



Transport for NSW

Beaches Link and Gore Hill Freeway Connection

Chapter 15

Aboriginal cultural heritage

15 Aboriginal cultural heritage

This chapter outlines the potential Aboriginal cultural heritage impacts associated with the project and identifies measures which address these impacts. A detailed Aboriginal cultural heritage assessment has been carried out for the project and is included in Appendix L (Technical working paper: Aboriginal cultural heritage assessment report).

The Secretary's environmental assessment requirements as they relate to Aboriginal cultural heritage, and where in the environmental impact statement these have been addressed, are detailed in Table 15-1.

Avoiding or minimising impacts has been a key consideration throughout the design and development process for the Beaches Link and Gore Hill Freeway Connection project. A conservative approach has generally been used in the assessments, with potential impacts presented before implementation of environmental management measures.

The proposed environmental management measures relevant to Aboriginal cultural heritage impacts are included in Section 15.5.

Table 15-1 Secretary's environmental assessment requirements – Aboriginal heritage

Secretary's requirement	Where addressed in EIS
1. The Proponent must identify and assess any direct and/or indirect impacts (including cumulative and visual impacts) to the heritage significance of listed (and nominated) heritage items includes of: <ul style="list-style-type: none"> a. Aboriginal places and objects, as defined under the <i>National Parks and Wildlife Act 1974</i> and in accordance with the principles and methods of assessment identified in the current guidelines; 	Section 15.4 identifies and assesses all Aboriginal places and objects. The legislative and policy framework used for this assessment is outlined in Section 15.1 , which includes reference to the guidelines used to consider potential impacts.
<ul style="list-style-type: none"> b. Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan; 	Section 15.3.3 identifies Aboriginal places of heritage significance as defined in the Standard Instrument – Principal Local Environmental Plan.
<ul style="list-style-type: none"> d. items listed on the State, National and World Heritage lists 	Section 15.3.3 identifies search results from relevant Aboriginal heritage databases. Listed non-Aboriginal heritage items are identified in Chapter 14 (Non-Aboriginal heritage).
<ul style="list-style-type: none"> e. heritage items and conservation areas identified in local and regional planning environmental instruments covering the project area; and 	Section 15.3.3 identifies search results relevant Aboriginal heritage databases including relevant local environmental plans.
<ul style="list-style-type: none"> f. marine items of potential heritage significance within Middle Harbour, such as any shipwrecks. 	Section 15.3.4 discusses potential submerged Aboriginal sites. Non-Aboriginal maritime heritage sites are discussed in Chapter 14 (Non-Aboriginal heritage).

Secretary's requirement	Where addressed in EIS
<p>2. Where impacts to State or locally significant heritage items or archaeology are identified, the assessment must:</p> <p>a. include a significance assessment and statement of heritage impact for all heritage items (including any unlisted places that are assessed of heritage value);</p>	<p>Significance assessments are presented in Section 15.3.</p>
<p>b. provide a discussion of alternative locations and design options that have been considered to reduce heritage impacts;</p>	<p>A discussion of alternative locations and design options is provided in Appendix L (Technical working paper: Aboriginal cultural Heritage assessment report) and Section 4.4 and Section 4.5 of Chapter 4 (Project development and alternatives).</p>
<p>c. in areas identified as having potential archaeological significance, undertake a comprehensive archaeological assessment and management plan in line with Heritage Council guidelines which includes a methodology and research design to assess the impact of the works on the potential archaeological resource and to guide physical archaeological test excavations and include the results of these excavations. This is to be carried out by a suitably qualified archaeologist and is to discuss the likelihood of significant historical, maritime and Aboriginal archaeology on the site, how this may be impacted by the project, and includes measures to mitigate any impacts;</p>	<p>Details of test excavations carried out are presented in Section 15.3 and Annexure D of Appendix L (Technical working paper: Aboriginal cultural Heritage assessment report).</p>
<p>d. consider impacts to the item of significance caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, increased traffic, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment (as relevant);</p>	<p>Discussion of impacts to items of significance as a result of vibration, demolition, archaeological disturbance, altered historical arrangements and access, increased traffic, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment (as relevant) are provided in Section 15.4 and further discussed in Chapter 10 (Construction noise and vibration)</p>
<p>e. provide a comparative analysis to inform the rarity and representative value of any heritage places proposed for demolition;</p>	<p>No sites are proposed for demolition.</p>
<p>f. outline mitigation measures to avoid and minimise identified impacts in accordance with the current guidelines; and</p>	<p>Mitigation and management measures are presented in Section 15.5.</p>

Secretary's requirement	Where addressed in EIS
<p>g. 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>	<p>Appendix L (Technical working paper: Aboriginal cultural heritage assessment report) provides details of qualifications held by archaeologists.</p>
<p>3. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified archaeologist, meeting the minimum qualification requirements specified in section 1.6 of the <i>Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW</i> (DECCW 2010).</p>	<p>Appendix L (Technical working paper: Aboriginal cultural heritage assessment report) provides details of qualifications held by archaeologists. Section 15.2 provides details of attendance for site surveys.</p>
<p>4. The Proponent must identify and describe the Aboriginal cultural heritage values that exist across the whole area that would be affected by the development and document these in an Aboriginal cultural heritage assessment report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with <i>Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW</i> (OEH 2010), and guided by the <i>Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW</i> (Office of Environment and Heritage (OEH), 2011a).</p>	<p>Appendix L (Technical working paper: Aboriginal cultural heritage assessment report) documents Aboriginal cultural heritage values and details are summarised in Section 15.3.3 and Section 15.3.7.</p>
<p>5. Consultation with Aboriginal people must be undertaken and documented in accordance with the <i>Aboriginal cultural heritage consultation requirements for proponents 2010</i> (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.</p>	<p>Aboriginal stakeholder consultation was carried out in accordance with the <i>Procedure for Aboriginal Cultural Heritage Consultation and Investigation</i> (Roads and Maritime, 2011) and is discussed in Chapter 7 (Stakeholder and community engagement) and Appendix L (Technical working paper: Aboriginal cultural heritage assessment report). Aboriginal cultural significance was assessed through consultation and is summarised in Section 15.3.7.</p>
<p>6. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to the Environment, Energy and Science Group in the Department of Planning, Industry and Environment.</p>	<p>Appendix L (Technical working paper: Aboriginal cultural heritage assessment report) documents potential impacts and management recommendations. These are summarised in Section 15.4 and Section 15.5.</p>

Secretary's requirement	Where addressed in EIS
Note that due diligence is not an appropriate assessment, and an ACHAR is required	Appendix L (Technical working paper: Aboriginal cultural heritage assessment report)

15.1 Legislative and policy framework

The primary legislation relevant to Aboriginal cultural heritage in NSW is the *National Parks and Wildlife Act 1974* (NPW Act) and its supporting regulation, which provides for the management of Aboriginal land, objects and places. Although an Aboriginal heritage impact permit would not be required for the project under section 90 of the NPW Act (refer to Chapter 2 (Assessment process)), an equivalent level of assessment and consultation has been carried out.

The requirement to consider potential impacts on Aboriginal cultural heritage, including objects and places, is given effect through the following guidelines:

- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010d)
- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011a)
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010b)
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW, 2010c).

The *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime Services, 2011a) specifically tailors and applies the requirements of these guidelines to its road projects.

The *Native Title Act 1993* (Commonwealth) and *Aboriginal Land Rights Act 1983* (NSW) provide a framework for the protection of native title rights on certain Crown lands. There are no Crown lands subject to a native title claim within the footprint of the project.

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth) aims to recognise the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity, and to promote the use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in cooperation with, the owners of the knowledge. The EPBC Act establishes both the National Heritage List, which includes natural, Indigenous and historic places that are of outstanding heritage value to the nation, and the Commonwealth Heritage List, which includes places on Commonwealth lands and waters or under Australian Government control that have Indigenous heritage significance. There are no Aboriginal heritage items in the detailed investigation area that are registered on either the National or Commonwealth lists.

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (Commonwealth), provides for the protection of Aboriginal cultural property that are of particular significance to Aboriginals in accordance with Aboriginal tradition and may apply to Aboriginal cultural property as well as ancient sites.

15.2 Assessment methodology

The Aboriginal cultural heritage assessment was carried out in accordance with the PACHCI (Roads and Maritime Services, 2011a). The PACHCI applies the requirements of other relevant guidelines (refer to Section 15.1) to road projects.

The PACHCI provides Aboriginal people with the opportunity to participate in the decision making process regarding the management of their cultural heritage, by providing Transport for NSW with information regarding cultural significance as well as providing input into management options, if required. The PACHCI includes up to four stages of assessment, all of which are relevant and have been applied to the project:

- Stage 1 – a desktop risk assessment was carried out to determine whether the project may potentially impact on Aboriginal cultural heritage and require further assessment or investigation. The desktop risk assessment considered relevant registers and databases, including but not limited to the Aboriginal Heritage Information Management System (AHIMS)
- Stage 2 – because Stage 1 identified a risk of impact on Aboriginal cultural heritage, site surveys of relevant areas were carried out in consultation with the Metropolitan Local Aboriginal Land Council
- Stage 3 – because Stage 2 identified that there may be an impact on Aboriginal cultural heritage, an Aboriginal cultural heritage assessment report (ACHAR) was prepared and formal consultation with Aboriginal stakeholders was carried out
- Stage 4 – the outcomes and recommendations from the ACHAR, including mitigation and management measures, would be implemented during construction and operation of the project.

For the purpose of the Aboriginal cultural heritage assessment, all areas within 300 metres of the project's construction footprint were considered. As project refinements were made during the Stage 3 PACHCI process, this search area was refined to 50 metres (see Figure 15-1). Searches of AHIMS, relevant local environmental plans and State and Commonwealth heritage registers were carried out on 1 May 2017. A further search of AHIMS sites was carried out on 8 April 2020 to determine if any additional sites were apparent. No new AHIMS sites were determined from those identified in the 2017 search.

Site surveys were carried out in May, June and August 2017 by a qualified archaeologist accompanied by a representative of the Metropolitan Local Aboriginal Land Council. Aboriginal site officers were also engaged for archaeological field inspections in January 2018. Additional assessments were carried out with nominated site officers representing the Metro Metropolitan Local Aboriginal Land Council in August 2018, February 2020 and September 2020. During these surveys, site officers were provided an opportunity to comment on the potential for Aboriginal cultural material to be present within the study area, the cultural significance of any Aboriginal cultural heritage sites identified during the survey and proposed management recommendations, including recommendations for further assessment. Feedback from Registered Aboriginal Parties has also been incorporated into the assessment.

Registered Aboriginal Parties were identified in accordance with the DECCW guidelines (2010b) and invited to an Aboriginal focus group (AFG) meeting on the project, held on 28 September 2017. A second AFG was held on 3 November 2020. Through these meetings Registered Aboriginal Parties have been provided an opportunity to review site surveys and assessment methodology. Feedback from Registered Aboriginal Parties has been incorporated into the ACHAR.

Aboriginal stakeholder consultation was carried out in accordance with the PACHCI and is discussed in Chapter 7 (Stakeholder and community engagement) and Appendix L (Technical working paper: Aboriginal cultural heritage assessment report).

In conjunction with the PACHCI process, an assessment of potential submerged Aboriginal sites was carried out within the marine environment of the project area. Where possible, the assessment of potential submerged Aboriginal sites was coordinated with the PACHCI process.

The potential submerged Aboriginal sites assessment included:

- Review of existing information and remote sensing data
- Field survey, carried out as part of the maritime archaeological dive inspections in December 2017 at two locations where rock outcrops indicated the potential for the presence of rock overhangs which could have associations with past human occupation
- Establishing a predictive model of maritime heritage potential to guide the assessment of significance and sensitivity
- Assessing potential impacts and providing appropriate mitigation and management measures.

15.3 Existing environment

15.3.1 Ethnographic and archaeological context

The Sydney area has a rich indigenous heritage. Aboriginal occupation focused on accessing resources from diverse ecological areas, seasons and conditions. Occupation sites, hunting, travel and inter-clan contact would have been associated with coastal areas, smaller rivers, creeks and swamps.

Aboriginal occupation in the Sydney area is known to have extended beyond the Last Glacial Maximum (about 21,000 years ago). Evidence of Aboriginal occupation in NSW dates back to around 50,000 to 60,000 years ago at Lake Mungo, up to 30,000 years ago at Parramatta, and is increasingly identified at other locations in the Sydney Basin.

Until the most recent ice age, about 12,000 years ago, sea levels were about 100 metres below their current level and the eastern coastline of Australia was about 25 to 30 kilometres further east. As the climate grew warmer and the sea level began to rise, these freshwater creeks and rivers were gradually drowned, and the lower-middle slopes of the ancient valleys were slowly inundated. The sea eventually flooded the area that became Port Jackson, and food resources would have changed dramatically. The sea level stabilised about 6000 to 8000 years ago which allowed the development of the foreshore maritime resource economy that then operated until after the arrival of the First Fleet in 1788.

Numerous open and rockshelter sites with shell middens and remains of fish and land mammals dating to the past 4500 years are known around Port Jackson, including Middle Harbour (Attenbrow, 2010). The material culture of Aboriginal people reflected a reliance on organic materials, using an intimate understanding of timber, plant and animal products to make utensils, tools and weapons. Igneous stone suitable for hatchet heads and stone for flaking, cutting and scraping were not naturally available in the area and could be traded from long distances.

Historically, Aboriginal people lived in small family or clan groups that were associated with particular territories or places. The project would be located on land within the boundaries of the Darug linguistic group. The two dialects of *Darug* are suggested to have been used: the coastal dialect (area between Sydney Harbour and Botany Bay, and west to Parramatta), and the hinterland dialect (area to the west of the Cumberland Plain) (Attenbrow, 2010).

Rock shelters appear to have been widely used by Darug-speaking peoples in coastal areas at the time of European contact. Existing data suggests that dominant site types for this region include rock shelters, artefact scatters and isolated artefacts, with middens present in the coastal areas further north. Applied art in rock shelters and engravings on sandstone platforms were common in this part of Sydney, although their fragility means that many have been lost in the past two centuries.

There is evidence of Aboriginal occupation throughout the study area, with areas of plentiful food resources associated with shorelines, riparian zones and adjacent areas including Clive Park, Burnt Bridge Creek and Flat Rock Creek. During urban development, many of these areas have been covered by fill, concealing original formations. Some evidence of Aboriginal occupation may also be present along movement pathways, meeting and camping sites, which were often associated with ridgelines.

15.3.2 Environmental and landscape context

The lower North Shore landscape region is a highly urbanised and developed landscape with only very small pockets of unmodified landscape remaining. The lower North Shore portion of the study area includes several parks and reserves including St Leonards Park, ANZAC Park, Cammeray Golf Course, Artarmon Park and Artarmon Reserve, as well as the Flat Rock Reserve and the surrounding alluvial terraces and exposed sandstone outcrops. These parks and reserves have been subject to less intensive disturbance and may have increased potential for Aboriginal sites.

The Middle Harbour and Balgowlah landscape region is also a highly urbanised landscape with only very small pockets of unmodified landscape remaining. The landscape region is characterised by undulating to rolling low hills on Hawkesbury Sandstone with local reliefs of 20 to 80 metres and slopes of 10 to 25 per cent and rock outcrops of less than 25 per cent. A gentler gradient at Clive Park descends from Northbridge into a shallower portion of Middle Harbour with the Spit Bridge located where a long, narrow sandbar once formed. Middle Harbour is bordered by steep headlands of exposed Hawkesbury Sandstone with some low hills and rises on Triassic and later sediments. The study area traverses the low gradient at Clive Park towards Seaforth and Balgowlah, where Burnt Bridge Creek is situated in Hawkesbury Sandstone bedrock.

At the Wakehurst Parkway landscape region, there are sections of undisturbed remnant landscapes in two locations within or in close proximity to the project (Garigal National Park and Manly Dam Reserve). The Wakehurst Parkway is located within an erosional landscape comprising undulating to rolling low hills on Hawkesbury Sandstone, broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage. The landscape region is characterised by rugged, rolling to very steep hills on Hawkesbury Sandstone with local reliefs of 40 to 200 metres with rock outcrops and shallow, stony, highly permeable soils. The Wakehurst Parkway landscape region is particularly significant because of the Hawkesbury Sandstone and its association with known Aboriginal rock engravings.

15.3.3 Database search results

AHIMS sites in the region around the project are shown in Figure 15-1. Of these, 11 sites have been identified within 50 metres of the project construction footprint including:

- One artefact scatter
- Four art sites (engraving and pigment)
- Three rock shelters (with middens)
- Three potential archaeological deposits (PADs).

The location and condition of one of the sites (45-6-0662) was unable to be confirmed during field inspection and the Aboriginal Heritage Office has advised that the site was likely covered by gravel/vegetation. As such, a desktop assessment of this site was carried out, basing findings on settlement and vibration modelling.

The site Wakehurst Engraving MAN 104 (45-6-3032) was observed to be significantly damaged during field inspection in September 2020. This resulted in notification to the Department of Premier and Cabinet (Heritage) (also known as Heritage NSW).

A further three additional AHIMS sites, 45-5-2222 (Clive Park 4; Northbridge) 45-6-0994 (Chatswood) and 45-6-1587 (Seaforth) were initially identified within the study area but were later confirmed as being incorrectly mapped and were determined to sit outside the study area. These sites do not form part of the eleven sites identified within the study area and have not been considered further in this assessment.

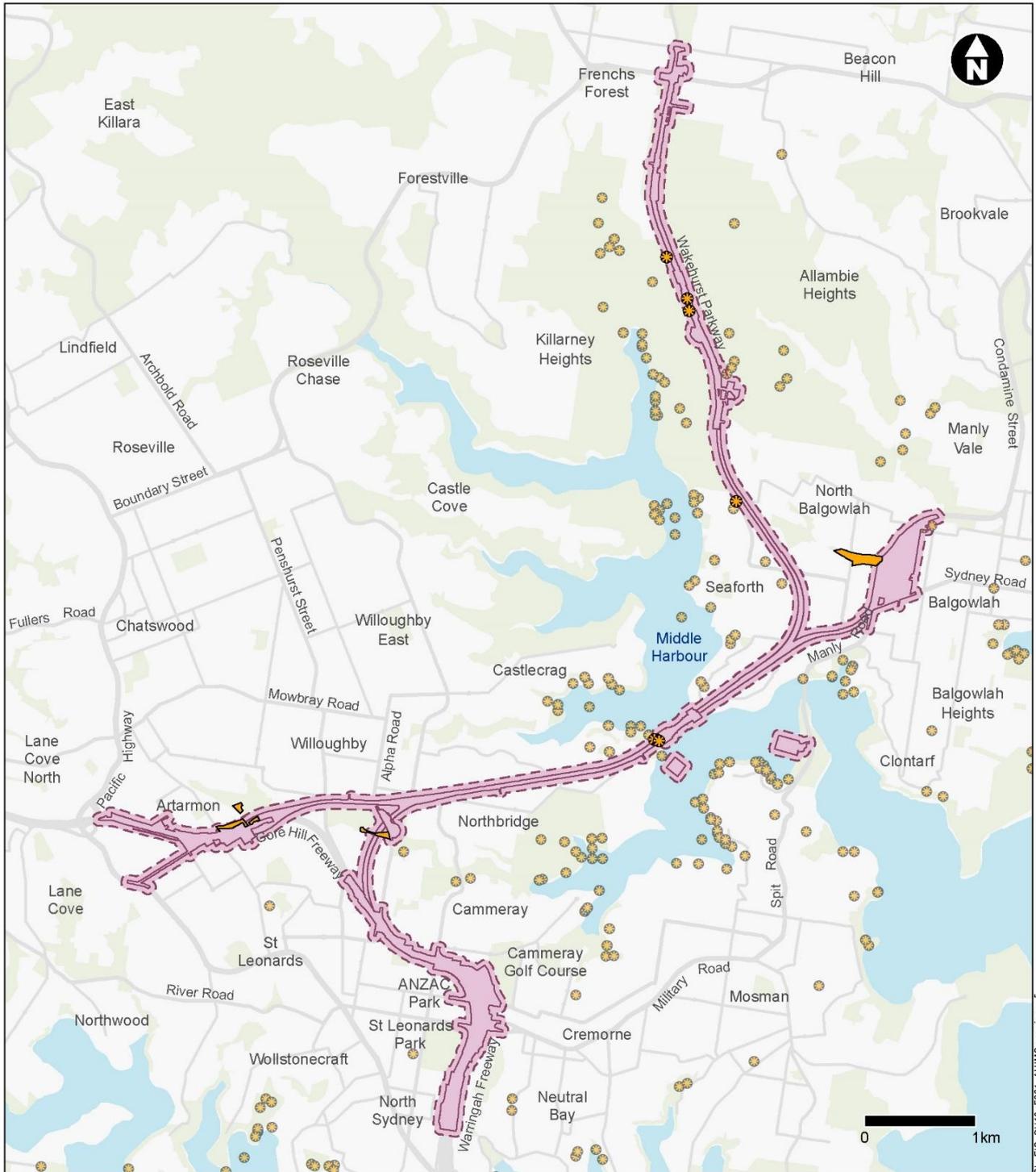
Details of the AHIMS sites, including Aboriginal cultural values identified through consultation with knowledge holders, are summarised in Table 15-2. The proximity of these sites to the construction footprint is shown in Figure 15-2 to Figure 15-5. The location of Aboriginal sites presented in Figure 15-2 to Figure 15-5 is based on the results of extensive AHIMS searches. Where possible, the location of these sites was confirmed during the archaeological survey.

No relevant items were identified in schedule 5 of the *North Sydney Local Environmental Plan 2013*, the *Willoughby Local Environmental Plan 2012* or the *Warringah Local Environment Plan 2011*.

Table 15-2 AHIMS sites within 50 metres of the project construction footprint

AHIMS site ID	Site name	Site type	Proximity to the project	Cultural value description
45-6-3599	Artarmon Park artefact scatter	Sub-surface artefact scatter	Within 50 metres of surface works at the Gore Hill Freeway Connection.	Part of cultural area and occupation site
45-6-3362	Artarmon Park potential archaeological deposit (PAD)	Potential archaeological deposit	Within 50 metres of surface works and the ramp tunnels at the Gore Hill Freeway Connection and Beaches Link on-ramp (portal).	Part of cultural area and occupation site
45-6-3361	Flat Rock Creek PAD	Potential archaeological deposit	Within 50 metres of surface works and above the alignment of the mainline tunnels at Flat Rock Drive construction support site (BL2).	Part of cultural area and occupation site
45-6-3012	Clive Park 8, Shelter and Midden	Shelter and midden (rock shelter is less than 50 m ³ in size)	Located above the mainline tunnels at Clive Park and within 50 metres of the Middle Harbour south cofferdam construction support site (BL7).	Part of cultural area and occupation site
45-6-0654	Clive Park 1; Northbridge	Shelter with midden, art, burial/s and artefact scatter (rock shelter is less than 50 m ³ in size)	Located above the mainline tunnels at Clive Park and within 50 metres of the Middle Harbour south cofferdam construction support site (BL7).	Part of cultural area and occupation site
45-6-0996	Clive Park 2; Taplin's Cicada Pupa Cave	Shelter with art and midden (rock shelter is less than 50 m ³ in size)	Located above the mainline tunnels at Clive Park and within 50 metres of the Middle Harbour south cofferdam construction support site (BL7).	Part of cultural area and occupation site
45-6-3363	Burnt Bridge Creek PAD	Potential archaeological deposit	Within 50 metres of surface works at Balgowlah and the ramp tunnels.	Part of cultural area and occupation site
45-6-3032	Wakehurst Engraving MAN 104	Rock engraving on outcrop	Within 50 metres of the ramp tunnels at Seaforth. Damage to the site was observed during field inspection in September 2020.	Part of cultural area and occupation site
45-6-2940	Rock engraving (Garigal National Park)	Rock engraving	Within 50 metres of surface works on Wakehurst Parkway (Killarney Heights).	Part of cultural area and occupation site

AHIMS site ID	Site name	Site type	Proximity to the project	Cultural value description
45-6-0662	Frenchs Forest; Bantry Bay; Wakehurst Parkway	Rock engraving	Potentially within 50 metres of surface works on Wakehurst Parkway (Killarney Heights). Location and condition of site could not be confirmed during field inspection as site is likely covered by gravel/vegetation.	Part of cultural area and occupation site
45-6-0655	Bantry Bay Aboriginal Engraving Site	Large rock engraving site with multiple engravings	Within 50 metres of surface works on Wakehurst Parkway (Killarney Heights).	Part of cultural area and occupation site



Legend

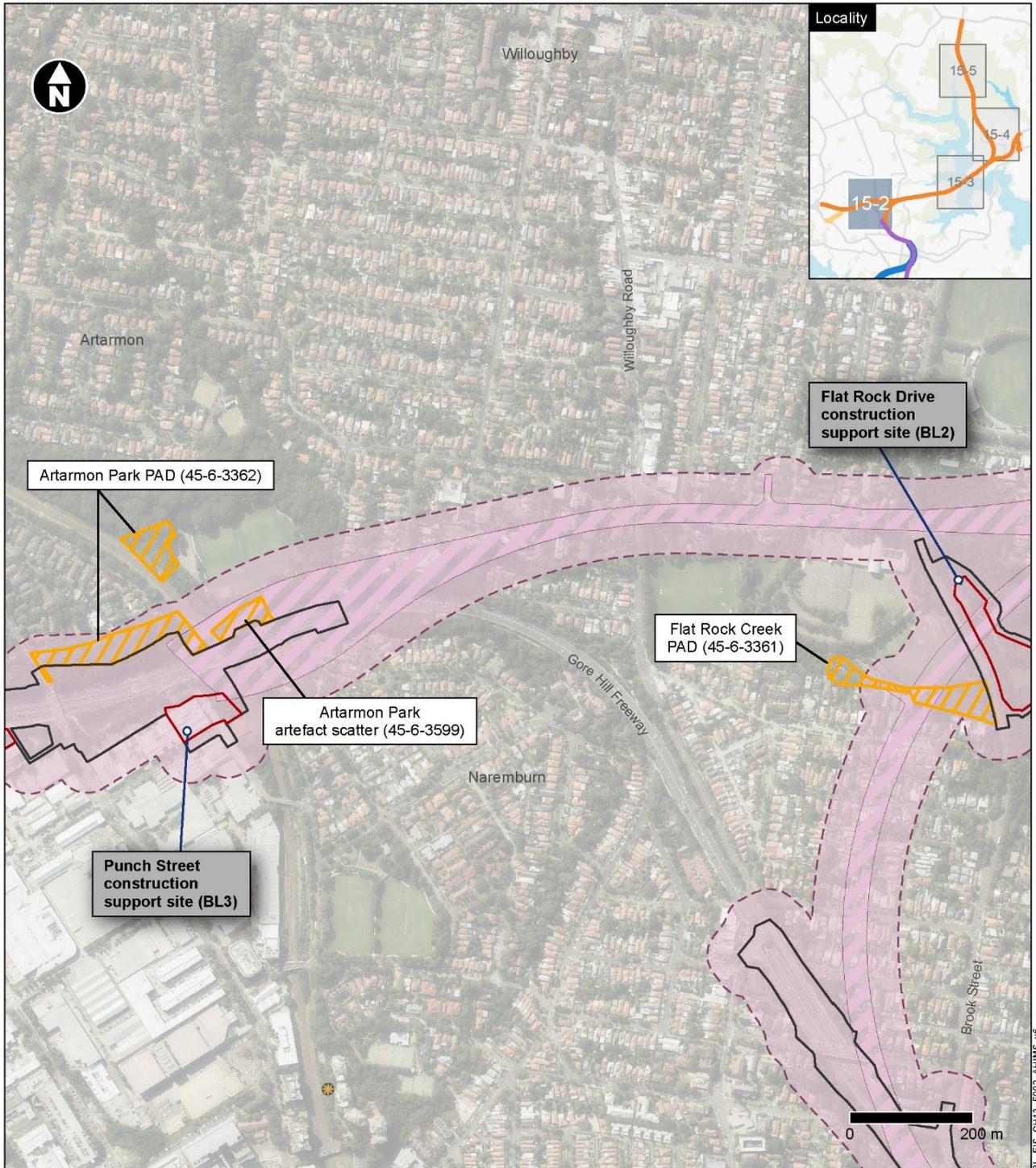
Construction features

-  50 metre area around construction footprint
-  Construction footprint
-  Tunnel

AHIMS sites

-  AHIMS site within 50 metres of the construction footprint
-  AHIMS site over 50 metres from the construction footprint
-  Potential Archaeological Deposit

Figure 15-1 AHIMS sites in the region around the project



Legend

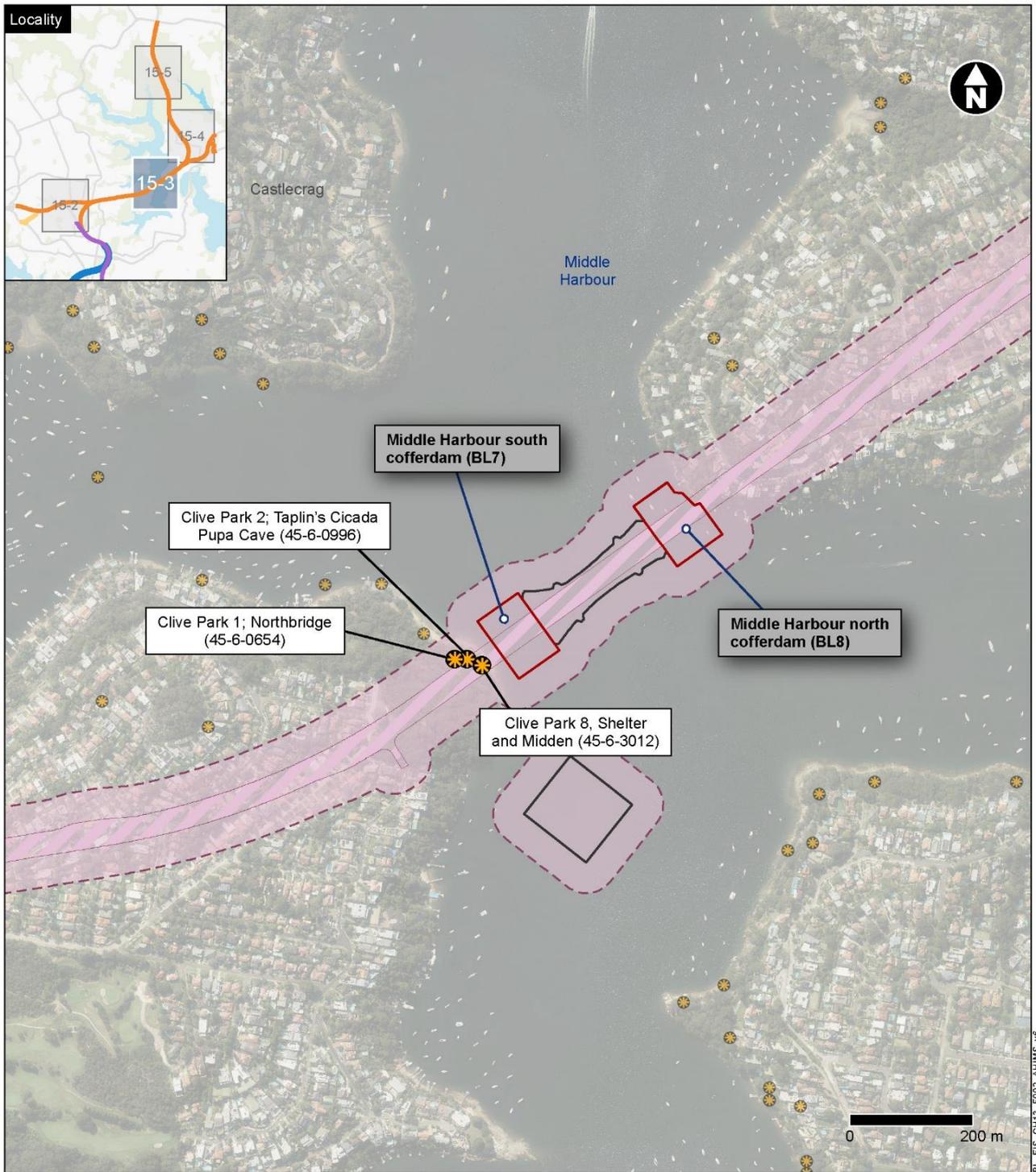
Construction features

-  50 metre area around construction footprint
-  Construction footprint
-  Construction support site
-  Tunnel

AHIMS sites

-  AHIMS site over 50 metres from the construction footprint
-  Potential Archaeological Deposit

Figure 15-2 AHIMS sites within 50 metres of the project construction footprint (Gore Hill Freeway and Flat Rock Creek)



Legend

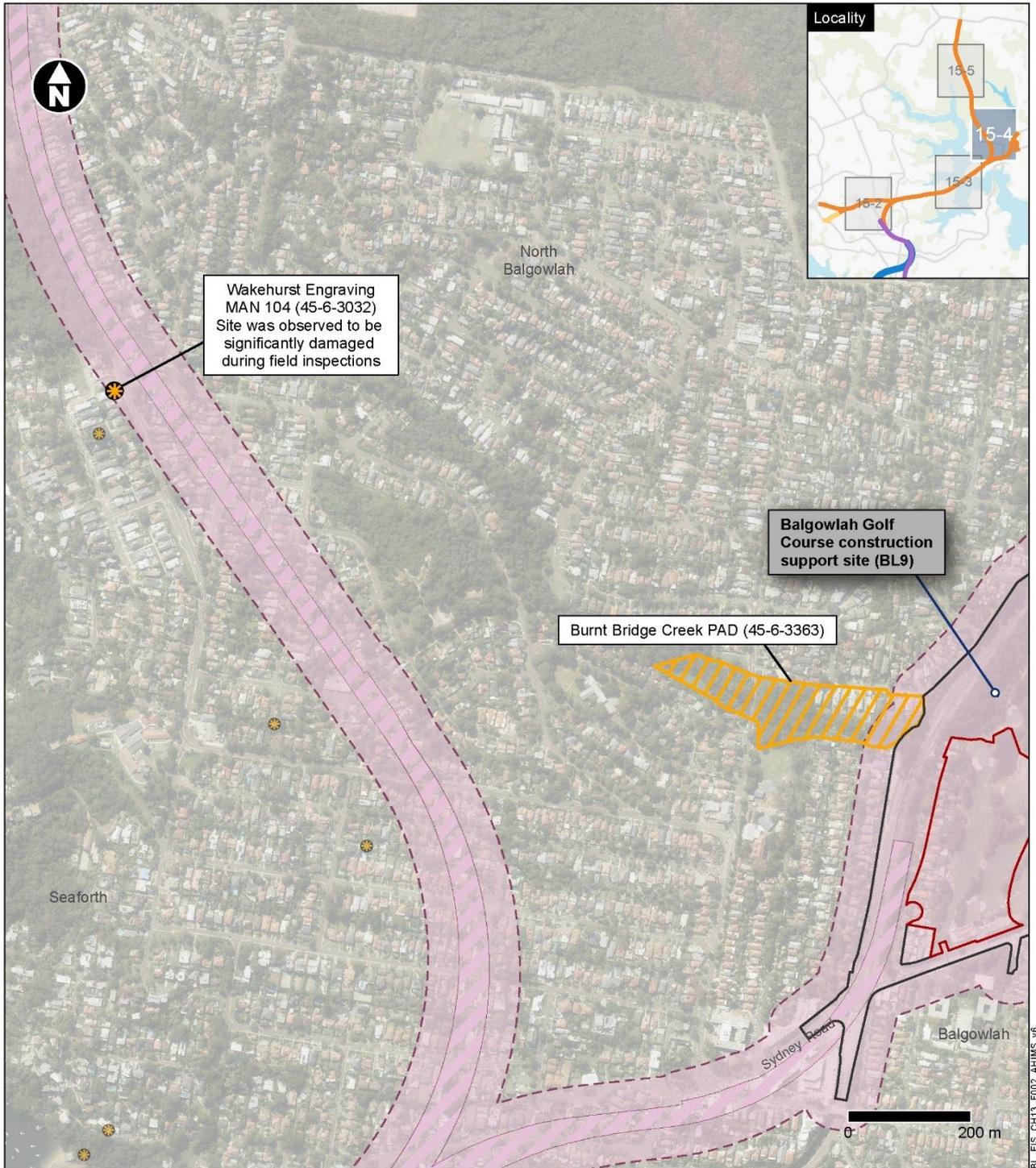
Construction features

- 50 metre area around construction footprint
- Construction footprint
- Construction support site
- Tunnel

AHIMS sites

- AHIMS site within 50 metres of the construction footprint
- AHIMS site over 50 metres from the construction footprint

Figure 15-3 AHIMS sites within 50 metres of the project construction footprint (Middle Harbour)



Legend

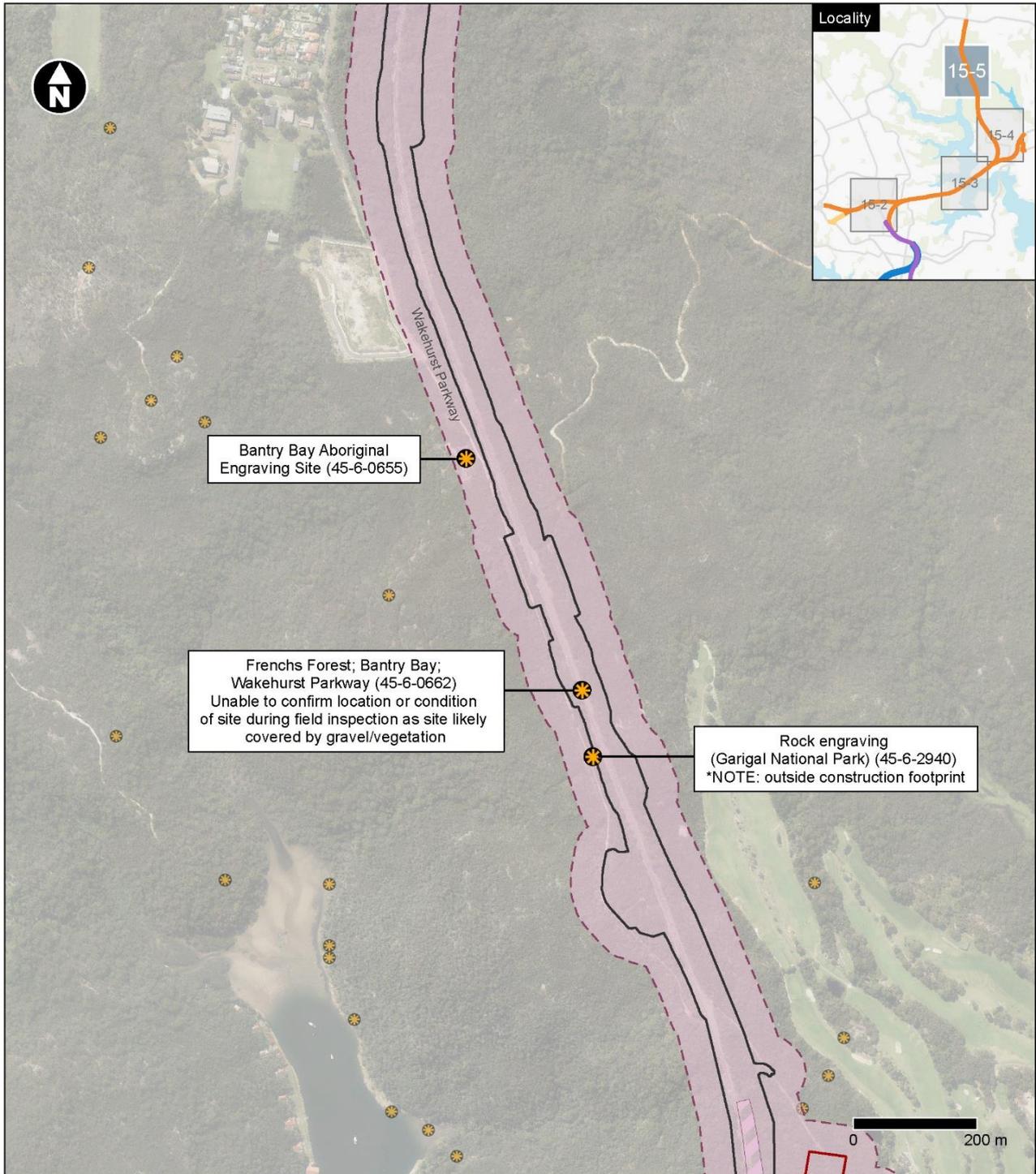
Construction features

- 50 metre area around construction footprint
- Construction footprint
- Construction support site
- Tunnel

AHIMS sites

- AHIMS site within 50 metres of the construction footprint
- AHIMS site over 50 metres from the construction footprint
- Potential Archaeological Deposit

Figure 15-4 AHIMS sites within 50 metres of the project construction footprint (Seaforth to Balgowlah)



Legend

Construction features

- 50 metre area around construction footprint
- Construction footprint
- Construction support site
- Tunnel

AHIMS sites

- AHIMS site within 50 metres of the construction footprint
- AHIMS site over 50 metres from the construction footprint

Figure 15-5 AHIMS sites within 50 metres of the project construction footprint (Wakehurst Parkway)

15.3.4 Potential submerged Aboriginal sites

Potential submerged Aboriginal archaeological sites refers to archaeological sites inundated since around 17,000 years ago, when the sea level began to rise, eventually flooding the river valley and forming a flood tide delta (Sydney Institute of Marine Science 2014). Aboriginal archaeological sites that could occur in inundated areas of the study area include:

- Rock shelters with occupation evidence and deposit
- Art and grinding grooves on sandstone ledges and faces
- Middens and/or stone artefact scatters on sandstone platforms and elevated area
- Fish traps on shallow, wide and gently sloping sandstone platforms.

The probability of these surviving intact, or at all depends on how the sea rose – gradually or as an encroaching active shoreline with wave and tidal action, and the subsequent pattern of tidal flow. The pronounced rock outcrops at about 20 metres depth close to Seaforth Bluff are considered to have moderate to high potential for the presence and survival of inundated rock shelters, more so than smaller rock overhangs closer to Clive Park which have been assessed as having low potential. At 30 metres below the current bed of the harbour, peat deposits present along the ancient watercourse that formed Middle Harbour have the greatest potential to contain well-preserved archaeological objects. There is a moderate to high potential for all identified site types listed above to be present in the Pearl Bay (west of Spit West Reserve) and the area between Clive Park and Beauty Point.

Potential rock overhangs are submerged and concealed by marine sediments, so they cannot be readily accessed and assessed. The assessment of impacts to submerged Aboriginal archaeological sites is therefore based on the potential for such sites to exist, using available geophysical information and an understanding of site formation processes.

Areas where submerged Aboriginal archaeological sites could occur have been considered based on a combination of the likelihood of the site occurring and the likelihood of it surviving inundation. Table 15-3 presents how archaeological potential has been defined, based on the likelihood of a site's presence.

Table 15-3 Defining Aboriginal archaeological potential

Archaeological potential	Likelihood of presence
Moderate to high	50–100 per cent
Low	25–49 per cent
Very Low	2–24 per cent
Remote	Less than 0–1 per cent

Table 15-4 summarises areas of submerged Aboriginal archaeological potential relevant to the project.

Table 15-4 Summary of areas of submerged Aboriginal archaeological potential

Location	Potential Aboriginal site type	Archaeological potential	Predicted potential location within study area
Between Northbridge and Seaforth	Stone artefacts, midden deposits and fish traps	Moderate to high	Formed along the ancient watercourse (as shown from geotechnical investigations).
	Rock shelters	Moderate to high	Along the sloping bed of the harbour on the Seaforth side of Middle Harbour.
	Rock shelters	Low	Along the sloping bed of the harbour on the Clive Park side of Middle Harbour.
	Rock shelters, art, grinding grooves, middens, stone artefact scatters, quarry sites and fish traps	Very low	Across the remainder of the study area.
Pearl Bay (west of Spit West Reserve)	Rock shelters, grinding grooves, middens and/or stone artefact scatters, stone quarry sites, fish traps	Moderate to high	In potential residual soils and/or sandstone overhangs/ledges, creek lines that may occur buried beneath Holocene marine sediments, up to up 30 metres thick below the current surface bed of the harbour.
Between Clive Park and Beauty Point)	Rock shelters, grinding grooves, middens and/or stone artefact scatters, stone quarry sites, fish traps.	Moderate to high	In potential residual soils and/or sandstone overhangs/ledges, creek lines that may occur buried beneath Holocene marine sediments which are assumed to comprise at least the first few metres of the current bed of the harbour.

15.3.5 Archaeological survey results

Targeted archaeological surveys were carried May, June and August 2017 to confirm the location of registered AHIMS sites and to assess areas identified as having potential Aboriginal archaeological sensitivity based on particular landforms. Additional assessments were undertaken with nominated site officers representing the Metropolitan Local Aboriginal Land Council in August 2018, February 2020 and September 2020. During these surveys, site officers were provided an opportunity to comment on the potential for Aboriginal cultural material to be present within the study area, the cultural significance of any Aboriginal cultural heritage sites identified during the survey and proposed management recommendations, including recommendations for further assessment. These areas of potential Aboriginal archaeological sensitivity and archaeological survey results are described in Table 15-5.

The archaeological surveys verified the presence of 10 of the 11 identified AHIMS sites. The location and condition of one of the sites (45-6-0662, Frenchs Forest; Bantry Bay; Wakehurst Parkway) could not be confirmed during field inspection and the Aboriginal Heritage Office has advised that the site was likely covered by gravel and vegetation.

The site Wakehurst Engraving MAN 104 (45-6-3032) was observed to be significantly damaged during field inspection in September 2020. An extensive area of bedrock from the horizontal rock

engraving appeared to have been cut back, with a significant portion missing, exceeding one square metre in extent. Transport for NSW has notified Heritage NSW of the damage.

No previously unrecorded Aboriginal cultural heritage places or objects were identified during the surveys.

Table 15-5 Outcomes of the archaeological surveys

Survey area	Aboriginal archaeological sensitivity	Archaeological survey results
St Leonards Park, North Sydney	Low	No Aboriginal cultural heritage was identified.
Cammeray Golf Club, Cammeray	Low	No Aboriginal cultural heritage was identified.
ANZAC Park, Cammeray	Low	No Aboriginal cultural heritage was identified.
Artarmon Park, Artarmon	Low	Potential archaeological deposit: several large sandstone outcrop areas and intact deposits: <ul style="list-style-type: none"> • Artarmon Park PAD (45-6-3362) • Artarmon Park artefact scatter (45-6-3599).
Punch Street, Artarmon	Low	No Aboriginal cultural heritage was identified.
Flat Rock Creek, Willoughby	Low	Historically significant area (Henry Lawson Cave) outside study area. One potential archaeological deposit identified near large sandstone outcrop areas with potentially intact deposit: <ul style="list-style-type: none"> • Flat Rock Creek PAD (45-6-3361).
Clive Park, Northbridge	High	Registered AHIMS sites inspected: <ul style="list-style-type: none"> • Clive Park 2; Taplin's Cicada Pupa Cave (45-6-0996) • Clive Park 1; Northbridge (45-6-0654) • Clive Park 8, Shelter and Midden (45-6-3012). No further Aboriginal cultural heritage was identified.
Spit West Reserve, Mosman	Low	No Aboriginal cultural heritage was identified.
Balgowlah Golf Course and Burnt Bridge Creek, Balgowlah	Low	High levels of disturbance across the site. Two recorded AHIMS sites were unable to be located (note these sites have now been documented as being destroyed and Heritage NSW have updated AHIMS to reflect this). Areas of potential archaeological deposit were noted where intact landforms remain adjacent to the creek. There is the potential for grinding grooves and engravings in the sandstone bedrock. Location of Burnt Bridge Creek PAD (45-6-3363). No further Aboriginal cultural heritage was identified.

Survey area	Aboriginal archaeological sensitivity	Archaeological survey results
Wakehurst Parkway, Seaforth to Frenchs Forest	High	Registered AHIMS sites inspected: <ul style="list-style-type: none"> • Bantry Bay Aboriginal Engraving Site (45-6-0655) • Wakehurst Engraving MAN 104 (45-6-3032) This site was observed to be significantly damaged during field inspection carried out in September 2020 • Rock engraving (Garigal National Park) (45-6-2940) • The location and condition of Frenchs Forest; Bantry Bay; Wakehurst Parkway (45-6-0662) was not able to be confirmed as the site was likely covered by gravel/vegetation.

15.3.6 Test excavation

During the archaeological survey, three areas of potential archaeological deposit were identified.

Further assessment and impact modelling was carried out to determine whether these sites had the potential to be directly impacted by the project. Based on this impact modelling, only the Artarmon Park potential archaeological deposit required test excavation as it is within the construction footprint that could be directly impacted by construction activities.

Test excavation at Balgowlah and Flat Rock Creek was not required because the areas of potential archaeological deposit are outside the immediate construction footprint. Although they are within the broader 50 metre area from the construction footprint being considered for indirect impacts (vibration and settlement), areas of potential archaeological deposit would not be impacted.

The test excavation at Artarmon Park consisted of:

- 17 shovel test pits (500 millimetres x 500 millimetres)
- One test pit (1000 millimetres x 1000 millimetres).

During the test excavations an artefact scatter consisting of 15 sub-surface stone artefacts (chert, silcrete, quartzite and mudstone material) were identified in association with Artarmon Park PAD (45-6-3362). This has been recorded as Artarmon Park artefact scatter (45-6-3599).

15.3.7 Significance assessment

The significance of those Aboriginal sites within 50 metres of the project construction footprint is summarised in Table 15-6, and has been assessed based on the four values of the Australia ICOMOS (International Council on Monuments and Sites) *Burra Charter* (Australia ICOMOS 2013):

- Social values
- Historical values
- Scientific values
- Aesthetic values.

Aboriginal cultural significance was assessed through consultation with the relevant Registered Aboriginal Parties during the archaeological survey and consultation process.

Potential archaeological deposits do not have a statement of significance below as they have not been extensively excavated and their significance is not able to be determined. It is noted that project refinements have allowed potential archaeological deposits to be avoided, removing the need to excavate in these areas during construction.

Any potential submerged Aboriginal archaeological sites could potentially have very high scientific significance due to the potential to yield information that would contribute to an understanding of New South Wales' natural and cultural history. Submerged Aboriginal archaeological sites and Pleistocene Aboriginal archaeological sites are both, on their own, rare site types within a New South Wales context and the identification of submerged Pleistocene landscapes and associated Aboriginal archaeological resources would be an extremely rare discovery within Australia.

Table 15-6 Significance of Aboriginal sites within 50 metres of the project construction footprint

Name and AHIMS ID	Significance value				Overall significance
	Social	Historical	Scientific	Aesthetic	
Artarmon Park artefact scatter (45-6-3599)	High	N/A	Moderate	Low	Low-moderate
Clive Park 8, Shelter and Midden (45-6-3012)	High	N/A	High	High	High
Clive Park 1; Northbridge (45-6-0654)	High	N/A	Moderate-high	High	High
Clive Park 2; Taplin's Cicada Pupa Cave (45-6-0996)	High	N/A	Moderate-high	Moderate	Moderate-high
Rock engraving (Garigal National Park) (45-6-2940)	High	High	Moderate-high	High	High
Bantry Bay Aboriginal Engraving Site (45-6-0655)	High	High	High	High	High

Name and AHIMS ID	Significance value				Overall significance
	Social	Historical	Scientific	Aesthetic	
Wakehurst Engraving MAN 104 (45-6-3032)	High	N/A	Low	Low	Low The site was observed to be damaged during field inspection in September 2020. Prior to the field inspection, the site had low overall significance. Following the September 2020 inspection, the significance rating of low is retained.
Frenchs Forest; Bantry Bay; Wakehurst Parkway (45-6-0662)	The location and condition of this site could not be confirmed during field inspection as the site was likely covered by gravel/vegetation. As such, a desktop assessment of this site was carried out, and no significance assessment has been carried out. The Aboriginal Heritage Office were the last agency to have conducted a condition assessment of the site.				

15.4 Assessment of potential impacts

15.4.1 Potential impacts to terrestrial Aboriginal heritage sites

Most potential impacts to Aboriginal sites would occur during construction, and may include:

- Direct impacts such as the removal or destruction of an Aboriginal site
- Indirect impacts associated with construction vibration generated by surface works in proximity to Aboriginal sites.

Potential impacts during operation are expected to be limited and may include indirect impacts associated with Aboriginal site setting (visual impacts, changes to vistas/landscapes), changes to ongoing use or environmental association.

The potential for these impacts to occur at known Aboriginal sites is summarised in Table 15-7. Based on the results of this assessment and in consultation with the Registered Aboriginal Parties, it is anticipated that:

- The location and condition of one Aboriginal site Frenchs Forest; Bantry Bay; Wakehurst Parkway (45-6-0662) could not be confirmed during field inspection but is considered likely to be within the construction footprint. This site could have partial/potential direct impact but this would need to be determined through further consultation/inspection
- Five Aboriginal sites (45-6-0655, Bantry Bay Aboriginal Engraving Site; 45-6-2940, Rock engraving (Garigal National Park); 45-6-3362, Artarmon Park PAD; 45-6-3361, Flat Rock Creek PAD and 45-6-3363, Burnt Bridge Creek PAD) are located within 50 metres of surface works including two sites that may be subject to indirect impacts associated with vibration and settlement (45-6-0655, Bantry Bay Aboriginal Engraving Site and 45-6-2940, Rock engraving (Garigal National Park))

- Five Aboriginal sites (45-6-3032, Wakehurst Engraving MAN 104; 45-6-3012, Clive Park 8, Shelter and Midden; 45-6-0654, Clive Park 1; Northbridge; 45-6-0996, Clive Park 2; Taplin's Cicada Pupa Cave and 45-6-3599, Artarmon Park artefact scatter) are located above or within 50 metres of the tunnel alignment and may be subject to indirect impacts associated with vibration and settlement
- Operational impacts are considered to be negligible.

Table 15-7 Assessment of potential impacts to known Aboriginal cultural heritage sites

Site	Site type	Overall site significance	Potential impact and description	Risk of potential impacts
Artarmon Park artefact scatter (45-6-3599)	Sub-surface artefact scatter	Low-moderate	Site is a sub-surface artefact scatter and would not be impacted by the project.	No impact
Artarmon Park PAD (45-6-3362)	Potential archaeological deposit	N/A	Site is a potential archaeological deposit and would not be impacted by the project.	No impact
Flat Rock Creek PAD (45-6-3361)	Potential archaeological deposit	N/A	Site is a potential archaeological deposit and would not be impacted by the project.	No impact
Clive Park 8, Shelter and Midden (45-6-3012)	Shelter and midden	High	Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible
			Indirect – settlement Settlement is predicted to be between 25-30 millimetres.	Negligible
Clive Park 1; Northbridge (45-6-0654)	Shelter with art, burial/s, shelter with midden, artefact scatter	High	Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible
			Indirect – settlement Settlement is predicted to be between 20-25 millimetres. Large overhang and high significance of this site increased significance outcome of potential impact.	Minor

Site	Site type	Overall site significance	Potential impact and description	Risk of potential impacts
Clive Park 2; Taplin's Cicada Pupa Cave (45-6-0996)	Shelter with art, shelter with midden	Moderate-high	Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible
			Indirect – settlement Settlement is predicted to be 10-15 millimetres.	Negligible
Burnt Bridge Creek PAD (45-6-3363)	Potential archaeological deposit	N/A	Site is a potential archaeological deposit and would not be impacted by the project. Rock shelter is less than 50 cubic metres in size.	No impact
Wakehurst Engraving MAN 104 (45-6-3032)	Rock engraving on outcrop	High	Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible
			Indirect – settlement Settlement at this location is predicted to be 10-15 millimetres, which poses a minor risk, however the existing site is already significantly impacted/damage and risk is therefore considered negligible.	Negligible
Rock engraving (Garigal National Park) (45-6-2940)	Rock engraving	High	Indirect – change to environmental setting and access There is the potential for changes to the visual setting and surrounding landscape due to the removal of mature native trees during construction. There is the potential for changes to the site access during construction works.	Negligible
			Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible

Site	Site type	Overall site significance	Potential impact and description	Risk of potential impacts
Frenchs Forest; Bantry Bay; Wakehurst Parkway (45-6-0662)	Rock engraving	Not assessed	Direct (partial/potential) Location and condition not confirmed during site inspection as site was likely covered by gravel/vegetation.	Minor
Bantry Bay Aboriginal Engraving Site (45-6-0655)	Large rock engraving site with multiple engravings	High	Indirect – change to environmental setting and access There is the potential for changes to the visual setting and surrounding landscape due to the removal of mature native trees during construction. There is the potential for changes to the site access during construction works.	Negligible
			Indirect – vibration Vibration impact would be outside the minimum working distance for unsound structures.	Negligible

Note: Each AIHMS site has been assessed for indirect impacts associated with settlement. With the exception of Clive Park 8, Shelter and Midden (45-6-3012), Clive Park 1; Northbridge (45-6-0654), Clive Park 2; Taplin's Cicada Pupa Cave (45-6-0996) and Wakehurst Engraving MAN 104 (45-6-3032) all sites within the study area are outside of the zone of potential settlement impacts.

15.4.2 Impacts to potential submerged Aboriginal sites

Potential rock overhangs are submerged and concealed by marine sediments, so they cannot be readily accessed and assessed. The assessment of impacts to submerged Aboriginal archaeological sites is therefore based on the potential for such sites to exist, using available geophysical information and an understanding of site formation processes.

The predictive model provides a basis for assessing potential impacts and identified that there is documented evidence of Aboriginal occupation and land use patterns along the Port Jackson shoreline and the broader Sydney Basin.

The extent to which sites may have survived inundation is dependent on the length and intensity of exposure to water movement and wave action. It is predicted that most submerged sites are likely to be identified in peat deposits which have formed above residual subsoils, some of which may be beneath at least 10 metres of marine sediment.

Construction activities associated with excavation within the cofferdams, dredging and piling may have direct and indirect impacts on potential submerged Aboriginal archaeological sites. The construction of the immersed tube tunnels would require dredging of the bed of the harbour to create a trench for the installation of the immersed tube tunnel. The slopes of the trench would generally be about 14 degrees (25 per cent) to maximise the stability of the trench and minimise the risk of slumping. The tunnel trench would be designed to provide a solid and safe place for the immersed tube tunnel to be placed.

Most of the potential impacts to submerged Aboriginal archaeological sites would likely occur during construction rather than operation, and may include:

- Direct impacts from construction activities such as dredging, piling and excavation within the cofferdams
- Indirect impacts associated with construction vibration generated by construction activities in proximity to Aboriginal sites.

Indirect impacts such as vibration would have a negligible impact, because any submerged Aboriginal archaeological sites would be buried, and movement of individual objects would be minimal.

Further investigation would be required to confirm the presence of sites and their condition. If confirmed, the identification and documentation of such Aboriginal archaeological sites would demonstrate that such sites could be present across Sydney Harbour / Middle Harbour, and the information obtained in this project would be valuable in managing this resource.

A summary of potential impacts to submerged Aboriginal heritage is provided in Table 15-8.

Table 15-8 Assessment of potential impacts to submerged Aboriginal sites

Location	Potential Aboriginal site type	Archaeological potential	Significance of direct impacts	Risk of indirect impacts
Between Northbridge and Seaforth	Stone artefacts, midden deposits and fish traps	Moderate to high	Moderate to major (before mitigation) due to dredging	Negligible
	Rock shelters – Seaforth side of Middle Harbour	Moderate to high	N/A as likely below construction depth	Negligible
	Rock shelters – Clive Park side of Middle Harbour	Low	N/A	Negligible
	Rock shelters, art, grinding grooves, middens, stone artefact scatters, quarry sites and fish traps (across remainder of study area)	Very low	Negligible to moderate (before mitigation) due to dredging and excavation	Negligible
Pearl Bay (west of Spit West Reserve)	All forms identified – rock shelters, grinding grooves, middens and/or stone artefact scatters, stone quarry sites, fish traps	Moderate to high	Potential impacts to submerged Aboriginal sites unlikely in this location as the depth of piling for the temporary wharf would not reach below bed of the harbour strata containing Aboriginal archaeological sites. Potential impacts are therefore considered negligible to minor.	
Between Clive Park and Beauty Point)	All forms identified – rock shelters, grinding grooves, middens and/or stone artefact scatters, stone quarry sites, fish traps	Moderate to high	Potential impacts to submerged Aboriginal sites unlikely in this location as the depth of piling for the temporary wharf would not reach below bed of the harbour containing Aboriginal archaeological sites. Potential impacts are therefore considered negligible.	

15.5 Environmental management measures

Measures to avoid, minimise or manage Aboriginal cultural heritage impacts as a result of the project are detailed in Table 15-9.

Table 15-9 Environmental management measures – Aboriginal cultural heritage

Ref	Phase	Impact	Environmental management measure	Location
Terrestrial Aboriginal heritage				
AH1	Pre-construction and construction	Aboriginal heritage – vibration, and settlement impacts	<p>Before the start of construction, further consultation with Heritage NSW, the Metropolitan Local Aboriginal Land Council, the Aboriginal Heritage Office and the Registered Aboriginal Parties will be carried out to decide an appropriate course of action for the Aboriginal site 45-6-0662 on Wakehurst Parkway, as the location of this site could not be confirmed during field inspection (site is likely covered by gravel/vegetation).</p> <p>If considered appropriate, an archaeological investigation may be carried out at the possible site location to carefully remove the gravel/vegetation, to confirm its presence and record the underlying site condition.</p> <p>If new information regarding site condition is identified during consultation suggesting the site may be subject to impacts due to vibration and settlement, environmental management measures AH2, AH3 and AH4 will apply.</p> <p>In the absence of confirming the site, if during construction works a site is located, the unexpected finds protocol prescribed in AH5 would apply. Further, Heritage NSW, an appropriately qualified archaeologist and the Metropolitan Local Aboriginal Land Council will be contacted and the site will be re-recorded in situ.</p>	Frenchs Forest; Bantry Bay; Wakehurst Parkway (45-6-0662)
AH2	Pre-construction and construction	Aboriginal heritage – vibration impacts	<p>The following process will be carried out to confirm where vibration monitoring at those terrestrial sites within 50 metres of the project corridor will be required:</p> <ol style="list-style-type: none"> Terrestrial Aboriginal site condition surveys of sites will be completed by an appropriately qualified person using those techniques appropriate in determining which sites are considered to be structurally unsound Where this determination cannot be made, as a precaution the site will be considered to be structurally unsound A screening of vibration intensive activities within 50 metres of structurally unsound sites will be carried out to identify activities 	All registered AHIMS sites subject to vibration intensive activities determined to be structurally unsound (see AH2).

Ref	Phase	Impact	Environmental management measure	Location
			<p>that have the potential to exceed vibration levels of 2.5 millimetres per second</p> <p>d) Sites identified as being both structurally unsound and having potential for exceedance in vibration levels of 2.5 millimetres per second will be identified as requiring vibration monitoring where this cannot be reduced at the source.</p>	
AH3	Construction	Aboriginal heritage – vibration impacts	<p>Vibration monitoring will be carried out at sites that have been identified as requiring monitoring in accordance with the process outlined in environmental management measure AH2. The monitoring process will:</p> <ul style="list-style-type: none"> • Be developed by a suitably qualified person • Be risk-based • Include appropriate frequency and duration of monitoring including adequate benchmark recording before works commence • Include appropriate management protocols for any exceedances. <p>Where possible, project works will be conducted in a manner to minimise vibration levels, to less than 2.5 millimetres per second at all structurally unsound AHIMS sites.</p>	All registered AHIMS sites located subject to vibration intensive activities determined to be structurally unsound (see AH2).
AH4	Construction	Aboriginal heritage – vibration impacts	<p>Where monitoring identifies that vibration levels exceed 2.5 millimetres per second, or following vibration intensive activities, subsequent condition survey of sites that are subject to monitoring in AH3 will be carried out.</p> <p>The subsequent condition surveys will record any changes to the integrity of the site that may have resulted from construction vibration. Additional surveys must be carried out by a suitably qualified person and include a Metropolitan Local Aboriginal Land Council representative. AHIMS site cards will be updated accordingly where any changes are observed. Condition surveys may include further photogrammetry and 3D-capture techniques, in which case comparison against the baseline will be carried out.</p>	All registered AHIMS sites subject to vibration monitoring (see AH3)

Ref	Phase	Impact	Environmental management measure	Location
AH5	Construction	Unexpected discovery of historical heritage materials, features, or deposits	If at any time during construction of the project, any items of potential Aboriginal archaeological or cultural heritage conservation significance or Ancestral remains are discovered they will be managed in accordance, the <i>Standard Management Procedure: Unexpected Heritage Items</i> (Roads and Maritime Services, 2015d).	BL/GHF
AH6	Construction	Aboriginal heritage – impacts	Cultural and historic heritage awareness training will be carried out for personnel engaged in work that may impact heritage items before commencing works for the project.	BL/GHF
AH7	Pre-construction and construction	Aboriginal heritage – impacts	As part of the project urban design and landscape plan, an Aboriginal heritage interpretation strategy will be developed for the project in consultation with Registered Aboriginal Parties and other relevant Stakeholders. Appropriate Aboriginal heritage interpretation will be incorporated into the project urban design and landscape plan in accordance with the interpretation strategy.	BL/GHF
Maritime Aboriginal heritage				
AH8	Pre-construction	Potential Aboriginal submerged sites heritage impacts	<p>The effectiveness of using high resolution geophysical survey to identify rock overhangs concealed by marine sediments will be assessed. If it is determined that a high resolution geophysical survey could produce the desired results, then the survey will be carried out.</p> <p>If the geophysical survey conclusively shows that there are no rock overhangs measuring at least 1.5 metres in height (from the rock base to the rock ceiling), there would be no further archaeological work carried out and any residual risk will be managed through an unexpected finds procedure. However, if the geophysical survey is inconclusive or distinct rock overhangs are identified, then an archaeological dive investigation will be implemented. Much of the diving will be done in near zero visibility and will therefore be limited to what a diver can feasibly and safely do.</p>	Potential rock shelter(s) at Seaforth located outside of Middle Harbour north construction support site (BL8) cofferdam footprint but within the dredge footprint

Ref	Phase	Impact	Environmental management measure	Location
AH9	Pre-construction and construction	Potential Aboriginal submerged sites heritage impacts	<p>The effectiveness of using high resolution geophysical survey to identify rock overhangs concealed by marine sediments will be assessed. If it is determined that a high resolution geophysical survey could produce the desired results, then the survey will be carried out.</p> <p>If the geophysical survey conclusively shows that there are no rock overhangs measuring at least 1.5 metres in height (from the rock base to the rock ceiling), there would be no further archaeological work carried out and any residual risk will be managed through an unexpected finds procedure. However, if the geophysical survey is inconclusive or distinct rock overhangs are identified, then onsite visual monitoring within the cofferdam will be carried out during the construction period, after the cofferdam has been de-watered. The aim of the monitoring will be to identify voids within the bedrock close to the interface with marine sediments.</p> <p>In the event that a void in the bedrock appears that displays the characteristics of a potential rock shelter, then the marine sediments will be removed by pump. Should the marine sediments bottom out onto the rock no further action would be taken. If the characteristics of the marine sediments change or if fissures are evident, then samples of the sediments will be taken, preferably as an intact core sample.</p> <p>In consultation with a suitably experienced geomorphologist a set of criteria will be established for the identification of pre-inundation soil deposits (peat, charcoal, roots, etc). If pre-inundation soil deposits are evident within samples, a controlled archaeological investigation to recover any artefacts will take place. However, the extent of the archaeological investigation and method of recovery will be determined by the constraints of the bed rock conditions and workplace health and safety protocols and constraints within the cofferdams, including safety protocols for handling of potentially contaminated sediment.</p> <p>Environmental, engineering and workplace health and safety factors such as operating space within an overhang, viscosity of the pre-inundation soil and elevated contamination levels will have an influence on the method of archaeological investigation, which will nonetheless aim to retain spatial and stratigraphic control if at all feasible.</p>	Within the footprint of Middle Harbour south and north cofferdams construction support sites (BL7 and BL8)

Note: BL = Beaches Link, GHF = Gore Hill Freeway Connection