

Warragamba Dam Wall Raising

DRAFT Non-Aboriginal Heritage
Impact Assessment

*Editorial note: WaterNSW template to be used
in next draft*

Report to SMEC
September 2018



Artefact Heritage
ABN 73 144 973 526
Level 4, Building B
35 Saunders Street
Pyrmont NSW 2009
Australia

+61 2 9518 8411
office@artefact.net.au

Document history and status

DRAFT

Revision	Revision type	Date issued	Written by	Reviewed/ Approved by	Date approved
1	First Draft	28 September 2018	Charlotte Simons Jenny Winnett Matthew Alexander	Dr Sandra Wallace	28 September 2018

DRAFT

Author	
Project manager	
Project number	170302
Project name	Warragamba Dam EIS Assessments

Copyright

Unless specified or agreed within the contract with the client, copyright in this report remains with Artefact Heritage Pty Ltd. Ownership of existing historic source material remains with the original or current owners of that material, with appropriate referencing provided within the document, and where necessary, permissions for use of such materials have been sought. This document may only be used for the purposes for which it was commissioned and in accordance with the terms of the contract. Unauthorised use of this document in any form whatsoever is prohibited.

Moral Rights

Artefact Heritage Pty Ltd asserts its Moral Rights in this work, unless specified or agreed within the contract with the client, in accordance with the (Commonwealth) Copyright (Moral Rights) Amendment Act 2000. Artefact Heritage Pty Ltd's moral rights include the attribution of authorship, the right not to have the work falsely attributed, and the right to integrity of authorship.

Right to Use

Artefact Heritage Pty Ltd provides to the client for this project (and the client's successors in title) an irrevocable royalty-free right to reproduce or use the material from this report, except where such use infringes the copyright and/or Moral Rights of Artefact Heritage Pty Ltd.

Disclaimer

Artefact Heritage Services has completed this document in accordance with the relevant federal, state and local legislation and current industry best practice. The company accepts no liability for any damages or loss incurred as a result of reliance placed upon the document content or for any purpose other than that for which it was intended.

EXECUTIVE SUMMARY

Overview of findings

Editorial Note: Placeholder – to be completed in final draft

Recommendations

Editorial Note: Placeholder – to be completed in final draft

DRAFT

CONTENTS

1. Introduction	1
1.1. Project Background.....	1
1.2. The project	2
1.3. Project Location	2
1.3.1. Study area	2
1.4. Assessment Approach	4
1.4.1. Project scope	4
1.5. Assessment structure.....	6
1.6. Limitations and assumptions.....	7
1.7. Authorship.....	8
2. Heritage Management Framework	9
2.1. Introduction	9
2.2. The World Heritage Convention.....	9
2.2.1. World Heritage List	9
2.3. Environmental Protection and Biodiversity Conservation Act 1999	13
2.3.1. Bilateral agreement made under Section 45 of the EPBC Act.....	13
2.3.2. Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1.....	14
2.3.3. World, National, and Commonwealth Heritage Principles.....	14
2.3.4. National Heritage List	15
2.3.5. Commonwealth Heritage List.....	18
2.4. NSW Heritage Act 1977	21

2.4.1.	The 2009 'Relics provisions'	21
2.4.2.	State Heritage Register	22
2.4.3.	Section 170 registers	29
2.4.5.	NSW Register of Shipwrecks.....	35
2.5.	Environmental Planning and Assessment Act 1979 (NSW).....	37
2.5.1.	State Environmental Planning Policy (Infrastructure) [ISEPP] 2007.....	37
2.5.2.	Local Environment Plans	37
4.	Historical Context	42
4.1.	Non-Aboriginal History of Western Sydney	42
4.1.1.	Early colonial history.....	42
4.1.2.	Rural development.....	43
4.1.3.	Consolidated settlement and development.....	44
4.2.	Overview of Sydney's Water Supplies	45
4.2.1.	Early water sources, the Upper Nepean Scheme & additional catchment areas	45
4.3.	Development of Warragamba Dam.....	46
4.3.1.	Planning for the Warragamba development	46
4.3.2.	Warragamba Emergency Supply Scheme.....	47
4.3.3.	Warragamba to Prospect pipeline.....	48
4.3.4.	Construction of Warragamba Dam	48
4.3.5.	Modifications and development at Warragamba Dam	51
4.4.	Development of World and National Heritage Places in the Referral Area	54
4.4.1.	Development of the Greater Blue Mountains World Heritage Property	54
4.4.2.	Development of the Australian Convict Sites World Heritage Property	56

5. Existing Environment	57
5.1. Site inspection.....	57
5.2. Greater Blue Mountains Area (WHL Place ID 105127, NHL Place ID 105999).....	57
5.2.1. Description.....	57
5.2.2. Significance	57
5.2.3. Site survey.....	61
5.3. Australian Convict Sites (Old Great North Road) (WHL Place ID 106209, NHL Place ID 106318).....	62
5.3.1. Description.....	62
5.3.2. Significance	63
5.3.3. Site survey.....	65
5.4. Warragamba Dam - Haviland Park (SHR No. 01375).....	66
5.4.1. Description.....	66
5.4.2. Significance	67
5.4.3. Site survey.....	67
5.5. Warragamba Emergency Scheme (SHR No. 01376, LEP No. I270).....	68
5.5.1. Description.....	68
5.5.2. Significance	68
5.5.3. Site survey.....	69
5.6. Track (SHR No. 01372).....	70
5.6.1. Description.....	70
5.6.2. Significance	70
5.6.3. Site survey.....	70

5.7.	Warragamba Supply Scheme (WaterNSW s170 No. 4580161, LEP No. I270)	70
5.7.1.	Description.....	70
5.7.2.	Significance	71
5.7.3.	Site survey.....	72
5.8.	Warragamba Conservation Area (LEP No. C4).....	74
5.8.1.	Description.....	74
5.8.2.	Significance	75
5.8.3.	Site survey.....	75
6.	Archaeological assessment.....	76
6.1.	Archaeological potential.....	76
6.1.1.	Assessment of archaeological potential	76
6.2.	Archaeological significance.....	80
6.2.1.	Assessment against the NSW heritage assessment guidelines.....	81
6.2.2.	Statement of archaeological significance	84
7.	Project Description	86
7.1.	The project	86
7.2.	Demolition	86
7.3.	Project infrastructure.....	87
7.4.	Project operation	87
7.4.1.	Normal operations	88
7.4.2.	Environment flow releases.....	88
7.4.3.	Flood operation mode.....	88
7.4.4.	Emptying of the flood management zone after rainfall events.....	88

7.5.	Project construction.....	90
7.5.1.	Construction program and staging.....	90
7.5.2.	Construction methodology.....	91
7.5.3.	Construction of ancillary facilities.....	91
7.5.4.	Construction materials.....	92
8.	Heritage Impact Assessment	94
8.1.	Methodology.....	94
8.1.1.	Impact terminology	94
8.1.2.	Assessing flooding impacts	95
8.1.3.	Mitigation and management measures.....	96
8.2.	Potential impacts to listed sites	98
8.2.1.	Summary of heritage places.....	98
8.3.	World Heritage List.....	98
8.3.1.	Greater Blue Mountains Area (WHL Place ID 105127)	98
8.3.2.	Australian Convict Sites (Old Great North Road) and buffer zone (WHL Place ID 106209)...	101
8.4.	National Heritage List.....	103
8.4.1.	The Greater Blue Mountains Area (NHL Place ID 105999).....	103
8.4.2.	The Greater Blue Mountains Area - Additional Values (NHL Place ID 105696).....	103
8.4.3.	Great North Road, Wisemans Ferry to Bucketty (NHL Place ID 106318)	103
8.5.	Commonwealth Heritage List.....	103
8.6.	State Heritage Register.....	104
8.6.1.	Warragamba Dam - Haveland Park (SHR No. 01375)	104
8.6.2.	Warragamba Emergency Scheme (SHR No. 01376).....	106

8.7.	S170 Registers.....	106
8.7.1.	Warragamba Supply Scheme (WaterNSW s170 No. 4580161).....	107
8.8.	NSW Register of Shipwrecks.....	110
8.9.	LEP Schedule 5 Registers	111
8.9.1.	Warragamba Supply Scheme and Warragamba Emergency Scheme (LEP No. I270)	111
8.10.	Archaeological impact assessment.....	111
8.10.1.	Assessment of impact to archaeological remains.....	111
8.11.	Cumulative Impact	113
8.12.	Project development and Justification.....	113
9.	MANAGEMENT OF NON-ABORIGINAL HERITAGE.....	115
10.	REFERENCES.....	118
11.	APPENDIX 1: World heritage places impact TABLES[Editorial note: All tables are preliminary only and subject to change once data is updated and impacts to GBMWA are confirmed]	121
12.	APPENDIX 2: National heritage places impact TABLES.....	123
13.	APPENDIX 3: Commonwealth heritage places impact TABLES	125
14.	APPENDIX 4: State heritage places impact TABLES	127
15.	APPENDIX 5: s170 heritage places impact TABLES	133
16.	APPENDIX 6: NSW historic shipwreck database impact TABLES	137
17.	APPENDIX 7: LEP heritage places impact TABLES	139
18.	World, National, and Commonwealth Management Principles.....	173

FIGURES

Figure 1.1: Referral Area	3
Figure 2.1: World heritage places in the north of the Referral Area	10
Figure 2.2: World heritage places in the south of the Referral Area	11
Figure 2.3: National heritage places in the north of the Referral Area	15
Figure 2.4: National heritage places in the south of the Referral Area	16
Figure 2.5: Commonwealth heritage places in the north of the Referral Area	18
Figure 2.6: Commonwealth heritage places in the south of the Referral Area	19
Figure 2.7: State heritage places in the north of the Referral Area (Note: only place numbers are provided due to space constraints)	25
Figure 2.8: State heritage places in the centre of the Referral Area (Note: only place numbers are provided due to space constraints)	26
Figure 2.9: State heritage places in the south of the Referral Area (Note: only place numbers are provided due to space constraints)	27
Figure 2.10: s170 Registers heritage places in the north of the Referral Area	32
Figure 2.11: s170 Registers heritage places in the centre of the Referral Area	33
Figure 2.12: s170 Register heritage places in the south of the Referral Area	34
Figure 2.13: NSW Register of Shipwrecks places in the Referral Area	36
Figure 2.14: LEP Schedule 5 Registers heritage places in the north of the Referral Area	39
Figure 2.15: LEP Schedule 5 Registers heritage places in the centre of the Referral Area	40
Figure 2.16: LEP Schedule 5 Registers heritage places in the south of the Referral Area	41
Figure 3.1: Historical painting depicting a view along the Nepean River at the Cow Pastures, 1825 (Source: State Library Victoria)	42
Figure 3.2: Historical painting by George William Evans depicting a view along the Nepean River at connection with Grose River, 1809 (Source: State Library NSW, call no. SV/123)	43

Figure 3.3: A homestead in the Burragorang Valley prior to flooding of the township to establish Warragamba Dam, c1884-1917 (Source: Museum of Applied Arts & Sciences. Object No. 85/1284-435)	44
Figure 3.4: Historic photograph of Prospect Reservoir at the time of completion, 1888 (Source: Reproduced in Besley, M. 'The Sweat of their Brows' Water Board, 1988)	45
Figure 3.5: Historical photograph of works progress at the dam, 1958 (Source: KW 581107 – 1, SWC/SCAHR&AF)	49
Figure 3.6: Historical photograph of the newly completed Warragamba Dam, 1960 (Source: National Library of Australia)	50
Figure 3.7: Historical photograph of the opening ceremony of Warragamba Dam, 1960 (Source: Reproduced in Besley, M. 'The Sweat of their Brows' Water Board, 1988)	50
Figure 3.8: Overhead view of Warragamba Dam during the opening ceremony, 1960 (Source: Sydney Water Board Journal, Special Edition, October 1960)	51
Figure 3.9: Photograph of the newly completed Haviland Park, c1960s. (Source: RS/17 – 4M, SWC/SCAHR&AF)	52
Figure 3.10: Photograph showing the raising of the crest wall using the 18 tonne cableway that remained at this time, November 1988. (Source: R95B – 2, SWC/SCAHR&AF)	53
Figure 3.11: Photograph of the spillway under construction, c2000, showing impact to north-western end of Haviland Park (Source: RS/17 – 5, SWC/SCAHR&AF)	53
Figure 3.12: Overhead view of the newly completed auxiliary spillway, 2002 (Source: SCA)	53
Figure 3.13: Plan of the proposed Blue Mountains National Park, 1932. (Source: Blue Mountains Gazette)	55
Figure 3.14: 1833 watercolour, 'Convicts building road over the Blue Mountains, NSW 1833' (Source: National Library Australia, Call No. PIC Drawer 3842 #T2083 NK9673)	56
Figure 4.1: View south along the Wollondilly River to Nattai National Park within the Greater Blue Mountains Area	62
Figure 4.2: View southeast at the Joorilands woolshed site towards Nattai National Park within the Greater Blue Mountains Area	62
Figure 4.3: View north along W4G Trail with peaks of the Nattai National Park within the Greater Blue Mountains Area to right	62
Figure 4.4: View southwest from Burragorang Lookout over Lake Burragorang and the Greater Blue Mountains Area	62

Figure 4.5: View north to entrance of Australian Convict Sites (Old Great North Road) from Settlers Road.	66
Figure 4.6: View north east along Settlers Road to Buffer Zone area around the Australian Convict Sites (Old Great North Road).	66
Figure 4.7: View south-east across Haviland Park towards remnant fountain base.	68
Figure 4.8: View east to remnant fountain base within Haviland Park.	68
Figure 4.9: View north across Haviland Park.	69
Figure 4.10: View to entry gate at Haviland Park.	69
Figure 4.11: View north-east from Weir Road towards Megarritys Bridge.	70
Figure 4.12: View south-west along Weir Road towards pumping station.	70
Figure 4.13: View down from Weir Road to weir structure.	70
Figure 4.14: View north-west to existing bridge on Production Avenue over auxiliary spillway and crest road on the dam wall, note blue crest crane in distance.	74
Figure 4.15: View north-west from terrace garden picnic area showing the dam wall and towers and downstream face.	74
Figure 4.16: View down from Crest Road to the Valve House and attached annexe building located to the rear.	74
Figure 4.17: View west from Production Avenue towards the original blue-painted and track mounted crest crane on the dam wall.	74
Figure 4.18: View north-west across Haviland Park towards the dam, remnant fountain base seen in distance.	75
Figure 4.19: View down from Crest Road to existing landscaping and stairs in the Terraced Garden adjacent to the dam wall.	75
Figure 4.20: 1930 commemorative plaque from the dam's opening, located on Crest Road.	75
Figure 5.1: Overview of archaeological potential (source: Graham Brooks and Associated June 2010; Artefact Heritage overlay on SIX Maps)	80
Figure 61 Outflows and discharge from Warragamba Dam for a 1 in 20 chance in a year event	88
Figure 62 Outflows and discharge from Warragamba Dam for a 1 in 100 chance in a year event	89

[Figure 7.1: Overlay of archaeological potential on plan of the proposed works](#)
113

DRAFT

TABLES

Table 1.1: SEARs as they relate to non-Aboriginal cultural heritage (Note - Aboriginal heritage tasks have been omitted)	5
Table 1.2: Assessment structure	6
Table 2.1: World heritage places within the Referral Area	9
Table 2.2: National heritage places within the Referral Area	14
Table 2.3: Commonwealth heritage places within the Referral Area	17
Table 2.4: SHR heritage places within the Referral Area	21
Table 2.5: S170 heritage places within the Referral Area	28
Table 2.6: NSW Register of Shipwrecks places within the Referral Area	35
Table 2.7: Place counts for LEP Schedules	38
Table 5.1: Summary of archaeological potential	78
Table 5.2: Overview of NSW Heritage Branch archaeological significance criteria	81
Table 5.3: Consideration against NSW heritage assessment criteria	82
Table 61 Preliminary construction program	90
Table 62 Volume and type of concrete required	91
Table 63 Weight of materials for concrete production	92
Table 64 Other construction materials [TO BE COMPLETED ONCE INFORMATION RECEIVED]	92
Table 7.1: Artefact Heritage terminology for heritage impact types	93
Table 7.2: Terminology for assessing the magnitude of heritage impact	93
Table 7.3: Impact assessment criteria	95
Table 7.4: Impact assessment scores	95
Table 7.5: Average impact level scores	95

Table 7.6: Assessment against Significant Impact Criteria	
100	
Table 7.7: Assessment against Significant Impact Criteria	
102	

DRAFT

ABBREVIATIONS

The following acronyms and abbreviations may be used in this assessment

Acronym	Definition
AEP	Annual exceedance probability
ARD	Archaeological Research Design
Artefact Heritage	Artefact Heritage Services Pty Ltd
Burra Charter	<i>The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013</i>
CBD	Central Business District
CHL	Commonwealth Heritage List
CMP	Conservation Management Plan
DA	Development application
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (now the Office of Environment and Heritage)
DECC	NSW Department of Environment and Climate Change (now the Office of Environment and Heritage)
DECCW	NSW Department of Environment, Climate Change and Water (Now the Office of Environment and Heritage)
ED	Excavation Director
EIS	Environmental impact statement
Element	An individual piece of fabric, or an assemblage of fabric which contributes to the place's significance
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
Fabric	The physical elements of a heritage place
GIS	Geographic information system
GPS	Global positioning system
Heritage Division	Part of OEH, formerly the NSW Heritage Branch and Heritage Office
HIS	Heritage Impact Statement
ICOMOS	International Council on Monuments and Sites
LEP	Local environmental plans
LGA	Local Government Area
NHL	National Heritage List
NP&W Act	National Parks and Wildlife Act 1974
NSW	New South Wales
OEH	Office of Environment and Heritage
Place	Defined by the Burra Charter as a <i>geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.</i>

Acronym	Definition
s60	Section 60
s140	Section 140
s170	Section 170
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SHI	State Heritage Inventory
SHR	State Heritage Register
SSD	State Significant Development
SoHI	Statement of Heritage Impact
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WHL	World Heritage List
World Heritage Convention	Convention Concerning the Protection of World Cultural and National Heritage

1. INTRODUCTION

Artefact Heritage has been engaged by SMEC Australia Pty Ltd (SMEC) to undertake a Non-Aboriginal Heritage Assessment of the potential impacts associated with the proposed flood mitigation works at Warragamba Dam (the Dam) (the project).

This assessment forms part of the environmental impact statement (EIS), pursuant to Division 5.2 (s5.12) (State Significant Infrastructure) of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). The project was referred for consideration to be declared State Significant Infrastructure (SSI) due to being essential to the State for economic, social and environmental reasons under the EP&A Act.

The project is a controlled action and therefore requires concurrent assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In accordance with the Bilateral Agreement reached between the NSW and Commonwealth Governments, an EIS under the EP&A Act for SSI can also be used for an EIS under the EPBC Act for a controlled action, where directed by the Federal Minister. The direction was given for the project to be assessed under the Bilateral Agreement on 17 July 2017. The project will be assessed by relevant NSW departments in the first instance followed by assessment by the Federal Minister for final approval.

1.1. Project Background

WaterNSW, a New South Wales (NSW) state owned corporation, is seeking approval for the project, which would involve raising the Dam wall to create a Flood Management Zone (FMZ) of about 14 metres to temporarily capture flood waters.

As outlined in the *State Infrastructure Strategy 2012-2032* (INSW 2012), the flooding history in the Hawkesbury-Nepean Valley can be traced back to the very early years of European settlement. During the 1980s and 1990s evidence emerged that floods significantly larger than any yet historically recorded could occur in the Hawkesbury-Nepean Valley. In 2013, the NSW Government initiated the Hawkesbury-Nepean Valley Flood Management Review to consider flood planning, flood mitigation and flood response in the Hawkesbury-Nepean Valley. The review found that the current flood management and planning arrangements were insufficient in mitigating the risk, and no single mitigation option could address all the flood risks present in the Hawkesbury-Nepean Valley. The raising of Warragamba Dam to capture floodwaters was concluded to be the most effective infrastructure measure that could have a major influence on flood levels during those events when most of the damage occurs.

In June 2016, the former Premier and Minister for Western Sydney Mike Baird, MP announced the NSW Government's proposal to raise the Warragamba Dam by around 14 metres to significantly reduce the risk of flooding in the Hawkesbury-Nepean Valley. This announcement followed a review of flood mitigation arrangements and the establishment of an independent taskforce, under the direction of Infrastructure NSW (INSW) to investigate feasible flood options to reduce overall flood risk to the valley. The cost-benefit analysis modelled by INSW demonstrated that Warragamba Dam Raising would provide a 75 percent reduction in flood damages on average and reduce current levels of flood damages from \$5 billion to \$2 billion.

While raising the Dam wall was found to significantly reduce the flood risk, it cannot eliminate it, regardless of the Dam's height. As a result, dam raising must be complemented with other non-infrastructure and policy actions. In May 2017, INSW published *Resilient Valley, Resilient Communities: Hawkesbury-Nepean Valley Flood Risk Management Strategy* (the Flood Strategy). The Flood Strategy covers the geographic region between Bents Bridge and the Brooklyn Bridge, encompassing the fast-growing Local Government Areas (LGAs) of Penrith City, Hawkesbury City, The Hills Shire and Blacktown City.

The Flood Strategy's main objective is to reduce risk to life, property and social amenity from floods in the Hawkesbury-Nepean Valley. The strategy includes nine key recommendations, a combination of infrastructure and non-infrastructure initiatives of which the project is one. It provides the context and policy impetus to mitigate flood risk in the Hawkesbury-Nepean Valley.

WaterNSW is also seeking approval for the installation and operation of environmental flow infrastructure at Warragamba Dam. Warragamba Dam does not currently have the appropriate infrastructure to allow the controlled release of environmental flows into the Warragamba River and the Hawkesbury-Nepean Rivers. Studies undertaken to investigate environmental flow releases from Warragamba Dam demonstrate that there would be substantial downstream water quality and aquatic ecological benefits from environmental flow releases.

1.2. The project

The project consists of four key elements:

- Demolition or removal of components of the existing Warragamba Dam to allow the project to be built
- Upgrading Warragamba Dam to create FMZ of about 14 metres to temporarily capture floodwaters
- Operational procedures and rules to temporarily capture flood waters in the FMZ and then empty the FMZ in readiness for the next flood event
- Construction and operation of the environmental flows infrastructure.

The project is detailed in Section 6.0.

1.3. Project Location

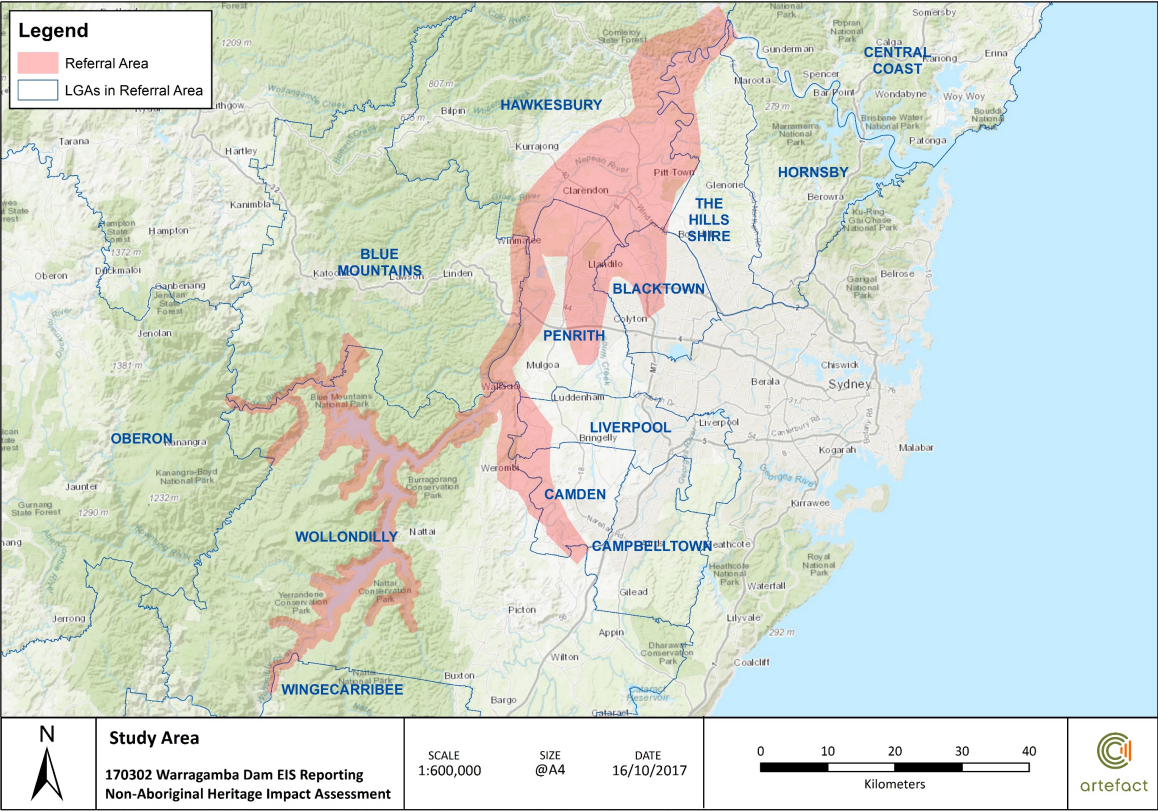
Warragamba Dam is located on the Warragamba River, which is a major tributary of the Hawkesbury-Nepean River, which in itself has a vast 2-million-hectare catchment, which stretches from beyond Lithgow in the west and Goulburn in the south. Warragamba Dam is around 55km west of the Sydney Central Business District (CBD).

1.3.1. Study area

Following the decision to develop the recommendation to raise the wall, initial assessments determined that potential impacts would require a Referral under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), which defined an area for assessment.

This Referral Area forms the study area for the purposes of this HIA and is shown in Figure 1.1.

Figure 1.1: Referral Area



1.4. Assessment Approach

1.4.1. Project scope

The scope of the task is to prepare a non-Aboriginal heritage assessment for the Project in accordance with the EPBC Act, *Heritage Act 1977* (Heritage Act), and as required by the Secretary's environmental assessment requirements (SEARs) issued for the project as shown in Table 1.1 and Table 1.2 below.

Construction impacts associated with raising the dam wall by approximately 14 metres, and impacts from the operational functions of the project both upstream and downstream of the dam wall will be assessed. The HIA will assess the Referral Area as shown in Figure 1.1.

This HIA has been informed by the NSW Heritage Manual (NSW Heritage Office and NSW Department of Urban Affairs and Planning 1996) and the Australia ICOMOS Charter for Places of Cultural Significance, The Burra Charter, 2013 (Burra Charter) and contains the following:

- Review of the relevant State and Commonwealth heritage registers and listings to identify any registered heritage sites in the Referral Area, including:
 - World Heritage List (WHL)
 - National Heritage List (NHL)
 - Commonwealth Heritage List (CHL)
 - NSW State Heritage Register (SHR)
- Review of relevant legislative and policy requirements, including:
 - Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)
 - Infrastructure State Environment Planning Policy 2007 (SEPP)
 - Environmental Planning and Assessment Act 1979 (EP&A Act)
 - Heritage Act 1977 (NSW)
- Review of the following management and reference documents:
 - *Greater Blue Mountains World Heritage Area Strategic Plan 2009* (Department of Environment and Climate Change 2009)
 - *The Greater Blue Mountains World Heritage Area Nomination, 1998* (New South Wales National Parks and Wildlife Service in association with Environment Australia 1998)
 - *Warragamba Supply Scheme Conservation Management Plan DRAFT 7* (2010);

- *Special Areas Strategic Plan of Management* (WaterNSW and Office of Environment & Heritage 2015)
- *Australian Convict Sites Strategic Management Framework* (Department of the Environment Heritage Water and the Arts, 2012)
- *The Old Great North Road Cultural Landscape Dharug National Park Conservation Management Plan* (Griffin NRM Pty Ltd 2004)
- *Australian Convict Sites Nomination* (Commonwealth of Australia 2008)
- A Heritage Impact Assessment which includes assessment under the EP&A Act as CSSI and assessment under the EPBC Act as a controlled action:
 - Legislative context including EPBC Act requirements
 - Fieldwork results
 - Historical heritage impact assessment for the construction area (including discussion of CMP policies for the dam)
 - Historical heritage impact assessment for the operational area (summary table of listed places as appendix); and
 - Management and mitigation measures.

Table 1.1: SEARs as they relate to non-Aboriginal cultural heritage (Note - Aboriginal heritage tasks have been omitted)

Key Issue and Desired Performance Outcome	Requirement (specific assessment requirements in addition to the general requirements)	Where requirement addressed in this report
<p>The design, construction and operation of the project facilitates, to the greatest extent possible, the long-term protection, conservation and management of the heritage significance of places of environmental heritage and Aboriginal objects and sites.</p> <p>The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and sites.</p>	<ol style="list-style-type: none"> 1. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative impacts) to the heritage significance of: <ol style="list-style-type: none"> c. environmental heritage, as defined under the Heritage Act 1977; and d. places listed on the National and World Heritage lists. Investigations including surveys and identification of cultural heritage values should be conducted in consultation with OEH regional officers. 2. Where impacts to State or locally significant heritage places are identified, the assessment must: <ol style="list-style-type: none"> a. include a statement of heritage impact for all heritage places (including significance assessment); b. consider impacts to the place of significance caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment (as relevant) c. outline measures to avoid and minimise those impacts in accordance with the current guidelines; and d. be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed, the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria). 	<p>Editorial note: to be finalised in next draft</p>

1.5. Assessment structure

Table 1.2 provides an outline of the assessment chapters and appendices.

Table 1.2: Assessment structure

Chapter Number	Chapter
1	Introduction
2	Heritage management framework and legislative context
3	Overview history
4	Existing environment, heritage items and significance
5	Archaeological potential and significance
6	Proposed works
7	Potential impacts
8	Management of non-Aboriginal heritage
Appendix 1	World heritage places impact tables
Appendix 2	National heritage places impact tables
Appendix 3	Commonwealth heritage places impact tables
Appendix 4	State heritage places impact tables
Appendix 5	s170 heritage places impact tables
Appendix 6	NSW historic shipwreck database impact tables
Appendix 7	LEP heritage places impact tables
Appendix 8	World, National, and Commonwealth Management Principles

1.6. Limitations and assumptions

This HIA provides an assessment of non-Aboriginal (historical) heritage values only.

Heritage items on non-statutory registers, including the Register of the National Estate, National Trust Register and the RAIA Register of Twentieth Century Buildings have not been included in this draft assessment. Instead, consultation with these institutions would be undertaken after preparation of this draft assessment once stakeholders have matched areas of positive and negative impacts to items on their respective databases. This methodology was previously provided to the Heritage Division of the NSW Office of Environment & Heritage (OEH) in November and December 2017.

Due to the extent of the Referral Area and large numbers of affected listed heritage items, items of potential heritage significance that are not included on statutory registers have not been included in this assessment.

Non-Aboriginal archaeological assessment has been limited to the construction area of the project around the dam itself, where subsurface impacts are anticipated.

Overall, the following limitations apply to the assessment:

- No Aboriginal heritage values were assessed

- No sub-surface investigations were made
- A detailed non-Aboriginal archaeological assessment was limited to the construction area of the project
- No identification or assessment of items of potential heritage significance not included on statutory registers or lists was undertaken
- No new archival investigations were undertaken
- No community consultation was undertaken.

1.7. Authorship

This assessment was prepared by Charlotte Simons (Heritage Consultant), Matt Alexander (Project Leader) and Jenny Winnett (Principal). Dr Sandra Wallace (Director) provided management input and review.

2. HERITAGE MANAGEMENT FRAMEWORK

2.1. Introduction

The following legislation applies to the Referral Area in respect to the management of cultural heritage. This section also includes a list of listed heritage items located within the Referral Area. There is a total of 1,132 statutory listings present. In some instances, a single place is represented on several statutory lists.

The tables included below and associated Figure 2.1 to Figure 2.16 provide an overview of these listed heritage places. On those figures showing the World, National, Commonwealth, s170 places, and Shipwreck Database, full names of sites are provided. Due to the number of sites mapped and their distribution, for SHR places, only listing numbers are provided, and for LEP places, only the site curtilage is shown on the maps.

2.2. The World Heritage Convention

The *Convention Concerning the Protection of World Cultural and Natural Heritage 1972* (the Convention), also referred to as the World Heritage Convention, provides State Parties with guidance on how to identify potential sites for inscription on the World Heritage List, and what is required of each State Party in the protection and preservation of such sites. Signatories of the Convention pledge to conserve World Heritage sites situated on their territory, and also to take active measures to protect their national heritage. The Convention aims to promote international cooperation to protect heritage that is of such outstanding universal value that its conservation is important for current and future generations. The Convention also sets out the criteria that a site must meet to be inscribed on the World Heritage List.

Encouragement is provided to each of the State Parties to ensure that the protection of world and national heritage is integrated into relevant planning process and programs, and provide sufficient resourcing to protect, conserve, and communicate the significant values of each place.

Additionally, the Convention explains how the World Heritage Fund is to be used and outlines the required reporting that each State Party is required to make to UNESCO on a regular basis.

UNESCO summarises the importance of the Convention by stating:

“The most significant feature of the 1972 World Heritage Convention is that it links together in a single document the concepts of nature conservation and the preservation of cultural properties. The Convention recognizes the way in which people interact with nature, and the fundamental need to preserve the balance between the two.”

2.2.1. World Heritage List

The Convention sets out the criteria that a site must meet to be inscribed on the World Heritage List (WHL) and the role of State Parties in the protection and preservation of world and their own national heritage. Places on the World Heritage List are protected in Australia through the EPBC Act.

The Referral Area is located partially within the curtilage of two places listed on the WHL, as summarised in Table 2.1 and illustrated on Figure 2.1 and Figure 2.2.

Table 2.1: World heritage places within the Referral Area

Name	Place ID	Status	Natural Criteria	Cultural Criteria	Address	Relationship to the Referral Area
The Greater Blue Mountains Area	105127	Declared property	ii, iv		Great Western Hwy, Katoomba NSW	Upstream
Australian Convict Sites (Old Great North Road)	106209	Declared property		iv, vi	The Old Great Northern Rd, Wisemans Ferry NSW	Downstream

DRAFT

Figure 2.1: World heritage places in the north of the Referral Area

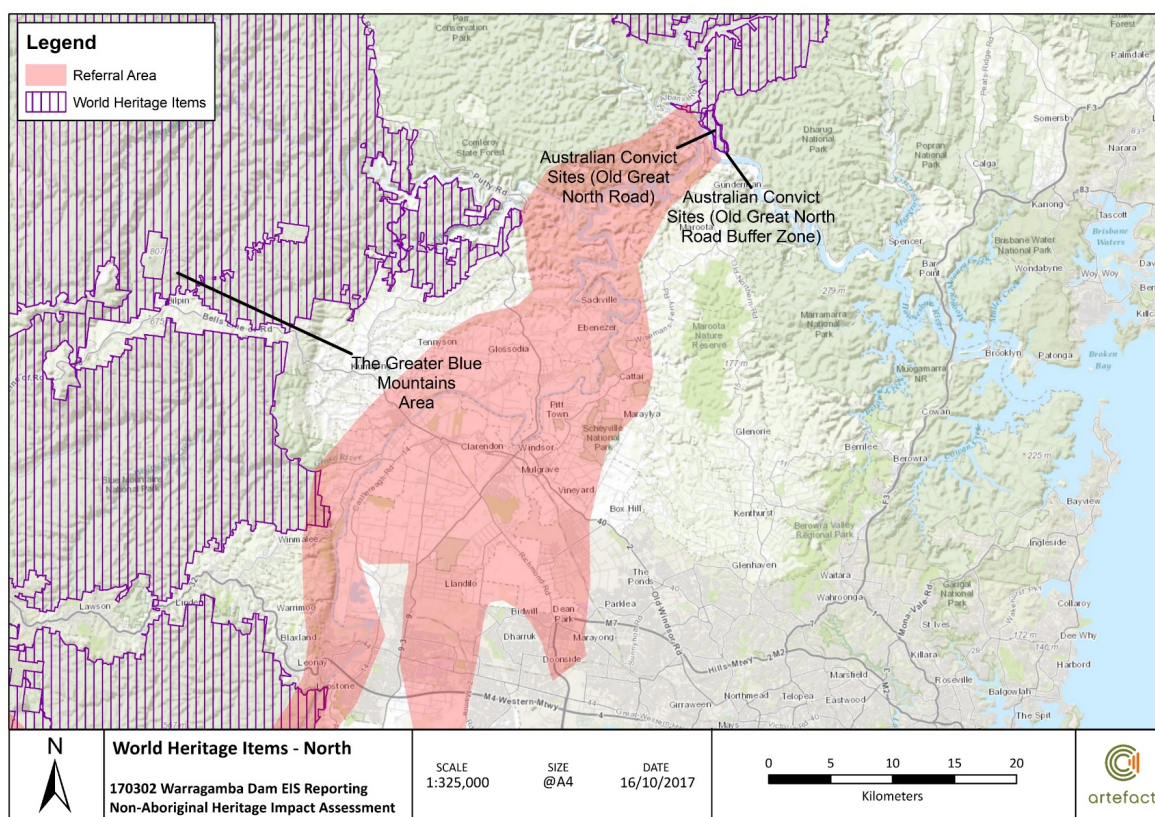
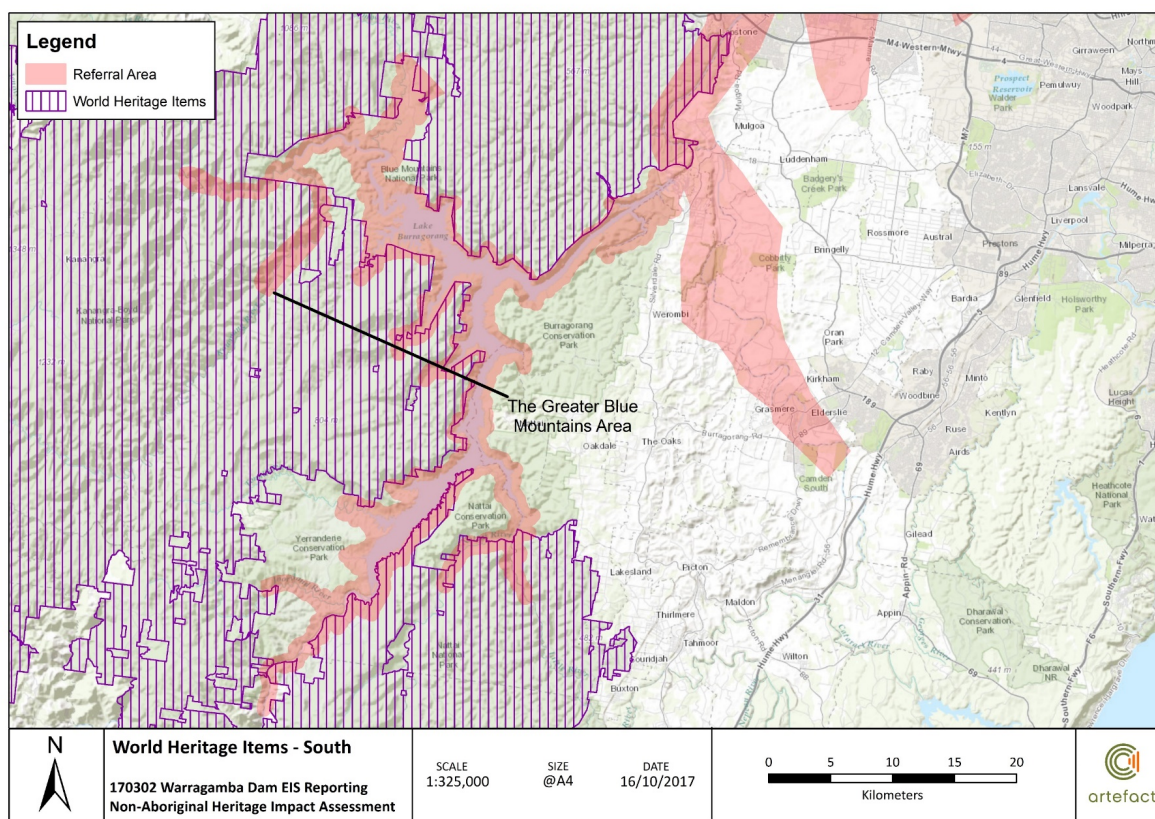


Figure 2.2: World heritage places in the south of the Referral Area



DRAFT

2.3. Environmental Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legislative framework for the protection and management of matters of national environmental significance, that is, flora, fauna, ecological communities and heritage places of national and international importance. Heritage places are protected through their inscription on the World Heritage List (WHL), Commonwealth Heritage List (CHL) or the National Heritage List (NHL).

Under Part 9 of the EPBC Act, approval under the EPBC Act is required for any action occurring within, or outside, a Heritage place that has, will have, or is likely to have a 'significant impact' on the heritage values of a World, National or Commonwealth heritage listed property (referred to as a 'controlled action' under the Act). A 'significant impact' is defined as:

"an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts."

The EPBC Act stipulates that a person who has proposed an action that will, or is likely to, have a significant impact on a site that is listed on the World Heritage List, National Heritage List, or Commonwealth Heritage List, must refer the action to the relevant Minister (hereafter the Minister). The Minister will then determine if the action requires approval under the EPBC Act. If approval is required, an environmental assessment would need to be prepared. The Minister would approve or decline the action based on this assessment.

Impacts to places listed on the world, National, and Commonwealth heritage lists are assessed under the guidance of the DoEE publication *Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1*.

A significant impact is defined as 'an impact which is important, notable, or of consequence, having regard to its context or intensity.' The significance of the action is based on the sensitivity, value and quality of the environment that is to be impacted, and the duration, magnitude and geographic extent of the impact. If the action is to be undertaken in accordance with an accredited management plan, approval is not needed, and the matter does not need be referred to the Minister.

The EPBC Act controls actions that may impact places on the World Heritage list within Australia, the National Heritage List, and the Commonwealth Heritage List. Each of these lists, and the places listed on them within the Referral Area are detailed in the chapters that follow.

2.3.1. Bilateral agreement made under Section 45 of the EPBC Act

The Commonwealth Department of Environment and Energy (DoEE) provides the following statement on the bilateral agreement:

"The bilateral agreement between the Commonwealth of Australia and the State of New South Wales relating to environmental assessment (the assessment bilateral agreement), allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of the State of New South Wales in assessing actions under the EPBC Act."

The current agreement enhances the streamlining benefits of the One-Stop Shop in advance of an approval bilateral agreement commencing. The current

agreement will deliver on the objective of promoting efficient, thorough and transparent environmental regulation while minimising duplication.”¹

In essence, the bilateral agreement allows the assessments of matters addressed under the EPBC Act through formally accredited NSW process cited in the agreement. For development, this means a single approval process is followed, instead of the former dual Commonwealth/State processes.

2.3.2. Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1.

The *Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1* (Impact Guidelines) guides the process for the assessment of various matters under the EPBC Act, including the assessment of impacts to such matters as:

- Listed threatened species and ecological communities
- Listed migratory species
- World heritage properties
- National heritage places.

The Impact Guidelines state that:

“Approval under the EPBC Act is required for any action occurring within or outside a declared World Heritage property that has, will have, or is likely to have a significant impact on the World Heritage values of the World Heritage property.

An action is likely to have a significant impact on the World Heritage values of a declared World Heritage property if there is a real chance or possibility that it will cause:

- *one or more of the World Heritage values to be lost*
 - *one or more of the World Heritage values to be degraded or damaged, or*
 - *one or more of the World Heritage values to be notably altered, modified, obscured or diminished.”²*
-

The approach above is also utilised in assessing impacts to places of National heritage significance.

2.3.3. World, National, and Commonwealth Heritage Principles

Under the EPBC Act, actions which that have, will have, or are likely to have a significant impact on the values of a World, National, or Commonwealth heritage property must be in line with the Heritage Principles, as presented in Schedules 5, 5B, and 7B of the EPBC Act Regulations respectively. These principles are reproduced in Appendix 8.

¹ <http://www.environment.gov.au/protection/environment-assessments/bilateral-agreements/nsw>. Accessed 19/10/2017.

² Commonwealth Department of the Environment, 2013. *Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1*. pp.15-16

The three sets of principles guiding statement is to “...to identify, protect, conserve, present and transmit, to all generations...”³ the values of the places on each list, and in the case of the WHL, to “...if appropriate, rehabilitate the World Heritage values of the property.”⁴

2.3.4. National Heritage List

The National Heritage List (NHL), established under the EPBC Act, provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.

The Referral Area is located partially within the curtilage of one place listed on the NHL – The Greater Blue Mountains Area. The Referral Area is also located partially within the curtilages of an additional two nominated places, which have not yet been accessioned to the NHL. However, they should be managed in accordance with the values set out in their nomination until such time as a decision on whether to list the places or not has been made.

These items have been summarised in Table 2.2, and are shown in Figure 2.3 and Figure 2.4.

Table 2.2: National heritage places within the Referral Area

Name	Place ID	Class	Status	Address	Relationship to the Referral Area
The Greater Blue Mountains Area	105999	Natural	Listed place	Greater Western Hwy, Katoomba NSW	Upstream and Downstream
The Greater Blue Mountains Area - Additional Values	105696	Natural	Nominated place	Katoomba, NSW	Upstream and Downstream
Great North Road, Wisemans Ferry to Bucketty	106318	Historic	Nominated place	Wisemans Ferry to Bucketty, NSW	Downstream

³ National Heritage Management Principles. Accessed at http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/cth/consol_reg/epabcr2000697/sch5b.html on 23/10/2017

⁴ Australian World Heritage Management Principles. Accessed at http://www.austlii.edu.au/cgi-bin/viewdoc/au/legis/cth/consol_reg/epabcr2000697/sch5.html on 23/10/2017

Figure 2.3: National heritage places in the north of the Referral Area

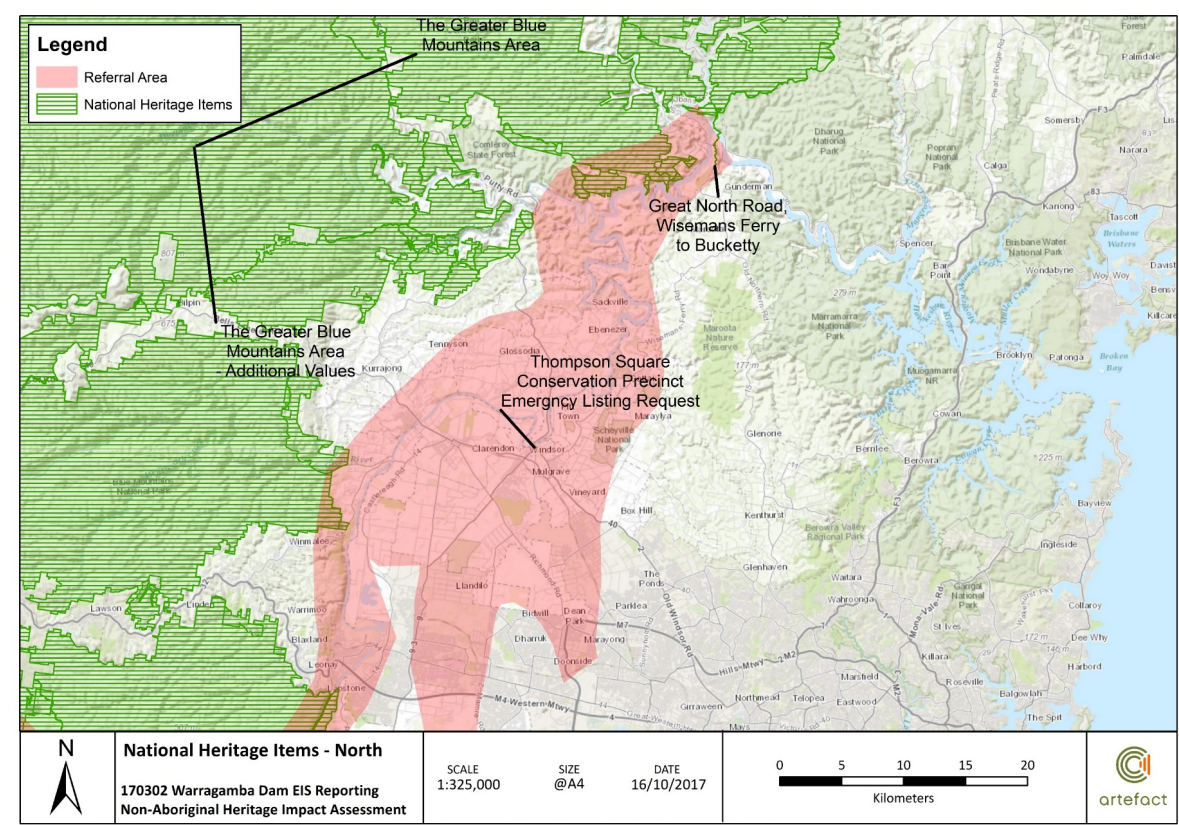
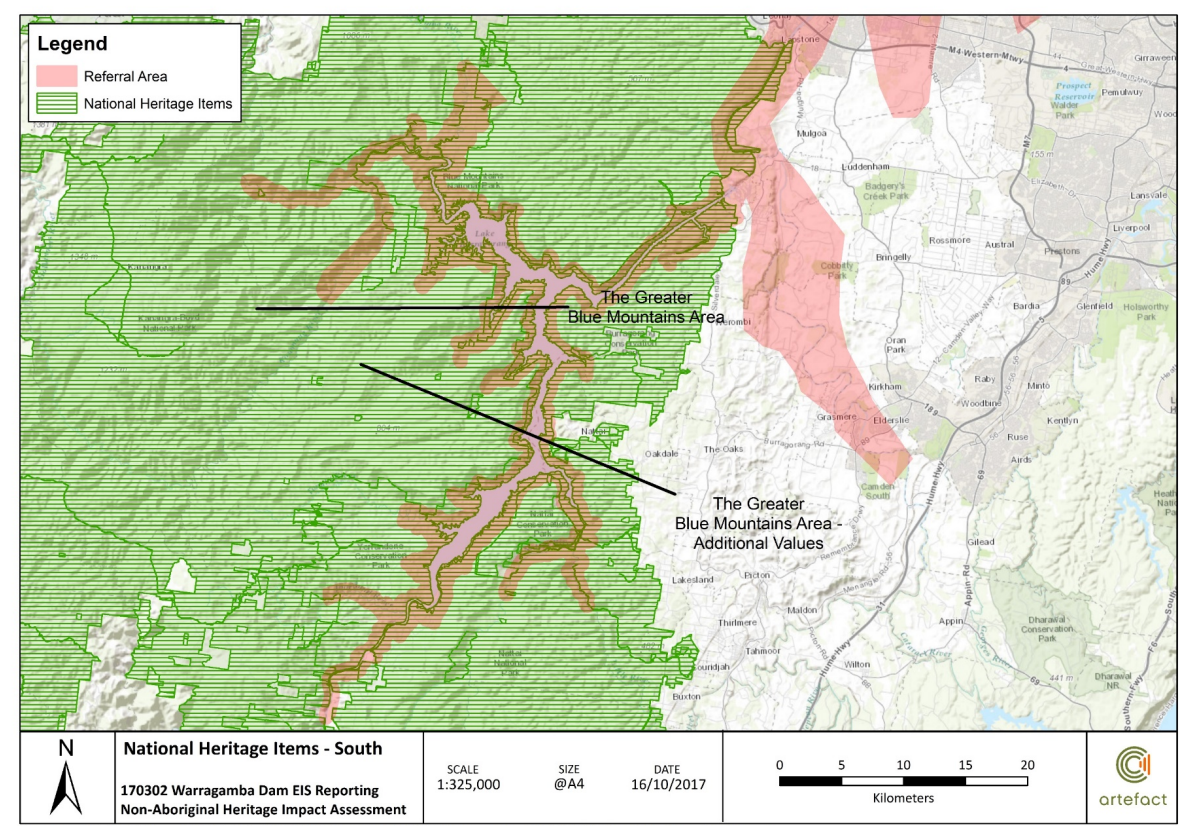


Figure 2.4: National heritage places in the south of the Referral Area



DRAFT

2.3.5. Commonwealth Heritage List

The Commonwealth Heritage List (CHL) was established under the EPBC Act, which provides a legal framework to protect and manage heritage places owned by the Commonwealth and managed by its various Departments and other organisations. Under the EPBC Act, significant heritage places owned by the Australian Government are protected through listing on the Commonwealth Heritage List.

There are 6 places listed on the CHL located within the Referral Area. These places are identified in Table 2.3, and are shown in Figure 2.5 and Figure 2.6.

Table 2.3: Commonwealth heritage places within the Referral Area

Name	Place ID	Class	Status	Address	Relationship to the Referral Area
Orchard Hills Cumberland Plain Woodland	105317	Natural	Listed place	The Northern Rd, Orchard Hills NSW	Downstream
North Base Trig Station	105240	Historic	Listed place	Dight St, Richmond RAAF Base NSW	Downstream
Shale Woodland Llandilo	105534	Natural	Listed place	Stony Creek Rd, Shanes Park NSW	Downstream
RAAF Base Richmond	105653	Historic	Listed place	McNamarra Av, Richmond NSW	Downstream
Llandilo International Transmitting Station	106101	Historic	Listed place	Stoney Creek Rd, Shanes Park NSW	Downstream
Camden Post Office	106176	Historic	Listed place	135 Argyle St, Camden NSW	Downstream

Figure 2.5: Commonwealth heritage places in the north of the Referral Area

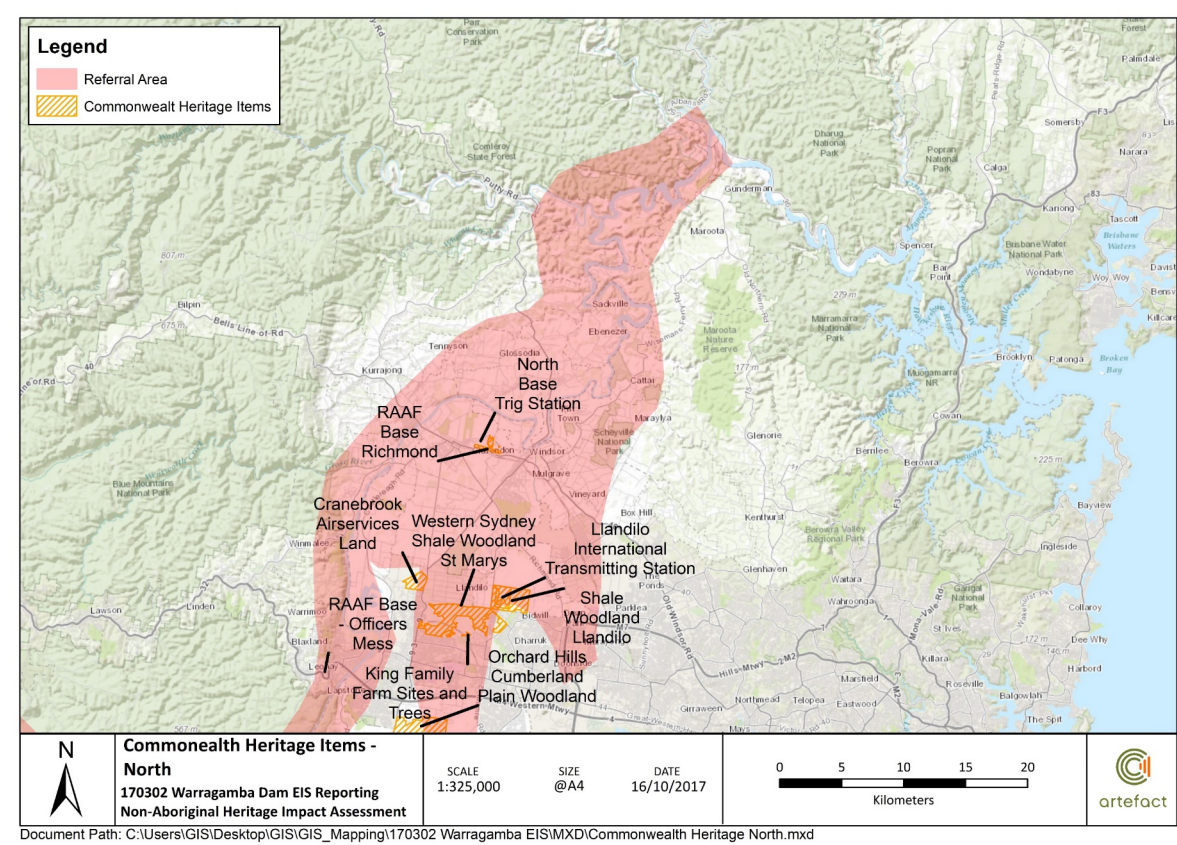
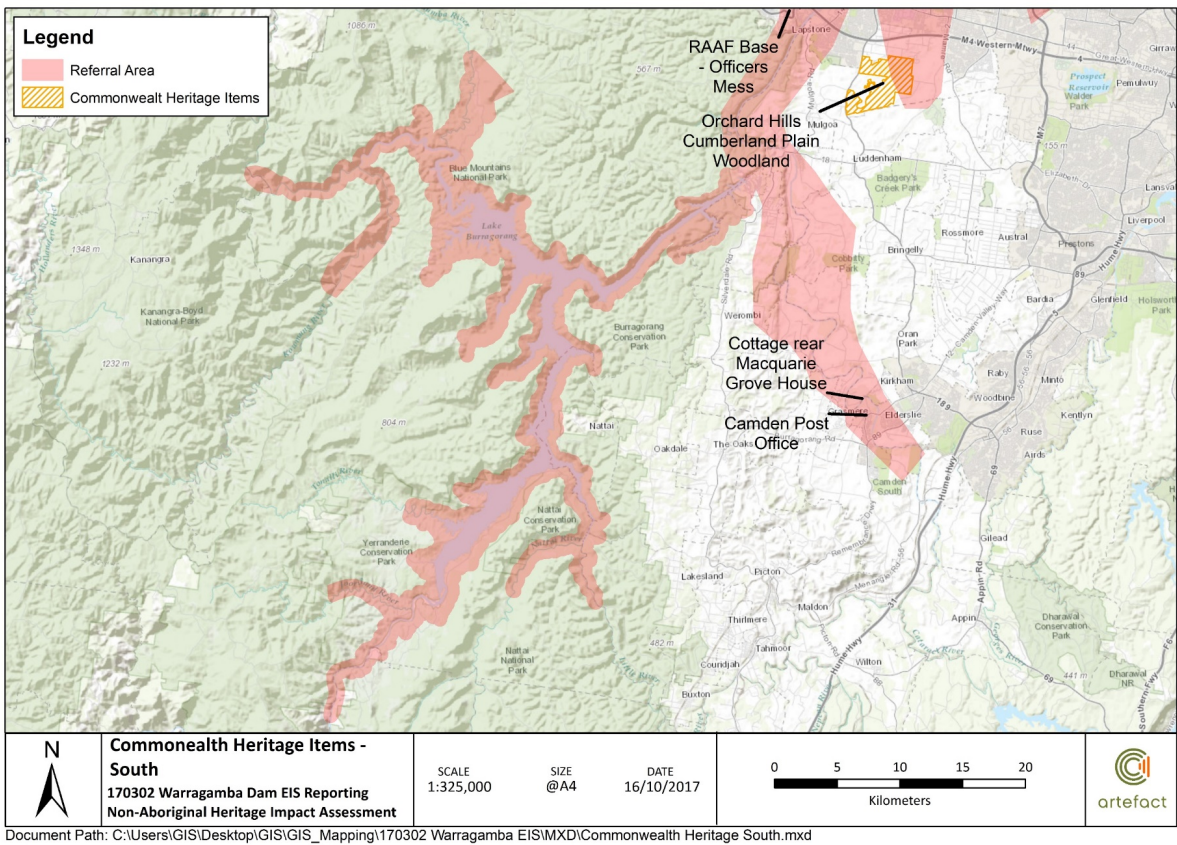


Figure 2.6: Commonwealth heritage places in the south of the Referral Area



DRAFT

2.4. NSW Heritage Act 1977

The NSW *Heritage Act 1977* (Heritage Act) provides protection for items of 'environmental heritage' in NSW. 'Environmental heritage' includes places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Items considered to be significant to the State are listed on the State Heritage Register (SHR) and cannot be demolished, altered, moved or damaged, or their significance altered without approval from the Heritage Council of NSW.

2.4.1. The 2009 'Relics provisions'

The Heritage Act also provides protection for 'relics', which includes archaeological material or deposits. According to Section 139 (Division 9: Section 139, 140-146):

- (1) A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance is carried out in accordance with an excavation permit.
- (2) A person must not disturb or excavate any land on which the person has discovered or exposed a relic except in accordance with an excavation permit.
- (3) This section does not apply to a relic that is subject to an interim heritage order made by the Minister or a listing on the State Heritage Register.
- (4) The Heritage Council may by order published in the Gazette create exceptions to this section, either unconditionally or subject to conditions, in respect of any of the following:
 - a. Any relic of a specified kind or description,
 - b. Any disturbance of excavation of a specified kind or description,
 - c. Any disturbance or excavation of land in a specified location or having specified features or attributes,
 - d. Any disturbance or excavation of land in respect of which an archaeological assessment approved by the Heritage Council indicates that there is little likelihood of there being any relics in the land.

Section 4 (1) of the Heritage Act (as amended in 2009) defines a relic as:

...any deposit, artefact, object or material evidence that:

relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and is of State or local heritage significance

A relic has been further defined as:

Relevant case law and the general principles of statutory interpretation strongly indicate that a 'relic' is properly regarded as an object or chattel. A relic can, in

*some circumstances, become part of the land be regarded as a fixture (a chattel that becomes permanently affixed to land).*⁵

Excavation permits are issued by the Heritage Council of NSW, or its Delegate, under Section 140 of the Heritage Act for relics not listed on the SHR or under Section 60 for relics listed on the SHR. An application for an excavation permit must be supported by an Archaeological Research Design and Archaeological Assessment prepared in accordance with the NSW Heritage Division archaeological guidelines. Minor works that will have a minimal impact on archaeological relics may be granted an exception under Section 139 (4) or an exemption under Section 57 (2) of the Heritage Act.

2.4.1.1. Works

'Works' refer to past evidence of infrastructure. 'Works' may be buried, and therefore archaeological in nature, however, exposure of a 'work' does not trigger reporting obligations under the Heritage Act. 'Works', as places of environmental heritage, have the potential to provide information that contributes to our knowledge of past practices, and good environmental practice recognises this. Roads and Maritime, for example, uses its *Standard Management Procedure: Unexpected Heritage Places* to manage the discovery of such works⁶.

2.4.2. State Heritage Register

The SHR was established under Section 22 of the Heritage Act and is a list of places and objects of particular importance to the people of NSW, including archaeological sites. The SHR is administered by the Heritage Division of the OEH and includes a diverse range of over 1,500 items, in both private and public ownership. To be listed, an item must be deemed to be of heritage significance for the whole of NSW.

There are 81 places listed on the SHR located within the Referral Area. These places are identified in Table 2.6, and are shown in Figure 2.7 to Figure 2.9. There are no places within the Referral Area that are subject to an Interim Heritage Order (IHO) as of 8 June 2018.

There are two SHR items located within the construction zone, comprising Haviland Park (SHR No. 01375) and the Warragamba Emergency Scheme (SHR No. 01376), and one SHR item located upstream, comprising the Track (SHR. 01372) heritage item.

Table 2.4: SHR heritage places within the Referral Area

Name	SHR No.	Suburb	Relationship to the Referral Area
Loder House	00003	Windsor	Downstream
House & Outbuildings	00005	Windsor	Downstream
Toxana	00014	Richmond	Downstream
St. Matthew's Anglican Church, Rectory, Stables & Cemetery	00015	Windsor	Downstream
Lennox Bridge	00024	Glenbrook	Downstream
Peninsula House, Tebbutt's Observatory	00028	Windsor	Downstream
Hobartville, including outbuildings	00035	Richmond	Downstream
Macquarie Arms Hotel	00041	Windsor	Downstream
Mountain View	00044	Richmond	Downstream

⁵ *Assessing Significance for Archaeological Sites and 'Relics'*, Heritage Branch, Department of Planning, 2009:7.

⁶ Roads and Maritime, 2015

Name	SHR No.	Suburb	Relationship to the Referral Area
House	00045	Richmond	Downstream
Fernhill	00054	Mulgoa	Downstream
Clear Oaks Moxey's Farm House	00058	Richmond	Downstream
Glenmore	00074	Mulgoa	Downstream
Terrace Building	00075	Windsor	Downstream
Cottage	00107	Windsor	Downstream
House	00108	Windsor	Downstream
House	00109	Windsor	Downstream
Houses	00110	Windsor	Downstream
Imperial Hotel	00114	Rooty Hill	Downstream
Thompson Square Conservation Area	00126	Windsor	Downstream
Ebenezer Church (Uniting), Old Schoolhouse, Cemetery & Tree	00138	Ebenezer	Downstream
House	00142	Windsor	Downstream
House	00150	Windsor	Downstream
Rev. Peter Turner Cottage and Well	00202	Windsor	Downstream
Nant Gwylan and Garden	00243	Camden	Downstream
Fairlight Homestead & Barn	00262	Mulgoa	Downstream
Mamre	00264	St Marys	Downstream
Macquarie Arms Inn (former)	00282	Pitt Town	Downstream
Upper Castlereagh Public School and residence	00339	Castlereagh	Downstream
Camden Park	00341	Camden Park	Downstream
Glenleigh Estate	00346	Regentville	Downstream
Rose Cottage	00358	Wilberforce	Downstream
Bird In The Hand Inn (former)	00373	Pitt Town	Downstream
Craithes House	00378	Penrith	Downstream
Camelot	00385	Narellan	Downstream
Bowman House	00468	Richmond	Downstream
Macquarie Grove Cottage	00493	Cobbitty, Camden	Downstream
Stannix Park House, cattle tanks and site	00598	Wilberforce	Downstream
Building	00610	Richmond	Downstream
Natural Area	00649	Agnes Banks	Downstream
Simmons Hardware Store	00667	Windsor	Downstream
Clydesdale - Grand House, Barn & Cottage	00674	Marsden Park	Downstream
Seymours House	00681	Richmond	Downstream
Methodist Parsonage (former)	00735	Windsor	Downstream
Mackenzie House	00735	Windsor	Downstream

Name	SHR No.	Suburb	Relationship to the Referral Area
Uniting Church and Hall	00735	Windsor	Downstream
Claremont Cottage	00738	Windsor	Downstream
Building, outbuildings, grounds, trees	00753	Richmond	Downstream
Windsor Court House	00804	Windsor	Downstream
Fossil Collection	00971	Londonderry	Downstream
Petrology Collection	00973	Londonderry	Downstream
Cattai Estate	00982	Cattai	Downstream
Stables at rear of Police Station	01018	Windsor	Downstream
Emu Plains Railway Station group	01136	Emu Plains	Downstream
Penrith Railway Station group	01222	Penrith	Downstream
Richmond Railway Station and yard group	01236	Richmond	Downstream
Riverstone Railway Station and yard group	01237	Riverstone	Downstream
St Marys Railway Station Group	01249	St Marys	Downstream
Windsor Railway Station Group and Former Goods Yard	01287	Windsor	Downstream
Megarritys Bridge	01367	Warragamba	Downstream
Track	01372	Warragamba	Upstream
Warragamba Dam - Haviland Park	01375	Warragamba	Within construction zone
Warragamba Emergency Scheme	01376	Warragamba	Downstream
Rose Cottage and Early Slab Hut	01392	Werrington	Downstream
Great Drain and two house sites	01402	Maroota South	Downstream
Richmond Post Office	01410	Richmond	Downstream
Brownlow Hill Estate	01489	Orangeville	Downstream
Australiana Pioneer Village	01683	Wilberforce	Downstream
Camden Park Estate and Belgenny Farm	01697	Camden South	Downstream
Richmond Park	01808	Richmond	Downstream
Scheyville National Park	01817	Scheyville	Downstream
Yobarnie Keyline Farm	01826	North Richmond	Downstream
Emu Plains (Nepean River) Underbridge	01830	Penrith	Downstream
Macquarie Schoolhouse/Chapel and St. John's (Blacket) Church	01836	Wilberforce	Downstream
Wilberforce Cemetery	01837	Wilberforce	Downstream
Government Cottage Archaeological Site	01843	Windsor	Downstream
McQuade Park	01851	Windsor	Downstream
Glenbrook Railway and World War Two Mustard Gas Storage Tunnel	01861	Glenbrook	Downstream
Blacktown Native Institution	01866	Oakhurst	Downstream
Wilberforce Park	01868	Wilberforce	Downstream

Name	SHR No.	Suburb	Relationship to the Referral Area
Colebee and Nurragingy Land Grant	01877	Colebee	Downstream

DRAFT

Figure 2.7: State heritage places in the north of the Referral Area (Note: only place numbers are provided due to space constraints)

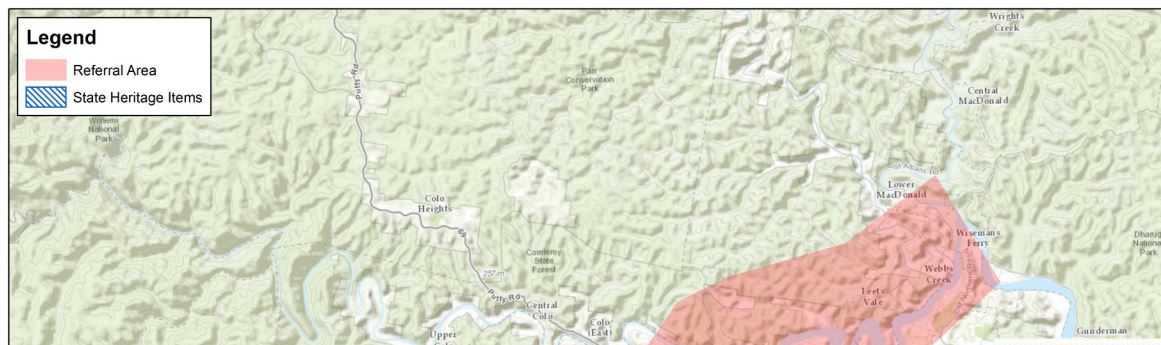


Figure 2.8: State heritage places in the centre of the Referral Area (Note: only place numbers are provided due to space constraints)

Figure 3.6: Historical photograph of the newly completed Warragamba Dam, 1960
(Source: National Library of Australia)

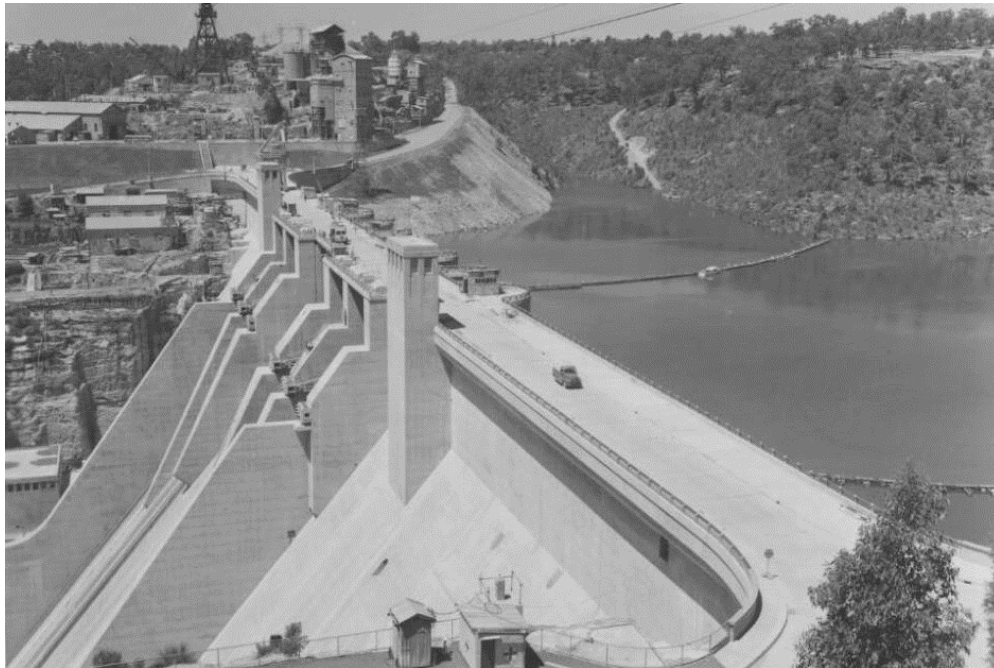


Figure 3.7: Historical photograph of the opening ceremony of Warragamba Dam, 1960
(Source: Reproduced in Besley, M. 'The Sweat of their Brows' Water Board, 1988)

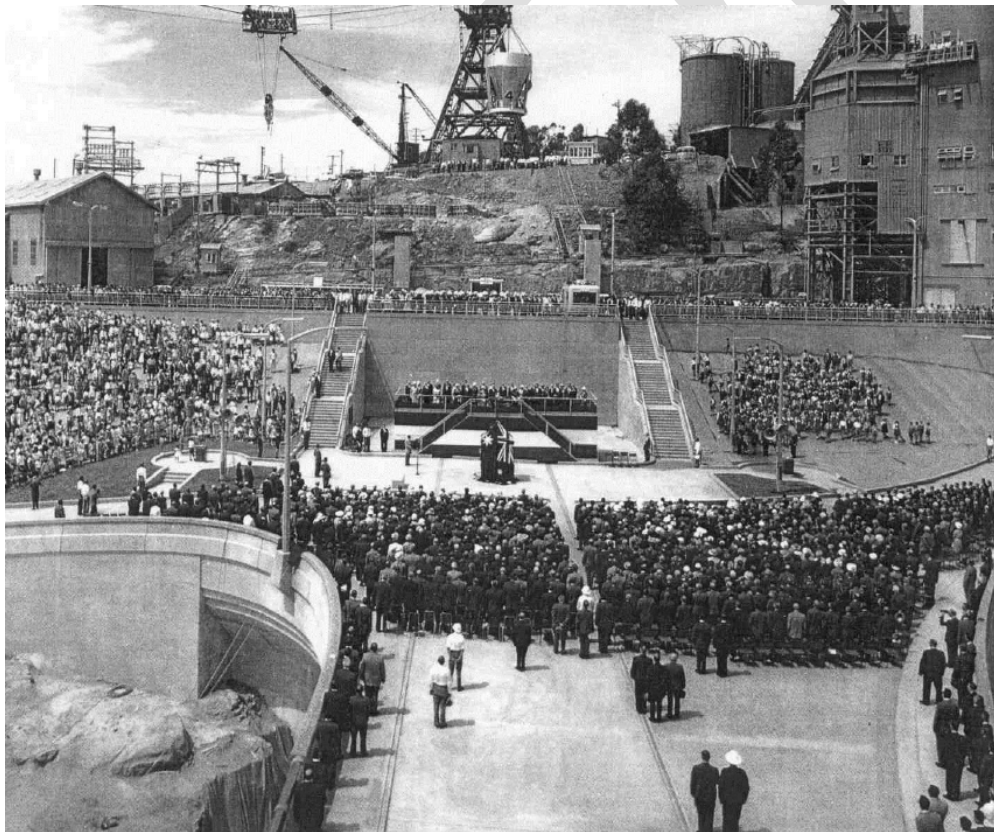


Figure 3.8: Overhead view of Warragamba Dam during the opening ceremony, 1960
(Source: Sydney Water Board Journal, Special Edition, October 1960)



4.3.5. Modifications and development at Warragamba Dam

In November 1961, heavy flood flows resulted in a series of repairs. Upon completion of construction works and selling of surplus equipment, the works area, which comprised a number of bare, excavated platforms and open areas, required rehabilitation. During the 1960s, works were focused around the beautification programme, and completion of park and picnic areas and former works areas associated with the dam. Comprising two picnic areas and a terraced garden immediately above the eastern bank, these landscaped areas accommodated visitors and organised conducted tour groups of the dam.³⁹

³⁹ Graham Brooks & Associates. 2010:57.

Figure 3.9: Photograph of the newly completed Haviland Park, c1960s.
(Source: RS/17 – 4M, SWC/SCAHR&AF)



During the 1970s, a new chlorination plant and pumping station was constructed, along with an elevated water reservoir and Pumping Station 114. In the 1980s, works were further developed with buildings associated with the Operation Depot and Field Services Corporation constructed during this period.⁴⁰ Developments in rainfall and flood estimation during the early 1980s indicated that Warragamba Dam could experience floods much larger than previously estimated. In December 1985, the Warragamba Dam flood protection program was announced by the Government.⁴¹

With several model studies demonstrating the dam would fail after a 1 in 750 year flood event, a two stage program was formulated. Between 1987 and 1990, the first stage involved the crest of the dam being raised by five metres to cater for a 1 in 1,500 year flood, and the dam wall itself was strengthened using post tensioned steel cables. The second stage involved the construction of an auxiliary spillway located on the eastern bank of the dam to divert excess flood waters around the dam and reduce the pressure on the wall.⁴²

⁴⁰ Graham Brooks & Associates. 2010:57.

⁴¹ Graham Brooks & Associates. 2010:58-59.

⁴² Graham Brooks & Associates. 2010:59-60.

Figure 3.10: Photograph showing the raising of the crest wall using the 18 tonne cableway that remained at this time, November 1988.
(Source: R95B – 2, SWC/SCAHR&AF)



Preliminary site works for the spillway in 1998, and in 1999 construction of the large structure began. Works involved modification to the existing structure of the dam and surrounding area. Large amounts of rock and soil were removed from the site (effectively the western end of Haviland Park) and were relocated to the western bank to create the rehabilitated Left Bank Spoil embankment. At this time, a public platform and lookout overlooking the dam and spillway works site with access from Eighteenth Street, was constructed while the dam and surrounding public areas were closed during construction works.⁴³ The construction of the auxiliary spillway resulted in the removal of a significant part of the park's original area and exotic plantings, along with the loss of other features including a children's playground and picnic shelter located at the western end of the park.

Figure 3.11: Photograph of the spillway under construction, c2000, showing impact to north-western end of Haviland Park
(Source: RS/17 – 5, SWC/SCAHR&AF)

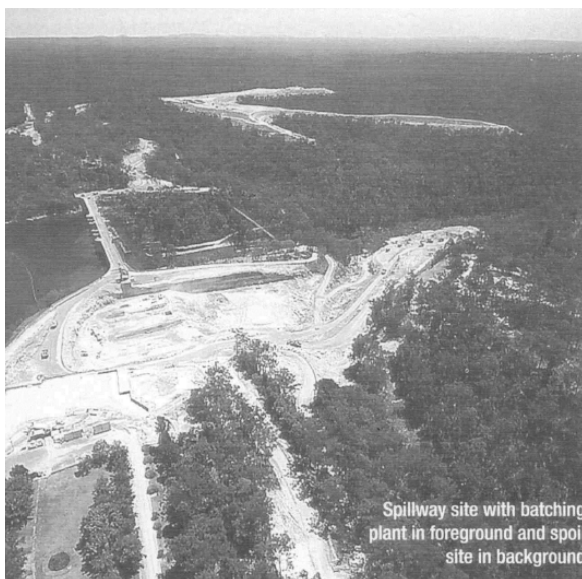


Figure 3.12: Overhead view of the newly completed auxiliary spillway, 2002
(Source: SCA)



⁴³ Graham Brooks & Associates. 2010:60.

The Christmas 2001 bushfires caused considerable damage to the area surrounding the dam and spillway construction site. Growth and planting on the Left Bank Spoil embankment was affected, while archaeological sites and remains of elements relating to the Emergency Scheme, the former Community Relations building and works depot area and sheds, were lost. The fire also caused further damage to the deteriorating timber suspension bridge crossing the gorge.⁴⁴ Elements of Haviland Park were also impacted.

In 2008-2009, the Sydney Catchment Authority (SCA) constructed a new Warragamba Visitor and Operations Centre at the western end of Haviland Park, with views over the dam and auxiliary spillway. A new maintenance shed and other auxiliary structures have been built adjacent to the picnic areas. The former SCA office, now the only extant building dating to the initial construction phase of the dam, has been adaptively reused as a Moveable Heritage store.⁴⁵

4.4. Development of World and National Heritage Places in the Referral Area

The following provides a brief overview history of the development of the World and National heritage places located within the Referral Area. The development of the Greater Blue Mountains World Heritage property has been adapted from 'The Greater Blue Mountains Area: World Heritage Nomination' prepared by the Australian Government in 1998.

4.4.1. Development of the Greater Blue Mountains World Heritage Property

In 1932, the genesis of a Greater Blue Mountains National Park was proposed by early conservationist Myles Dunphy. Dunphy's proposal for the national park comprised large areas of what are today the Blue Mountains National Park along with the Wollemi, Kanangra-Boyd, Nattai, Gardens of Stone and Thirlmere Lakes National Parks and other smaller reserves (Figure 3.13). The Dunphy Park proposal was submitted to the Surveyor General and the Blue Mountains Shire Council. The Blue Mountains National Park Committee was formed to promote the park, and in 1933 the committee evolved into the National Parks and Primitive Areas Council.⁴⁶

⁴⁴ Graham Brooks & Associates. 2010:60.

⁴⁵ Graham Brooks & Associates. 2010:60.

⁴⁶ New South Wales National Parks and Wildlife Service in association with Environment Australia, 'The Greater Blue Mountains Area: World Heritage Nomination'. 1998:176.

Figure 3.13: Plan of the proposed Blue Mountains National Park, 1932.
(Source: Blue Mountains Gazette)



In 1937, the gazettal of a reserve in the Kanangra-Boyd area represented the beginning of a lengthy process of establishing the Greater Blue Mountains National Park. In 1959, the Blue Mountains National Park was gazetted, covering an area of approximately 63,000 hectares.⁴⁷ The construction of the Warragamba Dam between 1948 and 1960 greatly affected southern portions of the Blue Mountains National Park, with the flooding of the Burragorang Valley. In 1969, the Kanangra-Boyd National Park was established, and a decade later an expanded area to the north was included in the Wollemi National Park.⁴⁸

⁴⁷ New South Wales National Parks and Wildlife Service in association with Environment Australia. 1998:176.

⁴⁸ New South Wales National Parks and Wildlife Service in association with Environment Australia. 1998:178.

Following the sustained efforts of conservation groups against competing interests during the 1990s, the Nattai National Park and Gardens of Stone National Park were established. By 1998, the area in of the gazetted parks in relation to the 1932 scheme was almost double the size of the original Dunphy proposal for the Blue Mountains National Park.⁴⁹

The protection of specific areas of wilderness proceeded slowly, but by the 1990s wilderness areas were gazetted at Nattai in 1991, Kanangra-Boyd in 1997, and Wollemi in 1998.⁵⁰ In 1999, 37 walking tracks within the Blue Mountains National Park were added on the SHR. In 2000, the Greater Blue Mountains Area was inscribed on the UNESCO WHL, with the listing comprising 1.03 million hectares representative of the evolutionary adaptation and diversification of the eucalypts in post-Gondwana isolation on the Australian Continent.

4.4.2. Development of the Australian Convict Sites World Heritage Property

In 2007, the Old Great North Road was recognised as a place of National significance on the NHL and was recommended for nomination on the WHL. In 2010, at the 34th session of the UNESCO World Heritage Committee, the Old Great North Road, along with ten other Australian sites with significant associations with convict transportation and labour, were inscribed as a group on the WHL as the Australian Convict Sites.

Figure 3.14: 1833 watercolour, 'Convicts building road over the Blue Mountains, NSW 1833'
(Source: National Library Australia, Call No. PIC Drawer 3842 #T2083 NK9673)



⁴⁹ New South Wales National Parks and Wildlife Service in association with Environment Australia. 1998:178.

⁵⁰ New South Wales National Parks and Wildlife Service in association with Environment Australia. 1998:178

5. EXISTING ENVIRONMENT

5.1. Site inspection

Site inspections were undertaken on 17 November 2017 and 8 March 2018. Due to the considerable number of statutory listings within the Referral Area, site inspections were limited to those places upstream or within close proximity to the proposed construction zone. This included the Warragamba Dam site itself and Greater Blue Mountains Area. State, local or s170 listed heritage items located downstream of the Project were not inspected during the preparation of this assessment. Results of the site inspection are included under the heading for each listed item.

5.2. Greater Blue Mountains Area (WHL Place ID 105127, NHL Place ID 105999)

5.2.1. Description

The WHL entry for the Greater Blue Mountains Area provides the following description of the item:

The Greater Blue Mountains Area consists of 1.03 million ha of sandstone plateaux, escarpments and gorges dominated by temperate eucalypt forest. The site, comprised of eight protected areas, is noted for its representation of the evolutionary adaptation and diversification of the eucalypts in post-Gondwana isolation on the Australian continent. Ninety-one eucalypt taxa occur within the Greater Blue Mountains Area which is also outstanding for its exceptional expression of the structural and ecological diversity of the eucalypts associated with its wide range of habitats. The site provides significant representation of Australia's biodiversity with ten percent of the vascular flora as well as significant numbers of rare or threatened species, including endemic and evolutionary relict species, such as the Wollemi pine, which have persisted in highly-restricted microsites.⁵¹

5.2.2. Significance

The WHL entry for the Greater Blue Mountains Area provides the following statement of Outstanding Universal Value:

Brief Synthesis: *The Greater Blue Mountains Area (GBMA) is a deeply incised sandstone tableland that encompasses 1.03 million hectares of eucalypt-dominated landscape just inland from Sydney, Australia's largest city, in south-eastern Australia. Spread across eight adjacent conservation reserves, it constitutes one of the largest and most intact tracts of protected bushland in Australia. It also supports an exceptional representation of the taxonomic, physiognomic and ecological diversity that eucalypts have developed: an outstanding illustration of the evolution of plant life. A number of rare and endemic taxa, including relict flora such as the Wollemi pine, also occur here. Ongoing research continues to reveal the rich scientific value of the area as more species are discovered.*

The geology and geomorphology of the property, which includes 300 metre cliffs, slot canyons and waterfalls, provides the physical conditions and visual backdrop

⁵¹ United Nations Educational, Scientific and Cultural Organization, World Heritage Convention: 'Greater Blue Mountains Area'. <http://whc.unesco.org/en/list/917>. Accessed 2 March 2018.

to support these outstanding biological values. The property includes large areas of accessible wilderness in close proximity to 4.5 million people. Its exceptional biodiversity values are complemented by numerous others, including indigenous and post-European-settlement cultural values, geodiversity, water production, wilderness, recreation and natural beauty.

Criterion (ix): The Greater Blue Mountains include outstanding and representative examples in a relatively small area of the evolution and adaptation of the genus *Eucalyptus* and eucalypt-dominated vegetation on the Australian continent. The site contains a wide and balanced representation of eucalypt habitats including wet and dry sclerophyll forests and mallee heathlands, as well as localised swamps, wetlands and grassland. It is a centre of diversification for the Australian scleromorphic flora, including significant aspects of eucalypt evolution and radiation. Representative examples of the dynamic processes in its eucalypt-dominated ecosystems cover the full range of interactions between eucalypts, understorey, fauna, environment and fire. The site includes primitive species of outstanding significance to the evolution of the earth's plant life, such as the highly restricted Wollemi pine (*Wollemia nobilis*) and the Blue Mountains pine (*Pherosphaera fitzgeraldii*). These are examples of ancient, relict species with Gondwanan affinities that have survived past climatic changes and demonstrate the highly unusual juxtaposition of Gondwanan taxa with the diverse scleromorphic flora.

Criterion (x): The site includes an outstanding diversity of habitats and plant communities that support its globally significant species and ecosystem diversity (152 plant families, 484 genera and c. 1,500 species). A significant proportion of the Australian continent's biodiversity, especially its scleromorphic flora, occur in the area. Plant families represented by exceptionally high levels of species diversity here include Myrtaceae (150 species), Fabaceae (149 species), and Proteaceae (77 species). Eucalypts (*Eucalyptus*, *Angophora* and *Corymbia*, all in the family Myrtaceae) which dominate the Australian continent are well represented by more than 90 species (13% of the global total). The genus *Acacia* (in the family Fabaceae) is represented by 64 species. The site includes primitive and relictual species with Gondwanan affinities (*Wollemia*, *Pherosphaera*, *Lomatia*, *Dracophyllum*, *Acrophyllum*, *Podocarpus* and *Atkinsonia*) and supports many plants of conservation significance including 114 endemic species and 177 threatened species.

The diverse plant communities and habitats support more than 400 vertebrate taxa (of which 40 are threatened), comprising some 52 mammal, 63 reptile, over 30 frog and about one third (265 species) of Australia's bird species. Charismatic vertebrates such as the platypus and echidna occur in the area. Although invertebrates are still poorly known, the area supports an estimated 120 butterfly and 4,000 moth species, and a rich cave invertebrate fauna (67 taxa).

Integrity: The seven adjacent national parks and single karst conservation reserve that comprise the GBMA are of sufficient size to protect the biota and ecosystem processes, although the boundary has several anomalies that reduce the effectiveness of its 1 million hectare size. This is explained by historical patterns of clearing and private land ownership that preceded establishment of the parks. However parts of the convoluted boundary reflect topography, such as escarpments that act as barriers to potential adverse impacts from adjoining land. In addition, much of the property is largely protected by adjoining public lands of State Forests and State Conservation Areas. Additional regulatory mechanisms, such as the statutory wilderness designation of 65% of the property, the closed and

protected catchment for the Warragamba Dam and additions to the conservation reserves that comprise the area further protect the integrity of the GBMA. Since listing, proposals for a second Sydney airport at Badgerys Creek, adjacent to the GBMA, have been abandoned.

Most of the natural bushland of the GBMA is of high wilderness quality and remains close to pristine. The plant communities and habitats occur almost entirely as an extensive, largely undisturbed matrix almost entirely free of structures, earthworks and other human intervention. Because of its size and connectivity with other protected areas, the area will continue to play a vital role in providing opportunities for adaptation and shifts in range for all native plant and animal species within it, allowing essential ecological processes to continue. The area's integrity depends upon the complexity of its geological structure, geomorphology and water systems, which have created the conditions for the evolution of its outstanding biodiversity and which require the same level of protection.

An understanding of the cultural context of the GBMA is fundamental to the protection of its integrity. Aboriginal people from six language groups, through ongoing practices that reflect both traditional and contemporary presence, continue to have a custodial relationship with the area. Occupation sites and rock art provide physical evidence of the longevity of the strong Aboriginal cultural connections with the land. The conservation of these associations, together with the elements of the property's natural beauty, contributes to its integrity.⁵²

The NHL entry for the Greater Blue Mountains Area provides the following statement of significance:

The Greater Blue Mountains Area was inscribed on the World Heritage List at the 24th Session of the World Heritage Committee, held in Cairns from 27 November to 2 December 2000.

It is an area of breathtaking views, rugged tablelands, sheer cliffs, deep, inaccessible valleys and swamps teeming with life. The unique plants and animals that live in this outstanding natural place relate an extraordinary story of Australia's antiquity, its diversity of life and its superlative beauty. This is the story of the evolution of Australia's unique eucalypt vegetation and its associated communities, plants and animals.

The Greater Blue Mountains Area consists of 1.03 million hectares of mostly forested landscape on a sandstone plateau 60 to 180 kilometres inland from central Sydney, New South Wales. The property includes vast expanses of wilderness and is equivalent in area to almost one third of Belgium, or twice the size of Brunei.

The property, which includes eight protected areas in two blocks separated by a transportation and urban development corridor, is made up of seven outstanding national parks as well as the famous Jenolan Caves Karst Conservation Reserve. These are the Blue Mountains, Wollemi, Yengo, Nattai, Kanangra-Boyd, Gardens of Stone and Thirlmere Lakes National Parks.

⁵² Commonwealth Department of the Environment: Accessed at <http://www.environment.gov.au/heritage/places/world/blue-mountains/values> on 21/12/2017.

The area does not contain mountains in the conventional sense but is described as a deeply incised sandstone plateau rising from less than 100 metres above sea level to 1 300 metres at the highest point. There are basalt outcrops on the higher ridges. This plateau is thought to have enabled the survival of a rich diversity of plant and animal life by providing a refuge from climatic changes during recent geological history. It is particularly noted for its wide and balanced representation of eucalypt habitats from wet and dry sclerophyll, mallee heathlands, as well as localised swamps, wetlands, and grassland. Ninety-one species of eucalypts (thirteen percent of the global total) occur in the Greater Blue Mountains Area. Twelve of these are believed to occur only in the Sydney sandstone region.

The property has been described as a natural laboratory for studying the evolution of the eucalypts. The largest area of high diversity of eucalypts on the continent is located in south-east Australia. The Greater Blue Mountains Area includes much of this eucalypt diversity.

As well as supporting such a significant proportion of the world's eucalypt species, the property provides examples of the range of structural adaptations of the eucalypts to Australian environments. These vary from tall forests at the margins of rainforest in the deep valleys, through open forests and woodlands, to shrublands of stunted mallees on the exposed tablelands.

In addition to its outstanding eucalypts, the Greater Blue Mountains Area also contains ancient, relict species of global significance. The most famous of these is the recently-discovered Wollemi pine, a "living fossil" dating back to the age of the dinosaurs. Thought to have been extinct for millions of years, the few surviving trees of this ancient species are known only from three small populations located in remote, inaccessible gorges within the nominated property. The Wollemi pine is one of the World's rarest species.

More than 400 different kinds of animals live within the rugged gorges and tablelands of the Greater Blue Mountains Area. These include threatened or rare species of conservation significance, such as the spotted-tailed quoll, the koala, the yellow-bellied glider and the long-nosed potoroo as well as rare reptiles including the green & golden bell frog and the Blue Mountains water skink.⁵³

The NHL entry for the Greater Blue Mountains Area Additional Values provides the following statement of significance:

The nominated area was inscribed on the World Heritage List in 2000. The area is being nominated for the National Heritage List for two additional values (natural beauty and cultural associations) which were nominated for the World Heritage List but not accepted and one value (geology/landforms) which was not nominated but was mentioned in the nomination document as a possibility for a future extended values renomination. We believe all of these additional values are worthy of recognition for the National Heritage List...

...A major feature of the aesthetic values relates to the presence of nationally and internationally significant wilderness areas. The Wollemi Wilderness Area is the largest wilderness in the south east of mainland Australia and the largest in the

⁵³ Commonwealth Department of the Environment: Accessed at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=place_name%3Dblue%2520mountains%3Bkeyword_PD%3Don%3Bkeyword_SS%3Don%3Bkeyword_PH%3Don%3Blatitude_1dir%3DS%3Blongitude_1dir%3DE%3Blongitude_2dir%3DE%3Blatitude_2dir%3DS%3Bin_region%3Dpart;place_id=105999 on 21/12/2017.

World dominated by a sclerophyll forest cover. These wilderness conditions also make a major contribution to the maintenance of a high integrity condition of all the area's heritage values...

... the area is amongst the best in the World in relation to this value. Its landscape provides enduring testimony to the revolution in natural area perception which developed as the people of Sydney initially explored the areas above and below the fringing cliffs of the Central Causeway then ventured out into remote areas to first explore the wild areas then conserve them; the saga extending all the way from small reservations to World Heritage recognition. Since the area was added to the World Heritage List there has been further progress with regard to the protection of the area's wilderness areas. The four areas dedicated under the Wilderness Act 1987 now cover 550,392 hectares, over half the World Heritage Area. A further wilderness area - Yengo - which was formally identified under the Wilderness Act in November 2001 is awaiting declaration...

... the area 'is the best example of an upland of sedimentary rocks deeply dissected by rivers over tens of millions of years'... The area played a major role in the development of understanding of weathering processes. The major weathering forces which created the landforms are still at work and are providing new information about the evolution of the earth's surface on a regular basis...⁵⁴

5.2.3. Site survey

For the purposes of this assessment, a sample field survey of the southern portion of the Greater Blue Mountains Area was undertaken on 17 November 2017. This survey encompassed accessible areas of the Nattai National Park and Lake Burragorang along Sheehys Creek Road, W4 Trail, Sheepwalk Trail and W1d Joorilands Trail, and covered areas with greater levels of anticipated impact from the Project. This field survey also enabled views towards the Kanangra-Boyd National Park from the Burragorang Lookout located in Nattai.

Figure 4.1: View south along the Wollondilly River to Nattai National Park within the Greater Blue Mountains Area.



Figure 4.2: View southeast at the Joorilands woolshed site towards Nattai National Park within the Greater Blue Mountains Area.



⁵⁴ Commonwealth Department of the Environment: Accessed at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=place_name%3Dblue%2520mountains%3Bkeyword_PD%3Don%3Bkeyword_SS%3Don%3Bkeyword_PH%3Don%3Blatitude_1dir%3DS%3Blongitude_1dir%3DE%3Blongitude_2dir%3DE%3Blatitude_2dir%3DS%3Bin_region%3Dpart;place_id=105696 on 21/12/2017.

Figure 4.3: View north along W4G Trail with peaks of the Nattai National Park within the Greater Blue Mountains Area to right.



Figure 4.4: View southwest from Burragorang Lookout over Lake Burragorang and the Greater Blue Mountains Area.



5.3. Australian Convict Sites (Old Great North Road) (WHL Place ID 106209, NHL Place ID 106318)

5.3.1. Description

The WHL entry for the Australian Convict Sites provides the following description of the item:

The property includes a selection of eleven penal sites, among the thousands established by the British Empire on Australian soil in the 18th and 19th centuries. The sites are spread across Australia, from Fremantle in Western Australia to Kingston and Arthur's Vale on Norfolk Island in the east; and from areas around Sydney in New South Wales in the north, to sites located in Tasmania in the south. Around 166,000 men, women and children were sent to Australia over 80 years between 1787 and 1868, condemned by British justice to transportation to the convict colonies. Each of the sites had a specific purpose, in terms both of punitive imprisonment and of rehabilitation through forced labour to help build the colony. The Australian Convict Sites presents the best surviving examples of large-scale convict transportation and the colonial expansion of European powers through the presence and labour of convicts.

The NHL entry for the Old Great North Road provides the following description of the item:

The convict built Great North Road runs in a generally northward direction from Sydney for some 250 kilometres to Jerry's Plains in the Hunter Valley. North of Dural the road runs through farmland to the Hawkesbury River at Wiseman's Ferry. On the northern side of the Hawkesbury River the terrain rises steeply to a heavily dissected sandstone plateau cut by rivers, creeks and ravines. The road rises from the Hawkesbury via the Devine's Hill ascent to the plateau and then follows the narrow ridge-top of the Judge Dowling Range before descending at its northern end to the rich lands of the Hunter River Valley. Devine's Hill precinct is located within a 43 kilometre portion of the Great North Road that the National Parks and Wildlife Service (NPWS) terms the Old Great North Road (OGNR) to distinguish it from other portions of the route which have been modernised.

The nominated place is the 7.5 kilometre portion of the Old Great North Road incorporating the 1.8 kilometre Devine's Hill section of road (built 1829-32) and the

abandoned 5.2 kilometre Finch's Line (built 1828) which provide ascents from the Hawkesbury River on its northern side, opposite the town of Wisemans Ferry, to the sandstone plateau in an open forest setting plus the link road (0.5 km) joining them. The precinct lies within the Dharug National Park and the natural setting retains the qualities of the physical environment in which the convict road builders would have laboured. The scale and extensive nature of the road structures along this portion of the Old Great North Road represent the most advanced aspects of road engineering in the colony in the 1820s.

The Devine's Hill precinct of the Old Great North Road is part of a large complex of bushland that surrounds Sydney to the north and west, and is contiguous with the north-eastern extremity of the Greater Blue Mountains World Heritage Area. The environment of the Old Great North Road landscape reflects the ecology and ecosystems of this greater whole. While the plant biodiversity of the study area is a small part of an extensive whole, a number of threatened species grow in close proximity to the road.

The sandstone landforms make an important contribution to the character of the Old Great North Road due to the effect of differential weathering and contribute significantly to the aesthetic appeal of the landscape. The geology of the area is predominantly Hawkesbury Sandstone containing shale lenses but the ascents from the Hawkesbury River and the descent to the MacDonald River also pass through a narrow band of Narrabeen Series rocks (Bryan 1996). Both sandstone and shale have been extensively used in the construction of the Old Great North Road (NPWS 1999:15). The combination of monumental stone construction, rugged landscape, distinctive vegetation, spectacular views or aspects and intriguing sandstone formations has inspired a range of aesthetic responses to the Old Great North Road and its landscape, both historically and in the present community.

Where the Old Great North Road traverses the plateau it is through natural bushland and for much of the route, no signs of development can be seen in any direction. The setting of the Old Great North Road is important as it provides a sense of what nineteenth century travel was like. The scenic quality of the Old Great North Road landscape derives from the contrast between monumental stone remains and the seemingly undisturbed nature of the bush around them. Important views across undisturbed bushland are gained from the ridge top locations of the road, while the Finch's Line provides spectacular views over the Hawkesbury River and Wisemans Ferry.

5.3.2. Significance

The WHL entry for the Australian Convict Sites provides the following statement of Outstanding Universal Value:

The property consists of 11 complementary sites. It constitutes an outstanding and large-scale example of the forced migration of convicts, who were condemned to transportation to distant colonies of the British Empire; the same method was also used by other colonial states.

The sites illustrate the different types of convict settlement organised to serve the colonial development project by means of buildings, ports, infrastructure, the extraction of resources, etc. They illustrate the living conditions of the convicts, who were condemned to transportation far from their homes, deprived of freedom, and subjected to forced labour.

This transportation and associated forced labour was implemented on a large scale, both for criminals and for people convicted for relatively minor offences, as well as for expressing certain opinions or being political opponents. The penalty of transportation to Australia also applied to women and children from the age of nine. The convict stations are testimony to a legal form of punishment that dominated in the 18th and 19th centuries in the large European colonial states, at the same time as and after the abolition of slavery.

The property shows the various forms that the convict settlements took, closely reflecting the discussions and beliefs about the punishment of crime in 18th and 19th century Europe, both in terms of its exemplarity and the harshness of the punishment used as a deterrent, and of the aim of social rehabilitation through labour and discipline. They influenced the emergence of a penal model in Europe and America.

Within the colonial system established in Australia, the convict settlements simultaneously led to the Aboriginal population being forced back into the less fertile hinterland, and to the creation of a significant source of population of European origin.

Criterion (iv): *The Australian convict sites constitute an outstanding example of the way in which conventional forced labour and national prison systems were transformed, in major European nations in the 18th and 19th centuries, into a system of deportation and forced labour forming part of the British Empire's vast colonial project. They illustrate the variety of the creation of penal colonies to serve the many material needs created by the development of a new territory. They bear witness to a penitentiary system which had many objectives, ranging from severe punishment used as a deterrent to forced labour for men, women and children, and the rehabilitation of the convicts through labour and discipline.*

Criterion (vi): *The transportation of criminals, delinquents, and political prisoners to colonial lands by the great nation states between the 18th and 20th centuries is an important aspect of human history, especially with regard to its penal, political and colonial dimensions. The Australian convict settlements provide a particularly complete example of this history and the associated symbolic values derived from discussions in modern and contemporary European society. They illustrate an active phase in the occupation of colonial lands to the detriment of the Aboriginal peoples, and the process of creating a colonial population of European origin through the dialectic of punishment and transportation followed by forced labour and social rehabilitation to the eventual social integration of convicts as settlers.*⁵⁵

The NHL entry for the Old Great North Road provides the following statement of significance:

Finch's Line and the Devine's Hill ascent are important as a particularly challenging segment of the 250km long Great North Road. The road, built with convict labour, was commenced in 1826 and completed in 1836. This segment of the Great North Road contains a rich array of features associated with convict road building, including traces of the first road, known as Finch's Line constructed in 1828, the later road re-alignment ascending Devine's Hill built between 1829-32, the archaeological remains of a convict stockade which housed convicts during the building of the road, the landscape setting of the roads including the massive

⁵⁵ Commonwealth Department of the Environment: Accessed at <http://www.environment.gov.au/heritage/places/world/convict-sites/values> on 21/12/2017.

retaining walls and buttresses on Devine's Hill, culverts and the landscape along the roads and between the routes.

Governor Darling promoted the building of roads to assist in the development of the colony. Built as one of the Governor's three 'Great Roads', it linked Castle Hill just west of Sydney to the fertile and recently settled Hunter Valley. Road access via a permanent land route would provide the means of moving people, goods and large numbers of stock to the expanding district. Expansion and exploration were key aims of Governor Darling's administration and were sanctioned by the British Government which saw the economic opportunities they would bring. Road building was a civilising improvement and it played an important role in the transition of the colony from penal outpost to colonial settlement.

The Old Great North Road is also important for its role in the story of convict punishment. The system of using convicts in road gangs was a form of additional punishment, for offences committed in the colony and was known as secondary punishment. It was a particularly harsh form of punishment deliberately designed to deter criminal activity in Britain and in the Australian colonies. The very worst convicts were placed in iron collars and leg irons. The road gangs worked in isolated and harsh conditions for months on end with limited shelter from the elements and reduced rations. Despite these drawbacks the construction of the Great North Road was a significant achievement.

The monumental buttressed retaining walls and associated drainage system on Devine's Hill are an impressive example of the ambitious and exacting nature of work that involved surveying, engineering, blasting, quarrying and masonry carried out by the convict gangs under the direction of assistant surveyors. These structural features as well as the associated quarrying sites are still intact today and are undisturbed by development on or in the vicinity of the road.

Without such development, the Old Great North Road can provide information about colonial road construction and about how convicts lived and worked in this place. Evidence of convicts personalising their work can be found in convict graffiti rock carvings and the '25 R. Party' engraving indicating the road gang responsible for building this part of the road.

The Old Great North Road is regarded as outstanding for its social value with the local community, including through its association with the Convict Trail Project which draws together all parties with an interest in the Great North Road.

The Old Great North Road is valued as a public resource, a public thoroughfare and for its educational potential for present and future generations.⁵⁶

5.3.3. Site survey

For the purposes of this assessment, a field survey of a localised section of the Australian Convict Sites/Old Great North Road was undertaken on 7 June 2018. This survey encompassed accessible areas of the Old Great North Road that are within or in the vicinity of the Referral Area.

⁵⁶ Commonwealth Department of the Environment: Accessed at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;place_id=105961 on 21/12/2017.

Figure 4.5: View north to entrance of Australian Convict Sites (Old Great North Road) from Settlers Road.



Figure 4.6: View north east along Settlers Road to Buffer Zone area around the Australian Convict Sites (Old Great North Road).



5.4. Warragamba Dam - Haviland Park (SHR No. 01375)

5.4.1. Description

The SHR listing for the Warragamba Dam – Haviland Park heritage item provides the following description of the item:

Warragamba Dam is located in a narrow gorge within the Warragamba River, approximately 65 km west of Sydney and 15km south of Penrith. The south-eastern corner of the site connects to the Warragamba township established as part of the Warragamba Supply Scheme. The northern side of the dam is adjacent to the Blue Mountains National Park. East of the dam is a large Entry Precinct and Picnic Grounds, and Haviland Park is between this Precinct and the dam itself and spillways.

Haviland Park is to the dam's east and covers 10 acres contains plantings and built features which are substantially intact from the time of establishment in the 1960s. There is remnant evidence of the construction apparatus, including rail tracks, building footings, concrete anchors, former aggregate conveyor tunnel, existing terraced road alignments, 19 ton cableway and associated machinery. The existing timber and fibro systems office (former engineers office) and information centre (former staff mess) which constitute the only two remaining buildings from the original construction site.

*Haviland Park now comprises two open, relatively level grassed areas bounded by native and introduced trees and shrubs. The most prominent are two rows of sweet gums (*Liquidambar styraciflua*) planted during the 1960s. The areas are bounded by access roads with newly formed car parking areas and kerbs also provided. The precinct is the major open space recreation area of the dam but has been closed since 1997 due to construction works at the site. (Sydney Catchment Authority, 2007, 1).*

Haviland Park covers an area of 10 acres contains plantings and built features which are substantially intact from the time of establishment. There is remnant evidence of the construction apparatus, including rail tracks, building footings, concrete anchors, former aggregate conveyor tunnel, existing terraced road alignments, 19 ton cableway and associated machinery.

The tree lined avenue of exotic and indigenous plantings includes; coastal redwood (Sequoia sempervirens), Chinese tallow tree (Sapium sabiferum), brush box (Lophostemon confertus), sweet gum (Liquidambar styraciflua), paperbark (Melaleuca sp.), Jacaranda, camphor laurel (Cinnamomum camphora), plus major species of Monterey pine (Pinus radiata), Eucalypt, and she-oak (Casuarina sp.). The site is surrounded by a dry packed stone retaining wall. A landscaped exotic garden and steps adjacent to the existing picnic shelter to the north. This garden comprises significant plantings, in this instance of Cacti, Agave, succulents, and Yuccas. Access is provided to the Folly Creek area.

The facilities available for public use include, parking areas, viewing points, picnic areas with tables and seats, barbeque fireplaces, with wood provided, boiling water installations, children's playgrounds, shelter sheds, public toilets, and drinking fountains. The existing timber and fibro systems office (former engineers office) and information centre (former staff mess) which constitute the only two remaining buildings from the original construction site.⁵⁷

5.4.2. Significance

The SHR listing for the Warragamba Dam – Haviland Park heritage item provides the following statement of significance:

Haviland Park has a high level of state heritage significance for several reasons. It represents the pinnacle of quality visitor facilities provided by the Board at Dam sites. It contains numerous archaeological, architectural and engineering remnants from the dam's construction. The Park displays a high degree of formality and planning and is rich in both exotic and native botanical species which contribute to the landscape significance of the park. It commemorates the role of Haviland, without whom the numerous landscaped parks and reserves of the Dams would not have been established, nor executed with such high regard for design and formalism. It is highly valued by the community of New South Wales as a place for passive recreation, leisure activities and sightseeing pursuits. Sydney Water continues the role of maintaining Haviland Park and providing visitor facilities.⁵⁸

5.4.3. Site survey

For the purposes of this assessment, a field survey of Haviland Park was undertaken on 8 March 2018. This survey encompassed accessible areas of the park, which has been assessed as being affected by greater levels of anticipated impact from the Project.

It is noted that at the time of the survey, many of the significant elements listed on the SHR are no longer extant, having been damaged or destroyed by the December 2001 bushfires (refer to Section 3.3.5). The only remaining significant elements comprise a remnant fountain base, several mature plantings at the southern end of the site and sections of dry packed stone retaining wall.

Figure 4.7: View south-east across Haviland Park towards remnant fountain base.

Figure 4.8: View east to remnant fountain base within Haviland Park.

⁵⁷ Office of Environment & Heritage, State Heritage Inventory: 'Warragamba Dam – Haviland Park' <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051483>. Accessed 12 June 2018

⁵⁸ Office of Environment and Heritage, 'Warragamba Dam – Haviland Park'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051483> on 03/05/2018.



Figure 4.9: View north across Haviland Park.



Figure 4.10: View to entry gate at Haviland Park.



5.5. Warragamba Emergency Scheme (SHR No. 01376, LEP No. I270)

5.5.1. Description

The SHR listing for the Warragamba Emergency Scheme heritage item provides the following description of the item:

Construction site for the Warragamba Emergency Scheme was 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, shads, batching plants, roads, electrical substation, chlorination plant, maintenance staff accommodation, balance reservoir, Megarrity's bridge, water pumping station, tunnels, and associated pipelines.⁵⁹

5.5.2. Significance

The SHR listing for the Warragamba Emergency Scheme provides the following statement of significance:

The Emergency Scheme is representative of the collective engineering response to Sydney's critical water shortage during the Second World War period. It was the

⁵⁹ Office of Environment & Heritage, State Heritage Inventory: 'Warragamba Dam – Haviland Park' <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051483>. Accessed 12 June 2018

first stage in the storage and extraction of water from the Warragamba River, and was preliminary to the Warragamba Dam. All of the components are excellent examples of the civil engineering skills of the times; the Balance Reservoir is particularly significant because it provides a stilling pool downstream of Warragamba Dam for the purpose of flood discharge; the group of five cottages associated with the construction of the dam are considered to be of high significance because they housed the operations staff between 1940 and 1959. These have since been incorporated into the Warragamba township, one of the largest townships in the Shire of Wollondilly.⁶⁰

5.5.3. Site survey

For the purposes of this assessment, a field survey of key elements of the Warragamba Emergency Scheme was undertaken on 8 March 2018. This survey encompassed accessible areas assessed as being affected by greater levels of anticipated impact from the Project.

Figure 4.11: View north-east from Weir Road towards Megarrity's Bridge.



Figure 4.12: View south-west along Weir Road towards pumping station.



Figure 4.13: View down from Weir Road to weir structure.



⁶⁰ Office of Environment and Heritage, 'Warragamba Emergency Scheme'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051484> on 03/05/2018.

5.6. Track (SHR No. 01372)

5.6.1. Description

The SHR listing for the Track heritage item provides the following description:

Packed stone and earth track built by the Pearce family around 1870. The track leads to the Wentworth Falls in the Burragorang Valley.

5.6.2. Significance

The SHR listing for the Track heritage item provides the following statement of significance:

The track is a historically significant archaeological relic built by Europeans as a route of transportation on settlement of the Burragorang Valley. It is representative of a very early form of road construction, evidenced by its design and siting. It has immense historical value as it facilitated the European exploration and expansion of the valley. There are anecdotal linkages to the Pearce family, who were active settlers within the upper reaches of the Blue Mountains. It is a significant component of the cultural landscape and is understood to be exceedingly rare because of the high level of intactness noted in the remaining fabric.⁶¹

5.6.3. Site survey

It is noted the SHR curtilage for the 'Track' heritage item is incomplete, with no information provided on the SHI listing card for the item or associated GIS mapping information.

Editorial note: Awaiting response from Heritage Division on clarification of heritage curtilage (requests sent 4/5/18, 6/6/18, 14/6/18, 26/7/18) site survey not possible until curtilage confirmed

5.7. Warragamba Supply Scheme (WaterNSW s170 No. 4580161, LEP No. I270)

5.7.1. Description

The SHI database listing card for the Warragamba Supply Scheme does not provide a physical description of the item. The Warragamba Supply Scheme CMP 2010 identifies the item as comprising the following components and sub-components:

The three major components (and their sub-components) are as follows.

Warragamba Dam

• Main dam wall with a crest length of 351 metres (m) and height 142 m. The dam is a straight gravity wall and contains the following sub-components:

• Crest gantry crane

• Crest gates

• Dam outlets

• Internal inspection galleries, lift shafts, and access tunnels.

⁶¹ Office of Environment and Heritage, 'Track'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051480> on 03/05/2018.

- 18 ton Cableway (upper tail tower).
- Haviland Park.
- Hydro-electric power station.
- Suspension bridge.
- Valve house.
- Picnic grounds.
- Dam models and existing visitor centre.
- Production office and other buildings within Haviland Park.
- Conference Centre.
- Former construction township.

Warragamba Emergency Scheme including:

- Warragamba Emergency Pumping Station No.9.
- Warragamba Weir.
- Balance Reservoir.
- Former construction township.
- Megaritty's Bridge.

Warragamba-Prospect Pipelines 1 & 2.⁶²

5.7.2. Significance

The SHI database listing card for the Warragamba Supply Scheme heritage item provides the following statement of significance:

The Warragamba Supply Scheme, is the largest and most important of the water supply systems to provide a secure water supply to satisfy the demands of industrial, commercial and residential development of metropolitan Sydney. The dam, associated infrastructure and pipelines is one of the largest (possibly largest) of any type of dam in the world constructed specifically for an urban water supply.

The Warragamba Dam foundation and wall drainage systems, and the post-war architectural expression of the crest, lift towers and Valve House collectively continue to be integral elements of an outstanding example of a high, straight concrete gravity wall, which at the time of construction was the highest concrete gravity dam in the world constructed on stone foundations.

The scale of the use of mass concrete in the in the dam wall is unique in New South Wales. The design of the spillway incorporated in the wall and crest gates demonstrate a notable technological advancement and are possibly the only extant examples of their type in Australia.

The means of construction and infrastructure established for the construction of the dam, involved innovative techniques that were used for the first time in Australia,

⁶² Graham Brooks & Associates. 2010:8.

such as the pre-stressed concrete frame of the ice making plant and the use of circulated chilled water to cool the concrete being placed. The techniques also incorporated equipment and fabric from previous Board works and brought together experience gained from these earlier works and overseas models.

The Dam contains in-situ items of post-war era water delivery technologies developed by the Water Board, such as lengths of pipes, emergency roller gate, trash racks and penstocks which in consideration of their scale and integrity are rare examples of their types. The welded mild steel delivery pipeline similarly represents a notable advance in construction technology for the period.

It contains items of machinery and structures which are significant due to their relationship and role they played during the construction period, and which continue to demonstrate the means of construction and operations such as the Upper Tail Tower and remains of the Warragamba Suspension Bridge.

The dam is a regional landmark that has engendered beautification works undertaken from early in the construction phase to post completion of the dam for the use of local and general visiting public.

The picnic areas in particular have strong associations with past management practices of the Water Board and Haviland Park in particular demonstrates the Board's recognition of the scale and importance of the dam and adoption of a more sophisticated approach to picnic area and park design and layout under the influence of specialist consultants such as Professor Spooner. The grounds of the dam are associated with the local and regional community of Sydney as a longstanding place of passive recreation.⁶³

5.7.3. Site survey

For the purposes of this assessment, a field survey of the Warragamba Supply Scheme was undertaken on 8 March 2018. This survey encompassed accessible areas assessed as being affected by greater levels of anticipated impact from the Project, comprising the main dam wall and its associated features, surrounding picnic grounds including Haviland Park (above) and the Terraced Garden. A detailed description of the dam wall is provided below as adapted from the CMP 2010.

The existing dam wall structure comprises a straight gravity wall of mass concrete on sandstone foundations. The upstream face is vertical except near the crest where it is slightly cantilevered, the downstream face is approximately a 45 degree slope except at the crest, which is vertical. The wall is presently 142 metres from its lowest foundation to the crest.

The crest of the dam wall contains five flood control gates, crest bridges, roadway and lift towers. Four concrete piers extend from the top of the dam wall on the downstream face and frame the four original radial gates and central drum gate. The features of the downstream face of the wall are symmetrically arranged around the central drum gate. Two simply detailed original lift towers remain despite the 1990s raising of the wall, and these feature rectangular windows at the top that are surmounted by typical stepped fascia detail and flat roofs. The crest roadway comprises a vehicular road with crane rails and pedestrian pathways to either side, which in turn are bounded by a simple steel balustrade on a low concrete plinth. Remnant machinery, comprising the crest crane, and several memorials and plaques are located on the crest road.

The structure of the dam wall also contains several subcomponents comprising longitudinal and vertical contraction joints, a v-shaped thrust trench below the general foundation level, a cut-off trench

⁶³ Office of Environment and Heritage, 'Warragamba Supply Scheme'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=4580161> on 03/05/2018.

below the general foundation level upstream of the dam and silt coffer dam for low level outlet, a series of drainage and inspection galleries accessed via the electric lift well, a series of lower drainage and inspection galleries, four outlets that draw water from Lake Burragorang, a 14ft diameter penstock that supplies water to the Hydro-electric plant, and dam strain meters and network of survey stations around the site, within the dam wall and on the downstream face that study the movement of the wall.

Figure 4.14: View north-west to existing bridge on Production Avenue over auxiliary spillway and crest road on the dam wall, note blue crest crane in distance.



Figure 4.15: View north-west from terrace garden picnic area showing the dam wall and towers and downstream face.



Figure 4.16: View down from Crest Road to the Valve House and attached annexe building located to the rear.



Figure 4.17: View west from Production Avenue towards the original blue-painted and track mounted crest crane on the dam wall.



Figure 4.18: View north-west across Haviland Park towards the dam, remnant fountain base seen in distance.



Figure 4.19: View down from Crest Road to existing landscaping and stairs in the Terraced Garden adjacent to the dam wall.

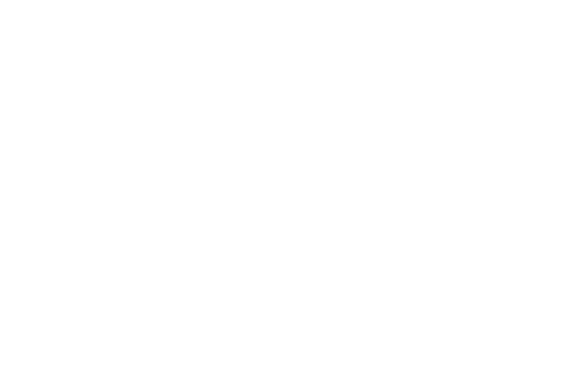




Figure 4.20: 1930 commemorative plaque from the dam's opening, located on Crest Road.



5.8. Warragamba Conservation Area (LEP No. C4)

5.8.1. Description

The SHI database listing card for the Warragamba Conservation Area provides the following description:

The town has distinctive physical and social features. Distinctive physical elements include:

- *street layout, design and names*
- *street furniture (e.g. signs)*
- *uniformity of housing style (e.g. Wolstenholme cottages); and,*
- *individual buildings such as the Anglican church, the town hall, the school and the shops which are distinctive.*

Socially, the Warragamba township is rather unusual. Many townships have been built on construction sites before, but this one developed a life of its own and the township continued after construction of the dam was completed.

Warragamba, the dam as well as the town, was, and still is, characterised by a remarkably strong emotional attachment that borders on the proprietary. "Former and present residents remark that the town has many of the virtues of rural life with few of the disadvantages, since the feuds that characterise many country towns had little opportunity to develop in a town that sprang up almost overnight." (Beasley, 1988) Much of the success of the Warragamba township is considered to, "lie in the genuine sense of achievement experienced by the people who lived and worked there. It was not just a construction site, but one with enormous material benefits for the people of Sydney. In an industry that normally enjoyed little esteem, the dam was a highly visible and much appreciated contribution to a young nation's resources." (Beasley, 1988)

5.8.2. Significance

The SHI database listing card for the Warragamba Conservation Area provides the following statement of significance:

Warragamba township is significant through its direct association with the development of the Metropolitan Water Supply System in NSW. It is also a rare example of accommodation built for construction of dams in the State which has survived, despite being originally built as a "temporary" town. It is an exceptional example of the "company town" concept that also shaped the Snowy Mountains Scheme in Cooma, but is a more intact and easily interpreted example than Cooma. The street design, names and furniture and the uniformity of architectural expression are indicative of architectural styles and Australian values in the formative post-WWII years. In addition, the town setting and the plantings in streets and parks within the town create an attractive townscape.

Warragamba also has social significance for both past and present residents reflecting life there with a common objective uniting all the residents while the dam was under construction. The depth of this feeling has been well documented in a number of publications. The major planned form of the village survives intact and the surviving buildings are highly valued by past and present residents. ⁶⁴

5.8.3. Site survey

Editorial note: To be completed

⁶⁴ Office of Environment and Heritage, 'Warragamba Conservation Area'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2690018> on 03/05/2018.

6. ARCHAEOLOGICAL ASSESSMENT

6.1. Archaeological potential

This section discusses the study area's potential to contain historical archaeological resources. The potential for the survival of archaeological remains is significantly affected by activities which may have caused ground disturbance. This assessment is therefore based on consideration of current ground conditions, and analysis of the historical development of the study area.

'Archaeological potential' refers to the likelihood that an area contains physical remains associated with an earlier phase of occupation, activity or development of that area. This is distinct from 'archaeological significance' and 'archaeological research potential'. These designations refer to the cultural value of potential archaeological remains and are the primary basis of the recommended management actions included in this document.

The following assessment of archaeological potential is focused on the proposed construction areas in the immediate vicinity of Warragamba Dam, and does not consider the historical archaeological potential of those areas which may be affected upstream and downstream of the proposed construction works.

6.1.1. Assessment of archaeological potential

6.1.1.1. Summary of historic land-use

In order to assess the potential extent of archaeological evidence within the study area, the primary phases of development, and potential associated land uses, are summarised below:

- Phase 1 (c.1800 – c.1900): Early land grants and rural development
- Phase 2 (c.1900 - 1940): Urban expansion/Warragamba Dam

6.1.1.2. Known impacts

A number of factors must be considered when assessing archaeological potential of the study area. The landscape surrounding the site of the Warragamba Dam has undergone substantial modification through construction and upgrades. These works have resulted in impact to evidence of the construction of the original Warragamba Emergency Scheme and construction areas.

The construction of the auxiliary spillway in the late 1990s removed the construction terraces that formerly held the ice making plant, concrete mixing plant, mechanical workshop and cement silos.⁶⁵ Construction of the Warragamba Deep-Water Storage Access infrastructure in the early 2000s impacted on the site of the former chlorination plant, WPS009 and part of the former substation.⁶⁶

6.1.1.3. Discussion of archaeological potential

The following section will discuss the potential for the study area to contain archaeological remains associated with historical phases of development of the study area.

Phase 1: Early land grants and rural development

⁶⁵ Graham Brooks and Associated Pty Ltd June 2010 p. 279

⁶⁶ Ibid

There is **nil to low potential** that archaeological evidence of land clearance, and modification for agricultural or pasturing purposes, pre-dating the construction of the Warragamba Dam, would be located within the study area. Evidence for these types of activities are typically ephemeral, and are therefore likely to have been disturbed by ongoing modification of the landscape through construction. Archaeological remains may include the following:

- Evidence of tree clearance (tree boles, etc)
- Evidence of cultivation (postholes, plough marks in subsoils, etc)
- Evidence of the formalisation of agricultural precinct boundaries, such as postholes associated with early fence lines.

Phase 2: Urban expansion/Warragamba Dam

The 2010 CMP for the Warragamba Supply Scheme identified several locations with the potential to contain an archaeological resource. The following potential archaeological resources are located within the construction footprint of the proposed works:⁶⁷

- The original construction township from the Warragamba Emergency Scheme and early years of site testing and establishment for Warragamba Dam – this was originally located on the ridge to the east of the river and is now mostly outside the ownership boundaries of the dam site.
- Evidence of the construction and operation of the Warragamba Emergency Scheme including the power station, chlorination and alum plant, batching plant and support sheds, which remains on the eastern back of the river.
- The single men's quarters and site of the west canteen from the Warragamba Dam construction township on either side of the road to the Dam lookout
- Staff barracks on the eastern side of the entrance road adjacent to Haviland Park
- Junior staff quarters on the northern side of the road to the conference centre
- The aggregate bins, aerial ropeway and depot in the area now occupied by Haviland Park
- Evidence of former roads and stores area to the east of the auxiliary spillway
- Evidence associated with the 10 tonne cableway in the Terraced Gardens
- Evidence associated with the 18 tonne cableway on the eastern side of the dam.⁶⁸

A summary of the archaeological potential of Warragamba Dam is included in Table 5.1 and is illustrated in Figure 5.1.

Table 5.1: Summary of archaeological potential

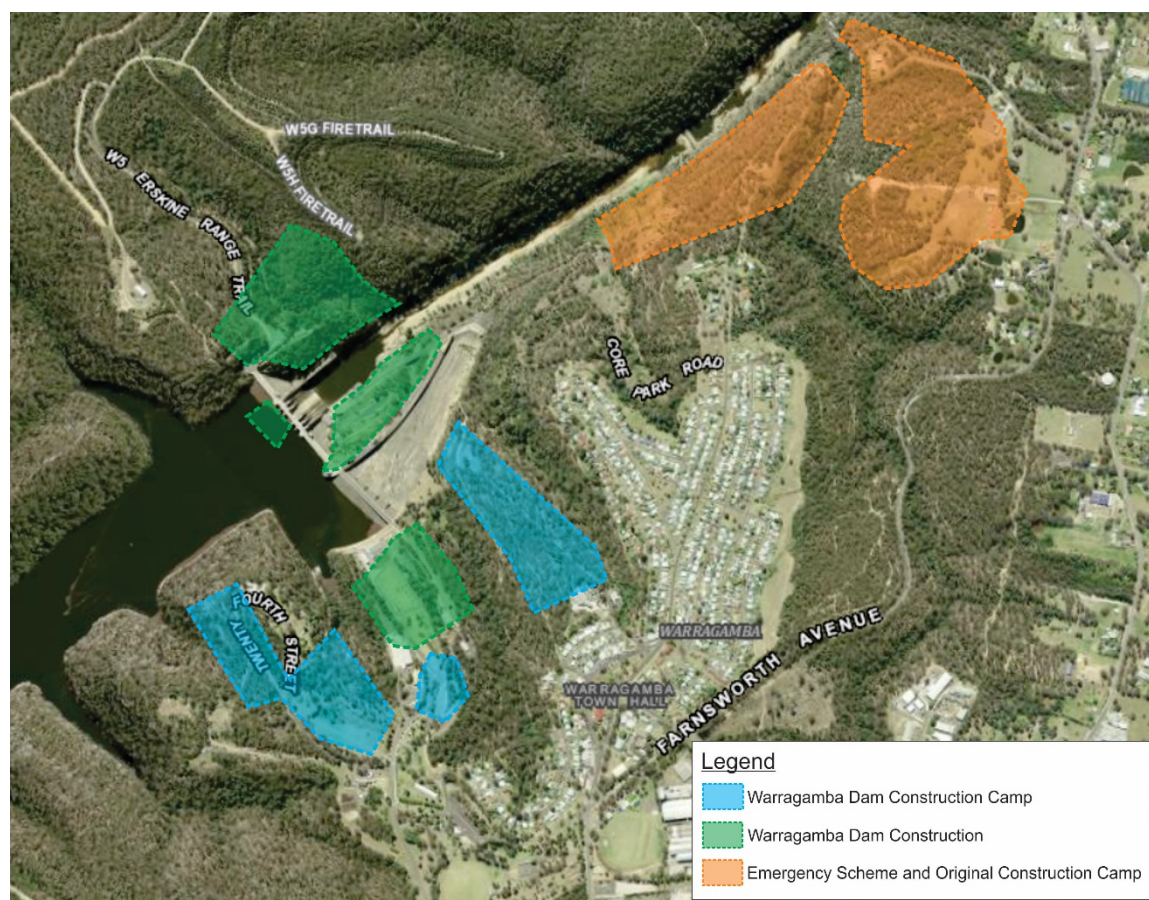
⁶⁷ Graham Brooks and Associates Pty Ltd, June 2010 p.278

⁶⁸ Ibid

Phase	Potential archaeological remains	Level of disturbance	Archaeological potential
1: Early land grants	Evidence of land clearance, and modification for agricultural or pasturing purposes including tree boles, plough marks and fence lines.	High level of disturbance through 20 th century construction activity	Nil to low
2: Warragamba Dam	<p>Evidence of the original emergency scheme (power station, chlorination and alum plant, batching plant and support sheds) and construction camp. Remains may include:</p> <ul style="list-style-type: none"> • building platforms, retaining walls, guttering and drainage, artefact deposits and possibly some building footings • concrete slabs and plinths, disused services and pipelines, former roadways (some with bitumen or gravel surfaces), concrete pathways and steps, dry packed retaining walls, artefact deposits and evidence of rock cuttings. 	Localised disturbance through demolition and later construction activities	Moderate to high
2	<p>Remains of the Warragamba Dam construction camp including:</p> <ul style="list-style-type: none"> • Evidence of the single men's barracks including footings, roads, paths, disused services and artefact deposits • evidence of former anchor tunnel, tail tower footings and pathways • evidence of junior and senior staff barracks including footings, services, artefact deposits and landscaping features. 	Localised disturbance through demolition and later construction activities	Moderate to high

Phase	Potential archaeological remains	Level of disturbance	Archaeological potential
2	<p>Evidence of the construction of Warragamba Dam including:</p> <ul style="list-style-type: none"> The carpenter's stores and Folly Creek suspension bridge including concrete slabs and footings, pits, services and the concrete slab and anchor tunnel for the suspension bridge Former roads and road surfaces Footings and disused services associated with the former offices Evidence of the 18 and 10 tonne cableways including concrete slab footings, tracks and buffer stops of the 18 tonne cableway travelling tail tower; footings of the former electricity sub-station; the west-bank block anchor for the Warragamba Gorge suspension bridge; and the slab footing of the former compressor house. The current terraced gardens contain the space formerly occupied by the travelling 10 tonne cableway tower and its tracks and may also contain footing slabs from the former compressors, pumps and coolers Evidence of the original upstream coffer dam. 	<p>Heavy localised impact through construction of the auxiliary spillway in the 1990s</p> <p>Construction of the Warragamba Deep-Water Storage Access Infrastructure in the early 200s impacted on the site of the former chlorination plant and substation</p> <p>Construction of the visitor's centre in 2008 impacted some of the archaeology associated with the McCann's Island aerial ropeway under Haviland Park</p>	Moderate to high

Figure 5.1: Overview of archaeological potential (source: Graham Brooks and Associated June 2010; Artefact Heritage overlay on SIX Maps)



6.2. Archaeological significance

Archaeological significance refers to the heritage significance of known or potential archaeological remains. As with other types of heritage items, archaeological remains should be managed in accordance with their significance. In situations where development is proposed, this can influence the degree of impact that may be acceptable or the level of investigation and recording that may be required.

While archaeological remains often form an integral component of the overall significance of a heritage place, it is necessary to assess them independently from above ground and other historic elements. Assessing the heritage value of archaeological remains is made more difficult by the fact that their extent and nature is often unknown. It becomes necessary for judgement to be made on the basis of expected or potential attributes. The NSW Heritage Branch document *Assessing Significance for Historical Archaeological sites and 'Relics'*⁶⁹ provides the framework for the following significance assessment. A summary of the criteria is included in Table 5.2.

Table 5.2: Overview of NSW Heritage Branch archaeological significance criteria

⁶⁹ Heritage Branch Department of Planning *Assessing Significance for Historical Archaeological Sites and 'Relics'* December 2009 p11-14

Heritage Branch archaeological significance criteria	Meaning
Archaeological Research Potential (NSW Heritage Criterion e)	<p>Archaeological research potential is the ability of the archaeological evidence, through analysis and interpretation, to provide information about a site that could not be derived from any other source, written or otherwise, and which contributes to the archaeological significance of the site and its 'relics'.</p> <p>The integrity of a site, the state of preservation of archaeological material and deposits will also be relevant.</p>
Association with individuals or groups of historical importance (NSW Heritage Criteria a, b and d)	<p>Archaeological remains may have particular associations with individuals, groups and events which may transform mundane places or objects into significant items through the association with important historical occurrences.</p>
Aesthetic or technical significance (NSW Heritage Criterion c)	<p>Whilst the technical value of archaeology is usually considered as 'research potential' aesthetic values are not usually considered to be relevant to archaeological sites. This is often because until a site has been excavated, its actual features and attributes may remain unknown. It is also because aesthetic is often interpreted to mean attractive, as opposed to the broader sense of sensory perception or 'feeling' as expressed in the <i>Burra Charter</i>.</p> <p>Nevertheless, archaeological excavations which reveal highly intact and legible remains in the form of aesthetically attractive artefacts, aged and worn fabric and remnant structures, may allow both professionals and the community to connect with the past through tangible physical evidence.</p>
Ability to demonstrate the past through archaeological remains (NSW Heritage Criteria a, c, f and g)	<p>Archaeological remains have an ability to demonstrate how a site was used, what processes occurred, how work was undertaken and the scale of an industrial practice of other historic occupation. They can demonstrate the principle characteristics of a place or process that may be rare or common.</p> <p>A site may best demonstrate these aspects at the time of excavation. It may also be possible to explain the nature of the site and demonstrate past practices via public interpretation with before, during, or after excavation.</p>

6.2.1. Assessment against the NSW heritage assessment guidelines

The study area has been assessed as having moderate to high potential to contain an archaeological resource associated with the construction of the Warragamba Emergency Scheme and construction camp and township of the 1930s to 1960s.

The assessment of the significance of the potential archaeological resource contained within the study area against the NSW heritage assessment criteria is outlined in Table 5.3.

Table 5.3: Consideration against NSW heritage assessment criteria

DRAFT

Criteria	Discussion	Local	State
A – Historical Significance An item is important in the course or pattern of the local area's cultural or natural history.	<p>The Warragamba Supply Scheme has played a fundamental role in providing water to metropolitan Sydney from 1940, through the Emergency Scheme at a time of great need and during protracted record drought and since with the construction of Warragamba Dam in ensuring security of water supply. The construction of the Emergency Scheme narrowly averted failure of the Sydney's water supply and was constructed in record time using nearly all of the Boards available resources and manpower.</p> <p>The construction of the Warragamba Dam was the single factor that led to the settlement of the township of Warragamba.</p> <p>Archaeological evidence associated with the Emergency Scheme, construction of Warragamba Dam, and the individuals who were involved in the construction works, would contribute to our knowledge of the cultural history of the area. The potential archaeological resource within the study area, if found to be significantly intact and legible, may have significance at a local level.</p>	✓	-
B – Associative Significance An item has strong or special associations with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history	<p>The construction of the Warragamba Supply Scheme between the years 1937 and 1961, necessitated the employment of a large body of labourers and tradesmen who lived at the construction sites with their families. The number of employees at the Emergency Scheme was up to 2,000 and up to 1,700 for Warragamba Dam, numbers which represents a major influx to the population of the local area. The township that emerged during the construction of the Dam, and the workers and their descendants, continue to have strong associations with the site.</p> <p>The potential archaeological resource within the study area, if found to be significantly intact, may have significance at a local level.</p>	✓	-
C – Aesthetic Significance An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in the local area.	<p>The potential archaeological remains within the study area have little potential for aesthetic significance. Although it is recognised that exposed <i>in situ</i> archaeological remains may have distinctive/ attractive visual qualities and have visual characteristics with the ability to connect communities and individuals to the past through tangible remains, the potential archaeological remains at the study area are likely to be ephemeral.</p> <p>The potential archaeological resource does not meet the local significance threshold under this criterion.</p>	-	-
D – Social Significance An item has strong or special association with a particular community or cultural group in the local area for social, cultural or spiritual reasons	<p>Warragamba Dam is recognised and significant part of the historic built environment of the local area. The Dam and surrounding area has strong links and continued association with Warragamba township, with some of the residents having direct association with its construction and ongoing operations. Archaeological evidence associated with former workers and inhabitants of the construction camps and Warragamba township may have resonance with the descendants of these individuals.</p> <p>The potential archaeological resource may meet the local significance threshold under this criterion.</p>	✓	-

Criteria	Discussion	Local	State
E – Research Potential An item has potential to yield information that will contribute to an understanding of the local area's cultural or natural history	Archaeological remains associated with the construction of the Supply Scheme between 1937 to 1961 have the potential to demonstrate aspects of its planning and construction. Remains may include remnant structures and/or modified landscapes associated with the provision of plant and equipment, employee accommodation and camp services, and routes of access for the supply of stores and materials. Remains may include: <ul style="list-style-type: none"> • remnant road alignments - The principal means of access to the dam construction site for transporting men, equipment, stores and materials • remains of the Emergency Scheme camps and barracks • remains of the substation and other infrastructure • evidence of the travelling tail towers and cableway - Remnant features of this use include the broad, sweeping, cleared platform, upper tail tower and rails/tracks. Potential archaeological evidence contained within the subject site is likely to contribute to knowledge on a number of questions relevant to major or broader research questions relating to NSW history, such as: <ul style="list-style-type: none"> • Developing local, regional and national economies – Environment; cultural landscape – Activities associated with the interactions between humans, human societies and the shaping of their physical surroundings. The potential archaeological resource within the study area, if found to be significantly intact and legible, may have significance at a local level.	✓	-
F – Rarity An item possesses uncommon, rare or endangered aspects of the local area's cultural or natural history	The study area has the potential to contain evidence of a significant 20 th century engineering achievement, and the development of a landscape created for the specific purpose of managing the water supply of Sydney. Should an archaeological resource associated with this phase of development be present and intact, it would be relatively rare. The potential archaeological resource within the study area, if found to be significantly intact and legible, may have significance at a local level.	✓	-
G – Representative An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area).	The construction technologies used at Warragamba represent a culmination of the technology and experience associated with dams constructed in New South Wales through to this period. Key representative attributes include the use of rope and cableways, the building of camps and township to house labourers and tradesmen, building of cottages to house salaried staff, the construction of terraced platforms for plant and machinery, mechanisation of concrete production, the construction of purpose built road of access to transport men, supplies and materials to the site, the building of permanent infrastructure such as water supply and the use of electricity to power plant, equipment and township. The potential archaeological resource within the study area, if found to be significantly intact and legible, may have significance at a local level.	✓	-

6.2.2. Statement of archaeological significance

Prior to the construction of the Warragamba Emergency Scheme in the 1940s the study area was occupied by agricultural land. It is unlikely that archaeological remains pre-dating early 20th century development have been retained.

The study area has moderate to high potential to contain an archaeological resource associated with the construction of the Warragamba Emergency Scheme, including earlier structures, evidence of former technologies, and the workers construction camp and township which developed throughout the 1930s to 1960s. There is potential that archaeological remains associated with these

developments are retained within the study area. This resource, if found to be substantially intact, would reach the local significance threshold primarily for its historical, social and technological values.

DRAFT

7. PROJECT DESCRIPTION

This Section describes the proposed Warragamba Dam Raising project, including the key proposal elements, ancillary facilities, design standards and construction activities.

Secretary's Environmental Assessment Requirements	Where addressed
2. Environmental Impact Statement	
Desired performance outcome: The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts.	
The EIS must include, but not necessarily be limited to, the following:	
(b) a description of the project, including all components and activities (including ancillary components and activities) required to construct and operate it;	
(i) a demonstration of how the project design has been developed to avoid or minimise likely adverse impacts both upstream and downstream of the dam wall;	

7.1. The project

The project consists of four key elements:

- Demolition or removal of components of the existing Warragamba Dam to allow the project to be built
- Upgrading Warragamba Dam to create FMZ of about 14 metres to temporarily capture floodwaters
- Operational procedures and rules to temporarily capture flood waters in the FMZ and then empty the FMZ in readiness for the next flood event
- Construction and operation of the environmental flows infrastructure.

These elements are described in the following sections.

7.2. Demolition

Some of the existing Warragamba Dam elements and infrastructure would require demolition or removal to enable the project to be built. This includes:

- The existing road and main spillway bridge across the top of Warragamba Dam
- The drum and radial gates associated mechanical and electrical infrastructure and portions of the piers within the main spillway
- The fuse plugs in the auxiliary spillway

- Other minor concrete structures to allow the tie-in of the new dam and spillway elements
- The valve house control room building located at the rear of the valve house
- Minor areas of roads, operational laydown areas, drainage systems and other infrastructure external to but associated with the dam
- Existing gantry crane and associated equipment
- Miscellaneous dam crest services and equipment.

7.3. Project infrastructure

Presented below are brief descriptions of the new and modified infrastructure that would be provided as part of the project. It should be noted that the detailed concept design of the project is occurring concurrently with the preparation of the EIS and consequently there may be minor changes to the project as described below.

- Dam abutments - The dam abutments are located either side of the main spillway and would be buttressed to a thickness of about 18 to 19 metres and raised to about RL 147.47 metres. The left abutment would be extended about 30 metres and a 12 to 15 metre wide road and pathway would be built along the top of the abutments and these would connect with the approaches and road network on either side of the dam
- Main spillway - The main spillway would be buttressed to about 17 metres thick and a new ogee spillway crest would be constructed at about RL128.45 metres. The spillway training walls to the dissipater and dissipater pond would be extended and new conduits and/or slots would be built to allow to control discharges from the FMZ
- Auxiliary spillway - After removal of the fuse plugs, a new 180 metre long concrete ogee spillway would be constructed with a crest level of RL x metres. The spillway base, walls and flip bucket would be modified and reinforced. Additional scour protection would be provided downstream of the flip bucket and in the Warragamba River
- Other infrastructure and elements - Other infrastructure and elements that would be provided as part of the project include new dam access roads, power and communications, landscaping and urban design features and an eel ladder structure
- Environmental flows infrastructure - This would include a multi-level offtake tower at the dam wall, a new flow regulation chamber, valves and a valve box downstream of the dam wall and a new pipeline from the valve box to the Warragamba River to discharge environmental flows.

7.4. Project operation

There would be two different modes of operation of Warragamba Dam including:

1. Normal operation with environmental flow releases

2. Flood operation

Normal operation with environmental flow releases would be the standard operating mode and would occur much of the time. Flood operation mode would only occur infrequently when large rainfall events are predicted.

7.4.1. Normal operations

Warragamba Dam operates most of the time as a water supply dam providing bulk water to its customers, primarily, Sydney Water. Normal operations would occur most of the time when the dam lake level is at or lower than RL116.72 metres – which is the Full Supply Level (FSL). Normal storage operations for the modified dam would be essentially the same as current operations. Inflows would be captured up until the FSL is reached after which either FMZ maintenance or FMZ operations procedures would be implemented.

7.4.2. Environment flow releases

Environmental flow releases would occur when the dam is not in flood capture operations. The objective of environmental flow releases is to mimic the variability of flows in downstream waters that would be experienced if the dam was not in place – and are based on inflows to the dam.

While a specific environmental flow regime is recommended in the Metropolitan Water Plan (a 90/10 scaled flow rule), the final rule for releasing the flows would be refined and reviewed before releases start

7.4.3. Flood operation mode

When a flood event is predicted, the gated conduits would be closed if they are open and the dam would begin to fill with flood water inflows. Assuming the dam was at FSL, the project would capture all flood water inflows up to about a 1 in 20 chance in a year event. For events larger than the 1 in 20 chance in a year event, the FMZ would be completely full and the uncontrolled discharge of water over the central spillway and, potentially, the auxiliary spillway would occur.

7.4.4. Emptying of the flood management zone after rainfall events

The FMZ would be emptied after a rainfall event has finished when the flood peak has passed the downstream areas to ready it for the capture of flood inflows from the next event. The rate of discharge of water from the FMZ is determined by several factors including:

- Ensuring the FMZ is emptied in sufficient time to capture a subsequent flood event
- Minimising the duration of upstream catchment inundation
- Not causing any increase in the extent of flooding downstream of the dam
- The need to maintain one or more downstream bridge river crossings open.

There would be three different emptying protocols, namely:

- Sunny day releases – This would occur when the downstream water levels are typically of dry weather conditions but significant rainfall has occurred in the catchment of Warragamba Dam

- Minor flood releases – This would occur typically when a rainfall event of less than a 1 in 20 chance in a year event had occurred or at the tail end of larger floods
- Major flood releases – this would occur for significant flood events when flow in the downstream river was greater than 230 GL/day.

7.4.4.1. Sunny day releases

Sunny day releases would only be required if there had been significant localised rainfall in the catchment of Warragamba Dam but there had not been corresponding rainfall in the downstream catchments. In this situation there would be the need to release water from the FMZ into the downstream waterways where water levels were typical of dry weather conditions resulting in minor flooding downstream. This type of rainfall pattern occurs infrequently with only one recently known occurrence in 2010. The discharge rate and duration from the FMZ would be determined on a case-by-case basis. Important considerations in the discharge rate and duration would be informing downstream river and floodplain users of the proposed release and potential impacts and the need to maintain bridge crossings of the river open.

7.4.4.2. Minor flood releases

The FMZ would typically have sufficient capacity to store all inflows for flood events up to about the 1 in 20 chance in a year event. While the 1 in 20 chance in a year event is still a relatively large event, with the operation of the project, flooding extents for this event and smaller events would be substantially reduced downstream and therefore the rate of discharge from the FMZ would need to be restricted so as not to cause any increases in the reduced downstream flooding extents. Generally, once inflows into the catchment were lower than the proposed discharge rate, the discharge of the FMZ would commence.

The rate of discharge would be relatively constant for events up to the 1 in 20 chance in a year event and would typically be about 1150 cubic metres per second or about 100 GL/day.

An example hydrograph showing outflows from the dam for the 1 in 20 chance in a year event for both existing conditions and with the project is shown in Figure 1-3.

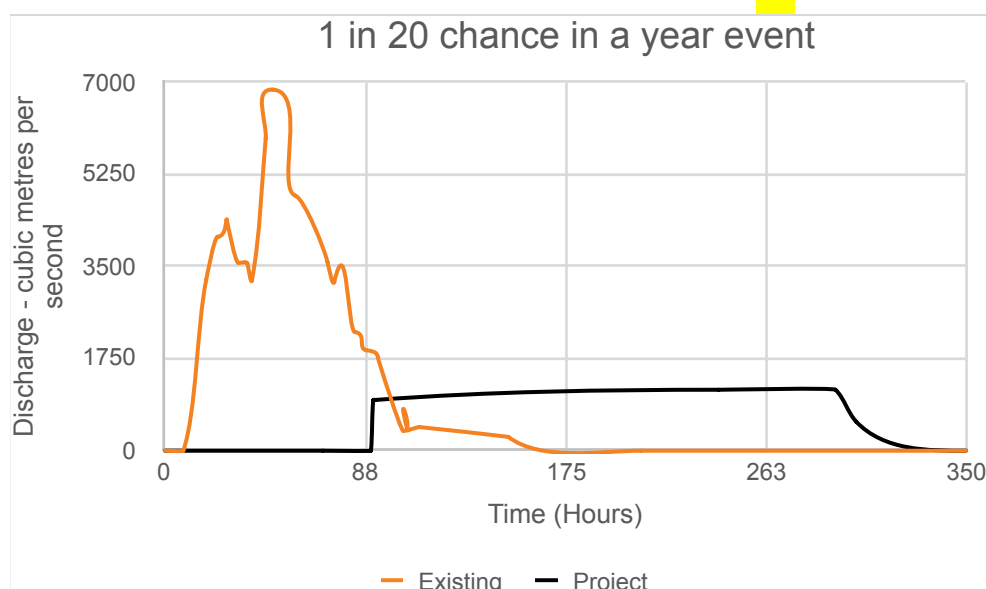


Figure 61 Outflows and discharge from Warragamba Dam for a 1 in 20 chance in a year event

7.4.4.3. Major flood releases

Figure 1-4 shows the hydrograph for outflows from Warragamba Dam for the 1 in 100 chance in a year event for both the existing situation and with the project.

For major rainfall events, the FMZ would only capture a proportion of the inflows and there would still be spills over the central and auxiliary spillways. However, especially for events up to about the 1 in 200 chance in a year event, the flow rate of spills over the dam with the project would be substantially lower than the existing situation. The spills from Warragamba Dam and inflows from other catchments apart from Warragamba Dam would result in flooding downstream albeit to a lesser extent than the existing situation. As the downstream flood levels would be higher, there is the opportunity to initially discharge water from the FMZ at a higher rate without increasing the extent of flooding (i.e. piggy back releases). Generally, these higher discharge rates would occur for about two days before the FMZ discharge rate would be reduced to the same discharge rate as for smaller flood events, namely about 1150 cubic metres per second or about 100 GL/day.

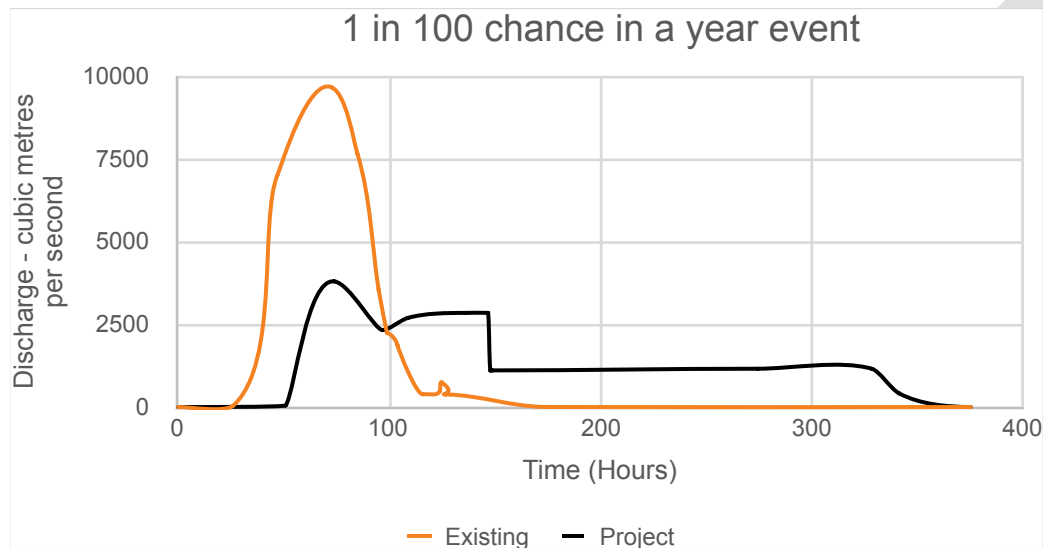


Figure 62 Outflows and discharge from Warragamba Dam for a 1 in 100 chance in a year event

7.5. Project construction

This section describes the likely approach to construction of the project including pre-construction activities, staging, early work, working hours, construction methods, temporary construction facilities, earthworks, materials, waste management, plant and equipment. Detailed construction planning would occur prior to construction commencing and would consider methods and scheduling to manage community and environmental issues including noise, access, amenity and general disruption. The details of construction would be finalised prior to construction and detailed in the Construction Environmental Management Plan (CEMP).

7.5.1. Construction program and staging

A preliminary construction program is presented in Table 1.1 with the project likely to be completed in about four years from commencement. The preliminary construction program is based on a five and half working day week which equates to the standard working hours in the Interim Construction Noise Guidelines (ICNG) (DECC 2009). However, as discussed in Section 1.8.2, some works need to be undertaken outside the standard working hours due to the construction methodology and concrete curing requirements.

Table 61 Preliminary construction program

Activity	Start Month	Finish Month
Set-up Establishment	1	5
Install Main Diversion Cofferdams	5	8
Abutment and central spillway works	8	42
New Outlet Conduits	26	42
Auxiliary Spillway Modifications – Downstream Works & Stage 1 of New Spillway Crest	8	32
Auxiliary Spillway – Stage 2 of New Spillway Crest & New High-Level Bridge	38	45
Demobilisation and Site Rehabilitation	45	49

The abutment works and central spillway works would need to be largely completed before the new auxiliary spillway crest can be completed. This is to allow water to be discharged via the auxiliary spillway if a major flood event was to occur during construction. However, Stage 1 of the new auxiliary spillway crest and upgrades of the auxiliary spillway chute would be undertaken during the main dam raising works.

7.5.2. Construction methodology

The stages and elements of the construction works include:

- Early works
- Enabling works
- Flood and dewatering works
- Abutment works
- Central spillway works
- Auxiliary spillway works
- Environmental flows infrastructure
- Other works.

7.5.3. Construction of ancillary facilities

Auxiliary construction facilities would be required to support the dam raising and these would include:

- Concrete batching facilities – It is not feasible to mix concrete at an off-site facility and then transport it to site. Potentially two onsite concrete batching facilities would be constructed – one in Havilland Park and one on a paved area near the valve house

- Boat ramp – the existing boat ramp and wharf west of the auxiliary spillway would be used to provide access to the dam for water based construction activities
- Main site office and worker's facilities – these would consist of demountable buildings
- Access road to dam wall base – There is an existing access road from the end of the auxiliary spillway to the end of the dissipater pool. This would be upgraded and extended to allow improved access the base of the dam wall in the central spillway area. An access from the left bank to the base of the dam wall would also be constructed
- Materials lay-down and storage areas.

7.5.4. Construction materials

Raw materials to produce concrete would generate most of construction materials required for the project. The estimated volume and type of concrete for the main components of construction are presented in Table 12.

Table 62 Volume and type of concrete required

Project element	Cubic metres of concrete
Foundation works – main dam and spillway (conventional concrete)	1160
Abutment and central spillway buttressing and raising (mass concrete)	440,000
Crest kerbs, spillway training walls and conduits (reinforced concrete)	6418
Bridge beams and piers (conventional concrete)	8575
Auxiliary Spillway overflow and crest (mass concrete)	80,850
Auxiliary Spillway apron, crest, walls, base and erosion protection (reinforced concrete)	10,875
Total	547,878

Based on the likely concrete mixes, the weight of different constituents of the concrete is presented in Table 13. There would be two types of concrete produced – a conventional concrete mix that is typically used in most construction projects and a special mass concrete mix which would be used for the dam and auxiliary spillway walls. The main component of the concrete mixes are aggregates both fine (sand) and coarse aggregates. An assessment of potential sources of aggregates was undertaken (NSW Public Works 2015) and quarries in the Blue Mountains, Southern Highlands, Central Coast and South Coast were identified as potential sources of coarse aggregates. Quarries in any of the four areas may have the capacity and quality of material to be able to meet the project's requirements. However, further assessment of the suitability and cost of the aggregates from individual quarries need to be undertaken during the detailed design before a source can be definitively identified. The quarries are about 95 to 150 kilometres from Warragamba Dam.

Further investigation also needs to be undertaken to determine the suitability and location of sand resources to supply the project. However, sand extraction within the Warragamba Dam catchment has been discounted because of potential environmental impacts and logistical difficulties.

Fly ash would be sourced from a power station in the region. Cement would be sourced from suppliers in the Sydney region.

Table 63 Weight of materials for concrete production

Materials	Kilograms per cubic metre of Structural concrete	Kilograms per cubic metre of Mass concrete	Total weight 1 (Tonnes)
Cement	240	100	64,428
Fly ash	80	135	79,725
Coarse aggregate	1100	1250	748,870
Fine Aggregate (Sand)	800	800	482,131

The amount of other materials required for construction is presented in Table 14.

Table 64 Other construction materials [TO BE COMPLETED ONCE INFORMATION RECEIVED]

Materials	Total weight (Tonnes)
Steel for reinforcing	1486
Other steel elements	?
Engineering fill	?
Rock gabion	?
Other	?

8. HERITAGE IMPACT ASSESSMENT

8.1. Methodology

This assessment has been prepared using the Statement of Heritage Impact 2002,⁷⁰ prepared by the NSW Heritage Office, contained within the NSW Heritage Manual, as a guideline.

8.1.1. Impact terminology

A detailed assessment is provided for direct, potential direct, indirect and archaeological impacts. Each type of impact is described in Table 7.1.

Table 7.1: Artefact Heritage terminology for heritage impact types

Impact	Definition
Direct	Impacts resulting from works located within the curtilage boundaries of the heritage item.
Potential direct	Impacts resulting from increased noise, vibrations and construction works located outside the curtilage boundaries of the heritage item.
Indirect	Impact to views, vistas and setting of the heritage item resulting from proposed works outside the curtilage boundaries of the heritage item.
Archaeological	Impacts to potential archaeological remains located within the curtilage boundaries of the heritage item.

Specific terminology and corresponding definitions are used in this assessment to consistently identify the magnitude of the project's direct, indirect or potentially direct impacts on heritage items or archaeological remains. The terminology and definitions are based on those contained in guidelines produced by the International Council on Monuments and Sites (ICOMOS)⁷¹ and are shown in Table 7.2.

Table 7.2: Terminology for assessing the magnitude of heritage impact.

Magnitude	Definition
High	Actions that would have a long-term and substantial impact on the significance of a heritage item. Actions that would remove key historic building elements, key historic landscape features, or significant archaeological materials, thereby resulting in a change of historic character, or altering of a historical resource. These actions cannot be fully mitigated.
Moderate	This would include actions involving the modification of a heritage, including altering the setting of a heritage item or landscape, partially removing archaeological resources, or the alteration of significant elements of fabric from historic structures. The impacts arising from such actions may be able to be partially mitigated.
Low	Actions that would result in the slight alteration of heritage buildings, archaeological resources, or the setting of an historical item. The impacts arising from such actions can usually be mitigated.
Neutral	Actions that would have no heritage impact.

⁷⁰ NSW Heritage Office 2002

⁷¹ Including the document *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*, ICOMOS, January 2011.

Magnitude	Definition
Positive	Actions that would have no heritage impact and may result in positive outcomes.

8.1.2. Assessing flooding impacts

Defining impacts for the World and National places upstream and downstream of the dam wall was based upon the results of site survey, input from the bio-diversity and ecological technical reports, and the utilisation of this information in assessing the impacts measured against the criteria of the *Matters of National Environmental Significance Significant Impact Assessment Guidelines 1.1*.

Places impacted by construction activities will be directly assessed against OEH criteria as outlined in the NSW Heritage Manual and other guidelines.

Assessment of impact to downstream heritage items was based on projections of Annual Exceedance Probability (AEP), and based on the following:

- If flooding will occur
- The extent of a place's curtilage impacted
- Changes in length of flooding
- Changes in depth of flooding
- Changes in the velocity of flooding [Placeholder: waiting on velocity information]

The AEP's investigated by this assessment are the 20%, 10%, 5%, 2%, 1%, and the PMF.

The impact assessment is based on the following assumptions:

- A lower AEP would result in higher impacts to heritage items, but are less likely to occur
- A higher AEP would result in fewer impacts to heritage, but are more likely to occur

The impact of the 20% AEP was of particular interest, as this would retain the floodwaters for longest upstream and create a longer period of flooding downstream.

Therefore, to provide a basis for discussion, impact levels for each AEP were defined by the criteria in Table 7.3, which considers flooding extent, duration, height, and velocity.

The values for each of the criteria were then added together to determine the total impact for each heritage item, at each AEP. These total impacts are summarised in Table 7.4:

For each heritage item, the average impact score from all six AEP's was then calculated. This provided an overall assessment of impact to each place. Heritage impact levels were assigned a score as summarised in Table 7.5.

Example: A heritage item which was assessed with three positive (-3), two minor (2), and a moderate (2) impact would have a total impact score of 1. Divided by six, the average would be 0.17. This results in an overall impact level between neutral and minor.

Due to the number of heritage listed places within the Referral Area downstream of the Project, the majority of heritage items have been assessed in Appendices 1-7. Impact to heritage items included in the Appendices has been assessed as being low, neutral or positive.

Where impact to a heritage item has been assessed as being moderate or high, these items have been further discussed in this section.

Table 7.3: Impact assessment criteria

Impact Score	Curtilage	Depth	Duration	Velocity
0	Out of AEP Zone	Out of AEP Zone	Out of AEP Zone	Out of AEP Zone
-2	Clear of inundation	Clear of inundation	Clear of inundation	Clear of inundation
-1	Less inundation	Less depth	Less duration	Lower velocity
0	Same inundation	Same depth	Same duration	Same velocity
1	More inundation	More depth	More duration	Higher velocity Placeholder: waiting on velocity information

Table 7.4: Impact assessment scores

Impact Score	Assessed Impact
-6 to -1	Positive
0	Neutral
1	Low
2	Moderate
3	High

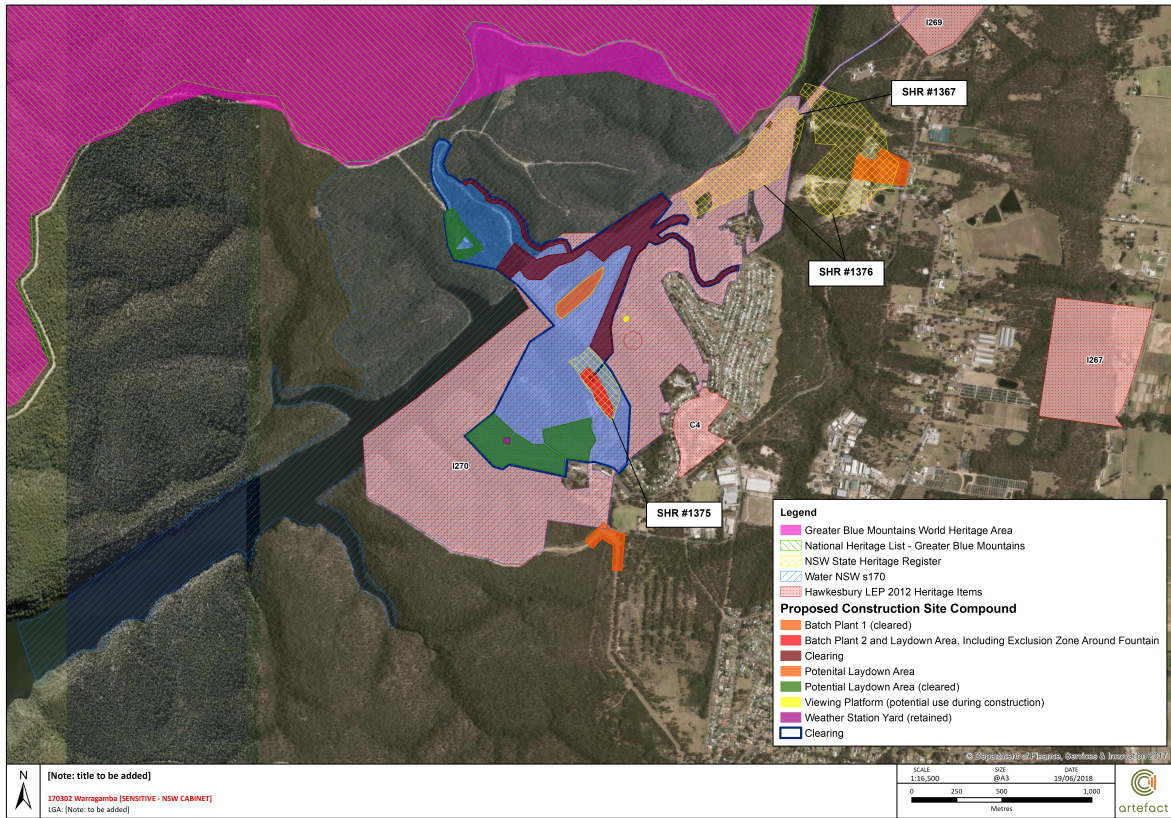
Table 7.5: Average impact level scores

Assessed Impact	Impact Level Score
-6 to -1	Positive
0	Neutral
1	Low
2	Moderate
3-4	High

8.1.3. Mitigation and management measures

Management measures have been recommended in Section 8 to mitigate potential impact to archaeological resources. These recommendations utilise the following guidelines:

- NSW Heritage Manual (Heritage Office and Department of Urban Affairs and Planning 1996)
- Interpreting Heritage Places and Items: Guidelines (NSW Heritage Office 2005)
- Heritage Interpretation Policy (NSW Heritage Office 2005).



8.2. Potential impacts to listed sites

8.2.1. Summary of heritage places

The assessment of heritage places within the Referral Area has determined that a total of 1,132 statutory listings are present, which include:

- EPBC Act (18);
 - World Heritage List – 3;
 - National Heritage List – 3;
 - Commonwealth Heritage List – 11;
- NSW Heritage Act (196);
 - State Heritage List – 81;
 - NSW Historic Shipwreck Database – 8;
 - s170 Registers – 86; and
- Local Environment Plans – 939.

In some instances, a single place is represented on several statutory lists, or has its curtilage split and listed more than once. Where curtilages are split, an assessment was undertaken for the entire combined curtilage, thus there are less LEP places in the appendices than noted above.

8.3. World Heritage List

For detailed impact tables, see Appendix 1, which provides an assessment of each place against each flood event assessed and the overall assessment for each place as well as mapping the overall impacts to places.

8.3.1. Greater Blue Mountains Area (WHL Place ID 105127)

8.3.1.1. Physical impact assessment

Impact of the Project to the WHL Greater Blue Mountains Area are noted in the impact tables as having a high impact through the mechanism of this assessment's methodology (Appendix 1). This impact covers areas both upstream and downstream of the dam wall, and is examined in more detail below.

Areas downstream of the dam wall will see a reduction in flood heights and extension of flood duration. The overall impact observed from the six events examined downstream would only affect small areas on the edge of the Greater Blue Mountains Area curtilage around Colo and Colo Heights. The impacts in these areas across the six scenarios are considered to be negligible given the nature of the flood mitigation impact of the Project.

The main impacts to the WHL Greater Blue Mountains Area relate to areas upstream of the dam wall. Around 1,303 hectares of the listed curtilage of the place are within the proposed inundation levels.

These areas of the item's curtilage would be directly impacted through the retention of flood waters at a higher level over an extended period of time. This area would constitute around 0.12% of the item's WHL curtilage. Inundation levels would impact sections of affected streams and rivers within the Greater Blue Mountains Area including Coxs River and Coxs River Arm, Kedumba River, Wollondilly River, Nattai River, Little River and associated creeks.

The diversity and intactness of the habitats and plant communities within the Greater Blue Mountains Area are a key aspect of the property's Outstanding Universal Value, with its habitats and plant communities supporting globally significant species and ecosystem diversity. The proposed increase in inundation levels within affected parts of the Greater Blue Mountains Area would result in permanent environmental changes to the ecosystems and ecology of these areas. **Editorial note: Integrate findings from Biodiversity Report when available**

Increased inundation levels and duration upstream of the dam wall would additionally impact occupation sites and deposits within the Greater Blue Mountains Area that provide tangible evidence of the place's longstanding Aboriginal connections. As outlined in the description of the property's Outstanding Universal Value, the conservation not only of the natural beauty of the Greater Blue Mountains but also its Aboriginal associations contributes to its integrity and World Heritage values. Impact to Aboriginal sites upstream of the dam wall would therefore diminish the exceptional WHL values of the Greater Blue Mountains Area. **Editorial note: Integrate findings from Aboriginal Assessment when available**

The Project would result in an overall high direct (physical) impact to the WHL Greater Blue Mountains Area.

8.3.1.2. Visual impact assessment

The Project would result in visual changes to affected portions of the Greater Blue Mountains Area within the raised inundation levels, mainly by way of scarring. **Editorial note: Integrate findings from Visual Impact Assessment and Biodiversity Report when available**

The Project would result in an overall moderate indirect (visual) impact to the WHL Greater Blue Mountains Area.

Editorial note: Impact to Greater Blue Mountains Area natural and cultural values can only be confirmed in reference to the findings of the Biodiversity Report, Aboriginal Assessment and Visual Impact Assessment.

8.3.1.3. EPBC Major Guideline Questions

The Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013) pose a series of questions on the nature of the impact to the heritage values of a World Heritage property or National Heritage Place which are to be considered when assessing the potential impact of a proposed action on items of World or National heritage.

These questions have been considered with reference to the potential impacts associated with the proposed action as follows:

1. Are there any matters of national environmental significance located in the area of the proposed action (noting that 'the area of the proposed action' is broader than the immediate location where the action is undertaken; consider also whether there are any matters of national environmental significance adjacent to or up/ downstream from the immediate location that may potentially be impacted)?

Yes, construction of the proposed action would occur both upstream and downstream of the World (and National) Heritage Property. Portions of the World (and National) Heritage Property are located within the proposed increased inundation levels of the Referral Area.

2. Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?

Yes, the proposed action would result in permanent changes within around 1,303 hectares of the Greater Blue Mountains Area, which constitutes around 0.12% of the World (and National) Heritage Property. This includes direct impacts to the natural and cultural values of the Greater Blue Mountains Area, as addressed in the associated Aboriginal Cultural Heritage Impact Assessment and Biodiversity Assessment Report. *Editorial note: Integrate findings from Biodiversity Report and Aboriginal Assessment when available*

3. Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?

No, there are no proposed measures to avoid or reduce the level of impact to the World (and National) Greater Blue Mountains Area. *Editorial note: Integrate findings from Biodiversity Report and Aboriginal Assessment when available.*

4. Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts (important, notable, or of consequence, having regard to their context or intensity)?

Yes, the proposed action would result in permanent changes within approximately 0.12% of the World (and National) Heritage Property. This includes impacts to the natural and cultural values of the Greater Blue Mountains Area, as addressed in the associated Aboriginal Cultural Heritage Impact Assessment and Biodiversity Assessment Report. *Editorial note: Integrate findings from Biodiversity Report and Aboriginal Assessment when available.*

8.3.1.4. Significant Impact Criteria

The Significant Impact Criteria outlined in the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013)* are intended to assist in determining whether the impacts of a proposed action on any matter of national environmental significance are likely to be significant impacts. Table 7.6 presents an assessment against the heritage values for the Greater Blue Mountains Area.

Table 7.6: Assessment against Significant Impact Criteria

Significant Impact Criteria	Impact to Greater Blue Mountains Area
Permanently remove, destroy, damage or substantially alter the fabric of a World Heritage property or National Heritage Place in a manner which is inconsistent with relevant values	Yes
Extend, renovate, refurbish or substantially alter a World Heritage property or National Heritage Place in a manner which is inconsistent with relevant values	No
Permanently remove, destroy, damage or substantially disturb archaeological deposits or artefacts in a World Heritage property or National Heritage Place	Yes
Involve activities in a World Heritage property or National Heritage Place with substantial and/or long-term impacts on its values	Yes
Involve construction of buildings or other structures within, adjacent to, or within important sight lines of, a World Heritage property or National Heritage Place which are inconsistent with relevant values	No

Significant Impact Criteria	Impact to Greater Blue Mountains Area
Make notable changes to the layout, spaces, form or species composition in a garden, landscape or setting of a World Heritage property or National Heritage Place which are inconsistent with relevant values	Yes
Alter the setting of a World Heritage property or National Heritage Place in a manner that is inconsistent with relevant values	No

8.3.2. Australian Convict Sites (Old Great North Road) and buffer zone (WHL Place ID 106209)

8.3.2.1. Physical impact assessment

Impact of the Project to the WHL Australian Convict Sites (Old Great North Road) are noted in the impact tables as having a positive impact through the mechanism of this assessment's methodology (Appendix 1). This is due to a reduction in flood levels across parts of the curtilage closest to the Hawkesbury-Nepean. *Editorial note: more analysis to be added into next draft*

The Project would result in a positive direct (physical) impact to the WHL Australian Convict Sites (Old Great North Road).

8.3.2.2. Visual impact assessment

It is not anticipated that the Project would result in any visual changes to portions of the Australian Convict Sites (Old Great North Road) within the Referral Area. No changes are proposed within the World (and National) property, and the reduction in flood levels within the item's curtilage that are close to the Hawkesbury-Nepean would minimise future changes to the visual appearance and configuration of the item's fabric.

The Project would result in a neutral indirect (visual) impact to the WHL Australian Convict Sites (Old Great North Road).

8.3.2.3. EPBC Major Guideline Questions

The *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (2013) pose a series of questions on the nature of the impact to the heritage values of a World Heritage property or National Heritage place which are to be considered when assessing the potential impact of a proposed action on items of World or National Heritage.

These questions have been considered with reference to the potential impacts associated with the proposed action as follows:

1. *Are there any matters of national environmental significance located in the area of the proposed action (noting that 'the area of the proposed action' is broader than the immediate location where the action is undertaken; consider also whether there are any matters of national environmental significance adjacent to or up/ downstream from the immediate location that may potentially be impacted)?*

Yes, the proposed action would occur in proximity to the Australian Convict Sites (Old Great North Road), involving parts of the curtilage closest to the Hawkesbury-Nepean.

2. *Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?*

No impacts to World Heritage values associated with the Australian Convict Sites (Old Great North Road) are anticipated by the proposed action, with reduction in flood levels in areas close to the World (and National) Heritage Property resulting in a positive outcome.

3. *Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?*

The proposed action provides flood mitigation that would reduce flood levels in areas of the Hawkesbury-Nepean in proximity to the Australian Convict Sites (Old Great North Road). This would protect the World Heritage values of the property.

4. *Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts (important, notable, or of consequence, having regard to their context or intensity)?*

No. The proposed action is not expected to impact on matters of national environmental significance.

8.3.2.4. Significant Impact Criteria

The Significant Impact Criteria outlined in the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2013)* are intended to assist in determining whether the impacts of a proposed action on any matter of national environmental significance are likely to be significant impacts. Table 7.7 presents an assessment against the heritage values for the Australian Convict Sites (Old Great North Road).

Table 7.7: Assessment against Significant Impact Criteria

Significant Impact Criteria	Impact to Australian Convict Sites (Old Great North Road)
Permanently remove, destroy, damage or substantially alter the fabric of a World Heritage property or National Heritage Place in a manner which is inconsistent with relevant values	No
Extend, renovate, refurbish or substantially alter a World Heritage property or National Heritage Place in a manner which is inconsistent with relevant values	No
Permanently remove, destroy, damage or substantially disturb archaeological deposits or artefacts in a World Heritage property or National Heritage Place	No
Involve activities in a World Heritage property or National Heritage Place with substantial and/or long-term impacts on its values	No
Involve construction of buildings or other structures within, adjacent to, or within important sight lines of, a World Heritage property or National Heritage Place which are inconsistent with relevant values	No
Make notable changes to the layout, spaces, form or species composition in a garden, landscape or setting of a World Heritage property or National Heritage Place which are inconsistent with relevant values	No
Alter the setting of a World Heritage property or National Heritage Place in a manner that is inconsistent with relevant values	No

8.4. National Heritage List

For detailed impact tables, see Appendix 2, which provides an assessment of each place against each flood event assessed and the overall assessment for each place as well as mapping the overall impacts to places.

8.4.1. The Greater Blue Mountains Area (NHL Place ID 105999)

The assessed heritage impacts on the values of the NHL Greater Blue Mountains Area are covered above for its World Heritage listing (refer to Section 7.3). It is noted that a larger portion of the NHL curtilage of the Greater Blue Mountains Area would be impacted by the raised dam levels. Around 1,420 hectares of the NHL curtilage are within the proposed inundation levels, which would constitute around 0.13% of the item's curtilage.

8.4.2. The Greater Blue Mountains Area - Additional Values (NHL Place ID 105696)

The assessed heritage impacts on the values of the NHL Greater Blue Mountains Area – Additional Values are largely consistent with the findings above for its World Heritage listing (refer to Section 7.3).

It is noted, however, that a larger portion of the Additional Values listing would be impacted by the raised dam levels. This is due to the curtilage extending down to the current FSL around the dam. Around 5,774 hectares of the listed curtilage of the Greater Blue Mountains Area – Additional Values are within the proposed inundation levels.

As previously covered, increased inundation levels and duration upstream of the dam wall would result in permanent changes to the ecology of affected areas and would additionally impact Aboriginal sites and places within the Greater Blue Mountains Area. The description of the property's Outstanding Universal Value indicates importance of both the natural and cultural values of the Greater Blue Mountains Area.

Editorial note: Integrate findings from Biodiversity Report and Aboriginal Assessment when available

8.4.3. Great North Road, Wisemans Ferry to Bucketty (NHL Place ID 106318)

The assessed heritage impact on the values of the NHL Great North Road, Wisemans Ferry to Bucketty heritage item are covered above for its World Heritage listing (refer to Section 7.3). The lowering of the flood levels will protect larger elements of the curtilage of the place and result in a generally positive impact. As covered above, this reduction in impact is not considered to be a significant impact under the Significant Impact guidelines and would support the aims of the National Heritage Principles in protecting a place's values. **Editorial note: more analysis to be added into next draft**

8.5. Commonwealth Heritage List

Impacts to places on the CHL are considered to be neutral across the six scenarios investigated with minor impacts in some events offset by positive impacts in other events. No place on the CHL suffers impacts that would be regarded as significant under the Significant Impact guidelines and the overall neutral impacts are considered to be in line with the Commonwealth Heritage Principles.

Editorial note: more analysis to be added into next draft

For detailed impact tables, see Appendix 3.

8.6. State Heritage Register

The general assessment of impact to SHR places is that the Project would generally result in positive impacts, with minor impacts across the six events examined in some places. No place downstream suffers more than a minor impact in any impact scenario, and in many instances the impacts across all six scenarios are neutral or positive. *Editorial note: more analysis to be added into next draft*

The assessment of impact across the downstream SHR places is considered generally positive and will lead to improved protection of State heritage in the downstream areas by the proposed dam wall raising. For detailed impact tables, see Appendix 4, which provides an assessment of each place against each flood event assessed and the overall assessment for each place.

The places assessed below are those that have a higher level of assessed impact (moderate or high) or those that are within the construction zone of the dam works. This includes the SHR listed Haviland Park and Warragamba Emergency Scheme.

8.6.1. Warragamba Dam - Haviland Park (SHR No. 01375)

The Project would result in a range of physical and visual impacts to the SHR listed Haviland Park, which is located within the Warragamba Supply Scheme and immediately east of the dam wall site. Covering an area of approximately 10 acres, the recreational space within Haviland Park contains rows of tree plantings, an original concrete fountain base (fountain no longer operable and upper section removed), remnant sections of the dry packed stone retaining wall that surrounded the site and facilities for public use, along with potential for historical archaeology relating to the area's former use as the construction site for the dam. Remnant construction evidence remains within Haviland Park, including existing terraced road alignments and associated machinery.

8.6.1.1. Physical impact assessment

The proposed raising of the dam wall would result in construction of a new bridge over the auxiliary spillway and realignment of a section of Production Avenue within the heritage curtilage of Haviland Park. The proposed realignment of a section of Production Avenue would impact the section of Haviland Park recently modified by landscaping works carried out in 2007. While this portion of the SHR item does not contain any significant elements, the realignment works would result in modifications and reduction of the item's heritage curtilage in this locality.

The proposed temporary use of a large portion of land within Haviland Park as a laydown area/ batching plant during construction works would result in a range of physical impacts, both temporary and permanent. This would include removal of vegetation and ground excavations across the site. While the vegetation within Haviland Park is largely non-original and is associated with replanting works following the December 2001 bushfire, the existing vegetation contributes to the cultural landscape character and setting of the park since its establishment during the 1960s beautification works that occurred following completion of the dam. The remnant concrete base of the original fountain, the centrepiece in the design of the park that is identified in the CMP 2010 as being a component of primary significance to the Warragamba Supply Scheme, would be retained and protected for the duration of the Project.

It is noted that Haviland Park has undergone a series of modifications over time. The northern and western sections of Haviland Park was previously impacted during the construction of the auxiliary spillway between 1998 and 2004, which resulted in excavation of the northern section of the park including removal of roads, car parks and some of the landscaped area, removal of the children's playground and picnic shelter located at the western end of the park, and removal of most exotic plantings and features to allow use of the park as a construction site. The December 2001 bushfire resulted in the loss of many of the remaining original elements within Haviland Park, including several buildings and original plantings throughout the site. In 2007, the Operations and Visitor Information

Centre was constructed on the northern portion of the site, which involved associated landscaping works.

It is understood the selection of Haviland Park as the location for a potential laydown area/batching plant is based on the historic use of this area over time as a construction site, along with the limited availability of cleared areas within the Warragamba Supply Scheme site. Associated archaeological impacts from proposed ground excavations within Haviland Park are covered in Section 7.10 below.

The Project would result in an overall high direct (physical) impact to the SHR listed Haviland Park heritage item.

8.6.1.2. Visual impact assessment

The Project would result in visual impact to the SHR listed Haviland Park for the duration of the Project. Establishment of a laydown area/batching plant, which would remove all trees and vegetation within the item's heritage curtilage and require excavations across the site, would diminish the landscape quality and setting of the park. It is noted that revegetation and landscaping works following completion of the project could mitigate this associated visual impact to the cultural landscape of the park. The establishment of a batching plant and introduction of large machinery in Haviland Park during the project would also obscure significant views from the approaches towards the dam along Farnsworth Avenue, although this visual impact would be temporary in nature.

The Project would result in an overall moderate indirect (visual) impact to the SHR listed Haviland Park heritage item.

8.6.1.3. Conservation policy

The following discussion provides an assessment of the Project against key relevant policies relating to Haviland Park that are contained in the Warragamba Supply Scheme CMP 2010.

Policy – Maintain Public Access

Maintain public access to the designated picnic areas of the Warragamba Dam site including Haviland Park and ensure visitors can view the dam wall in its setting.

The proposed establishment of a potential laydown area/batching plant within much of the heritage curtilage of the SHR listed Haviland Park would restrict public access to this element of primary significance, including the picnic areas, for the duration of the Project. It is noted this impact would be temporary in nature, and the use of Haviland Park as a public space would be reinstated upon completion of work.

Policy – Landscape and Setting

Manage and maintain the cultural landscape areas of the Warragamba Dam site. Manage the natural landscape features of the Warragamba Dam site to reinforce presence and symbolism of the dam wall which adds greatly to the natural drama of the local topography.

The proposed potential laydown area/batching plant within Haviland Park would require removal of all trees and vegetation within the item's heritage curtilage, and excavation across the entire site. While most of the plantings are recent following the construction of the auxiliary spillway and 2001 bushfires, several mature trees remain in the southern end of the park. This includes a series of paperbarks, which are described in the CMP 2010 as dating to the 1970s and having 'obscured in part the form of the space'. The removal of all plantings would result in a direct impact to the landscape quality and setting of the park. Revegetation and landscaping works following completion

of the project could mitigate this associated visual impact to the cultural landscape of the park. The proposed retention and protection of the remnant concrete fountain base within the park would assist in maintaining the cultural landscape qualities of the park.

Policy – Views

Maintain key views to and from the Dam wall and water body.

Establishment of a potential laydown area/batching plant within Haviland Park would result in storage of machinery and equipment in the locality, which could temporarily obstruct views towards the dam wall and water body from the park and approaches along the surrounding access roads. It is noted this impact would be temporary in nature.

Policy – Historical Archaeology

Recognise the potential for historical archaeology within the site, identify it proactively and manage it as an integral component of the heritage value of the Warragamba Dam site.

Policy – Excavation

Minimise impacts to significant archaeological resources when new work is planned and interpret those that embody key aspects of the significance of the Warragamba Dam site.

The proposed potential laydown area/batching plant within Haviland Park would result in ground excavations across the entirety of a site that has been identified as having historic archaeological potential, being the location of the original construction site for the dam. Refer to Section 7.10.

Policy – Archival Recording

Undertake archival recording within the heritage curtilage of Warragamba Dam prior to undertaking major works, including conservation works.

As illustrated in the policy above, the Warragamba Supply Scheme CMP 2010 outlines the requirement for the preparation of an Archival Recording prior to any changes or works within the heritage curtilage of Warragamba Dam. This includes changes to Haviland Park. Mitigation measures to carry out detailed archival recording as part of the Project are covered in Section 8.0.

8.6.2. Warragamba Emergency Scheme (SHR No. 01376)

Editorial note: more analysis to be added into next draft

8.7. S170 Registers

The general assessment of impact to s170 places is that it is generally positive, with minor impacts across the six events examined to some places. No place downstream suffers more than a minor impact in any impact scenario, and in many instances the impacts across all six scenarios are neutral or positive.

The assessment of impact across the downstream s170 places is considered generally positive and will lead to improved protection of State owned heritage in the downstream areas by the proposed dam. For detailed impact tables, see Appendix 5, which provides an assessment of each place

against each flood event assessed and the overall assessment for each place as well as mapping the overall impacts to places.

The places assessed below are those that have a higher level of assessed impact (moderate or high) or are within the construction footprint of the dam works. This comprises the s170 listed Warragamba Supply Scheme, identified as being State significant.

8.7.1. Warragamba Supply Scheme (WaterNSW s170 No. 4580161)

The Project would result in a range of physical and visual impacts to the s170 listed and State significant Warragamba Supply Scheme. The CMP 2010 defines the heritage curtilage of the Warragamba Supply Scheme as a complex comprising the dam wall (including Valve House, Hydro-electric Power Station and various components of the west and east training walls and auxiliary spillway), Lake Burragorang and operating area including western bank, the area downstream of the dam wall including elements of the Warragamba Emergency Scheme comprising Weir, Pumping Station No.9 and Balance Reservoir, the Terraced Garden and Haviland Park, Production Office and works depot area including former barracks area generally bounded by Farnsworth Avenue, Weir Road and Thirteenth Street, and pipelines to Prospect.

8.7.1.1. Physical impact assessment

The Project would involve varying degrees of impact to individual components within the overall heritage item, with the main heritage impacts focused around the dam wall and its associated features comprising the dam wall and its features including crest crane, equipment and commemorative plaques and memorials, the Valve House, landscaped areas of Haviland Park and the Terraced Garden to the east, and the 18t upper tail tower located on the western bank of the dam. Impact to Haviland Park is covered in the previous Section 7.6.1, and it is assessed that the Project would result in a high impact to this component.

The Project would result in permanent physical changes to the dam wall and its current configuration and features. Raising the wall by 14 metres would involve preparation of the downstream face and buttressing the wall with additional cast-in situ unreinforced concrete by up to 19 metres. This would directly impact original fabric of the dam wall itself. The drum and radial gates, associated mechanical and electrical infrastructure, and portions of the piers within the main spillway would be removed and replaced. The lift towers on both abutments would be raised by around 17 metres, and a pathway between 12 to 15 metres wide would be built along the top of the abutments to connect with the approaches.

The proposed buttressing works to the dam wall would necessitate demolition of the existing small annexe building located to the rear and above the main level of the Valve House. Noted in original schematic drawings as an “office”, the annexe building instead appears to have been used as part of the public area as a theatre. Constructed of pre-cast concrete panels, the annexe building is identified in the CMP 2010 as being of primary significance to the Warragamba Supply Scheme and representative of the original design and ongoing working of the place. It is noted the annexe building retains two decorative ceramic murals designed by Australian painter Byram Mansell and originally featured a set of concrete planter boxes by the same artist, although the planter boxes have since been relocated elsewhere on site. Removal of the annexe building would result in a direct physical impact to the Valve House and the broader Warragamba Supply Scheme complex.

The proposed raising of the dam wall would result in changes to significant features on the crest road including the crest crane and associated equipment, and several commemorative plaques/memorials. This involves requirement to remove the crest crane, which is one of the original and practical features of the crest road. The blue-painted and track mounted structure has been retained historically for maintenance works along the crest and gates and emergency operations, and is assessed in the CMP 2010 as being of primary significance to the Warragamba Supply Scheme. The crest storage area was previously relocated with the construction of the auxiliary spillway. Removal of

the crest crane would represent a direct physical impact to the heritage significance and intactness of the Warragamba Supply Scheme complex. The Project would require relocation of plaques and memorials on the crest roadway, including the rectangular polished terrazzo/concrete memorial with brass plaques commemorating the works and the significant persons involved. The memorial, which was unveiled at the opening ceremony of the dam in October 1960, was previously relocated during the construction of the auxiliary spillway. The relocation of memorials and plaques to new locations on the raised dam would not result in any additional impacts to the heritage significance of the Warragamba Supply Scheme complex.

The proposed raising of the dam wall and associated modifications to the left abutment access would also impact the 18t upper tail tower remaining on the western bank of the dam. The 18t upper tail tower demonstrates the original construction and operations processes of the dam and is identified in the CMP 2010 as being of primary significance to the Warragamba Supply Scheme. The Project has been developed to allow for the relocation of the 18t upper tail tower to a proposed new position along the crane rails on the terrace around 30 metres upstream. Retention of the 18t upper tail tower would represent a positive heritage outcome.

The proposed buttressing works to the dam wall would result in minor encroachments into the site of the adjacent terraced gardens, which constituted part of Haviland Park prior to the construction of the auxiliary spillway. This component, featuring ornamental gardens that reflect an ongoing evolution in garden design since the dam's construction, is identified in the CMP 2010 as being of primary significance to the Warragamba Supply Scheme. The terraced garden consists of a central lawn defined by low sandstone walls and surrounded by ornamental planting beds featuring a variety of garden plantings and succulents, and contains a series of stairs and pathways. The proposed establishment of a laydown area/batch plant in this location could result in the removal of vegetation and significant landscape elements, along with ground excavations, and direct impacts to significant fabric within the Warragamba Supply Scheme.

The Project would result in a high physical impact to the s170 Warragamba Supply Scheme heritage item.

8.7.1.2. Visual impact assessment

Raising the wall by 14 metres with abutments for 17 metres would involve preparation of the downstream face and buttressing the wall in mass concrete by up to 19 metres. The increase in height and width of the wall would result in visual changes to the dam's profile and modifications to aspects that are evocative of the original design of the dam wall, which are identified in the CMP 2010 as being of primary significance to the Warragamba Supply Scheme. It is noted the relative dimensions would be proportionately retained and the design would adopt a smooth profile, and that the dam wall in itself has been previously raised and subject to change over time in order to maintain the item's ongoing role and significant use. The demolition of elements in the vicinity of the dam wall, comprising the annexe building to the rear of the Valve House and original machinery like the crest crane, would also result in permanent visual changes to these significant elements of the Warragamba Supply Scheme. The loss of these items would diminish the visual qualities and intactness of the dam site.

The Project would involve clearing of bushland and vegetation adjacent to the dam and its surrounds. The CMP 2010 describes that the built element of the dam contrasts to both the natural and modified vegetated slopes of the valley, which highlights the scale and mass of the dam wall itself, and the surrounding vegetated landscape is identified as playing an important role in defining the landscape character and setting of the Warragamba Supply Scheme. Clearing of vegetation, as such, would result in visual changes that would diminish the landscape setting of the dam, although it is noted that revegetation and landscaping works following completion of the project would mitigate associated visual impacts. Moreover, it is noted that surrounding areas of bushland have been cleared and modified over time with the construction of the dam and subsequent changes.

The Project would result in an overall moderate visual impact to the s170 Warragamba Supply Scheme heritage item.

8.7.1.3. Conservation policy

The following provides an assessment of the Project against key relevant policies relating to the Warragamba Supply Scheme that are contained in the Warragamba Supply Scheme CMP 2010.

Policy – Landscape and Setting

Manage and maintain the cultural landscape areas of the Warragamba Dam site. Manage the natural landscape features of the Warragamba Dam site to reinforce presence and symbolism of the dam wall which adds greatly to the natural drama of the local topography.

The Project, comprising the dam works and associated laydown area/batching plants, would result in changes to the landscape and setting of the Warragamba Supply Scheme. This includes clearing areas of vegetation on the surrounding slopes of the valley, and removal of vegetation and plantings within sites that have been designated as laydown area/batching plants. The removal of bushland and plantings would result in a direct impact to the landscape quality and setting of Warragamba Supply Scheme, although it is noted that revegetation and landscaping works following construction activities of the Project would be able to reinstate the cultural landscape and setting of the dam and mitigate associated visual impact.

Policy – Demolition

Do not demolish elements of Primary heritage significance. Avoid impacts to elements of Contributory significance where possible. Where there is doubt about whether an item can be demolished, seek advice from a suitability qualified heritage specialist.

The Project would result in the demolition of several elements within the Warragamba Supply Scheme heritage item that are identified in the CMP 2010 as being of primary significance, including the annexe building to the rear of the Valve House. The Project would require relocation or demolition of the crest crane and 18t upper tail tower machinery elements, both of which are identified as items of primary significance within the Warragamba Supply Scheme.

These elements are evocative of the original design and operations of the dam, and the demolition of these elements would result in a direct impact to the intactness and integrity of the Warragamba Supply Scheme. Given the Project would allow for the ongoing use and functionality of the dam, which is a key part of the item's heritage significance, these impacts could be acceptable with adequate mitigation measures, as covered in Section 8.0.

Policy – New Construction

New construction within the Warragamba Dam site heritage curtilage, is acceptable provided the new work has been assessed by a heritage specialist and adverse heritage impacts have been minimised.

The preparation of this non-Aboriginal heritage assessment to address the impact of the proposed Warragamba Dam Wall Raising complies with the requirement of this policy in regard to new construction. New construction encompasses the raising of the dam wall, lift towers and training walls and auxiliary spillway walls, a new spillway bridge, new piers and bridge over the raised main overflow spillway, new outlet conduits with gates and baulks, and a new e-flows infrastructure

component. These new elements have been designed to respond to the existing form and overall proportions of the dam wall and associated infrastructure in order to respect the dam's original design, scale and materiality. The mitigation measures covered in Section 8.0 would assist in ensuring the appropriateness of new construction on the heritage significance of the Warragamba Supply Scheme.

Policy – Equipment & Machinery

Where equipment or machinery needs to be replaced, continue the existing practice of leaving the original equipment in situ and fitting the new equipment or machinery next to it unless this will result in negative heritage impacts to items of Primary or Contributory heritage significance.

The proposed raising of the dam wall would require removal of the crest crane located on the existing crest road of the dam wall and relocation of the 18t upper tail tower on the western bank. In keeping with the above policy, there is an opportunity for the crest crane to be relocated elsewhere on site so that original and significant machinery and equipment is retained within the curtilage of the Warragamba Supply Scheme heritage item for interpretive purposes. It is understood the existing crest crane would be abandoned in favour of a 250t mobile crane. Mitigation measures to retain, interpret and archivally record significant equipment and machinery are covered in Section 8.0.

Policy – Interpretation

Continue to develop interpretation programmes for the Warragamba Supply Scheme.

The extensive changes proposed in and around the dam wall would provide an opportunity for the changes to be interpreted and incorporated into the existing interpretation provided at the Warragamba Dam site by WaterNSW. This includes interpretation at the Operations and Visitor Information Centre and surrounding areas of public access comprising Haviland Park, the Terraced Garden, and various nearby lookout locations. This interpretation could form part of the narrative of the overall evolution of the place. Mitigation measures to explore and implement interpretation provisions are covered in Section 8.0.

Policy – Archival Recording

Undertake archival recording within the heritage curtilage of Warragamba Dam prior to undertaking major works, including conservation works.

As illustrated in the policy above, the Warragamba Supply Scheme CMP 2010 outlines the requirement for the preparation of an Archival Recording prior to any changes or works within the heritage curtilage of Warragamba Dam. Mitigation measures to carry out detailed archival recording as part of the Project are covered in Section 8.0.

8.8. NSW Register of Shipwrecks

Due to the natures of the impacts and the unknown condition of and generalised location of the wrecks in the river, it is difficult to determine or measure the nature of the impacts to these places. As such, the impacts to these places is considered minor across all events, in order to acknowledge the changes that will occur to the river, without being able to accurately determine where or how impacts may occur.

The assessment of impact across the downstream wrecks is considered generally minor in nature. For detailed impact tables, see Appendix 6, which provides an assessment of each place against

each flood event assessed and the overall assessment for each place as well as mapping the overall impacts to places. **Editorial note: more analysis to be added into next draft**

8.9. LEP Schedule 5 Registers

The general assessment of impact to LEP places is that it is generally positive, with minor impacts across the six events examined to some places. No place downstream suffers more than a minor impact in any impact scenario, and in many instances the impacts across all six scenarios are neutral or positive.

The assessment of impact across the downstream LEP places is considered generally positive and will lead to improved protection of local heritage in the downstream areas by the proposed dam. For detailed impact tables, see Appendix 7, which provides an assessment of each place against each flood event assessed and the overall assessment for each place as well as mapping the overall impacts to places.

The places assessed below are those that have a higher level of assessed impact (moderate or high), or are within the construction footprint of the dam works, and have previously been covered in earlier sections against their respective SHR or s170 listings.

8.9.1. Warragamba Supply Scheme and Warragamba Emergency Scheme (LEP No. I270)

The Project would result in a range of physical and visual impacts within the LEP curtilage of the Warragamba Supply Scheme and Warragamba Emergency Scheme heritage item.

Impact to the Warragamba Emergency Scheme is covered in the assessment under its SHR listing, refer to Section 7.6.2. Impact to the Warragamba Supply Scheme is covered in the assessment under its s170 listing, refer to Section 7.7.1.

8.10. Archaeological impact assessment

This report has been prepared in accordance with the NSW Heritage Office & Department of Urban Affairs and Planning *NSW Heritage Manual* (1996) and NSW Heritage Office *Statements of Heritage Impact* (NSW Heritage Office, 2002). The guidelines pose a series of questions as prompts to aid in the consideration of impacts due to the proposal. The questions vary in the guideline, depending on the nature of the impact to the heritage site.

8.10.1. Assessment of impact to archaeological remains

The proposed works include a number of activities with the potential to impact on archaeological remains, including vegetation clearance, demolition, levelling and construction works.

Proposed works within areas identified as having potential to contain archaeological remains associated with the Warragamba Dam construction camp include:

- The adaptation of a viewing platform that may be used during construction
- Potential laydown areas
- Vegetation clearance on the westernmost edge of the area of archaeological potential.

The proposal would result in impact to archaeological remains associated with the Warragamba Dam construction camp through vegetation removal and associated excavation works. These works are proposed for the easternmost portion of the area identified as having archaeological potential, and it is not anticipated that the works would result in a substantial impact to potential remains. A laydown area has been proposed for the area of south of the dam. It is assumed that the establishment of a

laydown would require considerable ground disturbance through vegetation removal and levelling works, and is therefore likely to result in a moderate to major impact to archaeological resources in this location.

Proposed works within areas identified as having potential to contain archaeological remains associated with construction of the Warragamba Dam include:

- The establishment of Batch Plant 1, including clearance and demolition of the existing office building to the rear of the valve house
- The establishment of Batch plant 2 and laydown area
- Vegetation clearance
- Construction of the raised dam wall and spillway.

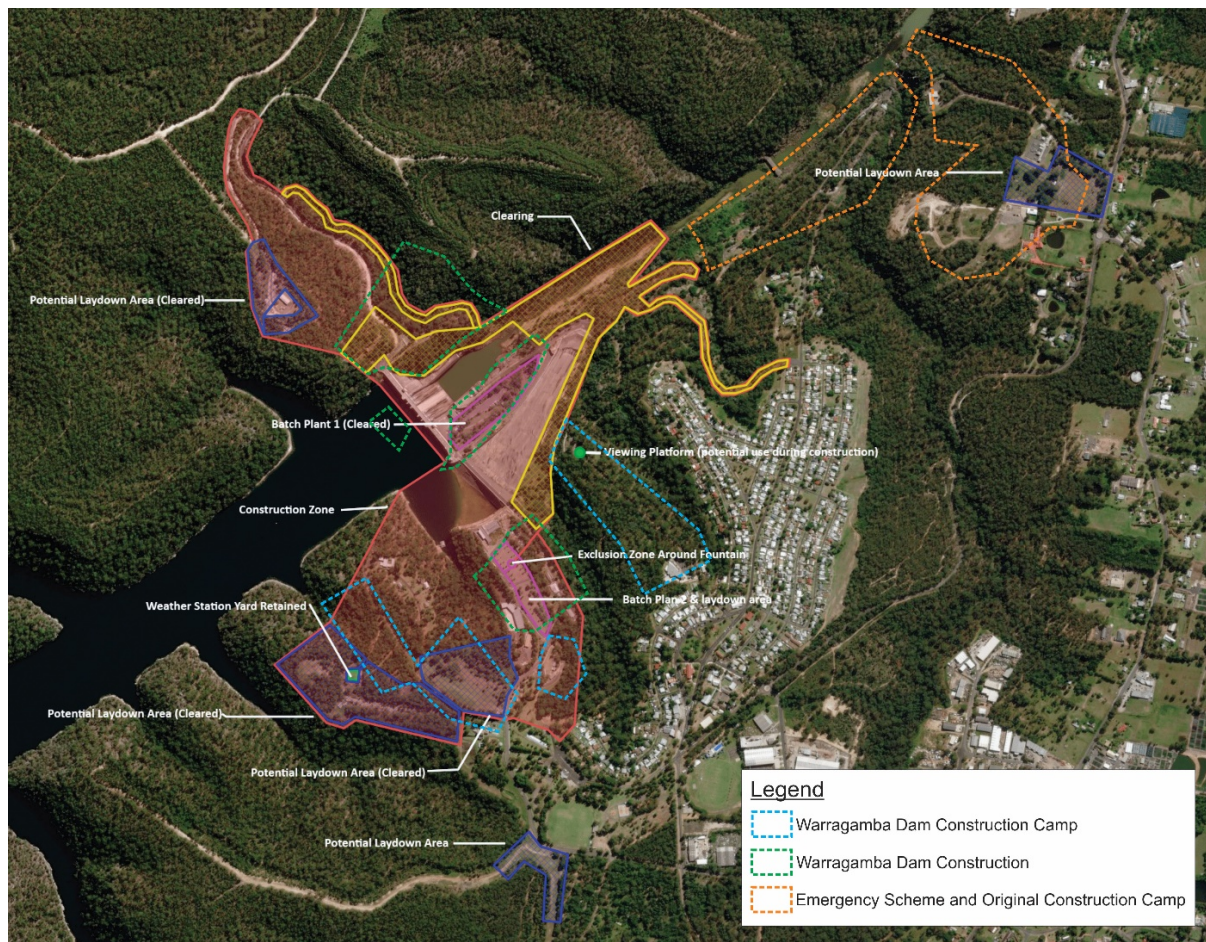
Much of the evidence associated with the construction of the Warragamba Dam was removed in the 1990s during construction of the ancillary spillway, although there are portions of the study area which retain archaeological potential. It is assumed that construction works and vegetation removal in the vicinity of the dam would result in a moderate to major impact to archaeological remains.

Proposed works within areas identified as having potential to contain archaeological remains associated with the Emergency Scheme and Original Construction camp include:

- A potential laydown area in the easternmost portion of the area of archaeological potential.

It is unclear at this stage whether a laydown area will be required in the location identified as having potential to contain archaeological remains associated with the Original Emergency Scheme construction camp. Archaeological remains associated with this historical phase, if intact, have the potential to retain considerable research potential, and would be considered rare in the regional context. Should impact to this area be required, it is assumed impact would include the clearance of the areas and levelling works prior to the establishment of ground slabs and offices/facilities. Works of this type have the potential to result in major impact to archaeological remains.

Figure 7.1: Overlay of archaeological potential on plan of the proposed works



8.11. Cumulative Impact

The nature of this assessment across six scenarios has been to determine the cumulative impact for each of the heritage lists examined. For each of the lists examined through the matrix, and with the further investigation of NHL places upstream of the dam, cumulative impacts across a century of flood events are largely to be considered positive or neutral or minor in most cases downstream.

The cumulative impact of the proposal around the dam itself is considered to result in a series of localised impacts during construction of works and following completion that would represent moderate to high physical and visual impacts, including to the State listed Haviland Park and s170 listed Warragamba Supply Scheme.

[Editorial note: cumulative impact discussion on GBMWA to be completed following review of Aboriginal heritage and Biodiversity reports]

The impacts outlined above, including those within the construction areas of the proposal, are partially offset by the positive impacts downstream, where hundreds of items of local, State, National and World heritage significance would see positive benefits from the proposed dam wall raising and flood mitigation measures.

[Editorial note: cumulative impact section to be finalised when impacts to GBMWA are known]

8.12. Project development and Justification

[Editorial note: to be completed, can SMEC/WaterNSW provide information]

DRAFT

9. MANAGEMENT OF NON-ABORIGINAL HERITAGE

Mitigation measures identified in other technical papers and other chapters of the EIS that are relevant to the management of potential heritage impacts include:

Editorial note – to reference relevant Chapters for Visual Impact Assessment, Biodiversity Report, and Vibration following compilation of draft EIS

Mitigation and management measures are provided below and relevant heritage items concerned summarised for easy reference. These would be implemented to address heritage impacts on non-Aboriginal heritage sites and areas of archaeological potential within the Referral Area.

[Editorial note: Additional mitigation measure in relation to the GBMWA may be added once impacts are confirmed following review of Aboriginal heritage and Biodiversity reports]

Table 122: Mitigation and management measures

Measure	Guidelines	Would apply to
1	<p>Photographic Archival Recording and reporting would be carried out in accordance with the NSW Heritage Office's How to Prepare Archival Records of Heritage Items (1998), and Photographic Recording of Heritage Items Using Film or Digital Capture (2006)</p> <p>The record would be prepared by a suitably qualified heritage consultant using archival-quality material. Records for SHR listed items would be held at the NSW Heritage Council and State Library. Records for LEP-listed items would be held by the local Council and local library. A copy of the record would be held by the owner of the asset.</p>	<ul style="list-style-type: none"> • Haviland Park <ul style="list-style-type: none"> – The fabric of the park and its significant elements – The setting of the park including views to and from the dam wall • Warragamba Supply Scheme <ul style="list-style-type: none"> – Directly impacted parts of the item – The interior, exterior and setting of the dam wall itself and associated structures, including approaches – The fabric and setting of machinery and equipment to be removed or altered – The fabric and setting of memorials and plaques to be removed or altered – The fabric and setting of affected significant buildings, i.e. annexe building to rear of Valve House – The fabric and setting of adjacent terraced garden on eastern bank
2	<p>Appropriate heritage interpretation would be incorporated into the design for the project in accordance with the NSW Heritage Manual, the NSW Heritage Office's Interpreting Heritage Places and Items: Guidelines (August 2005), and the NSW Heritage Council's Heritage Interpretation Policy.</p>	<ul style="list-style-type: none"> • Warragamba Dam site <ul style="list-style-type: none"> – Key locations on site including Operations and Visitor Information Centre, Haviland Park and associated lookouts – Key locations off site including Lake Burragorang lookout • Greater Blue Mountains Area

Measure	Guidelines	Would apply to
	A Heritage Interpretation Strategy for the project would be incorporated into future designs and planning. Opportunities for interpretive displays in appropriate locations would be explored	<ul style="list-style-type: none"> • Warragamba Dam site <ul style="list-style-type: none"> – Key locations on site including Operations and Visitor Information Centre, Haviland Park and associated lookouts – Key locations off site including Lake Burragorang lookout • Greater Blue Mountains Area
3	An appropriately qualified and experienced heritage architect would provide independent review periodically throughout detailed design.	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items
4	The project design would be sympathetic to impacted items (including retained significant elements) and surrounding heritage items by minimising impacts to sight lines, views and setting.	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items
5	Except for heritage significant elements affected by the project, direct impact on other heritage significant items elements would be avoided.	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items
6	Where heritage significant items or elements are to be retained within the construction zone, detailed design would consider appropriate adaptive reuse or interpretive use to be developed in consultation with a heritage architect.	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items
7	A moveable heritage item strategy (including a salvage strategy) would be prepared for the Warragamba Supply Scheme. The strategy would be prepared by a suitably qualified heritage consultant in consultation with WaterNSW, and include a comprehensive record of significant elements to be impacted. This would include items, machinery and equipment, and commemorative plaques and memorials contained within curtilage of the Warragamba Dam site. The moveable heritage item strategy would form part of a broader interpretation strategy for the Warragamba Supply Scheme.	<ul style="list-style-type: none"> • Warragamba Supply Scheme (including but not limited to: impacted significant machinery, equipment, plaques and memorials)
8	Fabric of primary and contributory significance of items proposed for removal would be identified and catalogued according to the significant fabric strategy prior to design development and would be re-used or salvaged where possible. Where not re-used within the design of the project, the significant fabric strategy would indicate appropriate storage locations as well as appropriate off-site locations where the salvaged elements may be reused in the future. Where large elements are impacted a sample of fabric may be appropriate.	<ul style="list-style-type: none"> • Warragamba Supply Scheme (including but not limited to impacted significant machinery, equipment, plaques and memorials)

Measure	Guidelines	Would apply to
9	Methodologies for the removal of existing structures and construction of new structures and infrastructure would be developed to minimise direct and visual impacts to other elements within the curtilages of the heritage items or to heritage items located in the vicinity of works. These methodologies would be included within the overall Construction Environmental Management Plan (CEMP).	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items
10	Site remediation measures related to construction sites would be incorporated within the Urban Design and Landscape Plan. The objective of the remediation would be to minimise long-term impacts on the visual amenity of the items by recreating a sympathetic environment. In particular, a landscape scheme would be prepared for the SHR listed Haviland Park to re-instate planting and landscaping within and around the item's curtilage. The scheme would consider appropriate plantings. Any boundary wall treatment would be designed in consultation with a heritage architect.	<ul style="list-style-type: none"> • Construction zone in relation to all heritage items • Haviland Park
11	<p>An archaeological research design would be prepared and implemented to identify the need for archaeological testing or monitoring. Archaeological mitigation measures recommended in the archaeological research design would be carried out in accordance with Heritage Council guidelines, and where identified in the archaeological research design, would be supervised by a suitably qualified Excavation Director.</p> <p>An Unexpected Finds Policy would be implemented during the project to manage and mitigate potential impacts to the potential archaeological resource.</p>	<ul style="list-style-type: none"> • Warragamba Supply Scheme • Haviland Park
12	Ancillary works required by the project related to batch plant, laydown areas, power supply, drainage facilities and any other works would be designed and constructed to minimise impacts on heritage items and areas of archaeological potential as much as feasible within the context of the project.	<ul style="list-style-type: none"> • Construction zone • Haviland Park
13	Design and construction within the SHR curtilage of Haviland Park would consider the recommendations of the Warragamba Supply Scheme CMP 2010 and the significant fabric strategy.	<ul style="list-style-type: none"> • Haviland Park
14	Design and construction within the s170 curtilage of the Warragamba Supply Scheme would consider the recommendations of the Warragamba Supply Scheme CMP 2010 and the significant fabric strategy.	<ul style="list-style-type: none"> • Warragamba Supply Scheme
15	In response to the prolonged inundation downstream, WaterNSW would develop an owners guide to dealing with the effects of flooding and prolonged exposure to moisture for heritage items within the Referral Area, to assist in preventing additional impact from poor flood recovery techniques. Expert opinion would be sought for providing input into such a guide and heritage values would be considered.	<ul style="list-style-type: none"> • Referral Area

10. REFERENCES

- Australian Government Department of the Environment and Energy, 'Old Great North Road'. Accessed at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;place_id=105961 (21/12/2017).
- Australian Government Department of the Environment and Energy, 'The Greater Blue Mountains Area': Accessed at https://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;place_id=105999 (21/12/2017).
- Australian Government Department of the Environment and Energy, 'The Greater Blue Mountains Area – Additional Values': Accessed at http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place_detail;search=place_name%3Dblue%2520mountains%3Bkeyword_PD%3Don%3Bkeyword_SS%3Don%3Bkeyword_PH%3Don%3Blatitude_1dir%3DS%3Blongitude_1dir%3DE%3Blongitude_2dir%3DE%3Blatitude_2dir%3DS%3Bin_region%3Dpart;place_id=105696 (21/12/2017).
- Australian Government Department of the Environment and Energy, 'Australian Convict Sites Statement of Outstanding Universal Value'. Accessed at: <http://www.environment.gov.au/heritage/places/world/convict-sites/values> (21/12/2017).
- Graham Brooks & Associates, 2010. 'Conservation Management Plan: Warragamba Supply Scheme'.
- Heritage Branch Department of Planning, December 2009. *Assessing Significance for Historical Archaeological Sites and 'Relics'*.
- ICOMOS, *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*, January 2011.
- Kass, T. for the NSW Heritage Office, 2005. 'Western Sydney Thematic History'.
- New South Wales National Parks and Wildlife Service in association with Environment Australia, 1998. *The Greater Blue Mountains Area: World Heritage Nomination*.
- Office of Environment and Heritage, 'Warragamba Dam – Haviland Park'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051483> (03/05/2018).
- Office of Environment and Heritage, 'Warragamba Emergency Scheme'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051484> (03/05/2018).
- Office of Environment and Heritage, 'Track'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051480> (03/05/2018).
- Office of Environment and Heritage, 'Warragamba Supply Scheme'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=4580161> (03/05/2018).
- Office of Environment and Heritage, 'Warragamba Conservation Area'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2690018> (03/05/2018).
- Office of Environment and Heritage, 'Warragamba Dam Group: Ropeway dam, Cableway, Suspension Bridge, Light Railways'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2690016> (03/05/2018).

Office of Environment and Heritage, 'Warragamba Light Railways & Cableways Sites'. Accessed at: <http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2690017> (03/05/2018).

Sydney Catchment Authority, 2013. 'Prospect Reservoir'. Accessed at: <http://www.sca.nsw.gov.au/water/supply/dams/prospect-dam> (21/12/2017).

Thorp, W. 1986. 'Historical Archaeological Component' in Fox and Associates. 1991. Heritage Study of the City of Penrith, Volume 2, Appendix D. Unpublished report to Penrith City Council.

Troy, J. 1993. *King plates: a history of Aboriginal gorgets*.

United Nations Educational, Scientific and Cultural Organization (UNESCO), 'Greater Blue Mountains Area'. Accessed at: <http://whc.unesco.org/en/list/917> (21/12/2017).

DRAFT

11. APPENDIX 1: WORLD HERITAGE PLACES IMPACT TABLES **[EDITORIAL NOTE: ALL TABLES ARE PRELIMINARY ONLY AND SUBJECT TO CHANGE ONCE DATA IS UPDATED AND IMPACTS TO GBM WHA ARE CONFIRMED]**

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF	AVERAGE IMPACT
105127	The Greater Blue Mountains Area	6	6	6	6	6	6	6
106209	Australian Convict Sites (Old Great North Road Buffer Zone)	-3	0	0	0	0	0	-1
106209	Australian Convict Sites (Old Great North Road)	0	0	0	0	0	0	0

12. APPENDIX 2: NATIONAL HERITAGE PLACES IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PMF	AVERAGE IMPACT
105 696	The Greater Blue Mountains Area - Additional Values	6	6	6	6	6	6	6
105 999	The Greater Blue Mountains Area	6	6	6	6	6	6	6
106 232	Thompson Square Conservation Precinct Emergency Listing Request	-3	0	0	0	0	-1	-1
106 318	Great North Road, Wisemans Ferry to Bucketty	-3	0	0	0	0	0	-1

13. APPENDIX 3: COMMONWEALTH HERITAGE PLACES
IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	P M F	AVERAGE IMPACT
105239	King Family Farm Sites and Trees	-1	1	0	0	0	1	0
105240	North Base Trig Station	0	0	0	0	0	1	0
105317	Orchard Hills Cumberland Plain Woodland	0	0	0	0	0	0	0
105534	Shale Woodland Llandilo	0	0	0	0	-1	0	0
105536	Western Sydney Shale Woodland St Marys	-1	0	0	0	0	0	0
105644	Cottage rear Macquarie Grove House	0	0	0	0	0	0	0
105653	RAAF Base Richmond	0	0	0	-1	-1	1	0
105770	Cranebrook Airservices Land	0	0	0	0	0	0	0
105972	RAAF Base - Officers Mess	0	0	0	0	0	0	0
106101	Llandilo International Transmitting Station	0	0	0	0	0	0	0
106176	Camden Post Office	0	0	0	0	0	0	0

14. APPENDIX 4: STATE HERITAGE PLACES IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PMF	AVERAGE IMPACT
00003	Loder House	0	0	0	0	0	1	0
00005	House & Outbuildings	0	0	-1	-1	-1	1	0
00014	Toxana	0	0	0	0	0	1	0
00015	St. Matthew's Anglican Church, Rectory, Stables & Cemetery	-3	-1	0	0	0	1	-1
00024	Lennox Bridge	0	0	0	0	0	0	0
00028	Peninsula House, Tebbutt's Observatory	-3	0	0	0	0	1	0
00035	Hobartville, including outbuildings	-3	0	0	0	0	1	0
00041	Macquarie Arms Hotel	0	0	0	0	0	1	0
00044	Mountain View	0	0	0	0	-1	1	0
00045	House	0	0	0	0	0	1	0
00054	Fernhill	0	0	0	0	0	0	0
00058	Clear Oaks Moxey's Farm House	0	-1	-1	0	0	1	0
00074	Glenmore	0	0	0	-1	-1	1	0
00075	Terrace Building	0	0	0	0	-1	1	0

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PMF	AVERAGE IMPACT
00107	Cottage	-3	-1	0	0	1	1	0
00108	House	0	0	0	-1	-1	1	0
00109	House	0	-1	0	0	0	1	0
00110	Houses	0	-1	-1	0	0	1	0
00114	Imperial Hotel	0	0	0	0	0	0	0
00126	Thompson Square Conservation Area	-3	-1	0	0	0	1	-1
00138	Ebenezer Church (Uniting), Old Schoolhouse, Cemetery & Tree	-3	0	0	0	0	1	0
00142	House	0	-1	0	0	0	1	0
00150	House	-3	-1	0	0	1	1	0
00202	Rev. Peter Turner Cottage and Well	0	0	0	0	-1	1	0
00243	Nant Gwylan and Garden	0	0	0	0	0	0	0
00262	Fairlight Homestead & Barn	0	0	0	0	0	0	0
00264	Mamre	0	0	0	0	0	0	0
00282	Macquarie Arms Inn (former)	-3	0	0	0	0	1	0
00339	Upper Castlereagh Public School and residence	0	0	0	0	0	1	0
00341	Camden Park	0	0	0	0	0	0	0
00346	Glenleigh Estate	-3	-1	-1	0	0	0	-1
00358	Rose Cottage	0	0	0	0	-1	1	0
00373	Bird In The Hand Inn (former)	0	0	0	0	0	1	0

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PM F	AVERAGE IMPACT
00378	Craithes House	0	0	0	0	0	1	0
00385	Camelot	0	0	0	0	0	0	0
00468	Bowman House	0	0	0	0	0	1	0
00493	Macquarie Grove Cottage	0	0	0	0	0	0	0
00598	Stannix Park House, cattle tanks and site	-3	0	0	0	0	1	0
00610	Building	0	0	0	0	0	1	0
00649	Natural Area	0	0	0	0	0	0	0
00667	Simmons Hardware Store	0	0	0	-1	0	1	0
00674	Clydesdale - Grand House, Barn & Cottage	-3	0	0	0	0	1	0
00681	Seymours House	0	0	0	0	0	1	0
00735	Methodist Parsonage (former)	0	0	0	0	0	1	0
00735	Mackenzie House	0	0	0	0	0	1	0
00735	Uniting Church and Hall	0	0	0	0	0	1	0
00738	Claremont Cottage	-3	0	0	0	0	1	0
00753	Building, outbuildings, grounds, trees	0	0	0	0	0	1	0
00804	Windsor Court House	0	0	0	-1	-1	1	0
00971	Fossil Collection	0	0	0	0	0	0	0
00973	Petrology Collection	0	0	0	0	0	0	0
00982	Cattai Estate	-3	0	0	0	0	0	-1

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PM F	AVERAGE IMPACT
01018	Stables at rear of Police Station	0	-1	-1	0	0	1	0
01136	Emu Plains Railway Station group	0	0	0	-1	-1	1	0
01222	Penrith Railway Station group	0	0	0	0	0	1	0
01236	Richmond Railway Station and yard group	0	0	0	0	0	1	0
01237	Riverstone Railway Station and yard group	0	0	-1	0	0	1	0
01249	St. Marys Railway Station Group	0	0	0	0	0	0	0
01287	Windsor Railway Station Group and Former Goods Yard	0	0	-1	-1	0	1	0
01367	Megarritys Bridge	0	0	0	0	0	0	0
01372	Track	0	0	0	0	0	0	0
01375	Warragamba Dam - Haviland Park	0	0	0	0	0	0	0
01376	Warragamba Emergency Scheme	0	0	0	0	0	0	0
01392	Rose Cottage and Early Slab Hut	0	0	0	0	0	1	0
01402	Great Drain and two house sites	-3	0	0	0	0	0	-1
01410	Richmond Post Office	0	0	0	0	0	1	0
01489	Brownlow Hill Estate	0	0	0	0	0	0	0
01683	Australiana Pioneer Village	-3	0	0	0	0	1	0
01697	Camden Park Estate and Belgenny Farm	0	0	0	0	0	0	0
01808	Richmond Park	0	0	0	0	0	1	0
01817	Scheyville National Park	-3	0	0	0	0	0	-1

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PMF	AVERAGE IMPACT
01826	Yobarnie Keyline Farm	0	0	0	0	0	0	0
01830	Emu Plains (Nepean River) Underbridge	-3	1	0	0	0	1	0
01836	Macquarie Schoolhouse/Chapel and St. John's (Blacket) Church	0	0	0	0	0	0	0
01837	Wilberforce Cemetery	0	0	0	0	0	0	0
01843	Government Cottage Archaeological Site	-3	0	0	0	0	1	0
01851	McQuade Park	0	0	0	-1	-1	1	0
01861	Glenbrook Railway and World War Two Mustard Gas Storage Tunnel	0	0	0	0	0	0	0
01866	Blacktown Native Institution	0	0	0	0	0	0	0
01868	Wilberforce Park	0	0	0	0	0	0	0
01877	Colebee and Nurragingy Land Grant	0	0	0	0	0	0	0

15. APPENDIX 5: S170 HERITAGE PLACES IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Name	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF	AVERAGE IMPACT
Administration Building/Quadrangle Buildings and Garden	0	0	0	0	0	1	0
Belgenny Farm, Cottage Monument, Dairy No 2, Macarthur Family Cemetery, Macarthur's Original Bloodli	0	0	0	0	0	0	0
Blacksmith's Shop	0	0	0	0	0	1	0
Building AA - Werrington Park House and Poplar Avenue	0	0	0	0	0	0	0
Camden Court House	0	0	0	0	0	0	0
Camden District Hospital	0	0	0	0	0	0	0
Camden Police Station	0	0	0	0	0	0	0
Cattai Creek Bridge	1	1	1	1	1	1	1
Cottage	-1	-1	-1	-1	-1	1	-1
Dunheved Fire Station	0	0	0	0	0	-3	-1
Eastern Creek Bridge	-1	-1	-1	1	1	1	0
Emu Plains (Lapstone Ck) Underbridge	0	0	0	0	0	1	0
Emu Plains (Nepean River) Underbridge	0	0	0	0	0	1	0
Emu Plains Railway Culvert	0	0	0	0	0	1	0
Emu Plains Railway Station Group	0	0	0	-3	-3	1	-1
Fire Control Objects (movable) - 13 places	0	0	0	0	0	1	0
Four Winds	0	0	0	0	0	-3	-1
Glenbrook Railway Deviation	0	0	0	0	0	0	0
Grandstand, Scoreboard and Oval	0	0	0	0	0	1	0
Great North Road (retaining walls, culverts, road cutting)	0	-1	-1	-1	-1	-1	-1

Name	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF	AVERAGE IMPACT
Hawkesbury River Bridge	-1	1	1	1	1	1	1
Hawkesbury River Bridge, Windsor	-1	-3	1	1	1	1	0
Lapstone (Knapsack Gully) Underbridge	0	0	0	0	0	0	0
Lapstone (Knapsack Gully) Underbridge	0	0	0	0	0	0	0
Loder House	0	0	0	0	0	1	0
Mamre	0	0	0	0	0	-1	0
Margaret Farm & Barn	0	0	0	0	0	-1	0
Mulgrave Railway Residence	0	0	-3	-3	-1	1	-1
Old Police Station	0	0	-3	-3	-1	1	-1
Orchard Hills Reservoir (WS 0083)	0	0	0	0	0	0	0
Owen Carter Memorial Chapel	0	0	0	0	0	1	0
Peach Tree Creek Bridge	0	0	-3	-3	-3	1	-1
Penrith Railway Station Group and Residence	0	0	0	0	-3	1	0
Penrith Weir	1	1	1	1	1	1	1
Pitt Town Water Pumping Station (WP0064)	-1	-3	-1	-1	1	1	-1
Richmond Courthouse and Police Station	0	0	0	0	0	1	0
Richmond Police Station and Court House	0	0	0	0	0	1	0
Richmond Railway Station Group	0	0	0	0	0	1	0
River Farm	-1	-1	-1	-1	-1	1	-1
Riverstone Police Station	0	0	0	-3	-3	1	-1
Riverstone Railway Station Group and Residence	0	0	-3	-3	-1	1	-1
Rooty Hill Railway Station Group	0	0	0	0	0	0	0
Rose Cottage and Early Slab Hut	0	0	0	0	0	1	0
Sackville Ferry Crossing, Sackville	-1	1	1	1	1	1	1
South Creek Bridge (Eastbound)	0	0	0	0	0	1	0
St Marys Railway Station Group	0	0	0	0	0	0	0
Stable Square, Surrounding Lawns and Palm Trees	0	0	0	0	0	1	0
State Records Movable Heritage - Furniture and Memorials	0	0	0	0	0	0	0
Theresa Park Weir	0	0	0	0	0	0	0

Name	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	PMF	AVERAGE IMPACT
Torquay	0	0	0	0	0	-1	0
UWS Campus Planned Landscape	0	0	0	0	0	1	0
UWS Campus, Nature Reserve and Castlereagh Jewel Beetle Habitat And Movement	0	0	0	0	0	1	0
Victoria Bridge over Nepean River	-1	1	-1	-1	-1	1	0
Warragamba Sewage Treatment Plant	0	0	0	0	0	0	0
Windsor (Elevated) Reservoir (WS 0140)	0	0	0	0	0	1	0
Windsor Courthouse	0	0	0	-3	-3	1	-1
Windsor Fire Station	0	0	0	0	0	1	0
Windsor Police Station	0	-3	-3	-1	-1	1	-1
Windsor Railway Station Group and Former Goods Yard	0	0	-3	-1	-1	1	-1
Windsor Water Pumping Station (WP00062)	-1	-1	-1	1	1	1	0
Wisemans Ferry Police Station and Official Residence	0	0	0	0	0	0	0
Wool Classing Building	0	0	0	0	0	1	0
Wool Pack Inn (Ruin)	0	0	0	0	0	1	0
Yarramundi House and Cottages	0	0	0	0	0	1	0

16. APPENDIX 6: NSW HISTORIC SHIPWRECK DATABASE
IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2% AEP	1 % AEP	PMF	AVERAGE IMPACT
2580	Government Wharf - Windsor	1	1	1	1	1	1	1
2585	Windsor wharf	1	1	1	1	1	1	1
2659	Isabel	1	1	1	1	1	1	1
2661	RAAF Wapiti	1	1	1	1	1	1	1
2662	RAAF Aircraft	1	1	1	1	1	1	1
2668	Gipsy Moth	1	1	1	1	1	1	1
2671	Aero Club Aircraft	1	1	1	1	1	1	1
2674	Narara	1	1	1	1	1	1	1

17. APPENDIX 7: LEP HERITAGE PLACES IMPACT TABLES

DRAFT

Colour	Impact Level
	Positive
	Neutral
	Low
	Moderate
	High

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVERAGE IMPACT
I304	'Huxley's Blacksmith Shop'	-3	-1	-3	-1	-1	1	-1
C4	Thompson Square Conservation Area	-3	-3	-1	-1	-1	1	-1
I277	Cottage	-3	-1	-1	-1	-1	1	-1
I316	Pair of cottages	-3	-1	-1	-1	-1	1	-1
I1007	Slab barn	-3	-1	-1	-1	-1	1	-1
C3	North Street Conservation Area	-3	-1	-1	-1	-1	1	-1
I14	Grounds and landscaping surrounding 'Hobartville'	-3	-1	-1	-1	-1	1	-1
I00738	'Claremont Cottage'	-3	-1	-1	-1	-1	1	-1
I444	'Bronte'	-3	-1	-1	-1	-1	1	-1
I312	Cemetery	-3	-1	-1	-1	-1	1	-1
I00126	House	-3	-1	-1	-1	-1	1	-1
I00107	House	-3	-1	-1	-1	1	1	-1
I00150	House	-3	-1	-1	-1	1	1	-1
I274	'Bridgeview'	-3	-3	-1	1	1	1	-1
I37	Cemetery St Phillips	-3	-1	-1	1	1	1	0
A5	Ruins of Merrymount	-1	-1	-1	-1	-1	-1	-1
I204	House	-1	-1	-1	-1	-1	-1	-1
A6	Hope Farm Windmill, Hope Farm Mill Granary and Stockmans Cottage foundations (part of Cattai Estate)	-1	-1	-1	-1	-1	-1	-1

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	PMF	AVERAGE IMPACT
I75	'Hope Farm House', 'Hope Farm Cottage', outbuilding and mill ruins (part of Cattai Estate)	-1	-1	-1	-1	-1	-1	-1
I129	Slab barn	-1	-1	-1	-1	-1	-1	-1
A8	Drainage trench and gate (part of Cattai Estate)	-1	-1	-1	-1	-1	-1	-1
A11	Cattai Horseworks (part of Cattai Estate)	-1	-1	-1	-1	-1	-1	-1
A12	Old Northern Road	-1	-1	-1	-1	-1	-1	-1
I133	House	-1	-1	-1	-1	-1	-1	-1
I128	'Berry Hill', house	-1	-1	-1	-1	-1	-1	-1
I136	Stone dairy	-1	-1	-1	-1	-1	-1	-1
I135	Rexford	-1	-1	-1	-1	-1	-1	-1
I77	'Johnstons'	-1	-1	-1	-1	-1	-1	-1
I74	Cattai Estate ('Caddie House', barn, silo and outbuildings part of Cattai Estate)	-1	-1	-1	-1	-1	-1	-1
I193	'Pagewood'	-1	-1	-1	-1	-1	-1	-1
I78	'Terry Mount'	-1	-1	-1	-1	-1	-1	-1
I72	'Rose Park'	-1	-1	-1	-1	-1	-1	-1
I71	'Bungool' (Riverside Oaks Golf Course)	-1	-1	-1	-1	-1	-1	-1
I73	William Daley's grave	-1	-1	-1	-1	-1	-1	-1
A14	Convict built road (Mr Sharps Track)	-1	-1	-1	-1	-1	-1	-1
A4	Private burial ground	-1	-1	-1	-1	-1	-1	-1
I76	Slab hut	-1	-1	-1	-1	-1	-1	-1
I191	The Parsonage, uniting church and cemetery	-1	-1	-1	-1	-1	-1	-1
I130	'Dargle'	-1	-1	-1	-1	-1	-1	-1
A9	Slab hut ruin and quarry site	-1	-1	-1	-1	-1	-1	-1
A7	'The Ridge', quarry site	-1	-1	-1	-1	-1	-1	-1
I269	Blaxland's Farm	-1	-1	-1	-1	-1	-1	-1
I270	Warragamba Supply Scheme and Warragamba Emergency Scheme	-1	-1	-1	-1	-1	-1	-1
I339	Cottage	-1	-1	-1	-1	-1	-1	-1
I337	'Kinlew'	-1	-1	-1	-1	-1	-1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I334	'Coromandel'	-1	-1	-1	-1	-1	-1	-1
I372	Monument to Aboriginal people	-1	-1	-1	-1	-1	-1	-1
I412	St John of God Hospital (former 'Belmont Park', mansion, garden, building, gatehouse and curtilage)	-1	-1	-1	-1	-1	-1	-1
I335	'Rockleigh'	-1	-1	-1	-1	-1	-1	-1
I338	'Pickwick Park'	-1	-1	-1	-1	-1	-1	-1
I512	'Lilburndale'	-1	-1	-1	-1	-1	-1	-1
I333	'Portland Head Farm'	-1	-1	-1	-1	-1	-1	-1
I459	'Rosemont'	-1	-1	-1	-1	-1	-1	-1
I518	'Ventiaville'	-1	-1	-1	-1	-1	-1	-1
I331	'Stoneleigh'	-1	-1	-1	-1	-1	-1	-1
I205	House	-1	-1	-1	-1	1	-1	-1
I255	'Jonlyn'	-1	-1	-1	-3	-1	1	-1
I391	House	-1	-1	-3	-1	-1	1	-1
I132	'Peacocks'	-1	-1	-1	-1	-1	1	-1
I190	Uniting church and cemetery	-1	-1	-1	-1	-1	1	-1
I192	'Kelso Park'	-1	-1	-1	-1	-1	1	-1
A25	Great drain and stone cut foundations	-1	-1	-1	-1	-1	1	-1
I268	Ravenswood	-1	-1	-1	-1	-1	1	-1
A70	Mill Creek Mill ruins	-1	-1	-1	-1	-1	1	-1
I1006	House	-1	-1	-1	-1	-1	1	-1
I468	Slab cottage and slab barn	-1	-1	-1	-1	-1	1	-1
I170	House	-1	-1	-1	-1	-1	1	-1
I00138	Uniting Church (including former schoolhouse) and Uniting Church Cemetery	-1	-1	-1	-1	-1	1	-1
I468	Slab cottage and slab barn	-1	-1	-1	-1	-1	1	-1
I323	'Ukamurra'	-1	-1	-1	-1	-1	1	-1
I310	Former manse and farm house	-1	-1	-1	-1	-1	1	-1
I01683	Australiana Pioneer Village	-1	-1	-1	-1	-1	1	-1
I377	House	-1	-1	-1	-1	-1	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I508	'Riverside', slab-barn	-1	-1	-1	-1	-1	1	-1
I167	House	-1	-1	-1	-1	-1	1	-1
I313	'Killarney Homestead'	-1	-1	-1	-1	-1	1	-1
I325	'Macquarie Retreat'	-1	-1	-1	-1	-1	1	-1
I23	Hawkesbury Agricultural College River Farm	-1	-1	-1	-1	-1	1	-1
I150	The Toll House	-1	-1	-1	-1	-1	1	-1
I405	'Tall Trees'	-1	-1	-1	-1	-1	1	-1
I00028	'Peninsula House' and observatory	-1	-1	-1	-1	-1	1	-1
I82	McMahon Homestead	-1	-1	-1	-1	-1	1	-1
I00598	'Stannix Park'	-1	-1	-1	-1	-1	1	-1
I373	Residence and barn	-1	-1	-1	-1	-1	1	-1
I00035	'Hobartville' (including outbuildings)	-1	-1	-1	-1	-1	1	-1
I158	'Trevallyn'	-1	-1	-1	-1	-1	1	-1
I311	'Spring Hill Farm' (house and barn)	-1	-1	-1	-1	-1	1	-1
I303	'Lynwood'	-1	-1	-1	-1	-1	1	-1
I511	'Hawkesbury Retreat'	-1	-1	-1	-1	-1	1	-1
I278	'Samuel Cox's House'	-1	-1	-1	-1	-1	1	-1
I24	'The Pines' (residence and trees)	-1	-1	-1	-1	-1	1	-1
I21	'Clarendon' (servants' quarters)	-1	-1	-1	-1	-1	1	-1
I348	'Reibycroft'	-1	-1	-1	-1	-1	1	-1
I284	'Myrtle Cottage' and slab barn	-1	-1	-1	-1	-1	1	-1
I322	'Prestonville'	-1	-1	-1	-1	-1	1	-1
I00282	'Macquarie Arms Inn' complex (former inn and slab barn)	-1	-1	-1	-1	-1	1	-1
I134	St Peter's Anglican Church	-1	-1	-1	-1	-1	1	-1
I25	Georgian farmhouse	-1	-1	-1	-1	-1	1	-1
I00126	Thompson Square	-1	-1	-1	-1	-1	1	-1
I33	House	-1	-1	-1	-1	-1	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I01843	House	-1	-1	-1	-1	-1	1	-1
I285	'Vine House'	-1	-1	-1	-1	-1	1	-1
I288	Slab barn	-1	-1	-1	-1	-1	1	-1
I1	House	-1	-1	-1	-1	-1	1	-1
I378	House and barn	-1	-1	-1	-1	1	1	0
I346	House and slab barns	-1	-1	-1	-1	1	1	0
I270	Slab barn	-1	-1	-1	-1	1	1	0
I345	'Sunny Farm'	-1	-1	-1	-1	1	1	0
I388	'Harmony Farm'	-1	-1	-1	-1	1	1	0
I151	'The Windsor Tavern'	-1	-1	-1	-1	1	1	0
I498	Cottage	-1	-1	-1	-1	1	1	0
I134	Brown's Cemetery	-1	-1	-1	1	1	1	0
I467	House and slab barn	-1	-1	-1	1	1	1	0
I275	Barn	-1	-1	-1	1	1	1	0
I462	House and slab barn	-1	-1	-1	1	1	1	0
I309	House and slab barns	-1	-1	-1	1	1	1	0
I466	House and slab barn	-1	-1	-1	1	1	1	0
I461	House and slab barns	-1	-1	-1	1	1	1	0
I307	Slab barns	-1	-1	-1	1	1	1	0
I465	Slab barn	-1	-1	-1	1	1	1	0
I463	House and slab barn	-1	-1	-1	1	1	1	0
I308	House and slab barn	-1	-1	-1	1	1	1	0
I306	Slab barn	-1	-1	-1	1	1	1	0
I464	Slab barn	-1	-1	-1	1	1	1	0
I276	Windsor Bridge	-1	-1	0	1	1	1	0
A2	Kanangra Boyd National Park	0	0	0	0	0	0	0
L002	Sedimentary Dykes	0	0	0	0	0	0	0
G018	Former Railway Line and Abandoned Rail Tunnel	0	0	0	0	0	0	0
YR001	Yellow Rock Trig Station	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
G005	The Spurline	0	0	0	0	0	0	0
G013	Gatekeeper's Cottage No 1	0	0	0	0	0	0	0
G026	Whitton Memorial	0	0	0	0	0	0	0
G017	Glenbrook Railway Deviation	0	0	0	0	0	0	0
G014	Glenbrook Tunnel (Lapstone Hill)	0	0	0	0	0	0	0
G004	The Bluff	0	0	0	0	0	0	0
G029	Lucasville Station	0	0	0	0	0	0	0
HH00 3	Stone Residence	0	0	0	0	0	0	0
HH00 1	Hawkesbury Lookout Fault Zone	0	0	0	0	0	0	0
HH00 2	Hawkesbury Panorama Lookout	0	0	0	0	0	0	0
G016	Briarcliffe (RAAF Base)	0	0	0	0	0	0	0
BX00 4	Mile Post Indicator	0	0	0	0	0	0	0
G023	Knapsack Gully Viaduct, 1865	0	0	0	0	0	0	0
G025	Knapsack Gully Viaduct, 1912	0	0	0	0	0	0	0
G027	Lennox Bridge	0	0	0	0	0	0	0
L001	Lapstone Monocline	0	0	0	0	0	0	0
L003	Lapstone Monocline	0	0	0	0	0	0	0
L004	Lapstone Monocline	0	0	0	0	0	0	0
G024	Lapstone Zig Zag	0	0	0	0	0	0	0
BX00 3	Old Bathurst Road	0	0	0	0	0	0	0
AH00 4	Shaws Creek	0	0	0	0	0	0	0
G030	Former Lapstone Hotel (RAAF Base)	0	0	0	0	0	0	0
G032	Ulinbawn	0	0	0	0	0	0	0
I207	Police station and residence	0	0	0	0	0	0	0
I194	Cemetery	0	0	0	0	0	0	0
I195	Brewongle Environmental Education Centre	0	0	0	0	0	0	0
A29	Watering hole	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
A28	Two quarries	0	0	0	0	0	0	0
A27	Convict road station	0	0	0	0	0	0	0
I137	Fig tree	0	0	0	0	0	0	0
I206	St Mary Magdalene Anglican Church	0	0	0	0	0	0	0
A30	Bridge and culvert	0	0	0	0	0	0	0
I52	HouseùThe Oaks	0	0	0	0	0	0	0
I55	HouseùWoodstock	0	0	0	0	0	0	0
I56	Plumpton House School	0	0	0	0	0	0	0
I57	HouseùAlroy	0	0	0	0	0	0	0
I72	House	0	0	0	0	0	0	0
I75	House	0	0	0	0	0	0	0
I101	HotelùImperial Hotel	0	0	0	0	0	0	0
I102	Hall - School of Arts	0	0	0	0	0	0	0
I87	Slab buildingùRiverstone High School	0	0	0	0	0	0	0
I88	House only	0	0	0	0	0	0	0
I106	Rooty Hill Railway Station	0	0	0	0	0	0	0
I36	School building	0	0	0	0	0	0	0
A120	Colebee and Nurragingy Land Grant	0	0	0	0	0	0	0
I54	Liquorstop Plumpton or Veals Store	0	0	0	0	0	0	0
A121	Archaeological siteùNative Institute site	0	0	0	0	0	0	0
I20	HouseùHill End	0	0	0	0	0	0	0
I54	Camden Park Estate - Dairy No.8, Cottages and Orchard Sites	0	0	0	0	0	0	0
I52	Brownlow Hill Sunday School	0	0	0	0	0	0	0
I106	House	0	0	0	0	0	0	0
I13	Post Office	0	0	0	0	0	0	0
I84	Dairy No.4 (EMAI Cottage 29)	0	0	0	0	0	0	0
I99	Menangle Gate Lodge (Former)	0	0	0	0	0	0	0
I49	Brownlow Hill Estate: Homestead, Aviary, Round House, Garden and Trees, Stables, Glendon	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I250	Theresa Park Church, Schoolmaster's residence & school	0	0	0	0	0	0	0
I249	Bungalow	0	0	0	0	0	0	0
I51	Aston dairy cottage and barn	0	0	0	0	0	0	0
I53	Camden Park Estate House and gardens	0	0	0	0	0	0	0
C4	Warragamba Conservation Area	0	0	0	0	0	0	0
I27	House	0	0	0	0	0	0	0
I30	House	0	0	0	0	0	0	0
I71	Cottage	0	0	0	0	0	0	0
A30	East Wilchard Road and Church Lane	0	0	0	0	0	0	0
I11	Bank	0	0	0	0	0	0	0
I141	House and Curtilage	0	0	0	0	0	0	0
I21	Cottage	0	0	0	0	0	0	0
I52	Archaeological Site	0	0	0	0	0	0	0
I108	Hilsyde	0	0	0	0	0	0	0
I95	Sandstone and timber barn (part Matavai farm complex)	0	0	0	0	0	0	0
I51	Archaeological Site	0	0	0	0	0	0	0
I92	St Paul's Rectory	0	0	0	0	0	0	0
I83	Roman Catholic Cemetery	0	0	0	0	0	0	0
I17	Bungalow	0	0	0	0	0	0	0
I28	House	0	0	0	0	0	0	0
I55	Cottage	0	0	0	0	0	0	0
I8	Former Plough & Harrow In	0	0	0	0	0	0	0
I4	Former Clinton's Motor Ga	0	0	0	0	0	0	0
I94	Chalker's Cool Room	0	0	0	0	0	0	0
I41	Masonic Lodge	0	0	0	0	0	0	0
I114	Cottage	0	0	0	0	0	0	0
I73	Edithville	0	0	0	0	0	0	0
I70	Cottage	0	0	0	0	0	0	0
I58	Cottage	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I26	Camden Town Farm	0	0	0	0	0	0	0
I89	Riverview	0	0	0	0	0	0	0
I67	Camden District Hospital	0	0	0	0	0	0	0
I133	Burton Arms Inn	0	0	0	0	0	0	0
I125	Caernarvon	0	0	0	0	0	0	0
I38	Brookfield House	0	0	0	0	0	0	0
I61	Cottage	0	0	0	0	0	0	0
I111	Nesbitt home	0	0	0	0	0	0	0
I3	Old Dairy Farmers Depot	0	0	0	0	0	0	0
I72	Taplin	0	0	0	0	0	0	0
I118	Carrington Hospital	0	0	0	0	0	0	0
I63	St John's Church	0	0	0	0	0	0	0
I64	Cottage	0	0	0	0	0	0	0
I68	Corner Shop	0	0	0	0	0	0	0
I79	Belgenny Farm	0	0	0	0	0	0	0
I20	Stockyard	0	0	0	0	0	0	0
I148	Brownlow Hill Weir	0	0	0	0	0	0	0
I16	Agricultural Hall	0	0	0	0	0	0	0
I49	Cottage	0	0	0	0	0	0	0
I48	St Andrews Church	0	0	0	0	0	0	0
I32	House	0	0	0	0	0	0	0
I9	Whplacean's	0	0	0	0	0	0	0
I103	John Oxley	0	0	0	0	0	0	0
I124	Camelot	0	0	0	0	0	0	0
I59	Cottage	0	0	0	0	0	0	0
I76	Cottage	0	0	0	0	0	0	0
I112	House	0	0	0	0	0	0	0
I144	Milestones and Mileposts	0	0	0	0	0	0	0
I29	House	0	0	0	0	0	0	0
I14	Former Froester's Hall	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I74	Mitchell House	0	0	0	0	0	0	0
I56	Cottage	0	0	0	0	0	0	0
I45	Macaria	0	0	0	0	0	0	0
I41A	Camden Public School	0	0	0	0	0	0	0
I140	Smeaton Grange	0	0	0	0	0	0	0
I10	Corner Shop	0	0	0	0	0	0	0
I46	Cottage	0	0	0	0	0	0	0
I53	House	0	0	0	0	0	0	0
I131	Bin Linden	0	0	0	0	0	0	0
I97	Macquarie Grove	0	0	0	0	0	0	0
I148	Thurns Weir	0	0	0	0	0	0	0
I57	Cottage	0	0	0	0	0	0	0
I39	Brookfield House	0	0	0	0	0	0	0
I90A	Cobbitty Public School	0	0	0	0	0	0	0
I115	Belvedere	0	0	0	0	0	0	0
I60	Bungalow	0	0	0	0	0	0	0
I148	Cobbitty Weir	0	0	0	0	0	0	0
I76	Cottage	0	0	0	0	0	0	0
I142	House and Curtilage	0	0	0	0	0	0	0
I7	Coner Commercial Building	0	0	0	0	0	0	0
I22	Chesham's Cottage	0	0	0	0	0	0	0
I47	Camden Library and Former	0	0	0	0	0	0	0
I96	Hassall's Cottage	0	0	0	0	0	0	0
I116	Macquarie House	0	0	0	0	0	0	0
I62	Cottage	0	0	0	0	0	0	0
I6	House	0	0	0	0	0	0	0
I90	Blacksmiths	0	0	0	0	0	0	0
I69	Nepean House	0	0	0	0	0	0	0
I110	St Mark's Church	0	0	0	0	0	0	0
I77	Workers Cottages	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I88	Windemere	0	0	0	0	0	0	0
I37	House	0	0	0	0	0	0	0
I24	House	0	0	0	0	0	0	0
I99	Wivenhoe	0	0	0	0	0	0	0
A	Camden Town Centre	0	0	0	0	0	0	0
I19	Camden Show Ground	0	0	0	0	0	0	0
I54	House	0	0	0	0	0	0	0
I43	Court House	0	0	0	0	0	0	0
I36	House former presbytery	0	0	0	0	0	0	0
I113	Elderslie	0	0	0	0	0	0	0
I5	Former First Camden Bank	0	0	0	0	0	0	0
I34	House	0	0	0	0	0	0	0
I25	Nant Gwylan	0	0	0	0	0	0	0
I66	Macarthur Park	0	0	0	0	0	0	0
I93	Pomere Grove Teen Ranch	0	0	0	0	0	0	0
I91	St Paul's Church	0	0	0	0	0	0	0
I98	Camden Airport	0	0	0	0	0	0	0
I23	Inter-war flat building	0	0	0	0	0	0	0
I101	Bruchhauser House	0	0	0	0	0	0	0
I12	Bank	0	0	0	0	0	0	0
I107	House	0	0	0	0	0	0	0
I148	Weir	0	0	0	0	0	0	0
I15	Tildsey Butcher Shop	0	0	0	0	0	0	0
I35	House	0	0	0	0	0	0	0
I42	St Paul's Church	0	0	0	0	0	0	0
I50	Cottage	0	0	0	0	0	0	0
A69	Road, stone wall, bridge, escarpment and drain	0	0	0	0	0	0	0
I0183 6	St John's Anglican Church and schoolhouse	0	0	0	0	0	0	0
I324	House	0	0	0	0	0	0	0

List ing Num ber	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVER AGE IMPAC T
I411	'Rouse Farm'	0	0	0	0	0	0	0
I343	House	0	0	0	0	0	0	0
I415	'The Terraces'	0	0	0	0	0	0	0
I01837	St John's General Cemetery (former Anglican Cemetery)	0	0	0	0	0	0	0
I74	House	0	0	0	0	0	-3	-1
I85	House	0	0	0	0	0	-3	-1
I297	'Cleary's House'	0	0	0	0	0	-3	-1
I342	'Ebenezer Villa'	0	0	0	0	0	-3	-1
A2	Original section of road and culvert	0	0	0	0	0	-1	0
I84	House	0	0	0	0	0	-1	0
I301	Cemetery	0	0	0	0	0	-1	0
I299	'Lone Acre'	0	0	0	0	0	-1	0
I328	House and barn	0	0	0	0	0	-1	0
I01868	War Memorial, Wilberforce Park	0	0	0	0	0	-1	0
I336	House	0	0	0	0	0	-1	0
I340	Former public school	0	0	0	0	0	-1	0
I298	'Wilbows Stone Cottage'	0	0	0	0	0	-1	0
I408	St Phillip's Anglican Church and cemetery	0	0	0	0	0	-1	0
I392	'Barrabadeen'	0	0	0	0	0	-1	0
I409	'Hill Crest'	0	0	0	0	0	-1	0
I286	'Bona Vista' (house and slab barns)	0	0	0	0	0	-1	0
I344	War Memorial in public reserve	0	0	0	0	0	-1	0
I79	'Montrose'	0	0	0	0	-3	-1	-1
I267	Charleville	0	0	0	0	-3	-1	-1
I381	'Milby Grange'	0	0	0	0	-3	-1	-1
I510	St John's Anglican Church	0	0	0	0	-3	-1	-1
C1	Pitt Town Conservation Area	0	0	0	0	-1	-1	0
A73	Sandstone well/soak	0	-1	-1	1	-1	-1	-1
I131	Church	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I69	House	0	0	0	0	0	1	0
I70	House	0	0	0	0	0	1	0
I73	ChurchùSt PaulÆs Anglican Church	0	0	0	0	0	1	0
I76	HouseùRedgate	0	0	0	0	0	1	0
I77	ShopsùParrington Terrace	0	0	0	0	0	1	0
I79	ChurchùSt AndrewÆs Uniting Church	0	0	0	0	0	1	0
I80	House and shop	0	0	0	0	0	1	0
I81	Riverstone Public School (former)	0	0	0	0	0	1	0
I82	Bicentennial Museumùformerly public school, then Masonic Hall	0	0	0	0	0	1	0
I83	House and slab cottage	0	0	0	0	0	1	0
A122	Brick cistern	0	0	0	0	0	1	0
I35	House	0	0	0	0	0	1	0
HCA6	Park Road	0	0	0	0	0	1	0
A849	Luddenham Homestead Site	0	0	0	0	0	1	0
A081	Site of Dungarth and plantings	0	0	0	0	0	1	0
I28	House	0	0	0	0	0	1	0
I231	House	0	0	0	0	0	1	0
I56	House	0	0	0	0	0	1	0
I272	House	0	0	0	0	0	1	0
I492	Former Methodist Church	0	0	0	0	0	1	0
I17	House	0	0	0	0	0	1	0
I189	Shop	0	0	0	0	0	1	0
I177	Former house	0	0	0	0	0	1	0
I0004 1	Macquarie Arms Hotel	0	0	0	0	0	1	0
I19	House	0	0	0	0	0	1	0
I472	House	0	0	0	0	0	1	0
I123	House	0	0	0	0	0	1	0
I500	House	0	0	0	0	0	1	0
I226	House	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I01808	Richmond Park Pavilion and statue	0	0	0	0	0	1	0
I481	House	0	0	0	0	0	1	0
I01410	Post and telegraph office and stables	0	0	0	0	0	1	0
I219	Former Windsor Council Chambers	0	0	0	0	0	1	0
I186	Bank	0	0	0	0	0	1	0
I65	House	0	0	0	0	0	1	0
I470	House	0	0	0	0	0	1	0
I153	House	0	0	0	0	0	1	0
I26	House	0	0	0	0	0	1	0
I487	House	0	0	0	0	0	1	0
I103	House	0	0	0	0	0	1	0
I478	House	0	0	0	0	0	1	0
I291	Pitt Town Public School and residence	0	0	0	0	0	1	0
I81	House	0	0	0	0	0	1	0
I1	House	0	0	0	0	0	1	0
I115	Shop	0	0	0	0	0	1	0
I8	Former railway cottage	0	0	0	0	0	1	0
I51	House	0	0	0	0	0	1	0
I484	House	0	0	0	0	0	1	0
I00610	Shops	0	0	0	0	0	1	0
I54	House	0	0	0	0	0	1	0
I194	Shop	0	0	0	0	0	1	0
I136	Bank and stables	0	0	0	0	0	1	0
I490	House	0	0	0	0	0	1	0
I00753	House	0	0	0	0	0	1	0
I198	Shop	0	0	0	0	0	1	0
I80	House	0	0	0	0	0	1	0
I121	Court house and police station	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVER AGE IMPAC T
I182	Shop	0	0	0	0	0	1	0
I190	Shop	0	0	0	0	0	1	0
I287	House	0	0	0	0	0	1	0
I10	Grandstand	0	0	0	0	0	1	0
I152	House	0	0	0	0	0	1	0
I143	House	0	0	0	0	0	1	0
I126	House	0	0	0	0	0	1	0
I00126	House	0	0	0	0	0	1	0
I12	House	0	0	0	0	0	1	0
I3	House	0	0	0	0	0	1	0
I96	House	0	0	0	0	0	1	0
I257	Fairfield House Gateway	0	0	0	0	0	1	0
I269	House	0	0	0	0	0	1	0
I195	Former shop	0	0	0	0	0	1	0
I176	Shop	0	0	0	0	0	1	0
I183	House and shop	0	0	0	0	0	1	0
I76	Residence and iron works	0	0	0	0	0	1	0
I62	Cottage	0	0	0	0	0	1	0
I251	House	0	0	0	0	0	1	0
I482	House	0	0	0	0	0	1	0
I99	House	0	0	0	0	0	1	0
I31	House	0	0	0	0	0	1	0
I112	House	0	0	0	0	0	1	0
I52	House	0	0	0	0	0	1	0
I407	Seventh Day Adventist Church	0	0	0	0	0	1	0
I235	Former Windsor Post Office	0	0	0	0	0	1	0
I476	'Elourea'	0	0	0	0	0	1	0
I64	House	0	0	0	0	0	1	0
I380	House and former shop	0	0	0	0	0	1	0
I154	The Bell Inn	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I293	House, former shop and former slab barn	0	0	0	0	0	1	0
I145	House	0	0	0	0	0	1	0
I45	House	0	0	0	0	0	1	0
I131	Royal Hotel	0	0	0	0	0	1	0
I0004 5	House	0	0	0	0	0	1	0
I79	House	0	0	0	0	0	1	0
I87	Former Masonic Temple	0	0	0	0	0	1	0
I30	House	0	0	0	0	0	1	0
I0000 3	'Loder House'	0	0	0	0	0	1	0
I55	House	0	0	0	0	0	1	0
I107	House	0	0	0	0	0	1	0
I72	Former house	0	0	0	0	0	1	0
I181	Shop	0	0	0	0	0	1	0
I91	House	0	0	0	0	0	1	0
I4	House	0	0	0	0	0	1	0
I495	House	0	0	0	0	0	1	0
I142	Houses	0	0	0	0	0	1	0
I483	House	0	0	0	0	0	1	0
I74	House	0	0	0	0	0	1	0
I77	House	0	0	0	0	0	1	0
I63	House	0	0	0	0	0	1	0
I11	East Richmond Railway Station	0	0	0	0	0	1	0
I230	House	0	0	0	0	0	1	0
I228	Houses	0	0	0	0	0	1	0
I90	Shop (former barn)	0	0	0	0	0	1	0
I501	House	0	0	0	0	0	1	0
I491	House	0	0	0	0	0	1	0
I258	House and outbuildings	0	0	0	0	0	1	0
I242	House	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I9	Administrative block, blacksmith shop and stable square	0	0	0	0	0	1	0
I178	Former house	0	0	0	0	0	1	0
I67	House	0	0	0	0	0	1	0
I85	Former Richmond Rest Home	0	0	0	0	0	1	0
I78	House	0	0	0	0	0	1	0
I296	'Grenville Cottage'	0	0	0	0	0	1	0
I180	House and shop	0	0	0	0	0	1	0
I196	Former shop	0	0	0	0	0	1	0
I39	House	0	0	0	0	0	1	0
I241	House	0	0	0	0	0	1	0
I445	House	0	0	0	0	0	1	0
I220	'Tates Hotel'	0	0	0	0	0	1	0
I266	'Hill Crest'	0	0	0	0	0	1	0
I89	St Andrew's Uniting Church	0	0	0	0	0	1	0
I488	Cottage	0	0	0	0	0	1	0
I332	'Port Erringhi'	0	0	0	0	0	1	0
I192	'Bussell Bros'	0	0	0	0	0	1	0
I0037 3	Former 'Bird in the Hand Inn'	0	0	0	0	0	1	0
I0004 5	House	0	0	0	0	0	1	0
I233	Former Windsor Grammar School	0	0	0	0	0	1	0
I184	Former house	0	0	0	0	0	1	0
I102	House	0	0	0	0	0	1	0
I104	House	0	0	0	0	0	1	0
I265	'Riverview Cottage'	0	0	0	0	0	1	0
I70	Former Richmond Council Chambers	0	0	0	0	0	1	0
I469	House	0	0	0	0	0	1	0
I473	House	0	0	0	0	0	1	0
I486	House	0	0	0	0	0	1	0
I216	Shop	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I406	Former police station and residence	0	0	0	0	0	1	0
I98	House	0	0	0	0	0	1	0
I239	Former Masonic Hall	0	0	0	0	0	1	0
I191	Shop	0	0	0	0	0	1	0
I263	House	0	0	0	0	0	1	0
I47	House	0	0	0	0	0	1	0
I0012 6	Former School of Arts	0	0	0	0	0	1	0
I100	Gate post at 'Kamilario' at entrance to Richmond Public School	0	0	0	0	0	1	0
I130	Former 'Black Horse Inn'	0	0	0	0	0	1	0
I101	'Vicky's House'	0	0	0	0	0	1	0
I225	House	0	0	0	0	0	1	0
I97	House	0	0	0	0	0	1	0
I268	'Fairview'	0	0	0	0	0	1	0
I111	Regent Theatre	0	0	0	0	0	1	0
I88	St Andrew's Uniting Church Hall	0	0	0	0	0	1	0
I0012 6	House	0	0	0	0	0	1	0
I493	House	0	0	0	0	0	1	0
I281	Scots Uniting Church	0	0	0	0	0	1	0
I114	Commercial Hotel	0	0	0	0	0	1	0
I50	House	0	0	0	0	0	1	0
I57	House	0	0	0	0	0	1	0
I0073 5	Uniting Church and Hall	0	0	0	0	0	1	0
I243	House	0	0	0	0	0	1	0
I95	House	0	0	0	0	0	1	0
I13	House	0	0	0	0	0	1	0
I93	Avenue of plane trees along eastern approach to Richmond	0	0	0	0	0	1	0
I197	Shop	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I240	Houses	0	0	0	0	0	1	0
I193	Shop	0	0	0	0	0	1	0
I185	Bank	0	0	0	0	0	1	0
I108	House	0	0	0	0	0	1	0
I44	House	0	0	0	0	0	1	0
I128	House	0	0	0	0	0	1	0
I16	'Inew Cottage'	0	0	0	0	0	1	0
I290	'Strathmore' (cottage and slab barn)	0	0	0	0	0	1	0
I0001 5	St Matthew's Anglican Church, rectory, cemetery and stables	0	0	0	0	0	1	0
I132	St Monica's Roman Catholic Church	0	0	0	0	0	1	0
I0046 8	'Bowman House'	0	0	0	0	0	1	0
I262	St Matthew's Roman Catholic Church	0	0	0	0	0	1	0
I7	'The Presbytery'	0	0	0	0	0	1	0
I138	'Anschau House'	0	0	0	0	0	1	0
I36	'Kialla'	0	0	0	0	0	1	0
I413	'Sunnyside' (former O'Dea's dairy)	0	0	0	0	0	1	0
I29	'Tara'	0	0	0	0	0	1	0
I5	'Mortimers Cottage'	0	0	0	0	0	1	0
I256	'Fairfield House'	0	0	0	0	0	1	0
I124	'The cottage'	0	0	0	0	0	1	0
I69	'Rutherglen'	0	0	0	0	0	1	0
I59	Cottage	0	0	0	0	0	1	0
I267	'Lindfield House'	0	0	0	0	0	1	0
I227	'Glenroy'	0	0	0	0	0	1	0
I480	Cottage	0	0	0	0	0	1	0
I117	'Chalmers Building'	0	0	0	0	0	1	0
I188	'Fitzroy Hotel'	0	0	0	0	0	1	0
I15	'Josieville'	0	0	0	0	0	1	0
I260	'Fitzroy Cottage'	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVER AGE IMPAC T
I294	'Royville'	0	0	0	0	0	1	0
I489	Cottage	0	0	0	0	0	1	0
I61	Cottage	0	0	0	0	0	1	0
I0001 4	'Toxana'	0	0	0	0	0	1	0
I43	Cottage	0	0	0	0	0	1	0
I92	House	0	0	0	0	0	1	0
I60	Cottage	0	0	0	0	0	1	0
I232	'Mountain View'	0	0	0	0	0	1	0
I35	'Rosmoyne'	0	0	0	0	0	1	0
I0001 5	St Matthew's Anglican Church, rectory, cemetery and stables	0	0	0	0	0	1	0
I118	House	0	0	0	0	0	1	0
I84	School of Arts	0	0	0	0	0	1	0
I140	House	0	0	0	0	0	1	0
I280	Pitt Town Hardware Produce and Fuel store	0	0	0	0	0	1	0
I271	House	0	0	0	0	0	1	0
I0073 5	Mackenzie House	0	0	0	0	0	1	0
I0068 1	House	0	0	0	0	0	1	0
I141	House	0	0	0	0	0	1	0
I71	House	0	0	0	0	0	1	0
I49	House	0	0	0	0	0	1	0
I106	House	0	0	0	0	0	1	0
I144	House	0	0	0	0	0	1	0
I113	Shop	0	0	0	0	0	1	0
I116	Westpac Bank	0	0	0	0	0	1	0
I110	House	0	0	0	0	0	1	0
I252	Former St Matthew's School	0	0	0	0	0	1	0
I68	House	0	0	0	0	0	1	0
I48	House	0	0	0	0	0	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
I86	Hall at rear of former Masonic Temple	0	0	0	0	0	1	0
I46	'Carsisle'	0	0	0	0	0	1	0
I125	'Eltham'	0	0	0	0	0	1	0
I32	'Benson House'	0	0	0	0	0	1	0
I264	'Crescentville'	0	0	0	0	0	1	0
I187	Bank	0	0	0	0	0	1	0
I20	House	0	0	0	0	0	1	0
I18	Avenue of trees east and west side of street	0	0	0	0	0	1	0
I27	House	0	0	0	0	0	1	0
I109	House	0	0	0	0	0	1	0
I127	House	0	0	0	0	0	1	0
I42	House	0	0	0	0	0	1	0
I83	House	0	0	0	0	0	1	0
I0123 6	Richmond Railway Station	0	0	0	0	0	1	0
I122	Shop	0	0	0	0	0	1	0
I94	House	0	0	0	0	0	1	0
I58	House	0	0	0	0	0	1	0
I261	House	0	0	0	0	0	1	0
I66	'Pangelis'	0	0	0	0	0	1	0
I0073 5	Former Methodist Parsonage	0	0	0	0	0	1	0
I75	House	0	0	0	0	0	1	0
I67	House	0	0	0	0	-3	1	0
I166	Hannabas Dairy	0	0	0	0	-3	1	0
I398	Uniting Church (formerly Methodist Church)	0	0	0	0	-3	1	0
I199	Royal Exchange Hotel	0	0	0	0	-3	1	0
I211	Residence and surgery	0	0	0	0	-3	1	0
I499	House	0	0	0	0	-3	1	0
I0012 6	Shop	0	0	0	0	-3	1	0
I319	House	0	0	0	0	-3	1	0

Listi ng Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I517	Former house	0	0	0	0	-3	1	0
I229	Railway Hotel	0	0	0	0	-3	1	0
I213	House	0	0	0	0	-3	1	0
I379	'No Mathatha'	0	0	0	0	-3	1	0
I516	Former house	0	0	0	0	-3	1	0
I396	Former Police Station	0	0	0	0	-3	1	0
I22	Cemetery	0	0	0	0	-3	1	0
I0012 6	House	0	0	0	0	-3	1	0
I320	Former inn	0	0	0	0	-3	1	0
I0020 2	'The Reverend Turner Cottage' (formerly 'Oxalis Cottage')	0	0	0	0	-3	1	0
I147	House	0	0	0	0	-3	1	0
I214	House	0	0	0	0	-3	1	0
I393	'Pareora'	0	0	0	0	-3	1	0
I215	House	0	0	0	0	-3	1	0
I0012 6	Shop	0	0	0	0	-3	1	0
I0012 6	Shop	0	0	0	0	-3	1	0
I0004 4	'Mountain View'	0	0	0	0	-3	1	0
I0035 8	'Rose Cottage'	0	0	0	0	-3	1	0
I37	'Zeta'	0	0	0	0	-3	1	0
I217	'Mrs Cope's Cottage'	0	0	0	0	-3	1	0
I509	Lower Portland Public School	0	0	0	0	-3	1	0
I159	Public school	0	0	0	0	-3	1	0
I410	House	0	0	0	0	-3	1	0
I212	House	0	0	0	0	-3	1	0
I222	'Learholm'	0	0	0	0	-3	1	0
I384	House	0	0	0	0	-3	1	0
I97	CemeteryùRiverstone General	0	0	0	-3	-3	1	-1

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVERAGE IMPACT
I96	House	0	0	0	-3	-3	1	-1
I95	House	0	0	0	-3	-3	1	-1
I92	War Memorial	0	0	0	-3	-3	1	-1
I91	House - Stationmaster's Residence (former)	0	0	0	-3	-3	1	-1
I93	Railway Station group	0	0	0	-3	-3	1	-1
A068	Government stockyard site	0	0	0	-3	-3	1	-1
I41	House	0	0	0	-3	-3	1	-1
I202	Former inn	0	0	0	-3	-3	1	-1
I399	House	0	0	0	-3	-3	1	-1
I471	House	0	0	0	-3	-3	1	-1
I210	House	0	0	0	-3	-3	1	-1
I477	Shop	0	0	0	-3	-3	1	-1
I247	House	0	0	0	-3	-3	1	-1
I475	House	0	0	0	-3	-3	1	-1
I165	House	0	0	0	-3	-3	1	-1
I514	Well structure	0	0	0	-3	-3	1	-1
I01018	Stables at rear of police station	0	0	0	-3	-3	1	-1
I318	Former hotel	0	0	0	-3	-3	1	-1
I245	Dedication stone, Hawkesbury Hospital	0	0	0	-3	-3	1	-1
I292	Slab barn	0	0	0	-3	-3	1	-1
I246	Shop and dwelling	0	0	0	-3	-3	1	-1
I155	Windsor Presbyterian Cemetery	0	0	0	-3	-3	1	-1
I394	'Primrose Cottage'	0	0	0	-3	-3	1	-1
I00108	House	0	0	0	-3	-3	1	-1
I201	O'Brien's Building	0	0	0	-3	-3	1	-1
I01851	McQuade Park	0	0	0	-3	-3	1	-1
I00126	Thompson Square	0	0	0	-3	-3	1	-1
I204	House	0	0	0	-3	-3	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I223	Shop	0	0	0	-3	-3	1	-1
I218	Bandstand rotunda	0	0	0	-3	-3	1	-1
I0080 4	'Windsor Court House'	0	0	0	-3	-3	1	-1
I382	House	0	0	0	-3	-3	1	-1
I283	St James' Anglican Church	0	0	0	-3	-3	1	-1
I397	'Karoola'	0	0	0	-3	-3	1	-1
I321	'Rhodesia'	0	0	0	-3	-3	1	-1
I315	'McGraths Hill Inn'	0	0	0	-3	-3	1	-1
I0012 6	Shop	0	0	0	-3	-3	1	-1
I513	Ashlar Morgue Building	0	0	0	-3	-3	1	-1
I497	House	0	0	0	-3	-3	1	-1
I207	House	0	0	0	-3	-3	1	-1
I208	House	0	0	0	-3	-3	1	-1
I209	House	0	0	0	-3	-3	1	-1
I0012 6	House	0	0	0	-3	-3	1	-1
I0066 7	Simmons Hardware Store	0	0	0	-3	-3	1	-1
I175	House	0	0	0	-3	-3	1	-1
I86	Police Station	0	0	-1	-3	-3	1	-1
I94	House	0	0	-3	-3	-3	1	-1
I224	House	0	0	-1	-3	-3	1	-1
I164	House	0	0	-1	-3	-3	1	-1
I314	Cottage	0	0	-1	-3	-3	1	-1
I205	House	0	0	-3	-3	-3	1	-1
I0000 5	House	0	0	-3	-3	-3	1	-1
I203	'The Royal Theatre' (former)	0	0	-1	-3	-3	1	-1
I248	'Woodside' (former Melville Cottage)	0	0	-1	-3	-3	1	-1
I34	House	0	0	-3	-3	-3	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I404	Railway station	0	0	-3	-3	-3	1	-1
I302	Cemetery	0	0	0	-1	-3	1	-1
I146	Railway cottage	0	0	0	0	-1	1	0
I0012 6	Former Coffey's Inn	0	0	0	-3	-1	1	-1
I78	Former Butcher Shop	0	0	-3	-3	-1	1	-1
I89	House	0	0	-3	-3	-1	1	-1
I90	Group of workersÆ cottages	0	0	-3	-3	-1	1	-1
I68	House	0	0	-3	-3	-1	1	-1
I129	Anglican church hall and cemetery	0	0	-3	-3	-1	1	-1
I259	Windsor Roman Catholic Cemetery	0	0	-3	-3	-1	1	-1
I383	House	0	0	-3	-3	-1	1	-1
I474	House	0	0	-3	-3	-1	1	-1
I139	'Uralla'	0	0	-3	-3	-1	1	-1
I403	Railway stationmaster's residence	0	0	-3	-3	-1	1	-1
I171	House	0	0	-3	-3	-1	1	-1
I446	'Blue Gardens'	0	-3	-3	-3	-1	1	-2
I202	Residence and post office	0	0	-3	-1	-1	1	-1
I0128 7	Windsor Railway Station	0	0	-3	-1	-1	1	-1
A662	Berkshire Park Homestead Site	0	-1	-3	-1	-1	1	-1
I160	House	0	-1	-3	-1	-1	1	-1
I0011 0	Former Peninsula Inn	0	-1	-3	-1	-1	1	-1
I168	House	0	-1	-3	-1	-1	1	-1
I0010 9	House	0	-1	-3	-1	-1	1	-1
I0012 6	"The Doctor's House"	0	-1	-3	-1	-1	1	-1
I169	House	0	-1	-3	-1	-1	1	-1
I157	Former Barrack Wall	0	-1	-3	-1	-1	1	-1
I0005 8	'Clear Oaks'	0	-1	-3	-1	-1	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
I148	'Lock Up' ruins	0	-1	-3	-1	-1	1	-1
I496	The Butcher's Shop	0	0	-1	-1	-1	1	0
I0014 2	Houses	0	-1	-1	-1	-1	1	-1
I161	'Sunny Brae'	0	-1	-1	-1	-1	1	-1
I376	St Thomas' Anglican Cemetery	0	-1	-1	-1	-1	1	-1
I173	House	0	-1	-1	-1	-1	1	-1
I347	House and barn	0	-1	-3	-1	1	1	-1
I375	Tizzana Winery	1	1	0	-3	-3	-1	-1
I208	Cable ferry	1	-1	-1	1	1	-1	0
I237	Former inn	1	-1	-1	-1	-1	1	0
I174	House	1	-1	-1	-1	-1	1	0
I374	St Thomas' Anglican Church	1	-1	-1	-1	-1	1	0
I395	'Rocky Hall'	1	-1	-1	-1	-1	1	0
I196	Cable ferry	1	1	0	1	1	1	1
I138	Cable ferry	1	1	0	1	1	1	1
I289	Blaxland's Crossing at Nepean River	1	1	0	1	1	1	1
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	0	0
0		0	0	0	0	0	-1	0
0		0	0	0	0	0	1	0
0	Runway	0	-1	0	-1	-1	1	0
1		0	-1	-1	-1	-1	1	-1
002	Farmhouse and outbuildings	-3	-1	-1	-1	-1	1	-1
2		0	0	0	0	0	0	0
003	Former Agnes Banks Public School	0	0	0	0	0	-3	-1
3		0	0	0	0	-3	1	0

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
6	Osborneö, homestead, barn, outbuildings and plantings	-1	-1	-1	-1	-1	-1	-1
008	Chestnut - dwelling, slab cottage and trees	-1	-1	-1	-1	-1	-3	-1
010	Tyreel - dwelling and barn	-1	-1	-1	-1	-1	-1	-1
012	Federation farmhouse and trees	-1	-1	-1	-1	-1	-1	-1
15	Agnes Banks Nature Reserve	0	0	0	0	0	-1	0
018	Former Castlereagh Council Chambers	0	0	0	0	0	-1	0
19	Memorial - Smith Park	0	0	0	0	0	0	0
20	Castlereagh Public School (Former)	0	0	0	0	0	-1	0
24	Shadforth Monument (former pioneer's monument)	0	0	0	0	0	-1	0
25	Private dwelling (former St Mark's Anglican Church Group, including church cemetery)	0	0	0	0	0	0	0
26	Greendale Roman Catholic Cemetery	0	0	0	0	0	-1	0
27	Remnants of former farm homestead ('Pemberton')	-1	-1	-1	-1	-1	-1	-1
28	Bents Basin Inn site	1	-1	-1	-1	-1	-1	-1
051	Emu Hall , dwelling, outbuildings and trees	0	-1	-3	-3	-3	1	-2
052	Former police station residence	0	0	-3	-3	-1	1	-1
055	Cottage	0	0	0	0	-3	1	0
058	Concrete house	-1	-1	-1	-1	-1	1	-1
059	Emu Plains Railway Station	0	0	0	-3	-3	1	-1
060	Weatherboard house	0	0	0	-3	-3	1	-1
061	Former Australian Arms Inn	0	0	0	-3	-3	1	-1
063	Former Union Inn including trees	0	0	0	0	-3	1	0
064	Stone house	0	0	0	-3	-3	1	-1
065	Westbank - house	0	0	0	0	-3	1	0
066	"Yodalla", house and garden	0	0	0	0	-3	1	0
069	Lewers Bequest and Penrith Regional Art Gallery, houses and garden	0	0	0	0	-3	1	0
071	Huntington Hall - dwelling and garden	0	0	0	-3	-3	1	-1
073	Melrose Hall	0	0	0	-3	-3	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
074	Orange Grove - cottage	0	0	-1	-3	-3	1	-1
075	War Memorial, Emu Park	0	0	-3	-3	-3	1	-1
076	Emu Plains Public School (former) including trees	0	0	0	-3	-3	1	-1
078	St. PaulÆs Anglican Church and Emu Plains General Cemetery	0	0	0	-3	-3	-1	-1
080	Yamba - Cottage	0	0	0	0	-3	1	0
082	Uniting Church	0	0	0	0	-3	1	0
083	Edwardian cottage	0	0	0	0	0	1	0
084	Sandstone cottage	0	0	0	0	0	1	0
085	Emu Plains Assembly Hall	0	0	0	0	0	-1	0
088	House û Hall Family	0	0	0	0	0	0	0
089	Gosling Street and Hessel Place Reserve	0	0	0	0	0	0	0
090	Bellbird Reserve	0	0	0	0	0	-3	-1
092	Gwandalan û dwelling and garden	0	0	0	-3	-3	1	-1
094	WorkmenÆs cottages	0	0	0	0	0	1	0
095	Madang Park û dwelling and trees	0	0	0	0	0	1	0
097	Penrith General Cemetery	0	0	0	0	0	0	0
098	Kingswood Public School	0	0	0	0	0	0	0
100	Federation house and garden	0	0	0	0	0	0	0
101	St. Phillips Anglican Church	0	0	0	0	0	0	0
108	Edinglassie - House	0	0	0	0	0	1	0
109	Leo Buring cottage, barn, glasshouse and memorial	0	0	0	0	0	0	0
112	Site of Edinglassie	0	0	0	0	-3	-1	-1
113	Cottage and outbuildings	1	-1	-1	-1	-1	1	0
115	Londonderry Cemetery	0	0	0	0	0	1	0
124	Glenmore	0	0	0	0	0	0	0
128	Fernhill, outbuildings, landscape & curtilage	0	0	0	0	0	0	0
138	Winbourne	-1	-1	-1	-1	-1	-1	-1
140	Fairlight	0	0	0	0	0	0	0
141	Table Rock Lookout	-1	-1	-1	-1	-1	-1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % A E P	2 % A E P	1 % A E P	P MF	AVER AGE IMPAC T
144	Pumping station (former)	-3	-1	-1	-1	-1	1	-1
146	Victoria Bridge	1	1	0	1	1	1	1
147	Punt Road, Nepean River	-1	-1	-1	-1	-1	1	-1
148	Rowing Course	-1	-1	-1	-1	1	1	0
151	House & garden	0	0	0	-3	-3	1	-1
155	Farmhouse	0	0	0	0	0	0	0
156	Orchard Hills Uniting Church	0	0	0	0	0	0	0
158	Edwardian cottage	0	0	0	0	0	1	0
159	The Lodge	0	0	0	0	0	1	0
160	Victorian house	0	0	0	0	0	1	0
161	Craithes - dwelling, trees, outbuildings and carriage loop	0	0	0	0	0	1	0
162	Avenue and garden planting	0	0	0	0	0	1	0
163	Combewood - house, garden and original entrance drive	0	0	0	0	0	1	0
163	Combewood - house, garden and original entrance drive	0	0	0	0	0	1	0
187	Station MasterÆs House (former)	0	0	0	0	-3	-1	-1
188	Penrith Railway Station	0	0	0	0	-3	-1	-1
219	Mimosa - dwelling, fence and garden	0	0	0	0	0	1	0
220	Former Stables, Mimosa	0	0	0	0	0	1	0
221	Moore Cottage	0	0	0	0	0	0	0
226	Margaret Farm- house, barn and tannery site	0	0	0	0	0	-1	0
229	Memorial Cairn	0	0	0	0	0	-1	0
230	Memeorial Cairn	0	0	0	0	0	0	0
232	Leeholme Horse Stud Rotunda	0	0	0	0	0	-1	0
234	Cottage	0	0	0	0	0	1	0
235	Tannery Pits(Former) & Well û Thompson Tannery Site	0	0	0	0	0	1	0
248	Werrington House ûdwelling and grounds	0	0	0	0	0	0	0
256	Penrith Ambulance Station	0	0	0	0	0	1	0
257	Peachtree Creek Bridge	0	0	-3	-3	-3	1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
258	Explorers Memorial	0	0	0	0	0	1	0
259	Museum of Fire (former Penrith Power Station)	0	0	0	0	0	1	0
261	Castlereagh Road	0	0	-3	-3	-1	-1	-1
261C	Castlereagh Road Alignment	0	0	0	0	0	1	0
269	Cemetery	0	0	0	0	0	0	0
270	Regentville Public School ,residence and garden	0	0	0	0	0	-3	-1
271	Regentville Mansion & Vinyard Terracing Site	0	0	-3	-3	-1	-1	-1
273	Glenleigh	-3	-1	-3	-1	-1	-1	-2
276	Regentville WorkersÆ Terrace	0	0	0	0	0	1	0
282	St Marys Railway Station	0	0	0	0	0	-1	0
298	Cottage	0	0	0	0	0	0	0
299	Bronte	0	0	0	0	0	0	0
300	Mourilyan - original section of house	0	0	0	0	0	0	0
305	Former St. Marys Council Chambers	0	0	0	0	0	0	0
307	St. Marys Public School	0	0	0	0	0	-1	0
308	Wagon Wheel Hotel	0	0	0	0	0	1	0
309	Cottage	0	0	0	0	0	-1	0
310	Victoria Park and Memorial	0	0	0	0	0	1	0
315	Werrington Park, garden & poplar avenue	0	0	0	0	0	0	0
318	Rose Cottage and slab hut	0	0	0	0	0	1	0
319	Torquay - House	0	0	0	0	0	-1	0
321	Four Winds - dwelling	0	0	0	0	0	-3	-1
325	Wallacia Hotel	0	0	0	0	0	1	0
327	Arms of Australia Inn	0	0	0	-3	-3	1	-1
654	Wool Pack Inn Ruin	0	0	0	0	0	1	0
655	Dunheved Fire Station	0	0	0	0	0	-3	-1
657	Water reservoir	0	0	0	0	0	0	0
659	Brick farmhouse, trees & orchard	0	0	0	-3	-3	-1	-1
660	Cottage	-3	-1	-1	-1	-1	-1	-1

List ing Num ber	Name	20 % AE P	10 % AE P	5 % AE P	2 % AE P	1 % AE P	P MF	AVER AGE IMPAC T
664	House	0	0	0	0	0	1	0
665	House	0	0	0	-3	-3	1	-1
666	International style house & garden	0	-1	-3	-3	-1	1	-1
667	Sandstone railway culvert	0	0	0	0	0	1	0
668	Railway Bridge	-1	-1	-1	1	1	1	0
669	House	0	0	0	0	0	0	0
670	Former teacher's residence	0	0	0	0	0	0	0
672	House	0	0	0	0	0	0	0
673	Former St David's Anglican Church	0	0	0	0	0	1	0
675	Community Hall	0	0	0	0	0	1	0
676	Farmhouse	0	0	0	-1	-1	1	0
677	Farmhouse	0	0	0	0	0	0	0
680	Site of Windmill	0	0	-3	-3	-1	-1	-1
685	Seidler House	-1	-1	-1	-1	-1	1	-1
693	Cottage	0	0	0	0	0	1	0
695	Cottage	0	0	0	0	0	1	0
794	Road, stone wall, bridge, escarpment and drain	0	0	0	0	0	0	0
795	Wiseman's Ferry Inn, including grounds	0	0	0	0	0	-1	0
797	Cottage	0	0	0	0	0	0	0
798	Cottage	0	0	0	0	0	-1	0
799	Cottage	0	0	0	0	0	-1	0
800	Gothic revival cottage	0	0	0	0	0	-1	0
801	Cottage	0	0	0	0	0	1	0
805	Bennett Wagon	0	0	0	0	0	1	0
806	Shop	0	0	0	0	0	0	0
810	House	0	0	0	0	0	-1	0
811	Cottage	0	0	0	0	0	-1	0
812	House	0	0	0	0	0	1	0
815	The Willows - House	0	0	0	0	-3	1	0
829	Bennetts Wagons	0	0	0	0	0	1	0

Listing Number	Name	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP	P MF	AVERAGE IMPACT
837	House	0	0	0	0	0	0	0
840	House	0	0	0	0	0	0	0
841	Llandilo Public School	0	0	0	0	0	-1	0
842	Farmhouse	0	0	0	0	0	0	0
843	Luddenham Road Alignment	0	0	0	0	0	-1	0
845	Lindfield	0	0	0	0	0	0	0
846	Canine Council dwelling	0	0	0	0	0	-1	0
848	Weir	1	1	0	1	1	1	1
850	Hall	0	0	0	0	0	1	0
859	Milestone	0	0	0	0	0	-3	-1
860	Milestone	0	0	0	0	0	0	0
861	Milestone	0	0	0	0	0	0	0
869	Explosive Storehouse	0	0	0	0	0	1	0
870	Nepean River	-1	-1	-1	1	1	1	0

DRAFT

18. WORLD, NATIONAL, AND COMMONWEALTH MANAGEMENT PRINCIPLES

Schedule 5—Australian World Heritage management principles

(regulation 10.01)

1 General principles

- 1.01 The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.
- 1.02 The management should provide for public consultation on decisions and actions that may have a significant impact on the property.
- 1.03 The management should make special provision, if appropriate, for the involvement in managing the property of people who:
 - (a) have a particular interest in the property; and
 - (b) may be affected by the management of the property.
- 1.04 The management should provide for continuing community and technical input in managing the property.

2 Management planning

- 2.01 At least 1 management plan should be prepared for each declared World Heritage property.
- 2.02 A management plan for a declared World Heritage property should:
 - (a) state the World Heritage values of the property for which it is prepared; and
 - (b) include adequate processes for public consultation on proposed elements of the plan; and
 - (c) state what must be done to ensure that the World Heritage values of the property are identified, conserved, protected, presented, transmitted to future generations and, if appropriate, rehabilitated; and
 - (d) state mechanisms to deal with the impacts of actions that individually or cumulatively degrade, or threaten to degrade, the World Heritage values of the property; and
 - (e) provide that management actions for values, that are not World Heritage values, are consistent with the management of the World Heritage values of the property; and
 - (f) promote the integration of Commonwealth, State or Territory and local government responsibilities for the property; and
 - (g) provide for continuing monitoring and reporting on the state of the World Heritage values of the property; and
 - (h) be reviewed at intervals of not more than 7 years.

3 Environmental impact assessment and approval

- 3.01 This principle applies to the assessment of an action that is likely to have a significant impact on the World Heritage values of a property (whether the action is to occur inside the property or not).

- 3.02 Before the action is taken, the likely impact of the action on the World Heritage values of the property should be assessed under a statutory environmental impact assessment and approval process.
- 3.03 The assessment process should:
- (a) identify the World Heritage values of the property that are likely to be affected by the action; and
 - (b) examine how the World Heritage values of the property might be affected; and
 - (c) provide for adequate opportunity for public consultation.
- 3.04 An action should not be approved if it would be inconsistent with the protection, conservation, presentation or transmission to future generations of the World Heritage values of the property.
- 3.05 Approval of the action should be subject to conditions that are necessary to ensure protection, conservation, presentation or transmission to future generations of the World Heritage values of the property.
- 3.06 The action should be monitored by the authority responsible for giving the approval (or another appropriate authority) and, if necessary, enforcement action should be taken to ensure compliance with the conditions of the approval.

Schedule 5B—National Heritage management principles

(regulation 10.01E)

- 1 The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.
- 2 The management of National Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their National Heritage values.
- 3 The management of National Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.
- 4 The management of National Heritage places should ensure that their use and presentation is consistent with the conservation of their National Heritage values.
- 5 The management of National Heritage places should make timely and appropriate provision for community involvement, especially by people who:
 - (a) have a particular interest in, or association with, the place; and
 - (b) may be affected by the management of the place.
- 6 Indigenous people are the primary source of information on the value of their heritage and the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.
- 7 The management of National Heritage places should provide for regular monitoring, review and reporting on the conservation of National Heritage values.

Schedule 7B—Commonwealth Heritage management principles

(regulation 10.03D)

- 1 The objective in managing Commonwealth Heritage places is to identify, protect, conserve, present and transmit, to all generations, their Commonwealth Heritage values.
- 2 The management of Commonwealth Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their Commonwealth Heritage values.
- 3 The management of Commonwealth Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.
- 4 The management of Commonwealth Heritage places should ensure that their use and presentation is consistent with the conservation of their Commonwealth Heritage values.
- 5 The management of Commonwealth Heritage places should make timely and appropriate provision for community involvement, especially by people who:
 - (a) have a particular interest in, or associations with, the place; and
 - (b) may be affected by the management of the place;
- 6 Indigenous people are the primary source of information on the value of their heritage and that the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.
- 7 The management of Commonwealth Heritage places should provide for regular monitoring, review and reporting on the conservation of Commonwealth Heritage values.



artefact

Artefact Heritage

ABN 73 144 973 526
Level 4, Building B
35 Saunders Street
Pyrmont NSW 2009
Australia

+61 2 9518 8411
office@artefact.net.au
www.artefact.net.au