



**Figure 5.16** Building B41 - eastern view from gardens

Source: EMA 2010

### **Building B21 – Sergeant’s Mess**

The Sergeant’s Mess appeared to have originally been constructed using a group of P1 style buildings as the original sections displayed similar construction techniques to the P1 Style. The building had been extended in several locations. A verandah and pergolas had been constructed on the southern side of the building in an enclosed garden/terrace area. The gardens were enclosed by timber paling fences (refer Figure 5.17).

Part of the external wall had been rendered and painted to approximately 1.5 m above the ground. This treatment detracted from the original character of the building.

The interior of the building comprised large open spaces which had a modern (non-original) feature. The building appeared to be in fair condition throughout.



**Figure 5.17** Building B21 - Mess and courtyard from south

Source: EMA 2010

### **1960's era buildings**

These buildings were located on the western side of the main north/south road through the precinct. The group included 5 two-storey live-in accommodation blocks (LIAs). The buildings were cream double face brick construction with concrete floors. Gabled reforms were clad in brown glazed concrete tiles. The group included a single storey mess/dining room building of similar construction. Based on limited visual inspection the buildings appeared to be generally in good condition (refer Figure 5.18).

### **1970's and 1980's era buildings**

The buildings of this period consisted of prefabricated steel carports and sheds. Cladding consisted of profiled galvanised steel sheet, in some cases prefinished. The buildings were scattered throughout the precinct. None of the buildings had any unusual or outstanding design or construction characteristics.

### **1990's era buildings**

Four two-storey face brick live-in accommodation buildings (LIAs) at the southern end of the precinct appeared to have been constructed in the 1990s. The buildings had pitched corrugated Colorbond roofs and aluminium framed windows. They were representative of this period but had no outstanding characteristics. At the time of the inspection the buildings were occupied and generally in good condition (refer Figure 5.19).



**Figure 5.18** Building B33 – representative of 1960s LIAs

Source: EMA 2010



**Figure 5.19** 1990's LIAs from north – Buildings 25, 26 and 27

Source: EMA 2010



### **5.1.2.3 The existing buildings**

Building 99 in the Transport Compound was constructed pre-1943 (Australian War Memorial photographic evidence). It is a large saw-toothed roofed workshop building (2-3 storeys in height). The structure is a steel frame; walls and roof are clad in Colorbond steel sheeting. The building has been re-clad since its construction circa 1940s (refer Figure 5.20). Originally the walls were clad in flat sheet. The re-cladding was undertaken during the mid-1990's redevelopment of the SME. The building is occupied as a transport workshop and is in good condition.



**Figure 5.20** Building 99 from northwest

Source: EMA 2010

## **5.1.3 Precinct 3 – Defence Support Group**

### **5.1.3.1 Location and setting**

Access to Precinct 3 is from Moorebank Avenue. The precinct is bounded to the north by the Moorebank training area. The eastern boundary is Moorebank Avenue. The SME site and Georges River respectively form the southern and western boundaries (refer Figure 5.21).

The eastern third of the precinct is occupied by car parks and a compact group of administration and stores buildings. The majority of the site is occupied by native vegetation, including mature eucalypt trees and open grassland. A wetland area occupies land adjacent to a tributary creek which cuts across the site in an east-west axis. A fenced memorial garden has been developed on the western edge of the built area. The garden is largely open dry land grass understory to a grove of mature native trees. Precinct 3 includes a gravel car park shared with the Defence National Storage and Distribution Centre (DNSDC) which is located on the eastern side of Moorebank Avenue. The precinct contains a number of buildings in a compact group close to Moorebank Avenue. The character of Precinct 3 is fragmented due to the mix of building types and periods. The northern half of Precinct 3 contains offices for organizations providing support to Defence personnel in the area. There are also a number of conference rooms and amenities areas. The administration buildings are grouped around a bitumen car park (refer Figure 5.21).



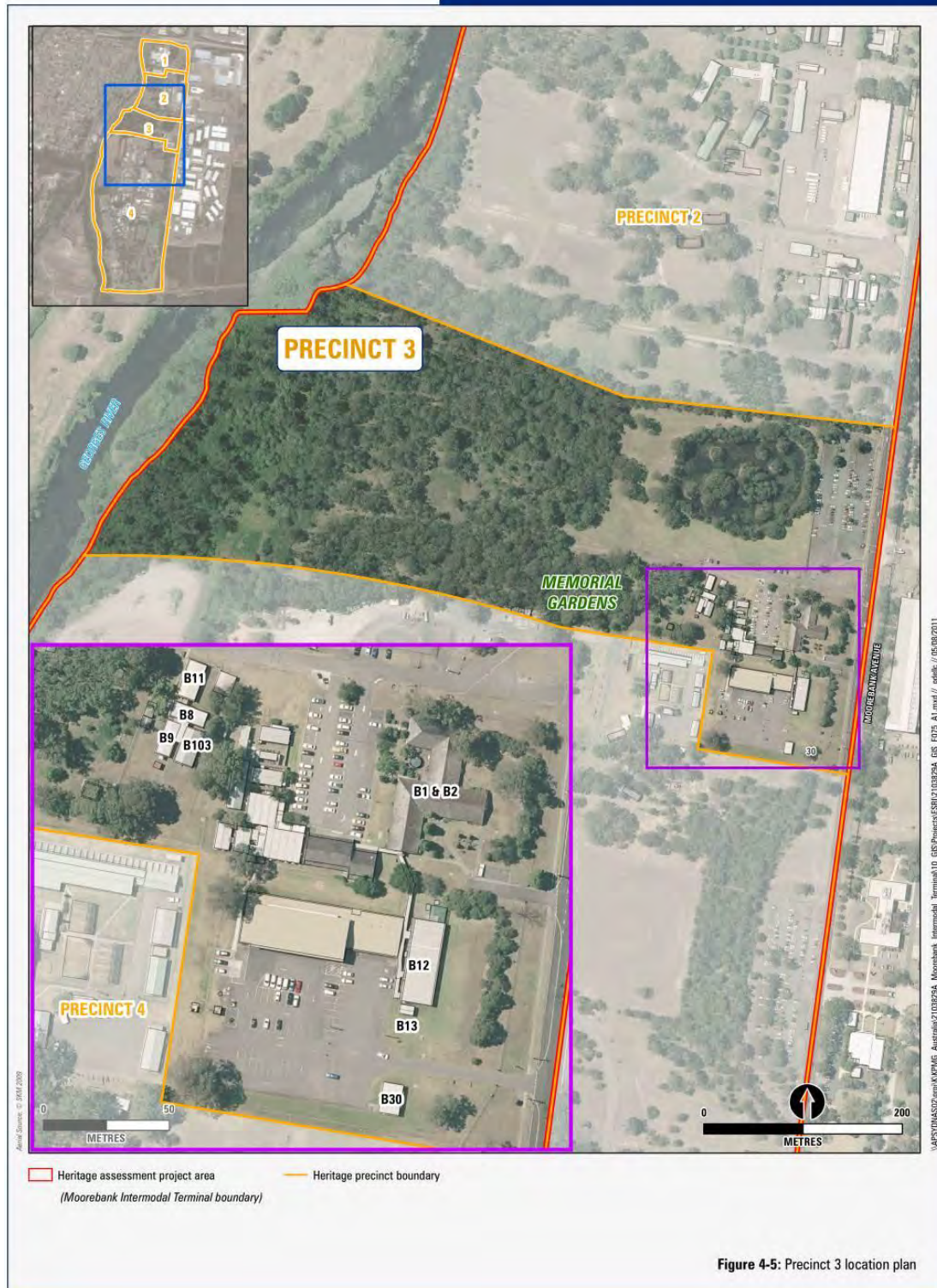


Figure 5.21 Precinct 3 location plan

### 5.1.3.2 The buildings

The buildings in this precinct include face brick single-storey offices (Buildings B1 and B2) from the 1980s. Building B1 has been extended in the past five years in a style similar to the original buildings. Conference rooms, amenities and some offices are located in prefabricated transportable buildings through the precinct which appear to have been installed in the 1980s or early 1990s as there are no buildings in this location on aerial photos until 1994 (refer Figure 5.22).



**Figure 5.22** Building B2 from north

Source: EMA 2010

Four weatherboard clad buildings of the P1 style World War II building are located in the western edge of the built area of the precinct. These are connected by more recently constructed covered ways (Building B7–B9 and B103). The buildings have an irregular placement. Three are aligned north south and one at right angles. There are slight variances of window, door and wall construction across the group indicating different periods of construction. The buildings appear to have been relocated here from another site (as there is no record of WWII development in this part of the Project area). The variance in details and irregular site placement also indicate a non-original grouping. The walls of B9, part of B7 and B8 have been rendered and painted externally to 1.5 m above the ground (in a similar manner to B21 at Moorebank BASC). The rest of the walls are painted weatherboard. The roofs of all of the buildings have been re-clad in corrugated Colorbond steel with new gutters and down pipes installed. The buildings are actively used and generally are in good condition externally (refer Figures 5.23 and 5.24).





**Figure 5.23** Building B7 from north

Source: EMA 2010



**Figure 5.24** Buildings B9 and B103

Source: EMA 2010

The southern half of Precinct 3 contains the stores areas. This area is enclosed by a perimeter chain wire fence. The buildings are located around a large bitumen car park. The buildings include a prefabricated office (B12 and B13), a single-storey weatherboard P1 office building and a large steel and concrete framed Q-Store building. Walls of this building are brickwork. All of the buildings are occupied and condition varies from fair to good (refer Figures 5.25, 5.26 and 5.27).

None of the buildings in the precinct have any outstanding characteristics.



**Figure 5.25** Building B12 offices

Source: EMA 2010



**Figure 5.26** Building B14 – Q Stores

Source: EMA 2010





**Figure 5.27** Building B30 – prefabricated transportable

Source: EMA 2010

#### **5.1.4 Precinct 4 – SME**

##### **5.1.4.1 Location and setting**

Precinct 4 occupies the majority of the Project area. It extends from Moorebank Avenue through to the Georges River in the west. The southern boundary of the precinct is formed by the East Hill Railway. All of the built development within the precinct is located north of this railway line (refer Figure 5.28).

The principal entry to the SME is from Moorebank Avenue along Chatham Avenue. The entry to the former Chatham Village site is still visible further north along Moorebank Avenue. The site entrance is marked by commemorative steel truss gates (Clive Steele Gates) and four concrete pillars either side of the entry road. These commemorate Major General Sir Clive Steele, after whom the Barracks are named (refer Figure 5.29). A sandstone block guardhouse is located approximately 100 m along Chatham Road.

The built area of SME is set back from Moorebank Avenue approximately 200 m from the site fence. There is a continuous band of landscaping between the buildings and the eastern site boundary. This includes a golf course and playing fields (south of Chatham Avenue) and open dry land grass with scattered, largely mature eucalyptus (north of Chatham Avenue). The fence line is defined by a mix of native and exotic trees and shrubs which form an almost continuous screen from the roadway (refer Figure 5.30). The density of the shrub screening varies along the frontage. There is an area of dense bushland east of the former Chatham Village site.

The landscape character along the Moorebank Avenue frontage carries throughout the site. The site is very open with building developments located within groves of mature eucalypts. Dry land grass extends throughout the core areas of the Base. The vegetation along the western side of the site has a denser understory and canopy which reflects its proximity to the river and contributes to its unsuitability for development.

Small areas of more intense garden and landscape development occur against adjacent specific buildings and site usages including golf course, Heritage Park and gardens associated with the Mess and Headquarters buildings.

## PROPOSED MOOREBANK INTERMODAL TERMINAL

[illegible]

**Figure 5.28** Precinct 4 location plan





**Figure 5.29** Clive Steele Memorial Gates

Source: EMA 2010



**Figure 5.30** Representative screen planting and open space on Moorebank Avenue boundary

Source: EMA 2010





#### **5.1.4.2 1950s buildings**

The original development of the precinct for SME occurred between the 1940s to mid-1950s. All of the 1940s phase buildings have been demolished. A number of central buildings from a major redevelopment phase in the mid-1950s remain including the RAE Museum (S04 - Former Headquarters), Officer's Mess (S108) and Peeler Club (S69).

Other surviving buildings from this period include B33, B51, B52, B54, B234, S69-S70 and S74. The buildings of this period are of the same architectural design. Walls are face cream brickwork with concrete floors. Roofs are hipped with brick gable ends, clad in brown glazed concrete tiles, doors and windows are paint finished. The four live in accommodation buildings (B51, B52, B54 and B234) are two-storey. The other buildings are single-storey.

The Peeler Club and Officer's Mess have been extended in a sympathetic manner. The buildings are designed in a simple and economical style. The RAE Museum building southern facade includes a section of wall constructed of stone blocks salvaged from a railway bridge constructed by internees of Holsworthy Internment Camp during World War I. All are being used and externally are generally in good condition (refer Figures 5.31 to 5.34).



**Figure 5.31** RAE Museum (S04)

Source: EMA 2010



**Figure 5.32** Officer's Mess (S108)

Source: EMA 2010



**Figure 5.33** Peeler Club (S69)

Source: EMA 2010



**Figure 5.34** Representative two-storey LIA

Source: EMA 2010

#### **5.1.4.3 RAE Chapel**

The Chapel building was purpose-designed in a limited RAE competition. It is a two-storey high building and contains a single level chapel and office areas. The walls are constructed of salvaged hand hewn sandstone block of varying sizes. The blocks are 8 inches thick (200 mm) and laid either side of a 200 mm concrete core.

The roof is a low pitched skillion constructed of a stramit deck supported on large exposed timber beams. On the northern façade the beams extend through past the eaves and are supported on cross timber columns of which there are seven. The columns extend past the roof beams and have a horizontal beam installed approximately one metre above which gives the columns a cross form in the elevation. This design detail provides a strong ecclesiastical reference for the building when viewed from Chatham Avenue. The lower end of the roof is supported on a structural timber window wall, which extends the full height of the southern wall. There is high level timber framed windows in the northern wall between the beam (refer Figure 5.35 and 5.36).

The interior of the Chapel has hand hewn face stonework walls on three facades. The southern wall and part of the eastern wall are clad in vertical timber boards which have a dark stained finish. The floor is concrete finished with vinyl tiles and a carpet runner on the central aisle. The ceiling is vermiculite stramit board (refer Figure 5.37).

The Chapel building in plan forms a “C” shape. A small courtyard is formed on the southern side by projecting arms of the Office and Foyer at each end of the building. The courtyard is paved with garden beds on the east and west side.





**Figure 5.35** Northern elevation of Chapel (S03)

Source: EMA 2010



**Figure 5.36** Western elevation of Chapel (S03) and Commemorative Bell Tower

Source: EMA 2010



There are two significant Memorials in the courtyard. On the eastern wall is a dark coloured timber cross with a timber clad awning. The cross is made from railway sleepers recovered from the Burma-Thai railway.

At the foot of the cross is a piece of stone from Changi Prison. The memorial commemorates members of the Eighth Division Engineers who were imprisoned at Changi or as prisoners of war worked on the Burma-Thai railway (refer Figure 5.38).

In the south-western corner of the courtyard is a tall headstone which is been relocated from the grave of Lieutenant Samuel Hodgson at Rookwood Cemetery. He is generally accepted as the founder of the New South Wales Colonial Volunteer Corp (refer Figure 5.39).

Outside the courtyard is the pathway leading to the RAE Officer's Mess. Along one side of the path, a line of trees has been planted by successive Commanding Officers (CO's) of the SME. The path is known as the CO's Walk (refer Figure 5.40). The western end of the path on the edge of the car park is a timber framed bell tower.

The bells were donated by the Royal Engineers of Far East Land Force (FARELF) command, who were based in Malaya.

There are several commemorations within the Chapel interior:

- the walls were constructed of stone blocks salvaged from an 1854 flour mill at Bow Bowing Creek, Campbelltown, and from a demolished cottage at Old Holsworthy. On close inspection it is possible to identify the different source of the stones due to the size of the blocks and the differing mason's techniques on the face;
- the fittings for the Chapel were all donated. The Royal Engineers donated a hanging plant container. The Baptismal Font was donated by the Western Command Engineers (WA). The altar chairs were donated by the Australian Women's Army Service; and
- mounted high on the north wall are two national flags. The flags recognise two servicemen who died in the Vietnam War and whose next of kin have been located.



**Figure 5.37** Chapel (S03) interior

Source: EMA 2010



**Figure 5.38** Burma-Thai Memorial

Source: EMA 2010



**Figure 5.39** Headstone of Lieutenant Hodgson

Source: EMA 2010





**Figure 5.40** CO's Walk from Chapel

Source: EMA 2010



### 1970s Lysaght sheds

Examples of a prefabricated steel building system which was used extensively on Defence installations during the 1970s are located in the Bridging Yards and Museum's stores area of SME's site. The sheds have a portal steel frame and are clad in a deep profile galvanised steel decking used on both walls and roof. Floors are concrete slab on ground.

The sheds at SME are a range of sizes and include multiple units banked side-by-side. The sheds are being used as workshops and storage facilities. There does not appear to have been many changes to the exterior of the sheds. Generally they appear to be in fair to good condition. There is extensive surface rust evident on building S131. It is presently used as workshops for the RAE Museum. Buildings included in this description are S113, S114, S116, S131 and S358 (refer Figure 5.41 and 5.42).



**Figure 5.41** Museum stores building (S131)

Source: EMA 2010



**Figure 5.42** Transport group building (S113)

Source: EMA 2010

#### **5.1.4.4 1992 to 1994 buildings**

Over half the buildings on the SME base were constructed in the major redevelopment period of 1992 to 1994. The buildings vary in use from small four-bedroom units to offices and very large workshop buildings. A common architectural language carries through all of the building in the use of roof forms and external finishes. The buildings of this period are identifiable by:

- Hipped or gabled roof forms with roof pitch 18° to 22°.
- Roof clad in white Colorbond custom orb.
- Walls part-height face cream brick with painted flat sheet above.
- Powder coated aluminium framed windows, predominantly vertical in proportion double hung sash operation, except where a high level.
- Flush panel external doors in steel frame. Often doors and frame are painted blue.
- Barrel vaulted clerestory window vents are located on the ridge line of large office buildings, mess or warehouse buildings (refer Figures 5.43 to 5.46).





**Figure 5.43** Headquarters building (S01)

Source: EMA 2010



**Figure 5.44** Representative 1990's live-in accommodation (B76-105)

Source: EMA 2010



**Figure 5.45** Building S12 Q store – representative workshop building

Source: EMA 2010



**Figure 5.46** Representative office/amenities building type (B58-66)

Source: EMA 2010

Buildings included in this period of development are B24–B49, B 58–B66, S01–S05, S07–S21, S24–S40, S76–S105, S110, S135 and S152.

The use of a common architectural style creates a distinct character to the buildings. Given the large number of buildings constructed in this period, these buildings provide the predominant architectural character of the precinct. The scale of the buildings is broken up by a scattering of native vegetation around the edge of fenced compounds in between and around the live-in accommodation units.



All of the 1992 to 1994 period buildings are occupied and externally they are in good condition.

#### **5.1.4.5 Miscellaneous buildings and structures**

There is a number of support buildings and structures throughout the SME base which were erected as one-off buildings rather than as part of a major redevelopment. These buildings are of differing design to others on the site. The buildings are all single-storey utilitarian structures and with the exception of the CUST Hut, Bicentenary Building and RAAF Hangar, they contain no unusual design or operational characteristics. As such, a detailed description of only these three buildings is not included in this report. The other buildings include:

- Golf Clubhouse (S187) – face brick, single-storey low pitched metal deck roof.
- Prefabricated Colorbond garages – single-storey either single or multiple door units. This includes the following buildings S115, S117, S137, S139, S140, S151, S162, S163, S167, S168, and S198.
- Steel frame metal deck roof training shelters with concrete slab floor but no walls. Fixed bench seating is provided in most. This includes buildings S136 and S166.
- Steel framed metal deck roofed carport structures. This includes S176 and S184.
- 2009 classroom buildings in Explosive Detection Area and Small Armaments Training Area – single-storey building set on brick piers. Clad in walls and roof in corrugated Colorbond steel. This includes S233 and S234.
- Afghanistan Mock Training Area. A prototype of Defence installation is currently being used in Afghanistan. Used to train Sappers in construction techniques.

#### **5.1.4.6 CUST Hut**

The CUST (Cullen Universal Steel Truss) Hut is a large clear span vaulted roof building. The roof is clad in white Colorbond custom orb. Along the long axis of the building, the roof carries through to ground level where large concrete open drains collect rainwater. The eastern and western end of the building has been filled in (originally open) with face red brick to approximately three metres above ground, then Colorbond clad to the roof level.

Powder coated aluminium framed windows have been installed in the end walls above the brick work. Doorways are limited to personnel access doors and roller doors in the gable ends (refer Figure 5.47).

The finishes in the end walls and roof are consistent with the 1990s period. As the building was erected pre-1949, this indicates that the building was refurbished during the 1990s redevelopment. The replacement of roofing is confirmed in the presence of safety mesh under the roof sheeting. This practice was only introduced in the past two decades.

The interior of the building is a very large, column free space with unlined vaulted roof over. The solid roof sheeting is interspersed with bands of translucent sheeting. The truss frame of the roof and all roof and wall framing is exposed. The building has a concrete floor slab throughout. Large modern Hi-bay type lights are suspended from the roof. The building is presently used to store large vehicles and equipment from the RAE Museum Collection (refer Figures 5.48 and 5.49).





**Figure 5.47** CUST Hut (S135) viewed from southwest

Source: EMA 2010



**Figure 5.48** Interior of CUST Hut (S135)

Source: EMA 2010



**Figure 5.49** General view of interior of CUST Hut (S135)

Source: EMA 2010

#### **5.1.4.7 Bicentenary building**

This is a small single-storey display building located within the Heritage Park north of the RAE Museum building. The building is square in plan and set up on an earthen plinth. North and South walls are principally timber framed glazing. East and West walls are face brown brick buttress pillars at the corners and spaced along the walls externally (refer Figure 4.45).

The building has a space frame trussed roof which is exposed internally. A metal panel fascia encloses the perimeter of the roof.

Training course opening and closing addresses are conducted in the building. There are a number of dioramas and course award items housed in the foyer of the building.



**Figure 5.50** Bicentenary building (S111) from southeast

Source: EMA 2010

#### **5.1.4.8 RAAF STRARCH Hangar**

The Hangar building is located within the Heritage Park between the CUST Hut and Bicentenary Building. The building is 30m x 32m and comprises a post tensioned steel truss roof which is tied down to large concrete footings. The name of the building (STRARCH) comes from the stressed arch design. The ends of the building are open. Walls on the long axis of the building are clad in Colorbond corrugated sheeting, as is the roof. The building has a level concrete floor throughout.

The building is a recent addition to the Park and houses large machinery and equipment from the RAE Museum collection. The hangar is in very good condition (refer Figures 5.51 and 5.52).





**Figure 5.51** RAAF STRARCH Hangar from west

Source: EMA 2010



**Figure 5.52** Detail of end wall of Hangar

Source: EMA 2010

#### **5.1.4.9 Memorials and Heritage Park**

There is a number of Memorials located in the precinct, many of which are located within the Heritage Park. The park is a large designated parkland area to the north of the Headquarters building; it is referred to as the Heritage Park by those on the base. There is a scattering of young eucalypts throughout the park with low shrubs planted along the street boundaries on Ripon Road and environs. The open areas are dry land grass.



The following buildings are located within the Heritage Park:

- S04 RAE Museum
- Bicentenary Building
- RAAF STRARCH Hangar
- CUST Hut
- Australian Army Museum Building.

The Heritage Park displays a number of large items associated with the history of the SME including:

- Steele Bridge, an example of the relocatable bridge type designed by Major-General Sir Clive Steele
- Bofor Gun and Anchor
- Australian Panel Bridge
- Bailey Bridge
- Heavy Girder Bridge (refer Figure 5.53).

Two key Memorials are located within the Heritage Park. The RAE Vietnam Memorial is located close to the north wall of the Headquarters building. The Memorial was relocated here from the Holsworthy Military Training Area.

The Memorial is framed to the south by beds of roses. A steel framed truss supports plaques with the names of those Sappers who lost their lives in the Vietnam conflict. The area of brick paving in front of the truss includes bricks imprinted with the names of military and paramilitary organisations and personnel from throughout Australia.

The Memorial includes a pyramidal shaped rock topped with a bronze plaque and slouch hat. These were part of the original Memorial. The stone was quarried from Nui Dat in Vietnam. Behind the rock is the flagpole from the original Memorial (refer Figure 5.54).

The Service Dogs Memorial is located near the South West corner of the RAAF STRARCH Hangar close to Ripon Road. This is a new small Memorial with a garden bed framing a central commemorative stone and plaque on a concrete slab base. Within the garden there are concrete plinths with bronze plaques containing the names of explosive ordnance dogs which were trained at RAE and died in active service. There are presently three commemorations (refer Figure 5.55).



**Figure 5.53** Heavy Girder Bridge

Source: EMA 2010



**Figure 5.54** Vietnam Memorial





Source: EMA 2010



**Figure 5.55** Service Dogs Memorial

Source: EMA 2010

#### **5.1.4.10 RAE Memorial and Fountain**

The RAE Memorial and Fountain is located at the intersection of Chatham Avenue and Ripon Road. As Chatham Avenue is the site entry road, the Memorial is visible to everyone who enters the Barracks. The Memorial was constructed by Sappers.

The Memorial comprises a fountain/pool of reflection and a tall simple square column in the centre of the pool. The pool is circular in plan and enclosed by low wall of hewn sandstone blocks. Within the perimeter wall are located the Corps Declaration Stone and a time capsule. The declaration stone is a symbolic representation of the home of the RAE and to commemorate all who have served in the Corps. The time capsule was placed in 2002.

The central column is approximately eight metres high and 600 x 600 mm in plan. It is constructed of off-form concrete. The finish when poured was considered unacceptable so Sappers used angle grinders to produce the rough cast finish which exists today (refer Figure 5.56).



**Figure 5.56** RAE Memorial viewed from Chapel

Source: EMA 2010

## **5.2 Archaeological Features**

### **5.2.1 Recording thresholds**

This section presents descriptions of archaeological recordings made during the field survey. Recordings were made if the following criteria or thresholds were considered to apply, or where there was uncertainty about interpretation:

- the feature(s) relates to pre 1950s European occupation, land use or Defence activity;
- notwithstanding the pre-1950s threshold, the feature(s) have potential to provide archaeological information which could not be gained from documentary records and would have significant heritage value;
- the feature is not a component of the built environment (which was covered by a separate survey program); or
- the feature is commemorative in function (regardless of its age).



## 5.2.2 Summary Table

**Table 5.1 Summary of European archaeological recordings**

Site code	Site type/ description	Size	Location (Central point only)	
			Easting (MGA)	Northing (MGA)
MH1	Dog Cemetery	Approx. 20 x 20 m	307981	6241312
MH2	Drainage ditches (military origin)	Approx. 5 x 10 m	307144	6240751
MH3	Portion of light rail (not <i>in situ</i> )	-	307307	6240998
MH4	Portion of light rail (not <i>in situ</i> )	-	307284	6239885
MH5	Large above ground concrete slab (military origin)	Approx. 2.5 x 2.5 x 0.8 m	307980	6241242
MH6	Commemorative garden	Approx. 70 x 60 m	307891	6241539
MH7	Liverpool Golf Course	Approx. 400 x 100 m	307493	6242007

## 5.2.3 Descriptions

### 5.2.3.1 MH1 Dog Cemetery

Map Grid Location (MGA): 307981.6241312

This recording comprises a cemetery for dogs and is located adjacent to the current dog training area in the northern portion of the SME. Dog training was established at Moorebank in the 1950s, with kennels, classrooms and stores originally located adjacent to the Dry Bridging Area. Training was discontinued in the 1960s, but revived in 1969 following success by US Forces with dogs in the Vietnam conflict. The current training area, near to the cemetery dates from the revival of the training course, from 1969.

The cemetery grounds are defined by a gravelled rectangular earth platform, approximately 20 x 20m, around and within which, at least seven graves can be distinguished (Figures 5.57 and 5.58). Each evident grave has variously defined borders, using stone cobbles, brick, and wooden elements. Rope and plastic dog toys have been placed on some graves. Three graves contain standing wooden crosses, the names 'Jasmine DM403' and 'Nugget' are each evident on two of the crosses (Figure 5.58). It is considered possible that there may be other graves which are not identified by surface features.





**Figure 5.57** General view of Dog Cemetery, MH1, looking SE. Graves occur within a gravelled rectangle and around its perimeter (photo Dec. 2010).



**Figure 5.58** MH2 – Detail of ditch showing edging of aligned sandstone cobbles. Scale rod parallels ditch and is 2 m long., Stones are situated to the right of the rod (photo Dec. 2010).

### **5.2.3.2 MH2 - drainage ditches**

Map Grid Location (MGA): 307144.6240751

This recording is located on the upper slopes of the tertiary terrace edge, in thick lantana growth. It is situated upslope of a large retaining wall and excavated riverside platform, and north of a stadium adjacent to a jetty on the Georges River.

The recording consists of two parallel excavated ditches or gutters, 2m apart, and aligned in an east to west direction across the slope contours (Figure 5.59). Both are roughly bordered with sandstone cobbles and show evidence of surface hardening with the placement of hardened sediments within the channels. The gutters were possibly installed to drain water from the playing fields that are situated upslope and some distance to the east. The ditches are approximately 1m wide, and average approximately 40cm in depth. One of the end stones on the western end of the most northerly gutter seems to be partially dressed.

Based on the location, form and construction of these features, this recording is interpreted as a Defence related feature. And probably dates from the establishment of the nearby playing fields.



**Figure 5.59** MH2 – Detail of ditch showing edging of aligned sandstone cobbles. Scale rod parallels the ditch and is 2 m long. Aligned stones are situated to the right of the rod (photo Dec. 2010).

### 5.2.3.3 MH3 Light rail portion

Map Grid Location (MGA): 307307.6240998

This recording comprises a section of light rail exposed in the bank of deeply entrenched vehicle track (Figures 5.60 and 5.61). The site is situated on the embankment of the tertiary terrace, at the southern end of the “dirt pans”. Two rails are evident, attached by a connecting plate to form a continuous section. The connection plate has been bent close to a right angle, with the second rail evident only by its end protruding from the bank (Figure 5.62). The rail is 57mm wide at the base, and 65mm in height, with the top edge of the rail measuring 32 x 13mm. Pins in the connecting plate are 105mm apart.

The rail is situated within a landscape which has been highly disturbed by earth works associated with Defence training installations and infrastructure. Based on this context, and the isolated nature of this find, it can be concluded that the rail portion is neither *in situ* nor likely to be close to its original location. The rail may have originally formed part of the light rail line which serviced a sand mining operation in the Project area between 1917 and 1930. Alternatively it may have formed part of former Defence infrastructure or a piece of training equipment.



**Figure 5.60** General view of a section of light rail (MH3) protruding from a road side bank, looking NW. Scale rod is 2 m (photo Dec. 2010).





**Figure 5.61** View of light rail portion (MH3), note connecting plate at right hand end. Scale rod is 2 m (photo Dec. 2010).



**Figure 5.62** Detail of connection plate joining two light rail portions at MH3 (photo Dec. 2010).

#### **5.2.3.4 MH4 Light rail portion**

Map Grid Location (MGA): 307284.6239885

This recording comprises a section of light rail and a bent linear metal plate exposed in spoil associated with the disturbed embankment of the tertiary terrace bank (Figures 5.63 and 5.65). This portion of the terrace embankment, like the majority of the slope within the Project area, has been substantially disturbed by the construction of training course earthworks and obstacles.

The portion of light rail extends from a low bank (Figure 5.64). Nearby is a long linear metal plate/rim which protrudes up to 1.5 m above ground level (Figure 5.65). The dimensions of the exposed section of plate/rim are 3m x 10cm x 12mm. It has a bracket on one side with a hole possibly for a connecting hinge pin. The dimensions of the light rail are 50mm wide at the base, and 55mm in height, with the top edge of the rail measuring 27 x 10mm. Pin holes on the light rail are 16mm in diameter and are placed at 105mm intervals.

Based on the context, and the isolated nature of this find, it can be concluded that the rail portion is not *in situ* and may not be close to its original location. The rail may have originally formed part of the light rail line which serviced a sand mining operation in the Project area between 1917 and 1930. Alternatively it may have formed part of former Defence infrastructure or a piece of training equipment.





**Figure 5.63** General view, looking E, at location of metal plate and rail finds at MH4 (picture centre). Note disturbance to ground from former Defence use a field training course (photo Dec. 2010).



**Figure 5.64** Detail of light rail protruding from spoil at MH4 (photo Dec. 2010).



**Figures 5.65 and 5.66** General and detail views of metal plate component at MH4, looking S. Scale rod is 2 m long. Detail is of bracket positioned at the free end of the plate component (photos Dec. 2010).







commemorative contexts, including a specimen planted by the Duke of Gloucester in 1934 at the AWM in Canberra. All of the Pines in the Moorebank commemorative garden are quite young and most likely date from the 1980s when seedlings and grafts from the AWM tree were made available to interested organisations, schools and clubs throughout Australia (<http://www.awm.gov.au/encyclopedia/lone.asp>).

Apart from an overarching military theme, the commemorative nature of the garden is informal, small scale, and appears to be relatively opportunistic. The use of pre-Defence era materials from the Grondo Winery site suggests that the garden's creators sought to incorporate and recognise local heritage values.

The following Figures document the commemorative features of the garden.



**Figure 5.68** General view across the commemorative garden (MH6), looking NE towards a grouping of rock cairns (photo Dec. 2010).





SECOND MILITARY DISTRICT NURSERY  
OFFICIALLY OPENED ON THIS SITE BY  
Col. R.S. DEACON A.M.  
COMD 2MD  
ON TUESDAY 29 AUGUST 1978



IN MEMORY OF JACK DARLING  
2 MARCH 1920 – 24 OCTOBER 1983  
A PLACE WHERE HE SPENT  
MANY PLEASANT MOMENTS

**Figure 5.69** Details and text of two cairns situated in the commemorative garden (MH6), looking NW (photos Dec. 2010).



THESE PINE TREES WERE  
GROWN FROM SEEDS OBTAINED  
FROM THE LONE PINE TREES  
AT GALLIPOLI AND BROUGHT  
HOME TO AUSTRALIA BY  
GALLIPOLI VETERANS.

**Figure 5.70** A cairn and plaques commemorating the Pine plantings in the garden (MH6).Details and text of two cairns situated in the commemorative garden (MH6), looking NW (photos Dec. 2010).





THIS ROCKERY WAS BUILT  
FROM STONES WHICH CAME FROM  
"GRONDO WINERY"  
CIRCA 1870  
WHICH WAS LOCATED ON  
HOLSWORTHY FIRING RANGE

**Figure 5.71** Views of a stone edged garden bed including a large Eucalyptus tree. A commemorative plaque states that the stones used to make the bed came from the site of the Grondo Winery, circa 1870, now within the Holsworthy Firing Range (photos Dec. 2010).

### 5.2.3.7 MH7 Liverpool Golf Course

Map Grid Location (MGA):	Fifth Tee:	307493.6242007
	Twelfth Tee:	307565.6242173
	Extent of tree plantings:	(SW) 307383.6241892
		(SE) 307441.6241893
		(NE) 307616.6242170
		(NW) 307544.6242198

This recording consists of tree plantings, earthworks, paths and posts that relate to the former Liverpool Golf Club. The Liverpool Golf Club was established in 1931 when part of the old Collingwood Estate on the eastern side of the Hume Highway became available for development as a golf course. The golf course underwent substantial development in the 1950s and 1960s but then closed in 1971 (<http://www.liverpoolgolf.com.au/guests/aboutus/history.mhtml>). During the late twentieth century a smaller golf course appears to have remained in operation between the railway and the Georges River, on the Liverpool City Council land that comprises the western portion of the IMT Project area.

A series of tree plantings, including native and introduced species, run parallel to the river along the western bank (Figures 5.72 and 5.73). The land surface in this area is highly modified and includes artificial mounds and depressions. These surface features and tree plantings appear to be the remains of the mid to late twentieth century golf course. Other evidence of the former golf course





includes posts marking the location of the fifth and twelfth tees, and remnants of concrete paving associated with the twelfth tee (Figures 5.74 and 5.75).

None of the features described above are visible on the 1943 aerial imagery of the area. It is therefore likely that the extant remains of the golf course all date to the period of golf course development during the second half of the twentieth century. On the basis of the age of the tree plantings and the materials evidenced at the remnant tees, it is probable that the items recorded at MH7 relate to the final phases of the Liverpool City Council golf course.



**Figure 5.72** Tree plantings at MH7, looking north from the 12<sup>th</sup> Tee (photo Feb. 2013)



**Figure 5.73** Tree plantings at the 5<sup>th</sup> Tee (photo Feb. 2013)



**Figure 5.74** Post marking the 12<sup>th</sup> Tee (photo Feb. 2013)



**Figure 5.75** Overgrown concrete paving adjacent the 12<sup>th</sup> Tee (photo Feb. 2013)



#### 5.2.4 Overview of surviving archaeological potential

Three potential archaeological deposits (MHPAD1, 2 and 3) have been identified at the location of former structures or facilities. One existing structure has been identified with an associated potential for archaeological deposits (the CUST Hut).

A review of historical sources relevant to the Project area (refer also Section 4) identified a variety of former structures, industries, and past activities within the Project area which could potentially have left a subsurface archaeological record that would have heritage value.

These can be grouped into the following phases:

- Nineteenth century tenant and subsequently freehold farming (including the development of orchards and vineyards);
- WWI camps and training areas, notably the 'Military Isolation Camp';
- Sand mining and transport via light rail (1917 – 1930s); and
- WWII Barracks, camps and training areas.

Where identifiable from survey evidence and the documentary record, former structures, industries and past activities are tabulated in Table 5.2 and their locations shown in Figure 5.76. The potential for these locations to retain significant archaeological deposits has however been substantially impacted or removed by subsequent Defence related land use practices, including large-scale earth works, detonation of artillery, a former sewerage treatment works, landscaping, and multiple phases of road and building construction.

All of the locations of former pre-Defence items, such as tenant farms, homesteads and orchards are now characterised by extensive land surface modification. Surface archaeological survey of these areas in 2010 did not reveal any evidence of, nor grounds for predicting, the presence of a surviving archaeological deposit. The majority occurred in cleared contexts, where subsequent Defence related development, building and landscaping had transformed the nineteenth century land surface. A small number of locations were situated in regenerating bushland. These areas were found to have been heavily impacted by quarrying, filling, and the construction of training infrastructure such as pits, trenches and other substantial landscaping. Some areas also were heavily impacted by shelling or the other explosive actions, as evidenced by crater fields visible in 1940s aerial photography. Table 5.2 provides a summary of the disturbance evident at each identified location. Figure 5.77 illustrates the location of all archaeological recordings in the Project area, together with former structures with no associated identified archaeological record.

No *in situ* evidence was found for the former sandmining infrastructure. Two isolated instances of light rail pieces, within highly disturbed contexts may relate to the former sand mining operation, or to later Defence rail usage.

Furthermore, with the exception of the former Liverpool Golf Course (MH7) no evidence of historical features were identified in the vicinity of the three rail access options. It was however noted that the flood deposits on the western bank, in the vicinity of the northern and central options, and on the eastern bank, in the vicinity of the central option, may relate to environmental changes that resulted from construction of the Liverpool Weir (NOHC 2014b). While this primarily has implications for Aboriginal heritage, the fact that these deposits may have formed as the direct result of European activities in the early 19<sup>th</sup> century means that these deposits may also contain evidence relevant to historical archaeology.

The review of documentary sources indicated that greatest potential for archaeological deposits related to the WWI period would be situated in the northern end of the Project area, being the area closest to the Liverpool Military Camp. The only item with a relatively definable location was the 'Isolation Camp' (refer MHPAD1 description below). A high proportion of the northern Project area has been substantially disturbed by multiple phases of construction and demolition, notably the



1950s construction and later demolition of 'Moorebank Village', north of Bapaume Road. Despite this, two small areas remain with potential to include archaeological traces of this camp (refer MHPAD1 description below).

The identification of the potential for archaeological deposits relating to the WWII period focused on an assessment of the two known clusters of Defence building and infrastructure development from this time (Figure 5.76). These were identified from historical mapping and aerial photography. Large portions of these two areas have been the subject of multiple phases of construction, demolition, and use as field training areas. According to an analysis of the cumulative impact, evident and predicted across these areas, three areas of predicted archaeological deposit, variably graded according to potential, have been identified (MHPAD1, 2 and 3).





**Table 5.2** Review of subsurface archaeological potential associated with archaeological recordings, WWII buildings and the location of former (WWII or before) structures according to chronological phase.

ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
<b>Pre Defence Occupation Phase</b>						
19C Farm -1	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High - two phases of Defence construction and demolition have occurred in this area since 19 <sup>th</sup> century occupation	Nil	Yes
19C Farm - 2	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High - two phases of Defence construction and demolition have occurred in this area since 19 <sup>th</sup> century occupation	Low	Yes
19C Farm - 3	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y (southern rail option)	High degree of disturbance from construction and subsequent demolition of former sewerage treatment plant	Nil	Yes
19C Farm - 4	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High degree of disturbance from construction and subsequent demolition of adjacent former sewerage treatment plant	Low	Yes



ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
19C Farm - 5	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High degree of disturbance from Defence related excavations and landscaping, include removal of original land surface	Nil	Not applicable
19C Farm - 6	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High degree of disturbance from Defence related excavations and landscaping	Nil	Yes
19C Farm - 7	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	Despite the presence of tree cover, this area has been highly disturbed by Defence training earthworks	Nil	Yes
19C Farm - 8	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	N	Despite the presence of tree cover, this area has been highly disturbed by Defence training earthworks	Nil	Yes
19C Farm - 9	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High degree of disturbance from Defence related land use, infrastructure and landscaping	Low	Yes
19C Farm - 10	Former building shown on 1890 Moorebank Farms Subdivision plan	1840s to c.1912	Y	High degree of disturbance from previous construction and demolition of Defence residential housing	Nil	Yes



ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
Orchard	Former orchard 'PE Barker Orchard' shown on 1888 plan	1840s to c.1912	Y	High to moderate degree of Defence related construction, landscaping and earthworks	Nil	Yes
1912 - 1	Former building shown on 1912 plan	1840s to c.1912	Y	High degree of Defence related disturbance involving complete removal of original land surface	Nil	Not applicable
1912 - 2	Former building shown on 1912 plan	1840s to c.1912	Y	High degree of disturbance from construction of buildings	Nil	Yes
<b>WWI and WWII Defence Phases</b>						
SM - 1	Former loading stage - Sand mining and transport via light rail	1917 – 1930s	Y	High degree of disturbance from Defence related construction and landscaping	Nil	Yes
SM - 2	Former siding and sand loading bins - Sand mining and transport via light rail	1917 – 1930s	Y (southern rail option)	Moderate degree of disturbance from Defence training earthworks and possibly also from adjacent rail construction	Low	Yes
MH3	Piece of light rail portion (not <i>in situ</i> )	1917-1930	Y	Within area highly disturbed by landscaping for training infrastructure	Low - not considered to be <i>in situ</i>	Yes





ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
MH4	Piece of light rail portion Consisting of two joined lengths (not <i>in situ</i> )	1917-1930	N	Within area highly disturbed by landscaping for training infrastructure	Low - not considered to be <i>in situ</i>	Yes
MHPAD1	Potential archaeological deposit – Titalka Park (location of former group of WWII buildings and WWI isolation camp)	Pre WWI up to and including the 1950s	Y	WWII buildings have been demolished. Subsequently developed as a park	High	Yes
MHPAD2	Potential archaeological deposit (location of WWII period buildings)	1940s till demolished, probably in the 1950s	Y	WWII buildings have been demolished. PAD consists of remnant areas of undeveloped open space	Moderate to high	Yes
MHPAD3	Remnant paved and garden areas in the vicinity of the former Drill Hall group of buildings (former buildings B36 – 40)	1940s up to present	Y	All structures were demolished in 2012, however adjacent paved areas and garden beds remain partially intact	Moderate to high	Yes



ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
<b>All existing WWII period structures</b>						
CUST Hut	CUST Hut	Relocated from Kapooka to Moorebank after 1946 and prior to 1948	Y	Building intact and in good condition	Moderate - building thought to have originally had an earthen floor which was subsequently overlain with a concrete slab. Archaeological deposit may remain under the current slab.	No, any potential archaeological excavation would occur as a salvage strategy in the event that the building is demolished and/or removed
B99	Large Transport Depot warehouse	pre 1948	Y	Building intact and in good condition	Nil - building considered always to have had concrete floor and surrounding sealed hard surfaces. This would have prevented the deposition of an archaeological deposit	No

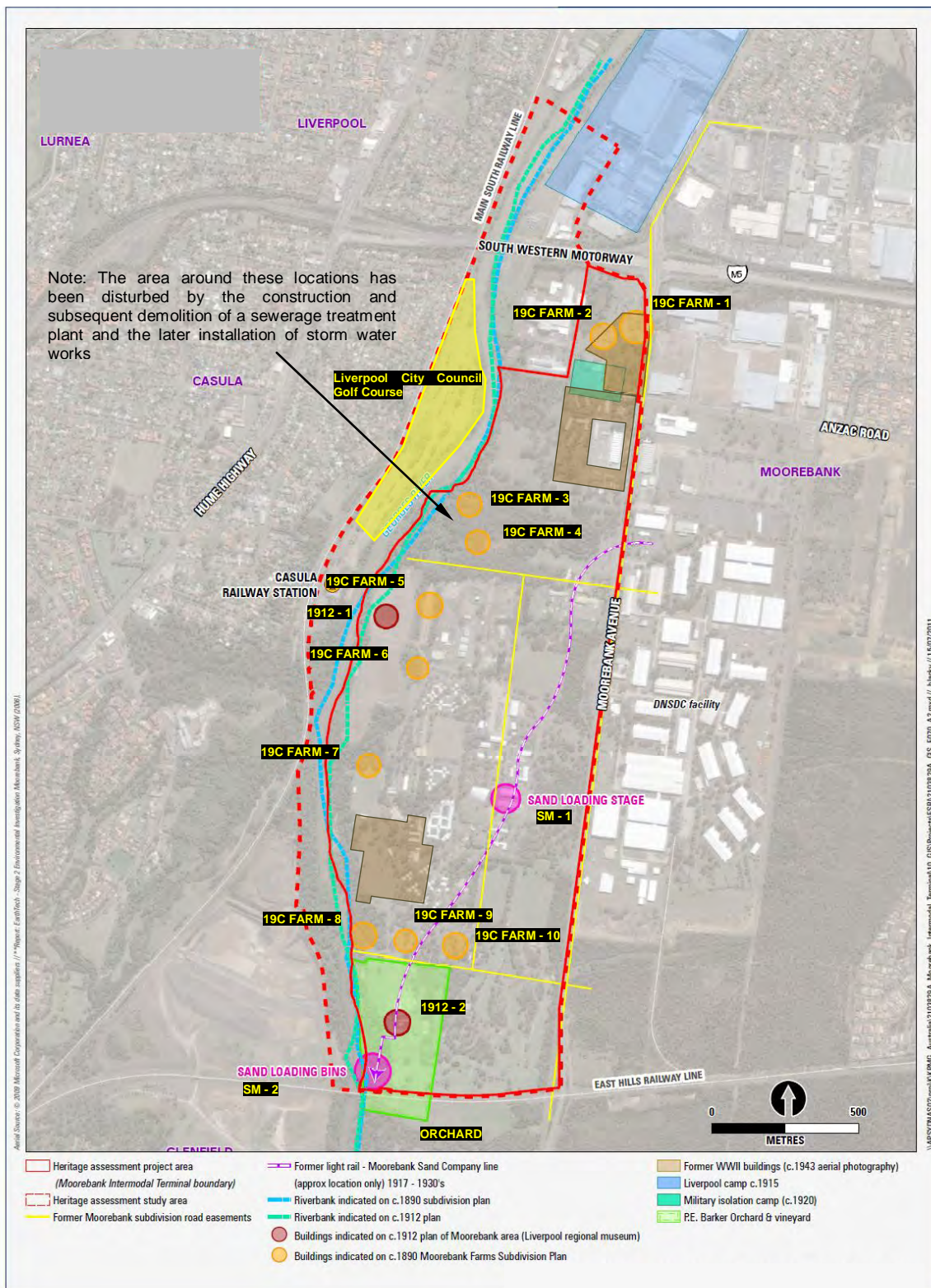


ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
B7-B9 & B103	P1 style buildings now serving as Defence administration buildings	1940s onwards	Y	Buildings have been substantially modified. Buildings have been re-positioned and their current location does not relate to their WWII history or function	Nil – the deposits under and around these structures do not relate to any significant phase	Not applicable
<b>Post WW2 Defence Phases</b>						
MH1	Dog Cemetery	1960s onwards	Y	Undisturbed at time of survey	Site significance does not warrant archaeological excavation	Yes
MH2	Pair of shallow linear drainage ditches, roughly bordered with rough sandstone cobbles (military origin)	20 <sup>th</sup> Century	N	Essentially a surface feature, remaining cobbles have been displaced	Low - site significance does not warrant archaeological excavation	Yes
MH5	Large above ground concrete slab (military origin)	20 <sup>th</sup> Century	Y	Above ground, intact feature.	Site significance does not warrant archaeological excavation	Yes
MH6	Commemorative garden	From the second half of 20 <sup>th</sup> century	Y	Undisturbed at time of survey – surface features and plantings	low	Yes



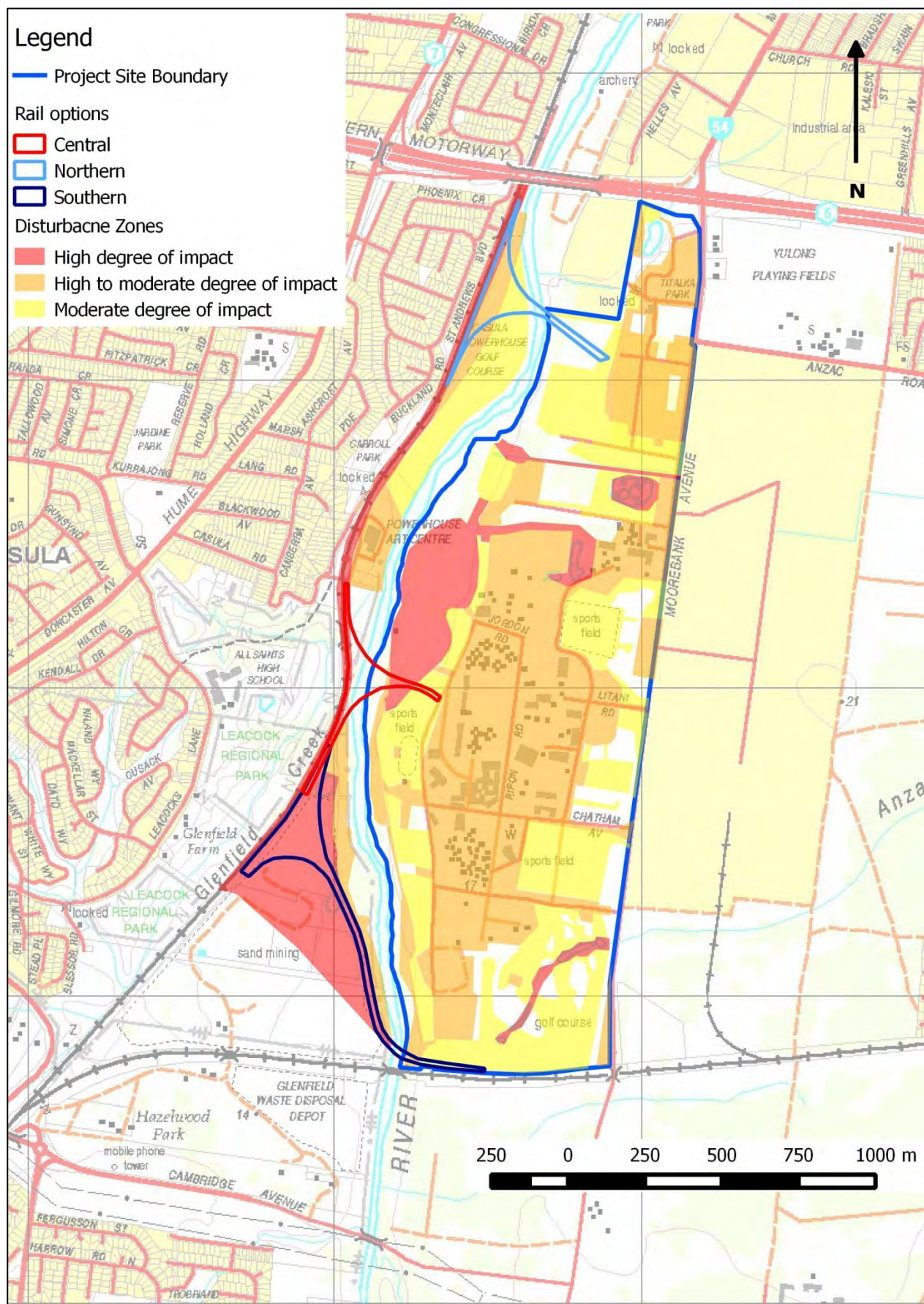


ID	Site type/ description	Age period	Inside proposed Concept Design construction footprint? Y/N	Degree of existing disturbance to site	Summary of subsurface archaeological potential	Is deposit/location physically accessible?
<b>Non-Defence related 20<sup>th</sup> Century phase</b>						
MH7	Liverpool Golf Course	1931 to late 20 <sup>th</sup> century	Y	High disturbance: the golf course as a whole has effectively been destroyed, the only extant features are tree plantings along some fairways and remnants of the fifth and twelfth tees	Site significance does not warrant archaeological excavation	Yes



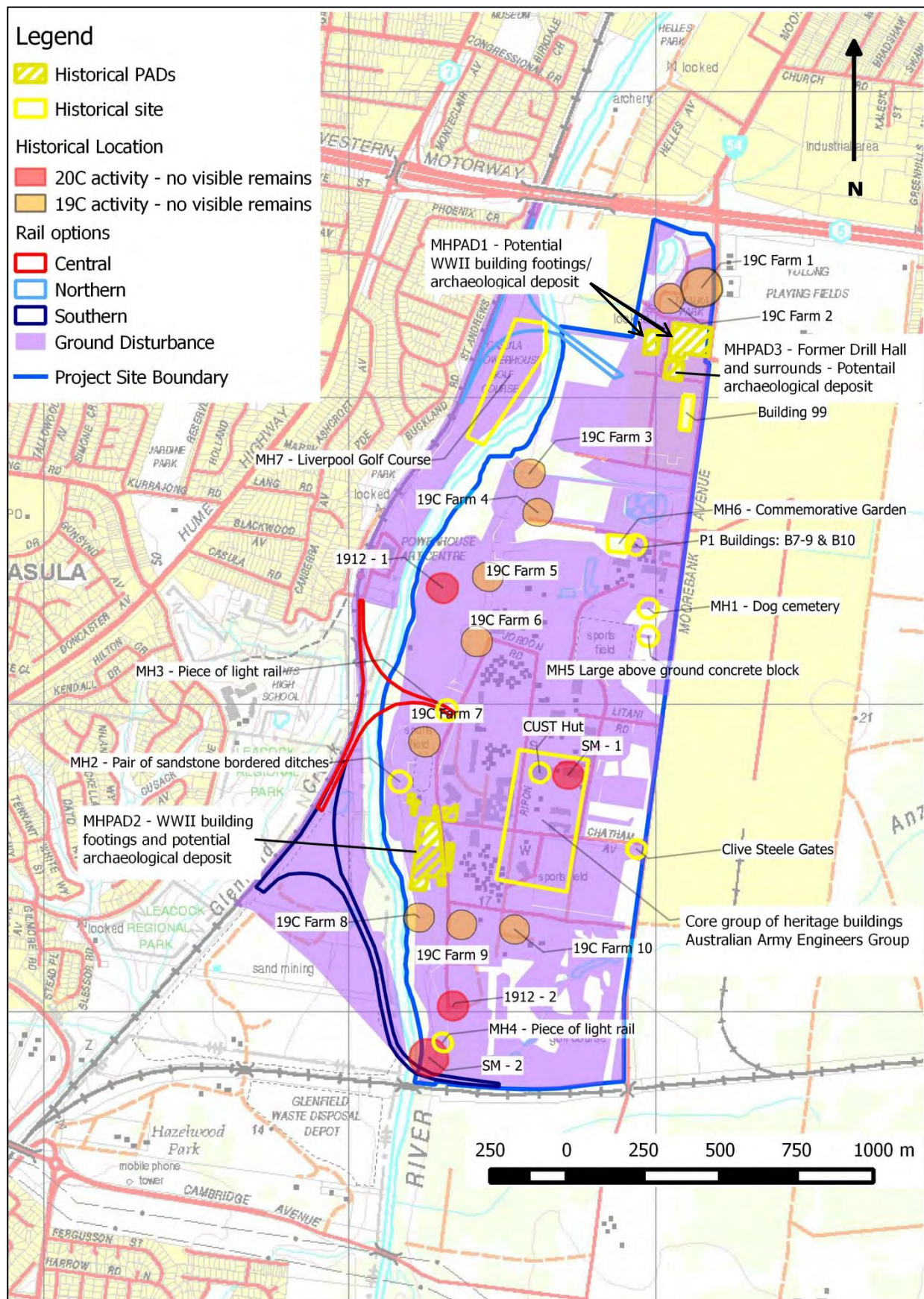
**Figure 5.76** The location of former European structures and activities within the Project area, as identified within the documentary record (after Figure 3.5, CDFD Aug 2010)





**Figure 5.77a** Mapping of existing disturbance zones across the Project area





**Figure 5.77b** The location of all European archaeological recordings and former identified structures and activities areas within the Project area, relative to areas of mapped disturbance; refer to Figure 5.77a for additional detail of existing disturbance zones



## 5.2.5 PADs associated with former structures or facilities

### 5.2.5.1 MHPAD1

MHPAD 1 Occurs within the following map grid points (MGA):

#### Eastern Area (Titalka Park):

NW(1)	308048.6242242
NW(2)	308058.6242252
NE(1)	308162.6242235
NE(2)	308173.6242221
SE	308163.6242143
S(1)	308099.6242151
S(2)	308095.6242129
SW	308034.6242143

#### Western Area:

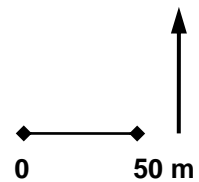
NW	307963.6242225
NE	308001.6242220
SE	307994.6242146
SW	307950.6242152

This recording consists of a potential archaeological deposit in which the remains of World War I and II Department of Defence infrastructure and associated activities may be present. The presence of WWII related mains are more likely than for the WWI period. The area of the deposit consists of the current Titalka Park, and a nearby area to the south and west of the Canteen and former tennis courts. These are open space, recreational areas which appear to have been subject to minimal development since the 1940s (Figures 5.78 and 5.84). The Titalka Park occurs within an area of 12 x 115m. The additional area has approximate dimensions 46 x 73m.





2012 aerial photo from Google Earth Pro showing boundary of MHPAD1 (yellow outline)

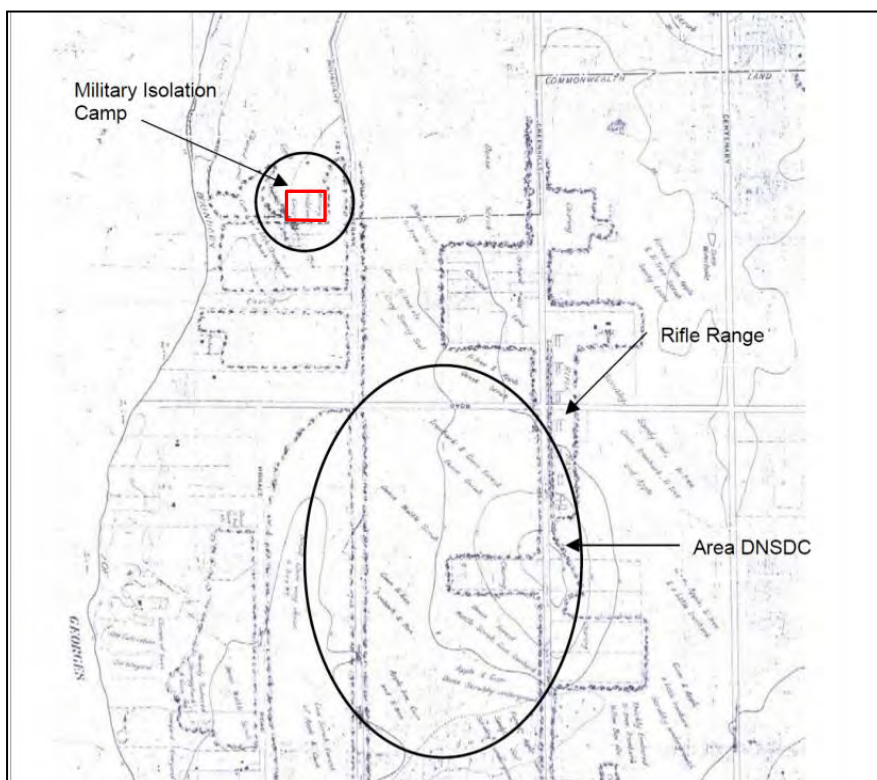


1943 aerial photo from [www.six.nsw.gov.au](http://www.six.nsw.gov.au) showing boundary of MHPAD1 (yellow outline) relative to World War II infrastructure

**Figure 5.78** Comparison of contemporary and 1943 aerial photography of the Titalka Park region and the area of MHPAD1 (yellow boundary).

A plan of the Moorebank area, dating to around 1912, indicates that the MHPAD1 area includes portions of a 'Military Isolation Camp' (Figure 5.79). The purpose of the camp is thought to have been an isolation area for the temporary accommodation of any men who came into camp with communicable diseases, such as measles and mumps. The Isolation Camp may have contained no permanent or even built structures, and may have instead consisted simply of tents (O'Keefe 2011). The western portion of the MHPAD1 has primarily been defined to potentially include traces of the Isolation camp.





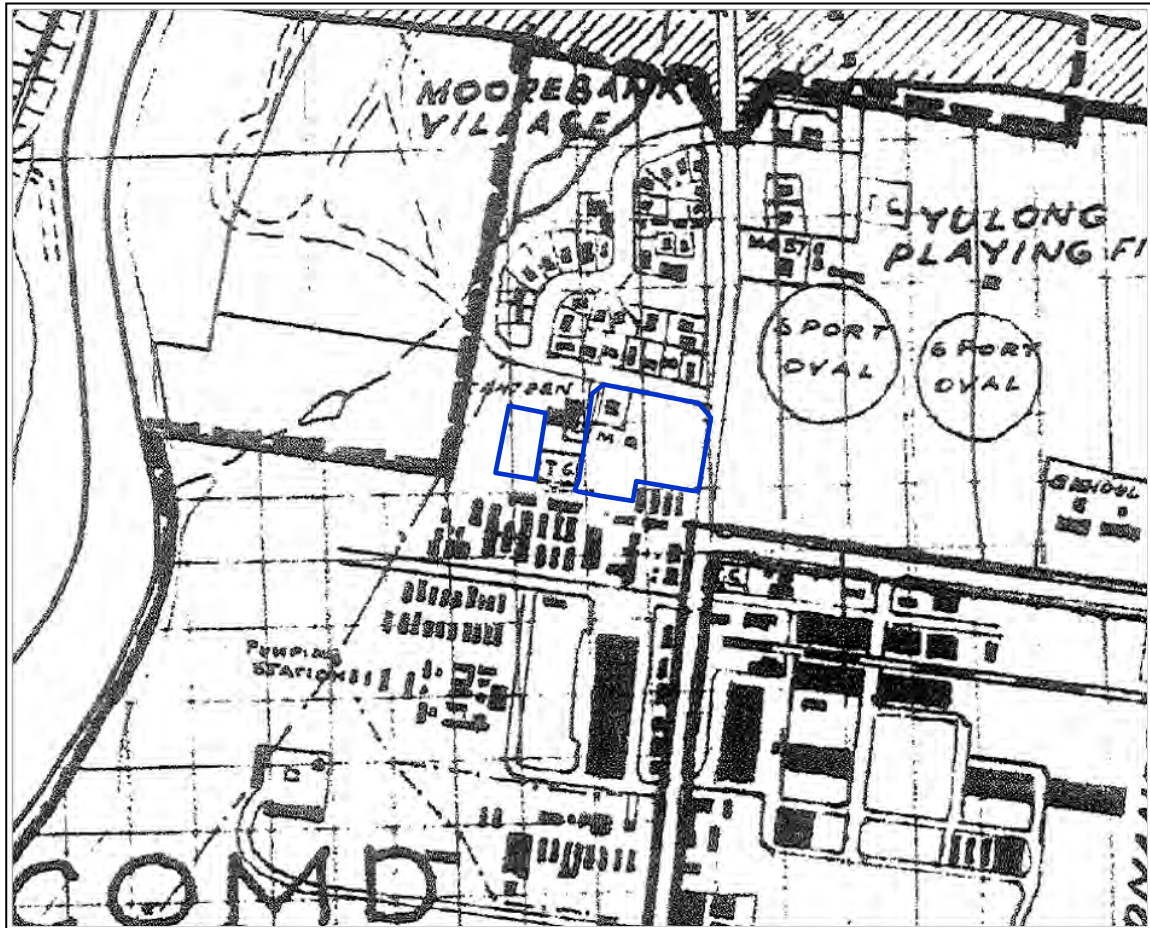
May 2012 aerial photo (left) from nearmap.com showing boundary of MHPAD1 (yellow outline) and approximate area of Military Isolation Camp c.1912 (red boundary), as determined by 'best-fit' overlay with contemporary mapping.

**Figure 5.79 (Top)** Extract of Plan of Moorebank area c.1912, (after Figure 2.5 from GBA 2004, p.15), showing location of 'Military Isolation Camp' (red boundary) (plan formerly in collection of Liverpool Regional Museum, subsequently transferred to Liverpool City Library where it has not so far been located). (Bottom): Comparison with May 2012 aerial photograph from Google Earth Pro 2012).

A 1943 aerial photograph, towards the end of World War II, shows the presence of Defence related infrastructure in the area of MHPAD1 (Figure 5.79). Three P1 type hut buildings are shown on the south side of, and perpendicular to Bapaume Rd (the northern boundary of Titalka Park), and a U shaped building with enclosed rear yard and outbuildings is shown in the north western portion of the future park. A number of smaller buildings and structures are associated with the P1 huts or situated near the southern park perimeter.

A 1958, topographic map of the Moorebank Holsworthy Area shows that by this time, the three P1 hut buildings have been removed, and four similarly proportioned buildings have been installed immediately to the southeast (Figure 5.80). These buildings remain to the present day (Buildings: B44-45, 47 & 48), and

display a variety of subsequent modifications and refurbishments to an original 1940s fabric (CDFD Aug. 2011:36). It is possible that the removed P1 hut buildings (previously mentioned) comprise three of these four remaining buildings on the southern boundary of Titalka Park. The U shaped building noted in the 1943 aerial photograph is identified in the 1958 map with the letters M.Q, possibly a reference to married quarters. Immediately adjacent to the western boundary of the present Titalka Park, the 1958 map shows a 'Canteen' building and tennis courts ('T.C'). The former still exists, together with the ground platform for the courts. The zone of ground surface disturbance related to both the canteen building and tennis courts separate the two defined areas of MHPAD1.



**Figure 5.80** Extract from 1958 topographic map: Moorebank Holsworthy Area CEN938d 1/9/57, Amended 22/4/58 (Australian War Memorial 123, Item 493), showing Defence infrastructure within the defined MHPAD1 area (Blue boundary) (CE C Commd Dec 1958).

At the time of survey (2011), Titalka Park consisted of an open area park with broadly spaced and aligned planted shade trees (Eucalyptus) and continuous grass turf (Figures 5.81 – 5.83). The area is fully fenced along its eastern (Moorebank Avenue) and northern (Bapaume Road) perimeter, and appears to be used for low impact recreation by Defence personnel. No standing structures remain within the MHPAD1 area although a number of buildings, including variously modified P1 type hut buildings dating from the 1940s, were present adjacent to the southern boundary of the park and PAD area. Apart from a remnant concrete floor near the southern boundary of the park (Figure 5.83), no clear surface remains of former structures are evident.

Immediately southwest of the Canteen building, the smaller, western portion of the MHPAD1, consists of a relatively flat, open and grassed area, with a step-down, or sloped embankment to the west. The latter is a natural landform feature, marking the edge of a Tertiary aged terrace which forms the high and level ground across most of the Moorebank IMT Project area. Apart from a pole supporting flood lights, there are no structures evident.





**Figure 5.81** Looking SW across Titalka Park towards buildings beyond the southern boundary of the park (photo Dec. 2010).

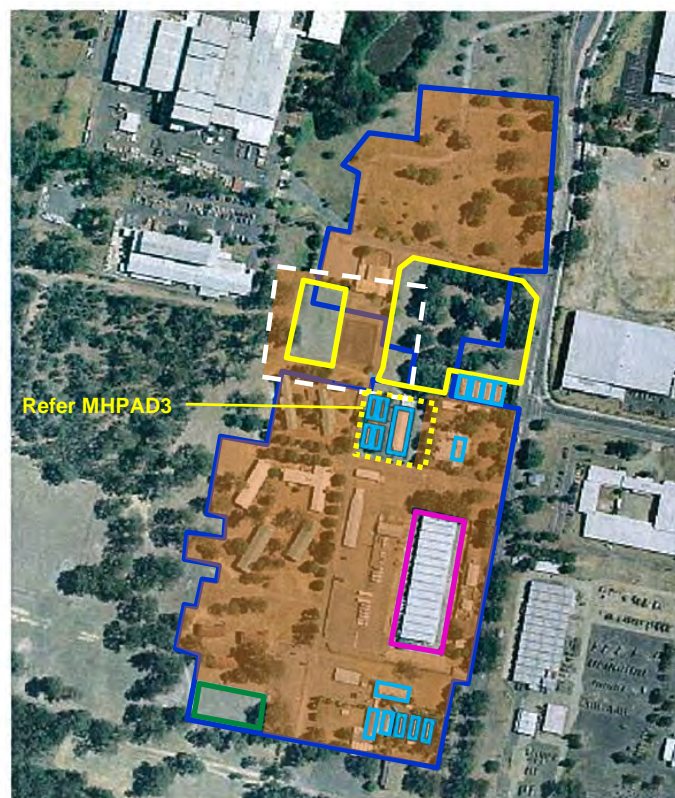


**Figure 5.82** Looking E across the northern portion of Titalka Park (photo Dec. 2010).



**Figure 5.83** Looking S across a remnant concrete floor on the southern margin of Titalka Park. These remains were removed during demolition works in 2012 (photo Dec. 2010).

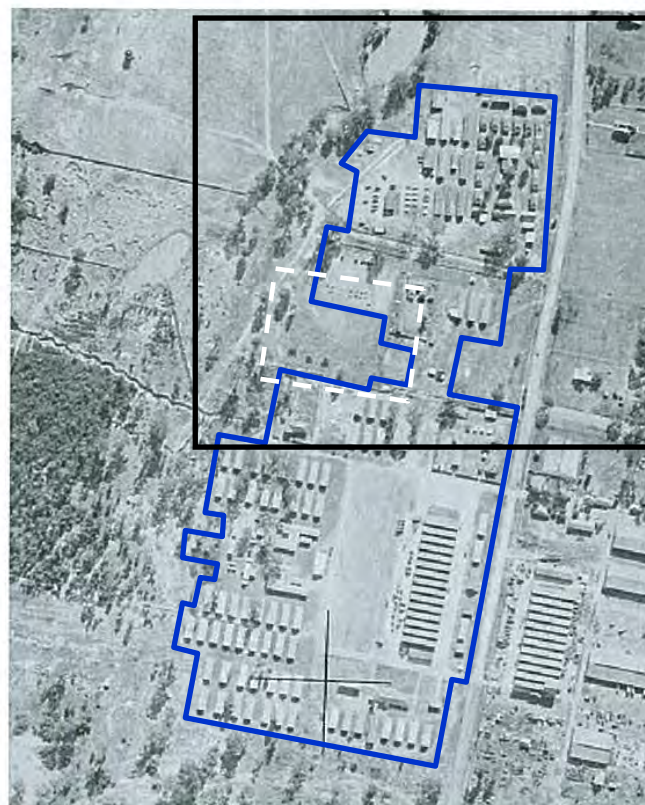




Approx Scale 1:8157 200m

Base image: 2008 from www.six.nsw.gov.au

**Figure 5.84** Interpretation of archaeological potential across MH PAD1



Approx Scale 1:8157 200m

Base image: 1945 aerial photograph from www.six.nsw.gov.au



1958 topographic map showing the development of the Moorebank Village, which required demolition and removal of the WWII structures (Moorebank Holsworthy Area CEN938d 1/9/57, Amended 22/4/58 Aus War Memorial 123, Item 493)

#### Key incl. Archaeological Potential

- *High* (least disturbance evident or inferred)
- *Moderate* (some disturbance evident or inferred due to proximity of later development)
- *Low* (considerable disturbance evident or inferred due to proximity of later development)
- *Nil* (including high degree of disturbance from later development and demolition)
- Approx. location of WWI Isolation camp
- Extent of WWII built environment
- WWII building (variously modified) extant at time of Dec 2010 survey but demolished in 2012
- Modified WWII building still extant





### 5.2.5.2 MHPAD2

MHPAD 2 occurs within the following map grid points (MGA):

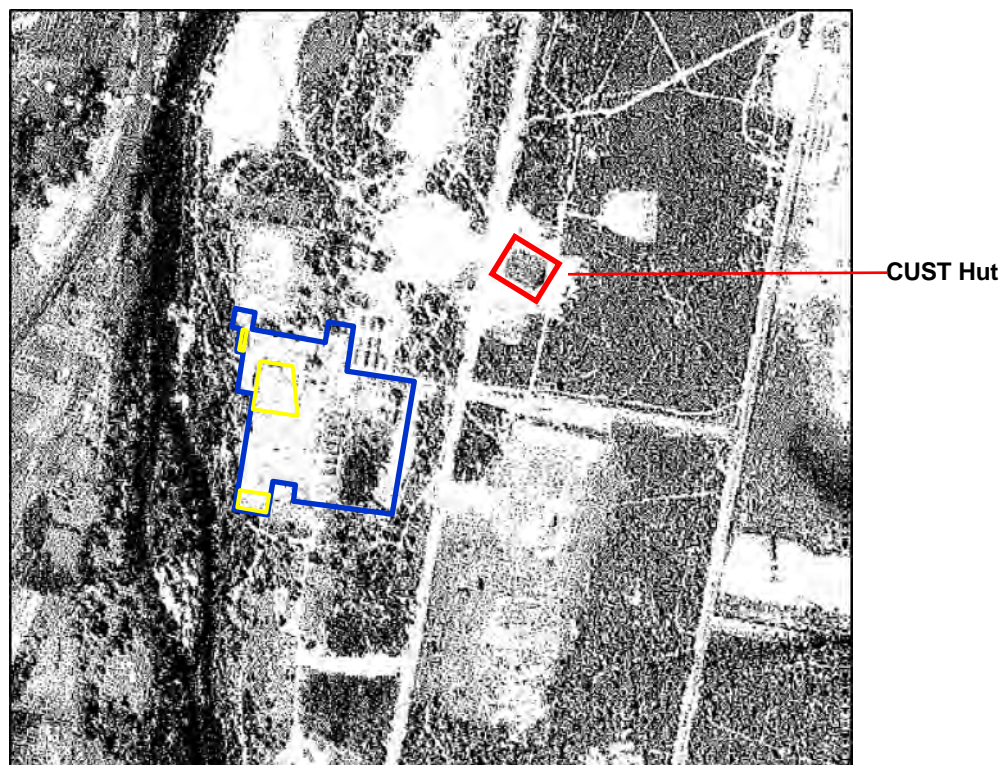
**Eastern Area (Titalka Park):**

NW	307214.6240688
NE	307481.6240645
SE	307485.6240347
SW	307485.6240347

This recording consists of a potential archaeological deposit in which the remains of World War II Department of Defence infrastructure and associated activities may be present.

A 1943 aerial photograph, dating towards the end of World War II, shows the presence of Defence related infrastructure in the area of MHPAD2 (Figure 5.85). The deposit is situated at the eastern end of Chatham Avenue within the SME (Figure 5.86). The deposit is situated within a former locus of WWII buildings, most of which appear to have been P1 type buildings. These were situated within an area of approximately 270 x 250m. Subsequent development has impacted a large proportion of this original area (Figure 5.82). The remaining portions of archaeological potential occur in open space areas which appear to have been variously used by Defence for field training and sporting activities.

Greatest potential occurs within areas that are distant from areas of post WWII construction and high impact training grounds. The largest area of least impact (defined as 'high potential') is a central northern remnant (refer Figure 5.86) where some masonry remains (probably footings) are evident on the ground surface. To the south of this area, field training impacts include excavation and surface erosion which will have impacted potentially occurring archaeological deposits. Areas in proximity of post WWII construction areas, depending on distance and likely impact, have been variously assessed as having moderate or low potential.



**Figure 5.85** Extract from 1949 aerial photography showing the locus of WWII buildings and infrastructure within which the MHPAD2 recording is situated. The nearby CUST Hut is indicated in red. The blue boundary Marks surviving buildings in 1956, and the yellow boundary, indicates the current surviving high potential deposits.



Base image from Google Earth Pro 2012

**Figure 5.86** Interpretation of archaeological potential across MH PAD2



Base map: extract from Nov 1956 Layout of Engineer Barracks Casula

### Archaeological Potential

- *High* (least disturbance evident or inferred)
- *Moderate* (some disturbance evident or inferred due to proximity of later development)
- *Low* (considerable disturbance evident or inferred due to proximity of later development)
- *Nil* (including high degree of disturbance from later development)
- Extent of WWII built environment





At the time of survey (Dec 2010), the MH PAD2 area consisted of an open grassed area, with some excavation and erosion scalds evident in the Southern western portion (Figures 5.87-5.89). No standing structures remain within the high potential portions of the PAD.



**Figure 5.87** Looking SE across the south western portion of MHPAD2. Note footing remains aligned in foreground (photo Dec 2010).



**Figure 5.88** Looking S across western portion of MHPAD2, note footing remains in foreground (photo Dec 2010).



**Figure 5.89** Detail of surface evidence of footings at MHPAD2, also shown in Figure above (photo Dec 2010).



### 5.2.5.3 MHPAD3

MHPAD 3 occurs within the following map grid points (MGA):

NW(1)	308049.6242135
SW(1)	308041.6242078
SW(2)	308033.6242078
SW(3)	308033.6242074
S(1)	308047.6242072
S(2)	308046.6242067
SE	308078.6242063
NE	308087.6242129

This recording consists of a potential archaeological deposit in which the remains of World War II Department of Defence activities and infrastructure associated with a group of WWII buildings may be present.

At the time of the December 2010 field survey, a group of five WWII P1 type buildings (B36-39 and B40) were present at this location (refer Figures 5.90 and 5.91, and built environment descriptions), and were recorded as standing structures with heritage significance (CDFD Aug 2011). Following the demolition of the buildings in 2012 (Bermagui Constructions 2012), this area was reinspected and determined to include remnant portions with potential archaeological deposit (MHPAD3). Technically, this recording is within the assessment area that includes MHPAD1, and could be considered a part of the same potential archaeological resource (refer Figure 5.84). However, given that its identification was a consequence of a change in status to an original survey recording, the separateness of this recording has been retained.

The PAD consists of:

- The footprint of the former Drill Hall Building (B40) (Figure 5.92);
- A margin of deposit (extending between 18 and 8m from the footprint), situated around the former building. Most of this margin is situated below a surviving bitumen surface (Figure 5.92). There are two unsealed areas to the north and south of the footprint (being remnant garden beds and entrance paths at the southern end, Figure 5.89, and grassed open ground to the northwest, Figure 5.90); and
- A remnant garden area, formerly situated at the southern end of building 39 (Figure 5.93).

The boundaries of MHPAD3 are shown in Figure 5.95, the maximum dimensions of the PAD are approximately 47 x 67 m.



**Figure 5.90** Looking SE towards former buildings B36 and 37, as they were in Dec 2010. The footprint of these buildings is situated to the west of MHPAD3.



**Figure 5.91** Looking NE towards former buildings B38, 39 and 40, as they were in Dec 2010. MHPAD3 includes the front garden plots and the footprint of the former Drill Hall (right).





**Figure 5.92** Looking N across the footprint of the former Drill Hall (Building B40), showing surrounding MHPAD3 deposits under bitumen (photo Aug 2012).



**Figure 5.93** Looking W across the southern portion of MHPAD3, showing the two garden beds and former entrances to former buildings B39 and B40 (photo Aug 2012).

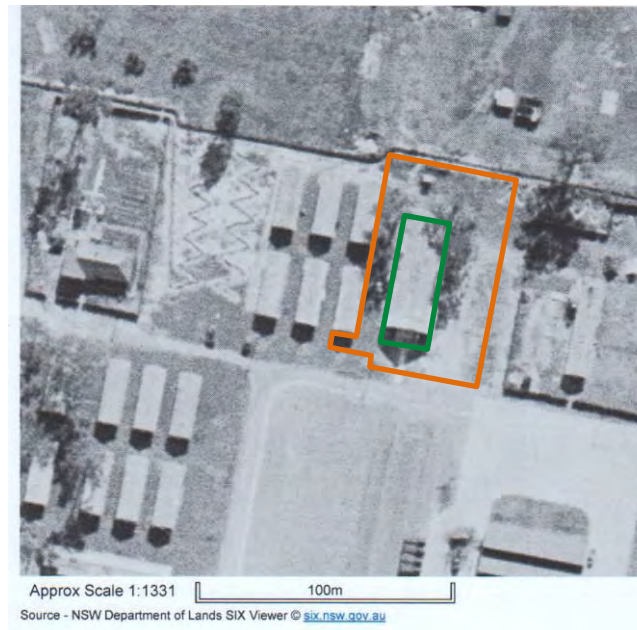


**Figure 5.94** Looking S towards the western boundary of MHPAD3 and the adjacent former location of buildings B36-39. Note the lack of archaeological potential due to disturbance from the removal of footings, and subsequent grading and seeding.





Base image: Jan. 2009 (Google Earth Pro 2012)



Base image: 1945 aerial photograph from [www.six.nsw.gov.au](http://www.six.nsw.gov.au)

**Figure 5.95** Interpretation of archaeological potential across MH PAD3

All buildings shown in the 2009 aerial photo were demolished in 2012 except for those outlined in purple or blue (refer key)

#### Key incl. Archaeological Potential

- *High* (least disturbance evident or inferred)
- *Moderate* (some disturbance evident or inferred due to proximity of later development)
- *Considerable* (considerable disturbance evident or inferred due to demolition or proximity of later development)
- *Nil* (including high degree of disturbance from later development and demolition)
- Modified WWII building still extant
- Other extant building
- Other extant building



### 5.2.6 PADs associated with existing structures or facilities

One existing structure has an assessed potential to be associated with potential archaeological deposits of heritage significance. This is the CUST Hut, situated in the SME.

With the exception of the B99 workshop in the transport compound (refer Built environment descriptions, Precinct 2), there are no other structures relating to the WWII period (or older) which remain in their original locations within the Project area. The B99 building appears to have been constructed with a concrete floor as an original component, together with extensive areas of surrounding sealed and hard surfaces. This is considered to have prevented the deposition of archaeological material relating to the building's use.

#### 5.2.6.1 CUST Hut

The CUST (Cullen Universal Steel Truss) Hut is a large clear span vaulted roof building (building S135), which was relocated from the Royal Australian Engineers Training Centre at Kapooka to the Moorebank School of Military Engineering after 1946 and prior to 1949 (refer historical background and Figure 5.9) (McNicol 1977). By 1956 the Hut was occupied by the Plant, Roads and Airfield Troop, which was part of the school's Military Training Wing.

Along the long axis of the building, the now Colourbond clad roof carries through to ground level where large concrete open drains collect rainwater. The original floor was apparently earthen and was later upgraded with the installation of a concrete slab. The eastern and western ends of the building were originally open and later filled in with brick and iron cladding.

Prior to the installation of the concrete floor, there is some potential for the accumulation of archaeological material relating to the early use of the CUST Hut at Moorebank. Given the age of the Hut relocation, between 1946 and 1949, this period of potential accumulation is likely to relate to at least the first decades since the establishment of the SME at Moorebank around 1940.

Testing of this predicted potential could only be realised in the event that the existing concrete slab floor was demolished or partially removed.

## 5.3 Cultural landscape

The landscape of the proposed IMT has been transformed by a sequence of human land use practices and cultural processes. These have successively changed the landscape, many removing evidence of past phases. The following is a review of this sequence (based on the historical outline presented in Section 4) and an analysis of the remaining landscape features or characteristics.

### 5.3.1 Pre-European

The occupation of the Sydney Basin by Aboriginal people is evidenced by an archaeological record which, to date, extends at least 15,000 years and possibly as far as 30,000 years (Jo McDonald Cultural Heritage Management Pty Ltd 2005). The physical consequences of Aboriginal land use are thought to include changes to vegetation regimes and to geomorphological process through the systematic use of fire (Mulvaney and Kamminga 1999). More direct evidence is presented by archaeological traces, such as archaeological deposits, and sites of cultural significance identified from oral testimony and ethno-historical records.

There are four remaining components of the Moorebank Project area which relate to the Aboriginal cultural landscape. These are the geomorphology, the remnant native vegetation, the archaeological evidence of Aboriginal occupation, and the cultural values associated with these physical traits. The geomorphological values relate to the morphology and alignment of the Georges River corridor (including remnant terrace edge features on its eastern margin), and the remnant lake basin at the northern end of the Project area. Despite the fact that each of these has been variously impacted by European quarrying, construction, landscaping, or filling, they retain a significant proportion of their overall pre-European shape and character to provide an effective physical context for understanding past Aboriginal land use and values.



Apart from scattered trees within developed areas, remnant native vegetation consists of forest and low woodland, and is now mostly confined to the eastern margin of the river, and small pockets of currently undeveloped land elsewhere across the Project lands. The structure and content of these vegetation communities has been significantly modified following European land use. This includes the loss of old-growth trees and species diversity from land clearance, grazing, timber getting and fire; and the introduction of invasive exotic species. Despite these changes, and the fact that a minor proportion of the tree cover is likely to date to pre-European times, the remaining areas continue to be evocative of the pre-European landscape. In addition the native vegetation has ecological value, which contributes to the habitat function of the river corridor. These are landscape values which are highly valued in contemporary Aboriginal lore and that relate to traditional and remembered past practice.

A suite of Aboriginal archaeological sites have been identified within the Project area, mostly focused on an elevated terrace edge and a remnant lake basin on the east side of the river (refer separate Aboriginal Heritage Assessment). These constitute direct evidence of Aboriginal interaction with the landscape, and are thus an important constituent of the cultural landscape.

Aboriginal community groups attest to the high cultural value of the Georges River corridor. This value is manifest in the physical components already outlined and related to cultural identity and legacy. As such the Georges River corridor falls under the definition of an associative cultural landscape (refer Section 3.7.1).

### **5.3.2 The Moorebank and Collingwood Estates**

Early nineteenth century European land use and development of the Project area included bush grazing and selective land clearance for purposes of cropping and the rearing of livestock. Following the death of Eber Bunker in 1836 and Thomas Moore in 1840, the Collingwood and Moorebank Estate lands, were leased out to a range of tenant farmers. Concurrently, agricultural practice further diversified to include poultry farming, dairying and the establishments of orchards and vineyards. This pattern of land use continued into the late nineteenth century when these lands were subdivided and sold off. Land use would have increasingly involved clearance of native vegetation to form a patchwork of enclosed and agricultural fields, probably interspersed by remnant blocks and edges of native vegetation. Much of the southern half of the Project area, away from the river, appears to have remained uncleared. Residential and agricultural buildings would have served each holding, with both the river and rough roads, formed along a grid of public land easements, providing service corridors.

Apart from the alignment of Moorebank Avenue, and a modern patchwork of native regrowth areas which perhaps mimics this characteristic of the nineteenth century farmed lands, there are no surviving features of the agricultural nineteenth century cultural landscape. Subsequent Defence related land use and development has removed all traces of former structures, internal road easements, enclosures, field systems, and property boundaries. The locations of former homesteads have been directly impacted by military training earthworks, or building and infrastructure developments.

### **5.3.3 Military use and land tenure up to World War II**

Military use of the Moorebank Estate lands commenced with training manoeuvres in the 1890s and tented encampments in the first decade of the twentieth century. By 1913 a large tract of the original Moorebank estate lands, including the proposed IMT site, was acquired by the Commonwealth for Defence purposes. Early developments within the Project area included an Isolation camp by 1812 which probably consisting of tents within a cleared area. The majority of development and infrastructure associated with World War I occurred to the north as part of the Liverpool Camp which extended south along the eastern river bank from Newbridge Road. Some farmlands within the Defence acquired area continued to be run as farms, presumably by tenants. Guards were stationed around market gardens during military training camps in the 1920s to prevent trainees stealing their produce.

Elsewhere the Moorebank lands were used for training exercises for infantry, artillery and other branches of the army. These actions are unlikely to have substantially changed the overall landscape of agricultural areas and surrounding remnant native vegetation. The ratio of agricultural to uncleared





land probably remained static or gradually decreased as reductions in grazing and cropping promoted native regrowth.

Since the first decade of the twentieth century field artillery units were deployed in the area for firing practice, and from 1911 onward, artillery batteries directed fire into the Moorebank area, south of the ordnance stores. The risk from falling artillery shells suggests that up to this time there were few, if any, military structures in this southern area.

Use of the Project area for the training of engineers began in the 1920s.

Sandmining of riverbank deposits in the south-western portion of the Project area occurred between 1933 and 1938. This industry included the installation of a rail line from the Ordnance stores on the east side of Moorebank Avenue, to the river extraction site, and included a loading stage half way along the line. Presumably, sandmining operations were suspended during artillery practice times.

Apart from potential archaeological traces of the Isolation camp, the Defence related pre-World War II cultural landscape has disappeared. There are no surviving structures from this period, or landscape components, apart from fringing boundaries of native vegetation, which relate directly to, or are evocative of this transition from agricultural to military training land use. The former agricultural and cleared lands have been transformed by a sequence of building developments, playing fields, a new road network and changes to natural land surfaces to form platforms and straightened drainage lines.

#### **5.3.4 World War II**

By the late 1930s the gathering signs of war prompted the repair of existing buildings, and the construction of stores, ammunition and training depots, and roads. Two areas of concentrated development are indicated in 1940s aerial photography: to either side of Bapaume Road in the north of the Project area, and further south, at the western end of Chatham Avenue. These correspond to areas around MHPAD3 and MHPAD2 respectively.

In December of 1939 the Army school of engineering commenced training courses, probably at Moorebank. By 1940, the field engineering wing of the now School of Military Engineering and the School of Signals was established at Moorebank with the help of a substantial building program. Further building and infrastructure development followed the build-up of other military units and facilities in the early war years. This included workshops, vehicle stores, sewerage, stormwater and fire services.

At the time of the survey, and prior to defence demolition actions in mid-2012 which were unrelated to the current assessment, a number of World War II P1 type buildings remained *in situ* near the middle section of the Project area in the area of the Moorebank Base Administration Support Centre (BASC) (refer Section 5.1.2). However since the demolition program, only a large workshop building in the Transport Compound (Building B99) remains of this group. This building has been re-clad since its construction in the 1940s. Some bitumen street paving and parking areas situated between the former building sites remain.

One group of four P1 type WWII buildings remains on site (as part of Defence Support Group), some 300m south of the demolished grouping. However these have been significantly modified and are no longer in their original location (refer Section 5.1.3).

Other traces of the World War two landscape consist of remnant sub-surface archaeological traces (refer Section 8), and some road alignments still present or actively used, including Bapaume and Ripon Roads, and Chatham Avenue/Belvoir Road.

All of these remaining components are either now isolated, lack integrity, or are remnant in nature and can only be highlights within a landscape dominated by more modern characteristics and values.

#### **5.3.5 Post War 1940s and 50s**

Amidst a post war decline in staffing at Moorebank, the CUST hut was relocated to Moorebank from Kapooka where a RAE training centre was disbanded in 1946. The rise of Cold War tensions in the



latter half of the 1940s underlined an on-going need for military preparedness and was quickly followed by what became a three phase rehabilitation and redevelopment of the SME site between 1948 and 1957. Further stimulus was provided by the commitment of troops to Korea in 1951. This period corresponded with an expansion of military functions at the site including the formation of new squadrons, relocation of field regiments, and the establishment of dog training. The building program included both the replacement of temporary WWII structures, refurbishment and adaptation of others, and many new buildings including barrack accommodation, stores, administration buildings, mess and training facilities.

A key memorial of the SME, to members of the Royal Australian Engineers who lost their lives in service, was erected in the period 1952-56 at the intersection of Ripon and Chatham Roads. The memorial gates to commemorate General Steele were erected at the entrance to the School in 1958.

### **5.3.6 1960s and 1970s**

A second major period of expansion and improvement at SME commenced in 1963. In that year, a Nuclear, Biological and Chemical Warfare Wing was raised, and it expanded gradually over the next few years. Another major stimulus occurred in 1965 with the introduction of a new conscription scheme and the commitment of a battalion of Australian troops to Vietnam.

Further training infrastructure was developed, existing buildings renovated and improved, new clubs established and two new double storey barracks were built facing the parade ground. A new chapel was built in 1968. A perimeter security fence and guard house was established and the grounds were improved with the planting of lawns, shrubs and shade trees. In 1971 the RAE Golf Course was established in the southern portion of the Project area. The former Administrative building for 7 Independent Field Squadron, originally erected in the mid-1950s was converted into the RAE's corps museum.

### **5.3.7 1980s onwards**

Another major period of development at SME began, in the mid-1980s. In 1985, the Explosive Ordnance Disposal trade was re-introduced to the School. Two years later, the Engineers designed the Bicentennial Building. A major rebuild of SME's buildings and facilities was launched in 1989 at a cost of \$40 million. As part of the redevelopment, the Directorate of Engineers-Army moved from Canberra in 1991 to be co-located with SME. With the incorporation of the Royal Australian Survey Corps back into RAE in 1996, the Geomatic Engineering Wing was established at Moorebank. This led in 1997, to the construction of the new Museum Building specifically to house the Survey Corps' historic collection. The building was substantially extended and re-opened in 2002.

During 2003-5, a Vietnam War Memorial dedicated to RAE personnel who lost their lives in Vietnam was erected. The STRARCH hangar was erected in about 2007.

The post Second World War expansion and redevelopment of the Defence facilities across the School of Military Engineering has created a palimpsest of different building phases and structures. The resulting landscape reflects the evolutionary growth of a Defence training facility and its related infrastructure across the second half of the twentieth century. Its key commemorative items were all instigated in this period. The arrangement and distribution of different functional areas describes the competing paradigms of forward planning and opportunistic adaptive reuse. As such this is a cultural landscape which falls under the category of an evolved and continuing landscape, with the rider that its fabric post-dates the Second World War and the way of life represented is contemporary rather than traditional (refer Section 3.7.1).

Most of the flat ground across the area has now been developed, leaving only remnant areas of native vegetation, either on flood prone ground, river side slopes, or now regenerating ground previously utilised, such as the area of the former sewerage treatment plant across the middle of the Project area.

Following the 2012 Defence program of demolition, nearly all of the buildings from Precinct two, the Moorebank Base Administrative Support Centre, to the north of the SME have been removed. The resulting landscape is an open woodland of remnant garden plantings and scattered native trees,



interspersed with lawns, street alignments, and building platforms, fringed by the bordering forest of the river corridor. The absence of nearly all the former structures in this precinct has reduced European cultural landscape values to a level below a conventional threshold for description.

## **5.4 Rail spur options**

Each rail spur option was assessed for the presence of European heritage sites.

### **5.4.1 Northern rail spur option**

There is one heritage item located adjacent to the northern rail spur option, *Railway viaduct, Main Southern Railway Line (item 12)*. The Aboriginal subsurface testing program undertaken for the northern rail spur option found subsurface archaeological deposits that may be of historical significance due to their connection to the construction of the Liverpool weir.

### **5.4.2 Central rail spur option**

There is one heritage item located adjacent to the central rail spur option, *Railway viaduct, Main Southern Railway Line (item 11)*. The field survey undertaken for the central rail spur option indicated that subsurface archaeological deposits that may be of historical significance due to their connection to the construction of the Liverpool weir may be located in the Project area both on the eastern and western banks of the Georges River.

### **5.4.3 Southern rail spur option**

There is one heritage item located adjacent to the southern rail spur option, *Glenfield Farm*. There are no heritage items within the Project area for the southern rail spur option.





## 6. PREDICTIVE ASSESSMENT

Each rail corridor option for the Project utilises a portion of the bed of the Georges River (see Figure 3.1). This land was unable to be directly surveyed as it is below the river level, therefore a predictive assessment has been undertaken to assess its archaeological potential both on the eastern bank adjacent to the main project area and on the western bank as it relates to each rail option.

A predictive assessment has also been undertaken of the Glenfield Landfill area as this area was unable to be directly accessed for this assessment.

### 6.1 Bed of the Georges River

Archaeological material that may potentially be associated with a river bed or bank includes the structural remains and associated debris from bridges, jetties, landings and maritime vessels. Dumped waste may also occur when the adjacent banks were used as dump sites for nearby residences or industrial areas.

A review of historical sources and existing heritage registers including the Liverpool City Council LEP, state heritage register and inventory did not identify any known European sites, former structures or industries within or near this portion of the river. This finding indicates that this portion of the river bed has low archaeological potential.

#### 6.1.1 Eastern bank

The eastern bank of the river is framed by the steep embankment of the Tertiary terrace and consequently does not offer an easily accessible site for a jetty, bridge or landing. Given that none of the known former nineteenth century farm houses or structures occurs near this section of the bank, it is an unlikely area for the disposal of associated waste (all former farmhouses are at least 300m away).

#### 6.1.2 Northern option

In the vicinity of the northern rail option the western river bank is backed by low river flats and formed part of the Collingwood estate, established by Eber Bunker in the early nineteenth century. The Project area however, is situated between 0.6 and 1.6 km upstream from the Collingwood homestead, and is unlikely to have been developed for jetties, landings or bridges during the life of this estate. Subsequent development and subdivision of the estate occurred well after the construction, and to the west of, the Great Southern Railway. This line served as a barrier which discouraged access and development to the east and the Georges River.

Archaeological subsurface test excavation was undertaken in 2014 (NOHC 2014b) of site MAPAD2 located on the eastern bank of the Georges River at the location of the northern rail option crossing. Stratigraphic profiles observed in the test pits are broadly consistent with the geological mapping for the area, namely showing components of a very recent (Holocene) floodplain alluvial landscape. The test pits show a very high degree of well-preserved bedding structure. This was not expected, and is interpreted as reflecting very recent active sand mobilization and re-deposition associated with 19<sup>th</sup> and 20<sup>th</sup> century flood events. Deposits excavated across MAPAD2 comprised three groups:

- poorly sorted clayey gravels that have been introduced in some areas, most notably across the southern and northern extremities of the test area, as fill (Unit 3);
- well sorted light grey or light brown clean sands with well preserved bedding structures and minimal soil development (Unit 2); and
- dark grey-brown silty sands with abundant charcoal (Unit 1).

The test excavation program has demonstrated that while the archaeological significance of the upper 120-150 cm of deposits is generally low, these deposits are likely to have significance in terms of being a representative example of environmental changes that resulted from European settlement, in



particular the construction of the Liverpool Weir. The Unit 1 and Unit 2 deposits have the potential to be of significance in terms of their scientific value, natural value, educational value, representativeness and social value (importance to the Aboriginal community and the broader Australian community) at local, State and National levels.

#### **6.1.2 Central and southern options**

In the vicinity of the central and southern rail crossing options, the western river bank is backed by a narrow strip of floodplain along the edge of the Great Southern Railway. As with the eastern side and the land further to the north, there were no known structures or infrastructure along this section of the floodplain to indicate that archaeological material is expected within this portion of bed of the Georges River however the results of the subsurface testing program also has direct relevance to these section of the river corridor. These sections of the rail corridor are assessed as having archaeological potential.

#### **6.2 Glenfield Landfill site**

Archaeological material is unlikely to remain in the vicinity of the Glenfield landfill. This area has undergone significant modification including earthworks and the introduction of substantial quantities of fill. This portion of the study area and the adjacent section of the western river bank is predicted to be of very low archaeological potential.



## 7. BUILT ENVIRONMENT ANALYSIS

### 7.1 Overview

This section analyses the principal built environment elements of the Project area and their setting in a wider context. This is provided in order to understand each item's significance and importance as part of the site as a whole.

#### 7.1.1 Principal elements

The Project area contains precincts, locations and structures associated with the earliest years of the establishment of a permanent military presence in Moorebank.

The Liverpool military camp associated with the First World War was sited north of the current M5 freeway, outside of the Project area. However the area to the south was employed as a training and manoeuvres area, and a Military Isolation Camp was established for a period in the approximate area of Titalka Park.

The ground to the north and south of Bapaume Road, including Titalka Park, was one of two foci for the first permanent military buildings within the Project area. The second being the western portion of Chatham Avenue, SME. These date from the Second World War and although standing buildings no longer remain, some evidence remains in the form of roadways and subsurface traces such as foundations.

Precinct 4 has been the home of the SME since 1940. All buildings from the first phase of development have been demolished. The site entry on Chatham Avenue is the original SME site entry road. Road names and layouts original to the SME exist in the following locations (Table 7.1):

**Table 7.1** Original road names from the establishment of the SME

Road name	Location
Chatham Avenue	From Moorebank Avenue to the intersection with Tarakan Road.
Belvoir Road	From Chatham Avenue to Jaquinot Road.
Ripon Road	From Chatham Avenue to its intersection with Bircross Road.
Un-named road	The former Chatham village entry road, from Moorebank Avenue to Bircross Road.

#### 7.1.2 Landscape

The predominant landscape character across the Project area is of mature shrub and eucalypt vegetation to the perimeter with the core areas of the site being open grassland with groves of eucalypts scattered across the site. The perimeter landscape of Precincts 2 and 4 is dense and comprises bushland along the river banks. Plantings along the Moorebank Avenue boundary (Precincts 2 and 4) relate to 1940s and to later plantings.

There is no evidence of a landscape design controlling any areas in the Project area. What limited garden areas there are within the site are small scale and representative of plants used at the time of construction of the adjacent building. The only garden areas with some potential significance (associational) are the roses in the Vietnam Memorial (Precinct 4). These plants were relocated here





from the original memorial at Holsworthy, according to RAE museum publications (RAE Museum no date).

Each of the mess buildings within the study area (Moorebank Mess, Moorebank Sergeant's Mess, Peeler Club and Sergeant's Mess) has a landscaped garden within their enclosed yard and adjacent to the buildings. None of the gardens demonstrates a strong design character or the use of significant or unusual plants.

The predominant trees throughout the Project area are eucalypts of varying species, including some large and mature examples.

In the built environment areas of the Project area, eucalypts occur mainly in groves or scattered amongst the buildings (as is the case around new SME Living-In Accommodation). The trees break up the scale of the large buildings and provide shaded areas near the accommodation buildings. The tree growth around the buildings provides a landscape outlook from buildings.

### **7.1.3 Setting**

The Project area is located in a zone of light industrial and military use. All of the land east of the Georges River is used for this purpose. It forms the western edge of the military sites in the Moorebank Holsworthy urban area. The other military sites include the DNSDC, situated on the eastern side of Moorebank Avenue adjacent to the project area, and the Holsworthy Training Area to the south.

The buildings on the land east of the Project area are mainly 2 to 3 stories in height and have large plan areas. The DNSDC site on the opposite side of Moorebank Avenue continues for the full length of the DSG and SME precincts (Precincts 2 and 4). This site includes large warehouse buildings through to smaller service buildings which collectively give a strong built edge to the east side of Moorebank Avenue.

Very few of the other sites near the Project area have grassed areas and most have only small gardens or soft landscaping. The Project area provides a contrast to other parts of its setting through its smaller scale buildings and high percentage of grassland and mature vegetation (soft landscaping) across the site.

The study area west of the Georges River comprises heavily vegetated riverbanks, adjacent river flats supporting grasslands or woodland, and an existing rail corridor. West of the rail corridor are steep slopes rising up to residential areas. The slopes are heavily vegetated with mature trees and shrubs surrounding the numerous homes which have been constructed there.

The landscape character of the eastern margin of the Georges River corridor within the Project area is one of dense vegetation with a small number of highly disturbed areas used for training and including defence related infrastructure. Both the immediate riverbanks and adjacent slopes contribute significantly to this aesthetic value of the corridor.

## **7.2 Analysis of building types**

### **7.2.1 1992 to 1994 redevelopment buildings**

A large number of buildings in the SME were constructed in a major redevelopment between 1992 and 1994. The design characteristics of these buildings are described in Section 5.1.4.4. There is a consistent design character across these buildings which contributed to the character of the site at the time of the assessment.

The buildings provide a range of functions across the site and vary from small scale substations to large transport workshops. The adaptation of a consistent architectural style across the site shows some creative skill on the part of the architects.

The overall design elements applied are representative of commercial architectural design being used in government and military buildings in Australia in the 1990s through to early 21st century. The



buildings do not illustrate any outstanding design or technical merit and overall exhibit only a low level of local significance.

## **7.2.2 Individual buildings of interest**

### **7.2.2.1 RAE Chapel (1968)**

The RAE Chapel has a moderate to high level of significance to the SME for the following reasons:

- it was designed by two former Sappers<sup>71</sup>, Col DA Davey and Captain J.M. Brindley
- the foundation stone was laid by a Sapper
- the building was constructed by Sappers
- it contains a number of memorials of significance to the Corps and beyond including the following:
  - ▶ Burma-Thai memorial
  - ▶ Headstone of Lieutenant Hodgson
  - ▶ Foundation Stone laid by one of the original CO's, Colonel Commandant LC Lucas
  - ▶ Corps Monogram in Entry Hall
  - ▶ Corps Honour Roll
  - ▶ Flag Memorial – Vietnam War.
- fittings donated to the chapel include:
  - ▶ hanging plant container
  - ▶ baptismal font
  - ▶ altar chairs.

The 2004 Heritage Assessment (GB&A 2004) does not mention all of the memorials in its physical evidence description or assessment of significance. The Thai-Burma Memorial and headstone are noted as significant. The assessment is that all of the memorials contribute to the significance of the place to the RAE.

The Chapel is significant to the local military community as it is the only military Chapel in the Liverpool area. It has been in use for christenings, weddings and funerals for service personnel and their families for over 50 years.

The building has some historic and associational significance through the use of stonework from the 1854 flour mill from Bow Bowing Creek (Campbelltown) and a cottage from Old Holsworthy Internment Camp in the construction of the walls.

The design of the chapel is unique and unusual. The seven cross columns along the northern wall are a strong iconic architectural element reflecting the building's function. The use of dark timber

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<sup>71</sup> Sapper: a soldier who performs a variety of military engineering duties such as bridge-building, laying or clearing minefields, demolitions, field defences and general construction, as well as road and airfield construction and repair



panelling internally and large areas of glazing on the South elevation are reflective of design trends of the period. The stramit board ceiling in the chapel would be an early application of this new ceiling system in the late 1960s.

#### **7.2.2.2 CUST Hut (Circa 1948)**

The CUST Hut is the oldest surviving building in the SME site. It is a rare example of a Cullen Unified Steel Truss building still in use and more so in military ownership in New South Wales. The building has historic significance to the SME site and technical significance of an increasingly rare construction system for clear span vaulted warehouses.

There is another example of a CUST hut at Fletcher's Auctions on Moorebank Avenue just north of the M5 freeway. There are understood to be two CUST huts in Defence ownership and use in Queensland (RAE Museum staff advice).

#### **7.2.2.3 Transport Compound Workshop – Building 99 (Circa 1940s)**

The Transport Compound Workshop (B99) is a large workshop that was constructed prior to 1943. It is the only remaining *in situ* structure built on site during the WWII period.

The Transport Compound Workshop contributes to the historical significance of The Moorebank Cultural Landscape, however it is not of itself historically important. The workshop structure is not an unusual, rare or endangered building type. Similar structures exist across Australia and similar buildings are listed on the CHL at Amberley RAAF Base Group, Archerfield Airport Heritage Precinct, RAAF Base Fairbairn Group, RAAF Base Richmond and the former Salisbury Explosives Factory. Nevertheless, B99 is locally rare, within the context of the Moorebank Cultural Landscape, as a WWII era building that remains *in situ*.

#### **7.2.2.4 Bicentenary Building**

The building is the only one of its design and build. It was apparently a prototype to be used for a Chapel at Puckapunyal, (RAE Museum brochure).

The building has some local significance to the SME as follows:

- It was designed by former Sappers Capt L.E.A. Orton and Major S.M.E. Evans in 1980.
- It was the last building on site to be completely constructed by Sappers.
- It has been used for opening and closing addresses of training courses and so has association with key events in a Sapper's training.

The building has some technical merit in the use of a space frame roof structure, which was innovative at the time of its construction although there is no outstanding aesthetic quality to the building.

#### **7.2.2.5 RAAF STRARCH Hangar (erected SME 2009–10)**

This building is a unique example of a RAAF STRARCH re-deployable hangar. SME management believes the Hangar may be the only example of this design still in Defence ownership in Australia (identified in staff interviews on SME site during field surveys, 2010). This statement has not been confirmed in research for this report. It should be noted that examples of this type of design and construction occur elsewhere in Australia outside of Defence ownership for example Drage's AirWorld at Wodonga VIC and at Avalon Airport, Melbourne, VIC. The construction system is unique and was developed to provide prefabricated quick erection Hangars to house F111 fighters. The system has since been developed for non-Defence commercial use and the company now operates as STRARCH Australia. This building, being still owned by Defence, consequently retains an historic connection to its original design use, to house the F111 Squadron when they first arrived in Australia.





#### **7.2.2.6 Afghanistan Training Area**

This compound within the SME site is a model of a compound perimeter walling system and other examples of structures presently being used in the Australian deployment in Afghanistan. The compound is used to train Sappers in construction techniques they will encounter if they are deployed to Afghanistan. The wall of the compound was apparently designed by British defence forces.

A similar training compound was constructed for use during the Vietnam War but has since been demolished.

The current compound has some associational significance with the SME in its training role for Sappers deployed to the war in Afghanistan. SME management has indicated that it is likely that this facility may be relocated to the new SME facilities at Holsworthy if the conflict is ongoing at the time. Relocation of the facility to a new SME base would not impact on the degree of significance of this facility.

#### **7.2.3 Memorials and collections**

This section analyses the significance of the various memorials and the RAE Museum Collection located on the Project area. With the exception of the museum collection most of these items are fixed to the ground and any management strategy for conservation would both involve deconstruction and relocation components.

##### **7.2.3.1 Burma-Thai Memorial (1968)**

This Memorial has a high level of associational significance to the RAE for its commemoration of the suffering and loss of lives of Sappers who as prisoners of war worked on the notorious Burma-Thai railway.

The Memorial has historic significance as it contains fabric salvaged from the Thai-Burma railway .

The Memorial has a physical association with the Chapel through being situated in the Chapel courtyard. However, its intrinsic significance is the fabric of construction of the cross and stone, and the historic Association with the actual Thai-Burma Railway.

##### **7.2.3.2 Services Dogs Memorial**

The Memorial has local social significance to the SME and specifically Explosive Ordinance Dog Training Section where the dogs were trained.

Whilst the Memorial commemorates the first explosive ordinance dogs killed in active service, it has low level historic significance. The Memorial does not contain the remains of any dogs.

##### **7.2.3.3 RAE Memorial (1954)**

This Memorial has a high level of social significance to the SME (training school) due to:

- The design and construction being by staff of SME and members of 7 Independent Field Squadron. The walls of the fountain were the last Project undertaken by stonemasons trained at SME.
- Its commemoration of the fallen Sappers of all conflicts.
- It is the site of the Corps Anzac Day Commemorations and Armistice Day service.
- The Memorial incorporates the time capsule installed in 2002.
- The Memorial incorporates the Corps Declarations Stone which moves with the Corps to any new permanent home.



The Memorial has a moderate level of historic significance as it was constructed at the time of the first major redevelopment of the SME (1950s).

The Memorial has a simple and dignified design but it does not have outstanding design or aesthetic qualities.

The RAE Memorial has landmark qualities within the SME due to its location on the main entry road and in the centre of the intersection of the principal roads in the SME site.

#### **7.2.3.4 Clive Steele Memorial Gates (1958)**

The Memorial has a strong visual presence on Moorebank Avenue and defines the formal entry to the Steele Barracks. The design is symmetrical, dignified and contains clear reference to Major-General Steele KBE, DSO, MC, VD in the use of trusses of the design he developed.

The Memorial has local associational significance to the SME for its commemoration of Major-General Sir Clive Steele after whom the Barracks are named. He was responsible for the expansion of the SME at Liverpool in the 1940s from his position of Engineer-in-Chief at Land Headquarters in Melbourne.

The Memorial is a competent singular design but does not possess any outstanding aesthetic qualities.

The Memorial has historic association with the major redevelopment of the site in the late 1950s. The Memorial was constructed in 1958 at the time the SME took on the name of Steele Barracks.

#### **7.2.3.5 Commanding Officers (COs) Walk**

This Memorial is a relatively recent addition to the site. It has a low level of association with each of the first ten COs of the SME through their having planted one of the trees in this area. However, there are no plaques acknowledging which CO planted which trees.

The Memorial is a simple reflection of the path taken by the COs from 1956 to 1992 between the old Headquarters Building (now RAE Museum) and the Officer's Mess.

#### **7.2.3.6 Vietnam Memorial (2004)**

The Memorial has a high level of historic and associational significance to the members of the 1 Field Squadron who built the first Memorial in Vietnam and established the Memorial at Holsworthy in 1989, and the committee of Sapper Vietnam Veterans responsible for its relocation to the SME.

The site has social significance to Vietnam veterans as it is the location the Vietnam Veterans Day commemoration service. The social significance of the place is also demonstrated by the many groups and individuals represented in the pavers.

The Memorial has a degree of historic association with the Vietnam War through its Commemorative function and commemoration stone which was quarried at Nui Dat, Vietnam where 1 Field Squadron had its headquarters.

#### **7.2.3.7 RAE Museum and Australian Army Museum of Military Engineering Collections**

The Collection as a whole is a unique record of the activities and development of the SME, RAE and Field Survey Unit. The Collection includes many unique items of machinery, equipment, apparel and documentation.

The Collection has a high level of significance on historic, social and scientific levels and contains rare examples of some equipment and machinery.

The Collection has some local social significance as it is periodically open to the public. Also items from the collection are occasionally displayed at public functions in the region.



Part of the Collection is located in the open display Heritage Park and other related hangars. Items in the open display include the Australian Panel Bridge, Bailey Bridge, Heavy Girder Bridge and Steele Bridge.

The remaining Collection (restored) is housed in the RAE Museum building, Australian Army Museum Building and CUST Hut. The yet to be restored items are located in storage sheds in yards in the North of the SME site (S31, S184, S151, S193 and S134).

The RAE Corps Museum was formally a 1950s administration building. The sandstone wall which forms part of the south-east corner of the building is constructed from stone derived from an old WWI Prisoner of War built Railway Bridge. The bridge formed part of the railway line servicing the Liverpool Army Complex and the POW camp. The stone was later recovered and erected at its current location in 1972.

The relocation of the Collection will be part of the MUR program (see Sections 10).

## **7.3 The people**

The project area is associated with a number of historically significant individuals.

### **7.3.1 Lord Kitchener**

Lord Kitchener stayed in a house on Moorebank Avenue in January 1910 whilst reviewing troop manoeuvres. The outcome of Kitchener's visit was a report which led indirectly to the formation of permanent military training areas throughout Australia. The house is not within the Project or study area and is now known as Kitchener House and privately owned. This site is not included in the assessment of significance of the Project area.

### **7.3.2 Major-General Sir Clive Steele**

Whilst it does not appear that Major-General Steele was present or served at SME Moorebank at any time, the barracks took his name following the major redevelopment in the 1950s. Major-General Steele served in the World War I and II and was decorated several times in his distinguished career. He was instrumental in the expansion of the Royal Australian Engineers in preparation for the war against Japan.

## **7.4 Social and intangible values**

The Project area includes a range of features, places and associations which have cultural values not necessarily resident in the physical fabric of any site or place. These can be discussed under the categories of social value and intangible cultural heritage (refer Section 3.7).

The following provides an outline of these values and how they relate to the Project area. Figure 7.1 presents the approximate location of associated with these values.

### **7.4.1 School of Military Engineering**

The history of the SME extends continuously from the commencement of World War II and has always been associated with the Moorebank site. The identity of the school, its history, traditions and practice are therefore intimately related to the SMEs location and its current fabric. For all current and former staff, trainees, graduates, and their descendants, there is likely to be a range of emotions, values and perceptions which amount to a strong corpus of social value for the School, its function, historical role and legacy.

The location of the site is a developmental consequence of the establishment of the Liverpool Military Camp which extended into the Project area during the First World War. As such, the SME site can also be seen as a historical continuation of this earlier establishment.

The intellectual property and the skills developed and taught by the SME amount to an intangible cultural heritage which contributed a vital component to Australia's military capability and engagement





from the Second World War onwards. This remains an on-going heritage, manifest in the conduct of its charter and associated rites and traditions. Much of this heritage could be expected to continue as a consequence of the continuation of the SME, wherever it is physically situated.

#### **7.4.2 Commemorative and memorial features and places**

There are a large number of memorial features and commemorative places across the SME which act as a focus for the recognition and celebration of its history, identity and function. These generate significant social value through the education and recognition they promote, and their ceremonial function across internal and external audiences. The memorials and commemorative places include the:

- RAE Memorial and Fountain;
- RAE Museum and Former Headquarters (S04);
- RAE Chapel, associated Memorials (S03) and CO's Walk;
- RAE Vietnam War memorial;
- Service Dogs memorial; and
- Clive Steele memorial gates.

In addition to these SME examples, the Commemorative garden (MH6) situated within Precinct three (Defence Support Group) commemorates individuals and actions associated with the Defence administration and maintenance of the Moorebank defence lands. The garden features a number of Gallipoli 'Lone Pine' derived plantings.

#### **7.4.3 Residential and social places**

The presence of various residential communities in close relationship to the functions of the Moorebank defence lands can be expected to have generated a strong corpus of social value through shared memory and tradition. The history of Moorebank is characterised by multiple phases of construction and demolition of accommodation and residential barracks, each separated according to appropriate divisions of rank and marital status. A majority of these developments across the history of Defence ownership have now been demolished. Notable examples which would remain within living memory of their residents are:

- Moorebank Village, dating from the 1950s and which was situated north of Bapaume Road;
- Chatham Village, also dating from the 1950s, which was situated in the region of Kirklands Crescent, in the middle portion of the Project area, and
- The dormitory buildings, dating from the 1960s and 1990s, recently demolished in the northern half of the Project area.

Associated with both the residential and day worker communities were the Mess Buildings and Clubs. These places were a focus for both ceremonial and social activities are a contributory element of the social value of the Project area. Places in this category include:

- The Officers Mess (S108);
- The former Sergeant's Mess (B21);
- The Peeler Club (S69); and
- The former Officer's Mess in the recently demolished WWII building (B41).



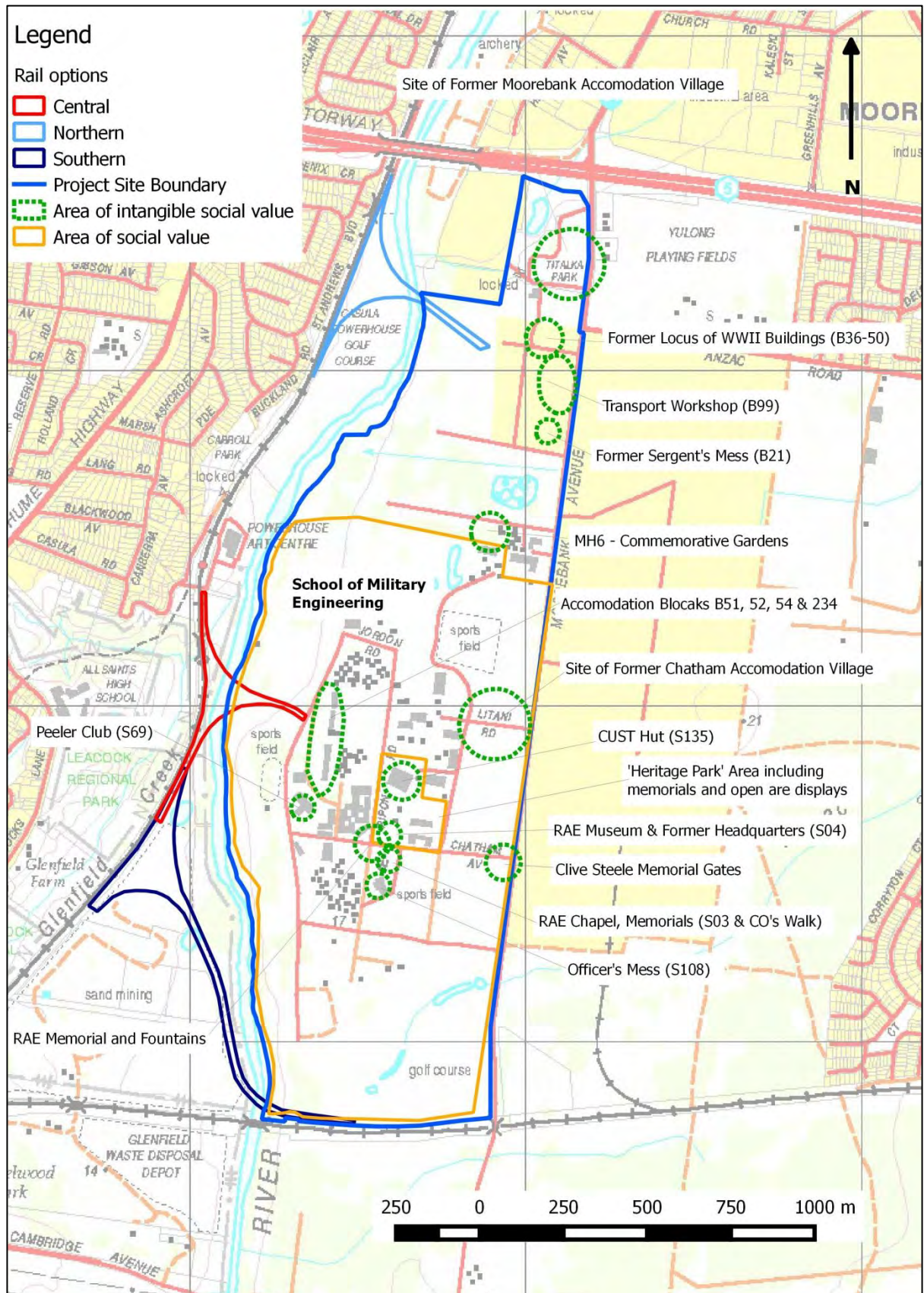
#### 7.4.4 WWII Features and remnant 1950s buildings

Despite the absence of any formal commemorative role or interpretation, the remaining *in situ* WWII features and structures across the Project area, provide a degree of historical structure to the later developmental arrangement of the Defence facilities. This is an important physical reference for the social and intangible values of the Project area which are seated on a continuous tradition extending from the Second World War. These features include:

- the Transport Compound Workshop (B99);
- the CUST Hut (established on its present site probably prior to 1948, or around 1952, refer Section 4.2.7) (S135); and
- the remnant road alignments, including the cross street alignments of Ripon Road and Chatham Avenue

In a similar mode, the remaining buildings from the 1950s provide a yardstick of relative time depth, particularly in the relative absence of WWII infrastructure. These include :

- The RAE Museum (and former Headquarters Building) (S04)
- The Officer's Mess (S108);
- The Peeler Club (S69); and
- Accommodation buildings (B51, B52, B54 and B234).







## 7.5 Comparative analysis

This section analyses aspects of the Project area which have been identified as significant on a broader base by comparing them to other similar facilities.

### 7.5.1 Timber 1940s era buildings

The following information is taken from 2004 Heritage Assessment of the Moorebank site (GB&A 2004:64-66, presented below in italics). This report is a comprehensive description of this building type and is presented as background for the current study.

One point which does need to be clarified is that the Sidney Williams Hut (referred to in the quote below) was also produced in Queensland and distributed extensively throughout Northern Australia during World War II. These buildings were steel angle frames with a wide eave along the long axis (to cope with torrential rainfall).

They were almost exclusively clad in corrugated iron on walls and roof. Many of the buildings remain unlined.

*The timber hut buildings within the School of Military Engineering precinct would appear to be typical of the 'P1' style of timber hut building constructed during World War II (Department of Architecture 1995, pp18-27). These buildings were also commonly known as the Sidney Williams type, and were typically supported on brick piers, with timber framed walls, floor and gabled roof structure. The walls were typically clad externally with corrugated iron, or weatherboards to full or half height with asbestos sheeting above. The roof trusses of the earliest buildings were simple tie beams. Later buildings were constructed with king post trusses or portal frames. Roofs were typically clad with either corrugated iron or asbestos.*

*The standard hut varied considerably as the war progressed, and was adapted for a number of other uses, such as guard houses, laundries, messes, headquarters and Q stores. The original design was 4.9 metres wide however increased to 5.5 and 6.1 metres as the war progressed. Though the simple gable roof shape remained, verandahs were also added, eaves extended to shade the walls from the sun in northern areas.*

*Hut buildings within the BASC/School of Military Engineering precinct, which appear to date from World War II, include buildings B36-B39, B44-B50 and B52-B56, and buildings B41 and B33 within BASC, buildings B7-9 within the Defence Corporate Support Centre, and Building B128 within the EOD Training Ground. Each of these buildings is typically supported on brick piers, with gabled roofs of corrugated asbestos sheeting, weatherboard clad walls and timber framed awning windows.*

*The number of timber hut buildings constructed during World War II would appear to be great. A 1995 study of such buildings reports that between May 1943 and August 1944 17,000 huts were constructed, but that less than 500 hut buildings remain within military use at present (Department of Architecture 1995, p22). (Ed note - this number may have reduced since 1995 due to redevelopments and use changes). Similar hut buildings can be found in Victoria, Queensland, Tasmania and Western Australia, and at Ingleburn, Dubbo and Marrangaroo in NSW.*

### 7.5.2 CUST Hut

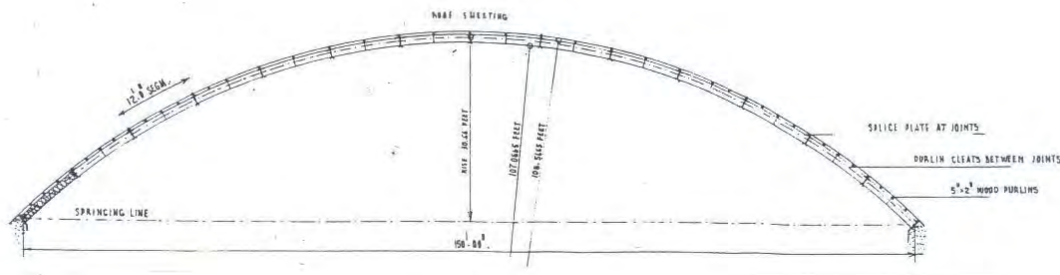
The following comparative analysis is taken from the 2004 Heritage Assessment by Graham Brookes and Associates. An example of a CUST hut in private ownership exists on Moorebank Avenue (Fletcher's Auctions) and has been sighted from street frontage in the preparation of the current study.

*The CUST hut is a 'Clearspan' arched building, generally 204 x150 feet in area, which is constructed of a series of 12 foot long arched segments, connected together by splice plates, and at either end by pin joints to concrete abutments end (refer Figure 7.2 for cross-section of a 'Clearspan').*



The CUST hut located within the SME at Moorebank would appear to be the only one of its kind still in Defence ownership in NSW. Historic photographs show a similar arched building at the former Penrith Engineer Stores Depot, however this building was demolished in the early 1990s. A similar arched building may have also been located at Ingleburn Defence site (Former Engineering Workshop), demolished in the late 1990s.

It is difficult to determine whether there are other such buildings remaining in private ownership and occupation in Sydney. There appears to be two 'Clearspan' arched structures located at the Heffron Park sports complex at Randwick, originally constructed as Naval Stores, and later used as the Bunnerong Migrant Hostel. These buildings have not been inspected, and are in private ownership and use.



**Figure 7.2** A cross section through a 'Clearspan' prefabricated arched building

(Specification and drawing types of prefabricated buildings and houses, Department of Works Melbourne)

### 7.5.3 STRARCH Hanger

The STRARCH hangar was erected in about 2007 to house the large items of the Museum collection. As outlined above SME management believes the Hangar may be the only example of this design still in Defence ownership in Australia. Indicative research did not find any other examples in Defence ownership however it is not clear if this is the case. The hangers were designed to be easily assembled but hard to disassemble meaning they may have been erected in other locations but no records kept.

This type of design and construction occur elsewhere in Australia outside of Defence ownership for example Drage's AirWorld at Wodonga VIC and at Avalon Airport, Melbourne, VIC.

Any further information on the hanger itself or others like it has not been able to be found for this assessment.

### 7.5.4 Transport Compound Workshop (B99)

The workshop structure at Building 99 is a steel framed, saw tooth roofed workshop. It was constructed during WWII, a period of significant expansion at Moorebank. The building was later reclad with Colourbond steel sheeting in the 1990s.

Store houses and workshops were erected during WWII along the eastern seaboard, but were concentrated in the southeast (GB&A 2004:74). Similar structures include Hangar 76 at Amberley RAAF Base, Queensland, which has a welded steel frame supporting a saw tooth roof characteristic of late 1930s and early 1940s utilitarian and workshop structures erected by the Commonwealth. Buildings 46-48 at RAAF Base Fairbairn, ACT are also saw tooth roofed hangars with steel framed central spaces and roof trusses in the prevailing Inter War Art Deco and Functionalist style employed by the Commonwealth.



Within a comparative context, particularly in terms of Commonwealth owned places, the Transport Compound Workshop (B99) is one of many similar extant structure from the WWII period. However, unlike many similar structures that are listed on the CHL, Building 99 has lost most of its original context.

#### **7.5.5 RAE Museum and Australian Army Museum of Military Engineering Collections**

There are numerous military collections throughout Australia maintained by the respective Services. Many bases or regiments maintain collections, typically associated with the history and development of the base or regiment.

The RAE Museum Collection is considered to be of exceptional historic, scientific and social significance due to:

- its focus as a record of the history of the SME and RAE
- items in the collection are unique to the RAE.

It contains a record of the development of military engineering and mechanical practices and equipment over a period of 60 years. Some of the acquisitions have only been possible due to the Museum's location at Steele Barracks.

### **7.6 Cultural landscape**

A description of the cultural landscape values present within Project area is provided in Section 5.5. It was concluded that the landscape of the Project area incorporates both Aboriginal and European cultural landscape values. The Aboriginal values reside within the Georges River, its immediate geomorphological context, archaeological traces, and the remnant fringing native vegetation. These components combine to form a landscape with high cultural associations and referential social value.

The European values reside in the post second world war fabric, arrangement and continuing function of the School of Military Engineering. Steele Barracks is unique as the only home of the SME since the 1940s. It is the primary location for trade training for RAE Members. The explosive ordnance training at the SME and related Holsworthy ranges is unique in Australia (comments from SME staff).

The landscape of the School reflects the evolutionary growth of a Defence training facility and its related infrastructure across the second half of the twentieth century. The design of the SME has evolved over three phases of development and so today represents a conglomeration of planning ideas. The BASC area shows elements of 1940s military establishment construction techniques and planning but from base design perspective is an incomplete record of low integrity.

The arrangement and distribution of different functional areas describes the competing paradigms of forward planning and opportunistic adaptive reuse.

As such this is a cultural landscape which falls under the category of an evolved and continuing landscape, with the rider that its fabric post-dates the Second World War and the way of life represented is contemporary rather than traditional.





## 8. EXCAVATION RESULTS AND ANALYSIS

The following section describes the results of the archaeological subsurface testing program and details the analysis of the excavation results and responses to the research questions.

See Figure 8.1 for the location of all transects.

### 8.1 Summary

The following excavations were undertaken:

- test excavations were conducted at MHPAD1, MHPAD2 and MHPAD3;
- nine mechanical excavation transects and six by-hand excavation squares were opened up at MHPAD1;
- three by-hand excavation trenches were excavated at MHPAD2; and
- one mechanical excavation transect and two by-hand excavation squares were opened up at MHPAD1.

The results of the archaeological testing program are:

- archaeological evidence across the three sites comprised *in situ* building remains and features as well as associated artefact deposits; and
- evidence of early and/or mid-twentieth century military occupation was found at all three sites.

The artefact assemblage from Moorebank consisted of 1842 artefacts with a total weight of 29,314.2 grams (Table 8.1). The vast majority of this assemblage came from MHPAD1 (1269 pieces; 23,265.1 g), 457 artefacts (5,543.2 g) were recovered from MHPAD 2, and 116 artefacts (505.9 g) were recovered from MHPAD3. Glass and metal were the most common materials represented at each site, although substantial amounts of building materials (forming the majority of the miscellaneous items) were also recovered.

**Table 8.1** Summary of Moorebank assemblage by site, frequency and weight

Material	MHPAD1		MHPAD2		MHPAD3	
	Frequency	Weight (g)	Frequency	Weight (g)	Frequency	Weight (g)
Ceramics	45	1314.6	68	1743.4	3	49.7
Glass	637	2816.5	203	493.3	44	74.2
Metal	443	9252.6	116	949.5	53	346.6
Animal Bone	22	111.4	5	1.2	3	4.1
Miscellaneous	122	6795.9	65	1492.7	13	10.6
Samples	-	2974.1	-	863.1	-	20.7
<b>Total</b>	<b>1269</b>	<b>23265.1</b>	<b>457</b>	<b>5543.2</b>	<b>116</b>	<b>505.9</b>

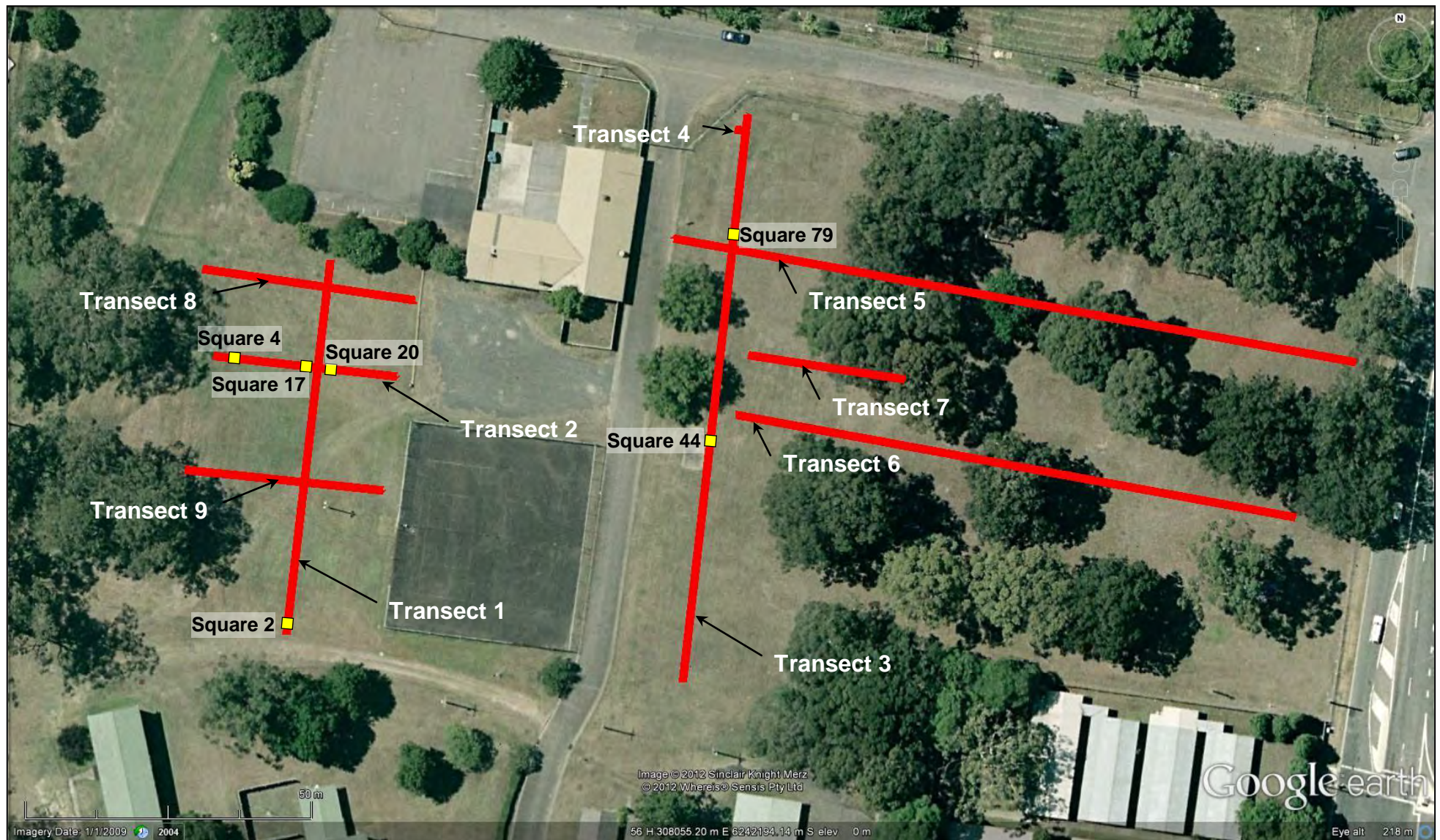


Figure 8.1 Overall plan of excavation transects and by-hand pits at MHPAD1 (Google Earth Pro 2012)





## 8.2 Excavation areas

The following describes the excavation sequence for each area investigated during the archaeological testing program.

Context catalogues and Harris Matrices for each excavation area are provided at Appendix 2, these include additional details of features investigated within each transect and hadn excavation square.

### 8.2.1 MHPAD1

Transects 1, 3, 8 and 9 aimed at investigating the potential area of the Military Isolation Camp and transects 3, 4, 5, 6 and 7 aimed at testing the location of the WWII P1 Huts and associated infrastructure and the landscape of soldier accommodation.

#### **Transect 1: 66 m long on an alignment of 7°**

Excavation at Transect 1 was undertaken as three cuts, although excavation of the final cut was conducted in two parts due to delays associated with the discovery of potential unexploded ordnance within Cut 2.

One by-hand excavation square was opened up at the southern end of Transect 1 (Excavation Square 2, Contexts 1, 2 and 3).

Cut 1 was excavated to a depth of 40-50 mm; it comprised a dark-brown to black-brown sandy loam with occasional patches of clayey orange-brown soil. The soil at the northern end of the transect tended to be a paler brown sandy loam.

Cut 2 was excavated to a depth of 90-110 mm; it exposed mottled orange and brown clayey sands with intermittent features such as a black-brown sandy loam circle at the southern end that was later excavated by hand, irregular linear clay features and orange-red clay fill at the northern end of the transect. A single electrical cable was also encountered in the middle of the transect; no further excavation took place adjacent this cable.

Cut 3 was excavated to a depth of approximately 150 mm. Initially excavation was restricted to the northern half of the transect while features at the southern end were further investigated and recorded, and unidentified metal items to the south of the electrical cable inspected to confirm that they were of no danger. Excavation of Cut 3 at the southern end was conducted following the completion of all necessary investigations relating to Cut 2 in that area. At the base of Cut 3 a yellow-grey sand, with mottling from suspected bioturbation, was exposed. A number of features including suspected post holes, evidence of service trenches and various other linear features were observed throughout the transect. Mechanical excavation was subsequently terminated in Transect 1 and detailed mapping and hand excavation commenced.

#### **Transect 2: 32 m long on an alignment of 97°**

Transect 2 was excavated perpendicular to and about half way along Transect 1, intersecting at the point where a linear feature had been observed at the base of Cut 3. It was excavated in three cuts and the soil profile was broadly similar to that described above for Transect 1. The orange clay fill observed across the northern part of Transect 1 was also found at the eastern end of Transect 2, where it overlay a series of semi-regular and clearly bounded clay features that appeared to have been formed by the tracks of a vehicle (tank, bulldozer or similar heavy vehicle).

Three by-hand excavation squares were opened up within Transect 2 (Excavation Square 4, Contexts 5 and 6; Excavation Square 17, Contexts 4, 10 and 12; and Excavation Square 20, Contexts 7 and 8). These areas of by-hand excavation corresponded to the following features:

- at the western end of the transect, a rectangular, grey-brown silty sandy feature was revealed extending into the sand at the base of Cut 3 with what appeared to be *in situ* wood associated (Figure 8.2);





- immediately to the west of the intersection with Transect 1, the regular linear boundary between mottled light brown sand and yellow brown sands with nodules extended for about 2 m as a relatively clear and regular line. By-hand excavation in this location revealed fragments of brick in association with mixed deposits of clay and sand (Figure 8.3).
- the linear feature described above extended about 1.5 m eastwards into Transect 2; there was a fragment of brick in association with this feature. By-hand excavation in this location revealed a mottled orange brown sand across the square. Fragments of brick and corroded nails were recovered.



**Figure 8.2** Piece of wood excavated within Transect 2, Square 4



**Figure 8.3** Bricks and 1919 coin revealed by excavation at Transect 2 Square 17

### **Transect 3: 98 m long on an alignment of 7°**

Transect 3 was excavated parallel with and directly adjacent a concrete platform in the eastern portion of MHPAD1; it cut through the former location of the U-shaped building in the northwest corner of Titalka Park. This transect was excavated in three cuts.

Two by-hand excavation squares were opened up within Transect 3 (Excavation Square 44, Contexts 9 and 14; and Excavation Square 78, Context 11). These two excavations corresponded to building footings adjacent the concrete platform and footings in the former location of the U-shaped building.

Cut 1 was excavated to an average depth of 50 mm revealing a fairly uniform dark-brown sandy loam with occasional artefacts. A row of bricks was revealed adjacent the concrete platform; no further mechanical excavation was conducted along this central portion of the transect.

Cut 2 was excavated to a depth of about 90-120 mm; it exposed a mottled dark brown sandy loam with patches of light brown gravelly sandy loam. Artefacts continued along the transect.

Cut 3 was excavated to a depth of 150-170 mm. Numerous artefacts were exposed along the transect. At the northern end, in the vicinity of the former location of the U-shaped building, a series of linear features were revealed that appear to potentially correspond to the positioning of building foundations. Various artefacts were collected from this area.

### **Transect 4: 2 m long on an alignment of 97°**

This short transect was excavated in two cuts in order to explore the extent of a patch of light grey gravels observed in the side of Transect 3, at the northern end. The feature was found to extend for about one metre west of Transect 3.

### **Transect 5: 122 m long on an alignment of 100°**

Transect 5 was excavated perpendicular to and across the northern portion of Transect 3.

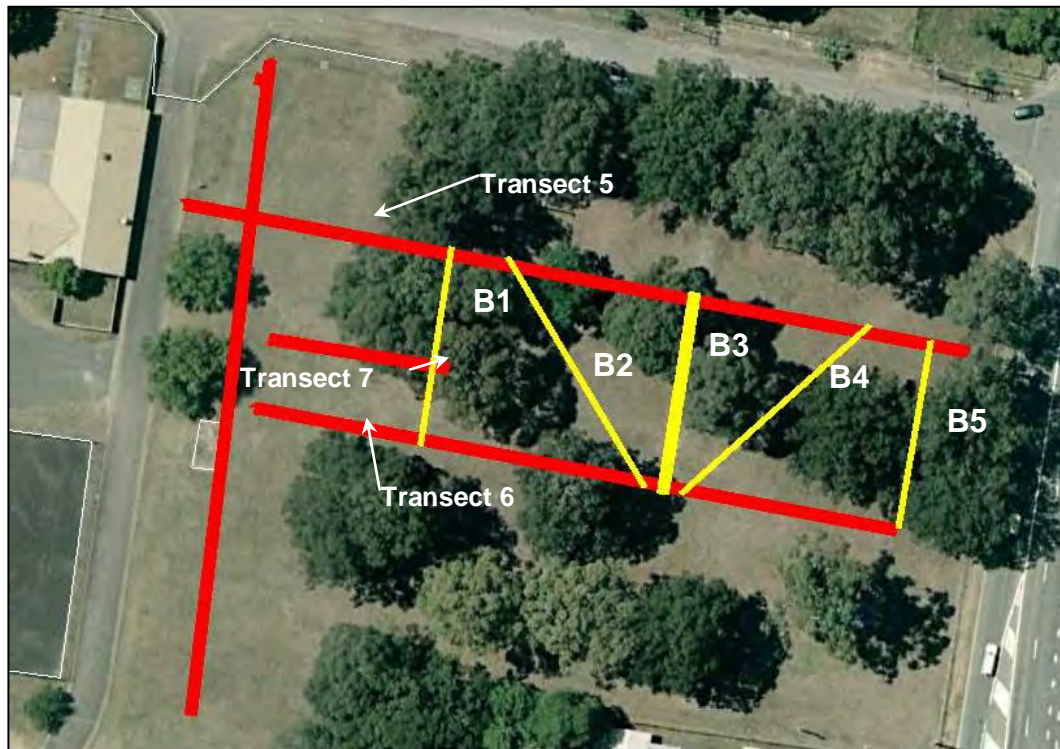




Cut1 was excavated to a depth of 50 mm; it revealed a broadly uniform brown sandy loam with a reddish tinge.

Cut 2 was excavated to an average depth of 100 mm, it exposed a series of five yellow to yellow-orange compacted gravelly bands running north-south across the trench. The bands occurred at regular intervals with the outermost bands (B1 and B5 in Figure 8.4) approximately 39 m either side of the wider central band (B3 in Figure 8.4). The intermediary bands (B2 and B4 in Figure 8.4), which were angled slightly, were located at a distance of about 27 m either side of the central band. In some cases these gravel bands were bordered by strips of dark humic loam, this was most noticeable adjacent the inside edge of the diagonal band on the eastern side.

These bands of gravel were interpreted as paths flanking and joining a central road, they extended under the former locations of the P1 buildings that once stood in this area.



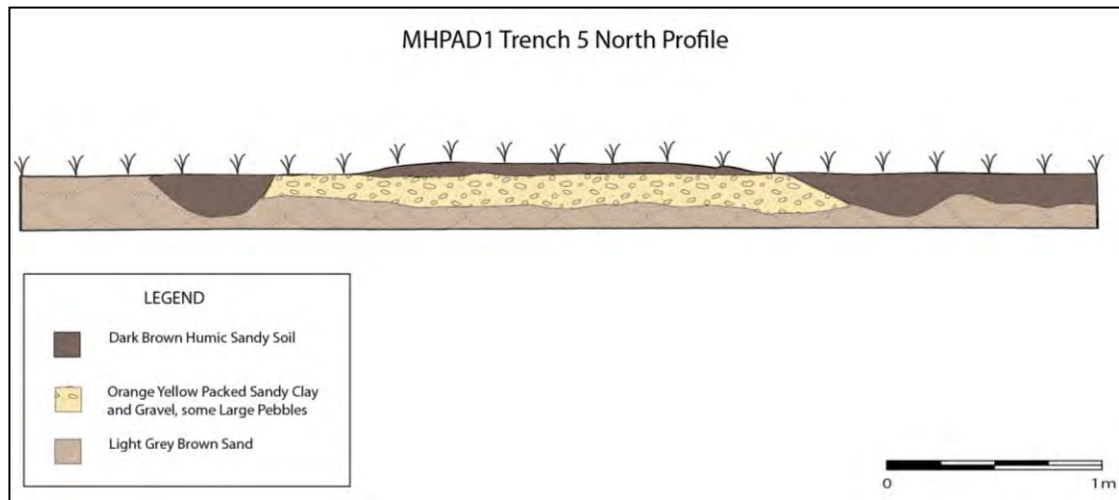
**Figure 8.4** Approximation of the location and alignment of the bands/paths observed in Transect 5, 6 and 7 (Google Earth Pro 2012).

A concentration of artefacts was also encountered between Squares 20 and 25, adjacent the footings of the U-shaped building.

Cut 3 concentrated on the central portion of the transect, extending from Square 58 through to 108 - the area between the diagonal path features (B2 and B4) and either side of the apparent road (B3). This cut exposed more of the detail around B3, revealing that this feature was flanked on each side by a 30-40 cm band of dark brown humic loam, similar to that observed adjacent B5.

Subsequent to a detailed recording and photography along the entire transect, the trench was cut down a further 20-25 cm in order to examine the profile of the road at B3. Figure 8.5 shows the northern profile that was recorded for this feature.





**Figure 8.5** Cross section of the road feature (B3) present in Transect 5

#### **Transect 6: 100 m long on an alignment of 100°**

This transect was excavated just to the east of Transect 3, parallel to and south of Transect 5. One of the primary aims of this transect was to investigate the area around the predicted meeting point of the road and two diagonal path features observed in Transect 5.

Evidence of this path intersection was found at Cut 2. Further to the east of this there was also evidence of a sand stockpiling area.

The majority of this transect was excavated down to Cut 3 (approximately 150 mm), however a deeper test trench was also excavated at the eastern end in an area where no cultural features were evidenced. The purpose of this trench was to inspect the soil profile for comparison with sediments and stratigraphy in other areas of the site.

#### **Transect 7: 28 m long on an alignment of 99°**

This transect was excavated parallel to and in between Transects 5 and 6; it was aimed at investigating evidence for a structure evidenced in the 1943 aerial photography as being present on the south-western corner of the easternmost P1 building.

Transect 7 was excavated in a single cut to a depth of approximately 50 mm. Excavation in this area revealed additional evidence for the path(s) running north-south along the western side of Titalka Park as well as a section of brick and cement flooring (Figure 8.6) in the vicinity of the structure adjacent the abovementioned P1 building. Numerous artefacts were recovered in association with the building remains.



**Figure 8.6** Brick and cement flooring uncovered at eastern end of Transect 7

#### **Transect 8: 38 m long on an alignment of 98°**

This Transect was situated across the northern third of Transect 1; it was initially excavated as two cuts to an average depth of 100 mm. The only feature revealed within this transect was a band of building rubble (brick, concrete, mortar and glass) that extended through both Cut 1 and Cut 2 at the western edge of the transect, near the edge of the terrace.

Given that the building rubble appeared to be the result of a demolition layer/fill pushed across the terrace, it was decided to cut down through the terrace in this location to examine the soil profile. A series of steps were subsequently cut in at the western end of the terrace enabling inspection of the soil profile to a depth of around 1500 mm.

This *sondage* revealed a dark brown to black silty loam at a depth in excess of 500 mm, underneath a series of marbled layers of sand and clay fill (Figure 8.7). This layer appeared to be an A horizon soil overlying B Horizon grey sands and a yellow-grey clay.

As a result of this discovery there was a need to reassess the nature of the deposits encountered across Transects 1 and 2. The *sondage* was subsequently extended a further 6 m to the east in order to follow the A horizon through the western portion of Transect 8. It was found that the A horizon continued eastwards at a depth of around 500-600 mm. Furthermore, a series of cross shaped dark silty features were found extending into the B-horizon sands below; these features appeared to be following an east-west alignment at a regular interval of about 2 m. Items of bottle glass were also recovered from within the old A-horizon soils in the trench wall.



**Figure 8.7** Northern profile of the western end of Transect 8 showing the layers of fill above an old A-Horizon soil

#### **Transect 9: 35 m long on an alignment of 96°**

This transect was excavated perpendicular to and across the southern third of Transect 1. It was initially excavated in two cuts to a total depth of 100 mm; it revealed orange-brown sands with areas of orange-red clay, similar to the soils exposed in Cuts 2 and 3 in Transects 1 and 2.

Excavation was then focused at the eastern end of this transect, where a trench was cut down through the edge of the terrace in order to investigate evidence of the former A horizon observed in Transect 8. The trench at the western end of Transect 9 again produced evidence to suggest the introduction of mixed clay and sand fill with building rubble in the upper levels of the soil profile. Traces of the remnant A horizon were also found at a depth of 50 cm, although in this instance it appeared that the soil profile had been truncated at the far western end of the trench.

#### **8.2.2 MHPAD2**

Three areas of by-hand excavation were investigated at MHPAD2 (see Figure 8.8). These comprised a 1 x 2 m trench across Squares T16 (Contexts 1, 2, 4 and 5) and T17 (Contexts 1, 6, 8, 10 and 11), a 1 x 1 m trench at Square AE19 (Contexts 1 and 3), and a 1 x 2 m trench across Squares AG8a and AH8a (Contexts 1, 7 and 9). See Appendix 2 for further details on the selection of test excavation areas.

#### **8.2.3 MHPAD3**

##### **Transect 1: 10 m long on an alignment of 97° - abutting concrete steps at eastern end**

Cut 1 consisted of breaking up and removing the asphalt capping and exposing the road base below. Excavation extended to a depth of 30-40 mm.

Cut 2 was excavated to a depth of 90-100 mm revealing hard packed road base across the whole trench. A band (800 mm wide) of paler gravels was also exposed running north-south across the middle of the trench; this corresponds to a drain that runs down the middle of the road.

Cut 3 was excavated to a depth of 150-180 mm revealing orange-brown gravelly fill at the eastern end adjacent the concrete step and a distinct band of grey-green gravelly fill over the drain in the





middle of the trench (Figure 8.9). No further excavation was conducted into the gravelly fill associated with the drain.

Cut 4 was excavated to a depth of 220-230 mm; it exposed the western edge of the lower concrete step at the eastern end, which is immediately abutted by a mixed orange-brown and grey gravelly fill. This graded to a purple-grey sand towards the centre of the trench, east of the drain. On the western side a brown-grey, less compacted sand was exposed across the remainder of the trench.

Cut 5 was excavated to a depth of 280 mm, exposing purple-grey sand across the majority of the trench. At the eastern end, the sand abutted a piece of *in situ* timber bordering yellow sand and gravel fill adjacent the concrete steps. One area of by-hand excavation was opened up in this area at the eastern end of Transect 1 (Excavation Square 10, Contexts 9 and 10).

Cut 6 was excavated to a depth of 330 mm. Within the eastern section of the trench, the purple grey sand continued between the timber and the drain. Within the western portion, the purple-grey sand graded to purple black across most areas, with a clear transition to grey sand at the far western end.

Cut 7 was excavated to a depth of 380 mm. The purple-grey sand continued in the east, while in the western half a pocket of dark brown sand with orange clay inclusions was exposed, extended into the northern wall and surrounded by yellow sand. No further excavation occurred into this feature.

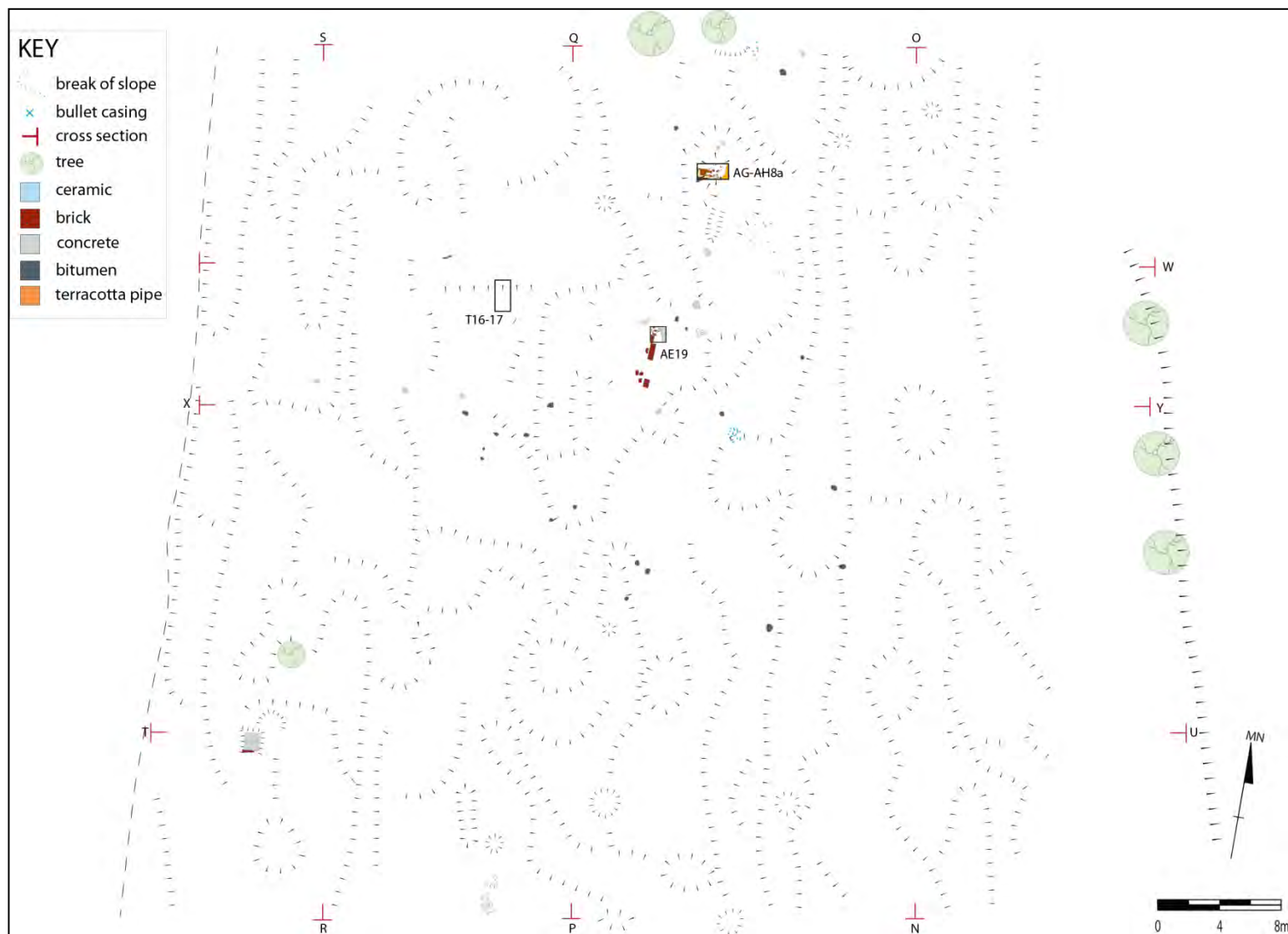
Cut 8 was excavated down to a depth of 440mm. At the eastern end only, the purple-grey sand fill was grading to a paler grey (Figure 8.9 and 8.22). At the western end, excavation continued to the west of the feature identified in Cut 7, exposing mottled yellow and grey sand.

Cut 9 was excavated to a depth of 490 mm. The purple grey sand continued at the eastern end and the mottled yellow sand continued at the western end.

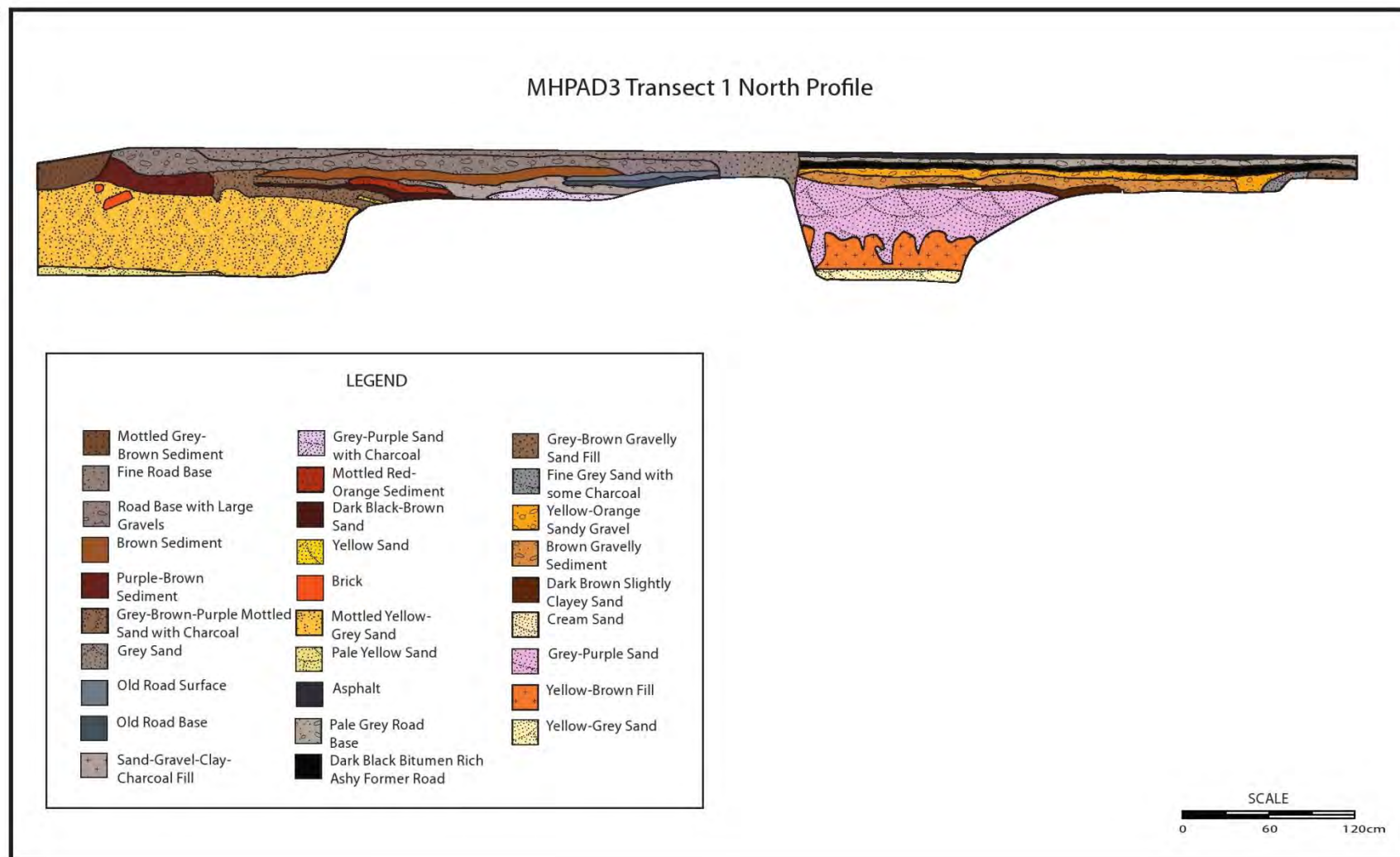
The eastern half of the trench was then cut down to a total depth of 850 mm in order to find the base of the purple-grey sand fill, which had a sharp and irregular transition to imported rock fill, overlying yellow sand.

The western half of the trench was also cut down to this depth to expose the transition from the mottled sands to paler yellow sands.

Two areas of by-hand excavation were also investigated within areas of remnant garden bed to the southeast of Transect 1 (Figure 8.10). These comprised a 1x1 m trench at Square R5 (Contexts 1, 2, 3, 5, 7 and 8) and Square AA8 (Contexts 1, 2, 3, 4, and 6).

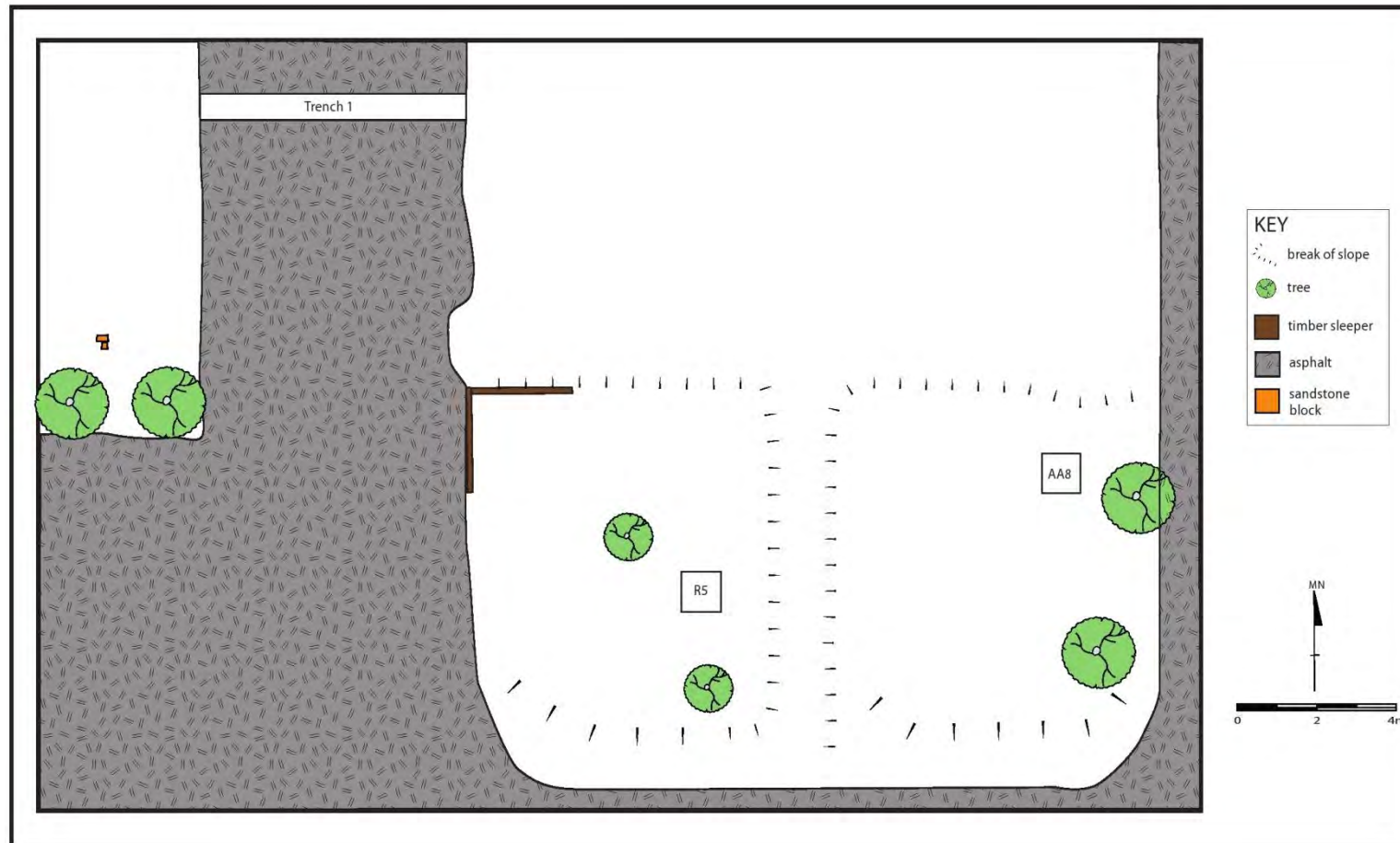


**Figure 8.8** Overall plan of surface features and excavation areas at MHPAD2



**Figure 8.9 MHPAD3 Transect 1 North Profile**





**Figure 8.10** Overall plan of excavation areas at MHPAD3



This section details the analysis of the excavation results and responses to the research questions.

### 8.3 MHPAD1 Analysis

This site is thought to have originally been the location of the WWI isolation camp, which may have consisted of tents, and WWII period structures including P1 type buildings and married quarters.

#### 8.3.1 Archaeological features

The excavations at MHPAD1 revealed a variety of features across the site that appear to relate to buildings, paths and landscaping. These include features that relate to the WWII period as well as features that clearly predate this phase of site use.

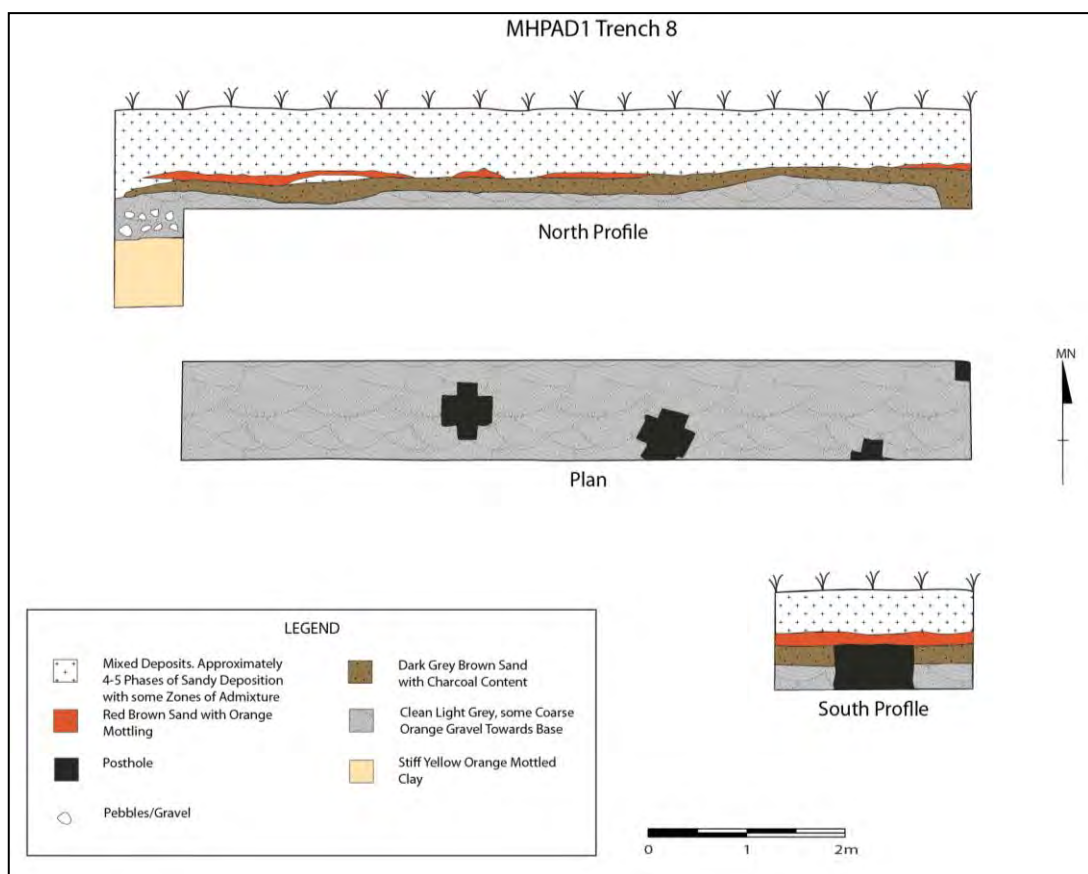
Across the western portion of the site, Transects 1, 2, 8 and 9 indicated evidence of significant earthworks to build up the terrace on which the existing house and old tennis courts were built.

The evidence for this change in the land surface was most clearly evidenced in the soil profiles at the western end of Transect 8 (Figures 8.11 and 8.12), however the remnant topsoil layer evidenced by a very dark brown sand with charcoal staining was also observed in some portions of the soil profile in Transect 9.

On the basis of evidence from these two trenches it appears that over 50 cm of mixed clay and sand fill has been pushed over from the eastern side of the site. Within this fill there are various early to mid-twentieth century artefacts including coins, bricks, bottles, fibro-cement and window glass, which suggests that the levelling of this area may have been associated with the removal or demolition of structures. Moreover, the 1943 aerial photography for this area suggest that this event postdates the photograph; the artificially formed straight edge of the terrace, which is visible in more recent aerial imagery, does not appear to be present in the 1943 image. It is thus possible that the fill and building materials that constitute the upper 40-60 cm of the existing soil profile of this terrace relate to the demolition of the WWII period structures that existed further to the east.

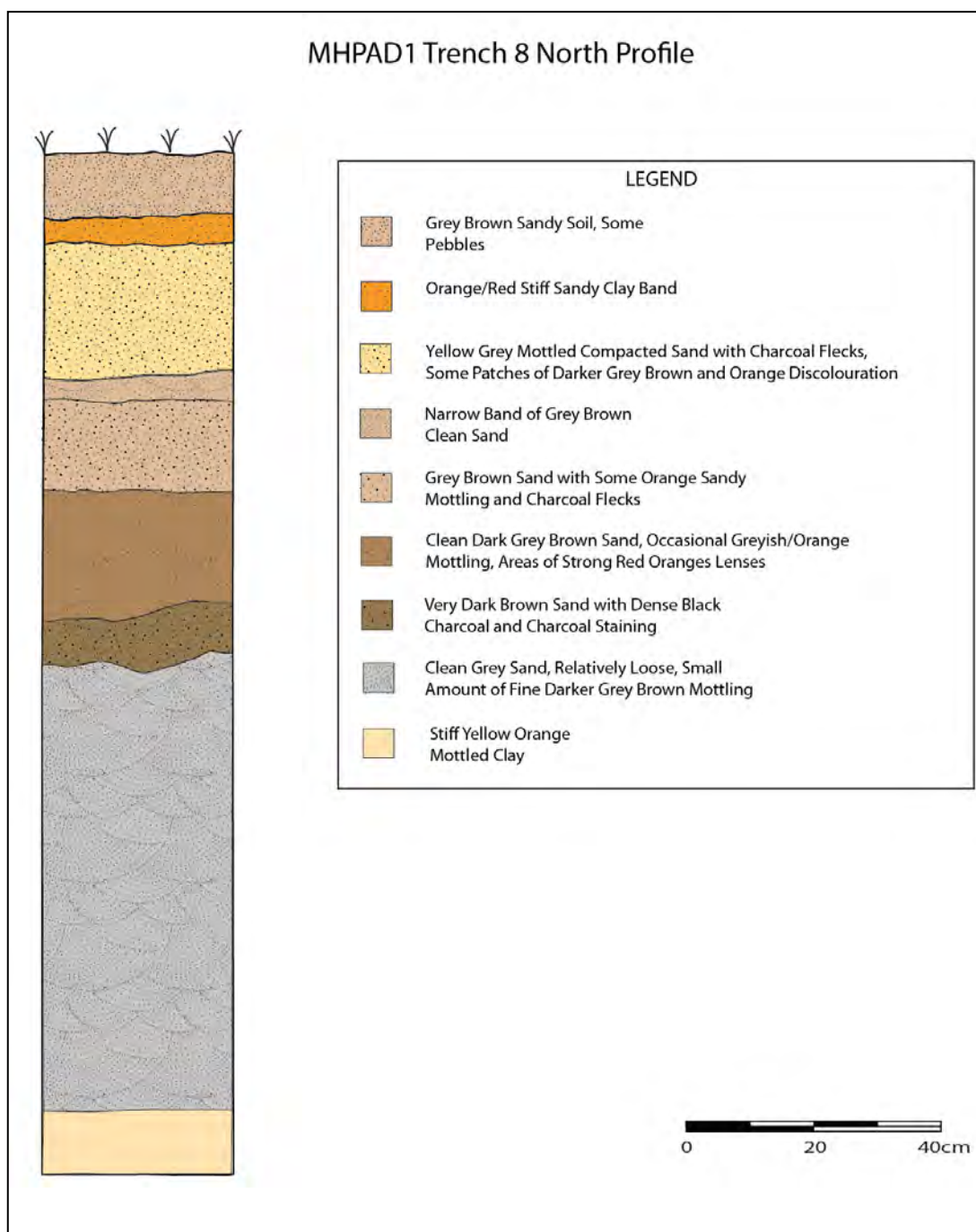
The other implication is that the series of cross-shaped features that cut through the previous topsoil layer into the sand below date to either WWII or before. At this stage it is unclear what these features relate to, however the absence of any associated post holes around them suggests they may be the result of something that was driven into the ground. It is possible that they are the result of structures erected as part of training exercises during the first half of the twentieth century.

Across the eastern portion of MHPAD1, Transects 5, 6 and 7 revealed evidence of a linear network of paths and a road that appear to predate the WWII structures. They include a 3 m wide packed gravel road extending north-south, and various narrower paths (approximately 1.5 m wide) running both parallel with and diagonally flanking the road. The two diagonal paths extend from Transect 6 in the north, southwest and southeast to intersect with the road in the vicinity of Transect 5 (Figure 8.4). Traces of the easternmost path also appear to be evident in the 1943 aerial photography (Figure 8.13). Given that these features are generally not evident in 1943, it is possible that they fell into disuse some years prior; they may relate to activities during WWI or the interwar period.



**Figure 8.11** Section and plan from western end of Transect 8, showing relationship between current ground surface, old ground surface and a series of cross shaped features.





**Figure 8.12** Full profile of deposits at western end of Transect 8.



**Figure 8.13** 1943 aerial image of structure at MHPAD1, arrow indicates presence of a feature that appears to relate to the pathway evidenced within Transect 5 and 6  
(Six Viewer [www.six.nsw.gov.au](http://www.six.nsw.gov.au))

### 8.3.2 Structural evidence

The majority of the assemblage from this site was of a structural nature. It included machine made bricks, but generally the evidence was indicative of timber and fibro-cement structures as evidenced by fragments of asbestos sheeting, nails, bolts, and roofing screws. The bricks at MHPAD1 were mostly found in association with building footings (e.g. in Transect 3 adjacent the cement platform and as part of a brick and cement platform in Transect 7).

The exterior of some or all of these structures appears to have been painted a green colour, as evidenced by painted fragments of window glass and wood. Window glass recovered from across the site suggests that both rippled glass and standard windows were present, the rippled glass presumably relating to bathrooms.

Evidence for floor coverings included fragments of red linoleum and white tiles, the latter possibly relating also to internal walls. Other building fittings evidenced at MHPAD1 include stoneware/terracotta drainage pipes, porcelain electricity transformers, a stone/marble sink, iron hinges, an iron dial/switch, iron gas/water pipes, electrical insulated wire, and an iron drawer handle.

In terms of site chronology, the structural evidence is broadly indicative of the early to mid-twentieth century. The wire jolt head nails used in some of the construction indicate a date from the 1940s onwards (Varman, 1986:260).

### 8.3.3 Domestic evidence

This site contained a large amount of domestic related material culture. This included tableware items such as ceramic plates, saucers, glass tumblers, and teacups, as well as bottles, jars, and vials (Figure 8.14). Other household and personal items present included mirrors, glass lamp shades, coins (Figure 8.16), carbon batteries, an aluminium toothpaste tube (Figure 8.15), a plastic bike pedal, two pieces of possible plastic jewellery and a glass swirl marble. A small amount of bone was also recovered, the majority of which appeared to belong to large mammals such as sheep. While none of these



fragments displayed definitive butchery marks it is possible that they represent meal remains from the domestic occupation of this site.

Overall the artefacts are indicative of a fairly typical domestic assemblage including a few potential hints for the presence of women and children (e.g. the plastic jewellery and the glass marble). This is of particular interest because it supports the idea that MHPAD1 corresponds in part to WWII married quarters.

By-hand excavation within Transect 3, Square 44, Context 9 resulted in recovery of a possible human tooth. This find was examined by Dr Denise Donlon a Forensic Anthropologist who identified the item as a porcelain crown which would have been used as part of a denture ([Appendix 6](#)). It featured a diatoric chamber or hollow section in its base along with two holes on its sides. This hollow and holes allowed acrylic to flow in and set securing the crown in place. This form of dental technology is no longer used, but was common in the early twentieth century. In conclusion, this crown would have been worn as part of a denture by an adult and is possibly a copy of a second permanent maxillary molar.

While it is unclear how the dental crown entered the archaeological record, its age and association with building footings thought to date to the 1940s suggests it may have belonged to a soldier housed in this area during or sometime shortly after WWII.



**Figures 8.14 and 8.15** Ingram's Shaving Cream Jar (Catalogue #2184) and glass vial (Catalogue #2123) - left, and aluminium toothpaste tube (Catalogue #3190) – right.



**Figure 8.16** Australian Copper Coin 1919 (Catalogue #3193) and Australian One Shilling 1934 (3000)





### 8.3.4 Military evidence

While the majority of the evidence at MHPAD1 is broadly similar to any other domestic site from the early to mid-twentieth century, evidence was also found for the military nature of the occupation. The military evidence comprised bullet casings and the barrel group of a machine gun.

Three bullet casings were found within the upper contexts. All three were the same type: 5.56x45 mm Australian Defence Industries (ADI) blank rounds (Figure 8.17) used for training purposes (Pearson, D 2012, Pers. Comm., 20 Aug). This ammunition is used by the Steyr assault rifle used by the Australian Defence Force since 1989 (Anon 2008).



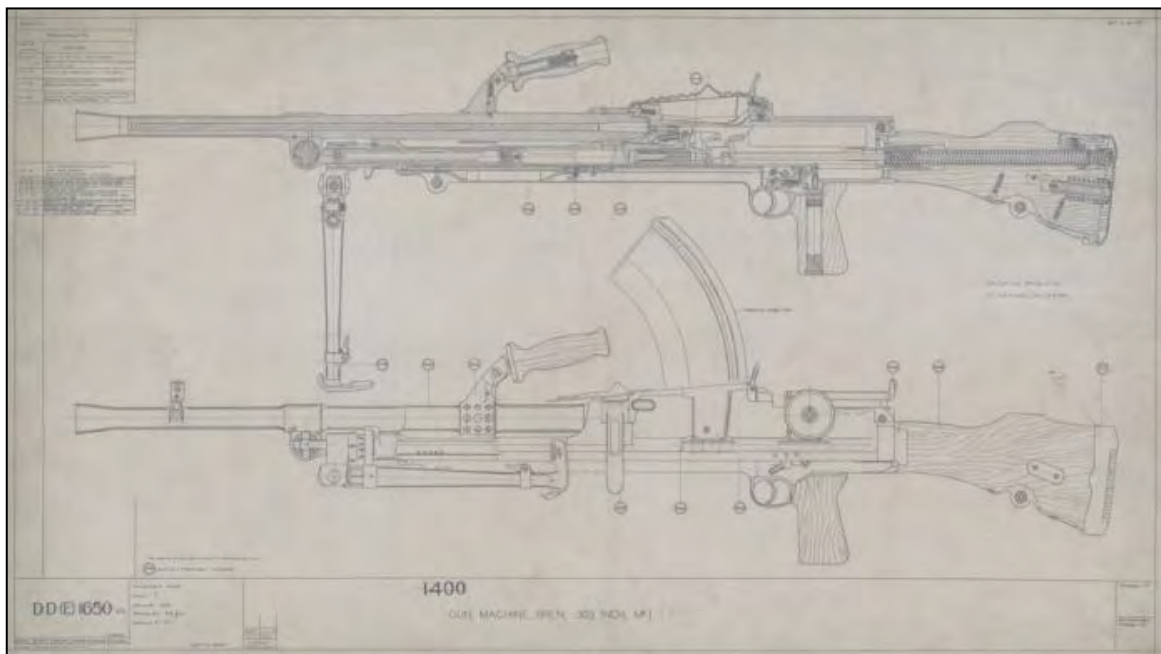
**Figure 8.17** 5.56x45mm ADI rounds (Catalogue #3146 & 3164)

The barrel group of a Bren Light Machine Gun (Figures 8.18- 8.20) was also recovered from Transect 6. This weapon was used during WWII by the Allies and adopted by many Commonwealth countries after the war. It was used by the Australian Defence Force in WWII (1939-1946) and the Korean War (1950-1953) (Pearson, D 2012, Pers. Comm., 11 Oct).

The barrel group itself was an interchangeable part that was swapped out during use when it heated up too much. The presence of this item as part of the archaeological record is intriguing in so much as it represents an item that would be signed out from the Quartermaster, therefore, someone would have been accountable for the loss of this particular artefact (Pearson, D 2012, Pers. Comm., 11 Oct).



**Figures 8.18 and 8.19** Bren Light Machine Gun Barrel Group (Catalogue #3201)



**Figure 8.20** Plan of Bren Machine Gun .303" Australian Mark 1 1937-1944 (Pearson Collection)

## 8.4 MHPAD2 analysis

This site corresponds to the former location of a number of WWII period buildings.

### 8.4.1 Archaeological features

The placement and alignment of the buildings that once stood in this location is still evidenced by a series of subtle surface features including earth works and remnant *in situ* structural items such as concrete. Additional *in situ* evidence for the buildings was found in each of the three by-hand excavation pits (refer to data and photos at Appendix 2)



### 8.4.2 Structural evidence

The structural evidence from this site is broadly similar to that from MHPAD1. It is indicative of the presence of buildings constructed primarily of timber fastened with nails and screws. The use of fibro-cement sheeting was also evidenced by fragments of asbestos on the surface of the site and within some of the excavation contexts. The use of bricks in building footings was evidenced by surface features and within excavation Squares AE19 and AG8a. Once again there was evidence for the use of green paint on at least some exterior items; black exterior paint was also evidenced.

The interior of these buildings appears to have been painted a white or cream colour and part of the flooring may have used grey grid patterned linoleum. The bathroom of the structure was once again fitted with rippled glass, and evidence of bathroom porcelain and stoneware drainage pipes was found within the excavation trench AG-AH8a.

The distribution of artefacts, together with micro topography of the site, suggested that the buildings in this area included a toilet/bathroom area at the eastern end of the westernmost buildings. This layout is similar to that described in nearby P1 buildings used during the 1950s and 1960s (P Hurren 2012 Pers. Comm .Sept 7).

### 8.4.3 Domestic evidence

The domestic assemblage from this site was considerably smaller and less diverse than that recovered at MHPAD1. It contained some tableware and food storage related items such as a ceramic platter and bottle glass. Other items present included lamp glass, coins, and an iron bulldog clip (Figure 9.11). Numerous fragments of heavy duty fabric, possibly canvas, were also recovered. This fabric was green on one side and white on the other.

The above artefacts appear to be indicative of a more regimented and less personalised assemblage than that recovered from MHPAD1; this is in keeping with what would be expected for standard barracks within the SME.



**Figure 8.21** Australian Three Pence 1948 (3172)

#### 8.4.3.1 Military evidence

The area of investigation at MHPAD2 contained 74 of the Steyr ADI bullet casings. Their presence here indicates that this area has been used for training purposes in the recent past.





## 8.5 MHPAD3 Analysis

This site corresponds to the former location of the Drill Hall and associated P1 buildings from the 1940s.

### 8.5.1 Archaeological features

While the two by-hand excavation squares revealed minimal archaeology, the mechanically excavated transect provided evidence of road formation (Figure 8.22) and broader site preparation associated with the buildings that once stood in this area. Of particular note was the well-engineered road that is potentially evidence of sapper training in road construction (P Hurren 2012 Pers. Comm .Sept 7).



**Figure 8.22** Trench excavated across MHPAD3 showing different phases of road formation and maintenance

### 8.5.2 Structural evidence

The structural evidence from MHPAD3 was consistent with the buildings known to be situated in the area prior to demolition. The paltry assemblage from this site included only a few structural related artefacts. These items suggest that the structures formerly located here were of timber construction fastened with nails, tacks, and bolts, and featured a tin roof secured with roofing screws. It also featured windows of which one had a frosted white and red surface that may have been fitted in the bathroom. Part of this structure, perhaps a chimney, was rendered or plastered. Other internal and external fittings include an iron padlock, a stoneware drain pipe, and an aluminium drain strainer.

### 8.5.3 Domestic evidence

The domestic related artefacts recovered from this area included a single bone button (Figure 8.23), two fragments of unidentified ceramic tableware, bottle glass and lamp glass fragments, fragments of glass tumblers, and part of a bone cutlery handle. While it is difficult to infer much from such a sparse assemblage, it could be argued that the artefacts are of a less personal or individualised nature than those recovered from MHPAD1 or MHPAD2.



**Figure 8.23** Bone Button (4014)

## 8.6 Dating summary

The manufacturing processes evidenced and materials present in the assemblages from these three sites indicate that they date predominantly to the first half of the 20<sup>th</sup> century (Table 8.2).

The date range can be further narrowed for each site as follows:

MHPAD1 contains evidence that dates primarily to the 1930s through to the 1950s, with more limited artefactual evidence for the turn of the twentieth century and the late twentieth century. Of interest is the fact that the evidence for the earliest occupation comes from the lower sections of Transect 8, where evidence was found for an earlier ground surface with in situ features below. i.e. the limited testing of deeper deposits at MHPAD1 suggests the presence of archaeological deposits that predate the WWII occupation evidenced in the upper layers.

At MHPAD2 the strongest dating evidence is for the period from 1948 onwards. However, given that relatively undisturbed evidence, in the form of both surface features and subsurface deposits, exists for the presence of the P1 buildings that were constructed circa 1940, it is inferred that evidence relating to the early 1940s also exists. The absence of definitive artefactual evidence relating to this period is explained by the limited and exploratory nature of excavations at this site.

The dating evidence from MHPAD3 is less definitive. Excavations at this site suggest that there is very limited research potential. While Transect 1 provided evidence regarding the sequence of road construction and modification, the hand excavation squares did not reveal evidence of intact archaeological deposits.

**Table 8.2** Datable items by site, manufacturer, location, country, and date

Site	Manufacturer/Item	Location	Country	Date	Reference
MHPAD1	Australia Defence Industries Ltd	-	Australia	1989-2006	Cotteril 2008; Ferguson 2006
MHPAD1	One Shilling	-	Australia	1934	-
MHPAD1	Copper Coin	-	Australia	1919	-
MHPAD1	Australian Glass Manufacturers	Sydney	Australia	1923-1930	Boow 1991:176



Site	Manufacturer/Item	Location	Country	Date	Reference
MHPAD1	Australian Glass Manufacturers	Sydney	Australia	1930+	Boow 1991:176
MHPAD1	Australian Glass Manufacturers	Sydney	Australia	1945	-
MHPAD1	Australian Glass Manufacturers	Sydney	Australia	1954	-
MHPAD1	NSW Bottle Company	Sydney	Australia	1909-1980	Harris 2007:9
MHPAD1	Ingram's Shaving Cream	Lornamead	England	1931+	Historyworld 2012
MHPAD2	Australian Defence Industries Ltd	-	Australia	1989-2006	Cotteril 2008; Ferguson 2006
MHPAD2	Three Pence	-	Australia	1948	-
MHPAD2	20c Coin	-	Australia	1966	-
MHPAD2	20c Coin	-	Australia	1969	-
MHPAD3	Pepsi-Cola	-	USA	1898-1961	Wikipedia 2012

## 8.7 Responses to research questions

The following is a consideration of how the archaeological evidence from MHPADs1-3 relates to the research questions formulated for the subsurface testing program.

*Do traces of the known WWII buildings remain?*

Traces of the known WWII buildings were found within and adjacent Transects 3, 5, 6, and 7 at MHPAD1 and across MHPAD2. Evidence from both these sites suggested that relatively intact and extensive deposits exist in relation to the P1 type barracks that once stood in these areas.

*Do traces of the WWI Isolation Camp remain?*

It is still unclear whether evidence of the WWI isolation camp exists at MHPAD1. Nevertheless, the presence of capped and relatively intact deposits with associated turn of the century artefacts and cultural features, is evidence to suggest that the archaeological traces of the isolation camp may still exist within these deposits.

*What was the function of the U-shaped building in the north western portion of Titalka Park. Does the archaeological record confirm the documentary evidence for residential (married) quarters?*

The artefact assemblage from this area provides at least circumstantial evidence supporting this interpretation. In particular, the large domestic assemblage including items potentially indicative of the presence of a family suggests that there were indeed married quarters located in this area.

Evidence from Transects 3 and 5 indicated that there is good potential for archaeological deposits associated with the building that once stood in this location. Further investigation of these deposits is likely to contribute to an understanding of the function of this building and its relationship to the adjacent P1 buildings.

*Are there subsurface deposits associated with the building footings observed at MHPAD2?*





Subsurface archaeological deposits, including *in situ* building remains were encountered within all three trenches excavated at MHPAD2.

*If present, how intact are the deposits at MHPAD2 and what is their probable extent?*

Test excavations at MHPAD2 indicated that archaeological deposits at this site are relatively intact. On the basis of the test excavations and the surface mapping undertaken at this site it is predicted that archaeological deposits extend across virtually the entire grassed area north of the mines training compound (Figure 8.24). Archaeological deposits at MHPAD2 are likely to be concentrated within the upper 20-30 cm and preservation is predicted to generally be greatest across the central portion of the grassed area. Disturbance is likely to be greatest around the margins of the site, particularly in the south where it borders the mines training compound and in the north and east where service trenches and road construction has impacted the site.

*Do traces of Defence (or earlier) related structures or activities remain, which are not currently known from the documentary record?*

Evidence for pre-WWII features have been found within both the western and eastern portions of MHPAD1. It is also reasonable to expect that earlier phases of activity may be evidenced at MHPAD2; however this could not be confirmed within the scope of the current excavation program.

The archaeological features revealed in Transects 5, 6, 7 and 8 at MHPAD1 appear to be quite well preserved. On the basis of existing information, it is unclear exactly what these features relate to, however it is tentatively suggested that they form part of the archaeological record of WWI and/or interwar period military training.

*Does the archaeological evidence have the potential to provide significant information which goes beyond, or falls outside of, that already known or which could reasonably be predicted, based on current knowledge and documentation of the period?*

The archaeological evidence from MHPAD1 and MHPAD2 has the potential to contribute to an understanding of the construction, use and abandonment of WWII period barracks. This evidence is likely to be significant in terms of the interpretation of the various forms and functions of P1 buildings as well as the nature of different types of barracks (e.g. the material culture of general barracks versus married quarters).

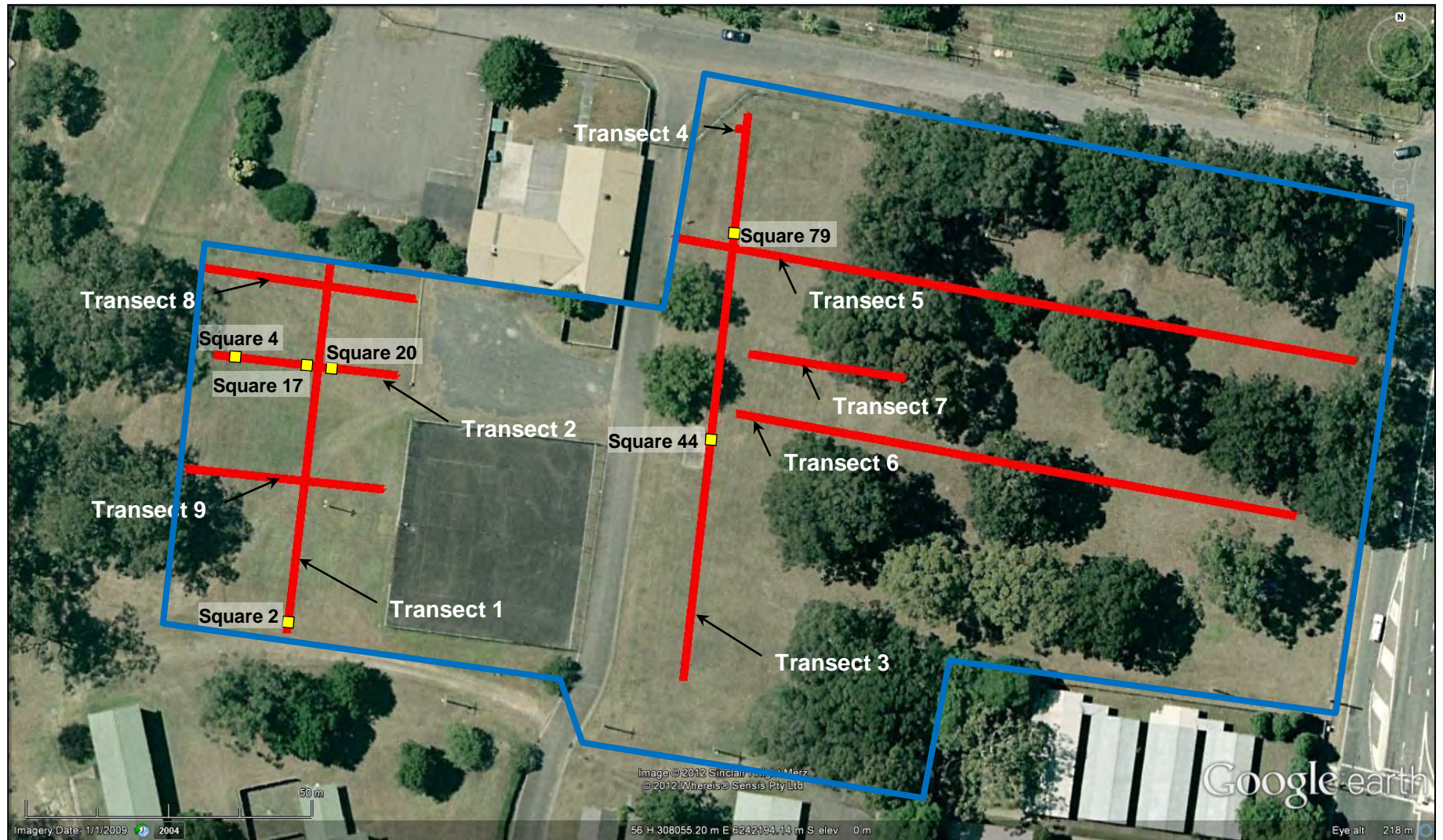
There is also the potential for the archaeology to significantly inform an understanding of pre-WWII occupation, particularly at MHPAD1. Across the western portion of this site there is evidence for the presence of relatively intact and well stratified deposits dating to the early to mid-twentieth century. The extent of such deposits is not entirely clear, but in light of the excavation results across the two test areas at MHPAD1 it appears likely that at least part of the area beneath the tennis courts is of moderate archaeological potential. The revised boundary of potential archaeological deposits for MHPAD1 is shown in Figure 8.25.

Excavations at MHPAD3 did not reveal evidence of archaeological deposits that have the potential to provide significant information that is already known of which could reasonably be predicted.



**Figure 8.24** Revised MHPAD2 boundary following subsurface testing program  
(Google Earth Pro 2012)





**Figure 8.25** Revised MHPAD1 boundary following subsurface testing program (Google Earth Pro 2012)





## 9. SIGNIFICANCE ASSESSMENT

### 9.1 NSW assessment criteria

The NSW Heritage Branch has defined a methodology and set of criteria for the assessment of cultural heritage significance for items and places, where these do not include Aboriginal heritage from the pre-contact period (NSW Heritage Office & DUAP 1996, NSW Heritage Office 2000). The assessments provided in this report follow the Heritage Branch methodology.

The following heritage assessment criteria are those set out for Listing on the State Heritage Register. In many cases items will be significant under only one or two criteria. The State Heritage Register was established under Part 3A of the Heritage Act (as amended in 1999) for listing of items of environmental heritage that are of state heritage significance. Environmental heritage means those places, buildings, works, relics, moveable objects, and precincts, of state or local heritage significance (section 4, Heritage Act 1977).

An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria:

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

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register. Only particularly complex items or places will be significant under all criteria.

In using these criteria it is important to assess the values first, then the local or State context in which they may be significant.

Different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases it is constructive to note the relative contribution of an item or its components. Table 9.1 provides a guide to ascribing relative value.



**Table 9.1** Guide to ascribing relative heritage value

Grading	Justification	Status
Exceptional	Rare or outstanding item of local or State significance.  High degree of intactness  Item can be interpreted relatively easily.	Fulfils criteria for local or State listing.
High	High degree of original fabric.  Demonstrates a key element of the item's significance.  Alterations do not detract from significance.	Fulfils criteria for local or State listing.
Moderate	Altered or modified elements.  Elements with little heritage value, but which contribute to the overall significance of the item.	Fulfils criteria for local or State listing.
Little	Alterations detract from significance.  Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance.	Does not fulfil criteria for local or State listing.

## 9.2 Commonwealth assessment criteria

The Commonwealth Heritage List is a register of natural and cultural heritage places owned or controlled by the Australian Government. These may include places associated with a range of activities such as communications, customs, defence or the exercise of government. The *Environment Protection and Biodiversity Conservation Act 1999* establishes this list and nominations are assessed by the Australian Heritage Council.

In accordance with the *Environment Protection and Biodiversity Conservation Act 1999* a place has a Commonwealth Heritage value if it meets one of the Commonwealth Heritage criteria (section 341D).

A place meets the Commonwealth Heritage listing criterion if the place has significant heritage value because of one or more of the following:

The Commonwealth Heritage Criteria (SEWPac 2011) for a place are any or all of the following:

- The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history.
- The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history.
- The place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history.
- The place has a significant heritage value because of the place's importance in demonstrating the principal characteristics of:



- i) A class of Australia's natural or cultural places, or
  - ii) A class of Australia's natural or cultural environments.
- e) The place has a significant heritage value because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.
  - f) The place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period.
  - g) The place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.
  - h) The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.
  - i) The place has significant heritage value because of the place's importance as part of Indigenous tradition.

**Note:** The cultural aspect of a criterion means the Indigenous cultural aspect, the non-Indigenous cultural aspect, or both.

### **Thresholds**

While a place can be assessed against the above criteria for its heritage value, this may not always be sufficient to determine whether it is worthy of inclusion on the Commonwealth Heritage List. The Australian Heritage Council may also need to use a second test, by applying a 'significance threshold', to help it decide. This test helps the Council to judge the level of significance of a place's heritage value by asking 'just how important are these values?'

To be entered on the Commonwealth Heritage List a place will usually be of local or state-level significance, but must have 'significant' heritage value.

### **Commonwealth Heritage Management Principles**

In addition to the above criteria and thresholds, Schedule 7B of the Environment Protection and Biodiversity Conservation Regulations 2000 (Regulation 10.03D) lists the Commonwealth Heritage Management Principles. These principles are:

1. The objective in managing Commonwealth Heritage places is to identify, protect, conserve, present and transmit, to all generations, their Commonwealth Heritage values.
2. The management of Commonwealth Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their Commonwealth Heritage values.
3. The management of Commonwealth Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.
4. The management of Commonwealth Heritage places should ensure that their use and presentation is consistent with the conservation of their Commonwealth Heritage values.
5. The management of Commonwealth Heritage places should make timely and appropriate provision for community involvement, especially by people who:
  - a) Have a particular interest in, or associations with, the place; and
  - b) May be affected by the management of the place.





6. Indigenous people are the primary source of information on the value of their heritage and that the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.
7. The management of Commonwealth Heritage places should provide for regular monitoring, review and reporting on the conservation of Commonwealth Heritage values.

When assessing the Commonwealth heritage significance of places within the study area in addition to applying the primary and secondary tests of the Commonwealth Heritage Listing criteria and the significance thresholds, reference also needs to be made to the above Commonwealth Heritage Management Principles. The latter is particularly relevant to the study area where there are:

- Other heritage values of the place that are the responsibility of the ACT Government (Principle 3); and
- A number of indigenous places for which the primary source of information on the value of their heritage has been provided through the active participation of local Aboriginal communities (Principle 6).

Heritage significance can apply to a building or a place at either local, State or Commonwealth level. The principal mechanisms recognising heritage places located on Commonwealth owned or managed land, the National Heritage List and the CHL. Each list has its own criteria for assessment of significance. As the whole of the Project area is owned by the Department of Defence the assessment of cultural heritage significance will be undertaken using the CHL criteria. If the assessment indicates that the place or elements within it meet the criteria for entry on the CHL, preparation of a nomination to the CHL may be recommended for the relevant places.

### 9.3 Summary of significance assessments

The Project area, including the Moorebank Cultural Landscape and the components of the natural, built and archaeological landscape that comprise it, have been assessed against the NSW and CHL assessment criteria. The Moorebank Cultural Landscape and many of its constituent elements have been identified as having significance against both sets of criteria. Table 9.2 provides a summary of this significance assessment; Figure 9.1 illustrates which items meet local, State and Commonwealth significance thresholds. Detailed assessments for each item are provided in Appendix 4. The following summary does not include built environment items that fall below the threshold of State or Commonwealth assessment criteria.

#### 9.3.1 Significance assessment against NSW Criteria

*Criterion (a): important in the course, or pattern, of cultural history*

The CUST Hut, MH1, MH6, the RAE Chapel, RAE Museum and Collections (including the Museum Sandstone Wall), Commanding Officers' Walk and Other Memorials across the SME are assessed to have local significance against this criterion.

MHPADs 1 and 2 display potential for local significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 1 and Unit 2 deposits at MAPAD2 have been assessed to have heritage value against this criterion in particular their connection to environmental conditions prior to and subsequent to European settlement, however further assessment is required to fully determine the significance of these items.

The Moorebank Cultural Landscape is assessed as having local significance against this criterion. This significance stems not only from the above individual items that are assessed as being historically significant, but also from items such as MHPADs 1 and 2 which contribute to the overall significance of the Project area. The Transport Compound Workshop (B99) is not assessed to have significance against this criterion as an individual item but the item does contribute to the overall significance of the Project area.



The CUST Hut and the Museum Collections have also been assessed to be of State significance against this criterion.

*Criterion (b): strong or special association with the life or works of a person, or persons*

The CUST Hut, MH1, MH6, the RAE Chapel, RAE Museum and Collections (including the Museum Sandstone Wall), Commanding Officers' Walk and Other Memorials across the SME are assessed to have local significance against this criterion. These items have significance due to their associations with various military personnel; they also contribute to the overall significance of the Moorebank Cultural Landscape, which also derives significance through associations with Thomas Moore.

The CUST Hut and the Museum Collections have also been assessed to be of State significance against this criterion.

The Unit 2 deposits at MAPAD2 appear to be the direct result of construction of the Liverpool Weir, which was designed by David Lennox an engineer who was also important within NSW and Victoria due to his involvement in bridge design and construction. The life and works of David Lennox are thus important in the context of local history, as well as the history of infrastructure within NSW and Australia as a whole. As such, these deposits are potentially of importance as direct evidence of the effect of the works of David Lennox.

*Criterion (c): important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement*

The CUST Hut and the RAAF STRARCH Hangar are of local significance against this criterion.

MHPADs 1 and 2 display potential for local significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 2 deposits at MAPAD2 appear to be the direct result of early nineteenth century innovation and technical achievement with regard to modification of a river system in order to secure a fresh water supply for Liverpool. As such, these deposits are potentially of importance as an indirect demonstration of that early nineteenth century technical achievement.

The Moorebank Cultural Landscape is assessed as having local significance against this criterion. This significance stems not only from the abovementioned items but also from elements of the natural landscape and the broader landscape setting.

The CUST Hut and the RAAF STRARCH Hangar have also been assessed to be of State significance against this criterion.

*Criterion (d): strong or special association with a particular community or cultural group*

MH1, MH6, the RAE Chapel, RAE Museum Collections, RAE Museum Sandstone Wall, Commanding Officers' Walk, and Other Memorials across the SME are assessed to have local significance against this criterion.

These items, together with the identified intangible cultural values across the Project area contribute to the significance of the Moorebank Cultural Landscape as a whole.

There are no items within the study area assessed to be of State significance against this criterion.

*Criterion (e): potential to yield information that would contribute to an understanding of cultural history*

MHPADs 1 and 2 and the Unit 1 and Unit 2 deposits at MAPAD2 are assessed to have local significance against this criterion. Potential also exists for the CUST Hut to be locally significant against this criterion.

While the above items contribute to the overall significance of the Moorebank Cultural Landscape, the area as a whole does not have significance against this criterion.

There are no items within the study area assessed to be of State significance against this criterion.



*Criterion (f): possesses uncommon, rare or endangered aspects of cultural history*

The CUST Hut, the Transport Compound Workshop (B99) are assessed to have local significance against this criterion.

MHPADs 1 and 2 display potential for local significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 1 and Unit 2 deposits at MAPAD2 have been assessed to have heritage value against this criterion due to the fact that they appear to comprise a hitherto unrecorded example of changes in flood regime that appear to archive:

- regional properties in the catchment sediment record; and
- a record of recent sand aggradation and vertical accretion superimposed on the earlier floodplain surface caused by the construction of the Liverpool Weir in 1836.

Further assessment of these deposits is required to fully determine the significance of these items

These items, together with the identified intangible cultural values across the Project area contribute to the local significance of the Moorebank Cultural Landscape as a whole.

The CUST Hut has also been assessed to be of State significance against this criterion.

*Criterion (g): important in demonstrating the principal characteristics of a class of cultural place*

The CUST Hut is assessed to have local significance against this criterion.

MHPADs 1 and 2 display potential for local significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 1 and Unit 2 deposits at MAPAD2 are assessed as having significance against this criterion and require further investigation to fully determine the significance.

These items, together with all the other heritage elements across the Project area (even those items that do not have individual significance against this criterion) contribute to the local significance of the Moorebank Cultural Landscape as a whole.

The CUST Hut has also been assessed to be of State significance against this criterion.

### **9.3.1 Significance assessment against CHL Criteria**

*Criterion (a): The place has significant heritage value because of the place's importance in the course, or pattern, of Australia's natural or cultural history*

The CUST Hut, MH1, MH6, the RAE Chapel, RAE Museum and Collections (including the Museum Sandstone Wall), Commanding Officers' Walk and Other Memorials across the SME are assessed to meet the CHL threshold for significance against this criterion.

MHPADs 1 and 2 display potential for significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 1 and Unit 2 deposits at MAPAD2 have been assessed to have heritage value against this criterion in particular their connection to environmental conditions prior to and subsequent to European settlement, however further assessment is required to fully determine the significance of these items.

The Moorebank Cultural Landscape is assessed as meeting the CHL threshold for significance against this criterion. This significance stems not only from the above individual items that are assessed as being historically significant, but also from items such as MHPADs 1 and 2 which contribute to the overall significance of the Project area. The Transport Compound Workshop (B99) is not assessed to have significance against this criterion as an individual item but the item does contribute to the overall significance of the Project area.





*Criterion (b): The place has significant heritage value because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history*

The CUST Hut meets the CHL threshold for significance against this criterion.

MHPADs 1 and 2 display potential for significance against this criterion; this can only be clarified through additional subsurface investigations.

The Unit 1 and Unit 2 deposits at MAPAD2 have been assessed to have heritage value against this criterion due to the fact that they appear to comprise a hitherto unrecorded example of changes in flood regime that appear to archive:

- regional properties in the catchment sediment record; and
- a record of recent sand aggradation and vertical accretion superimposed on the earlier floodplain surface caused by the construction of the Liverpool Weir in 1836.

Further assessment of these deposits is required to fully determine the significance of these items

The Moorebank Cultural Landscape is assessed as meeting the CHL threshold for significance against this criterion. This significance is derived from the abovementioned items, together with the identified intangible cultural values across the Project area.

*Criterion (c): The place has significant heritage value because of the place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history*

MHPADs 1 and 2 are both assessed to meet the CHL threshold for significance against this criterion. Potential also exists for the CUST Hut to meet the threshold for significance against this criterion.

The Unit 1 and Unit 2 deposits at MAPAD2 have been assessed to have heritage value against this criterion and require further investigation to fully determine the significance.

While the above items contribute to the overall significance of the Moorebank Cultural Landscape, the area as a whole does not meet the CHL threshold for significance against this criterion.

*Criterion (d): The place has a significant heritage value because of the place's importance in demonstrating the principal characteristics of:*

- i) A class of Australia's natural or cultural places, or*
- ii) A class of Australia's natural or cultural environments.*

The CUST Hut is assessed to have meet the CHL threshold for significance against this criterion.

MHPADs 1 and 2 and the Unit 1 and Unit 2 deposits at MAPAD2 display potential to meet the threshold for significance against this criterion; this can only be clarified through additional subsurface investigations.

These items, together with all the other heritage elements across the Project area (even those items that do not have individual significance against this criterion) contribute to the significance of the Moorebank Cultural Landscape as a whole, which meets the CHL threshold for significance against this criterion.

*Criterion (e): The place has a significant heritage value because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.*

While none of the individual items within the Project area meet the CHL threshold for significance against these criteria, the Moorebank Cultural Landscape as a whole provides a contrast to the surrounding landscape through its smaller scale buildings and high percentage of grassland and mature vegetation (soft landscaping) across the site.



In these regards the landscape and/or its elements do meet the CHL threshold for aesthetic significance.

*Criterion (f): The place has significant heritage value because of the place's importance in demonstrating a high degree of creative or technical achievement at a particular period.*

The CUST Hut and the RAAF STRARCH Hangar meet the CHL threshold for significance against this criterion.

MHPADs 1 and 2 and the Unit 1 and Unit 2 deposits at MAPAD2 display potential for significance against this criterion; this can only be clarified through additional subsurface investigations.

The Moorebank Cultural Landscape is assessed as meeting the CHL threshold for significance against this criterion. This significance stems not only from the abovementioned items but also from elements of the museum collections such as the various bridges.

*Criterion (g): The place has significant heritage value because of the place's strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.*

MH1, MH6, the RAE Chapel, RAE Museum Collections, RAE Museum Sandstone Wall, Commanding Officers' Walk, and Other Memorials across the SME meet the CHL threshold for significance against this criterion.

The Unit 1 and Unit 2 deposits at MAPAD2 are likely to be of importance to both the Aboriginal community and the local Liverpool community in terms of the record they appear to archive of ecological change, flooding patterns and potential information regarding the pre-European landscape. Further investigation is required to fully determine the significance.

These items, together with the identified intangible cultural values across the Project area contribute to the significance of the Moorebank Cultural Landscape, which also meets the CHL threshold for significance against this criterion.

*Criterion (h): The place has significant heritage value because of the place's special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.*

The CUST Hut, MH1, MH6, the RAE Chapel, RAE Museum and Collections (including the Museum Sandstone Wall), Commanding Officers' Walk and Other Memorials across the SME meet the CHL threshold for significance against this criterion. These items have significance due to their associations with various military personnel; they also contribute to the overall significance of the Moorebank Cultural Landscape, which also derives significance through associations with Thomas Moore.

The Unit 2 deposits at MAPAD2 are assessed as having potential heritage significance against this criterion.

The Moorebank Cultural Landscape meets the CHL threshold for significance against this criterion.

*Criterion (i): The place has significant heritage value because of the place's importance as part of Indigenous tradition.*

Whilst none of the individual elements of European heritage within the Project area have been identified as having Aboriginal cultural values, there are places within the Moorebank Cultural Landscape (refer to the Aboriginal Heritage Assessment – NOHC 2014a) that meet the CHL threshold for significance against this criterion.

The Unit 1 deposits at MAPAD2 have the potential to contain archaeological and paleo-environmental evidence that would be of importance in terms of understanding Indigenous traditions and life-ways. Such evidence would be of importance as a connection between the present Aboriginal community and Indigenous tradition.



**Table 9.2** Summary of Significance Assessments

Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
Moorebank Cultural Landscape	Yes Local (Criteria A, B, C, D, F and G)	The Moorebank Cultural Landscape is the product of numerous phases of landscape occupation and use spanning Indigenous occupation (pre-European settlement) through to the present day. Many of these phases of use and associated cultural history patterns are evidenced within different portions of the landscape. The toponyms, buildings, spatial organisation, memorials, archaeological deposits and elements of the natural landscape have various strong and/or special associations with Thomas Moore, the Australian Army (particularly the SME) and the Aboriginal community. Furthermore, the archaeological deposits identified within the Project area have the potential to yield information that would contribute to an understanding of its cultural history. The landscape as a whole it also notable as a locally distinct and representative cultural landscape.	Yes (Criteria A, B, D, E, F, G, and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations, social values, representativeness, research potential, technological characteristics, uniqueness, and Aboriginal cultural values.
Two pieces of No light rail (MH3 and MH4)	No	These items have been disturbed by subsequent land use activities in the area and are no longer in situ. Consequently, the items are unable to demonstrate their associated lifeways. The loss of site integrity also impacts on the potential research value of the items and associated lifeways and consequent changes in significance that may have come from intactness. There are no other heritage values associated with these items e.g. social value.	No	This group of sites do not meet any of the Commonwealth heritage list criteria.
MHPAD1	Yes - Local (Criterion E, with potential for A, C, F and G)	This site maintains a high level of integrity and represents significant archaeological research potential at a local level The archaeological potential of this site and its association with MHPAD2 are such that potential exists for the two sites to be of State significance. Further heritage value in the form of social value could also be assigned to this site. These aspects of site significance assessment would necessitate broad area excavations	Yes (Criteria C with potential for A, B, D and F)	The integrity of archaeological deposits at this site is such that research and scientific values exist at Commonwealth level.





Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
MHPAD2	Yes – Local (Criterion E, with potential for A, C, F and G)	This site maintains a high level of integrity and represents significant archaeological research potential at a local level. The archaeological potential of this site and its association with MHPAD1 are such that potential exists for the two sites to be of State significance. Further heritage value in the form of social value could also be assigned to this site. These aspects of site significance assessment would necessitate broad area excavations.	Yes (Criteria C with potential for A, B, D and F)	The integrity of archaeological deposits at this site is such that research and scientific values exist at Commonwealth level.
MHPAD3	No	This site has major disturbance resulting from the removal of the buildings that once stood in this area. Consequently, the site is not intact and its ability to demonstrate the activity of its associated lifeways is compromised. The only area of substantial intact deposit. Relates to road construction; these deposits do not display significant research potential.	No	This site does not meet any of the Commonwealth heritage list criteria.
MAPAD2 (Unit 1)	Potential significance against criteria a, e, f and g	The sequence identified may be part of a broader sequence of deposits. The extent to which the sequence is preserved elsewhere is not known. On present evidence the conclusion would be that it is one of the few places where this historic stratigraphic record has survived development impacts. The overall conclusion is that the heritage values are very considerable, and work should be undertaken to archive the information in the sequence proportional to scheme impacts.	Potential significance against criteria a, b, c, d, g and i	The site requires further investigation to fully determine significance.
MAPAD2 (Unit 2)	Potential significance against criteria a, b, c, e, f and g	The Unit 1 deposits may contain significant environmental information on the historic and immediately prehistoric environments at close to the upper tidal limit of the Georges River. The assessed significance is high as the deposits reflect a quite rare occurrence sealing of the floodplain due to rapid changes to channel hydrology caused by weir construction.	Potential significance against criteria a, b, c, d, f, g and h	The site requires further investigation to fully determine significance.



Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
CUST Hut	Yes – Local/State(Criteria A, B, C, E, F and G)	The CUST Hut has a strong and special association with Lieutenant Colonel D.R. (Dan) Cullen. It is important in the history and development of the SME site. The integrity and intactness of this structure provides for a high level of technical significance. The possible subsurface integrity of this site represents significant archaeological research potential at a local level. The site is also rare and representative of its type. Further heritage value in the form of social value could also be assigned to this site. Refer to Museum Collection regarding items within structure.	Yes (A, B, C, D, F and H)	The integrity, uniqueness and intactness of this structure provides for a high level of technical significance. The archaeological potential of this site may also contribute to its significance as a Commonwealth level.
B99	Yes – Local (Criterion F)	Of itself the Transport Compound Workshop is not considered to be significant however it is locally rare, within the context of the Moorebank Cultural Landscape, as a WWII era building that remains <i>in situ</i> . This building also contributes to the historical significance of The Moorebank Cultural Landscape.	No	This site does not meet any of the Commonwealth heritage list criteria as an individual site but contributes to the significance of the Moorebank Cultural Landscape.
Dog Cemetery (MH1)	Yes – Local (Criteria A, B and D)	The cemetery as a memorial possesses significant social value at a local level whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
Pair of sandstone bordered ditches (MH2)	No	This site does not possess archaeological research potential. There are no other heritage values associated with this site e.g. social value, technical.	No	This site does not meet any of the Commonwealth heritage list criteria.
Large above ground concrete block (MH5)	No	This site does not possess archaeological research potential. There are no other heritage values associated with this site e.g. social value, technical.	No	This site does not meet any of the Commonwealth heritage list criteria.



Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
Commemorative Gardens (MH6)	Yes – Local (Criteria A, B and D)	The site as a memorial possesses significant social value at a local level whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
Liverpool Golf Course (MH7)	No	This site does not possess archaeological research potential; the recording comprises disturbed remnants of a golf course from the latter part of the twentieth century. There are no other heritage values associated with this site e.g. social value, technical.	No	This site does not meet any of the Commonwealth heritage list criteria.
RAE Chapel	Yes – Local (Criteria A, B and D)	The religious nature of this site and its containment of various items, namely a number of memorials, ascribe to it a social value whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
RAAF STRARCH Hangar	Yes – Local/State (Criterion C)	The integrity and intactness of this structure provides for a high level of technical significance, whilst not possessing associated archaeological research potential. Refer to Museum Collection regarding items within structure.	Yes (Criterion F)	The integrity, uniqueness and intactness of this structure provides for a high level of technical significance.
RAE Museum and Australian Army Museum of Military Engineering Collections	Yes Local and State (Criteria A, B, and D)	The collection (both movable and fixed) possesses a high level of social, historical and technical or scientific value at a local or state level. The collection contains rare and unique items.	Yes (Criteria A, G and H)	The rarity and uniqueness of this collection provides for a high level of social, historical and technical or scientific value at Commonwealth level.





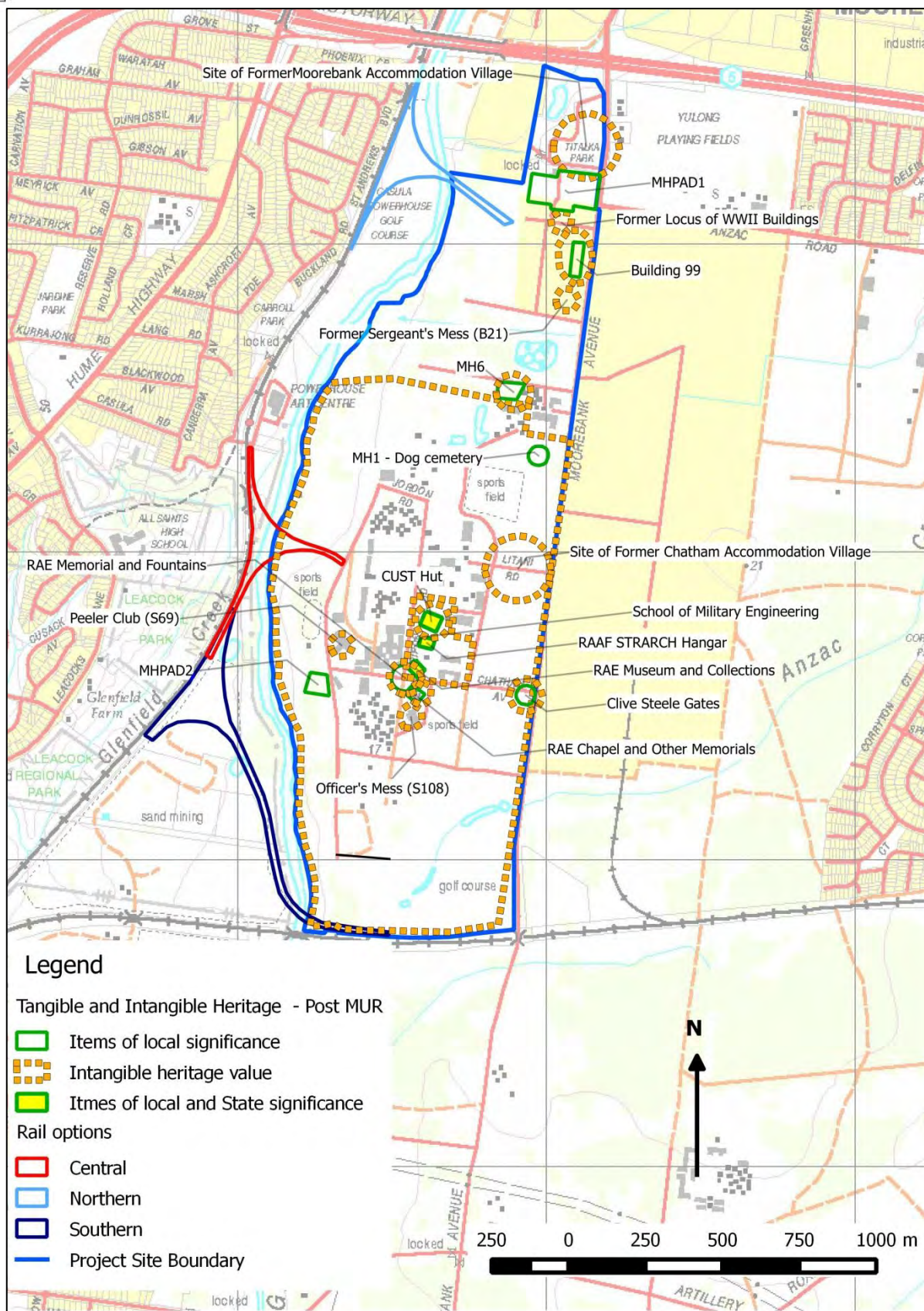
Site Number		Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
RAE	Museum Sandstone Wall	Yes Local (Criteria A, B and D)	The site as a memorial possesses significant social value at a local level whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
Other Memorials		Yes Local (Criteria A, B and D)	The memorials possess significant social value at a local level whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	These items meet the Commonwealth heritage list criteria in terms of historical associations and social values.
Commanding Officers (COs)	Walk	Yes Local (Criteria A, B and D)	The site as a memorial possesses significant social value at a local level whilst not possessing archaeological research potential.	Yes (Criteria A, G and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.



**Table 9.3** European cultural heritage elements within the Project area, grouped according to their respective significance ranking

COMMONWEALTH	STATE	LOCAL	NIL
<ul style="list-style-type: none"> <li>Moorebank Cultural Landscape</li> <li>CUST Hut</li> <li>RAAF STRARCH Hangar</li> <li>RAE Museum and Australian Army Museum of Military Engineering Collections</li> <li>RAE Museum Sandstone Wall</li> <li>COs Walk</li> <li>MHPAD1</li> <li>MHPAD2</li> <li>MAPAD2 (Unit 1)</li> <li>MAPAD2 (Unit 2)</li> <li>MH1</li> <li>MH6</li> <li>RAE Chapel</li> <li>Other Memorials</li> </ul>	<ul style="list-style-type: none"> <li>CUST Hut</li> <li>RAAF STRARCH Hangar</li> <li>RAE Museum and Australian Army Museum of Military Engineering Collections</li> </ul>	<ul style="list-style-type: none"> <li>Moorebank Cultural Landscape</li> <li>CUST Hut</li> <li>RAAF STRARCH Hangar</li> <li>RAE Museum and Australian Army Museum of Military Engineering Collections</li> <li>RAE Museum Sandstone Wall</li> <li>B99</li> <li>COs Walk</li> <li>MHPAD1</li> <li>MHPAD2</li> <li>MAPAD2 (Unit 1)</li> <li>MAPAD2 (Unit 2)</li> <li>MH1</li> <li>MH6</li> <li>RAE Chapel</li> <li>Other Memorials</li> </ul>	<ul style="list-style-type: none"> <li>MH 3-4</li> <li>MHPAD3</li> <li>MH2</li> <li>MH5</li> <li>MH7</li> </ul>

*Note: While some individual elements do not have individual significance, they are essential components of the overall design aesthetic and community values.*



**Figure 9.1** Location of items that meet local, State and Commonwealth heritage thresholds





## 10. MOOREBANK UNIT RELOCATION (MUR) PROJECT

As part of an action arising from a broader Defence asset review Defence activities will be relocated to Holsworthy Barracks. The proposed transfer of a range of Defence functions to Holsworthy Barracks will be undertaken under the Moorebank Unit Relocation (MUR) Project. The MUR Project will involve the relocation of 18 items of heritage value and is planned to be completed by mid-2015 (Table 10.1).

**Table 10.1** Items relocated as part of the MUR

No	Name
1	Burma-Thai Cross
2	Headstone of Lieutenant Hodgson
3	Bell and bell tower
4	Hanging plant containers, Chapel
5	Baptismal Font, Chapel
6	Altar Chairs, Chapel
7	Three badges on front of Chapel
8	Sandstone in the walls of the Chapel and plaques
9	Clive Steele Memorial Gates
10	The Service Dogs' Memorial
11	The CO's walk, vicinity of the Officers Mess
12	Australian Panel Bridge
13	Bailey Bridge
14	Heavy Girder Bridge
15	Steele Bridge
16	The RAE Memorial and Fountain
17	The Vietnam Veterans' Memorial and associated plaques
18	RAE Corps Museum Wall and Collection

Environmental Resources Management Australia Pty Ltd (ERM) have undertaken a Heritage Impact Assessment (HIA) for the proposed relocation and removal of heritage items from Steele Barracks in Moorebank.

It was found that the items proposed for relocation have local heritage significance, with some of the items meeting the threshold for nomination to the Commonwealth Heritage List (CHL). The impacts to the relocated items, as discussed in the MUR report (ERM 2013), will include changes to the setting of these items, however the new setting will be consistent with the historical context, function and use of the relocated items. Furthermore, the relocation process will allow for and ensure the long term security of these items.

The heritage values of the items identified for relocation will not be diminished by the proposed relocation. This is due to:

- the option to relocate the majority of the items instead of demolition is considered a positive heritage outcome;
- the memorials are associated with and are important to Defence personnel who will also be relocating; and
- the interpretive material that will be provided will enhance the understanding and appreciation of the items by current and future generations.

The relocation of the items as part of the MUR will have a dual impact on the historical context of the items remaining and the residual Moorebank Cultural Landscape.



As a result of the MUR project the resultant Moorebank Cultural Landscape will be a fragmented one with an added loss of historical and social connection through the cessation of occupation and use. While many of the intangible values (e.g. associations with the memorials, Chapel and Museum) will be transferred to the new SME site at Holsworthy, there will be residual values associated with the broader landscape setting, as well as more tangible elements of the landscape such as the archaeological deposits, the CUST Hut, the Transport Compound Workshop (B99), the RAAF STRARCH Hangar, the dog cemetery and the commemorative garden. These items display many of the heritage values which are characteristic of the entire Moorebank Cultural Landscape; they include:

- components of the natural environment, albeit an altered one, with references to the garden/parkland that the Moorebank landscape setting is characterised by;
- key elements of the built environment that reference the military history of the location and technical achievements in engineering;
- items that have served a memorial function, commemorating military service, significant events such as Gallipoli, as well as recognition of earlier local historical patterns through incorporation of materials from a local vineyard (refer to description of MH1);
- aspects of the street layout and associated names; and
- archaeological deposits that relate primarily to military occupation through the early to mid-twentieth century.

All impacts related to the Project are considered following the impacts of the MUR, i.e. all items in Table 10.1 are relocated and not addressed in this EIS.

The predicted significance assessment of the remaining items following the MUR is summarised below.



**Table 9.2** Summary of predicted significance assessments post MUR

Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
Moorebank Cultural Landscape	Yes Local (Criteria A, B, D, F and G)	Post MUR the Moorebank Cultural Landscape would be greatly impacted with the removal and/or impact of many elements that contribute towards the area's significance. The site would retain some intrinsic elements including the spatial organisation, toponyms, archaeological deposits and elements of the natural landscape. These elements retain associations with Thomas Moore, the Australian Army (particularly the SME) and the Aboriginal community. Furthermore, the archaeological deposits identified within the Project area would continue to have the potential to yield information that would contribute to an understanding of its cultural history. The landscape as a whole would retain locally distinct and representative cultural values.	Yes (Criteria A, B, C, F, and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations, research potential, technological characteristics, uniqueness, and Aboriginal cultural values.
Two pieces of light rail (MH3 and MH4)	No	No change	No	This group of sites do not meet any of the Commonwealth heritage list criteria.
MHPAD1	Yes - Local (Criterion E, with potential for A, C, F and G)	No change	Yes (Criteria C with potential for A, B, D and F)	The integrity of archaeological deposits at this site is such that research and scientific values exist at Commonwealth level.
MHPAD2	Yes - Local (Criterion E, with potential for A, C, F and G)	No change	Yes (Criteria C with potential for A, B, D and F)	The integrity of archaeological deposits at this site is such that research and scientific values exist at Commonwealth level.





Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
MHPAD3	No	No change	No	This site does not meet any of the Commonwealth heritage list criteria.
MAPAD2 (Unit 1)	Potential significance against criteria a, e, f and g	No change	Potential significance against criteria a, b, c, d, g and i	The site requires further investigation to fully determine significance.
MAPAD2 (Unit 2)	Potential significance against criteria a, b, c, e, f and g	No change	Potential significance against criteria a, b, c, d, f, g and h	The site requires further investigation to fully determine significance.
CUST Hut	Yes – Local/State(Criteria A, B, C, E, F and G)	No change	Yes (A, B, C, D, F and H)	The integrity, uniqueness and intactness of this structure provides for a high level of technical significance. The archaeological potential of this site may also contribute to its significance as a Commonwealth level.
B99	Yes – Local (Criterion F)	Of itself the Transport Compound Workshop is not considered to be significant however it is locally rare, within the context of the Moorebank Cultural Landscape, as a WWII era building that remains <i>in situ</i> . This building also contributes to the historical significance of The Moorebank Cultural Landscape.	No	This site does not meet any of the Commonwealth heritage list criteria as an individual site but contributes to the significance of the Moorebank Cultural Landscape.



Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
Dog Cemetery (MH1)	Yes – Local (Criteria A and B)	Post MUR the cemetery loses some social value as it would lose the immediate and ongoing connection with the members of the SME community and the functioning dog unit, the place would retain local significance as a memorial to service dogs.	Yes (Criteria A and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
Pair of sandstone bordered ditches (MH2)	No	No change	No	This site does not meet any of the Commonwealth heritage list criteria.
Large above ground concrete block (MH5)	No	No change	No	This site does not meet any of the Commonwealth heritage list criteria.
Commemorative Gardens (MH6)	Yes – Local (Criteria A and B)	Post MUR the site as a memorial would lose some social value at a local level as it would lose the immediate and ongoing connection with the members of the SME community and a functioning military establishment. The place would retain local significance as a memorial to SME personnel and their actions.	Yes (Criteria A and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations and social values.
Liverpool Golf Course (MH7)	No	No change	No	This site does not meet any of the Commonwealth heritage list criteria.
Remaining elements of the RAE Chapel	Yes – Local (Criteria A, B and D)	The MUR project would remove a large proportion of the social significance associated with this site. The building will cease to function as a chapel and all of its commemorative fabric would be relocated. The remaining architectural elements of the site would simply serve as a historical marker of the location and former function of the chapel.	Yes (Criteria A and H)	This site meets the Commonwealth heritage list criteria in terms of historical associations.



Site Number	Significance against NSW Criteria	Statement	Significance against CHL Criteria	Statement
RAAF STRARCH Hangar	Yes – Local/State (Criterion C)	No change	Yes (Criterion F)	The integrity, uniqueness and intactness of this structure provides for a high level of technical significance.
Remaining elements of the RAE Museum Sandstone Wall	No	Given that a majority of the stone will be recovered and reused in a commemorative context the heritage values of the stone will be maintained and that list location does not retain significance as a consequence.	No	This site does not meet any of the Commonwealth heritage list criteria.





## 11. ASSESSMENT OF IMPACTS

The Project would have impacts on European heritage items within and adjacent to the proposed construction footprint. The general requirements included in the SEARs specify that the heritage assessment must consider impacts from vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment.

The classification of development impact falls into two broad categories, direct or indirect impact. This classification is made relative to the identified heritage place or item. Where a development would result in physical loss or change to a place or change to a place or item, this is a direct impact. Direct impact may affect a part or all of a place or item.

Where a development would avoid direct impact to a place or item, but would change its context or surroundings, this is termed an indirect impact. This is mostly caused by a development being situated in relative proximity to the place or item, and consequently changing the setting of the place or item to a significant degree. Indirect impacts may reduce the historical integrity of a place or item, and compromise the interpretation or visual appreciation of the place item.

The Moorebank Cultural Landscape and eleven individual recordings have been assessed to be of heritage significance. All of these identified heritage items would be directly impacted by the construction footprint (see Figure 10.1).

Table 10.1 provides an overview of the impact assessment at each item, including impacts to the Moorebank Cultural Landscape as a whole. These impacts assessment have been based on the current concept plan for the Project.

Details of impacts assessments for each item are provided in the Statement of Heritage Impacts (SOHIs) at Appendix 5.

Options for mitigation of impacts are provided within each SOHI and discussed in further detail in Section 12 of this report.

### 11.1 Direct impacts

Figure 10.1 illustrates the location of the post-MUR, tangible and intangible heritage values relative to the Project. Anticipated impacts within the residual landscape and the elements that comprise it would consist of:

- building, garden and memorial demolition;
- disturbance to archaeological deposits;
- destruction of the landscape setting and vistas;
- loss of and/or reduced historical associations;
- loss of existing internal street layouts and associated names; and
- loss of access to these items.

All remaining heritage items will be directly impacted by the Project as well as all remaining intangible heritage values. Table 11.1 summarises the impacts to the heritage items (post-MUR). In summary, the impacts from the Project on the residual Moorebank Cultural Landscape (i.e. post-MUR) and the items of heritage value that comprise it would be a significant impact on the heritage environment.



**Table 11.1 Impact Assessment (direct impacts associated with the main Moorebank IMT Project Site – all rail access options)**

Site ID	Location relative to concept design	Aspects that respect or enhance the item's heritage significance	Aspects that could detrimentally impact on the item's heritage significance	Resultant impact on the item's heritage significance
Moorebank Cultural Landscape	within construction footprint (main Project site)	Retention of elements of the landscape such as Moorebank Avenue (road alignment and name) and portions of regrowth bushland respect some aspects of heritage values associated with the cultural landscape.	The Project would detrimentally impact the residual Moorebank Cultural Landscape; it would result in disturbance to archaeological deposits, removal of remaining landscape elements, loss of the existing landscape setting, historical associations and loss of access to items. The Moorebank Cultural Landscape has been assessed to be of local and Commonwealth significance in terms of historical associations, research potential, technological characteristics, uniqueness, and Aboriginal cultural values.	Disturbance to archaeological deposits, demolition of remaining landscape elements, loss of the existing landscape setting and loss of access to items would result in loss of research potential. It would also result in the loss of the site's uniqueness and technological significance.
MHPAD1	within construction footprint	Not applicable/none	The Project would result in archaeological disturbance to locally significant deposits and <i>in situ</i> building remains at the site. These deposits have also been assessed to be of significance against Commonwealth criteria.	The archaeological disturbance would result in the loss of the research potential associated with these deposits.
MHPAD2	within construction footprint	Not applicable/none	The Project would result in archaeological disturbance to locally significant deposits and <i>in situ</i> building remains at the site. These deposits have also been assessed to be of significance against Commonwealth criteria.	The archaeological disturbance would result in the loss of the research potential associated with these deposits.



Site ID	Location relative to concept design	Aspects that respect or enhance the item's heritage significance	Aspects that could detrimentally impact on the item's heritage significance	Resultant impact on the item's heritage significance
CUST Hut	within construction footprint	Not applicable/none	The Project would require the demolition of the CUST Hut, as well as disturbance to potential archaeological deposits associated with the building. The CUST Hut and associated archaeological deposits have been assessed to be of local and Commonwealth significance and to potentially have State significance.	The archaeological disturbance would result in the loss of the research potential associated with these deposits. The demolition of the building would result in a total loss of significance in terms of rarity and representativeness as well as the loss of its technical and aesthetic significance, historical associations with this building will be diminished.
B99	within construction footprint	Not applicable/none	The Project would result in demolition of the building. The Workshop has been assessed to be of significance in terms of its rarity in a local context, it also contributes to the overall historical significance of the Moorebank Cultural Landscape at local and Commonwealth levels.	The demolition of the building would result in a total loss of significance in terms of rarity.
Dog Cemetery (MH1)	within construction footprint	Not applicable/none	The Project would detrimentally impact the dog cemetery at MH1; it would result in subsurface/archaeological disturbance to the graves. The cemetery has been assessed to be of local and Commonwealth significance in terms of its historical importance.	The archaeological disturbance would result in the loss of significance in terms of its historical associations.
Commemorative Garden (MH6)	within construction footprint	Not applicable/none	The Project would detrimentally impact the commemorative garden at MH6; it would result in gross disturbance across the entire area. The garden has been assessed to be of local and Commonwealth significance in terms of its historical.	The ground disturbance in terms of its historical associations.





Site ID	Location relative to concept design	Aspects that respect or enhance the item's heritage significance	Aspects that could detrimentally impact on the item's heritage significance	Resultant impact on the item's heritage significance
Remaining elements of the RAE Chapel	within construction footprint	Not applicable/none	This item has been identified for partial relocation as part of the MUR project. The Project would require demolition of the remaining parts of the RAE Chapel. This site has been assessed to have be of local and Commonwealth significance in terms of its historical values.	The demolition of the remaining items will result in the loss of the remaining elements of historical significance.
RAAF STRARCH Hangar	within construction footprint	Not applicable/none	The Project would require the demolition of the STRARCH Hangar. This building has been assessed to be of local, State and Commonwealth significance in terms of its technical value.	The demolition would result in the loss of significance in terms of technical value.
RAE Museum Sandstone Wall	within construction footprint	Not applicable/none	This item has been identified for partial relocation as part of the MUR project. The Project would detrimentally impact the remaining parts of the RAE Museum Sandstone Wall; it would result in demolition or relocation of the remaining parts of the wall. The RAE Museum Sandstone Wall has been assessed to be of local and Commonwealth significance in terms of its social and historical values.	The partial demolition and relocation would result in the loss of residual significance in terms of historical associations and social importance.

## INDICATIVE NORTHERN RAIL CONNECTION CONCEPT LAYOUT MOOREBANK INTERMODAL TERMINAL

**Physical heritage items**  
**Intangible values**  
**Remnant items - Post-MUR**  
**Road alignments**

**Legend:**

- Roads
- Internal Roads
- Proposed Interstate Rail Line
- Proposed IMEX Rail Line
- 1% AEP Flood Level
- Container Storage
- Warehouses
- Available Area
- Truck Access
- Bapaume Road
- Admin
- Equipment Storage
- Maintenance & Repair
- IMEX Operating
- Interstate Terminal
- Other IMT Area
- Rail Corridor
- Detention Basins
- Conservation Areas
- Moorebank Avenue and 18 m Setback
- 7.5 m Setback

**Scale:** 0 125 250 500 Metres

**North Arrow:** N

**Map Labels:**

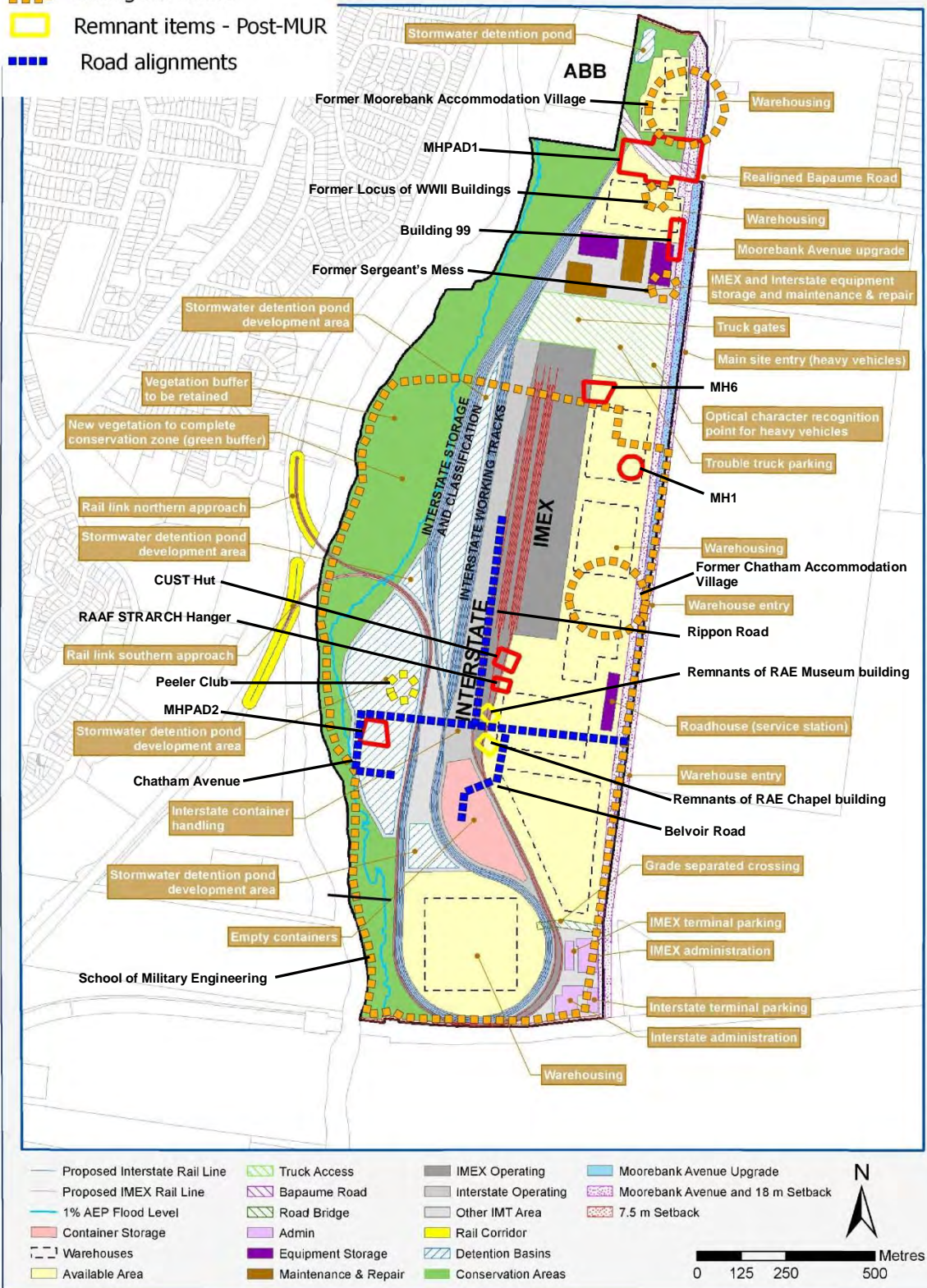
- Stormwater detention pond development area
- Rail link northern approach
- Former Moorebank Accommodation Village
- Rail link southern approach
- MHPAD1
- Former Locus of WWII Buildings
- Building 99
- Former Sergeant's Mess
- Vegetation buffer to be retained
- New vegetation to complete conservation zone (green buffer)
- Rippon Road
- Stormwater detention pond development area
- CUST Hut
- RAAF STRARCH Hanger
- Interstate container handling
- Peeler Club
- MHPAD2
- Container empty
- Chatham Avenue
- Belvoir Road
- Stormwater detention pond development area
- School of Military Engineering
- ABB
- Realigned Bapaume Road
- Interstate administration
- Interstate terminal parking
- IMEX terminal parking
- IMEX administration
- MH6
- Warehouse Entry
- MH1
- Roadhouse (service station)
- Former Chatham Accommodation Village
- Warehouse entry
- Remnants of RAE Museum building
- Express gate
- Remnants of RAE Chapel building
- IMEX container empty
- Truck gates
- Optical character recognition point for heavy vehicles
- Main site entry (heavy vehicles)
- Trouble truck parking
- Level crossing
- IMEX and Interstate equipment storage and maintenance & repair





- Physical heritage items
- Intangible values
- Remnant items - Post-MUR
- Road alignments

## INDICATIVE CENTRAL RAIL CONNECTION CONCEPT LAYOUT MOOREBANK INTERMODAL TERMINAL



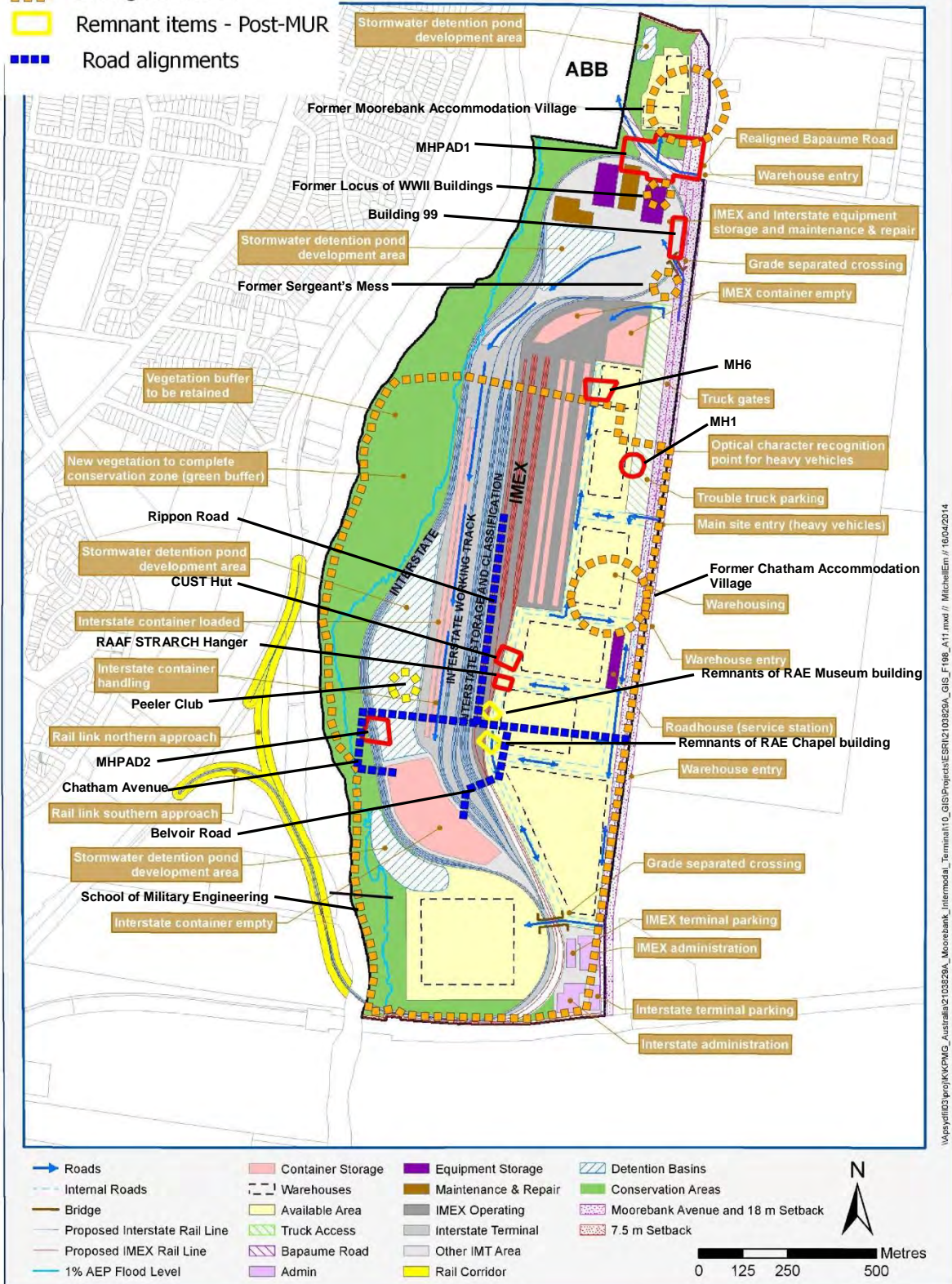
**Figure 11.1b** Post-MUR, tangible and intangible heritage values, relative to the current IMT concept plan – central rail access option  
(Base Image provided by Parsons Brinkerhoff).





- Physical heritage items
- Intangible values
- Remnant items - Post-MUR
- Road alignments

## INDICATIVE SOUTHERN RAIL CONNECTION CONCEPT LAYOUT MOOREBANK INTERMODAL TERMINAL



**Figure 11.1c** Post-MUR, tangible and intangible heritage values, relative to the current IMT concept plan – southern rail access option  
(Base Image provided by Parsons Brinkerhoff).



## 11.2 Indirect impacts

There are five items located adjacent to the Project area that are listed on the Liverpool City Council LEP and other heritage registers (Section 4.5.3). Impacts to these items from the project may include (Table 11.2):

- visual impact from the increase in scale, height and bulk of structures within the site; and
- noise and vibration associated with demolition, construction and operation of the Project.

The items in the broader study area are (see Figure 4.17):

- Kitchener House;
- Glenfield Farm;
- the former Casula Power Station, located on the western side of the Georges River to the Project area;
- railway viaduct, Main Southern Railway Line (item 12), located adjacent to Woodbrook Road, Casula; and
- railway viaduct, Main Southern Railway Line (item 11), located approximately 200 m south of the former Casula power station.

The impacts the Project may have on each of these items relate to the erection of buildings or structures within sightlines and alteration of the setting of the place.

### 11.2.1 Kitchener House

Of adjacent items, the item most likely to be subject to potential indirect impacts from the Project is Kitchener House.

Kitchener House is located on Moorebank Avenue directly across from the Project area. The impacts the Project may have on the place involve the erection of buildings or structures within sightlines of the place and alteration of the setting of the place.

The views from Kitchener House have been substantially altered over time. The Married quarters were constructed across Moorebank Avenue from Kitchener House in the 1940s and subsequently demolished, an industrial estate has been constructed surrounding the place on three sides and Moorebank Avenue has been upgraded substantially since Kitchener House was constructed in 1910.

The part of the Project area immediately adjacent to Kitchener House is a lower density section of the concept plan consisting primarily of warehouses and car parking with surrounding green space.

The impacts to Kitchener House from the Project are insubstantial particularly when taken into context with the current surrounding landscape.

### 11.2.2 Glenfield Farm

Glenfield Farm is located on the western side of the newly constructed Southern Sydney Freight line and the Main Southern Railway Line at the connection point for the southern rail option. The southern rail connection will head directly towards Glenfield Farm from the Project and connect onto the SSFL.

Any impact to the site will be visual through and if constructed the southern rail option connection will visually impact the site both from the construction of the new rail access and from trains approaching the site from a different direction (moving towards the site, rather than passing by the site). There is some screening vegetation within the site boundary however some views do exist over the study



area. The views from the house and barn were assessed to be significant in the 2002 CMP for the property (Mayne-Wilson & Associates 2002:116).

A visual impact assessment (Clouston Associates 2014) has been completed for the project which assesses the impact to the Glenfield Farm area as moderate to high. These views have already been considerably impacted by the Glenfield Landfill and the construction of the SSFL including particularly the Glenfield flyover (that carries the SSFL over the Southern railway line). Plant screening within Glenfield Farm and as part of the rehabilitation works will provide little screening during the early operational stages but once established, may offer a greater level of screening of the Project.

Impacts from noise may include the increase in freight trains travelling along the SSFL and the rail connection into the Project. Again the current noise levels from the SSFL have already impacted the place and the project is not expected to increase the rail noise level from the current operation levels (SLR 2014).

The noise levels for all construction works are within the NMLs at receptors Glenfield (SLR 2014). It is expected that ground vibration levels will comply with the human comfort and cosmetic structural damage criteria (SLR 2014). Any perceptible ground vibration from rail freight is expected to be within the vibration criteria for both human comfort and the less conservative criteria for cosmetic structural damage (SLR 2014).

### **11.2.3 Railway viaducts and Casula Power Station**

The main Project area is located on the opposite side of the Georges River to Railway viaduct, Main Southern Railway Line (item 11) and Railway viaduct, Main Southern Railway Line (item 12) and the Casula Power Station. Again any impacts from the main Project site will be visual from the increase in height, scale and bulk of structures within the site. This is particularly pertinent to the Casula Power House. The visual assessment report (Clouston Associates 2014) assessed the as impact as moderate to low, stating that:

The Powerhouse Arts Centre and surrounding land sit at a similar elevation to the Project site, with views towards the development heavily screened by riparian vegetation along both sides of the Georges River.

The visual impact of the Project on the heritage significance of the Casula Power House is considered to be negligible.

At Casula, predicted noise levels during piling, compaction, bulk earthworks and rail construction works are above the noise management levels (NMLs) at the nearest receptors and trigger the investigation and implementation of reasonable and feasible noise mitigation measures (SLR 2014). Recommendations for noise mitigation in the area is outlined in the noise and vibration assessment for the project.

As above it is expected that ground vibration levels at nearest receptors will comply with the human comfort and cosmetic structural damage criteria (SLR 2014).

The impact from the main Project area to the railway viaducts is considered to be negligible.





**Table 11.2 Indirect impacts from the main Moorebank IMT Project Site**

<b>Site ID</b>	<b>Aspects that respect or enhance the item's heritage significance</b>	<b>Aspects that could detrimentally impact on the item's heritage significance</b>	<b>Resultant impact on the item's heritage significance</b>
Kitchener House	No direct impact, Project area immediately adjacent is a lower density section of the concept plan and consistent with the current setting	Erection of buildings or structures within sightlines of the place and alteration of the setting of the place.	insubstantial
Glenfield Farm	No direct impact	Visual impact the site both from the construction of the new rail access and from trains approaching the site from a different direction. Impacts from noise including the increase in freight trains travelling along the SSFL and the rail connection into the Project.	Views already considerably impacted, screening vegetation remains. The noise levels for all construction works are within the NMLs at receptors Glenfield (SLR 2014).
Casula Power Station	No direct impact	Visual impact from the increase in height, scale and bulk of structures within the site. At Casula, predicted noise levels during piling, compaction, bulk earthworks and rail construction works are above the noise management levels (NMLs).	negligible
railway viaduct, Main Southern Railway Line (item 12)	No direct impact	Visual impact from the increase in height, scale and bulk of structures within the site. At Casula, predicted noise levels during piling, compaction, bulk earthworks and rail construction works are above the noise management levels (NMLs).	negligible
railway viaduct, Main Southern Railway Line (item 11)	No direct impact	Visual impact from the increase in height, scale and bulk of structures within the site. At Casula, predicted noise levels during piling, compaction, bulk earthworks and rail construction works are above the noise management levels (NMLs).	negligible



### 11.3 Impacts associated with the rail spur options

The impacts from the internal Project layouts for each rail option are the same across all options, except for the degree of impact to MHPAD2 and will result in the loss of all heritage items and values.

#### 11.3.1 Northern option

Impact from the internal project layout for the northern rail spur option is a direct impact to all heritage items. Site MHPAD2 is partly, approximately 30%, within a conservation zone and will therefore be partly conserved.

The northern rail access option tie in lines would run across this area and link in onto the bridge across the Georges River. Bridge construction will include pylons and abutments. Potential impacts in this area would include substantial surface modifications, constriction of abutments, as well as excavation for the pylons for the bridge. The pylons and abutments would have the potential to cause disturbance to MHPAD2 (Unit 1 and Unit 2) deposits. The extent of potential disturbance will not be known until the detailed design has been completed.

The Aboriginal test excavation program within the Northern Powerhouse land has demonstrated that while the archaeological significance of the upper 120-150 cm of deposits is generally low, these deposits are likely to have significance in terms of being a representative example of environmental changes that resulted from European settlement, in particular the construction of the Liverpool Weir. The MAPAD2 (Unit 1 and Unit 2) deposits have the potential to be of significance in terms of their scientific value, natural value, educational value, representativeness and social value (importance to the Aboriginal community and the broader Australian community) at local, State and National levels.

The construction area to the south of the construction footprint would be utilised as a laydown and stockpile area as well as for vehicle parking. Potential exists for disturbance to MHPAD2 (Unit 2) deposits across this area and depending upon the nature of site preparation works, there may be disturbance to some sections of the MHPAD2 (Unit 1) deposits in this area.

The northern rail access option will also be connecting with the SSFL and the northern rail option connection is directly adjacent to heritage item *Railway viaduct, Main Southern Railway Line (item 12)*. The Project will not result in any additional direct impacts to this item compared with the construction of the SSFL. Indirect impacts may occur during construction of the rail connection through inadvertent impacts.

#### 11.3.2 Central option

Impact from the internal project layout for the central rail spur option is a direct impact to all heritage items.

Surface survey indicates that it is likely that flood deposits on the western bank of the Georges River may be similar to what was found during the northern powerhouse land testing. The central rail access option tie in lines would run across this area and link in onto the bridge across the Georges River. Bridge construction will include pylons and abutments. Potential impacts in this area would include substantial surface modifications, constriction of abutments, as well as excavation for the pylons for the bridge. Therefore central rail option will impact upon areas of predicted archaeological sensitivity that may have relevance in terms of historical heritage values.

The construction area associated with this option would be utilised as a laydown and stockpile area as well as for vehicle parking. Potential exists for disturbance to sensitive archaeological deposits across this area and depending upon the nature of site preparation works, there may be disturbance to some sections of the deposits in this area.

The central rail access option will be connecting with the newly constructed Southern Sydney Freight line (SSFL) this line is directly adjacent to the Main Southern Railway Line (passenger line). The central rail option connection is directly adjacent to heritage item *Railway viaduct, Main Southern Railway Line (item 11)*. The Project will not result in any additional direct impacts to this item



compared with the construction of the SSFL. Indirect impacts may occur during construction of the rail connection through inadvertent impacts.

### **11.3.3 Southern option**

Impact from the internal project layout for the southern rail spur option is a direct impact to all heritage items. Site MHPAD2 is partly, approximately 15% within a conservation zone and will therefore be partly conserved.

The southern option will not directly impact upon any heritage items or any areas of archaeological sensitivity however this option is adjacent to an item on the State Heritage Register, Glenfield Farm, and may have indirect impacts on this site. Impact to the site will be visual through and if constructed the southern rail option connection will visually impact the site both from the construction of the new rail access and from trains approaching the site from a different direction (moving towards the site, rather than passing by the site). These views have already been considerably impacted by the Glenfield Landfill and the construction of the SSFL including particularly the Glenfield flyover (that carries the SSFL over the Southern railway line). Plant screening within Glenfield Farm and as part of the rehabilitation works will provide little screening during the early operational stages but once established, may offer a greater level of screening of the Project.





## 12. STATUTORY AND POLICY CONTEXT<sup>72</sup>

### 12.1 Environment Protection and Biodiversity Conservation Act 1999

This Act (EPBC Act) repeals the *Environment Protection (Impact of Proposals) Act 1974*, the *National Parks and Wildlife Conservation Act 1975*, the *Whale Protection Act 1980*, the *World Heritage Properties Conservation Act 1983*, and the *Endangered Species Protection Act 1992*. The scope and coverage of the Act is wide and far-reaching. The objectives of the Act include: the protection of the environment, especially those aspects of national significance; to promote the conservation of biodiversity and ecologically sustainable development; and to recognise the role of indigenous people and their knowledge in realising these aims.

The Act makes it a criminal offence to undertake actions having a significant impact on any matter of national environmental significance (NES) without the approval of the Environment Minister. Actions which have, may have or are likely to have a relevant impact on a matter of NES may be taken only:

- In accordance with an assessment bilateral agreement (which may accredit a State approval process) or a declaration (which may accredit another Commonwealth approval process); and
- With the approval of the Environment Minister under Part 9 of the Act. An action that requires this Commonwealth approval is called a 'controlled action'.

The nine matters of national environmental significance protected under the EPBC Act are:

- [world heritage properties](#)
- [national heritage places](#)
- [wetlands of international importance](#) (listed under the Ramsar Convention)
- [listed threatened species and ecological communities](#)
- [migratory species](#) protected under international agreements
- [Commonwealth marine areas](#)
- [the Great Barrier Reef Marine Park](#)
- [nuclear actions \(including uranium mines\)](#)
- [a water resource, in relation to coal seam gas development and large coal mining development](#)

In addition, the Act makes it a criminal offence to take on Commonwealth land an action that has, will have, or is likely to have a significant impact on the environment (section 26(1)). A similar prohibition (without approval) operates in respect of actions taken outside of Commonwealth land, if it has, or is likely to have a significant impact on the environment on Commonwealth land (s26(2)). Section 28, in general, requires that the Commonwealth (or its agencies) must gain approval (unless otherwise excluded from this provision), prior to conducting actions which has, will, or is likely to have a significant impact on the environment inside or outside the Australian jurisdiction.

The Act adopts a broad definition of the environment that is inclusive of cultural heritage values. In particular, the 'environment' is defined to include the social, economic and cultural aspects of

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<sup>72</sup> The following information is provided as a guide only. Readers are advised to seek qualified legal advice relative to legislative matters.



ecosystems, natural and physical resources, and the qualities and characteristics of locations; places and areas (s528).

The Act allows for several means by which a controlled action can be assessed, including an accredited assessment process, a public environment report, an environmental impact statement, and a public inquiry (Part 8).

Section 68 imposes an obligation on a proponent proposing to take an action that it considers to be a controlled action, to refer it to the Environment Minister for approval.

## **12.2 Environmental Planning and Assessment Act 1979**

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and its regulations, schedules and associated guidelines require that environmental impacts are considered in land use planning and decision making. Environmental impacts include cultural heritage assessment. Division 4.1 of Part 4 of the EP&A Act establishes an assessment and approval regime for projects deemed to be State Significant Development (SSD). Division 4.1 applies to development that is considered to be SSD by either a State Environmental Planning Policy (SEPP) or a Ministerial Order published in the Government Gazette (under Section 89C of the EP&A Act).

Under Section 89D of the EP&A Act, the Minister is the consent authority for SSD. Section 23 of the EP&A Act enables the Minister to delegate the consent authority function to the Planning Assessment Commission, the Director-General or to any other public authority.

For SSD projects, the following authorisations are not required from other government agencies SSD:

- Approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*.

Furthermore, Division 8 of Part 6 of the *Heritage Act 1977* does not apply to prevent or interfere with the carrying out of approved SSD.

Despite these exemptions, as a part of the EIS for the Project required under the EP&A Act, the potential impact on historic heritage values must be assessed and effective impact mitigation and conservation management proposed. The application of this process to historic heritage values in listed in the SEAR's for this Project.

It is recommended that strategies for impact minimisation, mitigation and the management of heritage values drafted in this assessment be included in the EIS Statement of Commitments for this Project.

## **12.3 Implications for the Moorebank IMT Project**

The proposed Moorebank Intermodal Terminal would have impacts on European heritage items. Twelve items, including the overall Moorebank Cultural Landscape, have been assessed to be of heritage significance. All 12 items meet the criteria for Commonwealth Heritage Listing, three items meet the criteria for State heritage listing and all meet the criteria for local heritage listing. All of these identified heritage items would be directly impacted by the construction footprint.

Therefore the provisions of both the EPBC Act and the EP&A Act are applicable.

As the Project has the potential to impact matters of NES under the EPBC Act, the proposed action was referred to and accepted by SEWPaC as a controlled action, to be assessed by preparation of an Environmental Impact Statement (EIS). SEWPaC released guidelines for the content of a draft EIS for this Project (2011/6086), which require the EIS to meet the following in relation to heritage:

- identify, describe and map places or items of historical heritage value; and
- describe the significance of the values to people or groups associated with those places.



This Project is seeking approval as a Stage 1 state significant development (SSD). In March 2014, the NSW Department of Planning and Environment (P&E) issued Secretary's Environmental Assessment Requirements (SEARs) for the Project. The SEARs state that where impacts to National, State or locally significant historic heritage items are identified the assessment shall:

- outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the guidelines in the NSW Heritage Manual (1996) [NSW HO & DUAP 1996];
- 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);
- include a statement of heritage impact for all heritage items (including significance assessment);
- consider impacts from vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment; and
- where archaeological excavation is required, demonstrate that an appropriate archaeological assessment methodology, including research design (where relevant) has been undertaken, to guide physical archaeological test excavations and include the results of these excavations.

This European heritage assessment will form a part of the EIS to address the requirements under the EPBC Act and the EP&A Act and address the SEWPAC guidelines and SEARs.





## 13. MANAGEMENT AND MITIGATION STRATEGIES

The proposed concept plan for the Moorebank Intermodal Terminal has the potential to directly impact all of the remaining identified heritage items within the Project area. All remaining buildings will be cleared as part of the early works phase of the project therefore most impacts to sites will be associated with this phase. Earthworks will occur in project Phases A to C which will impact any remaining sites including archaeological deposits.

Given that the proposed impacts to European heritage have the potential to result in the total loss of heritage values, a range of mitigation strategies need to be considered and implemented where applicable, i.e. where it is not practicable to avoid impacts, the following mitigation strategies will help minimise and/or offset the loss of heritage values:

- Archival recording;
- Interpretation;
- Salvage of archaeological deposits;
- Relocation; and
- Adaptive reuse.

These measures along with specific mitigation measures related to the rail access options and indirect impacts are outlined.

### 13.1 Mitigation Measures

#### 13.1.1 Archival recording

Items of Commonwealth, State and Local significance will be impacted by the Project. Archival recording of any of these sites not already included in a program of archival recording for the MUR project will need to be undertaken. The items that warrant archival recording are:

- CUST Hut
- RAAF STRARCH Hangar
- RAE Museum and Australian Army Museum of Military Engineering Collections
- B99
- Dog Cemetery (MH1)
- Commemorative Gardens (MH6)
- Remaining elements of the RAE Chapel

#### 13.1.2 Interpretation

The Project area contains both tangible and intangible European heritage values. Physical conservation, relocation and salvage strategies can mitigate impact to the tangible resource (such as the memorials and archaeological deposits), but can be ineffective at addressing intangible values. The latter includes traditions and cultural values related to place, history, and memory. Such values can be maintained through recognition, the telling of stories and the use of names.



In order to address impact to both tangible and intangible values, it is proposed to develop a European heritage interpretation strategy for the Project. Key aspects of heritage within the Project area that should be incorporated into the interpretation strategy are values associated with:

- pre-European land use;
- nineteenth century settlement;
- military use and land tenure prior to WWII, inclusive of the archaeological evidence relating to this period;
- expansion/intensification of military use during WWII, inclusive of the archaeological evidence and physical structures relating to this period; and
- later twentieth century military use, inclusive of memorials, landscape elements and place names.

The strategy may consider the inclusion of commemorative signage within the Project area, and/or the development of a visitor's pamphlet detailing the past European use of the area. This information can also be included on web sites and other public documents. The naming of elements within the Project area such as roads and buildings could also be a way of acknowledging the past European use of the site.

The European heritage interpretation strategy should be developed in close consultation with local historical societies, former and current staff and military personnel. The strategy could consider combining both European and Aboriginal interpretation within the Project area.

#### **13.1.3 Salvage of archaeological deposits**

MHPAD1 and MHPAD2 contain archaeological deposits, inclusive of *in situ* building remains, that are assessed to be of local significance in the context of the history of military housing and training at Moorebank. These sites will be directly impacted by the Project. The mitigation measure applicable to these sites is the conduct of an archaeological salvage program.

Potential archaeological deposits have been identified at the CUST Hut however access to these deposits was not available at the time of this investigation as the building is still extant. When access is available the same mitigation measure for MHPAD1 and MHPAD2 applies, pending confirmation of the existence of such deposits at this site.

#### **13.1.4 Relocation**

Upon completion of the MUR project, the following elements of heritage significance will remain prior to construction of the Project:

- Portions of the RAE Chapel and fittings;
- CUST Hut;
- RAAF STRARCH Hangar;
- MH1 (Dog Cemetery);
- MH6 (Commemorative Garden); and
- The broader cultural landscape inclusive of intangible elements such as street names.

Given that these items are assessed to be of heritage value against both NSW and CHL significance criteria and include items of Commonwealth, State and Local significance, consideration needs to be



given to whether archival recording of the physical sites and features above will be sufficient mitigation of impacts resulting from the Project.

Options for these items included adaptive reuse, discussed below and/or relocation. Relocation of some of these items may be an option for the Project however the scale and cost of relocating the large structures such as the CUST Hut and RAAF STRARCH Hangar, however options for their relocation should be considered during the early works and detailed design phases of the project.

With regard to the Dog Cemetery at MH1, the IMT concept plan would result in destruction to and loss of the physical graves, as well as the intangible values associated with them, options for a relocated cemetery would help mitigate these impacts. Requirements and options for repositioning and reinterment of the individual graves, in accordance with the wishes of the SME's Explosive Detection Dogs unit, should be explored during the detailed design stage of the Project.

The remaining items Portions of the RAE Chapel and fittings and MH6 (Commemorative Garden) also provide an opportunity for relocation or celebration in another location within the Project area which also should be explored during detailed design.

### 13.1.5 Adaptive reuse

The significant elements of the built environment that remain following completion of the MUR project warrant mitigation measures above and beyond archival recording. While the MUR project itself provides mitigation measures that account for impacts to the RAE Chapel, the RAE Museum and Collection and various other memorials, it does not address impacts to remaining items, the loss of cultural context for those items or impacts to the residual cultural landscape.

Adaptive reuse of the CUST Hut, Transport Compound Workshop (B99) and the RAAF STRARCH Hangar would mitigate impacts to heritage values through the loss of their broader cultural landscape context. More importantly, it would provide an alternative to the potential destruction and loss of the structures themselves. Essentially as the Moorebank Cultural Landscape has been extensively impacted through the MUR project any remaining elements are a tangible link to that landscape and there is an increased value in keeping these elements within the landscape.

The concept design for the Project does not currently include provision for retention and reuse of any elements of the existing cultural landscape. However, opportunity exists within the detailed design phase to consider adaptive reuse of key components of the Moorebank Cultural Landscape. In particular, the CUST Hut and RAAF STRARCH Hangar provide opportunities for elements of the site's history and heritage to be commemorated, while also ensuring the long term future of both items. Requirements and options for their adaptive reuse, either *in situ* or at new locations within the Project, should be explored during the detailed design stage of the Project.

Similarly, the Commemorative Garden at MH6 displays both tangible and intangible heritage values associated with the garden itself and the broader Moorebank Cultural Landscape. Given that the IMT concept plan would result in destruction to and loss of the physical plantings and memorials, as well as the intangible values associated with them, options for an adapted form of garden would help mitigate these impacts. Opportunity exists to respect the character and setting of the Moorebank Cultural Landscape and the history of military associations through the preservation of this garden. As with the CUST Hut and STRARCH Hangar, requirements and options for continuation of the garden either *in situ* or at a new location within the Project, should be explored during the detailed design stage of the Project.

Given that mitigation of heritage impacts to the CUST Hut, B99, RAAF STRACH Hangar, MH1 and MH6 has not been encompassed within the mitigation strategies of the MUR project, it is the responsibility of the Project to ensure that losses to heritage values are minimised. Adaptive reuse is the only viable mitigation option that respects the heritage significance of these items

Opportunity also exists for certain less tangible elements of the cultural landscape, such as toponyms, to be commemorated or reused. Street names such as Chatham Avenue, Ripon Road, and Belvoir Road might be considered for inclusion as location names within the Project, thus continuing the commemoration implicit in each name while also commemorating the prior military





history of the site. Similarly, the name Steele Barracks might be incorporated into some aspect of site naming.

### **13.1.6 Rail access options**

#### *Northern rail access option*

No additional individual heritage items are impacted by this option.

The archaeological deposits on the northern option - northern Powerhouse land are assessed to be of Commonwealth significance and the Unit 1 and Unit 2 deposits have the potential to be of significance in terms of their scientific value, natural value, educational value, representativeness and social value (importance to the Aboriginal community and the broader Australian community) at local, State and National levels. Further investigation through a program of archaeological subsurface testing is required to effectively assess the nature, extent and significance of any deposits that may be impacted by this option. However, it should be noted that the impacts to the Unit 1 and Unit 2 deposits in this area would not be extensive, so any impacts to historical heritage values could be managed through monitoring and/or salvage excavation as part of the broader Aboriginal archaeological investigations (NOHC 2014b).

The full mitigation measures for this area are outlined in the addendum report (NOHC 2014b).

#### *Central rail access option*

No additional individual heritage items are impacted by this option.

Surface survey indicates that it is likely that flood deposits on the western bank of the Georges River may be similar to what was found during the northern Powerhouse land testing (NOHC 2014b). Further investigation through a program of archaeological subsurface testing is required to effectively assess the nature, extent and significance of any deposits that may be impacted by this option. However, it should be noted that the impacts to any Unit 1 and Unit 2 deposits that may be present in this area would not be extensive, so any impacts to historical heritage values could be managed through monitoring and/or salvage excavation as part of the broader Aboriginal archaeological investigations (NOHC 2014b).

Inadvertent indirect impact from the construction of the rail connection may occur to site *Railway viaduct, Main Southern Railway Line (item 11)*. This site should be noted on all plans and maps during construction and all care taken to avoid this item.

#### *Southern rail access option*

While the southern rail access option is unlikely to have direct impacts on any areas of historical heritage significance, potential does exist for indirect impacts to the State Heritage Register listed site, Glenfield Farm. A visual assessment of the site (Clouston Associates 2014) identified that the impact to the Glenfield Farm area was moderate to high. However these views have already been considerably impacted by the Glenfield Landfill and the construction of the SSFL. Screen plantings should be maintained within the Glenfield Farm site and rehabilitation works will provide into the future.

Inadvertent indirect impact from the construction of the rail connection may occur to site *Railway viaduct, Main Southern Railway Line (item 12)*. This site should be noted on all plans and maps during construction and all care taken to avoid this item.

### **13.1.7 Mitigation of indirect impacts**

Indirect impacts are anticipated at five items outside of the Project area. The items in question are Kitchener House, Glenfield Farm, Casula Power Station and two railway viaducts (items 11 and 12) on the Main Southern Railway Line. All of these items are listed on the Liverpool City Council LEP.



Impact mitigation for the Glenfield Farm and the two railway viaducts (items 11 and 12) are discussed above in section 13.1.5.

The Project will have an indirect impact on the view from Kitchener House; however this impact has been assessed as 'insubstantial' given that the house is set back from Moorebank Avenue and the views from this site have already been altered by surrounding developments. While further alterations of the views from Kitchener House cannot effectively be avoided, the proposed interpretation strategy will help to offset the limited indirect impacts of the Project.

The visual impact of the Project on the heritage significance of the Casula Power House is considered to be negligible.

### **13.1.8 Effectiveness of mitigation measures**

During the current assessment, various measures to avoid and mitigate harm have been considered. However, there are very limited options in terms of altering the Project impact area.

The majority of study area has been identified as not having items of heritage significance, however within the Project area as a whole there is evidence of land use from pre-contact through to the present day. In that regard it does provide a relatively unique palimpsest of human occupation including indigenous, early settler and military phases. Historical themes evidenced within this landscape include early settlement, development of the Moorebank and Collingwood estates, WWI and WWII activities, sandmining, light railway, military training and commemoration of life events. The most recent occupation i.e. military training and memorials are what is most clearly demonstrated in the landscape. The MUR project has identified the items with intangible values within this landscape that are to be relocated to Holsworthy, thus mitigating impacts upon social values by transferring them to a more secure and permanent location. The European interpretation strategy will also serve to commemorate and document these intangible values.

The proposed mitigation measures for the identified archaeological deposits are focused on investigating, documenting and archiving those deposits identified as having the greatest research potential. Additional investigations, historical research and a comprehensive salvage program will maximise information yielded from impacted sites as well as ensuring retention of such information for future generations.

In terms of effectiveness, the proposed mitigation measures will account for the majority of the Project impacts to European heritage. All items identified as having high social significance will be relocated by the MUR project, and all archaeological deposits identified as having research potential will be salvaged. The only gap in the mitigation strategy is the impact on the Dog Cemetery (MH1), Commemorative Garden (MH6), CUST Hut, Transport Compound Workshop (B99) and RAAF STRARCH Hangar. These items meet criteria for Commonwealth Heritage Listing as well as Local and/or State levels of significance against NSW criteria. The loss of the cultural landscape context in which these items sit, and the loss of the physical structures and garden, are not presently accounted for. As such, the adaptive reuse or relocation of these items should be a priority for the Project; the archival recording that would accompany these actions is not of itself sufficient mitigation of the potential loss of these structures and the heritage values associated with them.



## 14. RECOMMENDATIONS

It is recommended that:

- Further consideration is given to options for the retention and/or relocation and adaptive reuse of the CUST Hut and the RAAF STRARCH Hangar to mitigate impacts on heritage values associated with these structures and their broader cultural landscape context. The first preference would be to retain and adaptively reuse these items on the redeveloped Project Site (within the precinct but outside the secure area, as part of the administrative facilities or similar). If this is not feasible or practicable, the second preference would be for relocation to another appropriate location, potentially with adaptive reuse;
- Archival recording of all items of Commonwealth, State and Local significance will be required prior to any impact. This would include recording of salient physical aspects of the Moorebank Cultural Landscape;
- The European heritage interpretation strategy would be developed in close consultation with local historical societies, former and current staff and military personnel. The strategy could consider combining both European and Aboriginal interpretation within the Project area;
- No impacts should occur within the PAD boundaries of MHPAD1 and MHPAD2 without prior archaeological salvage as these sites contain archaeological deposits, inclusive of in situ building remains, that are assessed to be of local significance in the context of the history of military housing and training at Moorebank;
- In addition to archival recording of the Transport Compound Workshop (B99) consideration is given during the detailed design stage for the *in-situ* conservation or adaptive reuse of this structure within the Project. This would assist with mitigation of heritage impacts to the structure itself and the Moorebank Cultural Landscape as a whole;
- In addition to archival recording, the Dog Cemetery (MH1) is repositioned and the individual graves reinterred. This would be carried out in accordance with the wishes of the SME's Explosive Detection Dogs unit and respecting the social value of the site;
- In addition to archival recording consideration is given during the detailed design stage for the *in-situ* conservation of the Commemorative Garden (MH6). If *in-situ* conservation is not possible the plaques and planting should be relocated to an alternate location within public space within the Project;
- If the central rail access option is to go ahead Heritage item *Railway viaduct, Main Southern Railway Line (item 11)* should be noted on all plans and maps during construction and all care taken to avoid this item.
- If the southern rail access option is to go ahead heritage item *Railway viaduct, Main Southern Railway Line (item 12)* should be noted on all plans and maps during construction and all care taken to avoid this item.
- The unanticipated discoveries protocol at Appendix 7 would be followed in the event that historical items or relics or suspected burials are encountered during excavation works; and
- The unanticipated discoveries protocol at Appendix 7 would be followed in the event that historical maritime items or relics are encountered during bridge works within the Georges River.

These recommendations would be implemented in combination with those set out in the Aboriginal cultural heritage assessments for the Project (NOHC 2014a and b).





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