

Analysis and Assessment

Heritage Listings

North Head is listed as Historic Place No. 105759 on the National Heritage List (Place File No. 1/13/024/0019).

North Head Sanctuary is listed as 'The North Head Artillery Barracks, North Head Scenic Drive, Manly', Historic Place No. 105431 on the Commonwealth Heritage List (Place File No. 1/13/024/0005).

The full text of the above listings can be found at Appendix 4 and 5.

North Head is also listed on the Register of the National Estate as:

- North Head (Place ID: 101621, Place File No: 1/13/024/0019)
- North Head Quarantine Station & Reserve (former) (Place ID: 2866, Place File No: 1/13/024/0008)
- North Head Artillery Barracks (Place ID: 19091, Place File No: 1/12/024/005)
- North Head Military Reserve (Place ID: 102495, Place File No: 1/12/024/0005)
- North Head Fortifications (Place ID: 2863, Place File No: 1/13/024/0005)
- New Quarantine Cemetery (Place ID: 2867, Place File Number: 1/12/024/0009)

North Head Quarantine Station and Reserve is listed on the State Heritage Register under the NSW *Heritage Act 1977*.

Manly LEP 1988 lists the following 'Architectural and Archaeological Items' at North Head:

- North Head Fortifications (Artillery School)
- Stone Walls
- North Head Scenic Drive
- The School of Artillery
- The Australian Police Staff College
- Quarantine Station (Sydney Harbour National Park)
- Cemetery (Sydney Harbour National Park)
- Group of Institutional Buildings (Commonwealth Military Reserve)

The following 'Landscape Items' located either within or immediately adjacent to the Defence site are listed under Manly LEP 1988:

- North Head Fortifications
- Roadway: North Head
- Walls: North Head
- School of Artillery
- Cemetery: North Head

Conservation Management Plans

The Trust has recently commissioned several Conservation Management Plans (CMPs) for the North Head Sanctuary. **Figure 16** illustrates the areas covered by each of the CMPs.

In November 2004, the Trust commissioned the preparation of updated detailed Conservation Management Plan for the buildings and cultural landscape items within the former School of Artillery Precinct, North Head. The boundary for this CMP covered all the inner and outer core buildings as well as the 1930s houses. All structures to the east of the stone wall were excluded from this study.

The CMP prepared by Dawbin Architects (2008) included detailed inventories for each building to guide future works. The CMP divides the former School of Artillery into two areas – the “Core Buildings” (essentially “the Parade Ground Precinct”) and “Outer Areas”, which includes “The Sheds” precinct. Dawbin then provides detailed recommendations for conservation policies and the adaptive re-use of the site. These recommendations are addressed in the Outcomes section of this Plan.

In 2008, the Trust commissioned Robertson & Hindmarsh Pty Ltd to prepare a Conservation Management Plan for North Fort (the area east of the stone wall). This CMP included the stone walls and Avenue of Honour. This CMP also includes detailed conservation policies for the site which are addressed in the Outcomes section of this Plan.

The methodology used in the preparation of the CMPs to assess significance generally follows the format set out in James Semple Kerr’s *The Conservation Plan*. The CMPs assessed the cultural significance of the place by examining the way in which its extant fabric and setting demonstrates its function, associations and aesthetic qualities.

The National and Commonwealth Heritage values in this plan were taken from the statutory listings. However, summary statements of significance from the CMPs have also been included and these assist in describing the heritage values of the site.


Archaeological Assessments

A non-indigenous archaeological report was included as part of the detailed CMP for North Head. In summary it found that the lands within this study boundary were assessed as having low archaeological potential for non-indigenous archaeological remains. Two areas within this boundary were identified as requiring further research. These are identified as areas E and G - **Figure 17**.

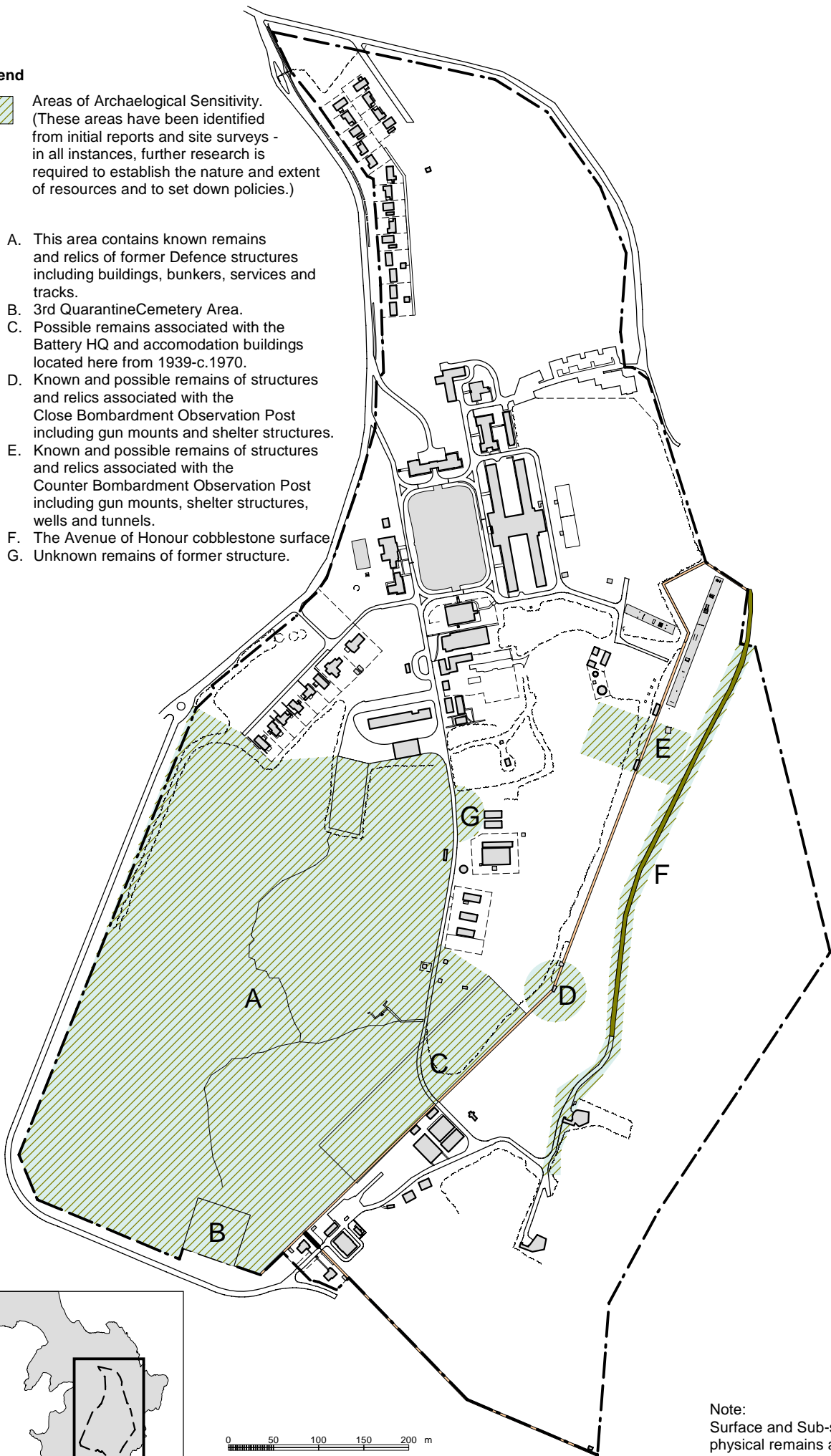
Other areas of the site have not been fully surveyed for their archaeological potential. More cursory site surveys with staff of the North Fort Museum have identified areas that evidently contain surface and sub-surface remains of infrastructure associated with the Battery and former North Fort Barracks. These areas are detailed as areas A, C D and F in **Figure 17**. Prior to undertaking any works in these areas, the Trust will commission detailed archaeological surveys.

The 3rd Quarantine Cemetery (Area B - **Figure 17**), is a known site with exceptional archaeological potential. In 2006, the Trust commissioned Banksia Heritage + Archaeology to prepare an Archaeological Management Plan (AMP) for the cemetery. Banksia Heritage + Archaeology found the Cemetery is of national significance as it is an integral part of the process of quarantine and as a reminder that it was Australia’s protection against deadly epidemic disease. The cemetery is most likely Australia’s largest, most intact and best preserved quarantine cemetery. Consequently, Banksia Heritage + Archaeology make detailed recommendations for ongoing management of the cemetery which are addressed in the Outcomes section of this Plan.

Legend

 Areas of Archaeological Sensitivity. (These areas have been identified from initial reports and site surveys - in all instances, further research is required to establish the nature and extent of resources and to set down policies.)

- A. This area contains known remains and relics of former Defence structures including buildings, bunkers, services and tracks.
- B. 3rd Quarantine Cemetery Area.
- C. Possible remains associated with the Battery HQ and accomodation buildings located here from 1939-c.1970.
- D. Known and possible remains of structures and relics associated with the Close Bombardment Observation Post including gun mounts and shelter structures.
- E. Known and possible remains of structures and relics associated with the Counter Bombardment Observation Post including gun mounts, shelter structures, wells and tunnels.
- F. The Avenue of Honour cobblesurface
- G. Unknown remains of former structure.



Note:
Surface and Sub-surface Aboriginal physical remains are possible in all areas.

Fig. 17 Areas of Archaeological Sensitivity

Threats to Biodiversity

The main threats to biodiversity on North Head are:

- Loss and fragmentation of habitat through clearing, development and maintenance activities;
- Altered soil nutrient status and hydrology;
- Infection and dieback of native plants caused by *Phytophthora cinnamomi* (and other pathogens);
- Inappropriate fire regimes and arson;
- Mowing / slashing and inappropriate use of herbicides;
- Invasion of weed species;
- Inappropriate plantings in and around remnants;
- Seed and wildflower collection;
- Erosion and/or physical damage from surface water run-off, wind, vehicles, rabbits, and pedestrian use;
- Predation of native flora and fauna by domestic and feral animals including rabbits, foxes, dogs, cats and rats;
- Dumping of rubbish, garden refuse and soil; and
- Fatalities due to road traffic.

A series of actions have been recommended in order to manage species diversity at North Head. These recommendations have been incorporated into the Outcomes section.

Bush Fire Management

Due to the area's former use by defence, most of North Head has not burnt for up to 40 years. The heath and scrub vegetation has evolved with fire over many thousands of years to the extent that they require fire to trigger reproduction. For many of the native plants, fire stimulates flowering and seed dispersal, germination of the soil-stored seedbank, or regrowth from epicormic buds and lignotubers (depending on the species and its tolerance to fire). Absence of fire has favoured dominance of up to 8m senescent *Leptospermum laevigatum* (Tea Tree Scrub) whose tall thick canopy suppresses regeneration of the diverse range of groundcover and shrub species.

The Recovery Plan for ESBS provides interim recommendations on appropriate fire regime for the community pending further research on the fire ecology of ESBS, as follows:

- Successive fires at intervals of less than 8 years, or more than 15 years should be avoided; and fire should not be excluded for periods of greater than 30 years; and
- A variable fire regime for ESBS should be trialled on a small scale as a research priority.

In 2006, NPWS prepared (in conjunction with the Trust and other land managers) an integrated Fire Management Strategy (FMS) for Sydney Harbour National Park, North Head precinct. This plan outlines the Bushfire Risk Management Strategies for the whole of North Head area. This plan outlines the Bush Fire Risk Management Strategies for the whole of North Head including the North Head Sanctuary.

The Trust is represented on the Manly-Mosman-North Sydney Bush Fire Management Committee set up as a statutory requirement under the NSW *Rural Fires Act 1997*. The Manly-Mosman-North Sydney Bush Fire Risk Management Plan and Operations Plan guide the preparation of sub-plans for specific areas. Hazard reduction proposals, including mechanical clearance and prescribed burns for asset protection, are submitted for approval to the Committee each year ahead of the designated bush fire season.

With regard to the North Head Sanctuary, the FMS has identified primary and secondary roads through the site, with access off North Head Scenic Drive and Blue Fish Drive. Asset protection zones have been identified around much of the North Head Sanctuary with strategic fire advantage zones around the boundary of the asset protection zones, along the length of the historic stone walls and around the 3rd Quarantine Station Cemetery.

In 2002, Conacher Travers prepared an Interim Bushfire Management Plan for the former School of Artillery. This plan provides guidelines for the protection of life and property, and the natural and cultural heritage assets of the site including the heritage stone walls and the 3rd Quarantine Cemetery.

The plan identifies a series of future planning strategies in relation to bushfire management as identified below:

- Implement an Asset Protection Strategy that details the fire risk to each asset, with consideration of proposed uses within a bushfire prone landscape. (Recommended bushfire protection areas are shown at *Appendix 1 – Environmental Considerations*)
- Prepare a detailed Bushfire Management Plan that details the specific requirements of the threatened species, endangered populations and vegetation communities within the site.
- Prepare a strategic research program for the long-term protection of biodiversity within the site.
- Implement a burn program to promote a diversity of vegetation age classes across North Head (together with all North Head land managers)
- Develop an evacuation plan for users of the site.
- Develop an access capability assessment for determination of fire suppression needs and prescription burning requirements.

In 2007, ERM prepared a Bush Fire Management Plan (BFMP) for North Fort which documents the factors that influence fire on that part of the North Fort Sanctuary, the assets and other aspects that require protection from fire, and the strategies to prevent fire.

A Modified Landscape

The planning and formal nature of the built part of the North Head Sanctuary is in sharp contrast to the sense of wildness and isolation from the dominant surrounding bushland. In the central core of the site, the strong geometry of the built landscape is set against this wild backdrop, the lurching dune made habitable by benching and forming. Although substantial buildings face each side of the parade ground and the main entries are aligned with major axis, the bush works its way in at the corners. The design and planning of these buildings clearly references a tradition of colonial barracks evident and established at Victoria Barracks, Sydney.

The core buildings around the Parade Ground are built in the prevailing 1930s Art-Deco style and reflect a clear intention to provide permanent and modern facilities for the defence of the country.

The built form outside the Parade Ground Precinct is characterised in two ways. Firstly there is the suburban nature and pattern of the housing with the style, lot sizes, placement on the high side of the road and landscape features, however, it retains a clear institutional character. This creates a contrast between the regimental, ceremonial and hierarchical nature of the central core buildings and the repetitive domestic buildings. The main approach to the core is a deliberate design intended to conceal the gateway until aligned with the axis.

The remaining buildings can be characterised as being largely functional, ancillary and subservient to the site. These structures are not arranged along the central axis but are specifically located near the core, in the bush, or beside the road, each for operational reasons. They comprise structures associated with the battery such as Observation Posts and the Plotting Room that were deliberately concealed, or sheds and workshops providing support to the battery or the School. These structures are both concentrated in proximity to the core, and are scattered further around the site either as isolated units or small groupings.

Development around the Parade Ground has seen the introduction of exotic species in the form of grasses and ornamental horticulture. There are many ornamental species planted around the central core and other buildings including the houses. The most obvious introduced species are the *radiata* pines around the oval and the flamboyant pink Oleanders. Species appear to have been chosen due to their hardiness to the coastal climate and poor soils and have survived remarkably well.

The character of the plantings reflect the stylish influence of the inter-war period and relates to the formal axial planting of the complex being symmetrical groupings of the Hill's Fig, Moreton Bay Fig, West Australian Peppermint, Pencil Pines and Oleanders. The Norfolk Island pines planted on the parade ground help to define the axis. Evidence suggests that the range of species was purposefully selected to represent species from across Australia.

There is a sense that the surrounding bushland is 'knocking at the door' and preparing to overtake this formal landscape if given the chance. Given the lack of human activity on the site over recent years the natural vegetation is regenerating where and when circumstances permit. The Dawbin Conservation Management Plans address this issue and nominate a series of cultural landscape precincts across the North Head Sanctuary.

Site Contamination and Hazardous Building Materials

The North Head Sanctuary has a long history of military use dating back to the 1920s. As such, the site may reasonably be expected to have a degree of contamination arising from military activities or facilities, or related uses. Following the departure of the School of Artillery from North Head to Puckypunyal, the Department of Defence carried out a program of contamination assessment, remediation and validation of the site to address potential contamination. Reports prepared by contamination experts have been made available to the Trust documenting this work.

Contaminant sources identified include those associated with building hazardous materials such as lead paint and asbestos, storage of petroleum fuels and chemicals, fuel spillage, filling and dumping, stormwater sediments, radioactive materials and the storage and use of military materials.

The Trust notes that no contaminated land audit of this work has been carried out, and that Defence continues to occupy a portion of the site (part of North Fort).

The assessments' findings are summarised below:

Hazardous Building Materials

Asbestos building materials are evident in a number of buildings across the site, including asbestos sheeting and friable asbestos insulation. Building rubble has also been identified in a number of bushland areas where previous structures have been removed. Significant quantities of hazardous materials remain as part of the site building fabric. However, no detailed information is available regarding the nature of these materials, location, quantity, condition or requirement for remediation. To the Trust's knowledge, no remediation of these materials has been carried out.

In addition, lead based painted surfaces were identified throughout the site structures. Similarly, no information was presented regarding location, condition or requirement for remediation. To the Trust's knowledge, no lead paint abatement work has been carried out (apart from that carried out by the Trust for refurbishment of buildings to date).

No information was reported regarding the potential presence of other types of hazardous materials, such as polychlorinated biphenyls in light capacitors or other electrical equipment and synthetic mineral fibre materials.

Radioactive Materials

Two buildings were identified where radioactive substances were known or thought to have been stored. These buildings were the ARMCO facility (Building 34) and Building 213. However, a radioactivity survey was undertaken which did not identify any radioactive residues or sources in these buildings.

Underground Storage Tanks (USTs)

At least four underground storage tanks (USTs) were located on the site. A petroleum UST was located to the east of Building 1 (barracks), one large diesel UST was located east of the oil store (Building 48), and two small diesel USTs were located in front of the workshops (Building 20). Although it is unknown when this occurred, the two small USTs at the workshops are thought to have been removed when the large UST at Building 48 was installed. The petroleum and diesel USTs were decommissioned, removed and remediated by the Department of Defence in 2001.

The assessment identified that the petroleum UST at Building 1 had leaked due to the presence of petroleum hydrocarbons in the groundwater immediately down-gradient of the tanks. When this tank was removed, gross petroleum contamination was encountered in sandy soils beneath the tank and in the vicinity of the main mess building. It was reported that most of this contamination had been removed, but due to structural constraints some contamination was left beneath the building. Petroleum hydrocarbon exceeding relevant criteria has been identified in groundwater down-gradient of the tank at various stages following remediation.

It has been recommended that groundwater monitoring be carried out at wells down-gradient of the building 1 UST at six monthly intervals to confirm that contaminant levels decline to below the relevant criteria.

It was reported that no residual contamination remained in soils following removal of the diesel UST, and that no hydrocarbon contamination was found in down-gradient groundwater.

Military Materials

Various artillery weapons, both full calibre and sub-calibre, have been fired at North Head since the 1920s, with all full calibre firings being conducted seawards. Therefore, the Department of Defence lists the site on its unexploded ordnance (UXO) register, however it assessed it as having no significant residual UXO contamination.

An investigation and survey of residual military materials was carried out. The investigation indicated that there was a minimal risk to human health or the environment associated with military materials that may have arisen from the UXOs. However, it is considered that a 'reasonable quantity' of ordnance waste is likely to remain on the site.

It was recommended that no further investigation or clearance were warranted at the site while it remained inaccessible to the public. However, mainly due to the perceived public risk, it was recommended that should public access or tracks be created in certain areas of the site, then an additional search and clearance of materials should be conducted. These areas are the former ranges to the east of the stone wall not previously adequately investigated due to vegetation density.

In 2006, an investigation of the area to the east of the Avenue of Honour (including in the immediate vicinity of walking tracks in this locality) discovered numerous projectiles and blank cartridges, but no items containing high explosive fill material. All material located during the search, including cultural debris and ammunition waste was removed from the site for disposal and the area has been deemed safe for public use.

Stormwater Sediments

Stormwater sediments in 24 pits located in the former School of Artillery area were identified as containing heavy metal or asbestos contamination. Contaminated sediment has been removed offsite to licensed landfill as part of the remediation program carried out by the Department of Defence.

Dumped Waste Materials

A number of potentially contaminated waste material stockpiles were identified in the assessment. These were reportedly removed to licensed landfill as part of the remediation program carried out by the Department of Defence. Contaminated

material is progressively being removed from the site as it is uncovered during excavations for new buildings and refurbishments.

Oil Staining

Oil stains were identified in and around the workshops located in the former School of Artillery area. These were reportedly removed as part of the remediation program carried out by the Department of Defence.

Services

In December 2001, PPK Consulting undertook a detailed survey in order to establish the extent and condition of site services. The study looked at water and fire services, sewerage, electricity, telecommunications, gas and fuel services.

Sewer

The sewerage system at the North Head site consists of a network of gravity pipes falling to a sewer main on the western side of North Head Scenic Drive in land controlled by NPWS. The sewer pipe network on the former North Head Sanctuary site is in poor condition with a high percentage of the pipes blocked and showing signs of structural failure. The Trust is in the process of renewing sewerage lines and manholes along St. Barbaras Ave and upgraded connections to buildings on the western side of the Parade Ground. Works to connect the North Head Sanctuary Café, RAAMN and toilet block to the gravity fed sewerage system in the Sheds precinct are scheduled to commence shortly. The works will also involve the removal of redundant septic tanks and replacement of aged infrastructure. Sewerage fixtures and services within buildings are acceptable.

Water

The water system consists of a pump station at the end of Artillery Drive, two reservoirs and a gravity reticulation system. The site is connected to the Sydney Water supply main at the corner of Bluefish and Artillery Drives. The main water supply and hydrant network on the site is in poor condition with ongoing problems involving breakages and leaking mains. A major upgrade of water infrastructure has commenced with replacement pipes to be installed along North Fort Road to replacement potable water pipe to replace the current degraded pipe servicing the North Fort. Water fixtures and services within buildings are acceptable; however they will be replaced with more efficient fixtures as buildings are refurbished.

Fire

The fire hydrant system is interconnected into the water network described above. The existing hydraulic connections do not comply with current standards for the provision of fire fighting services and suffers from low pressure. A major upgrade of the hydraulic network is underway to resolve cross connection of services and to improve reliability and supply of water for fire fighting across the North Head Sanctuary.

Electricity

An overhead 11kv high voltage main runs through the site supplying North Fort, Quarantine Station and the National Park. Energy Australia has advised that the site substation is in poor condition and is in need of a major overhaul. Electrical distribution boards are being upgraded to increase capacity and additional wiring will be needed. Some rewiring may also be necessary. Photovoltaic arrays are to be installed on north facing roofs elevations of buildings across the North Head Sanctuary. Power generated will feed into the mains reticulation for the North Head

Sanctuary and any surplus will be exported to the grid and credited against the Trust's on-site usage.

Stormwater

The stormwater reticulation network suffers from the same problem as the sewer-structural failure of pits and pipes, tree root invasion and siltation. The system has uncontrolled discharge to the surrounding bushland which will need to be rectified.

Works have commenced to capture and recycle stormwater from building roofs across the North Head Sanctuary. Collected water will be treated before being reticulated for use in toilet flushing, laundries and other non-potable uses.

Defence Houses

Services within the allotments have been regularly maintained and upgraded as required. While the individual services have been maintained, the connection to the overall site infrastructure and its poor serviceability limits the reliability of the services.

Building Condition

There are over 80 buildings at the North Head Sanctuary. The major buildings are of full masonry construction, while there are also a number of steel clad sheds, garages and storage buildings.

The main problem affecting the full masonry buildings, particularly those that have been unoccupied for many years, is the corrosion and failure of the steel cavity ties and poor quality mortar mix. Conservation and maintenance of these buildings involves significant repairs and repointing of brickwork. There is also degradation associated with water ingress through roofing and flashings. The site is predominantly sandy foundation material that has contributed to footing failure and structural damage.

By comparison, buildings that have been continually occupied have benefited from regular maintenance. Their condition is consistent with their age. The building fabric is in serviceable condition but in some houses, the kitchen and bathrooms will require upgrading.

The Trust is undertaking a program of maintenance and repair of all buildings at North Head Sanctuary. Repairs include removal of degraded and contaminated building materials and replacement of building services with efficient fixtures and fittings.

Compliance with the Building Code of Australia

Many of the buildings at the North Head Sanctuary have a range of features that do not comply with the current Building Code of Australia (BCA). The primary compliance issues are stairs, handrails and balustrades in addition to issues of access and mobility for people with disabilities and the provision of appropriate amenities.

The existing buildings and structures on the site are being upgraded and refurbished as they are progressively occupied. In addition, BCA compliance reports are undertaken to facilitate public access for specific events such as the short term use of the Gymnasium and the three day Sanctuary Conference in 2002 (Building 1) and

filming of the Biggest Loser in the Parade Ground Precinct in 2009 (Buildings 1 and 17). BCA reports have also been undertaken for the Sergeants' Mess, Officers' Mess and Roden Cutler Buildings. HACCP reports have been completed for food handling facilities within the Officers' Mess, Other Ranks' Mess and the Sergeants' Mess.

The BCA and HACCP compliance reports recommend minor works to be carried out to those buildings listed above such as modifications to the doors, stairs and repair works to the floors, walls and ceilings.

The larger buildings such as the barracks require extensive fire compliance works such as sprinklers, fire stairs and fire doors. There are issues arising from the use of lead based paint systems and non-compliant glazing.

The houses predate the BCA, but the essential safety actions would be the installation of smoke alarms, electrical safety switches and an assessment of non-compliant glazing. The use of lead based paint poses a risk that requires management.

Identification of more specific building compliance issues are carried out as individual building uses are determined. The heritage values of the site will need consideration in the development of appropriate solutions.

Transport Management

The Trust commissioned PBA International and Woolacott Hale Corlett & Jumikis Consulting Engineers Pty Ltd, to prepare a Transport Management Plan (TMP) and Traffic Management Report (TMR), respectively for the School of Artillery at North Head Sanctuary.

The TMP and previous traffic studies have consistently recognised that the cumulative impact of future developments at North Head are a major issue in maintaining the environmental capacity of Darley Road and commercial area of Manly.

The TMP, which was developed in consultation with AIPM, NPWS, the lessees of the Q Station and Manly Council, identifies measures to minimise reliance on access by private motor vehicles and to maximise access by public transport, walking and cycling. The TMP also considers the cumulative impacts of the development of Trust lands and neighbouring sites such as the Q Station, AIPM and the Sewerage Treatment Plant. The TMR then goes on to recommend specific solutions (including works within and outside the site) to manage traffic associated with use of the Sanctuary.

Measures recommended in the TMP to minimise traffic generated by the North Head Sanctuary:

- Ensuring that the proposed uses of the multiple buildings on the site are relatively low car trip generators, especially at peak times;
- Managing traffic generation and mode choice to ensure that any car trips to the site match the limited capacity of the site to accommodate parked cars;
- Promotion of the area as a Sanctuary, with transport related facilities like parking and roads consolidated and used in a way that supports, not compromises, such a function;
- The provision of safe and convenient access routes onto and through the site for those people / vehicles with a legitimate reason to be there; and

- Work with others to manage the cumulative impacts of the adjoining uses of the site.

Together, the package of measures aims to reduce car-dependency and encourage access to and within the site by more sustainable modes of transport.

Traffic, Parking and Access

The TMP recognises that traffic management and accessibility by motor vehicle are issues that are particularly important in the North Head area.

In order to reduce the environmental and amenity impacts of increased traffic generation, one of the Trust's overall transport management objectives is to minimise travel demand by private car. This includes limiting car use through the setting of maximum number of parking spaces on Trust sites that are consistent with their traditional operational levels.

Under Defence occupation, the car parking was spread across the site in small groups, serving specific buildings and areas. There was no concentrated car park that served the whole precinct. In total there was space for over 500 vehicles to be parked on the site utilising existing parking spaces, hardstand areas around buildings and disturbed bushland areas.

The TMP identifies the future parking needs of the site, for everyday use as approximately 205 spaces, with additional areas being identified to accommodate extra cars and/or buses for special events. This figure is based on a relatively high percentage of public transport, walking and cycling modal split targets for the education and tourism related uses and more modest targets for these modes for employees generating uses. This figure takes into account the possibility of sharing spaces between different uses as the periods of peak demand of proposed uses would not generally coincide (ie. use of buildings for functions and restaurants at a different time to peak usage of 'Sanctuary' related facilities). This figure also assumes that there is a possibility of working with neighbouring organisations to reduce private car travel to the site such as coordinated shuttle bus arrangements and improved walking and cycling facilities.

Vehicular access to the North Head Sanctuary is currently available via Artillery Drive, North Head Scenic Drive, Bluefish Drive, and North Fort Road. Pedestrian access across the North Head Sanctuary is currently impeded by barriers associated with historical landownership. An expanded network of publicly accessible pathways will enable visitors to explore of the Sanctuary and the adjoining Sydney Harbour National Park.

The Trust is committed to a program of regular monitoring of traffic movements and demand for vehicular parking to ascertain whether additional parking is required to meet the needs of lessees and visitors. The monitoring will also address whether the recommendations of the TMP have been successful in managing traffic movements across the site. Depending on the outcome of this monitoring, this could involve the introduction of timed or pay parking within the North Head Sanctuary and upgrades to some of the intersections with North Head Scenic Drive and Bluefish Drive.

As stated previously, traffic movements on Darley Road are close to 500 vehicles per hour in the AM peak – its environmental capacity. The TMP considers the likely future traffic generation numbers of all new uses proposed on the headland, and estimates what proportion of this additional traffic could be potentially generated by

the use of the North Head Sanctuary, and how much of this will be added to Darley Road to further threaten environmental capacity of the road. The TMP estimates that with regard to traffic generation to and from the North Head Sanctuary, the proposed uses would be expected to generate 105 car vehicle trips to the site on an average weekday. It is anticipated that given the nature of proposed use on the site that a relatively low 20-30% of visitation would occur within the peak period.

The anticipated impact of this traffic is relatively low, compared to historic levels of Defence occupation of the site. To ensure that the impact on environmental capacity remains low, the following measures are recommended and require a coordinated approach between all land managers at North Head and Council:

- Improved pedestrian and cycle access;
- Improved public bus and bus stop access;
- Shuttle bus service for groups;
- Traffic calming along Darley Road; and
- Regular monitoring of traffic movements in North Head.