

7. Assessment of key issues

7.6 Non-Aboriginal heritage

This section describes the potential non-Aboriginal heritage impacts that may be generated by construction and operation of the project and presents a proposed approach to the management of these impacts.

Table 7-90 outlines the SEARs that relate to non-Aboriginal heritage and identifies where they are addressed in this EIS. The full assessment of non-Aboriginal heritage impacts is provided in **Appendix J**.

Table 7-90 SEARs (non-Aboriginal heritage)

Secretary's requirement	Where addressed in this EIS
10. Heritage	
1. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of:	Existing non-Aboriginal heritage is discussed in Section 7.6.3
c. environmental heritage, as defined under the <i>Heritage Act 1977</i> ; and	Impacts on non-Aboriginal heritage is discussed in Section 7.6.4 and Section 7.6.5
d. items listed on the National and World Heritage lists.	Existing non-Aboriginal heritage is discussed in Section 7.6.3 Impacts on non-Aboriginal heritage is discussed in Section 7.6.4 and Section 7.6.5
2. Where impacts on State or locally significant heritage items are identified, the assessment must:	Impacts on the Fleurs Radio Telescope Site and the McGarvie-Smith Farm Site are assessed in Section 7.6.4
a. include a statement of heritage impact for all heritage items including the Fleurs Radio Telescope Site and the McGarvie-Smith Farm Site (including significance assessment);	
b. consider impacts on the item of significance caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment (as relevant)	Impacts on non-Aboriginal items of significance are presented in Section 7.6.4 Impacts on Aboriginal items of significance are presented in Section 7.5.4 to Section 7.5.5
c. outline measures to avoid and minimise those impacts in accordance with the current guidelines; and	Measures to avoid and minimise non-Aboriginal heritage impacts are discussed in Section 7.6.7 Measures to avoid and minimise Aboriginal heritage impacts are discussed in Section 7.5.4 to Section 7.5.6 , with environmental management measures presented in Section 7.5.6
d. be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria).	Details of the qualifications of the heritage consultants undertaking this assessment are provided in Appendix J

7.6.1 Policy and planning setting

The non-Aboriginal heritage assessment was prepared to assess the impacts of the project in accordance with the following relevant legislation, policy and guidelines:

- *Heritage Act 1977* (Heritage Act)
- Part 3A of the Heritage Act – State Heritage Register
- Part 6 Division 9 of the Heritage Act – Archaeological relics
- EPBC Act
- Commonwealth Heritage List (CHL)
- National Heritage List (NHL)
- Register of the National Estate (RNE)
- The Australia ICOMOS Burra Charter (Australia ICOMOS, 2013)
- Roads and Maritime's Cultural Heritage guidelines (Roads and Maritime, 2015c)
- Statements of Heritage Impact (Heritage Office and Urban Affairs and Planning 1996, revised 2002)
- NSW Heritage Manual (Heritage Office and Urban Affairs and Planning, 1996)
- Assessing Heritage Significance (Heritage Office, 2001)
- Criteria for the Assessment of Excavation Directors (NSW Heritage Council, 2011).

Further detail about the above legislation, policies and guidelines and how they apply to project is provided in Chapter 2 of **Appendix J**.

7.6.2 Assessment methodology

The term 'heritage item' is used throughout this section to indicate any non-Aboriginal historical heritage place including buildings, structures, and archaeological remains. Each heritage item is individually numbered but may include either a single component or multiple components making up a broader complex with direct historical and cultural associations.

The overall approach to the non-Aboriginal heritage assessment comprised identifying heritage items within and adjacent to the study area through a review of previous heritage studies, searches of relevant heritage registers and schedules, and by undertaking field survey. The significance of each heritage item was assessed in accordance with the Heritage Office (2001) guidelines and the Australia ICOMOS Charter for Places of Cultural Significance 2013 (The Burra Charter) (Australia ICOMOS 2013).

The methodology for the assessment of non-Aboriginal heritage included:

- Desktop assessment which involved a review of relevant heritage legislation, search of all available historical heritage registers for the study area and literature review, including searches of the following heritage registers (accessed on 5 October 2017 and 21 August 2018):
 - NSW State Heritage Inventory (SHI)
 - NSW State Heritage Register (SHR)
 - Section 170 Registers (on SHI)
 - National Trust Register (NTR)
 - Register of the National Estate (RNE)
 - Commonwealth Heritage List (CHL)
 - National Heritage List (NHL)
 - World Heritage List (WHL)
 - Fairfield Local Environmental Plan 2013 (FLEP)
 - Liverpool Local Environmental Plan 2008 (LLEP)
 - Penrith Local Environmental Plan 2010 (PLEP)
- Developing a predictive model for occurrence of historical site types in the landscape
- Carrying out field surveys of the identified priority areas to inspect known historical heritage items, identify previously unidentified historical heritage items, assess potential for historical archaeology and determine heritage curtilages
- Preparation of an assessment of significance for heritage items within the study area
- Preparation of Statements of Heritage Impact (SOHI) in accordance with NSW Heritage Office (1996) guidelines for each heritage item for heritage items identified as potentially impacted by the project
- Assessment of cumulative non-Aboriginal heritage impacts that may arise from the interaction between project construction and operation activities and the activities of other approved or proposed projects in the area
- Development of management measures to mitigate impacts on non-Aboriginal heritage.

Study area

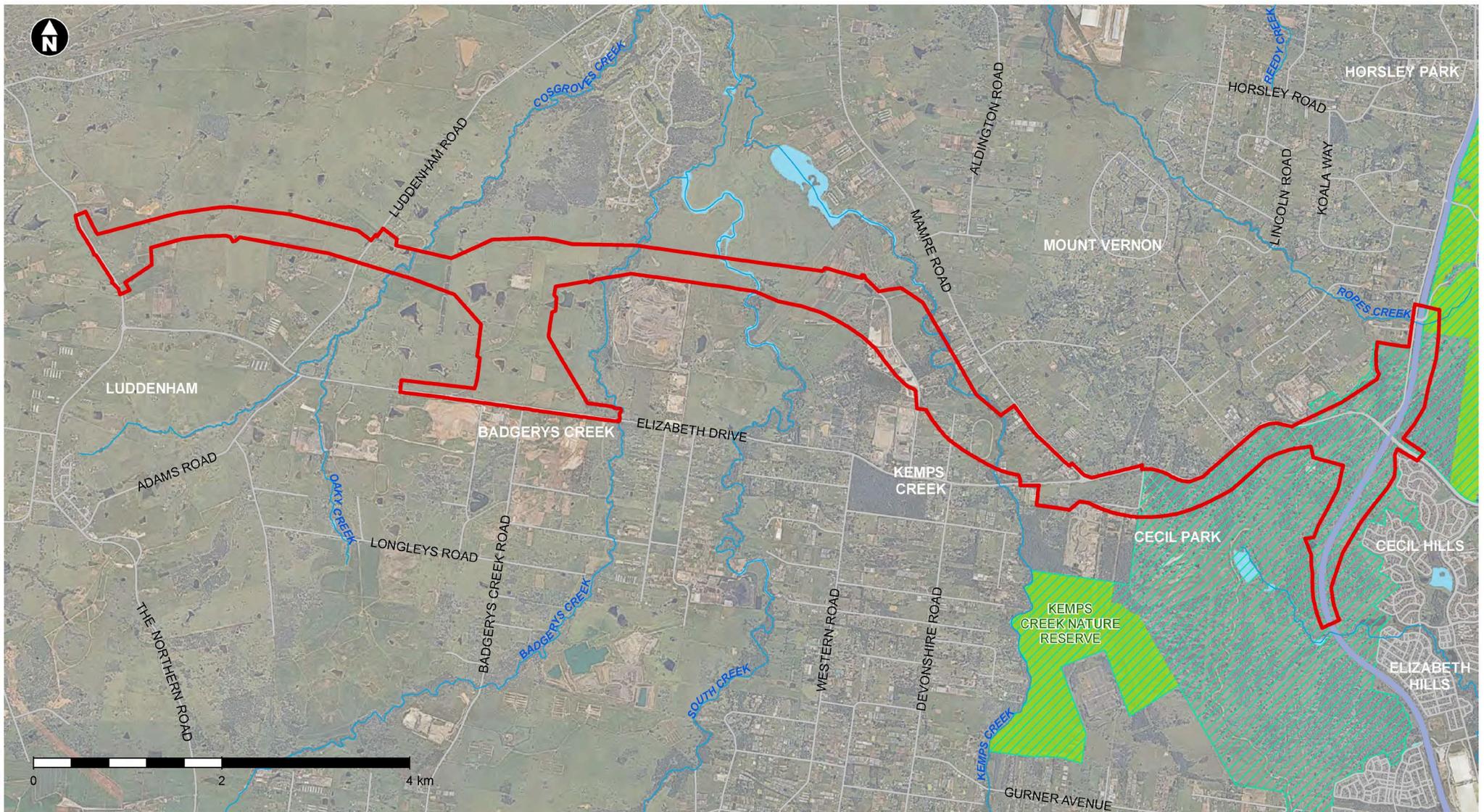
The non-Aboriginal heritage assessment has primarily investigated items and sites of potential heritage significance that are likely to be impacted by the project. The study area for the non-Aboriginal heritage assessment is shown in **Figure 7-70**. While the non-Aboriginal heritage assessment identifies known heritage items across a broader study area (see **Figure 7-72**), the impact assessment has focused on the study area illustrated in **Figure 7-70**.

Predictive model

Before undertaking field surveys, a predictive model was developed to identify priority areas within the study area. This predictive model was based on the following:

- Background information collected during the desktop assessment including aerial images
- The predictive statement for historical site types
- Previous studies and field surveys
- Historical heritage register listings.

These priority areas were the focus of the field investigations and are shown in **Figure 7-71**.

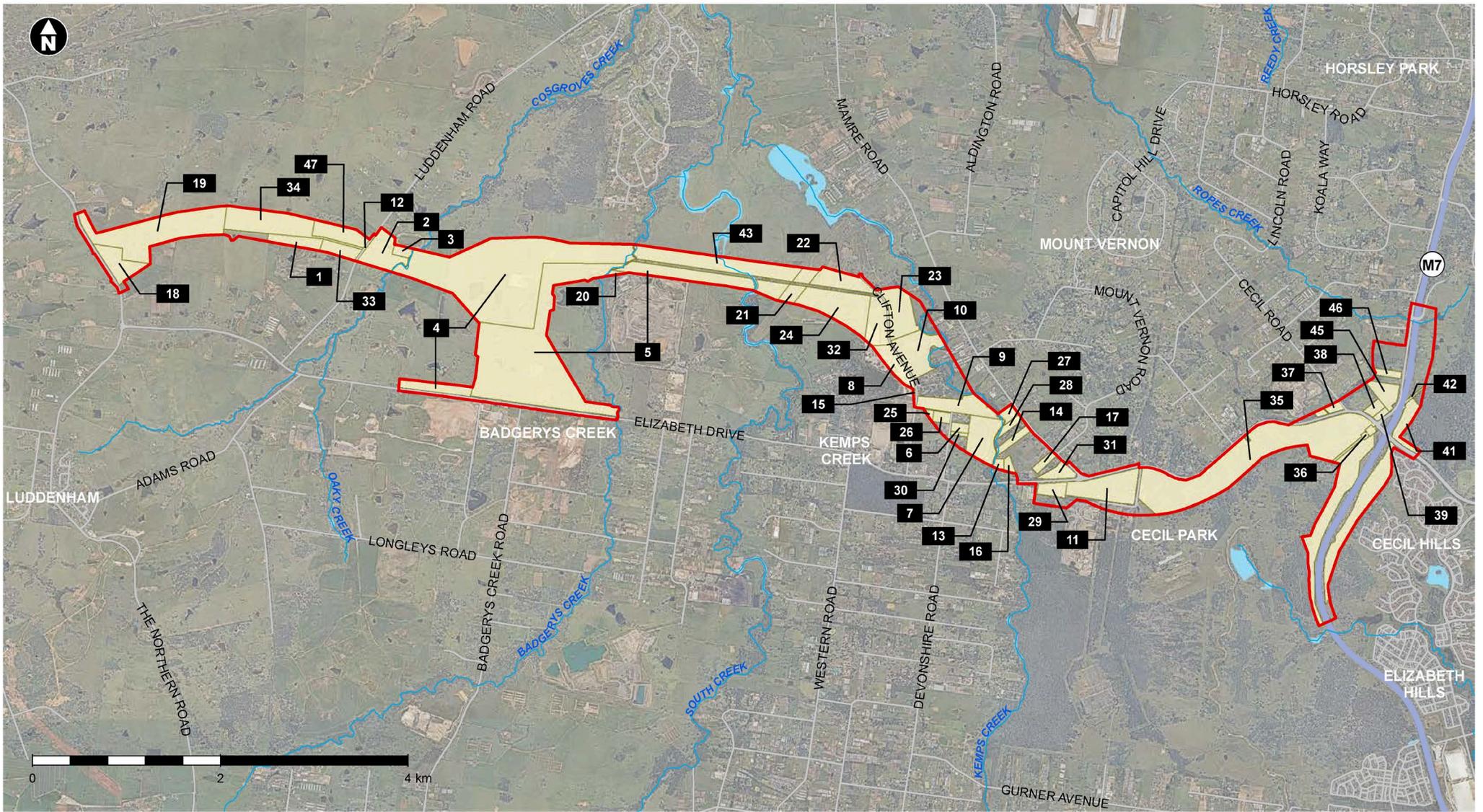


- Study area
- Western Sydney Parklands
- Waterways
- NPWS Reserves
- Motorway
- Main roads



Figure 7-70 Location of the study area for non-Aboriginal heritage assessment

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- Study area
- Survey areas
- ~ Waterways
- Motorway
- Main roads



Figure 7-71 Location of priority areas for field surveys

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Field survey and archaeological test excavations

The study area was surveyed by vehicle with targeted locations surveyed by foot. Field surveys were carried out by suitably qualified archaeologists between November 2017 and March 2019.

A separate field survey was carried out for the Fleurs Radio Telescope site to identify remains of the three arrays and any other associated infrastructure and artefacts, in conjunction with a specialist in the archaeology of Australian radio telescopes. The survey of the Fleurs Radio Telescope site consisted of pedestrian and vehicle transects over the area

Following the field survey, archaeological test excavation of the former Cecil Park historical complex was undertaken between 1 to 5 July 2019. The site identified in Cecil Hills (previously known as Cecil Park), Western Sydney NSW (Lot 1 DP724970) once housed a complex of former buildings associated with the village of Cecil Park, including the school and teacher's residence, the post office and the School Church of St Paul, and is considered to have potential for historical archaeological relics. Five strip trenches (1.5 metres wide by 5 metres long) were placed in strategic locations to identify the presence of the former buildings shown on historical aerial photography.

The finding of the archaeological field survey and test excavations are provided in **Section 7.6.3**.

Assessment of significance and impact assessment

Assessments of significance

Where non-Aboriginal heritage items were identified within the study area, assessments were carried out to determine relative importance ('assessments of significance'). Places which are likely to be significant are those which 'help an understanding of the past or enrich the present, and which would be of value to future generations' (Australia ICOMOS 2013). In Australia, the significance of a place is generally assessed according to the following values:

- Aesthetic value
- Historic value
- Scientific value
- Social value.

The NSW Heritage Council has adopted specific criteria for heritage assessment and the criteria that formed the basis of the assessment of significance is based are outlined below:

- Criterion (a) an item is important in the course, or pattern, of NSW cultural or natural history
- Criterion (b) an item has strong or special association with the life or works of a person, or group or persons, of importance in NSW cultural or natural history
- Criterion (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW
- Criterion (d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons
- Criterion (e) an item has potential to yield information that would contribute to an understanding of NSW cultural or natural history
- Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW cultural or natural history
- Criterion (g) an item is important in demonstrating the principal characteristics of a class of NSW cultural or natural places or cultural or natural environments.

An assessment of significance was prepared for heritage items located within the study area. The results are provided in **Section 7.6.3**.

Level of impact

As there are currently no NSW or other guidelines for identifying the level of impacts on heritage places, the level of impact of the project on non-Aboriginal heritage was assessed based on the definitions and framework for assessing severity of impacts from the EPBC Act Significant impact guidelines 1.2 (DoE, 2013). The definitions are provided in **Table 7-91**.

The framework uses the following criteria to assess level of impact:

- The scale of the proposed works and its impacts
- The intensity of the proposed works and its impacts
- The duration and frequency of the proposed works and its impacts.

For impacts on meet a certain level they generally need to have two or more of the characteristics noted in **Table 7-91**. The level of impact assigned to each heritage item is based on the level assessed following implementation of management or mitigation measures. The results are provided in **Section 7.6.5**.

Table 7-91 Definitions of levels of impacts

Two or more characteristics	Scale	Intensity	Duration/Frequency
Major	Medium – large	Moderate – high	Permanent/irreversible
Moderate	Small-medium	Moderate	Medium – long-term
Minor	Small/localised	Low	Short term/reversible
Negligible	Little or no physical impact; or little or no impact on heritage significance from physical impacts; or potential physical impacts are able to be prevented through implementation of management measures (eg vibration).		

7.6.3 Existing environment

Historical context

The study area traverses several regions with association to the agricultural practices of early settlers to the west of Sydney.

The poor sandstone soils of the Sydney Cove area encouraged exploration seeking better agricultural conditions west of Sydney, and by 1788 Europeans had settled around Parramatta. In 1789, the alluvial plains east of the Nepean River were described by early surveyors as favourable soil for farming, and towns were established at Richmond and Windsor, along the Hawkesbury River in the early 1790s. In 1806, 3300 acres of land was granted by Governor King to Major George Johnson and Captain Edward Abbot in what is now known as Fairfield.

The original grants of land in the study area are depicted on early Parish maps. Elizabeth Drive forms the southern boundary of two parishes, Melville (eastern end of study area) and Claremont (western end of study area). In both parishes, the majority of the land grants were made by Governor Macquarie, often as either rewards for good deeds or as incentives to newly arrived settlers.

As Sydney expanded the pressure for residential land increased. Large holdings began to subdivide to make way for smaller agricultural lots. These smaller lots began to develop into settlements and eventually, villages and suburbs including Luddenham, Badgerys Creek, Kemps Creek, Mount Vernon and Cecil Park/Cecil Hills.

Luddenham

In 1813 John Blaxland, a wealthy land owner and merchant, was granted land on South Creek which he named Luddenham. While some of the land was used to establish Blaxland's business enterprises the majority was retained for grazing. In 1858 the land was surveyed and subdivided.

The Village of Luddenham was a private village comprising a number of buildings associated with agricultural and pastoral purposes. Those still situated within the study area include sheds (Lot 506 DP 587193), and a weatherboard house and Old Dairy, Luddenham (Lot 502 DP 580982, 2787 Northern Road).

Badgerys Creek

In 1803 James Badgery was granted 100 acres on the Hawkesbury River, however the floods of 1806 forced him to seek property elsewhere. Badgery was eventually granted 640 acres between South Creek and what is now known as Badgerys Creek, north of present-day Elizabeth Drive.

Elizabeth Drive began as a roadway to access the land grants in the area and was a 'corduroy' road (built with logs laid across the road). Elizabeth Drive was originally named Orphan School Road and later Mulgoa Road. Badgerys farm was named Exeter Farm. Over subsequent years the Badgery family extended the holdings of Exeter Farm by acquiring properties south of Elizabeth Drive.

In the 1880s, the Luddenham Estate was opened for subdivision and in the 1890s the Badgery lands south of Elizabeth Drive were also subdivided into smaller lots. The subdivisions of these two large holdings opened the area for smaller farms that carried out a variety of activities which included fruit orchards, dairy farming, bee keeping, poultry farming and timber getting. With the rise in population came the need for more services.

Some of the historic buildings that made up Badgerys Creek village were demolished following the resumption of land for the construction of the Western Sydney Airport.

Kemps Creek and Mount Vernon

In 1809, Anthony Fenn Kemp received an initial grant of 500 acres of land in the Parish of Cabramatta, on the eastern side of Kemps Creek. This was augmented by a further grant of 300 acres in 1820. Kemp named his grant "Mount Vernon" after Washington's home. Mount Vernon comprised steep slopes, contrasting with the surrounding flatter regions to the north and west. Initial industry in the surrounding area focused on wheat and timber getting, however, later market gardens and fruit orchards developed on smaller farm properties.

Although the Kemps Creek area remains largely rural, a number of small shops and commercial businesses can be found in the area today. Residential development of Mount Vernon dates to after 1970 with no extant historical buildings remaining.

Cecil Park/Cecil Hills

In 1817 Governor Macquarie made a 1,000-acres grant to Thomas Wylde, known as Macquarie Park on the northern side of Elizabeth Drive and west of present day Wallgrove Road. Thomas Wylde's grants now comprise the suburb of Cecil Park, located in the eastern portion of the study area. A small portion of a 200-acres grant made to Simeon Lord is also contained within the suburb.

Macquarie also made a grant of 2000 acres in the Parish of Cabramatta to Wylde's son, Sir John Wylde. located opposite Thomas Wylde's grant, with Elizabeth Drive forming its northern boundary. Sir John Wylde's grant was named Cecil Hills and now comprises the suburb of that name.

The Wylde family held the land at Cecil Park/Cecil Hills until the late 1800s when it was purchased and subdivided, first into large lots in 1886 then into smaller rural lots in 1906. As with other villages in the study area, as land holdings became smaller the population grew necessitating an increase in services.

Heritage register and previous heritage assessments

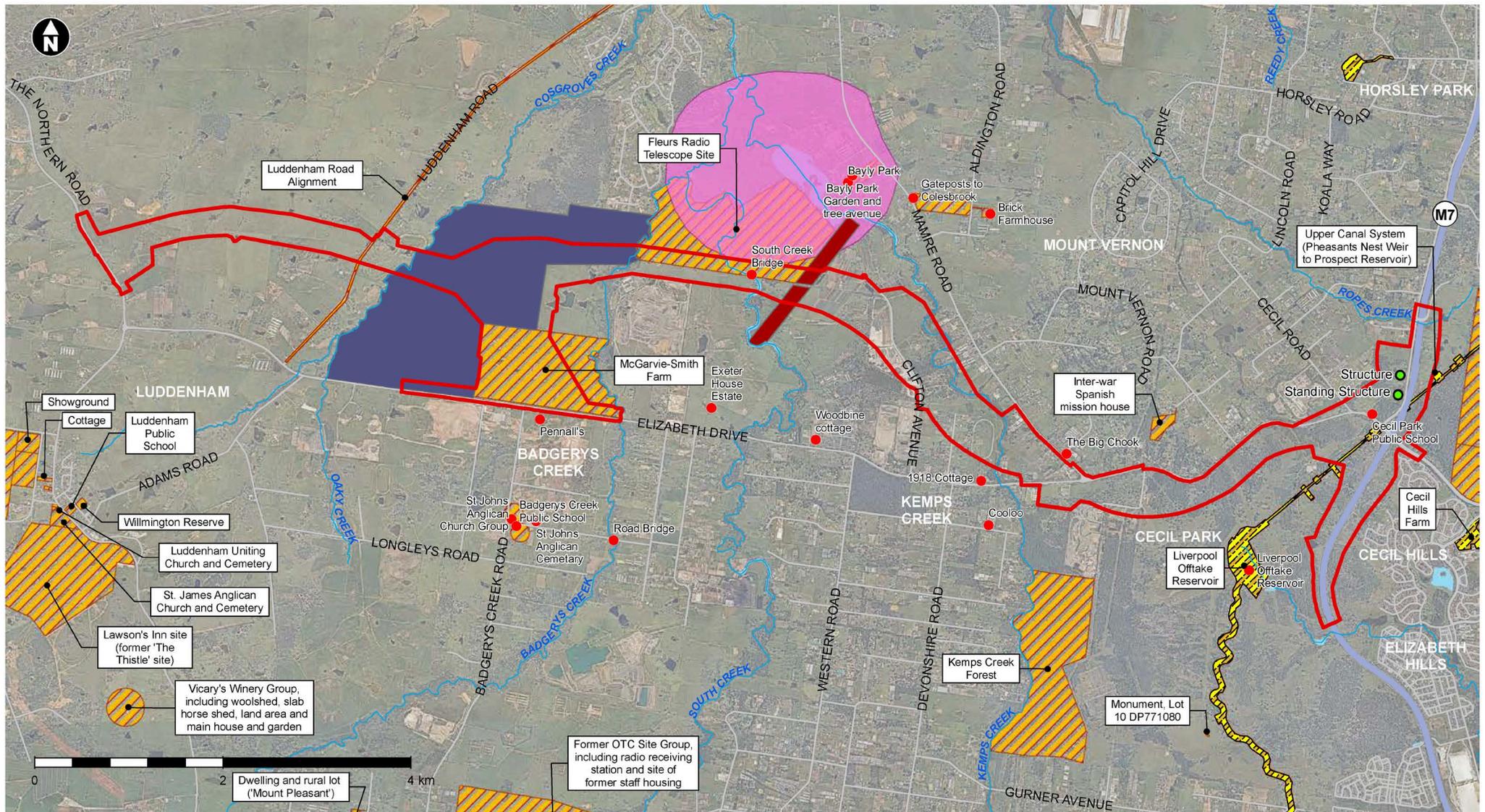
Heritage register searches have identified four registered heritage items within the study area that are listed on local environment plans or the SHR (see **Table 7-92**). There are no heritage items listed on the CHL, NTR, NHL or WHL within the study area.

A review of previous heritage assessments also identified six items of potential non-Aboriginal heritage and one heritage landscape within the study area.

The registered heritage items and potential heritage items/landscapes identified by previous assessments within the study area is listed in **Table 7-93** and mapped in **Figure 7-72**. A description of each location, based on field surveys, is provided in **Table 7-93**.

Table 7-92 Summary of heritage items identified on heritage registers and previous assessments within the study area

Heritage item name	Source	Item #	Significance (listed or based on previous assessment)
Heritage register			
McGarvie Smith Farm	PLEP	857	Local
Fleurs Radio Telescope Site	PLEP	832	Local
Luddenham Road Alignment	PLEP	843	Local
Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	SHR LLEP s170 Sydney Water	01373	State
Previous assessments			
South Creek Bridge	Aurecon (2016a)	-	Local
McMaster Field Station/McMaster Farm	Aurecon (2016a)	-	Local
Fleurs Aerodrome	Aurecon (2016a)	-	Local
Cecil Park School, Post Office and School Church	Aurecon (2016a)	-	Local
South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	Aurecon (2016a)	-	Local
Standing structure	Aurecon (2016a)	-	Identified but not assessed by Aurecon
Structure	Aurecon (2016a)	-	Identified but not assessed by Aurecon



- | | | | |
|------------|--|--|---|
| Study area | Non-Aboriginal heritage items identified in previous assessments | Listed or Registered heritage items | Non-listed heritage items |
| Waterways | Potential heritage item | LEP Heritage item | Fleurs aerodrome |
| Motorway | | State Heritage Register item | McMaster Field Station |
| Main roads | | | South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape |



Figure 7-72 Location of heritage items on registers and from previous heritage assessments prior to assessment of heritage significance

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Field survey results

The field surveys targeted priority areas of known historic items and potential heritage items identified during previous heritage assessments (see **Figure 7-99**). Three potential archaeological sites were identified during the field survey, these are:

- Karingal, located at Luddenham Road, Luddenham
- Exeter Farm archaeological site (Artefact scatter and trees), located at Elizabeth Drive, Badgerys Creek
- Artefact scatter, located at Salisbury Avenue, Kemps Creek.

Following the field survey, 12 registered or potential heritage sites were considered to occur within the study area and one heritage site, Item 12, is located immediately adjacent to the study area. These are:

- Item 1: McGarvie Smith Farm
- Item 2: Fleurs Radio Telescope
- Item 3: Luddenham Road Alignment
- Item 4: Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)
- Item 5: South Creek Bridge
- Item 6: McMaster Field Station/McMaster Farm
- Item 7: Fleurs Aerodrome
- Item 8: Cecil Park School, Post Office and School Church
- Item 9: Karingal
- Item 10: Exeter Farm Archaeological Site
- Item 11: Artefact Scatter
- Item 12: South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape (adjacent)
- Item 13: Former Cecil Park Public Hall.

A description of these heritage items and photographs from the field survey is provided in **Table 7-93**. The location of the 13 registered or potential heritage items is provided in **Figure 7-99**.

Test excavation results

Following the field survey, archaeological test excavations were undertaken at the Cecil Park School, Post Office and Church Site (Item 8). The results of the archaeological test excavation confirmed that the site is relatively undisturbed and that archaeological relics of the former Cecil Park historical complex have survived.

Test excavations revealed intact brick footings of the former c1898 Cecil Park school, including a former annex attached to the main school building, and a brick and mortar base, possibly for a stove. The footings were found below and in association with demolition fill containing occasional ceramic, glass and metal pieces, buttons, animal bone pieces with cut marks, and a marble. Given the integrity of the footings, it is likely that some in situ deposits associated with occupation of the school will survive within the broader building footprint. An artefact and charcoal rich deposit was also found in the footprint of the former c1906 St Paul's timber church. The deposit was found in association with broken bricks and may be the remains of a disturbed fireplace.

Further details are provided in Appendix B of **Appendix J**.

Table 7-93 Description of heritage items identified on heritage registers, previous assessments and during field surveys within the study area

Heritage item name	Description	Photographs (from field surveys)	
Registered heritage items			
<p>Item 1: McGarvie Smith Farm (PLEP 857)</p>	<p>The McGarvie Smith Farm overlaps with the study area on Lot 62 DP 1087838 and Lot 63 DP 1087838. The heritage item is located inside the project's construction footprint. It was surveyed on 14 November 2017 (Survey Area No. 5).</p> <p>During the field survey, a number of farm buildings, silo, concrete remnants, timber posts, sheds, dams, earth ditches and other features were noted.</p>	 <p>Figure 7-73 Example of the farms onsite (Farm 2, facing southwest)</p>	 <p>Figure 7-74 Silo and concrete remnants, facing west</p>
<p>Item 2: Fleurs Radio Telescope Site (PLEP 832)</p>	<p>The Fleurs Radio Telescope intersects with the study area on Lot 21 DP 258414. The South Creek 1 and 2 heritage items are about 80 metres north of the construction footprint. The site was surveyed on the 20 and 21 October 2017 by Wallis Heritage Consulting (Gorman 2018).</p> <p>During the field survey a number of buildings, remains of antennas, antenna footing trenches, concrete plinths, cabling, signal boxes, and demolition material were noted.</p> <p>The area around the Fleurs site is mostly grazing and farmhouses and the land is zoned low lying rural/commercial.</p>	 <p>Figure 7-75 South Creek 1 Antenna Complex signal box (Wallis Heritage Consulting, 2018)</p>	 <p>Figure 7-76 South Creek 1 Antenna complex, antenna trench looing east (Wallis Heritage Consulting, 2018)</p>

Heritage item name	Description	Photographs (from field surveys)	
<p>Item 3: Luddenham Road Alignment (PLEP 843)</p>	<p>Luddenham Road bisects the study area for about 347 metres. It was surveyed on 16 November 2017 (Survey Area No. 12). The heritage item is located inside the construction footprint.</p> <p>Within the study area, Luddenham Road comprises modern asphalt with no remnants of the original road visible. The road is located within the original cadastral location with road reserve either side.</p>	 <p>Figure 7-77 Luddenham Road, western road reserve, facing north.</p>	 <p>Figure 7-78 Luddenham Road, eastern road reserve, facing south.</p>
<p>Item 4: Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (SHR 01373)</p>	<p>The Upper Canal System bisects the study area in the southwestern and northeast corner of the Elizabeth Drive and M7 interchange on Lot 1/DP 603946 and Lot 51/DP811015. The heritage item is partly located inside the construction footprint. It was surveyed on 1-2 March 2018 (Survey Area Nos. 36 and 42).</p> <p>While the canal itself is about 32 metres underground (in tunnel), the Tunnel Shaft 4 is located at the surface within the study area. The shaft was observed from The M7 eastern road reserve within the median of the M7 Motorway (see Figure 7-80).</p>	 <p>Figure 7-79 View of surface over northeast section of the pipeline, facing northeast.</p>	 <p>Figure 7-80 Tunnel Shaft 4 as viewed from eastern road reserve, facing southwest.</p>

Heritage item name	Description	Photographs (from field surveys)	
Identified during previous heritage assessments			
<p>Item 5: South Creek Bridge</p>	<p>The South Creek Bridge is located in Lot 21 DP258414 and was surveyed on 14 November 2017 (Survey Area No. 5). The potential heritage item is located inside the project's construction footprint.</p> <p>This bridge would have connected a lower flat area south of the creek with a higher bank on the northern side. The bridge would have comprised round timber posts with flat timber planks attached to the top.</p> <p>During the field survey it was noted that there were remnants of a timber bridge comprising two rounded timber posts with flat timber planks attached located about 60 metres northwest of an existing modern bridge. Other timber features were located nearby (to the east) which contained metal bolts.</p>	 <p>Figure 7-81 South Creek Bridge, facing north.</p>	 <p>Figure 7-82 South Creek Bridge detail, facing east.</p>
<p>Item 6: McMaster Field Station/McMaster Farm</p>	<p>The McMaster Farm also known as McMaster Field Station, is located on Lot 101 DP848215 and was surveyed between 13 and 15 November 2017 (Survey area no. 4). The heritage item is located inside the project's construction footprint.</p> <p>During the field survey a number of buildings, silos, animal pens and stockyards, dams, ditches, concrete remnants, bricks and earthworks were noted.</p>	 <p>Figure 7-83 Building 3, facing south.</p>	 <p>Figure 7-84 Silo 1, facing southeast.</p>

Heritage item name	Description	Photographs (from field surveys)	
<p>Item 7: Fleurs Aerodrome</p>	<p>The Fleurs Aerodrome is located on Lot 2 DP88836 and was surveyed on 27 February 2018 (Survey area no. 21). The heritage item is partially located inside the construction footprint.</p> <p>Currently at the property there are three sections of the former airstrip:</p> <ul style="list-style-type: none"> • A short airstrip of bitumen that appears to be disused • A grassed area south and north of the existing airstrip • Building remains (north of the grassed area – outside the study area) <p>A modern shed is also located at the southern end of the airstrip and a large metal structure is located at the northern end of the current bitumen airstrip (see Figure 7-86). It is unknown if the metal structure is connected with the original aerodrome.</p>	 <p>Figure 7-85 Existing runway (disused) facing north</p>	 <p>Figure 7-86 Metal feature at northern end of runway, facing southwest</p>
<p>Item 8: Cecil Park School, Post Office and School Church</p>	<p>Cecil Park Public School is located on Lot 1 DP724970 and was surveyed on 1 March 2018 (Survey area no. 38) as well as on 1 August 2018. The heritage item is located inside the construction footprint.</p> <p>During the field survey bricks pieces and rubble, large exotic trees, circular depressions, bottles, vehicles tracks, levelled areas, in-situ footings and large rubbish pile were noted.</p>	 <p>Figure 7-87 Metal object located centre, western side of property.</p>	 <p>Figure 7-88 Rubble mound in southwestern corner of property.</p>

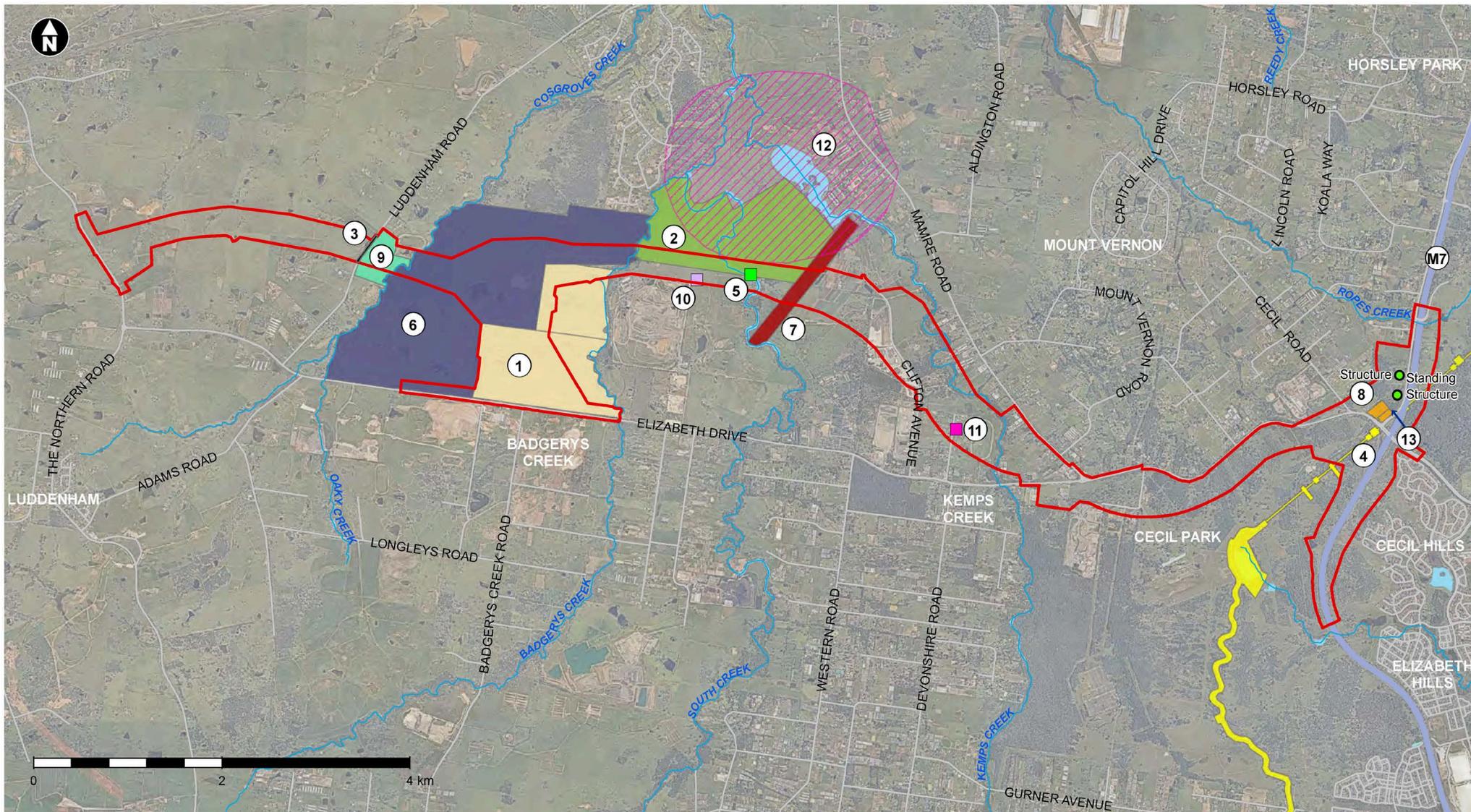
Heritage item name	Description	Photographs (from field surveys)	
<p>Item 12: South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape</p>	<p>This heritage landscape is not located within the study areas, but is located immediately adjacent.</p> <p>Within the part of the landscape investigated immediately adjacent to the study area (Lot 21/DP258414), no weirs were observed and the area did not overlap with any of the three creeks. South Creek is located adjacent (west) to the study area. Badgerys Creek is located around 930 metres west of the study area and Kemps Creek is located 1.2 kilometres northeast of the study area.</p> <p>This heritage landscape area also overlaps with the Fleurs Radio Telescope site.</p> <p>Vegetation at this location comprised of grass in an open paddock environment with occasional small trees located in the vicinity of buildings associated with the eastern side of the Fleurs Radio Telescope site.</p>	 <p>Figure 7-89 Part of the scenic landscape adjacent to the study area, facing northwest.</p>	 <p>Figure 7-90 Part of scenic landscape adjacent to the study area, facing southeast.</p>
<p>Item 13: Former Cecil Park Public Hall (Previously known as 'Standing structure')</p>	<p>During field investigations, the 'standing structure' referred to by Aurecon (2016a) was identified as the 'Former Cecil Park Public Hall'. This is discussed below.</p> <p>The former Cecil Park Public Hall is located within the study area in Lot 6/DP629798 and Lot1/DP308358 and was surveyed on 7 March 2019.</p> <p>The only structures still standing in situ on the site are the brick piers, timbers and a set of concrete stairs. There is abundant material at the site, comprising timbers, bricks and brick fragments and corrugated iron.</p>	 <p>Figure 7-91 Northern end of former Public Hall, looking east</p>	 <p>Figure 7-92 Example of debris located about 20 metres to the west of the <i>in situ</i> ruin of Cecil Park public hall.</p>

Heritage item name	Description	Photographs (from field surveys)
Structure	The structure referred to by Aurecon (2016a) at this location is a modern fibro/weatherboard dwelling with no heritage value.	No photograph.

Potential heritage items identified during field surveys

<p>Item 9: Karingal</p>	<p>The property is Lot 1 DP235124 and was surveyed on 13 November 2017 (Survey area no. 2). The property is currently Karingal Training Stables. The potential heritage item is located inside the study area but outside the construction footprint.</p> <p>Several buildings (stables and sheds) on the property appear to be old and are located in close proximity to each other. A large building containing stables has a central rail embedded in a concrete floor. There is a cart with metal wheels at one end of the shed which would have moved along the rail taking feed to the individual stables.</p> <p>Building rubble, old training track and building slab were also noted.</p>	 <p>Figure 7-93 Interior of shed, showing rail and timber beams.</p>	 <p>Figure 7-94 Interior of shed, showing cart with wheels that would have moved on rail.</p>
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Heritage item name	Description	Photographs (from field surveys)	
<p>Item 10: Exeter Farm Archaeological Site (Artefact Scatter and Trees)</p>	<p>The property is Lot 1 DP74574 and was surveyed on 14 November 2017 (Survey area no. 5) and in April 2018. The heritage item is located inside the study area and partially within the construction footprint.</p> <p>During the field survey, a row of trees forming a hedge that may be Osage-orange trees (<i>Maclura pomifera</i>) were observed. The Osage-orange was traditionally used in hedges for stock management and in colonial gardens. No buildings are visible however an angled depression is visible both on the ground and on the 1947 aerial image.</p> <p>East of the trees, an artefact scatter was noted, situated within a large depression in the ground. The artefact scatter comprises bricks, metal, ceramic and glass across an area about 50 metres wide.</p>	 <p>Figure 7-95 Area of site, facing southwest, with row of trees in background.</p>	 <p>Figure 7-96 19th century ceramic fragment located on ground surface.</p>
<p>Item 11: Artefact Scatter, Salisbury Avenue</p>	<p>Lot 2/DP736951 was surveyed on 15 November 2017 (Survey Area no. 6). The potential heritage item is located inside the project's construction footprint.</p> <p>The field survey identified a diffuse scatter of less than 15 ceramic, glass and metal pieces on the ground surface in an area about 20 metres wide immediately east of Salisbury Road. Ceramic pieces appeared to date from late 19th to early 20th century.</p> <p>There did not appear to be any building footings present in the area and there was some evident disturbance in the area.</p>	 <p>Figure 7-97 Survey area 6, facing northwest.</p>	 <p>Figure 7-98 Survey area 7, facing north.</p>



- | | | | | |
|-------------------------|---|---|---|---|
| Study area | Non-Aboriginal registered and potential heritage items | 4: Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) | 7: Fleurs aerodrome | 10: Exeter Farm Archaeological site |
| Waterways | 1: McGarvie Smith Farm | 5: South Creek Bridge | 8: Cecil Park School, Post Office and Church site | 11: Artefact Scatter Salisbury Ave |
| Motorway | 2: Fleurs Radio Telescope site | 6: McMaster Field Station | 9: Karingal | 12: South, Kemps and Badgerys Creek confluence weirs scenic landscape |
| Main roads | 3: Luddenham Road Alignment | | | 13: Former Cecil Park Public Hall |
| Potential heritage item | | | | |



Figure 7-99 Registered and potential heritage items within the study area following field surveys

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Assessments of significance

Following a comparative analysis and test excavations, only nine of the 13 heritage items within or adjacent to the study area were assessed as having either local, State or National heritage significance, these are:

- Item 1: McGarvie Smith Farm (**State significance**)
- Item 2: Fleurs Radio Telescope (**State and potentially National significance**)
- Item 3: Luddenham Road Alignment (**local significance**)
- Item 4: Upper Canal System (Pheasants Nest Weir to Prospect Reservoir) (**State significance**)
- Item 6: McMaster Field Station (**State significance**)
- Item 7: Fleurs Aerodrome (**local significance**)
- Item 8: Cecil Park School, Post Office and School Church (**local significance**)
- Item 10: Exeter Farm Archaeological Site (**local significance**)
- Item 12: South, Kemp's and Badger's Creek Confluence Weirs Scenic Landscape (**local significance**).

A summary of the significance of heritage items within and immediately adjacent to the study area is provided in **Table 7-94**, overleaf, and shown in **Figure 7-100**.

7.6.4 Assessment of potential impacts

Of the nine heritage items within or adjacent to the study area, five heritage items are subject to physical impacts as a result of the project. Following the implementation of management measures (**Section 7.6.7**), the project would have a major impact on four items and a minor impact on one item, these are:

- Major heritage impact:
 - Item 1: McGarvie Smith Farm
 - Item 6: McMaster Field Station
 - Item 7: Fleurs Aerodrome
 - Item 8: Cecil Park School, Post Office and Church Site
- Minor heritage impact:
 - Item 2: The Fleurs Radio Telescope Site.

The project was assessed as having a negligible impact on the remaining four heritage items, these are:

- Item 3: Luddenham Road Alignment
- Item 4: Upper Canal System
- Item 10: Exeter Farm Archaeological Site
- Item 12: South, Kemp's and Badger's Creek Confluence Weirs Scenic Landscape.

The complete SOHs for the heritage items are provided in **Appendix J**.

Site-specific management measures would be applied at heritage sites that were identified as being subject to impact generated by project activities. Management measures are provided in **Section 7.6.7** and include archival photographic recording, protective fencing, exclusion zones, interpretive strategies and archaeological test excavation. Site specific management measures would be further described in the construction cultural heritage management plan (CCHMP) that would be developed for the project.

A summary of the potential direct and indirect impacts on heritage items and implications of these impacts on the significance of the heritage items is provided in **Table 7-96**, overleaf.

Table 7-94 Summary significance of heritage items within and immediately adjacent to the study area

Heritage item	Source	Heritage item name	Significance
Item 1	Penrith LEP	McGarvie Smith Farm	Listed under Penrith LEP as Local but assessed as State for the purpose of this EIS
Item 2	Penrith LEP	Fleurs Radio Telescope Site	Listed under Penrith LEP as Local but assessed as State and potentially National for the purpose of this EIS
Item 3	Penrith LEP	Luddenham Road Alignment	Listed under Penrith LEP as Local
Item 4	SHR Liverpool LEP s170	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	Listed under State Heritage Register as State Listed under Liverpool LEP as Local
Item 5	Aurecon (2016a)	South Creek Bridge	None
Item 6	Aurecon (2016a)	McMaster Field Station	Not currently listed but assessed as State for the purpose of this EIS
Item 7	Aurecon (2016a)	Fleurs Aerodrome	Not currently listed but assessed as local for the purpose of this EIS
Item 8	Aurecon (2016a)	Cecil Park School, Post Office and School Church	Not currently listed but assessed as local for the purpose of this EIS
Item 9	Field survey 13 November 2017	Karingal	None
Item 10	Field survey 14 November 2017	Exeter Farm Archaeological Site	Not currently listed but assessed as local for the purpose of this EIS
Item 11	Field survey 15 November 2017	Artefact Scatter, Salisbury Avenue	None
Item 12	Aurecon (2016a)	South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	Not currently listed but assessed as local for the purpose of this EIS
Item 13	Field survey 7 March 2019	Former Cecil Park Public Hall	None

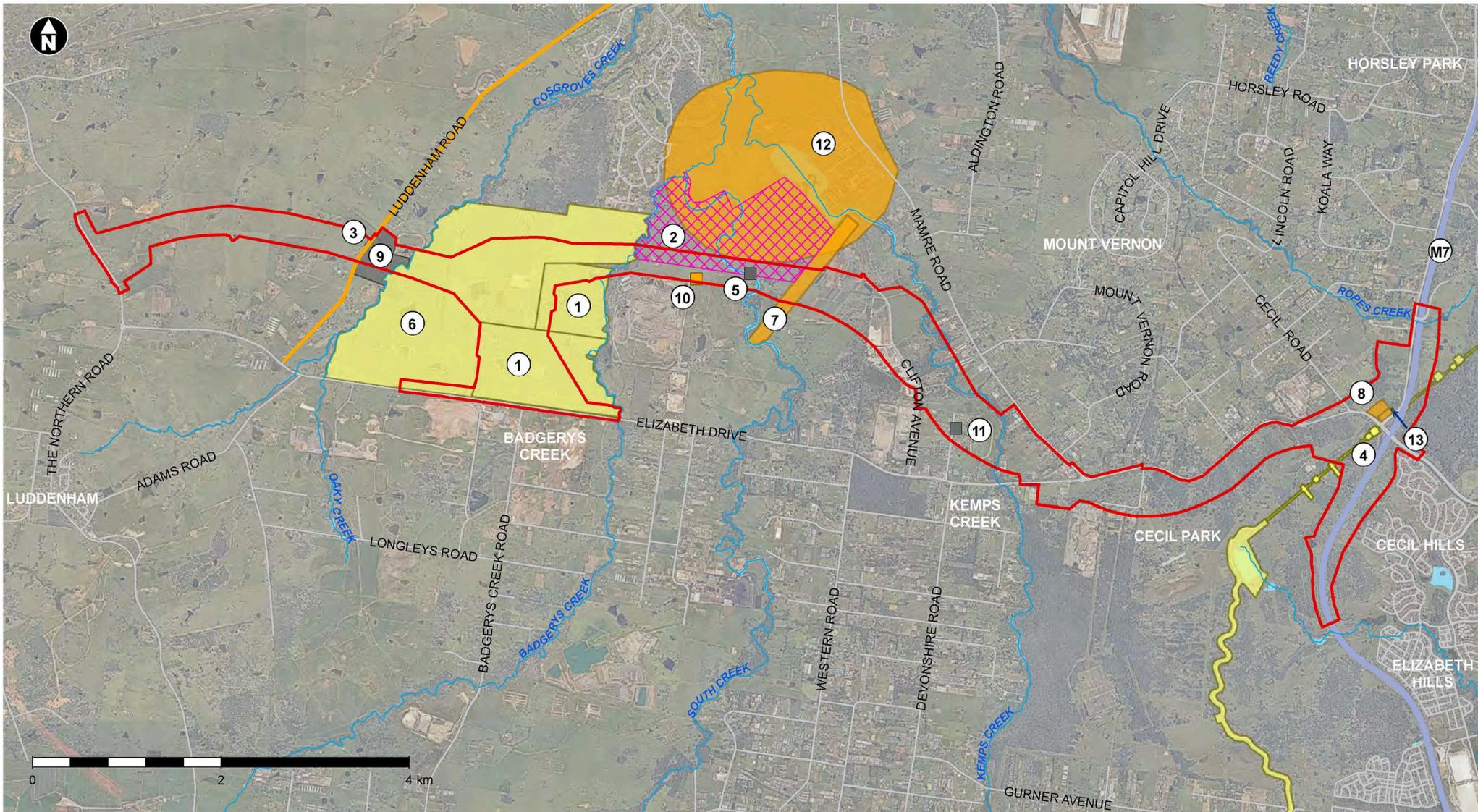
Table 7-95 Summary of significance of heritage items within and immediately adjacent to the project

Heritage item number	Heritage item name	Significance	Summary of heritage significance
Registered heritage items			
Item 1	McGarvie Smith Farm	Listed under Penrith LEP as Local but assessed as State for the purposes of this EIS	The McGarvie Smith Farm has a chronological series of surviving structures and infrastructure dating from the 1930s through until recent times. Although all the buildings contribute to the significance of use of the site over time, the two oldest buildings on the complex are McGarvie Smith Farm 1 and McGarvie Smith Farm 2. The farm's educational purposes for animal husbandry and pastoral experimentation for students from across the Commonwealth as well as the University of Sydney makes it a significant site in the history of these industries. Its link to Sydney University differentiates it from other experimental farms at the time, which were established by the NSW Department of Agriculture. The farm was a leader in finding solutions to the agricultural and pastoral industries of the mid twentieth century. The farm is assessed as being of State significance.
Item 2	Fleurs Radio Telescope Site	Listed under Penrith LEP as Local but assessed as State and potentially National for the purposes of this EIS	<p>The Fleurs Radio Telescope Site was a CSIRO facility established in the 1950s for radioastronomy research. Three innovative antenna arrays were designed and built in order to pick up low frequency radio signals from galaxies, the Sun and Jupiter. There are few extant remains at other CSIRO radioastronomy field sites around Sydney. Fleurs appears to be all that remains as physical fabric in its original location. Nationally, no other cross antennas or low frequency arrays survive.</p> <p>The site is considered to have State and potentially National significance as evidence of ground breaking scientific discoveries, leading to revisions of our understanding of the origins of the universe, and as evidence of Australia's pre-eminence in the international development of radioastronomy. There is renewed interest in the history of radioastronomy due to Australia's key role in the Square Kilometre Array, to which the Fleurs antennas can be considered historical precursors. The elements are considered to have outstanding interpretive potential.</p>
Item 3	Luddenham Road Alignment	Listed under Penrith LEP as Local	The item is considered to have local historical significance as an early road alignment. While the section of Luddenham Road within the study area is located within the original cadastral location of the early road, original fabric associated with the early road no longer exists due to modifications and renewal of the road surface over time.

Heritage item number	Heritage item name	Significance	Summary of heritage significance
Item 4	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	Listed under State Heritage Register as State Listed under Liverpool LEP as Local	<p>The Upper Canal System is significant as a major component of the Upper Nepean Scheme. As an element of this Scheme, the Canal has functioned as part of Sydney's main water supply system since 1888. Apart from maintenance and other improvements, the Upper Canal has changed little.</p> <p>The Canal is significant as it demonstrates the techniques of canal building, and evidence of engineering practice. The Canal as a whole is an excellent example of 19th century hydraulic engineering, including the use of gravity to feed water along the canal. A conservation management plan (CMP) (NSW Public Works Government Architect's Office, 2016) was prepared for the Upper Canal, and outlines guidelines for maintenance and repairs.</p>
Identified during previous heritage assessments, field survey or test excavations			
Item 5	South Creek Bridge	None	There is little evidence to indicate that South Creek Bridge formed part of an early route through this area. The item is considered to have insufficient significance to fulfil the criteria for State or local listing. The site is therefore not considered to be a heritage item and no further impact assessment is required.
Item 6	McMaster Field Station/ McMaster Farm	Not currently listed but assessed as State for the purposes of this EIS	The McMaster Farm, an experimental enterprise by CSIRO in the 1930s, is associated with the University of Sydney's FD McMaster Building (a State heritage listed building), both named in honour of Sir Frederick Duncan McMaster. His original gift to CSIRO in 1929, for the construction of the Division of Animal Health's first laboratory, located at Sydney University, marked the beginning of a new era of veterinary research in Australia that saw Australia forge an international reputation for excellence in veterinary research. The landscape was culturally modified for the purposes of CSIRO research: cultivated fields, fence lines, dams and groves of trees. The potential archaeology and intactness of this landscape rates it as moderately significant at a local or State level. The farm is an example of an intact CSIRO experimental farm operating in the mid-twentieth century which was focussed on livestock research.
Item 7	Fleurs Aerodrome	Not currently listed but assessed as local for the purposes of this EIS	<p>Fleurs Aerodrome represents an integral part of the RAAF defence of Australia and the larger US military strategy in the Asia-Pacific. An operational aerodrome, Fleurs housed and serviced multiple flight squadrons throughout the war, dependant on the deployment needs of the group. Fleurs Aerodrome retains its social significance due to the large number of men and women (many still with living memory) who worked on, and around the aerodrome during its WWII operations.</p> <p>Fleurs Aerodrome was one of only two parent operational aerodromes in the Greater Sydney region, and had the largest number of satellite airfields of any of the operational aerodromes. It represents a rare surviving example of such an airfield in both the Sydney region and greater NSW.</p> <p>Fleurs Aerodrome retains some integrity, despite subdivision and development (primarily agricultural and scientific) and enough general features remain to allow interpretation of its original usage.</p>

Heritage item number	Heritage item name	Significance	Summary of heritage significance
Item 8	Cecil Park School, Post Office and School Church	Not currently listed but assessed as local for the purposes of this EIS	<p>The site is significant at a local level for its historical heritage value, research potential and for its potential social heritage values. The subject site housed the public school, post office and the School Church of St Paul from 1895 to the 1950s and likely became a social hub for the small rural location of Cecil Park. Since the demolition of the school buildings in 1965, the site has remained vacant and undeveloped. Although there is no known current social significance attached to the site, the school, church and post office buildings most likely would have represented the heart of the early Cecil Park community.</p> <p>Archaeological test excavation has confirmed the presence of structural remains and in situ archaeological deposits of the former brick public school and the timber Church of St Paul at the subject site. Further salvage excavation and analysis at the site would provide further insights into the changing layout of the buildings and their use over time. In particular, the analysis of artefacts recovered from in situ deposits would provide information on the lives of children, teachers and worshippers who lived at Cecil Park.</p>
Item 9	Karingal	None	While the site may be associated with John Tapp, a well-known race-caller in the second half of the 20th century, there is insufficient evidence to confirm this. Historical aerial imagery has confirmed some of the buildings on the property existed before 1947, but there is no evidence of trotting tracks present at this time. The item is considered to have insufficient significance to fulfil the criteria for State or local listing, and no further impact assessment is required.
Item 10	Exeter Farm Archaeological Site (Artefact Scatter and Trees)	Not currently listed but assessed as local for the purposes of this EIS	The property was originally part of the Exeter Farm owned by James Badgery, and while the property ceased to belong to the family in the mid-1800s, the family gave the name to the adjacent creek and suburb. The whole property is therefore considered to be historically significant at a local level. The artefact scatter may be indicative of sub-surface deposits which would have potential to yield information about the previous use of the site. Despite the condition of the individual trees, the remnant hedge of Osage orange is a rare local example of an imported species being used as field markers and is indicative of that European practice.
Item 11	Artefact Scatter, Salisbury Avenue	None	There is no evidence to suggest that the site was originally a post office, as was stated by the current tenant. In addition, the site was disturbed through the construction of a swimming pool and there is little evidence that any building footings are present. The artefact scatter is considered to have insufficient significance to fulfil the criteria for State or local listing. The site is therefore not considered to be a heritage item and no further impact assessment is required.
Item 12	South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	Not currently listed but assessed as local for the purposes of this EIS	The South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape is significant for the weirs and surrounds located at the confluences of Badgerys and Kemps Creek with South Creek, remnant vegetation along creeks and roads, cultural landscapes associated with early homesteads, and presence of overall traditional rural landscape. However, the small section of the landscape adjacent to the study area is limited in these elements. The landscape adjacent to the study area comprises traditional rural landscape with open paddocks with occasional small trees located in the vicinity of buildings associated with the eastern side of the Fleurs Radio Telescope site. The South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape is considered to have sufficient significance to fulfil the criteria for local listing.

Heritage item number	Heritage item name	Significance	Summary of heritage significance
Item 13	Former Cecil Park Public Hall	None	<p>The Cecil Park Public Hall is associated, temporally and physically, with the nearby Cecil Park School, Post Office and Church Site (Item 8) as part of the development of the Cecil Park community. The overall area of Cecil Park has two phases of historical development: agricultural land that formed part of the large estate known as 'Macquarie Park' granted to Thomas Wylde (1817 – 1886) and its subsequent subdivision and development for the Cecil Park Public School, post office and School Church of St Paul (1895 – 1965). The Public Hall is an important part of the social history of the Cecil Park area and represents an attempt by residents in the years of the late nineteenth and early twentieth centuries to establish a civic centre for the Cecil Park community. It is therefore assessed as being of historical significance at the local level.</p>



- Study area**
- Study area
 - Waterways
 - Motorway
 - Main roads
- Assessed heritage significance**
- State and potentially National
 - State
 - Local
 - None

Item number	Item name
Item 1	McGarvie Smith Farm
Item 2	Fleurs Radio Telescope Site
Item 3	Luddenham Road Alignment
Item 4	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)
Item 5	South Creek Bridge
Item 6	McMaster Field Station/McMaster Farm
Item 7	Fleurs Aerodrome

Item number	Item name
Item 8	Cecil Park School, Post Office and School Church
Item 9	Karingal
Item 10	Artefact Scatter and Trees, Exeter Farm
Item 11	Artefact Scatter, Salisbury Avenue
Item 12	South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape
Item 13	Former Cecil Park Public Hall



Figure 7-100 Significance of heritage items within and immediately adjacent to the project

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Table 7-96 Summary of potential impacts on heritage items

Item	Listing	Significance	Proposed activities	Potential impacts	Heritage significance and implications
Item 1: McGarvie Smith Farm	Penrith LEP 857	Listed under Penrith LEP as Local, but assessed as State for the purpose of this EIS	Construction of dual carriageway motorway with two lanes in each direction and access road to the planned Western Sydney Airport at Badgerys Creek	The project would bisect the entire site and result in the demolition of five buildings and one silo: <ul style="list-style-type: none"> • McGarvie Smith Farm 6 • McGarvie Smith Farm 7 • McGarvie Smith Farm 8 • Shed 1 • Shed 2 	Major impact The proposed works within McGarvie Smith Farm would be of medium-large scale and moderate intensity, with the demolition of the buildings and silo being permanent and irreversible. The M12 Motorway would bisect the farm resulting in ongoing impacts during the operation of the project. The level of impact on the heritage items overall would be major.
Item 2: The Fleurs Radio Telescope Site	Penrith LEP 832	Listed under Penrith LEP as Local, but assessed as State and potentially National for the purpose of this EIS	Construction of dual carriageway motorway with two lanes in each direction	The project would demolish one element of the Fleurs Radio Telescope site - Shain Cross (SC01), which is located within the construction footprint.	Minor impact The proposed works within Fleurs Radio Telescope site would be at a localised scale and low intensity, with the demolition of the one element of the Shain Cross being permanent and irreversible. Operational impacts on the site may occur due to the proximity of vibration and traffic fumes on the significant fabric, however the specific impacts at this stage are unknown. The level of impact on the heritage item overall would be minor.
Item 3: Luddenham Road Alignment	Penrith LEP 843	Listed under Penrith LEP as Local	Construction of dual carriageway motorway with two lanes in each direction.	No physical impacts as there is little or no original physical road fabric or associated features within study area to be impacted.	Negligible impact
Item 4: Upper Canal System	SHR 01373, Liverpool LEP	Listed under State Heritage Register as State Listed under Liverpool LEP as Local	Construction of grade-separated interchanges including associated ramps, with M7 Motorway	The project would not destroy any sections of pipeline that are located underground. The Tunnel Shaft 4, located in the M7 central road median, would not be demolished as this location would not be subject to works.	Negligible impact

Item	Listing	Significance	Proposed activities	Potential impacts	Heritage significance and implications
Item 6: McMaster Field Station	N/A	Not currently listed but assessed in this report as State for the purpose of this EIS	Construction of grade-separated interchanges including associated ramps, with access road to the planned Western Sydney Airport at Badgerys Creek	<p>The project would bisect the landscape of the McMaster Farm overall as the dual carriageway and interchange would be located within the property.</p> <p>Some modified landscape elements would be destroyed by the project. A potential construction laydown area overlaps with the complex of buildings on the property, and may be reused as construction offices and facilities.</p>	<p>Major impact</p> <p>The proposed works within McMaster Field Station would be of medium-large scale and moderate intensity, with some of the changes being permanent and irreversible. The landscape of the heritage item would be impacted by the construction of the project. Operational impacts would be applicable as the project bisects the heritage item. The level of impact on the heritage item overall would be major.</p>
Item 7: Fleurs Aerodrome	N/A	Not currently listed but assessed as local for the purpose of this EIS	Construction of dual carriageway motorway with two lanes in each direction	<p>The proposed construction footprint would bisect the previous runway to the north of the existing runway. A remnant metal object is located 13 metres south of the construction footprint and is unlikely to be impacted by the project.</p>	<p>Major impact</p> <p>The proposed works within the Fleurs Aerodrome would be of medium-large scale and moderate intensity, with the changes being permanent and irreversible. The landscape of the heritage item would be impacted by the construction of the project. Operational impacts would be applicable as the project bisects the heritage item. The level of impact on the heritage item overall would be major.</p>
Item 8: Cecil Park School, Post Office and Church Site	N/A	Not currently listed but assessed as local for the purpose of this EIS	Construction of grade-separated interchanges including associated ramps, with M7 Motorway	<p>The project would physically disturb and destroy the area of archaeological potential through ground disturbance activities.</p>	<p>Major impact</p> <p>The proposed works within the Cecil Park historical complex would be of medium-large scale and moderate-high intensity, with the changes being permanent and irreversible. Construction impacts on Item 8 would cause physical damage to the entire area of archaeological potential within the heritage item, with the exception of the Cecil Park school site.</p> <p>As the construction would remove most of the archaeological aspects of the heritage item, it would no longer be of significance and would therefore not be subject to further operational impacts. The level of impact on the heritage item overall would be major.</p>

Item	Listing	Significance	Proposed activities	Potential impacts	Heritage significance and implications
Item 10: Exeter Farm Archaeological Site	N/A	Not currently listed but assessed as local for the purpose of this EIS	Construction of dual carriageway motorway with two lanes in each direction	The item is within 50 metres of the southern boundary of the project and would therefore not be directly impacted. This is based on the assumption that all vehicle movements, compounds, etc would be confined to the area within the project boundary. However, should this not be the case, or if the alignment be modified to include the site, it would physically impact the site.	Negligible impact
Item 12: South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	N/A	Not currently listed but assessed as local for the purpose of this EIS	Construction of dual carriageway motorway with two lanes in each direction	There would be no direct impacts associated with the project as works would not be carried out within the item's curtilage. There would be no direct impacts associated with the project as works would not be carried out within the item's curtilage. The potential hydrological changes associated with the project (see Appendix L) are minor and localised.	Negligible impact

7.6.5 Cumulative impacts

Cumulative non-Aboriginal heritage impacts may arise from the interaction of construction and operation activities of the project and other approved or proposed projects in the area. When considered in isolation, specific project impacts may be considered minor. These minor impacts may be more substantial, however, when the impact of multiple projects on the same receivers is considered.

Western Sydney is currently experiencing an unprecedented level of urban development, particularly in the areas around the new Western Sydney Airport. Alongside the airport, planned development includes urban release areas (Western Sydney Aerotropolis) as well as supporting public infrastructure investment (eg Sydney Metro Greater West and various road upgrades). Planned future development is likely to result in extensive change to the character of the existing peri-urban landscape and land use typologies. Numerous projects in varying stages of delivery and planning are currently underway near the M12 Motorway corridor.

The cumulative non-Aboriginal heritage impacts are considered in **Table 7-97** and outlined in further detail in **Appendix J**. Additional details of each of the projects considered is provided in **Table 7-3**.

These projects are relevant to the consideration of cumulative non-Aboriginal heritage impacts both temporally and spatially as they are or would be located within the vicinity of the project, may share common types of sites (ie homesteads or experimental farms) and construction and/or operation may have overlapping timeframes, as discussed further below.

The cumulative impact of the project on non-Aboriginal heritage was assessed based on the definitions and framework for assessing severity of impacts from the EPBC Act Significant impact guidelines 1.2 (Department of Sustainability Environment Water Population and Communities, 2013), provided in **Table 7-91**.

While the projects identified in **Table 7-97** are transformative, such extensive change is likely to generate impacts on historical heritage values associated with heritage items and landscapes associated with the historically rural nature of the region. The contribution of the M12 Motorway project to cumulative impacts on non-Aboriginal heritage in the area is minor, considering the heritage impacts would be being addressed and managed through the implementation of a range of environmental mitigation measures. These measures include archival recording, heritage interpretation integrated into the project and proposed landscape works. Through the heritage interpretation framework and its integration with the concept design proposal as described in **Appendix G**, the project would provide a positive contribution by communicating the history of the area to users of the motorway, including those visitors using the Western Sydney Airport.

7.6.6 Environmental management measures

The environmental management measures that will be implemented to minimise the non-Aboriginal heritage impacts of the project, along with the responsibility and timing for those measures, are presented in **Table 7-98**. It is noted that management measures relating to non-Aboriginal heritage items have also been addressed in other relevant section of the EIS, including:

- Vibration resulting from construction in **Section 7.6.5** and **Appendix K**
- Landscape character and visual impacts from construction and operation in **Section 7.3** and **Appendix G**.

Table 7-97 Cumulative non-Aboriginal heritage impacts

Project and status	Cumulative impacts
<p>Western Sydney Airport</p> <p>Approved. Under construction</p>	<p><u>Construction</u></p> <p>The heritage assessment for the construction of the Western Sydney Airport indicated that all 20 European and other heritage items on the airport site will be removed and/or demolished to facilitate development of the airport. No heritage items which are located outside the airport site, but within the study area, were determined to be directly impacted. However, the development was assessed to indirectly impact two heritage items within the study area; including:</p> <ul style="list-style-type: none"> • McGarvie Smith Farm, is subject to direct and indirect impacts by the Western Sydney Airport construction as a result of use for High Intensity Approach Lighting. The level of impact on this heritage item is minor, as a small portion of the property adjacent to the driveway will be impacted and not affect the significance of the heritage item. However, the current project will impact this heritage item to a major level as the proposed road would bisect the heritage item, affecting the significance of the heritage item. • Luddenham Road alignment, will be also be indirectly impacted by the Western Sydney Airport construction however this heritage item would not be impacted by the current project. <p>Overall, the types of non-Aboriginal heritage places to be impacted by the Western Sydney Airport project are similar to those impacted by the project, ie farming complexes. Therefore, there would be major cumulative non-Aboriginal heritage impacts associated with the construction of the project and the Western Sydney Airport, specifically in relation to the McGarvie Smith Farm. There would be negligible cumulative non-Aboriginal heritage construction impacts for the remainder of the current project.</p> <p><u>Operation</u></p> <p>The Western Sydney Airport and the project would be operational at the same time. As a result, indirect impacts such as changes to the landscape, vistas and ambience will occur to the heritage items located within the Western Sydney Airport site area. These impacts relate to McGarvie Smith Farm which would be impacted by the current project through the bisection of the site by the motorway. Bisecting the broader landscape of the site would reduce the significance of the setting of the experimental farm, and its modified landscape and the features demonstrating innovative water harvesting practices. There would be no additional heritage items impacted by the current project.</p> <p>As the impact on the McGarvie Smith Farm was assessed for the current project as being major, and impacts for the Western Sydney Airport are minor, there would be a major cumulative non-Aboriginal heritage impact associated with the operation of the project and the Western Sydney Airport, as a result of the impact on McGarvie Smith Farm.</p>

Project and status	Cumulative impacts
<p>Sydney Metro Greater West</p> <p>Not yet approved</p>	<p>The magnitude of cumulative construction impacts would be dependent on the specific construction locations, activities and impacts which are yet to be determined for the Sydney Metro Greater West. However, the McMaster Field Station and McGarvie Smith Farm are located within the Sydney Metro Greater West project area and would likely be subject to major impact by construction of the Sydney Metro Greater West. Therefore there would be major cumulative non-Aboriginal heritage impacts associated with the construction of the project and the Sydney Metro Greater West, particularly in relation to McGarvie Smith Farm and McMaster Field Station.</p> <p>The Sydney Metro Greater West and the project would both be operational in the longer term and as a result, impacts such as changes to the landscape, vistas and ambience would occur to the heritage items located within the Sydney Metro Greater West project area.</p> <p>These impacts relate to McGarvie Smith Farm and McMaster Field Station which would be impacted by the current project. Further bisecting the landscape would reduce the significance of the setting of the experimental farms, and their modified landscapes. There would be no additional heritage items impacted by the current project.</p>
<p>The Northern Road upgrade</p> <p>Approved.</p> <p>Construction has begun</p>	<p>Construction activities associated with Stage 5 and Stage 6 may overlap with the project construction. Both these stages are in the vicinity of the project.</p> <p>The existing non-Aboriginal heritage assessment for The Northern Road upgrade identified three heritage items that would be impacted including:</p> <ul style="list-style-type: none"> • Orchard Hills Cumberland Plain Woodland • Miss Lawson's Guesthouse site • Lawson's Inn site. <p>None of these heritage items would be further impacted by the current project.</p> <p>The site types that will be impacted by The Northern Road construction are related to early accommodation in the region and a canal associated with the Orchard Hills Cumberland Plain Woodland. These site types would not be impacted by the current project as there are no sites relating to early accommodation or irrigation within the current project area that would be impacted. There would be no cumulative non-Aboriginal heritage impacts associated with the construction of the project and The Northern Road upgrade Stages 5 and 6. There would be no cumulative non-Aboriginal heritage impacts associated with the operation of the project and The Northern Road upgrade Stages 5 and 6.</p>

Project and status	Cumulative impacts
<p>Other existing road network upgrades and potential road projects, including:</p> <ul style="list-style-type: none"> • Elizabeth Drive upgrade • Mamre Road upgrade • Outer Sydney Orbital <p>Not yet approved</p>	<p>The timing for construction of other road upgrade projects has not yet been announced. There is potential for overlaps in construction timing between the project and some of these road upgrade works. However, overlapping construction or operational timeframes do not usually add to the overall level of heritage impact.</p> <p>These projects are currently at varying stages of planning and no design or environmental assessment information is currently publicly available. As there has not been environmental assessment carried out for the planned and potential road upgrade projects in the western Sydney area, it is currently unknown whether there would be cumulative non-Aboriginal heritage impacts associated with the construction of the project and other road projects.</p> <p>As there has not been environmental assessment carried out, it is currently unknown whether impacts would be expected during operation of the planned and potential road upgrade projects. As such, it is unknown whether there would be cumulative non-Aboriginal impacts associated with the operation of the project and other road projects.</p>
<p>Major land releases, including:</p> <ul style="list-style-type: none"> • Western Sydney Aerotropolis • South West Growth Area • Western Sydney Employment Area. • Future strategic government project 	<p>Individual development projects in the Growth Areas are not yet well defined.</p> <p>The project would serve and facilitate the growth by providing increased road capacity and reducing congestion and travel times in the area. Outcomes of these strategies would guide the potential future context of the M12 Motorway project (operation).</p> <p>These projects are currently at varying stages of planning and no design or environmental assessment information is currently publicly available.</p> <p>As there has not been a heritage assessment carried out for the potential future Growth Areas projects, it is currently unknown whether there would be cumulative non-Aboriginal heritage impacts associated with the construction of the project and the development associated with the nearby growth areas. However, it can be surmised that this area will undergo substantial changes in the near future. While individual proposals will be subject to assessment for heritage impacts and other environmental assessments, there are likely to be long-term impacts that will change the landscape and the heritage character of this area substantially.</p> <p>As there has not been a heritage assessment carried out for the future potential developments, it is currently unknown whether impacts would be expected during operation of the project. As such, it is unknown whether there would be cumulative non-Aboriginal heritage impacts associated with the operation of the project and the development associated with the nearby growth areas.</p>

Table 7-98 Environmental management measures (non-Aboriginal heritage)

Impact	Reference	Environmental management measure	Responsibility	Timing
General	NAH01	<p>A construction cultural heritage management plan (CCHMP) will be prepared for the project as part of the CEMP in consultation with DPC (Heritage). The CCHMP will include as a minimum:</p> <ul style="list-style-type: none"> • A list, plan and maps with GIS layers showing the location of identified heritage items both within, and near, the construction footprint • A significance assessment and statement of significance for each item • Protocols and procedures including inductions and toolbox talks for all contractors and subcontractors working in the area to be informed of all exclusion zones, the elements and their significance, to prevent accidental damage or encroachment • Protocols and procedures to be implemented during construction to avoid or minimise impacts on items of heritage significance including protective fencing • The Roads and Maritime <i>Unexpected Heritage Items Procedure</i> (Roads and Maritime, 2015c) which would be followed in the event that unexpected heritage finds are uncovered during construction. 	Contractor	Prior to construction
	NAH02	<p>A suitably qualified heritage specialist will be engaged to prepare a heritage interpretation framework to guide development of the detailed urban design for the project. This framework will be prepared in accordance with the Interpreting Heritage Places and Items Guidelines (NSW Heritage Office, 2005) and will include:</p> <ul style="list-style-type: none"> • Integration of heritage themes and values to be incorporated • Collaboration with other design elements and themes for the project, including those associated with Western Sydney Airport and Sydney Metro Greater West, to develop an integrative design approach with surrounding development • Opportunities for design responses for Aboriginal and non-Aboriginal heritage 	Contractor / Roads and Maritime	Detailed design
	NAH03	<p>Impacts on Non-Aboriginal heritage items will be avoided or minimised where reasonable and feasible. Where impacts are unavoidable, works will be carried out in accordance with the measures for individual Non-Aboriginal heritage items outlined in measures NAH04 to NAH12.</p>	Roads and Maritime / Contractor	Detailed design, prior to construction and during construction

Impact	Reference	Environmental management measure	Responsibility	Timing
McGarvie Smith Farm (Item 1, Penrith LEP 857)	NAH04	<ul style="list-style-type: none"> A suitably qualified heritage consultant will be engaged to prepare an archival photographic recording of the site in accordance with the Heritage Information Series How to prepare archival records of heritage items (NSW Heritage Office, 1998). This will include both buildings and landscape features such as dams, and earthworks. The recording will include a detailed map showing the location of the features. Options will be investigated to provide funding support to the property's current owner to prepare a thematic heritage study of CSIRO and other agricultural research stations, including both McGarvie Smith Farm and McMaster Field Station, and other relevant agricultural research stations and similar facilities located in NSW. The thematic study will include a review of the role of such properties in veterinary research, association with agricultural, pastoral and animal husbandry groups, use of pioneering methods and practices and contribution to the development of farming in Australia. In the event that landowners do not prepare this study, Roads and Maritime will engage a heritage specialist to do so. 	Roads and Maritime / Contractor	Detailed design and prior to construction
The Fleurs Radio Telescope Site (Item 2, Penrith LEP 832)	NAH05	<ul style="list-style-type: none"> All extant elements of the radio telescopes and associated infrastructure, including rubbish mounds situated outside the construction footprint will be left intact Ground penetrating radar, or other remote sensing survey techniques, will be carried out under the supervision of a suitably qualified and experienced archaeologist before any ground disturbance within the heritage curtilage of the Fleurs Radio Telescope Site contained within the construction footprint to identify any sub-surface cables Measures will be included in the CHMP to describe how the heritage values of the site will be conserved and managed during construction Roads and Maritime will engage a suitably qualified heritage consultant to prepare an archival photographic recording of the impacted areas of the property, in accordance with DPC (Heritage) guidelines (Heritage Council of NSW 2006) The heritage interpretation framework for the project (NAH02) will include interpretation measures that will improve community awareness of the history of the Fleurs Radio Telescope as well as determine suitable locations for the presentation of information that are publicly accessible. 	Roads and Maritime / Contractor	Detailed design and prior to construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Upper Canal System (Pheasants Nest Weir to Prospect Reservoir (Item 4, SHR 01373)	NAH06	<ul style="list-style-type: none"> Relevant conservation policies outlined in the Upper Canal CMP (NSW Public Works Government Architect's Office, 2016) will be incorporated into the construction cultural heritage management plan (CCHMP) to ensure heritage fabric is not impacted by the project. The CCHMP will be consistent with and require implementation of relevant measures outlined in The Guidelines for development adjacent to the Upper Canal and Warragamba Pipelines (Sydney Catchment Authority 2012) which sets out guidelines for designing, planning or assessing development on land adjacent to this pipeline Guidelines and associated safe working distances to be adhered to for heritage structures as outlined in Appendix K A safe working distance exclusion zone will be established around the exposed tunnel air shaft in the M7 Motorway median in accordance with the process outlined in noise and vibration management measures NV09 - NV10. 	Roads and Maritime / Contractor	Prior to construction and during construction
McMaster Field Station (Item 6)	NAH07	<ul style="list-style-type: none"> A suitably qualified heritage consultant will be engaged to prepare an archival photographic recording of the impacted area, in accordance with DPC (Heritage) guidelines (Heritage Council of NSW 2006) (Heritage Council of NSW 2006). This will include both buildings and landscape features such as dams, and earthworks. The recording will include a detailed map showing the location of the features. Options will be investigated to provide funding support to property's current owner to prepare a thematic heritage study of CSIRO and other agricultural research stations, including both McMaster Field Station and McGarvie Smith Farm, and other relevant agricultural research stations and similar facilities located in NSW. The thematic study will include a review of the role of such properties in veterinary research, association with agricultural, pastoral and animal husbandry groups, use of pioneering methods and practices and contribution to development of farming in NSW and Australia. In the event that landowners do not prepare this study, Roads and Maritime will engage a heritage specialist to do so. A potential use zone will be established around the McMaster Farm group of buildings, including a suitable buffer zone, and no construction activities will take place within this zone. This zone will be incorporated into the construction heritage management plan (CHMP). The potential use zone will include safe working distances to be adhered to for heritage structures as outlined in Appendix K. Before occupying or utilising the buildings, a dilapidation survey will be carried out and a heritage architect will be engaged to advise on proposed modifications and management measures to avoid and minimise impact on the buildings. 	Roads and Maritime / Contractor	Detailed design, prior to construction and during construction

Impact	Reference	Environmental management measure	Responsibility	Timing
Fleurs Aerodrome (Item 7)	NAH08	<ul style="list-style-type: none"> A suitably qualified heritage consultant will be engaged to prepare an archival photographic recording of the impacted area before its disturbance and/or removal, in accordance with DPC (Heritage) guidelines (Heritage Council of NSW 2006). The recording will include a detailed map showing the location of the features. An interpretive framework developed for the project will include consideration of elements to enable the continued interpretation and understanding of the airstrip at Fleurs Aerodrome as a linear and continuous element. This will be carried out in consultation with Department of Defence and consider opportunities for involvement of veterans groups. Relevant guidelines and associated safe working distances will be adhered to for remaining heritage structures as outlined in the Appendix K 	Contractor / Roads and Maritime	Detailed design, prior to construction and during construction
Cecil Park School, Post Office and Church Site (Item 8)	NAH09	<ul style="list-style-type: none"> Roads and Maritime will liaise with local museums and/or historical societies to arrange a long-term secure artefact repository for the artefact assemblage. Once that arrangement has been made, DPC (Heritage) will be notified for their records. In the short term, Roads and Maritime will provide secure short-term secure storage for the assemblage. An Archaeological Research Design (ARD) for archaeological salvage of the former historical complex will be prepared and implemented prior to construction commencing by a suitably qualified historical archaeologist who fulfils the Heritage Council's <i>Excavation Director Criteria</i> to conduct open area excavation of a locally significant archaeological site. The ARD will include a revised impact assessment, revised research questions and a methodology to ensure archaeological relics within the project construction footprint are adequately investigated in accordance with standard NSW archaeological practice. 	Contractor / Roads and Maritime	Detailed design
South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape (Item 12)	NAH10	<ul style="list-style-type: none"> Management measures identified in the project UDLP (LVIA01) will be implemented during detailed design to minimise impacts on landscape and vistas Flooding management measures (F01 to F08) and surface water quality and hydrology management measures (SWH01 to SWH13) will be implemented to reduce broader impacts on the surrounding scenic landscape 	Contractor / Roads and Maritime	Detailed design, prior to construction and during construction