential for previously unidentified historical heritage items to be situated in the study area, based on the review of aerial imagery, and the nature of the previous heritage assessments which included limited field survey. Following a search of the above registers, and review of the previous literature, historical background and aerial imagery, the following types of historical heritage items are likely to be found in the study area:

- Houses, homesteads and other buildings associated with the settlement of the region
- Past rural uses related to agriculture and orcharding, including stockyards, fences, sheds and outbuildings, orchard trees, and wells.

### Table 3-3

<table>
<thead>
<tr>
<th>Heritage item name</th>
<th>Register</th>
<th>Number</th>
<th>Significance</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vicary’s Winery Group, including woolshed, slab horse shed, land area and main house and garden</td>
<td>LLEP</td>
<td>51</td>
<td>Local</td>
<td>The Northern Road, Luddenham. Part Lot 1, DP 838361</td>
</tr>
<tr>
<td>Luddenham Public School</td>
<td>LLEP</td>
<td>52</td>
<td>Local</td>
<td>The Northern Road, Luddenham. Lot 1, DP 194409</td>
</tr>
<tr>
<td>Scarred Tree and Aboriginal artefact scatter</td>
<td>PLEP</td>
<td>878</td>
<td>Local</td>
<td>Lot 200, Bradley Street, Glenmore Park Lot 200, DP 1162982</td>
</tr>
</tbody>
</table>
Figure 3-4 | Registered historical heritage items located within the study area
Figure 3-4 | Registered historical heritage items located within the study area
4. Field survey

4.1 Methodology

Prior to undertaking the historical heritage field survey, priority areas were identified using background information including aerial images, the predictive statement for historical site types, previous studies and field surveys, and historical heritage register listing. This provided a summary of target areas for survey.

The field survey was undertaken on 23-26 February and 5-6 April 2016 by Amanda Goldfarb (Project Archaeologist, Jacobs) and Jennifer Chandler (Project Archaeologist, Jacobs). The field survey areas was inspected on foot where grass was not long and there was access to the property. Some vehicle survey was also undertaken where grass was long and the property was large in size. In some cases the properties were viewed from the fence only.

A field survey of four additional areas relating to drainage works in the vicinity of the Warragamba Dam to Prospect Reservoir pipeline was undertaken on 20 September 2016 by Andrew Roberts (Senior Archaeologist, Jacobs). Photographs were taken of each survey area and notes made regarding relevant description and condition details. Mapping of features located during the surveys were undertaken using a DGPS Unit (Trimble® GeoXH™ GeoExplorer®) using GDA94/MGA55 for Eastings and Northings.

4.2 Limitations

Long grass and hot weather impacted on the field survey as there was very poor ground surface visibility and snake risk so some areas were not surveyed comprehensively, as follows:

- Lot A DP341629 and Lot A DP341893 (Survey area no. 3S-5) were viewed from the fence as there was no access to the properties. However, the location of the pipeline was able to be determined
- Lot 1 DP851626 (Survey area no. 4-16A) was surveyed by vehicle as there was very long grass present across the entire property
- Lot 21 DP258581 (Survey area no. 4-18) was not surveyed although a review of the aerial imagery indicated that there were no potential heritage items on the property.

Metadata for the spatial data used for calculations in this report is identified in Appendix A. The reliability of calculations provided in this report is limited to the reliability of that data.

Based on the large volume of current and relevant information available for the Orchard Hills Cumberland Plains Woodland CHP, the assessment of natural heritage values was prepared at a desktop level using existing information as outlined in Section 3.3 above. No additional field work was conducted in preparing the natural heritage assessment.

4.3 Results

The results of the historical heritage items known prior to survey are listed in Table 4-1. The detailed description, history and significance assessment are presented in Section 5. Targeted survey areas with potential for heritage items are listed in Table 4-2 and mapped in Figure 4-22. Where potential heritage items were identified during survey, this is noted in the results, with more detailed information and significance assessment provided in Section 5.

Table 4-1: Known historical heritage items surveyed

<table>
<thead>
<tr>
<th>Location</th>
<th>Item name</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot A DP341629</td>
<td>Warragamba Dam to</td>
<td>23/02/16</td>
<td>Survey undertaken from outside the gate on The Northern Road as access was restricted. Large steel pipeline on east/west alignment.</td>
</tr>
</tbody>
</table>
## Non-Aboriginal Heritage

<table>
<thead>
<tr>
<th>Location</th>
<th>Item name</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot A DP341893</td>
<td>Prospect Reservoir pipeline</td>
<td></td>
<td>Located underground at The Northern Road and emerges from ground about 100m from The Northern Road. This is a potential heritage item. A concrete aggregate slab in line with the pipeline is located in the road reserve. A circular piece of concrete is adjacent to the slab. This is not a potential heritage item.</td>
</tr>
<tr>
<td>2181 The Northern Road, Mulgoa Lot 3 DP238092</td>
<td>Orchard Hills Cumberland Plain Woodland (Chaffey Brothers Irrigation Scheme Canal)</td>
<td>06/04/16</td>
<td>Limited access to property so only canal (Chaffey Brothers Irrigation Scheme Canal) was surveyed. Canal traverses the property from the Warragamba Dam to Prospect Reservoir pipeline in the south, to an area opposite Grover Crescent in the north. Two canals side by side in some places with the westernmost canal a lot shallower. Two wooden features possibly related to the operation or construction of the canal were noted in the southern section, although they are outside the current construction footprint.</td>
</tr>
</tbody>
</table>

Figure 4-1: Pipeline, facing east. Photo taken by Jennifer Chandler from gate on The Northern Road on 23/02/16.

Figure 4-2: Concrete slab, facing west. Photo taken by Jennifer Chandler on 23/02/16.
## Non-Aboriginal Heritage

<table>
<thead>
<tr>
<th>Location</th>
<th>Item name</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot 21 DP614481</td>
<td>Chapel and school site</td>
<td>25/02/16</td>
<td>Identified in previous heritage study as having been the former site for a chapel and school. Modern houses are present on the site. The house within the construction footprint has cement sheeting and stumps. A row of palm trees is adjacent to the driveway and appear to be around 50 years old. Grassed triangular block to east of house was examined. Old fence adjacent to more modern one (timber and barbed wire). 0-5% ground surface visibility. No potential heritage items.</td>
</tr>
<tr>
<td>Lot 1 DP90157</td>
<td>Wells, stone gatepost and road cutting</td>
<td>25/02/16</td>
<td>Identified in previous heritage study as having some heritage features, such as wells. Cleared grassed paddock. Pieces of stone (squares/blocks) near the gate on Eaton Road and scattered across the paddock. A depression with stone blocks and wooden planks is about 100m north-east of the gate. The feature appears to be what was described in the previous heritage report as a well. A second feature is located about 20 m south-west of the first. It contains stone blocks on the edges of a depression. Both wells are filled. No well capping is visible, although the second well (south-west of first well) has stone rubble over the top. Paddock is used for cattle grazing. A cutting and possible gate post blocks listed in the previous heritage report were also observed. 5% ground surface visibility.</td>
</tr>
<tr>
<td>Location</td>
<td>Item name</td>
<td>Date surveyed</td>
<td>Results of survey</td>
</tr>
<tr>
<td>----------</td>
<td>-----------</td>
<td>---------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Lot 2 DP623457</td>
<td>Identified in several heritage reports as being the actual location for Lawson's Inn (not the LEP listed location).</td>
<td>26/02/16</td>
<td>Currently used to grow trees for Christmas tree business. There are currently rows of small trees and grass between rows has been recently slashed. Limited ground surface visibility. Fragments of glass and ceramic were found in a scatter 50 m x 2 m with a maximum density of about 2 per square metre. Glass appeared to be late 19th/early 20th century. Scatter was located in the north of the block, near Eaton Road. Stone blocks, which had been painted white, indicating a vehicle path, were found in centre of property. The property is adjacent to Eaton Road, The Northern Road former alignment.</td>
</tr>
</tbody>
</table>

Figure 4-5 : First well feature, facing north-east. Photo taken by Jennifer Chandler on 25/02/16.

Figure 4-6 : Second well feature, facing north-east. Photo taken by Jennifer Chandler on 25/02/16.
Figure 4-7: Assumed location of Lawson’s Inn, facing north. Photo taken by Jennifer Chandler on 26/02/16.

2215 The Northern Road, Luddenham Lots 1 & 2 DP851626

Lawson’s Inn site (LEP-listed location). This location is not historically correct.

26/02/16

This large block was heavily grassed and had a series of undulating rises with a drainage line cutting through the centre. Where the drainage line meets a dam, there is a cluster of trees (peppercorn and eucalypt). The peppercorn trees were noted in the LEP listing for Lawson’s Inn, however, no remains of the inn were located. The peppercorn trees were over 200 m from the current alignment of The Northern Road. Thick long grass across the property. Vehicular and pedestrian survey was undertaken over most of the area. 20th century dairy remains were located near The Northern Road. No historical features were identified. Visibility was 0%.

Remnants of The Northern Road

23/02/16
24/02/16
25/02/16

The three sections that were potentially remnants of The Northern Road were surveyed as part of these survey areas: Chapel and school site, 3S-3, 4-2 (detailed above and below).

Table 4-2: Other survey areas

<table>
<thead>
<tr>
<th>Survey Area No. ¹</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S-2</td>
<td>Lot 1 DP224861</td>
<td>23/02/16</td>
<td>Paddock located on slope. Grassed area with metal piles lying in the middle of the paddock. Used for grazing. No potential heritage items were identified. 0-5% ground surface visibility.</td>
</tr>
<tr>
<td>3S-3</td>
<td>Lot 1 DP569729</td>
<td>23/02/16</td>
<td>Located between a small private road and The Northern Road. Property has timber fencing (post and rail) and scattered trees. The house and sheds on the block are modern. The public road (Grover Crescent) is the old alignment of The Northern Road and is thus a potential heritage item.</td>
</tr>
</tbody>
</table>

¹ Survey Area No. was allocated according to design plans and project stage numbering for the project at the time of the survey and reflects the order that the areas were visited by the consultants.
<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S-4</td>
<td>Lots 41 &amp; 42 DP878814</td>
<td>23/02/16</td>
<td>Paddock/proposed road between Kingshill Road and Longview Road. Viewed from road, trees present and grass cover. No potential heritage items identified.</td>
</tr>
<tr>
<td>3S-5</td>
<td>Lot A DP341629&lt;br&gt;Lot A DP341893</td>
<td>23/02/16</td>
<td>Details in Table 4-1 above for Warragamba Dam to Prospect Reservoir pipeline</td>
</tr>
<tr>
<td>3S-6</td>
<td>Lot 3 DP238092</td>
<td>06/04/16</td>
<td>Details in Table 4-1 above for Orchard Hills Cumberland Plain Woodland.</td>
</tr>
<tr>
<td>3S-7</td>
<td>Lot 1 DP420840</td>
<td>23/02/16</td>
<td>Area is cleared and grassed with some clay surface visible. 20% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>3S-8</td>
<td>Lot 23 DP207317</td>
<td>23/02/16</td>
<td>An orchard containing pear/apple trees is at the back of the property. One row and a few partial rows of trees. Age is uncertain. Modern Colourbond shed and 1970s-1980s house. More fruit trees to the south-east of the house and cypress trees near the road. Potential heritage item.</td>
</tr>
</tbody>
</table>

Figure 4-8: Grover Crescent, facing south. Photo taken by Jennifer Chandler on 23/02/16.

Figure 4-9: Orchard, facing east. Photo taken by Jennifer Chandler on 23/02/16.
### Non-Aboriginal Heritage

<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S-9 Lot 1</td>
<td>DP109697</td>
<td>23/02/16</td>
<td>Located in large paddock with two dams. A few scattered trees. No potential heritage items identified. 0% ground surface visibility.</td>
</tr>
<tr>
<td>3S-10 Lot 2</td>
<td>DP202647</td>
<td>24/02/16</td>
<td>Mid-20\textsuperscript{th} century house located at the front of property adjacent to The Northern Road. House is constructed of cement sheeting with gabled corrugated iron roof. Rusted gutters. Louvre glass windows. Four water tanks (3 corrugated, 1 Colorbond). House is vacant and in poor condition. White painted wrought iron doors. House is on brick stumps. Timber weatherboards on south side of house at verandah. Timber present on side of roof. Separate structure to south of house, also cement sheeting. Roof is hipped, also corrugated. No potential heritage items identified.</td>
</tr>
<tr>
<td>3S-11 Lot s 9 &amp;10</td>
<td>DP26658</td>
<td>26/02/16</td>
<td>Located in Transgrid easement. Area is cleared and slopes up to the west. Swampy area near the Northern Road. Old pipes and a bathtub are present. Grass was long over 80% of the property with remaining areas slashed. Visibility was 0%. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-1 Lot 1</td>
<td>DP109697</td>
<td>23/02/16</td>
<td>Undulating paddocks with a dam in the middle of the lot. A small group of trees is located to the west of the dam comprising four exotic trees and a cypress tree. Unable to access this area closer. Thick ground cover. 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-2 Lot 502</td>
<td>DP580982</td>
<td>24/02/16</td>
<td>Historical information was provided by the current owner Malcolm Turner on 24 February 2016: Property contains slab hut, late 19\textsuperscript{th} century weatherboard house, old alignment of The Northern Road. There was a coolstore/dairy at the back of the property and another building located to the north-west of the house. The whole place is a potential heritage item.</td>
</tr>
</tbody>
</table>

![Figure 4-10: Orchard, facing south. Photo taken by Jennifer Chandler on 23/02/16.](image-url)
<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-3</td>
<td>Lot 1 DP200435</td>
<td>24/02/16</td>
<td>Viewed property from outside property fenceline. House appears modern on cleared and grassed block with a few scattered trees. Row of immature pines to rear and south-east of house. Dam and crops in south-east corner with sheds. 5% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-4</td>
<td>Lot A DP160890</td>
<td>24/02/16</td>
<td>Located on a bend of The Northern Road. Old house (mid-late 19th century) constructed from timber and stone. Hipped roof made from corrugated iron. Verandah out front with carport addition. Additional structure to rear of house has gabled roof and a chimney. Cream walls and green painted roof. To the south there is a green painted corrugated shed (19th century). Shed has timber beams and rafters. Shed is dilapidated in places. Beams are hand sawn. Potential animal run in the southern section of the shed. Stockyards are located next to the front of the shed. Owner (Maurice Pace, pers comm, 24/02/16) said that he bought the property in 1960 and was told the house and shed were 100 years old at that time. Potential heritage item.</td>
</tr>
</tbody>
</table>

Figure 4-11 : House, facing south. Photo taken by Jennifer Chandler on 24/02/16.

Figure 4-12 : Driveway which used to be Bringelly Road, facing south-east. Photo taken by Jennifer Chandler on 24/02/16.
## Non-Aboriginal Heritage

<table>
<thead>
<tr>
<th>Survey Area No.¹</th>
<th>Location</th>
<th>Date Surveyed</th>
<th>Results of Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-5 Lot 3 DP32026</td>
<td>24/02/16</td>
<td>Modern farm house and stockyards. One large saw is on the block, but power operated. 5-10% ground surface visibility. No potential heritage items identified.</td>
<td></td>
</tr>
<tr>
<td>4-6 Lot 1 DP517853</td>
<td>24/02/16</td>
<td>Modern farm buildings. Christmas tree farm. 10% ground surface visibility. No potential heritage items identified.</td>
<td></td>
</tr>
<tr>
<td>4-7 Lot 100 DP846962</td>
<td>24/02/16</td>
<td>‘Pleasantview’ homestead. Three houses on property. Westernmost one is located within the construction footprint. Owner (Kenneth Hughes pers. comm. 24/02/16) stated that this house was moved to site prior to 1930s-1940s and was the previous Llandilo public hall. The building is constructed from timber and has a modern roof, brick chimney. The house roof was damaged in a storm. New steel bars and slab in place for a new shed. Cement sheeting and louvre windows on west side of house. The original ‘Pleasantview’ homestead is located about 30 m to the east of the construction footprint boundary. There is an old house and several buildings which the owner (Kenneth Hughes pers. comm. 24/02/16) informed us was an old dairy. There is an old rusted diary vessel located outside one of the sheds. The house is made from timber and brick with a corrugated iron roof. The sheds are made from timber and corrugated iron.</td>
<td></td>
</tr>
</tbody>
</table>

---

1. Area No. refers to the survey area number.
<table>
<thead>
<tr>
<th>Survey Area No.¹</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>timber and corrugated iron. One shed has an old petrol pump located out the front. There is a lot of old farm machinery, a car and a truck located amongst the buildings. Potential heritage item.</td>
</tr>
</tbody>
</table>

Figure 4-15: House located within the project footprint at ‘Pleasantview’ property. Photo facing north-east. Photo taken by Jennifer Chandler on 24/02/16.

Figure 4-16: Original house at ‘Pleasantview’, facing south. Photo taken by Jennifer Chandler on 24/02/16.
<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-8</td>
<td>Lot 3 DP8272233</td>
<td>24/02/16</td>
<td>Land is sloping south up to telecommunications tower at highest point. Grassed and cleared paddocks. Used for grazing with a dam and storage container. No potential heritage items identified. 0-5% ground surface visibility.</td>
</tr>
<tr>
<td>4-9</td>
<td>Lot 2 DP519034</td>
<td>24/02/16</td>
<td>Land sloping down south from telecom tower at highest point. Dam and pump shed at lowest point. An old corrugated iron shed is also present (about 10x5 m). Shed has wooden studs and cross beams and is close to Adams Road. Grass was hip-high in paddock and weather hot, so close up survey of shed was not conducted due to risk of snakes. 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-10</td>
<td>Lot 104 DP846962</td>
<td>24/02/16</td>
<td>Modern house located on crest of rise. Grassed and cleared with exotic tree species and some native vegetation. Some old gable roofed sheds at back of property which is outside the project footprint. 5% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-11</td>
<td>Lot 2 DP250030</td>
<td>24/02/16</td>
<td>Modern house on sloping land. 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-12</td>
<td>Lot 21 DP614481</td>
<td>25/02/16</td>
<td>Details in Table 4-1 above for Chapel and School site.</td>
</tr>
<tr>
<td>4-13</td>
<td>Lot 1 DP90157</td>
<td>25/02/16</td>
<td>Details in Table 4-1 above for wells, stone gatepost and road cutting.</td>
</tr>
<tr>
<td>4-14</td>
<td>Lot 1 DP250030</td>
<td>25/02/16</td>
<td>Cleared and grassed paddock used for cattle grazing. Modern house with sheds and cattle yard at rear. A drainage channel with depression is next to the house yard and has star pickets around it. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-15</td>
<td>Lot 2 DP623457</td>
<td>26/02/16</td>
<td>Details in Table 4-1 above for property identified in several heritage reports as being the actual location for Lawson’s Inn (not the LEP listed location).</td>
</tr>
<tr>
<td>4-16A</td>
<td>Lot 2 DP851626</td>
<td>26/02/16</td>
<td>Details in Table 4-1 above for Lawson’s Inn site (LEP-listed location). This location is not historically correct.</td>
</tr>
<tr>
<td>4-16B</td>
<td>Lot 1 DP851626</td>
<td>05/04/16</td>
<td>Details in Table 4-1 above for Lawson’s Inn site (LEP-listed location). This location is not historically correct.</td>
</tr>
</tbody>
</table>

Figure 4-17 : Outlying building, facing west. Photo taken by Jennifer Chandler on 24/02/16.
<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-17</td>
<td>Lot 20  DP258581</td>
<td>25/02/16</td>
<td>Land used for market gardens and cattle grazing. Land slopes up to a crest at the eastern end of the block. Knee high grass. House occupant stated that he had not seen anything historical on the property (pers. comm. 25/02/16). 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-18</td>
<td>Lot 21  DP258581</td>
<td>25/02/16</td>
<td>Access to property denied. Very little visible from road. A review of aerial imagery indicated that there were no potential heritage items.</td>
</tr>
<tr>
<td>4-19</td>
<td>Lot 22  DP258581</td>
<td>25/02/16</td>
<td>Area is largely cleared with very long grass and some native vegetation. Old house site located on top of the rise outside the project footprint. House has been demolished recently. Land manager (Pam(^2), pers. comm. 25/02/16) said that it was an old property. Spruce and peppercorn trees present, indicating an older garden but no evidence of any related dwellings or structures. Area in study area is flat. 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-20</td>
<td>Lot 33  DP259698</td>
<td>25/02/16</td>
<td>Paddocks with knee-high grass and thick immature native vegetation. The area to the south has a steep gully, while to the north there was a dam. House occupant (pers. comm. 25/02/16) said that there were no heritage items that he knew of. 0% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-21</td>
<td>Lot 28  DP259698</td>
<td>25/02/16</td>
<td>Area was viewed from road, outside property boundary. Area is located under powerline easement and is largely cleared with some native vegetation. The house and outbuildings are modern. A natural gully is located in the east of the block. Area is heavily treed. Grass is long in places. 0-5% ground surface visibility. No potential heritage items identified.</td>
</tr>
<tr>
<td>4-22</td>
<td>Lot 27  DP259698</td>
<td>25/02/16</td>
<td>Modern house and outbuildings. There is a scatter of debris around the dam to the south and east of the property. Terracotta piping, ceramic and glass was noted. Some of it appears to be late 19(^{th})/early 20th century. It is uncertain how old the piles of debris are. The property owner said the soil was brought in to fill in the natural gully – recent fill. Patches of 100% ground surface visibility on and near piles of debris. No potential heritage identified as the fill was brought into the property and the age was unable to be established.</td>
</tr>
<tr>
<td>4-23</td>
<td>Lot 1   DP71367</td>
<td>26/02/16</td>
<td>Old style house on corner of Adams Road and The Northern Road. Located outside, but close to construction footprint (about 30 m). Old weatherboard/cement sheeting house with green painted corrugated roof. Weatherboard is cream in colour. House is occupied and surrounded by a hedge. The house is a potential heritage item.</td>
</tr>
<tr>
<td>4-24</td>
<td>Lot 11  DP1092165</td>
<td>26/02/16</td>
<td>Old tractor and machinery on display at front of property and located within Crown land (The Northern Road reserve). Property is a modern dairy business – Leppington Pastoral Co. Pty Ltd. The dairy manager (pers. comm. 26/02/16(^3)) stated that all the buildings and infrastructure on the block were built in the last 50 years. Area has sheds, houses and paddocks. All infrastructure appears modern. Manager also said he had not seen anything that appeared historical on property. 25-50% ground surface visibility. Old tractor is reflective of people’s relation to farming in the area but it's origin and history is unknown and is not obvious.</td>
</tr>
</tbody>
</table>

\(^2\) No surname provided.  
\(^3\) Name not provided.
### Non-Aboriginal Heritage Survey

<table>
<thead>
<tr>
<th>Survey Area No.</th>
<th>Location</th>
<th>Date surveyed</th>
<th>Results of survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-25</td>
<td>Lot 2 DP250684</td>
<td>26/02/16</td>
<td>Old farm machinery on display in front yard of house, however it’s origin and history is unknown and is not likely to be in its original location or context. No potential heritage items identified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Figure 4-18: Machinery outside property on road reserve, facing east. Photo taken by Jennifer Chandler on 26/02/16." /></td>
</tr>
<tr>
<td>4-26</td>
<td>Lot 1 DP226972 Lot A DP341629</td>
<td>20/09/16</td>
<td>This survey area is located within the Warragamba Dam to Prospect Reservoir pipeline easement. Soils in the entire area have been disturbed from the construction of the 1950s upgraded pipeline and associated infrastructure and comprises rubble, a mixture of blue gravel and clayey soil. One potential heritage item was noted in this area: a culvert covering a drainage channel which allows access to four concrete building foundations (located approximately 14 m west of the construction footprint).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Figure 4-19: Machinery in front yard of property, facing north-east. Photo taken by Jennifer Chandler on 26/02/16." /></td>
</tr>
<tr>
<td>Survey Area No.</td>
<td>Location</td>
<td>Date surveyed</td>
<td>Results of survey</td>
</tr>
<tr>
<td>----------------</td>
<td>----------</td>
<td>---------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>4-27</td>
<td>Lot A</td>
<td>20/09/16</td>
<td>This survey area is adjacent to the Warragamba Dam to Prospect Reservoir pipeline section constructed in the 1940s. The surface of the area comprises re-deposited overburden apparently as a result of the construction of the pipeline ditch in this location as it ventured underground directly west of this area. One potential heritage item was noted in this location: a concrete block culvert likely to be associated with the construction of the earlier pipeline.</td>
</tr>
<tr>
<td></td>
<td>DP347475</td>
<td></td>
<td>Figure 4-20 : Culvert covering a drainage channel, facing north-west. Photo taken by Andrew Roberts on 20/09/16.</td>
</tr>
<tr>
<td></td>
<td>Lot A</td>
<td></td>
<td>Figure 4-21 : Concrete culvert, facing north. Photo taken by Andrew Roberts on 20/09/16.</td>
</tr>
<tr>
<td></td>
<td>DP359606</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-28</td>
<td>Lot 2</td>
<td>20/09/16</td>
<td>Grassed area on private property. No potential heritage items identified.</td>
</tr>
<tr>
<td></td>
<td>DP32053</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-29</td>
<td>Lot 73</td>
<td>20/09/16</td>
<td>Grassed area of private property, viewed from fence. Building debris of unknown origin observed in area. No potential heritage items identified.</td>
</tr>
<tr>
<td></td>
<td>DP2120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4-22 | Location of survey areas in the study area
The Northern Road upgrade - Mersey Road to Glenmore Parkway

Western Sydney Airport site (Commonwealth Land)

The Northern Road (Existing)

Defence Establishment Orchard Hills (Commonwealth Land)

WaterNSW supply pipelines

Commonwealth Lands

Construction footprint

Survey area locations

Figure 4-22 | Location of survey areas in the study area
Figure 4-22 | Location of survey areas in the study area