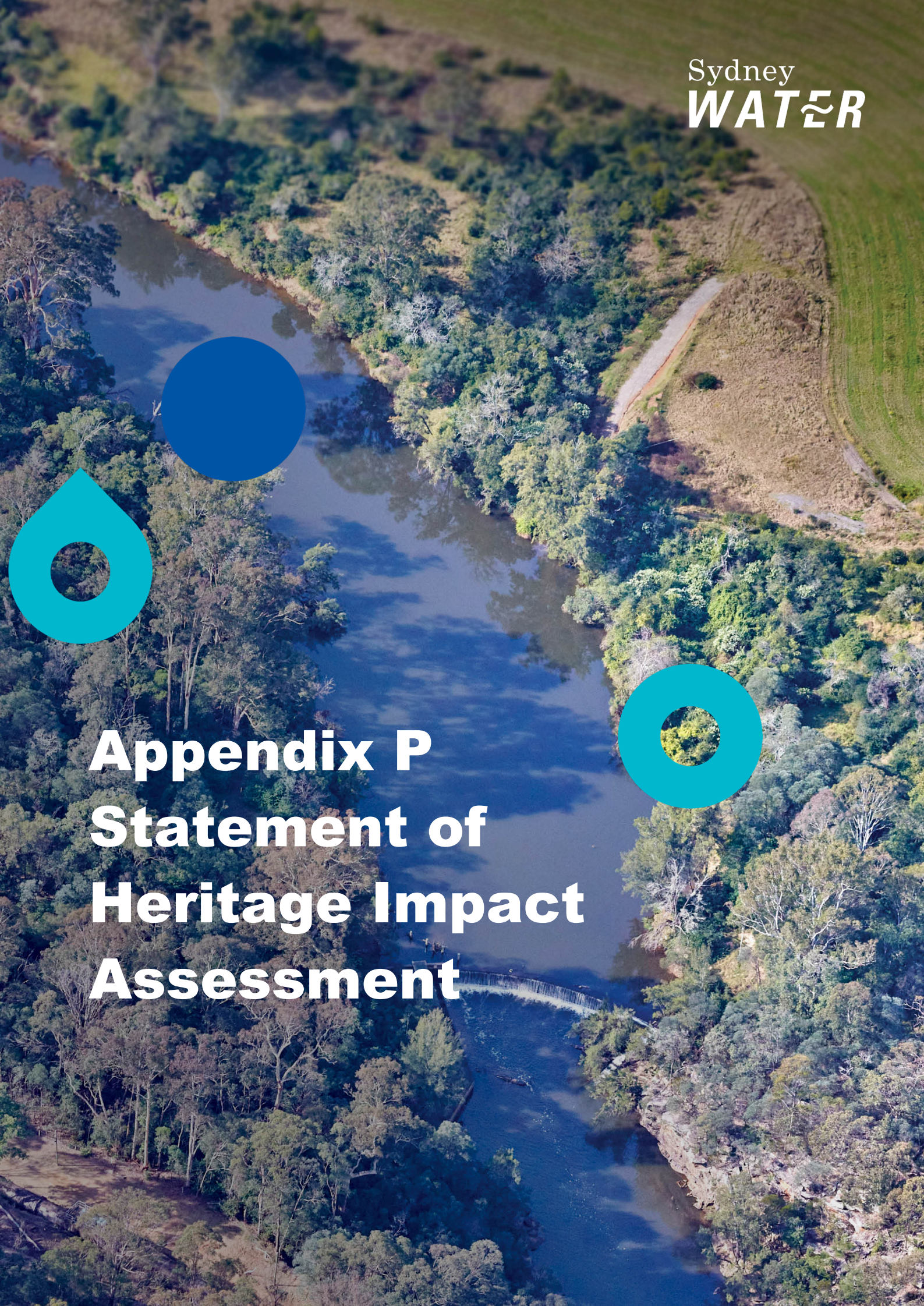

Sydney WATER

Appendix P Statement of Heritage Impact Assessment

EXTENT

HERITAGE ADVISORS
TO AUSTRALIA AND
THE ASIA PACIFIC

Upper South Creek Advanced Water Recycling Centre

Statement of Heritage Impact

Prepared for Sydney Water

June 2021—Final 0.1

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Document information

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Project:	Upper South Creek Advanced Water Recycling Centre SOHI
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Site location:	Upper South Creek
Heritage advisor(s):	Jen Jones Travers Eleanor Banaag Kim Watson

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Final Draft 0.3	MacLaren North	03.02.2021	QA
Final 0.1	Eleanor Banaag	05.05.2021	Client comments

Executive summary

Extent Heritage Pty Ltd (Extent Heritage) has been engaged by Sydney Water to prepare a Statement of Heritage Impact (SOHI) for the construction of a wastewater treatment plant, known as the Upper South Creek Advanced Water Recycling Centre (hereafter 'the Centre'), Western Sydney. The works will also include the construction of treated water pipelines to discharge into the Nepean and Warragamba Rivers, and brine pipeline to connect to the Malabar wastewater system at Lansdowne. The Centre and the associated treated water and brine pipelines will be referred to through this report as the 'Project'.

The Project is State Significant Infrastructure (SSI) and is being assessed under Part 5 of the Environmental Planning and Assessment Act 1979 (NSW) (EPA Act). The Planning Secretary's Environmental Assessment Requirements (SEARs) have been issued for the Project (SSI-8609189) and include requirements for non-Aboriginal archaeology and heritage.

This SOHI has been prepared in accordance with SEAR 24:

> A Statement of Heritage Impact (SOHI) should be prepared for the project by a suitably qualified heritage consultant in accordance with the guidelines in the NSW Heritage Manual. The SOHI is to address the impacts of the project on the heritage significance of the site and adjacent areas and is to identify the following:
>
> a) All heritage items (state and local) within and near the site, including built heritage, landscapes and archaeology, and includes detailed mapping of these items, and assessment of why the items and site(s) are of heritage significance.
>
> b) Assesses the project's impact on the heritage significance of heritage items or potential heritage items on, and near the development site. Documentary evidence should also be provided by an appropriately qualified Structural Engineer, with experience in heritage buildings, confirming that any affected heritage item is capable of withstanding the proposed works.
>
> c) Addresses the project's compliance with policies of relevant Conservation Management Plans for the affected sites;
>
> d) The impacts of the proposal on heritage item(s) including visual impacts, along with photomontages; and
>
> e) Any attempts to avoid and/or mitigate the impact on the heritage significance or cultural heritage values of the site and the surrounding heritage items; and
>
> f) Justification for any changes to the heritage fabric or landscape elements including any options analysis.

As detailed in Section 3 of this report, the heritage items within the assessment area of the Project include:

- Ten (10) local heritage items,
- One (1) state heritage item, and
- Nine (9) potential heritage items.

This assessment established that works associated with the construction and operation of the associated pipelines feeding Upper South Creek Advanced Water Recycling Centre will have a minor and inconsequential impact to the heritage significance of heritage items which intersect the Project. The works required to construct the treated water and brine pipelines will, where possible, see the remediation of the landscape on a like-for-like basis. This will have a positive outcome on the landscape character and setting of heritage items within this Project by reducing and mitigating the long-term impacts associated with the construction methodology of open trenching and underboring required for the treated water and brine pipelines.

Construction of the Centre on the site of 'Fleurs Radio Telescope Site' will have a major impact on heritage significance of this item. While the Project will see the removal of buildings and impressions in the landscape that visually communicate the former use of the site, the Project will have the opportunity to retain key features of the site and interpret the significance of the site. Important mitigation measures include archival recording of the site prior to construction works to ensure a final detailed recording of the site. Future mitigations to reduce the visual prominence of the Centre include detailed landscaping to screen the facility paired with considered architectural materials that are visually recessive.

The built heritage impacts are summarised below.

Site	Significance	Construction Impact	Operational Impact
Listed heritage items			
Fleurs Radio Telescope Site	Local	Major	No change
McGarvie Smith Farm	Local	Minor	No change
Luddenham Road Alignment	Local	Negligible	No change
Luddenham Homestead	Local	No change	No change
Luddenham Showground	Local	Negligible	No change
Blaxland's Farm	State	Negligible	Negligible
Blaxland Crossing	Local	No change	No change
Warragamba Supply Scheme and Warragamba Emergency Scheme	Local, part State	Minor	No change
Bandstand – Cabravale Memorial Park	Local	Minor	No change
Upper Canal System (Pheasants Nest weir to Prospect Reservoir)	State	Minor	No change

Site	Significance	Construction Impact	Operational Impact
Liverpool Offtake Reservoir	State	Minor	No change
Potential heritage items			
Exeter Farm Archaeological Site	Local	No change	No change
Fleurs Aerodrome	Local	Negligible	No change
McMaster Field Station	Local	Minor	No change
South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	Local	Moderate	No change
Blaxland's Garden	State/local	No change	No change
Lennox Reserve	Local	No change	No change
Lansvale Park	Local	No change	No change

General Recommendations

The following recommendations have been developed for the Project in order to reduce and mitigate possible risks to potential and known heritage items within the impact assessment area.

- Prior to works, a heritage induction should be delivered to all site contractors and supervisors involved working within a heritage curtilage or undertaking ground disturbance works. The induction will:
    - Brief contractors on the heritage sensitivity of the site;
    - Inform them of any recommended mitigation measures or controls required;
    - Help contractors identify unexpected archaeological finds;
    - Make them aware of their obligations under the Heritage Act; and
    - Establish an 'unexpected finds protocol' to ensure works halt and an archaeologist is immediately contacted in case of unexpected finds.
- No materials are to be stockpiled against heritage buildings or items.
- Any accidental damage to heritage items is to be treated as an incident, with appropriate recording and notification.

- All areas affected by works must be cleaned and made good by contractors after they have completed works.

- Where impacts to landscape are unavoidable, a process of remediating landscapes on a like for like basis should be employed.

- Any alteration to the heritage character of an item or landscape should consider the historic character of the area and treatments and finishes within the detailed design. Subtle integration of these elements to the new design may assist in minimising potential aesthetic impacts and complement the character of the surrounding area.

Built Heritage

Provided the general mitigation measures are implemented, there are few site-specific mitigation measures required as there are no long-term impacts associated with the Project. Where site specific mitigations are required they have been identified below.

Cabravale Memorial Park

- Contractors must be briefed on the heritage sensitive nature of the site and informed of any recommended mitigation measures or controls required, prior to works starting.

- It is recommended that a 'heritage protection zone' is adopted around key features and mature trees within the Cabravale Memorial Park. This will include:

    - Fencing around the Bandstand, 170mm Minenwerfer and Vietnam War Comradeship memorial to provide a safe buffer between the construction works and heritage monuments.

    - Protective zones around mature trees to ensure there is no impact to roots,

    - The Bandstand, 170mm Minenwerfer and Vietnam War Comradeship memorial are designated as 'no go zones', and

    - The measures are mapped and included in the CEMP.

- Where possible, existing roads and access tracks should be utilised. Where this is not possible and driving directly over grassed areas is required, some surface material can be applied to the ground cover to spread loads and prevent destruction of these areas.

- Any damage to the landscape is to be remediated upon completion of the work.

Upper Canal and Liverpool Offtake Reservoir

- Any accidental damage to heritage items is to be treated as an incident, with appropriate recording and notification for notification to WaterNSW and Heritage NSW.

Archival recording of Fleurs

- Our assessment has found that the remaining fabric on site is integral to the site's narrative and therefore its heritage significance and have recommended that the site is archivally recorded. Prior to the removal of works on identified historic elements related to the Fleurs Radio Telescope site, it is recommended that a photographic archival recording be conducted of these elements be undertaken, with particular reference to buildings, remnant equipment and the parabolic antennae. The photographic archival recording is to be undertaken by an experienced heritage consultant and in accordance with the *Photographic Recording of Heritage Items using Film or Digital Capture*, NSW Heritage Office, 2006.

- It is recommended the heritage interpretation devices for Fleurs Radio Telescope Site outlined in the Heritage Interpretation Framework prepared by Extent Heritage in November 2020 be implemented as a part of this Project.

Heritage Interpretation

- A Heritage Interpretation Framework was prepared for the Project to guide a cohesive and well-considered approach to interpretation of potentially significant elements and sites within the impact assessment area of the Project. This approach provided an understanding of the various opportunities for interpretation for the Project that best highlight the heritage significance of places and elements. Following this, it is recommended a Heritage Interpretation Plan is prepared to further develop the concepts through to fabrication and implementation.

- The heritage interpretation for this Project should consider the feasibility of the following opportunities:

    - Landscaping, structure plan and road alignments of/within the Centre to incorporate historic features such as the radio telescope arrays.

    - Public Art installation within the Centre. There is the opportunity to create soundscapes as a form of public art that use sound and noise as the medium of the artwork. Integrated with sculptural art, opportunities include interpreting the sound of birds in the antennas at Fleurs, the wind whistling through the metal elements of the dishes, and the sound of water from the creeks and channels to create a soundscape landscape.

    - Retention of two parabolic antennas as an interpretative installation.

    - Collect a meaningful assemblage of historic material/equipment and historic resources i.e. photographs that relates to the radio telescope functions of the site, and creation of a heritage display within the Centre.

    - Prepare digital resources (such as printable material or audio histories) that are available for download by the general public which will further promote the heritage

significance of the place to a wider audience. This will be particularly effective for expressing the historical significance of sites such as Fleurs radio telescope, Fleurs Aerodrome, and the McGarvie-Smith/McMaster Field Station/former CSIRO research facilities.

- Prepare an oral history of the Fleurs Field Station.

- For areas with high pedestrian or road traffic, it is recommended temporary interpretive hoarding is used to provide the public with an opportunity to learn about the historical sites captured in the Project's impact assessment area during the construction phase. Potential sites available include compound sites located at Luddenham Homestead Site and Cabravale Memorial Park, as well as at Blaxland's Farm at Silverdale Road.

- There are a number of major projects also proposed or in progress surrounding the Centre and has some interface with the Project, including the M12 Motorway and the Western Sydney International Airport and Aerotropolis. Interpretation at the site has the opportunity to consider a more holistic and collaborative approach with these other developments.

Historical Archaeology

Tabulated below are the mitigation measures for each Potential Archaeological Site (PAS) identified in this report. Many of the PAS have areas with different levels of archaeological potential or significance, and this is represented in the table below. The recommended mitigation responds to the differing levels of archaeological potential and significance, as well as proposed impacts.

PAS	Archaeological potential	Archaeological significance	Recommended mitigation
1 (Blaxland's Farm)	Moderate to moderate-high	State	Archaeological testing to inform detailed design and further works. Archaeological salvage excavation of remains of local or state significance within the impact area.
	Low	State or local	Works to proceed under an 'unexpected finds protocol'.
2 (Blaxland's Gardens)	Moderate	State or local	Archaeological testing to confirm assessed levels of potential and significance. Archaeological salvage excavation of remains of local or state significance within the impact area.
	Low	State or local	Works to proceed under an 'unexpected finds protocol'.

PAS	Archaeological potential	Archaeological significance	Recommended mitigation
3 (Blaxland's Crossing)	Moderate	Local	Archaeological testing to confirm assessed levels of potential and significance. Archaeological salvage excavation of remains of local or state significance within the impact area.
	Low	Unlikely to meet the threshold for local significance	Works to proceed under an 'unexpected finds protocol'.
4 (McMaster Field Station)	Low to low-moderate	Unlikely to meet the threshold for local significance	Works to proceed under an 'unexpected finds protocol'.
5 (McGarvie Smith Farm)	Low	Unlikely to meet the threshold for local significance	Works to proceed under an 'unexpected finds protocol'.
6 (Exeter House and Farm)	Low	Local	Works to proceed under an 'unexpected finds protocol'.
7 (Fleurs Radio Telescope Site)	Low	Unlikely to meet the threshold for local significance	Works to proceed under an 'unexpected finds protocol'.
8 (Upper Canal)	Low-moderate	State or local	Archaeological monitoring of ground disturbance in areas of low-moderate potential.
	High	Local	Avoid impacts in areas of high potential, if possible. Archaeological salvage excavation of remains of local significance within the impact area.
	Low	Local	Works to proceed under an 'unexpected finds protocol'.
9 (Lennox Reserve)	High	Local	Avoid impacts in areas of high potential, if possible. If impact cannot be avoided, complete archaeological testing to confirm potential and significance. Archaeological salvage excavation of remains of local or state significance within the impact area.
	Low	Local	Works to proceed under an 'unexpected finds protocol'.

PAS	Archaeological potential	Archaeological significance	Recommended mitigation
10 (Lansvale Park)	Moderate to high	Local	Archaeological testing to confirm potential and significance. Archaeological salvage excavation of remains of local or state significance within the impact area.
	Low	Local	Works to proceed under an 'unexpected finds protocol'.

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1. Introduction

1.1 Project overview

Sydney Water is planning to build and operate new wastewater infrastructure to service the South West and Western Sydney Aerotropolis Growth Areas. The proposed development will include a wastewater treatment plant in Western Sydney, known as the Upper South Creek Advanced Water Recycling Centre (the Centre). Together, this Water Recycling Centre and the associated treated water and brine pipelines, will be known as the 'Project'. An overview of the location of the proposed infrastructure is provided in Figure 1.

The Project has been declared State Significant Infrastructure (SSI) and is being assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). The Planning Secretary's Environmental Assessment Requirements (SEARs) have been issued for the Project (SSI-8609189) and include requirements for Non-Aboriginal Heritage.

This SOHI has been prepared in accordance with SEAR 24. It is the purpose of this report to analyse the potential impacts of the Project on the heritage significance of known and potential heritage items within the impact assessment area. This report will identify potential risks and identify safeguards to avoid or minimise impacts during detailed design, construction, and operation. Recommendations for heritage enhancement opportunities are also provided. This report specifically relates to built heritage and historical archaeology potential and includes recommendations and conclusions drawn from the impact assessment.

1.2 Project description

Sydney Water is planning to deliver the Project in stages, with Stage 1 comprising:

- Building and operating the Advanced Water Recycling Centre to treat an average dry weather flow of up to 50ML per day.
- Building all pipelines to their ultimate capacity, but only operating them to transport and release volumes produced by the Stage 1 Advanced Water Recycling Centre.

The timing and scale of future stages will be phased to respond to drivers including population growth rate and the most efficient way for Sydney Water to optimise its wastewater systems.

Further details of each component of the Project are provided below (refer to figure 1).

Advanced Water Recycling Centre

- A wastewater treatment plant with the capacity to treat up to 50 ML of wastewater per day, with ultimate capacity of up to 100ML per day.
- The Advanced Water Recycling Centre will produce:

- High-quality treated water suitable for a range of uses including recycling and environmental flows.
- Renewable energy, including through the capturing of heat for cogeneration.
- Biosolids suitable for beneficial reuse.
- Brine, as a by-product of reverse osmosis treatment.

Treated water pipelines

- A pipeline about seventeen (17) kilometres long from the Advanced Water Recycling Centre to the Nepean River at Wallacia Weir, for the release of treated water.
- Infrastructure from the Advanced Water Recycling Centre to South Creek to release excess treated water and wet weather flows.
- A pipeline about five (5) kilometres long from the main treated water pipeline at Wallacia to a location between the Warragamba Dam and Warragamba Weir, to release high-quality treated water to the Warragamba River as environmental flows.

Brine pipeline

- A pipeline about twenty-four (24) kilometres long that transfers brine from the Advanced Water Recycling Centre to Lansdowne, in south-west Sydney, where it connects to Sydney Water's existing Malabar wastewater network.

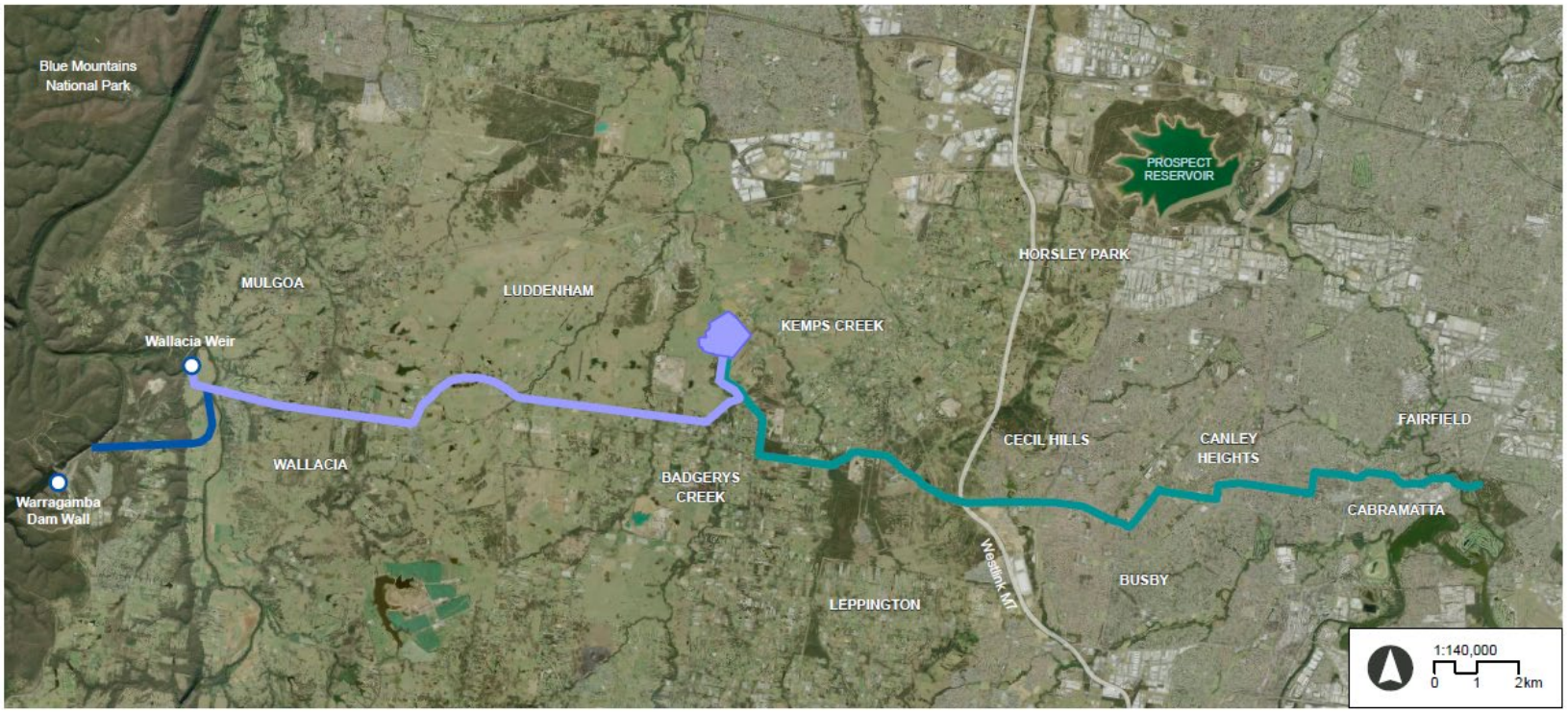

Figure 1. Project overview

1.3 Objectives

Table 1. SEARs relevant to Non-Aboriginal Heritage

No.	SEAR	Section SEAR is addressed in SoHI
24.	A Statement of Heritage Impact (SOHI) should be prepared for the project by a suitably qualified heritage consultant in accordance with the guidelines in the NSW Heritage Manual. The SOHI is to address the impacts of the project on the heritage significance of the site and adjacent areas and is to identify the following:	
a	All heritage items (state and local) within and near the site, including built heritage, landscapes and archaeology, and includes detailed mapping of these items, and assessment of why the items and site(s) are of heritage significance.	Section 3
b	Assesses the project's impact on the heritage significance of heritage items or potential heritage items on, and near the development site. Documentary evidence should also be provided by an appropriately qualified Structural Engineer, with experience in heritage buildings, confirming that any affected heritage item is capable of withstanding the proposed works.	Section 8
c	Addresses the project's compliance with policies of relevant Conservation Management Plans for the affected sites;	Section 8.6
d	The impacts of the proposal on heritage item(s) including visual impacts, along with photomontages; and	Section 8
e	Any attempts to avoid and/or mitigate the impact on the heritage significance or cultural heritage values of the site and the surrounding heritage items; and	Section 10
f	Justification for any changes to the heritage fabric or landscape elements including any options analysis.	Section 7.4
25.	A historical archaeological assessment prepared by a suitably qualified historical archaeologist in accordance with the guidelines Archaeological Assessment (1996) and Assessing Significance for Historical Archaeological Sites and Relics (2009). This assessment should identify what relics, if any, are likely to be present, assess their significance and consider the impacts from the project on this potential archaeological resource. Where impact is likely to occur, it is recommended that the significance of the relics be considered in determining appropriate mitigation strategy. If harm cannot be avoided in whole or part, an appropriate Research Design and Excavation Methodology should also be prepared to guide any proposed excavations or salvage programme.	Refer to Appendix A for Historical Archaeological Assessment
38.	An assessment of construction and operational noise and vibration impacts in accordance with relevant NSW noise and vibration guidelines. The assessment must include consideration of impacts to sensitive receivers, infrastructure, heritage and include, as relevant, the characteristics of noise and vibration (for example, low frequency noise).	Section 8

No.	SEAR	Section SEAR is addressed in SoHI
46.	An assessment of the visual impact of the project and any ancillary infrastructure during construction and operation on: a) views and vistas; b) key sites and buildings; c) heritage items including Aboriginal places and non-Aboriginal heritage; and d) the local community.	Section 8
Attachment 1. World Heritage		
17.	The EIS must identify and describe the characteristics and values, including Outstanding Universal values, of the Greater Blue Mountains Area – World Heritage property and National Heritage place that is likely to be impacted by all stages of the proposed action with appropriate reference to relevant management plans. The assessment of impacts should include information on: i. the modification, destruction, fragmentation, isolation, disturbance of an important or substantial area of habitat; ii. impacts on other users of the area; iii. the potential impacts on important amenities, navigation, culturally or historically significant sites, threatened or migratory species or sensitive habitat; iv. the potential visual impacts; v. a description of any specific mitigation and management measures proposed to protect or enhance the affected values of the World Heritage property or National Heritage place.	Subject to a separate study.

2. Methodology

2.1 Approach and methodology

The approach that has guided the preparation of this SOHI is in accordance with the principles and definitions as set out in the guidelines to *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (the *Burra Charter*) (Australia ICOMOS 2013).

The Heritage Council of NSW has established guidelines for the assessment of the significance of, and impacts to, heritage items and non-Aboriginal archaeological sites. These guidelines include:

- *Assessing Heritage Significance Guidelines (2001)*
- *Statement of Heritage Impact Guidelines (2002)*
- *Assessing Significance for Historical Archaeological Sites and Relics (2009)*
- *Archaeological Assessments (1996)*

This assessment has been produced in accordance with the process and recommendations of the above guidelines.

The assessment of impacts on the built and historical archaeological significance of heritage (and potential heritage) items within the Project has been modelled off the ICOMOS *Guidance on Heritage Impact Assessments.* Refer to table below for impact definitions. Note that the impact definitions emphasise the degree of change in terms of materiality and setting.

Table 2. Heritage Impact Definitions

Impact	Built heritage, historic urban landscape attributes
Major	Change to key historic building elements that contribute to Outstanding Universal Value (OUV), such that the resource is totally altered. Comprehensive changes to the setting.
Moderate	Changes to many key historic building elements, such that the resource is significantly modified. Changes to the setting of an historic building, such that it is significantly modified.
Minor	Change to key historic building elements, such that the asset is slightly different. Change to setting of an historic building, such that it is noticeably changed.
Negligible	Slight changes to historic building elements or setting that hardly affect it.
No change	No change to fabric or setting.

Additionally, the below table offers an additional scale for types of impact that can affect the significance of an item of State heritage significance, where the material threshold applies. The material threshold does not correspond to the degree of change, it is triggered by potential adverse impacts to State heritage significance.

Table 3. Scale of impact to State heritage significance.

Impact	Definition
Total loss of significance	Major adverse impact to the extent where the place would no longer meet the criteria for listing on the State Heritage Register.
Adverse Impact	Major (that is, more than minor or moderate) adverse impacts to State heritage significance.
	Moderate adverse impacts to State heritage significance.
	Minor adverse impacts to State heritage significance.
Little to no impact*	An alteration to State heritage significance that is so minor that it is considered negligible. * Little to no impact (as opposed to no impact) acknowledges that any change will result in some level of impact/alteration to State heritage significance.
Positive Impact	Alterations that enhance the ability to demonstrate the State heritage significance of an SHR listed place.

The assessment in this report was informed by a Preliminary Heritage Assessment, undertaken by Extent Heritage in April 2020. The Preliminary Heritage Assessment identified potential risks to known heritage items within the impact assessment area and identified mitigation measures to inform project design. The design process for the Project was an iterative process that involved consultation between project engineers and environmental specialists to refine the reference design of the Upper South Creek Water Recycling Centre and mitigate impacts to built heritage and historical archaeological potential. A program of targeted fieldwork was undertaken between July and November 2020 to investigate areas of interest as they related to built heritage and historical archaeological potential located within the impact assessment area.

2.2 Review of Previous Studies

The following table identifies the principle reports previously prepared in relation to the Project. These reports have been reviewed and inform the present assessment.

Year	Author	Title
2019	AECOM	Upper South Creek Water Recycling Plant Aboriginal and Historical Heritage Desktop Constraints Analysis
2019	Eco Logical Australia	Wylde MTB Upgrade, Cecil Park. Statement of Heritage Impact

Year	Author	Title
2019	Roads and Maritime Services	M12 Motorway Environmental Impact Assessment: Volume 7 Appendix J Non-Aboriginal Heritage Assessment Report
2019	Wendy Thorpe - CRM Cultural Resources Management	Heritage Assessment Historic Period Resources

2.3 Terminology

The following Burra Charter. Article 1 terminology is used in this report:

Place means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the *place* itself, its *fabric*, *setting*, *use*, *associations*, *meanings*, records, *related places* and *related objects*. Places may have a range of values for different individuals or groups.

Fabric means all the physical material of the place including elements, fixtures, contents and objects.

Conservation means all the processes of looking after a *place* so as to retain its *cultural significance.*

Maintenance means the continuous protective care of a *place*, and its *setting*. Maintenance is to be distinguished from repair which involves *restoration* or *reconstruction*.

Preservation means maintaining a *place* in its existing state and retarding deterioration.

Restoration means returning a *place* to a known earlier state by removing accretions or by reassembling existing elements without the introduction of new material.

Reconstruction means returning the *place* to a known earlier state and is distinguished from *restoration* by the introduction of new material.

Adaptation means changing a *place* to suit the existing *use* or a proposed use.

Use means the functions of a *place*, including the activities and traditional and customary practices that may occur at the place or are dependent on the place.

Compatible use means a *use* that respects the *cultural significance* of a *place*. Such a use involves no, or minimal, impact on cultural significance.

Setting means the immediate and extended environment of a *place* that is part of or contributes to its *cultural significance* and distinctive character.

Related place means a *place* that contributes to the *cultural significance* of another place.

Related object means an object that contributes to the *cultural significance* of a *place* but is not at the place.

Associations mean the connections that exist between people and a *place*.

Meanings denote what a *place* signifies, indicates, evokes or expresses to people.

Interpretation means all the ways of presenting the *cultural significance* of a *place*.

Terminology specific to this Project and used in this report includes the following terms:

- **Impact Assessment Area** - refers to the area within which project impacts may occur. This will be larger than the actual impact area to give some flexibility in construction impacts.
- **Impact Area** – refers to the actual area impacted by construction and operation. This is generally 15-30 metres along pipeline alignments. This will be finalised upon completion of reference design and impact assessments.

2.4 Limitations

The project area was inspected and photographed by the author of this report on between July and November 2020. Physical inspections were undertaken as a visual study only and involved no physical ground disturbance, excavation or testing.

This SOHI report addresses the built heritage and historical archaeological impacts of the Project. An Aboriginal Cultural Heritage Assessment did not form a part of this assessment.

The historical overview provides sufficient historical background to understand the place to assess the significance and provide relevant recommendations, however, it is not intended as an exhaustive history of the project area.

The assessment of historical archaeological potential, significance and impacts presented in this SOHI is excerpted from the detailed Historical Archaeological Assessment (HAA) prepared for this Project by Extent Heritage (2021) and appended to this report (see Appendix A).

2.5 Authorship

The following staff members at Extent Heritage have prepared this Statement of Heritage Impact:

- Dr MacLaren North, Managing Director;
- Dr Jennifer Jones-Travers, Senior Associate;
- Eleanor Banaag, Senior Associate;
- Kim Watson, Heritage Advisor; and
- Gabrielle Harrington, Heritage Advisor.

3. Heritage Legislative Context

3.1 Key heritage legislation

Historical archaeology and built heritage in New South Wales are protected by Commonwealth and State legislation, and regulations provided by local government. Of relevance to the Project are the:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *NSW Heritage Act 1977*
- *NSW Environmental Planning and Assessment Act 1979*
    - *Bankstown Local Environmental Plan 2015*
    - *Fairfield Local Environmental Plan 2010*
    - *Liverpool Local Environmental Plan 2008*
    - *Penrith Local Environmental Plan 2014*
    - *Wollondilly Local Environmental Plan 2011*
    - State Environmental Planning Policy (Western Sydney Parklands) 2009
    - *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020*

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places—defined in the EPBC Act as matters of national environmental significance.

Specifically, the EPBC Act aims to:

- Provide for the protection of the environment, especially matters of national environmental significance;
- Conserve Australia's biodiversity;
- Protect biodiversity internationally by controlling the international movement of wildlife;
- Provide a streamlined environmental assessment and approvals process where matters of national environmental significance are involved;
- Protect our world and national heritage; and

- Promote ecologically sustainable development.

The Project is in the vicinity of one heritage item listed on the National Heritage List and World Heritage List. The Blue Mountains National Park, listed on the World Heritage List and National Heritage List, as the *Greater Blue Mountains*, gazetted 2 December 2000 is located to the west.

The Project has been determined a controlled action and requires approval under the EPBC Act, assessed under the Bilateral Agreement. A controlled action means that a significant impact on a nationally protected matter is likely, and the activity needs to undergo federal assessment. A method of assessment will then be chosen, which will vary depending on the scale and complexity of the activity.

3.1.2 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides protection for heritage places, buildings, works, relics, movable objects, precincts, land and archaeological sites that are important to the people of New South Wales. Where these items have particular importance to the State of New South Wales, they are listed on the State Heritage Register (SHR). The Heritage Council of NSW is the approval authority under the Heritage Act for works to an item on the SHR.

In addition, Section 170 of the Heritage Act requires government agencies to establish and maintain a Heritage and Conservation Register, identifying items of environmental heritage as prescribed in Part 4 of the *Heritage Regulation 2012*.

See section 3.2 below for a list of all items within the Project that are listed on the State Heritage Register and State Agency Heritage and Conservation Register.

3.1.3 Environmental Planning and Assessment Act 1979 (NSW)

An Environmental Planning Instrument (EPI) is made under the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). An EPI can be a local environmental plan (LEP), or a state environmental planning policy (SEPP). These EPIs guide land use management at a local and state level. They include provisions for heritage conservation and development assessment and approval. Schedule 5 of the LEP lists items of environmental heritage within the LGA, including archaeological sites, buildings, and conservation areas. These items may be of national, state, or local heritage significance.

The Project extends across the Local Government Areas of Canterbury-Bankstown, Fairfield, Liverpool, Penrith, and Wollondilly. See section 3.2 below for a list of all items within the Project that are listed on Schedule 5 of the LEP.

3.1.3.1 State Environmental Planning Policy (Western Sydney Parklands) 2009

The *State Environmental Planning Policy (Western Sydney Parklands) 2009* (Western Sydney Parklands SEPP) put in place planning controls that enable the Western Sydney Parklands Trust to develop the Western Parklands into a multi-use urban parkland for the region of western Sydney. The consent authority must, before granting consent under this clause, consider the effect of the proposed development on the heritage significance of heritage items potentially impacted by the work.

Schedule 1 of the Western Sydney Parklands SEPP lists items of environmental heritage within the land to which the SEPP applies, including archaeological sites, buildings, and conservation areas. These items may be of national, state, or local heritage significance. See section 3.2 below for a list of all items within the Project that are listed on the Western Sydney Parklands SEPP, Schedule 1.

3.1.3.2 State Environmental Planning Policy (Western Sydney Aerotropolis) 2020

The *State Environmental Planning Policy (Western Sydney Aerotropolis) 2020* (Western Sydney Aerotropolis SEPP) put in place planning controls that enable the Western Sydney Planning Partnership to develop the Western Sydney Aerotropolis. The Western Sydney Aerotropolis comprises nine (9) precincts; Aerotropolis Core, Northern Gateway, Wianamatta–South Creek, Badgerys Creek, Agribusiness, Dwyer Road, Kemps Creek, North Luddenham and Rossmore. The consent authority must, before granting consent under this clause, consider the effect of the proposed development on the heritage significance of heritage items potentially impacted by the work.

Schedule 2 of the Western Sydney Aerotropolis SEPP lists items of environmental heritage within the land which the SEPP applies to. These items may be of national, state or local heritage significance. Section 3.2 below for list of all items within the Project that are listed on the Western Sydney Aerotropolis SEPP, Schedule 2.

3.2 Key relevant policy documents

3.2.1 Western City District Plan

Planning priority W6

In giving effect to ***A Metropolis of Three Cities***, this Planning Priority delivers on the following objectives and the corresponding strategies:

Objective 12: Great places that bring people together

Objective 13: Environmental heritage is identified, conserved and enhanced

Environmental heritage was identified as part of this Project. Refer below to sections 3.3 Summary of listings, 3.4 Potential Non-Aboriginal heritage items and 3.5 Non-Aboriginal heritage in the vicinity for all known and potential non-Aboriginal Heritage items within the Project.

The Project has made a conscious effort to minimise and reduce heritage impacts where possible. This was achieved through the location of the treated water and brine pipeline to areas generally restricted to road verges and below the roadway. Where pipelines deviate from roadways careful consideration was given to the location of pipelines and discharge outlets in areas of heritage sensitivity and archaeological potential. This was particularly significant at Blaxland's Farm where the pipeline and discharge outlet was revised to avoid areas likely to contain evidence associated with Blaxland's brewery and operations of his Luddenham Estate, dating as early as 1830. Refer below to section 7 for a discussion of this process.

While the Project will have a major heritage impact to the fabric and heritage significance of Fleurs Radio Telescope Site. This report has recommended several mitigation methods to help alleviate these impacts and to provide ongoing recognition of the heritage significance of the site, including archival recording and heritage interpretation.

The Project has considered objective 13 and this report fulfils the requirements of this objective.

3.3 Summary of listings

Tabulated below is a summary of all the relevant statutory heritage listings, relevant to the Project.

Table 4. Summary of statutory heritage listings within the Impact Assessment Area.

Register/Listing	Item Listed (Y/N)	Item Name	Item number
World Heritage List	Y	Greater Blue Mountains Area	No ID given
National Heritage List	Y	Greater Blue Mountains	105999
Commonwealth Heritage List	N	-	-
State Heritage Register	Y	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	01373
State Agency Heritage and Conservation Register	Y (WaterNSW)	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	-
	Y (WaterNSW)	Warragamba Supply System	-
State Environmental Planning Policy (Western Sydney Aerotropolis)	Y	McGarvie Smith Farm	I1
		The Fleurs Radio Telescope site	I5
		Luddenham Road alignment	I8
		Showground	I15

Register/Listing	Item Listed (Y/N)	Item Name	Item number
State Environmental Planning Policy (Western Sydney Parklands)	Y	Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	7
		Liverpool Offtake Reservoir	12
Fairfield LEP 2013	Y	Bandstand	I17
Liverpool LEP 2008	Y	Sydney Water Supply Upper Canal	15
Penrith LEP 2010	Y	Luddenham Road Alignment	843
		The Fleurs Radio Telescope Site	832
		McGarvie-Smith Farm	857
		Luddenham Homestead Site	A849
		Showground	679
Wollondilly LEP 2011	Y	Blaxland's Farm	I269
	Y	Blaxland's Crossing	I289
	Y	Warragamba Supply Scheme and Warragamba Emergency Scheme	I270

3.4 Potential Non-Aboriginal heritage items

The following heritage items are not listed on any statutory heritage registers but have been identified during the course of this assessment and in previous heritage studies as items of potential heritage significance.

Table 5. Summary of Potential Heritage Items within the Project.

Name	Address	Potential heritage significance
Blaxland's Garden	2595 Silverdale Road, Wallacia	Local/ State
Exeter House	1669-1723 Elizabeth Drive, Badgerys Creek	State
Exeter Farm Archaeological Site	885A Mamre Road, Kemps Creek	State
Fleurs Aerodrome	949A Mamre Road, Kemps Creek	Local

Name	Address	Potential heritage significance
McMaster Field Station	1853-2109 Elizabeth Drive, Badgerys Creek	Local
South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape	Badgerys Creek	Local
South Creek Bridge	885A Mamre Road, Kemps Creek	Local
Lennox Reserve	Hume Highway, Canley Vale	Local
Lansvale Park	Hume Highway, Lansvale	Local

3.5 Non-Aboriginal heritage in the vicinity

The following Non-Aboriginal heritage items identified are located within the vicinity of the Project. To capture these items, a 100 kilometre buffer zone was applied to the assessment area.

Table 6. Summary of heritage items in the vicinity of the Project.

Name	Address	Significance	Item number
Greater Blue Mountains	Blue Mountains	World and National	105999 (NHL)
Lansdowne Bridge	Hume Highway, Lansvale	State	01472 (SHR)
'House', Lansdowne	7 Henry Lawson Drive, Lansdown	Local	I27 (Bankstown LEP)
St. Andrews Anglican Church (Former)	25 Park Road, Wallacia	Local	326 (Penrith LEP)
"Bayly Park" - house	919-929 Mamre Road, Kemps Creek	Local	104 (Penrith LEP)
Park Road Conservation Area	Park Road, Wallacia	Local	HCA6 (Penrith LEP)
Blaxland Crossing	Nepean River, Wallacia	Local	I289 (Wollondilly LEP)
Wallacia Hotel	1590–1594 Mulgoa Road, Wallacia	Local	325 (Penrith LEP)
Wallacia Weir	Nepean River, Wallacia	-	No ID provided (SEPP Hawkesbury-Nepean No. 20 - 1997)

3.6 Non-Aboriginal heritage items mapped

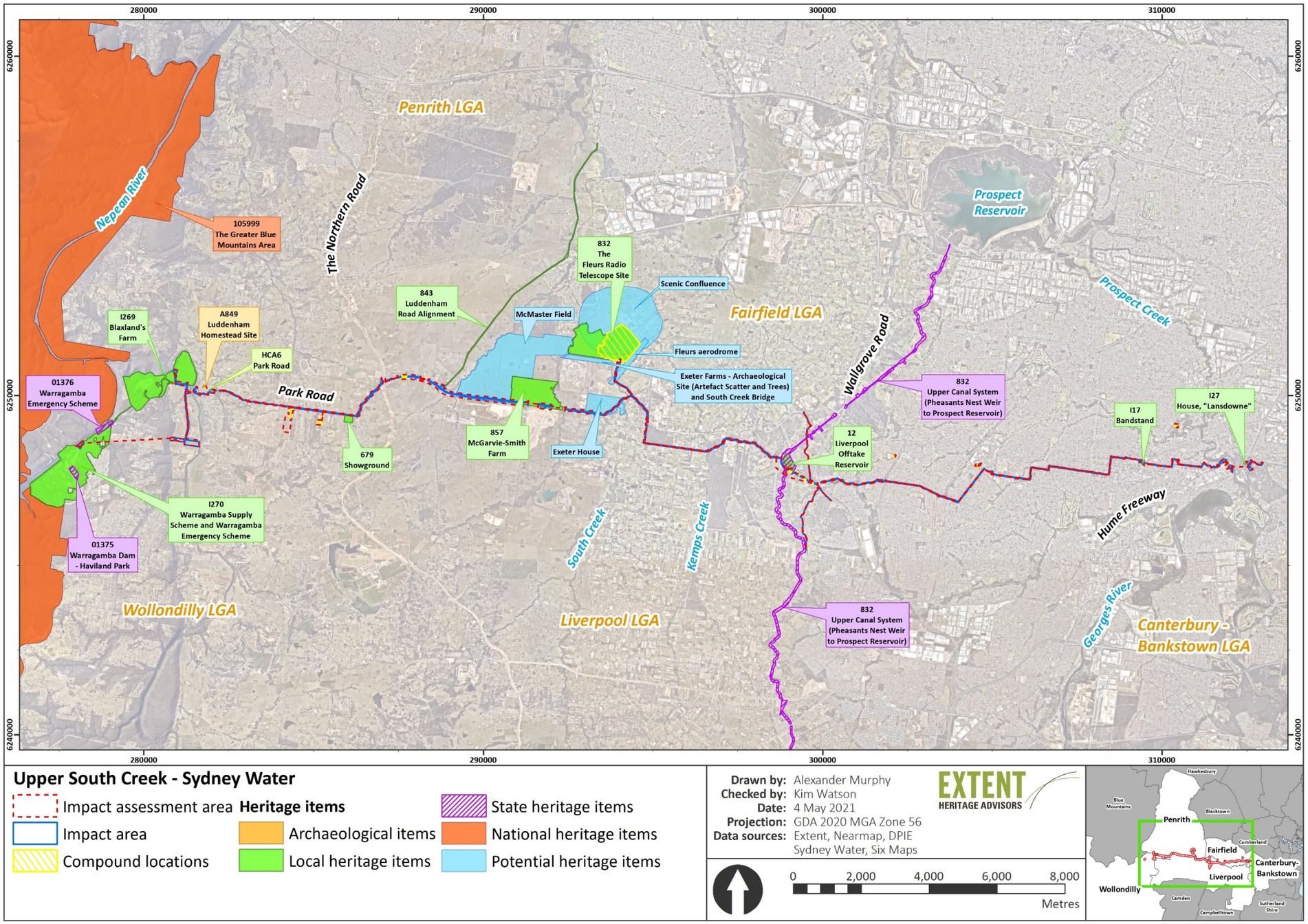

Figure 2. Overview of all known and potential non-Aboriginal heritage sites that intersect the Project.

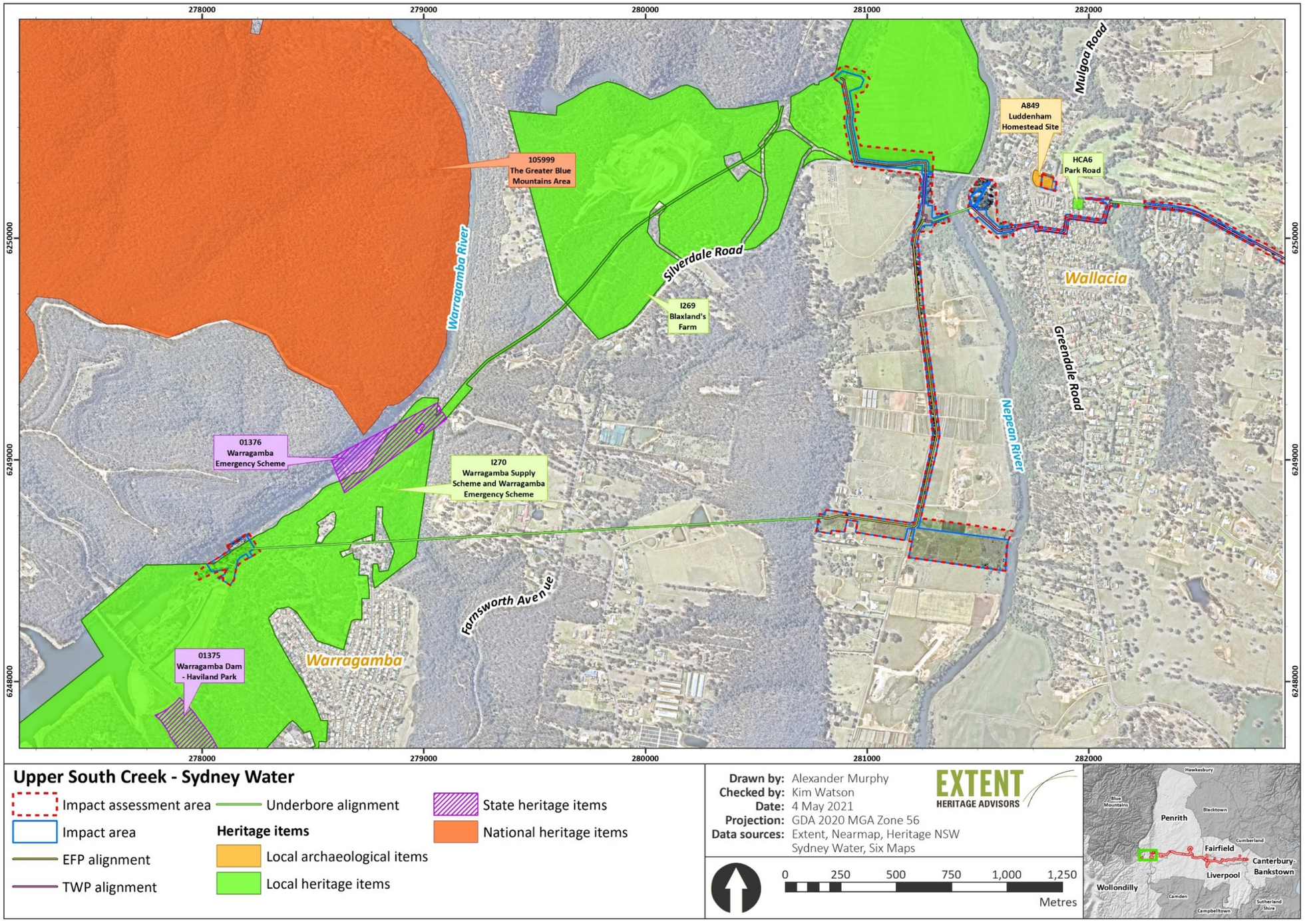

Figure 3. Project mapped over heritage items in the impact assessment area at the western end.

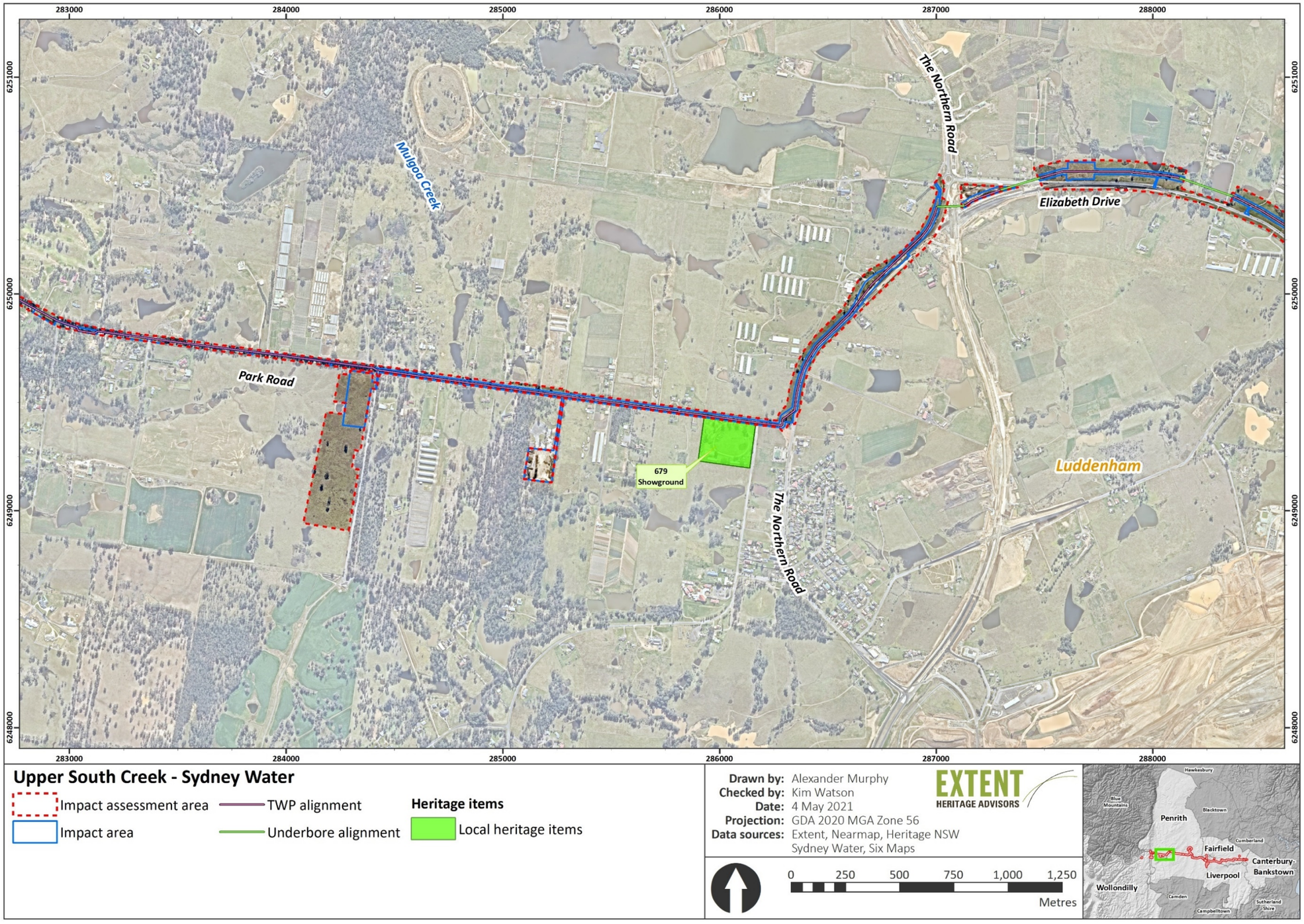

Figure 4. overview of works within the vicinity of the Showground.

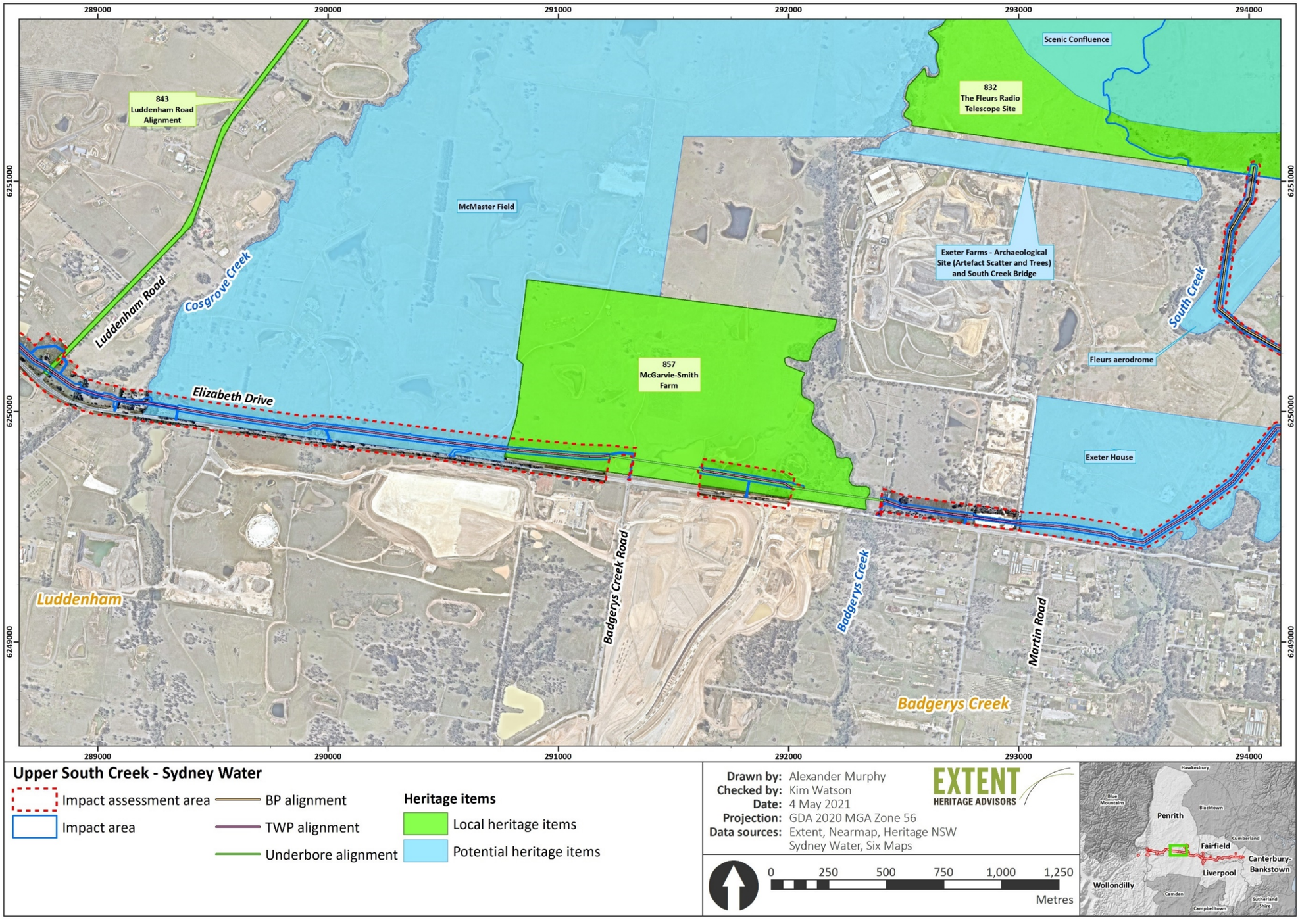

Figure 5. Overview of the Treated Water Pipeline in the vicinity of McGarvie Smith Farm, McMasters Field and Exeter House.

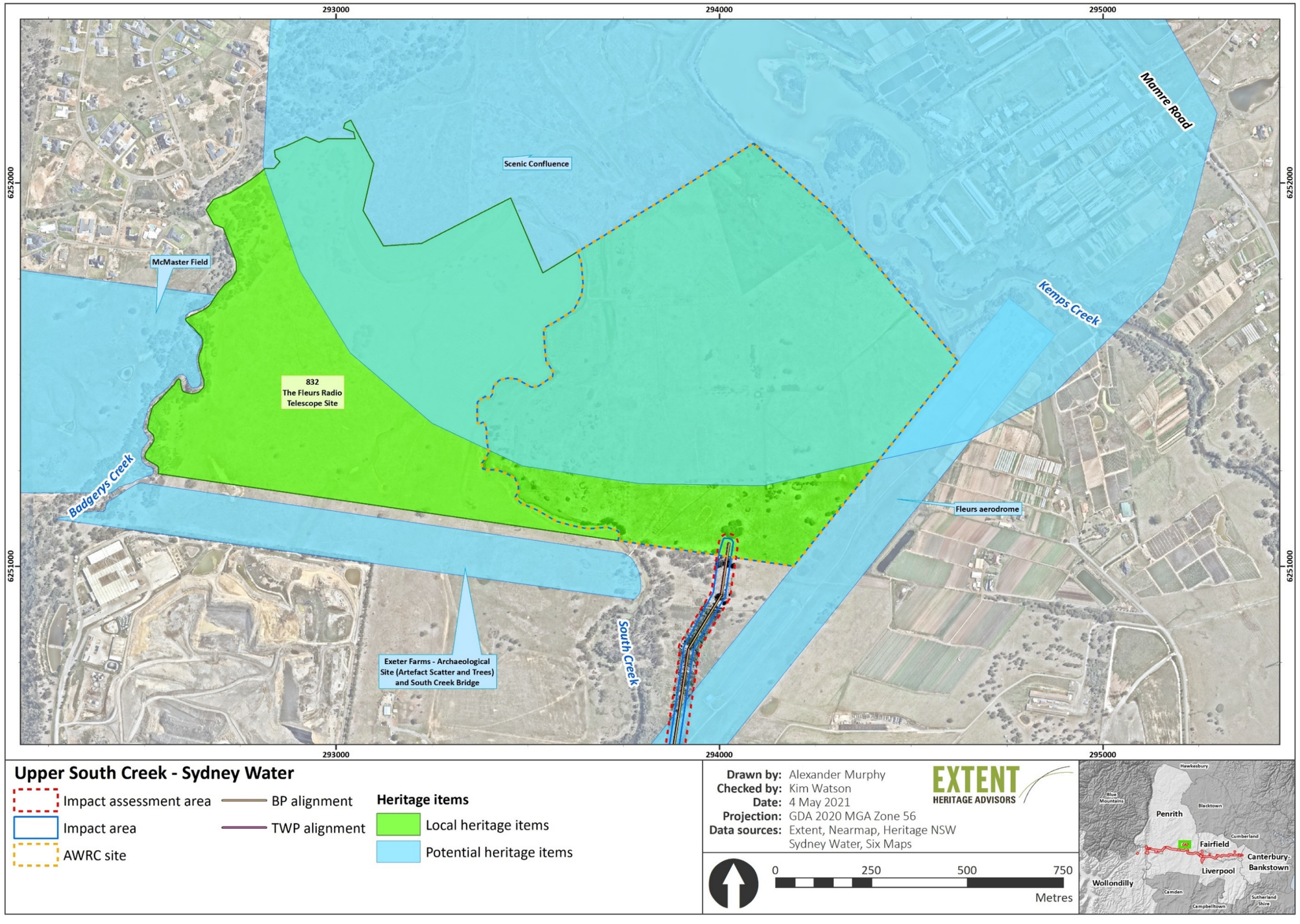

Figure 6. Overview of works surrounding the Centre.

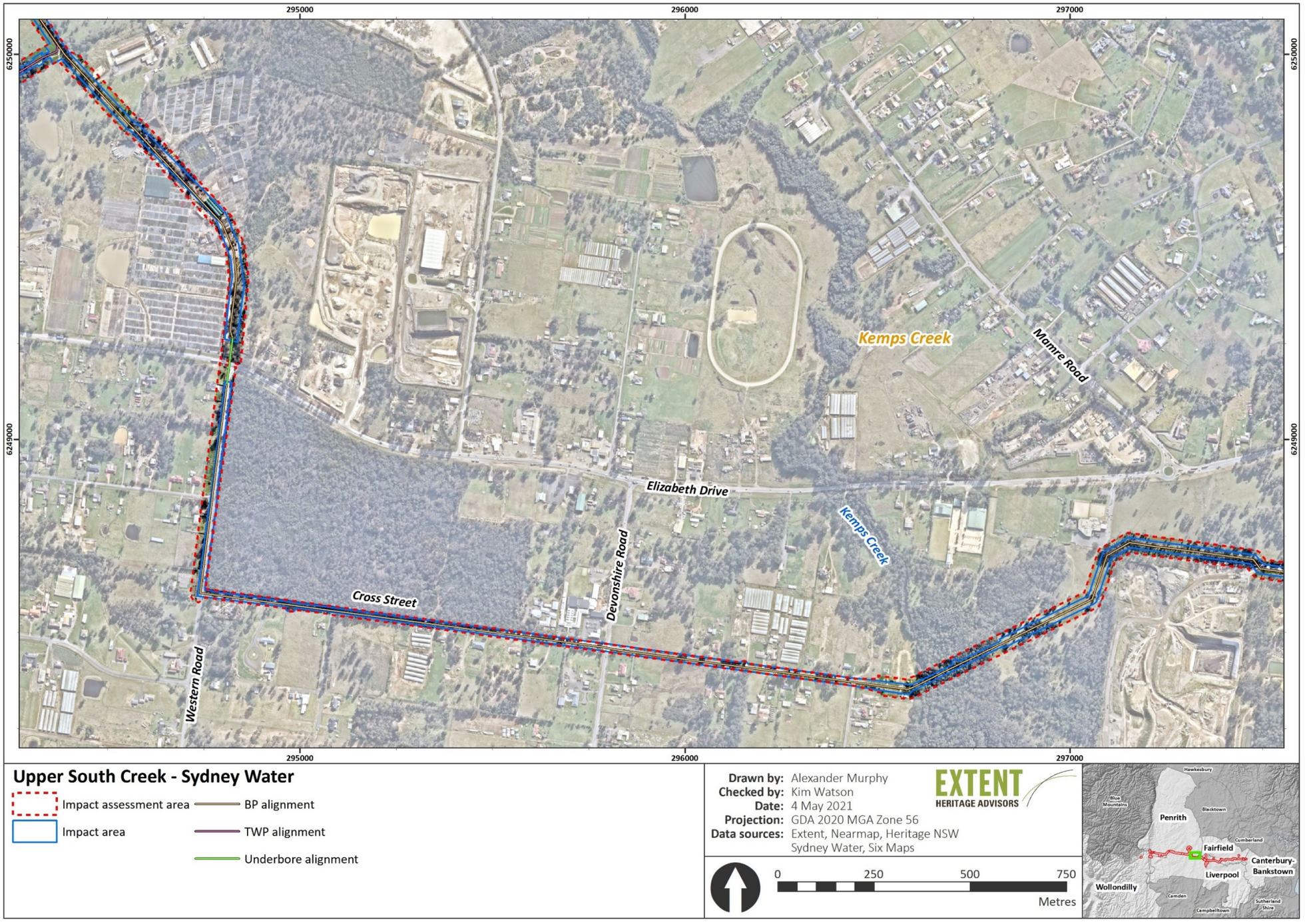

Figure 7. Overview of Brine Pipeline extended from the Centre.

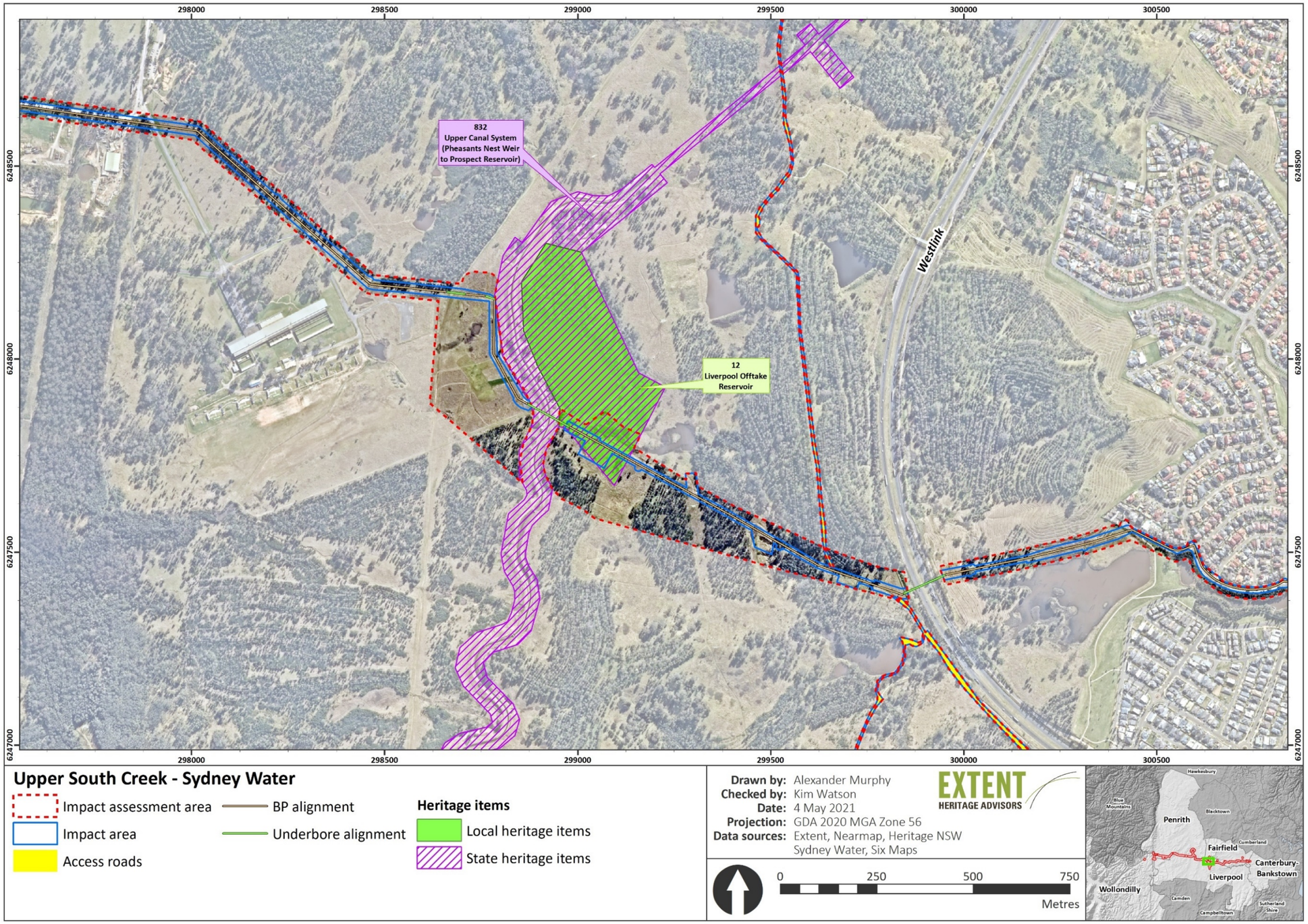

Figure 8. Overview of Brine pipeline underboring the Upper Canal.

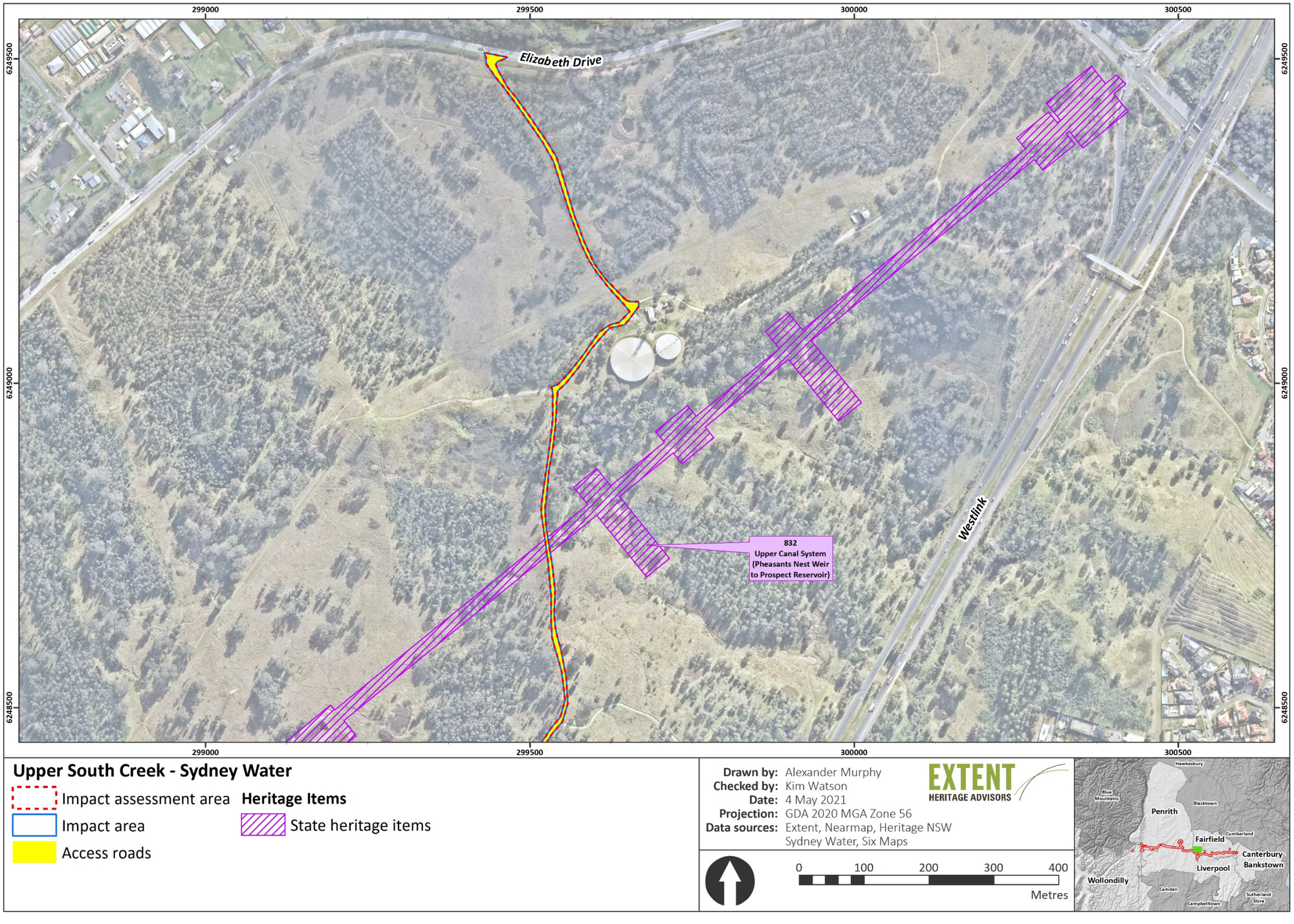

Figure 9. Overview of access roads through Western Sydney Parklands over Upper Canal.

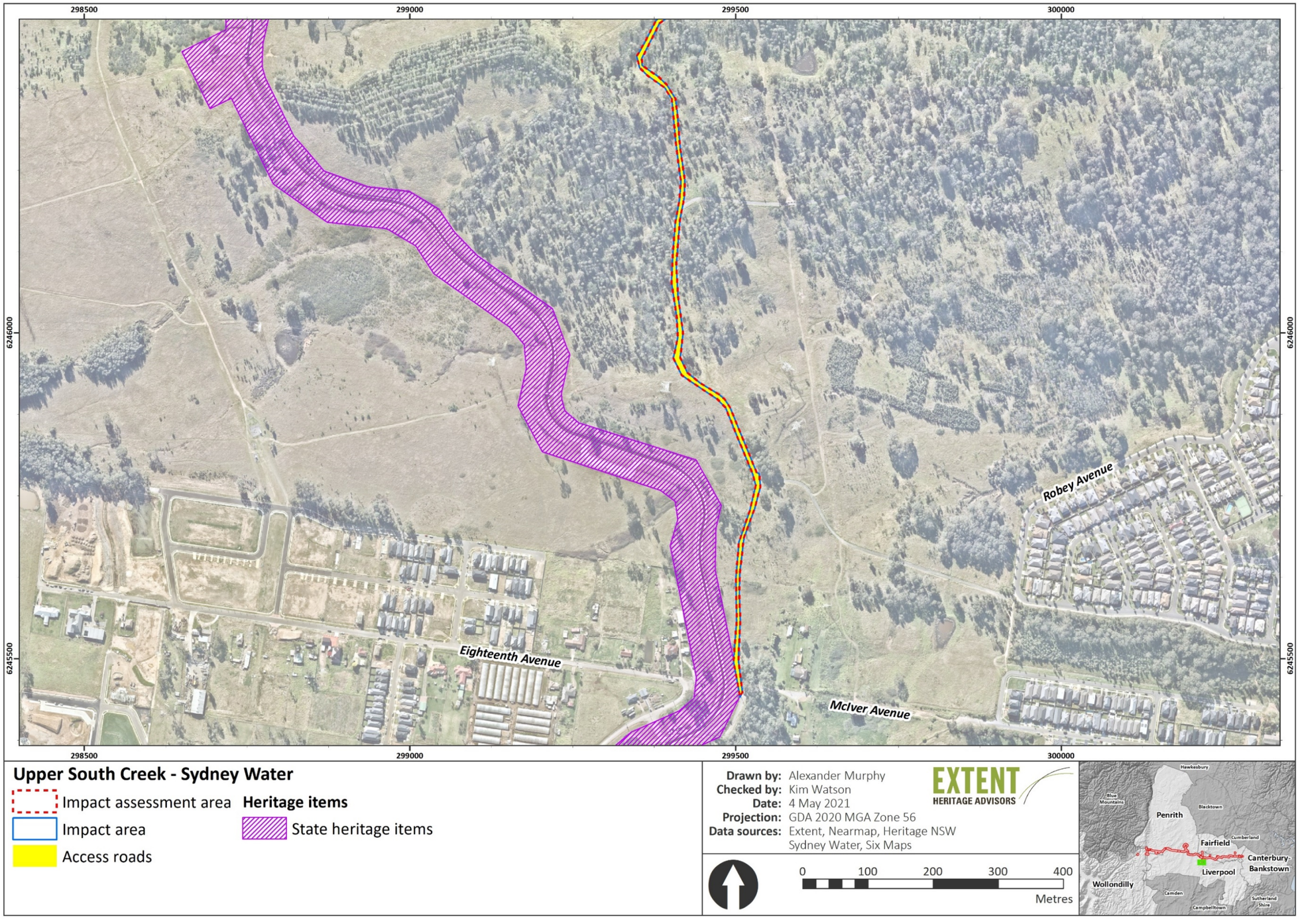

Figure 10. Overview of access roads provided in Western Sydney Parklands over the Upper Canal.

Figure 11. Overview of Brine Pipeline.

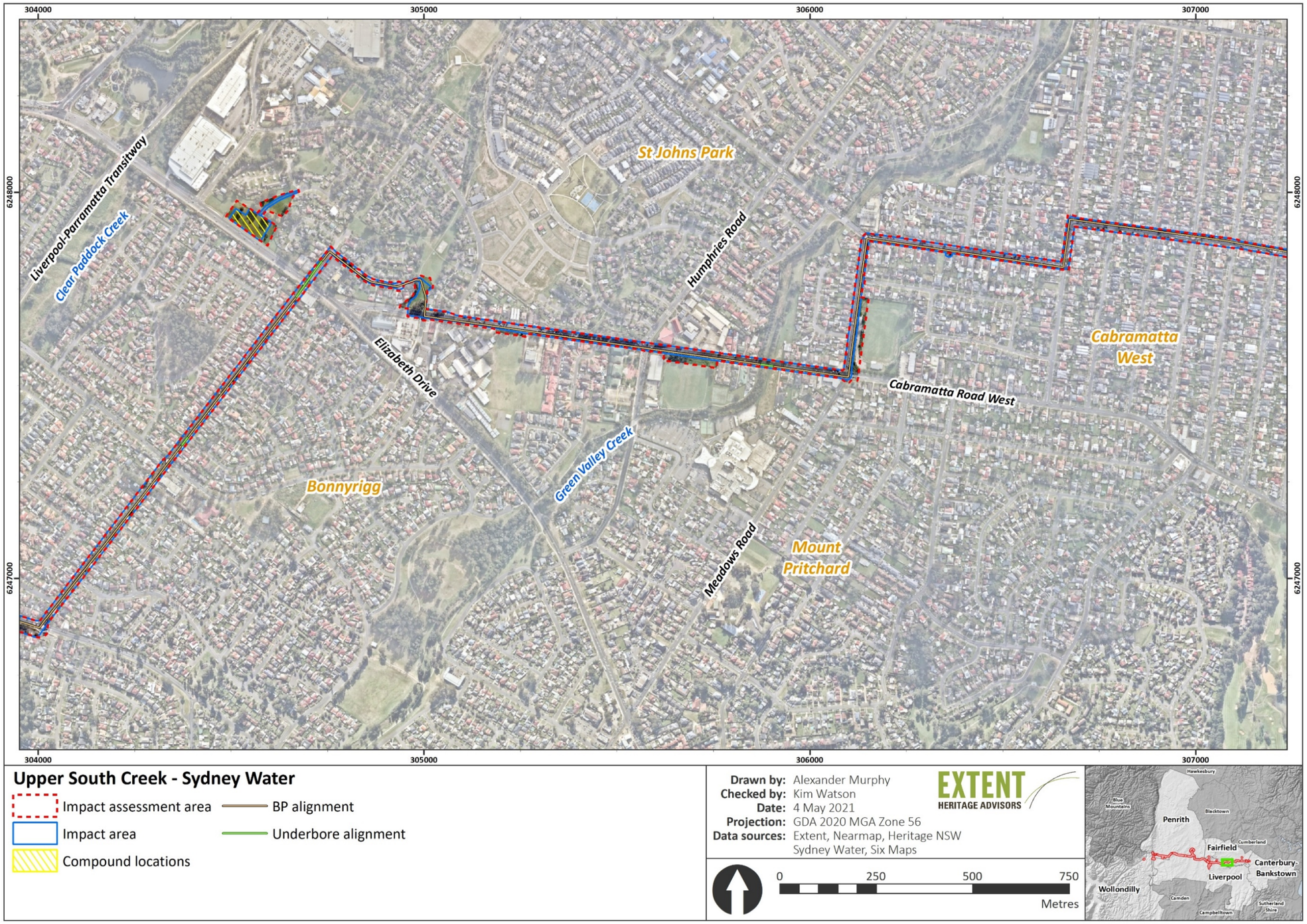

Figure 12. Overview of Brine Pipeline.

Figure 13. Overview of Brine Pipeline and works within Cabravale Memorial Park.

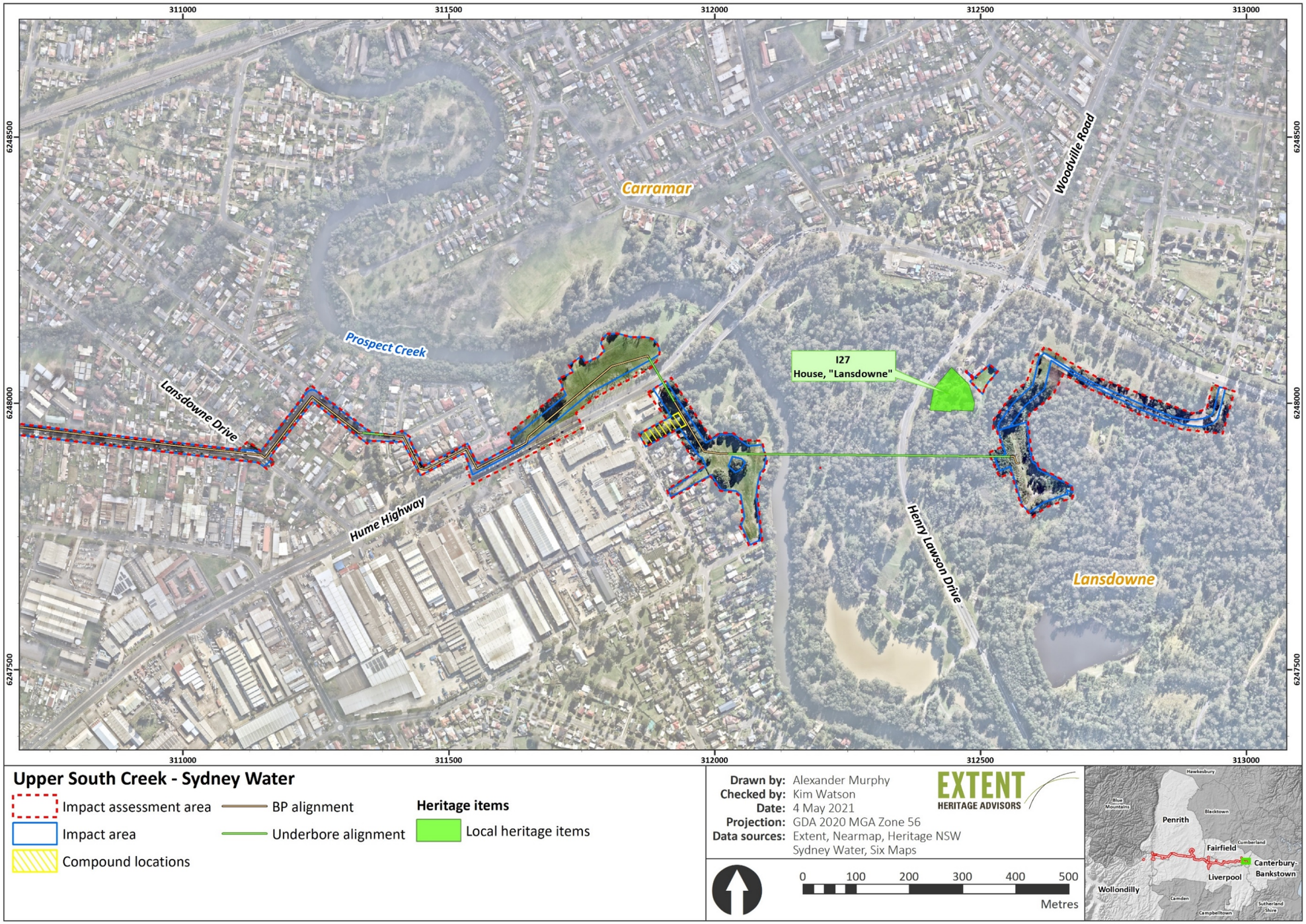

Figure 14. Overview of Brine Pipeline at the eastern end of the Project.

4. Historic context

The Project traverses through several suburbs of Western Sydney including Luddenham, Wallacia, Cecil Hill, Cecil Park, Canley Vale, Canley Heights, Cabramatta, and Lansdowne with the core development of the Upper South Creek Advanced Water Recycling Centre occurring between South Creek and Kemps Creek at Fleurs Radio Telescope Site. This historical background provides an overview of early development towards the west of Sydney with a focus on the Fleurs Radio Telescope Site.

We wish to acknowledge and pay respect to the Darug, Dharawal and Gundungurra people, the Traditional Custodians of the land that this Project takes place. We wish to pay respect to their Elders, past present and emerging. For a detailed ethnographic history refer to the Upper South Creek Advanced Water Recycling Centre Aboriginal Cultural Heritage Assessment Report, prepared by Kelleher Nightingale Consulting.

4.1 Rural European settlement

4.1.1.1 Exploration and exploitation

The Nepean/Hawkesbury River system and its many tributaries was a source of fascination for the early British settlers and frequently referred to in personal narratives of the day '…which exulted the rugged beauty of the natural scenery'(Penrith Thematic History, p.8) The presence of these watercourses and the rich alluvial soils of the river floodplain were major factors in attracting permanent settlement to the area by the early British settlers who were keen to make their fortune from agricultural and pastoral pursuits. Hunger and possible starvation were the keenest of all motivators for outward expansion (Thorpe 1983, 27).

Figure 15: Sketch by Joseph Lycett of View upon the Nepean River at the Cow Pastures, NSW, 1825 (Source: State Library of Victoria, Image 30328102131561/18)

In 1788 Governor Arthur Philip led several explorations into the outlying regions of Sydney, including the Nepean district. It was on a rise near what is now Pennant Hills that Philip first observed the Blue Mountains and the southern portion of the Lansdowne Hills. From the rising of the mountains, he had no doubt that a large river would be found nearby, although his initial searches proved unsuccessful (Murray and White, 1988). In June 1789, Captain Watkin Tench of the new outpost at Rose Hill, led an expeditionary party to the banks of the Nepean River 'through a country untrodden before by a European foot' (Power, 1983 in RMS 2016, 21). In 1791 Tench undertook a second exploratory journey travelling from Prospect Hill in a south-southwest direction towards the upper Nepean. The course of his outward journey took him through the lowland near the junction of South Creek and Kemps Creek and then through Bringelly. Tench and his party also came into contact with the Darug people during these explorations, and noted evidence of Aboriginal occupation along the Hawkesbury.

Figure 16: Sketch by Joseph Lycett of Liverpool NSW c1824 (Source: National Library of Australia nla.gov.au/tarkine/nla.obj-135702359)

4.1.2 Settlement and consolidation

In the early nineteenth century, European settlement within the Project, spanning from present Lansdowne to Wallacia, was established through the distribution of large grants of land. The majority of the grants to the west of Sydney were used for grazing and agriculture. These grants were given by Governor Macquarie primarily as rewards for good deeds or as incentives to newly arrived settlers. They were also laid out along transport routes, especially along Liverpool Road through Bankstown and on the road to Parramatta. However, despite attempts to lay out land according to its suitability for tillage, a process of amalgamation of grants into large estates counteracted the original layouts, which is shown on early Parish Maps of the County of Cumberland (Extent 2020, 29). There were also new settlers who, in the absence of receiving a grant, took to squatting along the rivers and creeks.

Badgerys Creek

Situated 30 miles from Sydney in the Cumberland District, Badgery's Creek is one of the oldest settled areas in Australia. In 1803 James Badgery, from whom the area takes its name, was originally granted 100 acres on the Hawkesbury River, however the 1806 floods forced him to seek property elsewhere. By 1810, Badgery was granted 640 acres between South Creek and what is now known as Badgerys Creek, north of present-day Elizabeth Drive. Badgerys farm was named Exeter Farm after his hometown in England. Over subsequent years Badgery extended the holdings of Exeter Farm, buying up other properties on land south of Elizabeth Drive. The properties were subsequently divided between his family on his death in 1827. These properties were subdivided in the 1880s as the Exeter Farms subdivision.

Figure 17 Exeter Farm House, originally constructed by James Badgery, photograph taken in 1995 prior to the demolition of the property (Source: Liverpool City Library, Heritage Library Collection, 1776-12)

By the 1890s the Badgery lands south of Elizabeth Drive were also subdivided into smaller lots, known as the Exeter Farms subdivision. The subdivisions of these two large holdings opened the area for smaller farms which were used for fruit growing, dairy farming, bee keeping, poultry farming and timber getting. With this increase in population, there was a need for more services and a village was planned south of Elizabeth Drive between Badgerys Creek and South Creek, known as the Exeter Farms subdivision. These plans, however, never eventuated, possibly owing to the gradual growth of the nearby village of Badgerys Creek.

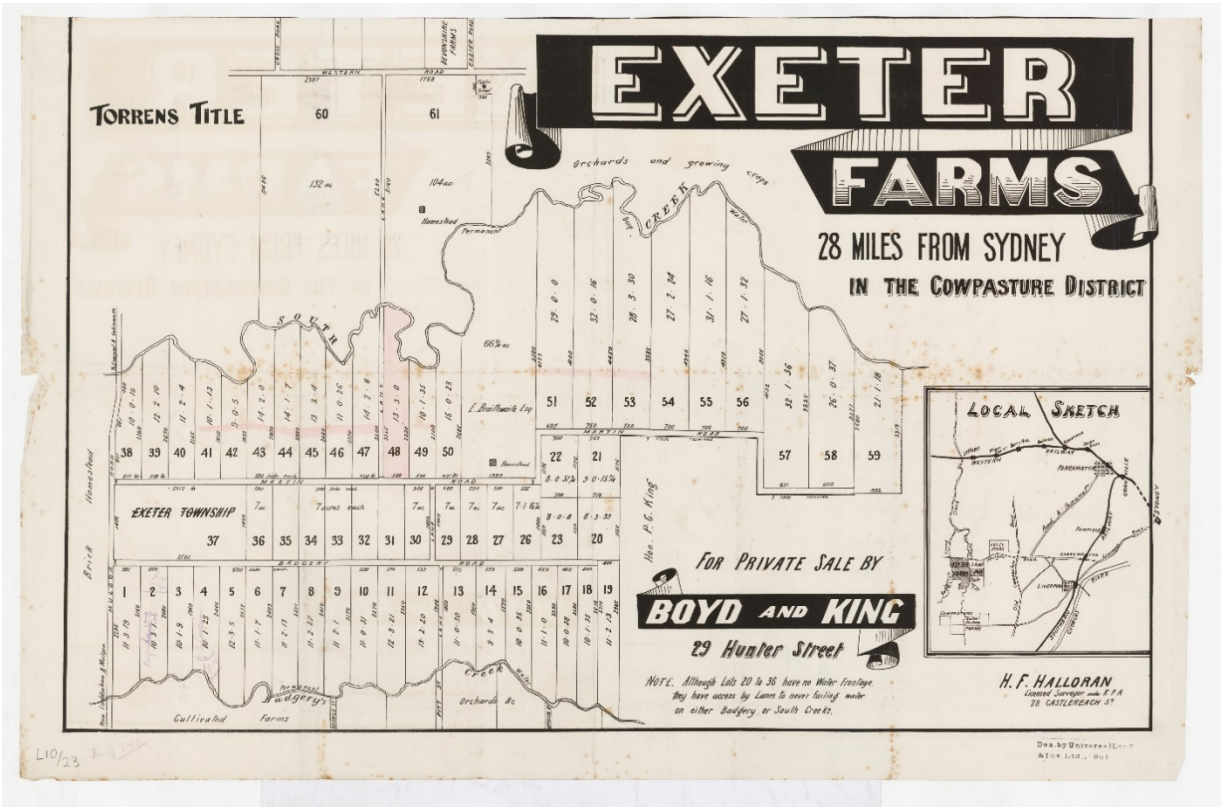

Figure 18. Exeter Farms (1893) (Source: NLA MAP LFSP 434, Folder 33)

Kemps Creek

For much of the nineteenth century, Kemps Creek and the surrounding area was associated with the Fleurs Estate, originally known as Bayly Park. Bayly Park estate was made of two grants from December 1805; the first grant was 680 acres granted to Nicholas Bayly known as King's Down, and a second grant of 300 acres to Richard Fitzgerald known as 'Restitution Farm'. In 1814 Bayly constructed his homestead here, still stands on Mamre Road, though it has been significantly modified over the years. Bayly made substantial improvements in the near environs of house and for several acres around it, including at least forty acres dedicated to wheat. The estate has changed hands over the years and by the end of the nineteenth century had been subdivided several times and had been almost comprehensively cleared and divided into fenced paddocks (CRM 2019, 10).

When Bayly died in 1823, Bayly Park was put up for sale and later bought by Richard Jones in 1826. Jones is accredited with naming the property, Fleurs Estate. Fleurs Estate had a number of subsequent owners throughout the nineteenth century and appears to have been primarily used for grazing. Until it was acquired by CSIRO for the establish of Fleurs Field Station in the 1940s.

Figure 19. Subdivision of farm, orchard, and dairy lands on the famous Fleurs Estate St Mary's, 1895. (Source: NLA MAP LFSP 2502, Folder 154).

Luddenham

Another noted free settler to take up a land grant in the Nepean area was John Blaxland, whose huge grant of 6710 acres, taken up in 1813, became the Luddenham estate.[1] The name Luddenham was Blaxland's home village in England. This land also covered part of the present-day suburb of Badgerys Creek. While some of the land was used to establish Blaxland's business enterprises the larger part was retained for grazing. By 1840, seven additional purchases of land resulted in the area of the estate totalling to 9885 acres. One of these purchases was located at the confluence of the Nepean and Warragamba Rivers. This was first allotted to Blaxland in 1825 by Governor Brisbane. On the banks of the Nepean River, John and his son Edward built a wooden dam, flour mill and brewery complex. The wooden dam was replaced in 1911 with a sandstone weir that remains is use today, known as Wallacia Weir.

While some of the land was used to establish Blaxland's business enterprises the majority was retained for grazing. Blaxland's homestead itself was located in the present-day suburb of Wallacia (known as Luddenham Homestead Site within this Project). The homestead was located on the eastern portion of estate on the eastern side of the Nepean River. In 1841, Blaxland mortgaged Luddenham and following his death in 1845, the estate was taken up by his son Edward who failed to revive the fortunes of the property. It was sold by the Australian Trust Company in October 1851 to Charles Nicholson. Nicholson established a private village of Luddenham at the eastern end of the estate, on the Northern Road. Tenant farmers managed much of the farmland with George Wallace managing the land at the present town of Wallacia and living in the homestead (NSW Heritage. n.d. Listing sheet for 'Luddenham Homestead').

A plan of the Luddenham Estate was prepared in 1859 and shows buildings and improvements on both sides of the present-day Park Road, east of Mulgoa Road. The remaining 2233 acres of the estate was sold to a syndicate of land developers in 1885 who subdivided the land into semi-rural allotments and created Park Road.

[1] Penrith Thematic History p. 11

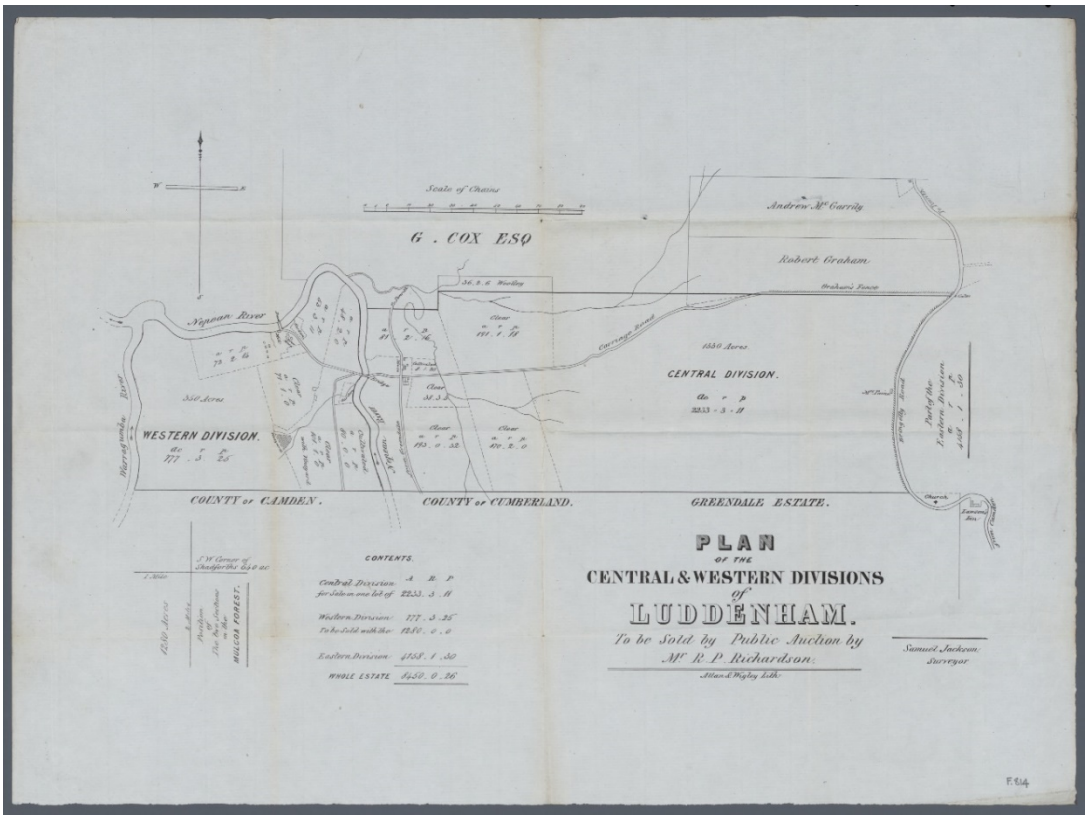

Figure 20. Plan of Luddenham, 1859 showing Central and Western Divisions. (Source: NLA MAP F 814)

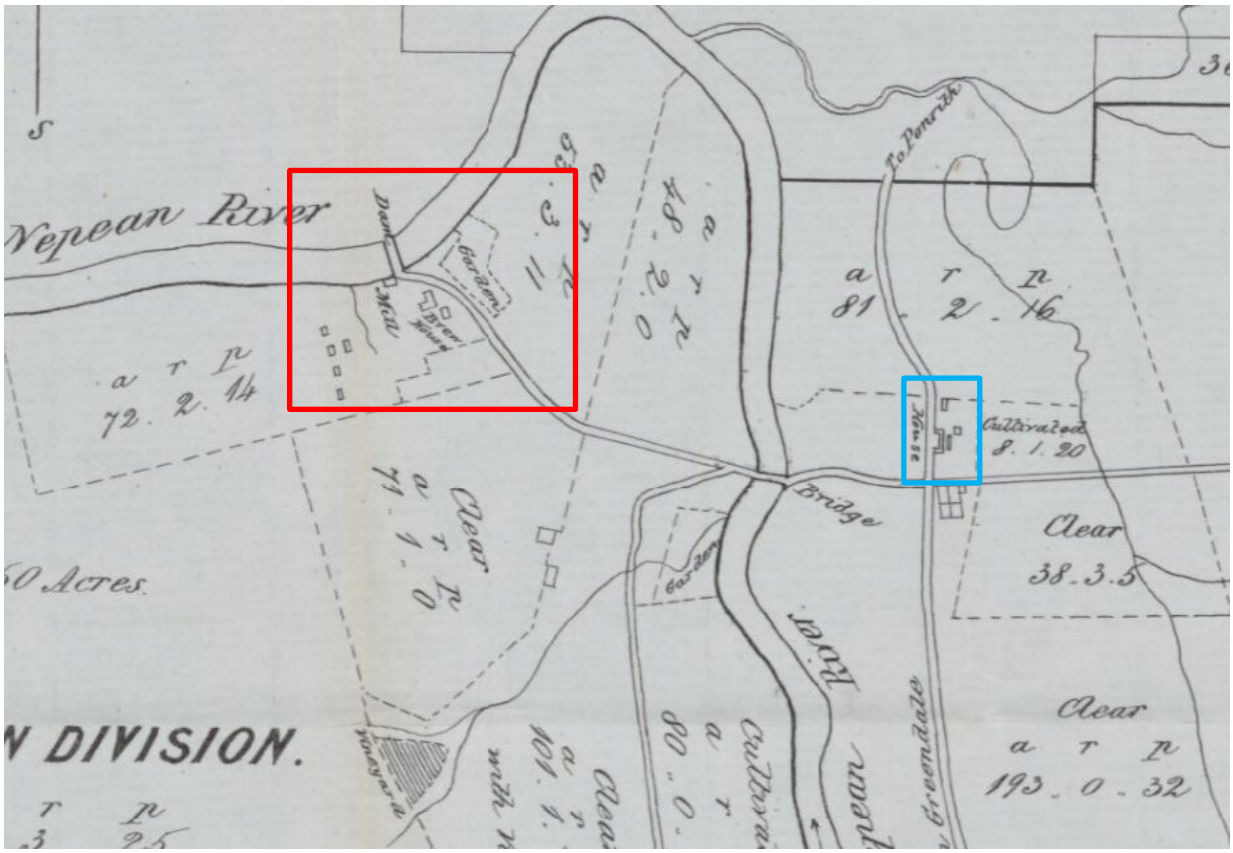

Figure 21. Detail of Luddenham Estate showing Blaxland's farm, outlined in red, and homestead, outlined in blue, c.1859. (Source: NLA MAP F 814)

Cecil Hills

In 1817, Thomas Wylde was granted 1,000-acres of land known as Macquarie Park on the northern side of Elizabeth Drive and west of Wallgrove Road. A small portion of a 200-acres grant was also made to Simeon Lord. Wylde's son, Sir John Wylde, was also granted 2000 acres in the Parish of Cabramatta opposite to his father's land, with Elizabeth Drive forming its northern boundary. He named his estate Cecil Hills. Some former convicts who were now free to settle in the new colony also managed to make good. One of the first white settlers in Cecil Park was Simeon Lord in the 1820s who originally came to NSW as a convict.

Canley Vale, Canley Height, and Cabramatta

The suburbs of Canley Vale, Canley Heights and Cabramatta are situated on 12,300 acres of land that originally formed a part of the Male Orphan School, an early nineteenth century Male Orphanage and School. The land was granted in 1803 by Governor King and was initially used for the support of female orphans.

However, the construction of the Female Orphan School in Parramatta in 1813 and the subsequent Female Factory in 1821 meant that the Canley Vale facility was no longer necessary. Instead, it was converted into the Male Orphan School Farm by Governor Macquarie in 1819 under the School and Clergy Lands Corporation Act. It was not until the coming of the railway to Fairfield in 1856 that the surrounding areas began to develop with Fairfield as the major centre. This boom in the local economy and the development of a nearby centre saw Canley Vale begin to grow as well.

In 1872, Henry Parkes (1815-1896) acquired and built a house beside Orphan School Creek, near the modern suburbs of Canley Vale and Cabramatta. Parkes built his home, Canley Grange here. The residence was flooded in 1873, but the Parkes family resided there for several more years, before moving on to a new residence (Evening News 'Fire at Canley Vale', Sat 22 September 1894). Parkes arranged for the construction of a private railway siding directly west of Canley Grange named 'Canley Vale,' which was built on the Granville-Liverpool railway line. Canley Vale later became an official railway station in 1878 (Hinton n.d.) This creation of Canley Vale railway station led to the subdivision and auction allotments around Parkes' Canley Grange. Although Canley Grange burnt down in 1894, there as an increase of the population residing in the area. As the population increased, a school was built at Canley Vale in 1884 alongside a corner shop.

After World War I, cheap, accessible and abundant land fuelled a land sales and building surge in the 1920s. The statistics from Cabramatta and Canley Vale demonstrate this rapid growth during the inter-war years where 682 buildings were recorded in 1925, and approximately 2,000 in 1938. Development remained close to the railway stations and slowly papered outwards. The rapid development of these areas saw the are shift from a rural town with a railway station to an extension of Sydney.

Increased population in these suburbs saw the provision of public spaces for recreation and leisure. Cabravale Park, located between Cabramatta and Canley Vale, is an area of land, covering 8.5 acres that was acquired by Cabramatta council in 1915 for this purpose. The land acquired formed part of a land sale that Sir Henry Parkes gave to the townspeople. In order to officiate the transfer from the Public Trustee to the council, legal action was sought. By 1922, this the park was successfully acquired by the council and dedicated a public reserve. This was followed by the official opening of the memorial park with the commemorative bandstand and mortar unveiled by Mr W.R Fitzsimons, M.L.A at the 1922 ANZAC service. The rotunda was designed by local man, Mr Hacksworthy.

Lansdowne

Lansdowne was part of a grant of 380 acres of land granted in 1800 to Lieutenant John Shortland, a distinguished naval officer who served as master's mate on the Sirius, one of the First Fleet. After spending five years in Australia, Shortland returned to England in 1792.Two years later he accompanied Governor Hunter when he sailed to Australia, notably among Shortland's shipmates were the explorers John Bass and Mathew Flinders. Both Bass and Flinders were granted land adjoining Shortland's 380 acres, the story being that upon exploring the region for themselves liked it so much as to arrange to claim land there for themselves and their friends. Despite the land grant, Shortland returned to England and died in 1810.

After his death, Shortland's land remained unoccupied for approximately eighty years. In December 1886, John Shortland's heir-at-law Edward Shortland sought to bring the land under the provisions of the Real Property Act. However, negotiations to purchase the property from Shortland began in 1887 and the land was eventually purchased by a man named Ahern in 1893. Ahern then sold the property in 1903 to John Varnell Tillett, who was Crown Solicitor of New South Wales from 1902 to 1931. On this land, Tillett built a homestead which he called Lansdowne, for which the area gets its name, at what is now 7 Henry Lawson Drive. Tillett spent much time and money clearing, thinning and landscaping the dense scrubland native to the property into something more reminiscent of a park. The land was later subdivided and sold, with the property of Lansdowne house holding just over an acre of land. However, the suburb of Lansdowne remains a small, green vista within an urban area.

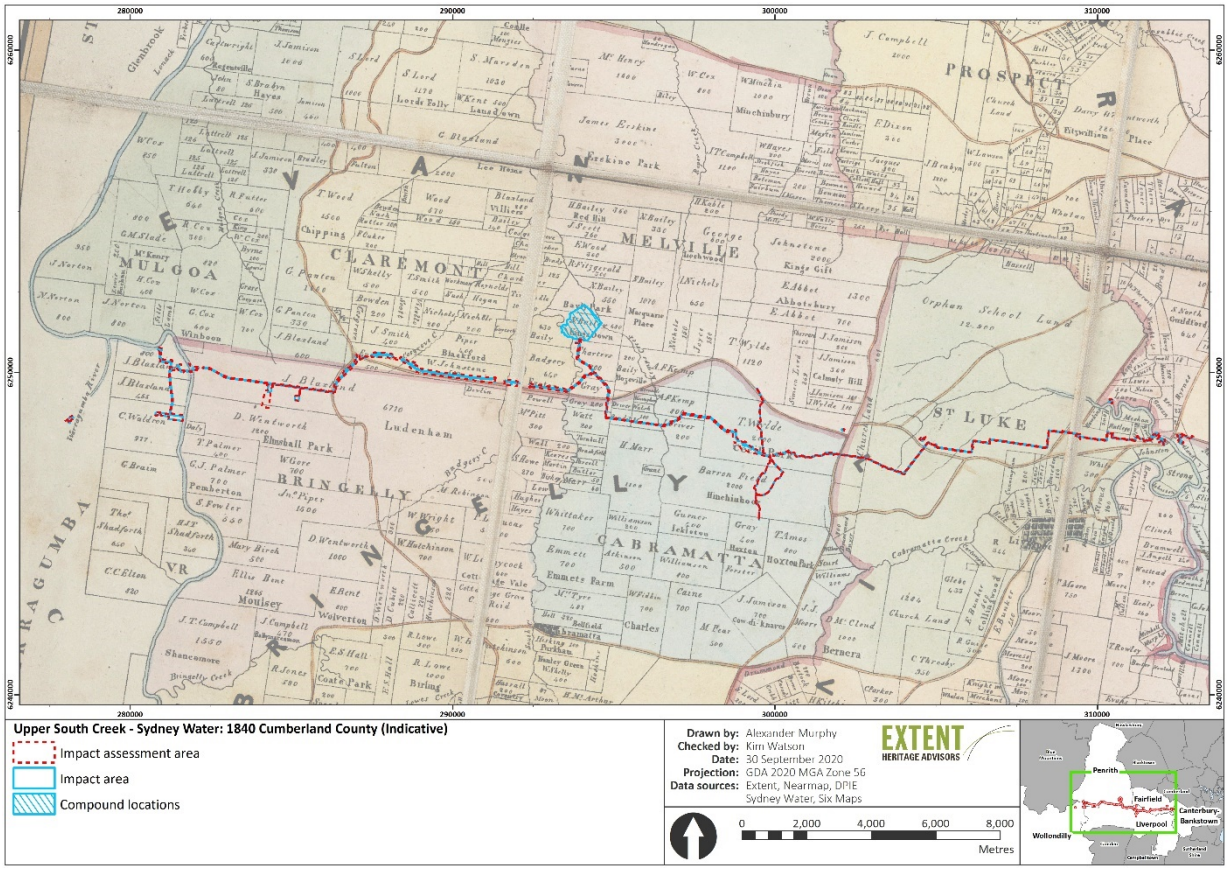

Figure 22. Map of County of Cumberland, 1840. The impact assessment area is marked in red. (Source: State Library of New South Wales, Mitchell Map Collection No. Z/MC 811.1/1840/2A)

4.2 Early infrastructure

4.2.1 Roads and bridges

Following the expansion of rural settlement further west, means for communication and transport were necessary and led to the development of early roads. Present day Elizabeth Drive, which runs east-west through the impact assessment area was constructed in the early nineteenth century and is visible in 1825 when the roads were surveyed and mapped. As more land was granted to the west of Sydney, there was a greater need for better established roads and means of communication. Present day Elizabeth Drive, which runs east-west through a significant portion of the Project, was constructed in the early nineteenth century. The road was initially constructed as a 'corduroy' road, using logs as its base. It was most likely constructed by settlers to provide access to land grants in the area. Elizabeth Drive was initially named Orphan School Road, as it extended west from the Male Orphan School at present day Bonnyrigg. The name was later changed to Mulgoa Road, and finally in honour of Queen Elizabeth II visiting the area in 1963 it was again changed to Elizabeth Drive (CRM 2019, 27).\

Luddenham Road was constructed in the early nineteenth century as a rural road to connect the pastoral estates of Luddenham and Leeholme which were owned by brothers John and Gregory Blaxland. John was granted the land in 1813 and Gregory in 1809. The road runs north-south connecting Mamre Road to the northeast with Elizabeth Drive to the southeast. The road eventually became a Government Road, first appearing on the Claremont Parish Map in c.1898 as a government road running north from the present-day Elizabeth Drive (NSW Heritage n.d. Listing sheet for 'Luddenham Road Alignment').

Given the geography of the region, bridges were built as part of the construction of the roads to traverse rivers and creeks. This includes the Lansdowne Bridge over Prospect Creek, designed by David Lennox and constructed with convict labour between 1834 and 1836. During this time, properties had to be accessed by other means, such as Blaxland's Crossing, a ford that was roughly paved with river pebbles consolidated into a causeway. This was used regularly by John Blaxland when crossing the Nepean River to reach his property on the western bank, where his cattle grazed on the fertile river flats.

Prior to 1863, Luddenham and the surrounding region primarily produced wheat. However, an outbreak of rust (a fungus which affects wheat and other grains) saw diminishing returns on wheat yield in the region throughout the mid nineteenth century. Instead the region changed to producing more fruit and raising cattle for dairy.

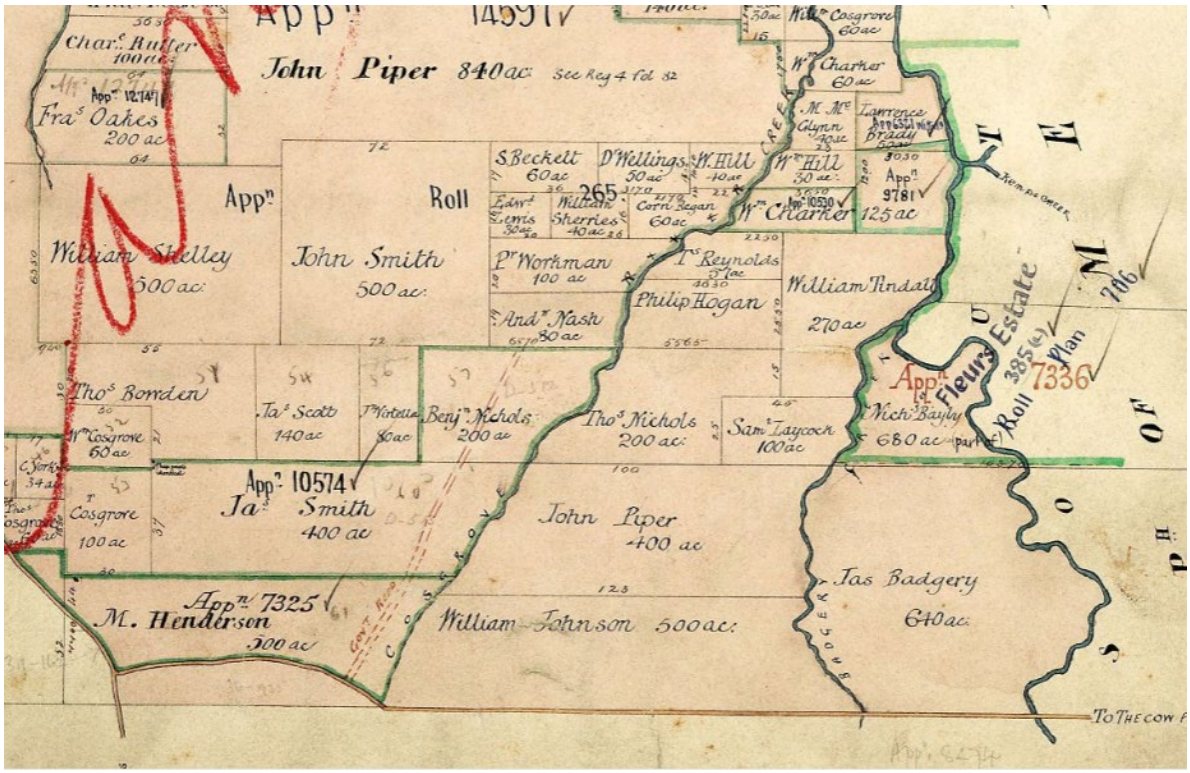

Figure 23. Parish of Claremont, 1898 showing part of Luddenham Road marked as ‘Govt Road’. (Source LPI HLRV 14070101)

4.2.2 Sydney’s water supply

The need for a source of clean water is arguably the reason why Sydney was founded where it is today. When the First Fleet approached the coast off what is now Sydney in January 1788, their initial explorations took them to Botany Bay where they anchored for several days. Of that initial landing in Botany Bay, Governor Arthur Phillip observed:

> Several small runs of fresh water were found in different parts of the bay, but I did not see any situation to which there was not some very strong objection…Several good situations offered for a small number of people, but none that appeared calculated for our numbers. (Governor Phillip to Lord Sydney, 15 May 1788, Historical Records of New South Wales, Vol 1 part 2 1783–1792, pp 121–122).

Following Phillip's discovery of a good source of fresh water, the Fleet moved into Port Jackson before anchoring at what became known as Sydney Cove, attracted by both the good harbour and the stream running through the mudflats and out into the cove. The new settlement straddled the watercourse, that later became to be known as the Tank Stream, Sydney’s first water supply.

The encroachment of the settlement and progressive pollution of the Tank Stream saw a greater reliance on inland sources of water, wells and captured rainwater stored in cisterns. Drought conditions during the 1810s and continued growth of the city meant that, by the 1820s, a new source of water was desperately required. By 1826 the Tank Stream had ceased all use as a potable water supply and water was carted from the Lachlan Swamps in what is now Centennial Park while plans were made for a new supply.

Mining engineer John Busby arrived in New South Wales in 1824 and by 1827 had been given the commission to design and supervise the construction of a tunnel to bring water from the Lachlan Swamps into Hyde Park. The second water supply of Sydney was known as Busby's Bore. The bore began to provide limited water as early as 1830 but the full extent of the tunnel was not completed until 1837. Pumps were installed at the Lachlan Swamps in 1854 to increase the flow and in 1858 the Botany Swamps Scheme came into operation, the third water supply.

The Botany Swamps Scheme involved constructing a steam pumping station, located within what is now Sydney Airport to drive the Botany Swamps Scheme. Fragments of its footings and a truncated section of the pumping station smokestack still exist and, for many years, served as a vent for the Southern and Western Suburbs Ocean Outfall Sewer.

Spurred by Sydney's population further west during the late nineteenth century and the overall population growth across New South Wales, there was an increased demand for a reliable and consistent water supply for the Sydney basin. The efforts to establish a water supply for Sydney, particularly during the Twentieth Century, led to the construction of many feats of engineering, many of which now form a part of the Upper Nepean Scheme. Elements of this system cross through the Project and played an important role in supplying water to Sydney's suburbs, including those within the Project. These included the Upper Canal, Liverpool Offtake Reservoir, and the Warragamba Emergency Scheme and Dam.

In February 1880, work began on the Prospect Reservoir (Sydney Morning Herald, 'The Water Supply of Sydney - Commencement of the Upper Nepean Scheme', 10 Feb 1880, 6). Built between 1880 and 1888 as part of the Upper Nepean Scheme, an ambitious plan to transport water from the Nepean, Cataract and Cordeaux Rivers through a gravity fed canal for approximately 100 kilometres into the city (Aird 1961, 17). While the Upper Nepean Scheme was under construction in the early 1880s, Sydney was gripped by a severe drought. In 1885, Hudson Brothers' engineering works at Clyde commenced construction of a series of temporary timber pipes and flumes to connect the partially built sections of the Upper Nepean Scheme with the existing Botany Swamps Supply system; the Temporary Scheme started operating on 30 January 1886. The Temporary Scheme was dismantled in 1888 after the Upper Nepean Scheme came fully into operation (Extent 2020, 53).

Figure 24: a rock cut and masonry lined section of the Canal c1898 with flume in the background and showing the serpentine nature of the Canal system [2]

When the Upper Nepean Scheme was commissioned, Prospect Reservoir served as the primary storage reservoir, from which a gravity canal, the Lower Canal, carried the water overland to a screening facility at Guildford, then through pipelines to balance reservoirs at Potts Hill. From Potts Hill, pipelines distributed water to Service Reservoirs located on high points, supplying their immediate vicinity. In the early years of the scheme, the reticulation infrastructure in sparsely settled areas was non-existent. Mains were progressively laid and houses connected and, by 1916, these areas were being supplied from service reservoirs.

Barely a decade after the completion of the Upper Nepean Scheme in 1888, Sydney ran dangerously low on water during the Federation drought of 1901-02. Fortunately, the scheme's original design lent itself to progressive expansion. As Sydney's population grew from 296,000 in 1888 to nearly 1.5 million in 1939, four new dams were built between 1907 and 1935, on the Upper Nepean to supplement the scheme's supply; the Cataract, Cordeaux, Avon and Nepean Dams (North 2011; WaterNSW n.d.). Two further major dams were built, at Woronora between1929 and 1941 and at Warragamba between 1948 and 1960. All of these dams, with some modifications, remain in service as major parts of the metropolitan water supply system. Warragamba Dam itself has twice the capacity of the remaining five dams combined and remains the largest single water storage component of Sydney's water supply system (North, 2011).

[2] Photographed sourced from Government Architect's Office, 'Upper Canal: Pheasant's Nest to Prospect Reservoir, Conservation Management Plan', prepared for WaterNSW, 2016, p. 110.

Warragamba Dam was last of the dams to be constructed during the twentieth century, having been established as a part of the response to Sydney's critical water shortage during the Second World War. Plans for Warragamba Dam began in 1910, when EM de Burgh, Chief Engineer for Water Supply and Sewerage, in the Public Works Department (PWD) prepared a proposal for a dam on the Warragamba River which he followed up in 1918 with more detailed plans. His proposals were passed onto the newly formed Metropolitan Water and Sewerage and Drainage Board in 1925 when it took over from the PWD. Between 1937 and 1940 the Emergency Scheme was enacted, and drastic water usage restriction were imposed on Sydney's population (Beasley 1988, 42). The completion of the Warragamba Emergency Scheme required during its peak 1,000 waged employees at the Headworks, and a further 1,000 on the Pipeline. All buildings used in the construction of the Emergency Scheme were designed for later re-use as cottages for the future maintenance and operations personnel, particularly in Wallacia where many key staff were boarded during the years of construction. The main works office was the original police station at the Nepean Dam site (Heritage NSW n.d. Listing Sheet for 'Warragamba Emergency Scheme').

Megarritys Bridge, a concrete arch bridge spanning Megarritys Creek, is the carrier for a major Warragamba pipeline. This provided a vital link across the Creek for the operation of the Warragamba Emergency Scheme. While it was designed eventually to carry the No 1 106" outlet main from Warragamba Dam, for the Emergency Scheme it carried the 48" main from the weir to Prospect Reservoir (Heritage NSW n.d. Listing Sheet for 'Megarritys Bridge').

4.3 Twentieth century development

In 1911, census figures reveal that more than a third of people living in the metropolis still resided in the City of Sydney and its adjoining suburbs within walking distance. A decade later that figure had fallen to just under one quarter. At the 1933 census only 16 per cent of the inhabitants of greater Sydney lived in the City and its immediately adjoining inner suburbs (Ashton 2008). A major factor in this spread to the suburbs were changes in transportation. Sydney was at the forefront of such developments in Australia, with the advent of the railway as the dominant form of transport in nineteenth-century Sydney. The railway line superseded significant roads that initiated the processes that lead to the creations of suburbs in Western Sydney (Extent 2020, 65).

Following World War One, there was a surge in building across Sydney due the availability of cheap, accessible, and abundant land, and suburbs at Wallacia, Canley Vale, Cabramatta and Mulgoa saw a surge in population and established themselves as suburbs. After the Second War, there was an increase in the use of cars as transportation. Following the increase use of cars as the main mode of transport, the town of Mulgoa developed as a holiday destination for those who lived in the inner suburbs of Sydney and wished to escape the city.

Although waves of Post-War immigration brought a range of ethnically different groups who brought their own practices, customs, eating habits, ways of building and systems of belief, this process from Federation in 1901 to 1973 was restricted by the White Australia Policy. This policy was abandoned in the 1970s with the Whitlam's Government introduction of Ethnic Communities Councils and with the Fraser Government adoption of cultural pluralism. This opened migration from Asian and non-European countries. The post-war migrants that settled in Australia experienced a period of economic growth and an economy with a need for labour following the building boom of the 1960s and increased demand for housing (Gwyther 2008).

From this period through to the present, many of the suburbs within the Project have remained multicultural and vibrant cultural hubs that have a wide variety of ethnicities within their population. With the development of new Motorways such as the M12 and the development of the new airport at Badgerys Creek, the population in Western Sydney is expected to increase, along with the housing and infrastructure and utilities in the area.

4.3.1 McGarvie Smith Farm

The McGarvie Smith Farm was first alienated for European purposes in the early years of the nineteenth century. It encompasses land that was included in two separate grants.

The majority southernmost portion of the site with a frontage to Elizabeth Drive was part of a grant of 500 acres made to William Johnston on 31 August 1819. Johnston was a free settler who first acquired land at Emu Plains in 1807. This land was granted by the military administration after the coup against Governor Bligh. It was cancelled by Governor Macquarie and in compensation he was given the grant at South Creek (CRM 2019, 27). In 1822 it was recorded that ten acres was under crop and the balance was used to run 96 head of cattle.

In April 1831 Johnston's land was sold to John Piper who had just purchased the land to the north of Johnston's property. John Piper is one of the best known figures of early Australian society; Point Piper in Sydney is named for him. He owned substantial properties throughout the colony. The properties at Badgerys Creek are unlikely to have received much attention from Piper other than as assets in a period of financial difficulty. His almost immediate sale of the land is indicative of this circumstance. In 1831, Piper sold the combined estate to Edward Cox.

Edward Cox was an outstanding stock breeder of merino sheep, horses and cattle. His primary residence was at Fernhill, Mulgoa so if he did purchase the Piper property it is possible it was used for his stock, although evidence for its use or improvements cannot be found at this time. The property was sold on 25 November 1873 to James Morrison. The farm came to commonly be referred to as 'Morrison's Paddock'.

In 1914, the property was sold to Norman Buffier. Norman Buffier was the son of a well-known local dairyman and cattle dealer, Daniel Buffier. Three generations of the family were involved in the dairy business at Luddenham and St Marys. The Estate came to be known as Bangaroo Estate. After the sale of a certain amount of the property in 1936 to CSIRO the Buffier family remained on the rest of the property and it was noted that some of the animals used for research at the new farms were from the Buffier's.

McGarvie-Smith Farm was purchased in 1936 by Sydney University in association with the McGarvie Smith Institute for the training of veterinary students and are the only known example of rural research institution buildings in the area.

The first faculty of Veterinary Science opened at Sydney University in 1910. Until 1923 it was the only research facility in the state. In that year the Advisory Council of Science and Industry (the precursor to the Council for Scientific and Industrial Research or CSIR formed in 1926 which was the predecessor to the CSIRO formed in 1949) established a Veterinary Research Station at Glenfield. In 1924 legislation was passed whereby all veterinarians had to be accredited and registered practitioners. This underlined the importance of the faculties, including others which had opened in other states, and supporting facilities. In 1930 after the closure of the veterinarian school in Melbourne, Sydney then became the only school in the country.

In 1931 the McMaster Animal health Laboratory, a CSIR facility, was built in the grounds of Sydney University. The university and the CSIR established and maintained close links from this relationship. Numbers enrolled greatly exceeded the university facilities. In 1936 the CSIR addressed the problem by establishing a field station at Badgerys Creek. The farm comprised of 400-acres that had been cleared and subdivided into convenient paddocks. Four large dams were constructed, a reticulation system installed and tanks and drinking troughs built. Approximately 200-acres was cultivated for crops including hay, silage and grains. Both tub and pit silos were in use. 30 acres was set aside as permanent pasture. The farm complex included a number of farm buildings and barracks for student accommodation. Other buildings include the residence for the farm manager, the dairy and milking bails, bull paddocks, calf house, piggery, stables, barn and machinery shed (Nepean Times 22 September 1938, 06).

Between 1936 and 1940, McGarvie Smith Farm was expanded by Sydney University with assistance from the Department of Public Works. The farm was the first veterinary farm established by the University and was used for training on animal diseases and practices, and animal husbandry. During the late 1940s and early 1950s the range of works undertaken on the facility expanded to include the application of science to farm management.

A key aspect of this work was H. J. Geddes' creation of the practice of water harvesting. Agriculture in this portion of the Sydney region had always been subject to the unreliability of rainfall – unpredictable periods of heavy rainfall interspersed with long periods of inadequate rainfall. Under Geddes a system of containing water on the farm for use during dry periods was developed. This became the basis for a system that had international application and is still in use. The facility also tested P. A. Yeoman's keyline design that sought to optimise irregular rainfall through gradual release into the soil by landscape design. The favourable results of the testing encouraged the wider use of the system to the extent that it became a key concept in Permaculture. The farm experimented with fodder crops throughout the 1940s and 1950s in association with the use of rotational grazing methods such as strip-grazing. The facility also tested and refined innovations developed overseas. These included the use of wheel-line irrigation systems in the early 1950s. The wider (post-war) availability of aluminium for equipment such as pipes made such portable and cost-efficient systems possible. In the 1950s they began constructing dams as they undertook a program of water harvesting and irrigation. In 1960 the farm added a dairy and the last recorded works undertaken was the planting of a large number of trees in the 1970's to act as windbreaks. By the 1980s the farm was seeing less and less usage by the university and was declared surplus to requirements in 1983. From that point on, the farm has only been in casual use.

The farm was a leader in the mid-twentieth century in finding solutions to long-standing problems associated with agriculture and pastoralism.

Figure 25. Opening of the McGarvie Smith Animal Husbandry Farm, Badgerys Creek, 1938. (Source: University of Sydney Archives G3_224_0935)

Figure 26. Indian farmers at the McGarvie Smith Animal Husbandry Farm Note: Farmers studying farm methods under the Colombo Plan, 1955 (Source: NAA Number A1501:A250/2),

4.3.2 The Fleurs Radio Telescope Site

A large portion of Fleurs Estate was leased to CSIRO for the Division of the Radiophysics. The Division of Radiophysics from 1946 to 1960 maintained a large number of field stations and remote sites around Sydney for the establishment of solar radio astronomy.

Radio Astronomy was founded in 1932 in the USA, however developed in the post-war years with the major technological changes that immediately followed World War II. This was led by Australia and England (CRM 2019, 61). Fleurs was one of the Divisions leading field stations that would become home to three innovative cross-type radio telescopes; the Mills Cross, the Shain Cross and the Chris Cross (George, Slee, Wielebinski 2015, 7). It was the last field station to be set up by the Division of Radiophysics prior to the erection of the 64 metre Parkes Radio Telescope.

Figure 27. photograph of Unknown, Alex Shain, Bruce Slee, Bernie Mills, Kevin Sheridan, Alec Little and Henry Rishbeth at Fleurs field station, c.1982. (Source: CSIRO Radio Astronomy Image Archive, ANTIF Archive, B13097-1)

In 1953 Bernard Mills from the CSIRO Division of Radiophysics in Sydney developed a new concept that bridged two types of antennae used; the interferometers and the stand along parabolic antennae. This was achieved through a cruciform or cross-shaped array which substantially increased the resolution of the signals. The prototype was developed at the Potts Hill field station in 1953 and in the following year the field station at Fleurs was established with the construction of the Mills Cross.

Kemps Creek was the ideal location for the CSIRO field station. There was large areas of open land and a low population. This was important because of the reduced “noise” that would not interfere with the array (CRM 2019, 61). A lease was obtained from Bawn for the area.

Figure 28. Photograph dated 1953, showing the construction of the 85.5 MHz Mills Cross array at Fleurs. (Source: CSIRO Radio Astronomy Image Archive, ANTIF Archive, B3174-14)

Following the construction of the Mills Cross, a larger array with a lower frequency was constructed in 1958. This array was known as the Shain Cross, named after Alex Shain. The Shain Cross was of a simpler construction method and comprised of a number of dipoles strung between timber poles with the ground serving as the reflector (CRN 2019, 63).

In 1957, an adaption of the Mills Cross Telescope was developed at the Fleurs field station to give a much higher frequency used to map the sun. This array was developed by William Christiansen and known as the Chris Cross. It was the first of its kind and used daily from 1957. Each arm had 32 parabolic dish antennae made of wire mesh and 5.8 metres in diameter.

Other improvements associated with the development of the Fleurs field station included the installation of an eighteen-metre-long reflector, that linked to the arm of the Chris Cross array and produced the first compound Interferometer. The Chris Cross solar investigations led to a better understanding of the sun's outer atmosphere; however the real achievement was the development of a new superior instrument.

Figure 29: The Chris Cross at Fleurs, 1964-1980 (Source: National Archives of Australia, B942 Research)

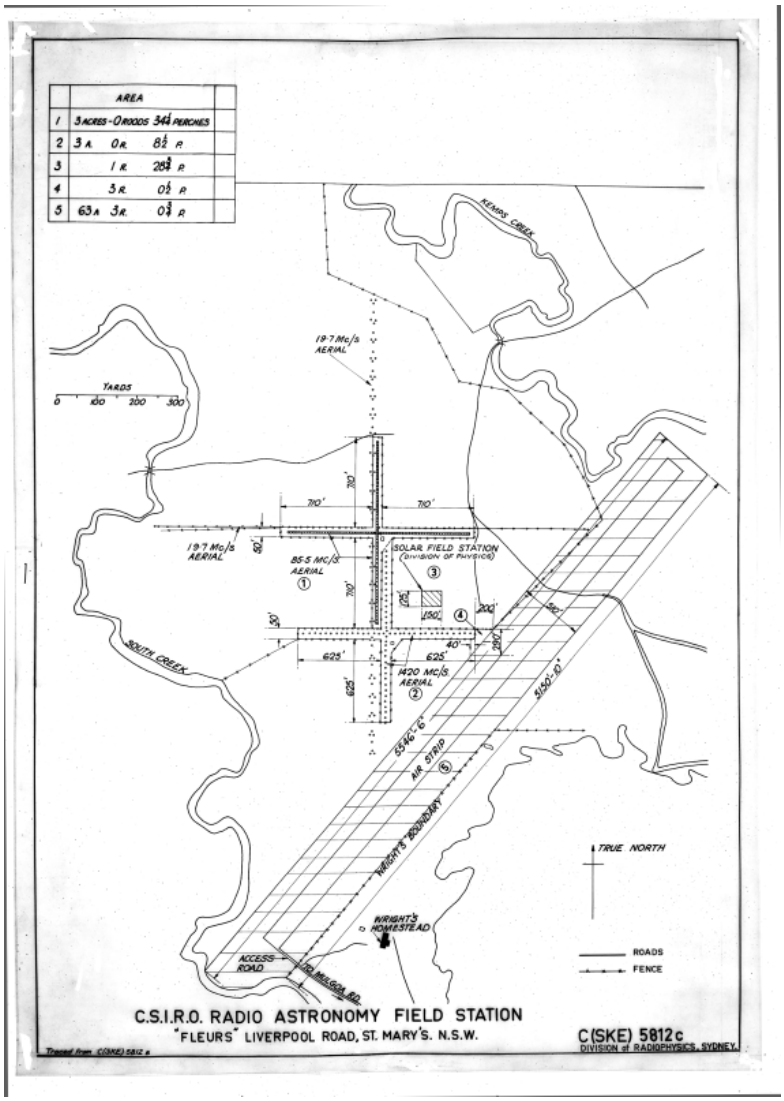

Figure 30. Fleurs field station (Source: CSIRO Radio Astronomy Image Archive, ANTIF Archive, B5815)

By 1963, the 18 metre antennae was transferred to Parkes, and the research programmes of Mills and Shain had come to an end. Fleurs was no longer required as a field station by the CSIRO. The lease of the field station was transferred to the University of Sydney where Mills and Christiansen were part of the University's Radiophysics department. The University used the existing radio equipment and continued to build additional radio telescopes for a detailed analysis of the sun and galaxy. The main radio telescope being transferred consisted of 64 parabolic antennae, was the Chris Cross.

Over ten years, into the 1970s, the university team and students converted the existing telescopes into a synthesis telescope. This was done by adding six stand-alone 13.7 metre parabolic antennae to the existing Chris Cross array at the eastern and northern ends of the cross. The large antennae were operated hydraulically using underground pipes to carry the hydraulic fluid. In the 1960s another four 13.7 metre antennae were added to the ends of the original cross.

This higher frequency telescope was used to study, amongst other things, the Milky Way and super nova. This was one of the most powerful telescopes in the world and remained the only one of its type in Australia until a second of the same type was constructed at Molongolo in 1983. It was closed down in 1988. It was turned over to the Engineering Faculty of the University of Western Sydney. For some years it was used as a teaching facility.

Figure 31. Antenna - General view of strain posts, reflector and dipoles from Eastern end at Fleurs Array, 1954. (Source: ANTF Historic Photographic Archive, 3234-2)

Figure 32. View of the Mills Cross receiving equipment inside the Receiver Hut at the centre of the array. One of the TA's, Ken --, is posing at one of the equipment racks, 1954. (Source: ANTF Historic Photographic Archive, 3454-2)

Figure 33. View looking along the E-W arm of the Mills Cross, showing the three major support posts at the end of the arm to which the tensioned wires above the mesh reflector were attachment, 1954. (Source: ANTF Historic Photographic Archive, 3324-1)

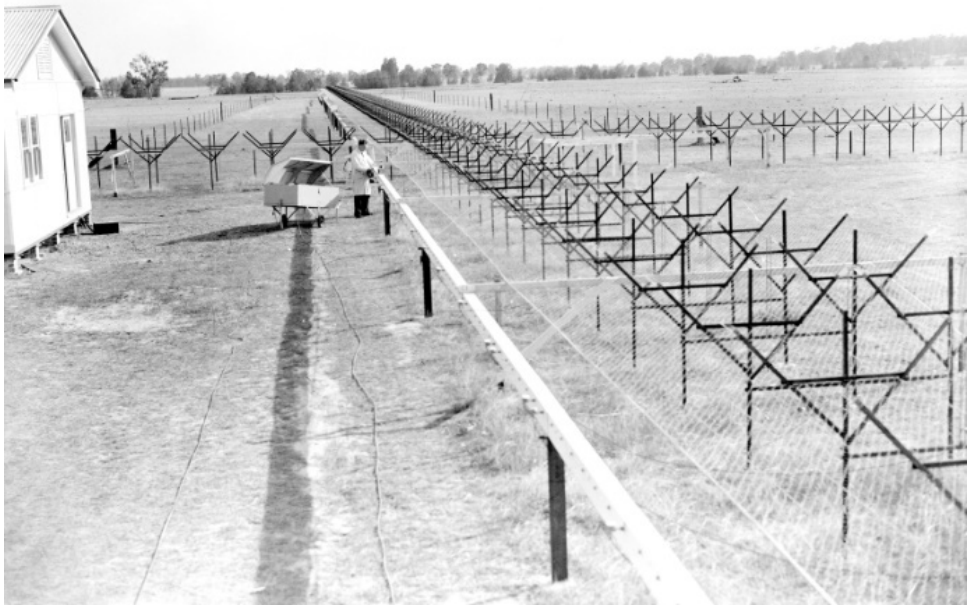

Figure 34. View looking S along the N-S arm of the Mills Cross, near the centre of the array, and with the receiver hut on the extreme left. (Source: ANTF Historic Photographic Archive, 3454-1)

Figure 35. Aerial photograph showing the Chris Cross under construction (but unfortunately not too clearly as the negatives are badly degraded). However, this photograph shows the construction huts at the centre of the array, formwork used when constructing the antennas,

and a number of completed antennas. Also visible are examples of the initial framework for each of the antenna mounts. (Source: ANTF Historic Photographic Archive, B5042-2)

Figure 36. Aerial photograph showing the Chris Cross under construction (but unfortunately not too clearly as the negatives are badly degraded). However, this photograph shows the construction huts at the centre of the array, formwork used when constructing the antennas, and a number of completed antennas. Also visible are examples of the initial framework for each of the antenna mounts. 1956 (Source: ANTF Historic Photographic Archive, B5042-3)

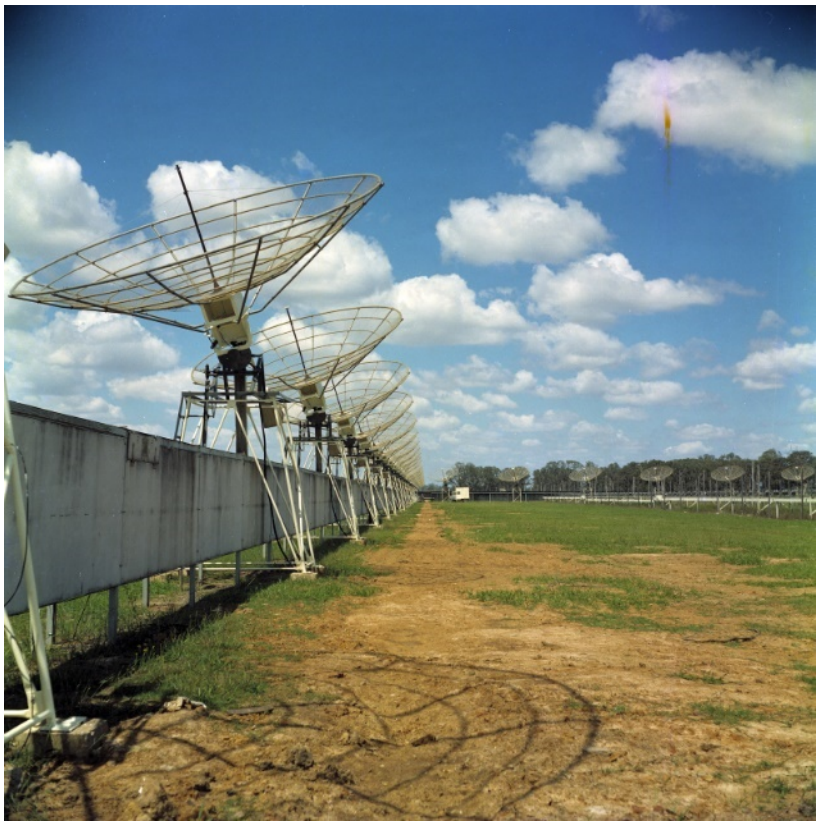

Figure 37. Array of Parabolic Antennae (Source: ANTF Historic Photographic Archive, N9114-14.)

4.4 Historic themes

The following historical themes outline the relationship of the heritage items within the Project boundary to national and state historical themes. National themes directly relate to the themes set out in the New South Wales historical themes (Heritage Office 2001). The themes tabulated below can be applied within the Project.

Table 7. Historical Themes

	NSW theme	Description	Application to Project assessment area
2. Peopling Australia	Convict	Activities related to incarceration, transport, reform, accommodation and working during the convict period in NSW (1788 – 1850) – does not include activities associated with the conviction of persons in NSW that are unrelated to the imperial 'convict system'.	Lansdowne Bridge (convict-built structure)
3. Developing local,	Agriculture	Activities relating to the cultivation and rearing of plant and animal species, usually for	McGarvie-Smith Farm (used to undertake research into agrarian and pastoral work)

	NSW theme	Description	Application to Project assessment area
regional and national economies		commercial purposes, can include aquaculture.	“Bayly Park” – house (demonstrates nineteenth century pastoral and agricultural estate planning) Blaxland's Farm (early agricultural processing)
	Exploration	Activities associated with making places previously unknown to a cultural group known to them.	Blaxland's Crossing (Blaxland’s Crossing is named after the river ford that John Blaxland regularly used when crossing the Nepean River to reach his property on the western bank, where his cattle grazed on the fertile river flats, associated with Luddenham Estate)
	Pastoralism	Activities associated with the breeding, raising, processing and distribution of livestock for human use.	McGarvie-Smith Farm (farm established to undertake research and provide practical experience in veterinarian practice and animal husbandry. The Fleurs Radio Telescope Site (known as the Fleurs Estate between nineteenth - early twentieth Century) “Bayly Park” – house Luddenham Homestead Site (estate which had a focus on pastoral activities) McMaster Field Station / McMaster Farm Exeter Farm Archaeological Site
	Science	Activities associated with systematic observations, experiments and processes for the explanation of observable phenomena	The Fleurs Radio Telescope Site (site of scientific research and innovation in radio astronomy) McGarvie-Smith Farm (used to undertake research into agrarian and pastoral work) McMaster Field Station / McMaster Farm
	Technology	Activities and processes associated with the knowledge or use of mechanical arts and applied sciences	Upper Canal System (demonstrates techniques of canal building and engineering practice) Liverpool Offtake Reservoir (technical achievement in it’s design and construction)

	NSW theme	Description	Application to Project assessment area
			Warragamba Emergency Scheme (water-supply technology) Megarritys Bridge (associated with Warragamba Emergency Scheme – technology of bridge building and reticulated water supply) The Fleurs Radio Telescope Site (some remnant evidence of above ground technology related to radio astronomy) Blaxland's Farm (remnants of early farming technology)
	Transport	Activities associated with the moving of people and goods from one place to another, and systems for the provision of such movements	Luddenham Road Alignment (an important early road link between pastoral estates of Luddenham and Lee Holme)
4. Building settlements, towns and cities	Towns, suburbs and villages	Activities associated with creating, planning and managing urban functions, landscapes and lifestyles in towns, suburbs and villages	Showground (traditional rural show reserve functioning for community organised events)
	Land Tenure	Activities and processes for identifying forms of ownership and occupancy of land and water, both Aboriginal and non-Aboriginal.	Blaxland's farm
	Utilities	Activities associated with the provision of services, especially on a communal basis	Upper Canal System (provision of water supply) Liverpool Offtake Reservoir (water supply) Warragamba Emergency Scheme (emergency water storage and supply)
	Accommodation	Activities associated with the provision of accommodation, and particular types of accommodation – does not include architectural styles.	Residential buildings include: House, Lansdowne
5. Working	Labour	Activities associated with work practises and organised and unorganised labour	Upper Canal System (built elements/structures relating to the ongoing use of the Upper Canal) Warragamba Emergency Scheme (built elements/structures relating to

	NSW theme	Description	Application to Project assessment area
			the construction and ongoing use of the dam)
6. Educating	Education	Activities associated with teaching and learning by children and adults, formally and informally.	The Fleurs Radio Telescope Site (an important site for the University of Sydney- university students contributed to the development of the FST array. McGarvie-Smith Farm (Sydney University veterinary research centre)
7. Governing	Defence	Activities associated with defending places from hostile takeover and occupation	Bandstand (war memorial group commemorating those who partook in the defence of Australia in the Twentieth Century)
8. Developing Australia's cultural life	Leisure	Activities associated with recreation and relaxation	Wallacia Hotel (premise used as a public bar and for accommodation)
	Social institutions	Activities and organisational arrangements for the provision of social activities	Wallacia Progress Association Hall (associated with the community activities of Wallacia since the 1940s)
9. Marking the phases of life	Persons	Activities of, and associations with, identifiable individuals, families and communal groups.	Fleurs Radio Telescope (associated with CSIRO and the University of Sydney Radiophysics Department)

5. Existing environment

Extent Heritage carried out a physical assessment of heritage items within the Project between July and October 2020. The analysis involved a targeted field study of heritage items and areas of heritage significance located within the project area corridor. The physical description and assessment will investigate the built form and landscape setting and assist in the determining of significance. It does not provide a detailed investigation of all fabric but an overview of the elements of the place.

5.1 Views and setting

The Project is set within Western Sydney between Lansdowne and Warragamba. The area around the Centre site is undergoing a process of major urban transformation with the construction of the new international Western Sydney Airport and Aerotropolis which will be transforming the rural landscape into a new city centre. At present these rural towns are characterised by low density urban centres surrounded by large rural residential allotments.

Within this proposed landscape, the Advanced Water Recycling Centre is located on the boundary of the suburbs of Kemps Creek and Badgerys Creek. The current landscape character of the area is predominately rural reflecting the history of agricultural and pastoral uses of the land. The area is characterised by low level grasses with gentle slopes towards Kemps Creek. Vegetation is more densely populated along the riparian corridors as the reminder of the area has been extensively cleared with some small strands of isolated trees extant (refer to Figure 38 and Figure 39).

The treated water pipelines will extend from Kemps Creek and head west where they will discharge into the Warragamba River and Nepean River. The pipelines will be located underground. Construction will be via open trenching with the exception of major waterways which will be underbored. Key roadways include Elizabeth Drive, Park Road, Silverdale Road and Bents Basin Road (refer to Figure 40 to Figure 44).

The brine pipeline will extend east from the centre at Kemps Creek along modern roadways to connect to existing wastewater infrastructure. In order to achieve this the pipeline will traverse through the Western Sydney Parklands and underbore the Upper Canal where it will join existing road alignments. The pipeline will follow under the roadway through the suburbs of Cecil Hills, Cecil Park, Bonnyrigg, Cabramatta, Canley Vale. These suburbs of western Sydney are characterised as urban residential centres with low to medium rise development. The brine pipeline will connect with existing wastewater infrastructure from Lansdowne Reserve, the Malabar wastewater system.

Figure 38. View north to South Creek and Fleurs field station. (Extent, 2020)

Figure 39. View east from the northern boundary of Fleurs field station. (Extent, 2020)

Figure 40. View east along southern boundary of McGarvie-Smith and Elizabeth Drive. (Extent, 2020)

Figure 41. View north along Bents Basin Road towards Silverdale Road. (Extent, 2020)

Figure 42. View east along Silverdale Road towards the Nepean River. (Extent, 2020)

Figure 43. View west along Park Road, Luddenham. (Extent, 2020)

Figure 44. Typical landscape over Blaxlands Farm archaeological site. (Extent, 2020)

Figure 45. View to Nepean River from Blaxlands Farm. (Extent, 2020)

Figure 46. View along Nepean River, looking towards location of proposed outlet. (Extent, 2020)

Figure 47. View towards Warragamba Dam. (Extent, 2020)

5.2 Built heritage areas of interest

5.2.1 Fleurs Radio Telescope Site

Fleurs Radio Telescope Site is located in Kemps Creek, in the Penrith local government area. The Fleurs site is located approximately two (2) kilometres from Elizabeth Drive and occupies land legally defined as Lot 21, DP 258414. The area is bisected by South Creek which meanders through the landscape on a north-south axis, dividing the area into an eastern and western portion. The eastern portion forms the focus of this report (refer to Figure 48).

Fleurs Farm was initially developed by CSIRO and later acquired by the University of Sydney in the 1960s. This change in ownership was hallmarked by the transfer of an 18 metre antenna from Fleurs to Parkes in 1963, which saw Fleurs no longer operate as an active field station by the CSIRO. The remaining arrays and buildings were then transferred to the University of Sydney who used the existing radio equipment and built additional radio telescopes.

Between 1960 and into 1970, the university converted the existing telescopes into a synthesis telescope. This was achieved by adding six standalone 13.7 metre parabolic antenna to the existing Chris Cross array at the western and northern ends of the cross. Two of these survive and are located near the banks of the South Creek and Kemps Creek.

A number of structures were removed from site in the 1990s and again in the early 2000s, which was followed by a program of demolition in 2005. The remnant built elements and below surface features present a highly fragmented landscape, with a substantial amount of original fabric removed and demolished.

Extant built features include: the receiver house (c.1953) south of the eastern arm of the Mills cross, a receiver hut and shed (c.1954) at the junction of the Chris Cross, and two small sheds between the eastern arms of the Mills Cross and the Chris Cross. In addition to the buildings and two parabolic antennae's, there are several isolated concrete footings, exposed cables and conduits, timber power poles and timber footings, piles of material and debris scattered across the site of Fleurs.

Figure 48. Indicative site plan of Fleurs Field Station with Parabolic Antennae shaded in red, Mills Cross shaded in blue, Chris Cross shaded in pink and the Shain Cross shaded in yellow. The buildings are located within the white boxes.

Parabolic Antennae

There are two, of which six which were originally constructed, that have survived within the curtilage of Fleurs Radio Telescope Site. The parabolic antenna to the north of the Shain Cross, on the southern embankment of the Kemps Creek is the most intact of the two surviving. Although elements appear to be corroded, the antenna remains upright with some associated timber power poles nearby (refer to Figure 49 and Figure 50). The timber poles provide important contextual and indicative information of the alignment of the Shain Cross (refer to Figure 51 and Figure 52). The upright parabolic antennae is located within a swampy area, separated from the rest of the site by a timber post and wire fence. This is to the north of the assessment area.

The fallen parabolic antenna to the west, on the banks of South Creek is separated by the remainder of the site by a steel post and wire fence (refer to Figure 53 and Figure 54). Within the enclosed area are associated equipment including a weathered timber power pole with no wires attached and concrete tank. Outside the enclosed area another single timber power pole remains with glass insulators and no wires (refer to Figure 55 and Figure 56). There are several large brambles surrounding the base of the antenna and a mature exotic tree. The antenna is severely corroded in sections, which has resulted in the loss of fabric. Although disfigured by the impact of the fall, the antenna retains a number of key features that assist the interpretation of the element and place.

Figure 49. View northwest to upright parabolic antenna. (Extent, 2020)

Figure 50. Detail of parabolic antenna. (Extent, 2020)

Figure 51. View northwest to timber power pole leading to upright parabolic antenna. (Extent, 2020)

Figure 52. View north to timber power pole leading to upright parabolic antenna. (Extent, 2020)

Figure 53. View west to fallen parabolic antenna, power pole and concrete tank. (Extent, 2020)

Figure 54. Detail of fallen parabolic antenna. (Extent, 2020)

Figure 55. Detail of power pole within enclosed area. (Extent, 2020)

Figure 56. Detail of power pole outside enclosed area. (Extent, 2020)

Receiver House (c.1953) and shed

The receiver house is located at the junction of the Mills Cross, on the southern side of the eastern arm of the array. The building was constructed in 1953 and received data from the Mills Cross. The building is single storeyed with a gabled roof sheeted in corrugated iron metal with roll top ridge capping and simple timber bargeboards. The building has boxed eaves with weathered fibrous cement sheet soffits and walls clad with compressed fibrous cement sheeting, that has been punctured in several locations. A small sunroom with louvered glass windows adjoins the southern elevation. Windows are generally timber framed, double hung sash windows, with no intact glass windowpanes. Windows on the north elevation have a skillion awning supported on timber brackets with a fibrous cement sheet awning covering. A double leaf timber door is located on the west elevation (refer to Figure 57 - Figure 59).

While the interiors were not inspected, views from the exterior indicated all significant equipment have been stripped from the building. Large brambles surrounded the building, and there are piles of material and debris to the north and a manmade dam to the south.

A shed located to the southeast of the receiver house, appears to date to the same period. The shed is a partially demolished timber framed structure with a skillion roof with some fibrous cement sheet walls extant (refer to Figure 60).

Both structures are in a poor, derelict condition, with much of their original material removed.

Figure 57. View to east and north elevations of receiver house. (Extent, 2020)

Figure 58. view to the east and south elevations of the receiver house. (Extent, 2020)

Figure 59. View south to north elevation of receiver house. (Extent, 2020)

Figure 60. View to shed and dam. (Extent, 2020)

Two Sheds (Former Solar Field Station, c.1961)

Between the eastern arms of the Mills Cross and the Chris Cross are two single storey buildings with compressed fibrous cement sheeting clad walls and gabled roofs with corrugated steel sheets and roll top ridge capping (refer to Figure 61). The windows are recorded as being casement sashes, however, on inspection there were no intact windows. The interiors are stripped of all significant equipment.

Based on aerial imagery, the buildings were constructed by 1961 and appear to relate to the former solar field station. The former field station historically comprised of three buildings connected by concrete slab footpath and enclosed by a fence. A building has since been demolished, likely c.2005 and the fence is not long present. Concrete paths connecting the buildings remain (refer to Figure 64).

The buildings that remain are in a poor condition. This is particularly evident where the roof frame of one building appears to have detached from the top plate of the wall frame causing the building to lean (refer to Figure 63).

Figure 61. Overview of sheds located between eastern arms of Mills Cross and Chris Cross. (Extent, 2020)

Figure 62. View south to shed 1. (Extent, 2020)

Figure 63. View to south to shed 2. (Extent, 2020)

Figure 64. View from shed 2 to shed 1. (Extent, 2020)

Figure 65. View west from shed 2 towards shed 1. (Extent, 2020)

Receiver hut and building (c.1961, extended c.1970s)

At the junction of the Chris Cross arrays is another receiver hut and additional building located to the south of the eastern arm. The buildings are surrounded by large brambles which obscure views and access to the buildings.

The original building, the receiver hut, was constructed by 1961 and contains a double gable roof that intersects a transverse gable. All roofs are sheeted with corrugated iron with steel roll top ridge capping. The structure is timber framed with compressed fibrous cement sheeting walls. Windows are timber framed sliding sashes with some flyscreens affixed. The interiors are completely stripped of significant fabric, with a number of computer modems left to decay in a room of the building (refer to Figure 66).

The building to the east is a timber weatherboard building with a gabled roof. The gable roof is sheeted with a corrugated steel sheet. The windows are timber framed casements with no glass windowpanes. The door frames are timber. The building appears to have been painted green in the past (refer to Figure 67).

The surrounding landscape contains a number of remnant concrete and brick footings that likely relate to former water tanks. Within the landscape it is possible to view from the ground the former alignment of the eastern are of the Chris Cross array.

The buildings are in a poor, derelict condition and severely impacted by overgrowth. There are sections of roof that have collapsed, and others which are missing sections of roof cladding (refer to Figure 68 to Figure 71).

Figure 66. View north west to the receiver hut (left) and shed added c.1970 (right). (Extent, 2020)

Figure 67. View to the 1970s weatherboard addition. (Extent, 2020)

Figure 68. View north to receiver hut. (Extent, 2020)

Figure 69. View north to receiver hut. (Extent, 2020)

Figure 70. View inside receiver hut. Room contains a number of abandoned computer modems. (Extent, 2020)

Figure 71. View southeast, overview of receiver hut. (Extent, 2020)

5.2.2 Fleurs Aerodrome

During World War II the land adjoining Fleurs to the east was used as a small airfield intended for the US forces, however, was instead used by the RAAF at Richmond. The land was purchased by the Commonwealth government and acquired by the University of Sydney in 1963. The main runway is still visible in the landscape today and was set at a 40 degree angle, a metal piece of machinery is retained within the middle of the runway (refer to Figure 72).

The following description is quoted from Aurecon (2016:120).

> Fleurs Aerodrome is situated on a flat area of land between South Creek and Kemps Creek, north of Elizabeth Drive. The aerodrome reserve transect allocated to the main landing strip runs on a north east to south west axis for about 1.6 kilometres (1 mile). The reserve is about 120 metres wide with the landing strip just off centre to the north, running down the middle. The existing strip itself on the bituminised portion is about 25 metres wide and nearly 300 metres in length, with the rest of its sections grassed. The reserve set aside for the aerodrome is the most intact of the site's elements, with only a minor incursion from a fence line on the northern side. The northern section of the existing landing strip has been cultivated over the years, the middle section has gone to grass, and the lower section containing the bituminized strip appears to be of later construction over an original footprint. It

is unsure as to whether a number of rudimentary structures overgrown with vegetation in the area are associated with the aerodrome or the radio telescopes site to the north. A number of modern buildings have been built on the reserve over the years (and removed). There are a small number of tracks that cross through the landing strips path.

Figure 72. View southeast to runway. (Extent, 2020)

Figure 73. View south to runway. (Extent, 2020)

5.2.3 South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape

The South, Kemps and Badgerys Creek Confluence Weirs Scenic Landscape is a traditional rural landscape that includes a portion of Fleurs Radio Telescope Site. The scenic landscape extends to the north of the proposed site of the Centre (Refer to Figure 49, Figure 51, Figure 53 and Figure 60).

The primary elements of significance associated with the area include remnant stands of natural vegetation along creeks and roadsides; the aesthetic cultural landscapes associated with early homesteads; and the many fine scenic landscapes, both natural and cultural (Perumal Murphy 1990:26).

5.2.4 McGarvie-Smith Farm

McGarvie-Smith Farm is located at 1793-1951 Elizabeth Drive Badgerys Creek, within the Penrith Council local government area. The farm comprises of land legally defined as Lots 62 and 63, in DP1087838 and Lot 3, in DP164242. The site is bound by the McMaster Field Station land to the west and suburb of Badgerys Creek to the east. The southern portion of McGarvie-Smith Farm along Elizabeth Drive forms the focus of this report.

The core of the McGarvie Smith Farm is situated to the north of the impact assessment area and includes original farm buildings constructed in 1936 as well as later farm buildings that range in date from 1940 to 1970 (refer to CRM 2019, 80-81 for detailed description).

The site retains some evidence for its pre-settlement landform of gentle slopes, although it has been extensively cleared of standing timber except for small stands of isolated trees. The densest stands of trees are along the banks of Badgerys Creek and the small creeks that run from it. The majority of the site is covered in low grasses.

The major changes to the topography have come from the creation of dams and earthworks associated with water catchment and water harvesting. There are ten major dams around the property and earthworks around some of them particularly visible in southern portion of the property, along Elizabeth Drive. The first dam constructed along the southern boundary of the site occurred to the west in 1936 or 1941 (refer to Figure 80) , with a second dam constructed on the east side between 1947 and 1961 (refer to Figure 76 and Figure 78).

Within this area fronting Elizabeth Drive there are isolated mature gum trees, a timber post and wire fence with some metal piles, as well as an unsealed gravel road that provides the primary entrance to the site (refer to Figure 74).

Figure 74. View north from access road of Elizabeth Drive. (Extent, 2020).

Figure 75. View west to southern boundary of McGarvie-Smith Farm and Elizabeth Drive. (Extent, 2020)

Figure 76. View east to southern boundary of McGarvie-Smith Farm and Elizabeth Drive. (Extent, 2020)

Figure 77. View east of southern boundary of McGarvie-Smith Farm. (Extent, 2020)

Figure 78. View to dam with McGarvie Smith Farm. (Extent, 2020)

Figure 79. View north along access road to farm buildings. (Extent, 2020)

Figure 80. View from access drive to dam and farm buildings located to the north and northeast of the Project. (Extent, 2020)

5.2.5 Luddenham Road Alignment

Luddenham Road is a rural road connecting Mamre Road to the northeast with Elizabeth Drive at the southeast. The road is undulating through adjacent farmland and, in some sections, is cut into the side of the hills.

The roadway itself is a modern asphalted two-lane road with grassed verges and some areas with remnant stands of trees. Where Luddenham Road intersects with Elizabeth Drive, the roadway is framed by modern metal guard rails. While the road is located within the original cadastral location with road reserve either side, there are no remnants of the original road visible (refer to Figure 81 to Figure 84).

Luddenham Road is in a good condition.

Figure 81. View northeast along Luddenham Road. (Extent, 2020)

Figure 82. View southeast from Luddenham Road to Elizabeth Drive. (Extent, 2020)

Figure 83. View west to Elizabeth Drive from Luddenham Road. (Extent, 2020)

Figure 84. View of road verge. (Extent, 2020)

5.2.6 Luddenham Showground

The Luddenham Showground is located at 428-452 Park Road, Luddenham, in the Penrith Council local government area. The showground is located on the south side of Park Road and comprises of land legally defined as Lot 1, in DP931631 and Lot 2, DP972057. Access to the showground is off Campbell Street. The road verge between the showground and Park Road forms the focus of this report.

The showground comprises of an assortment of corrugated metal clad buildings and timber framed shelters and stands located to the south of the allotment. The centre of the showground has a show ring which is enclosed by a metal post and rail fence. Within the show ring is a timber framed cattle run. The grounds are cleared with stands of mature shade trees along the fence line. The grounds are enclosed by a high chainmesh fence (refer to Figure 85 to Figure 88).

There is a deep road verge between Park Road and the Showground. The road verge consists of low grasses and compressed soil. Within the road verge is a public tap, which appears to be in operation (refer to Figure 89 and Figure 90).

Figure 85. View to Luddenham Showground from corner of Campbell Street and Park Road. (Extent, 2020)

Figure 86. View west along Park Road, with showground to the left. (Extent, 2020)

Figure 87. View southwest from Campbell Road to buildings located within the Showground. (Extent, 2020)

Figure 88. View northwest from Campbell Road to Showground. (Extent, 2020)

Figure 89. View west along Park Road. (Extent, 2020)

Figure 90. View east along Park Road. (Extent, 2020)

5.2.7 Warragamba Supply Scheme and Warragamba Emergency Scheme

The Warragamba Supply Scheme and Warragamba Emergency Scheme is located approximately 65 kilometres west of Sydney and 15km south of Penrith on the Warragamba River, in the Wollondilly Shire Council local government area. A portion of land to the east of the Warragamba Dam wall, on the southern embankment of the Warragamba River is the focus of this report. This is outside the SHR listing for Haviland Park, Warragamba Emergency Scheme, and Megarritys Bridge.

The Warragamba Supply Scheme consists of a concrete gravity dam with a height of 137 metres from foundations to crest. The dam creates a lake approximately 50 kilometres long with a surface area at full storage of 7,500 hectares. Water is conveyed to Sydney by two major steel pipelines, one 2.1 metres diameter and the other 3 metres. The northern side of the dam is adjacent to the Blue Mountains National Park. The south-eastern corner of the site connects to the Warragamba township and Haviland Park which contains a number of plantings and park features that date the 1960s.

The Warragamba Emergency Scheme is located on the east bank of the Warragamba River. Access to the site was along the road currently known as Weir Road. Major elements of the construction works still extant include the weir, a 10-cable cableway, sheds, batching plants, roads, electrical substation, chlorination plant, maintenance staff accommodation, balance reservoir, Megarritys bridge, water pumping station, tunnels, and associated pipelines.

The east bank of the Warragamba River is characterised by rocky outcrops surrounded by native trees. Access to the area is gained by Core Park Road which meanders down the embankment to and navigates to the west to the dam wall (refer to Figure 91 and Figure 92).

Figure 91. View west from Warragamba Dam to Warragamba River. (Extent, 2020)

Figure 92. View to Warragamba Dam. (Extent, 2020)

5.2.8 Cabravale Memorial Park

Cabravale Memorial Park is located within the suburb of Cabramatta, in the Fairfield City Council local government area. The park is bounded Bartley Street to the north, Railway Parade to the east, McBurney Road to the south and Park Road to the west. A section of Cabravale Memorial Park is locally listed on Schedule 5 of the Fairfield LEP as 'Bandstand'. The heritage overlay is confined to land legally defined as Lots 13, 14 and 17, in Section C, of DP 2526.

The Bandstand is one of three war memorials located within Cabravale Memorial Park and the heritage curtilage of the 'Bandstand'. The other two memorials include a 170mm Minenwerfer and the Vietnam War Comradeship Memorial.

The landscape setting which surrounds the memorials includes a crushed gravel driveway that extends from Railway Parade to surround the Bandstand and create two avenues either side of the Vietnam War Comradeship Memorial. The two avenues have concrete kerbs with garden beds that contain neat, formal landscaped hedges and garden beds. Other significant features within the landscape include the sandstone boundary fence along Bartley Street and Railway Parade (refer to Figure 93 and Figure 94).

There are a number of significant exotic and native trees with the curtilage of the Bandstand and wider Cabravale Memorial Park. A number of native trees are located in the northeast corner and surrounding an oval in the situated to the west. Concrete slab footpaths extend through the park, with every fifty metres marked by a paved heart and number of metres. The park has a number of park amenities which include shelters, benches, basketball courts and play equipment (refer to Figure 95 to Figure 98).

Figure 93. View south along Railway Parade. (Extent, 2020)

Figure 94. View north along Railway Parade. (Extent, 2020)

Figure 95. View west to northern section of Cabravale Memorial Park. (Extent, 2020)

Figure 96. View north to oval located in the western portion of Cabravale Memorial Park. (Extent, 2020)

Figure 97. View north to existing service track accessed Bartley Street. (Extent, 2020)

Figure 98. View east along gravel driveway. (Extent, 2020)

The Bandstand

The Bandstand is an octagonal rotunda with a corrugated iron sheet roof supported on eight face brick columns. The bandstand is addressed by several steps with a rendered brick balustrade and simple metal post handrail. At the base of steps are two Doric style columns topped with round light globes. The columns are set on exposed brick piers. The roof has exposed rafters and flat tongue and groove board ceiling. The balustrade has a brick soldier course edge and render infill, topped by seven metal panel balustrades. The metal panels are a later addition to the structure and are accompanied by a bronze plaque with explanatory text. They are titled: Gallipoli Landing, Loyalty Parade, Children Playing, Picnics in the Park, Street Parades, Fairfield Red Cross and Soldiers Marching (refer to Figure 99 to Figure 101).

The bandstand contains two plaques. One with a memorial inscription, the other with the names of 22 soldiers killed on active service.

The white marble tablet reads:

> Erected to the memory of those who made the supreme sacrifice in the Great War of 1914-1918.

The bronze plaque reads:

> This bandstand was erected in the park in 1919 in honour of the soldiers who died in the First World War. The bandstand was built at a cost of 350 Australian pounds and dedicated on Anzac Day 1919. A marble plaque on the northern side bears the names of the 22 local men who died in the war.
>
> In 2001, as a result of representations from the local member for Cabramatta Ms Reba Meagher, and in consultation with members of the Cabra-Vale Diggers' Club, Fairfield Heritage Committee and local community groups, Fairfield City Council commissioned the decorative metal panels around the bandstand. The panels depict those people from the district who fought in the war and supported the war effort at home, and were designed and manufactured by artists Philippa Johnson and Henry K. Topolnicki of Art.Is.An Option.

Figure 99. View northwest to bandstand. (Extent, 2020)

Figure 100. View north to bandstand. (Extent, 2020) (Extent, 2020)

Figure 101. View east to bandstand. (Extent, 2020)

Figure 102. View west from Railway Parade to bandstand. (Extent, 2020)

170mm Minenwerfer

The 170mm Minenwerfer is located between the Cabravale Park Memorial Bandstand and the Vietnam War Comradeship Memorial. The 170mm Minenwerfer is a medium class trench mortar utilized by the German Army in World War I. The mortar is set in a concrete plinth beside a single flagpole and has been coated with a protective paint to prevent rusting (refer to Figure 103).

The Vietnam War Comradeship Memorial

The Vietnam War Comradeship Memorial is a sunken landscaped area that once functioned as a pond. The area at its centre is now grassed and surrounded by three circular steps. At the apex of the circular landscaped area is a bronze statue of two soldiers and four flagstaffs. The sculptor was Do Trong Nhon. The bronze memorial was donated by the Community of Cabramatta to commemorate the comradeship shared by the Australian and Vietnamese soldiers during the Vietnam War (1962-1972). The memorial was officially unveiled by the Governor of NSW His Excellency Rear Admiral Peter Sinclair A.O. on the 31st August 1991.

Figure 103. View east to170mm Minenwerfer and Vietnam War Comradeship Memorial. (Extent, 2020)

5.2.9 Upper Canal and Liverpool Offtake Reservoir

Upper Canal

The Upper Canal commences at Pheasant's Nest Weir near the confluence of the Nepean and Cordeaux Rivers in the south, running to Prospect Reservoir near Blacktown in the north, over a distance of approximately 64 kilometres. From south to north, the Upper Canal corridor passes through the Wollondilly, Camden, Campbelltown, Liverpool and Fairfield Local Government Areas. Generally, the land through which the canal runs is characterised by farming and moderately dense suburban housing areas. The rural surrounds of the Canal have shifted in recent years; particular sections have been subject to housing developments, new roads and changes in utilities including sewers, storm water, telephone, and gas.

The Upper Canal has historically been divided into eleven maintenance 'sections'. These sections have been used in the current study and are also referred to in the Upper Canal CMP (2016), which is referenced throughout this report. For the purposes of this report the impact assessment area is located in section 10 of the canal network known as the 'Liverpool Dam Precinct'.

Section 10 remains largely rural, the area is partially within and bounded by Western Sydney Parklands to the north, south and east, and by Sydney International Shooting Centre to the west. The open canal in Section 10 has a predominantly concrete lined, trapezoidal (V-shaped) cross section set within a raised ridgeline. This section of canal was relined with concrete in 2018 (refer to Figure 104 and Figure 105).

Other features within section include a winch and grate system to allow filtration of the Upper Canal waters and archaeological features associated with the former maintenance cottage (item 10.12. Refer to Section 5.3.8 for detailed information on the historical archaeological potential) (refer to Figure 106).

Liverpool Offtake Reservoir

The Liverpool Offtake Reservoir is located outside of the Canal easement and is no longer in use or owned by WaterNSW. The entrance to the dam distinguished by a line of mature Bunya pines. The Liverpool Offtake Reservoir is an earthen reservoir with the upstream face lined with concrete slabs and bitumen joints. The concrete slabs date to a 1933 extension which raised the earthen walls of the reservoir (refer to Figure 109).

Built features within the landscape associated with the operation of the dam includes an offtake with concrete chamber and two extant structures, one small white fibro building and a small red brick building (refer to Figure 110, Figure 111 and Figure 112). The small brick building was likely one of the structures constructed between 1930 and 1947, associated with management and chlorination of the reservoir. A large drain cover was observed to the south of the red brick structure. Concrete footings, path, an iron water tank stand and state survey marks were observed in the area.

Figure 104. View south along the Upper Canal to water quality plant. (Extent, 2020)

Figure 105. View south along the Upper Canal to general area that will be underbored. (Extent, 2020)

Figure 106. View to winch and grate. (Extent, 2020)

Figure 107. View northwest from Upper Canal to International Shooting Range. (Extent,2020)

Figure 108. View east to Bunya pines at the entrance to Liverpool Dam from Upper Canal. (Extent, 2020)

Figure 109. View north to Liverpool Dam. (Extent, 2020)

Figure 110. View to concrete valve house in the Liverpool Dam. (Extent, 2020)

Figure 111. View to former chlorination shed. (Extent, 2020)

Figure 112. View to former chlorination shed. (Extent, 2020)

Figure 113. View northwest from Western Sydney Parklands towards Upper Canal and Liverpool Offtake Reservoir. (Extent, 2020)