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1 INTRODUCTION

1.1 Background

Roads and Maritime Services (Roads and Maritime) propose to upgrade about 3.2 kilometres of Mona Vale Road between Manor Road / Lane Cove Road, Ingleside and Foley Street, Mona Vale (Mona Vale Road East Upgrade), from a two lane (one in each direction) undivided road to a four lane (two lanes in each direction) divided road (the proposal). The proposal includes changes to the width, nature and location of the existing road and comprises part of the Mona Vale to Macquarie Park Corridor Strategy, prepared by the RTA in 2009.

The proposal aims to reduce congestion and delays, particularly during peak times. Community consultation in relation to the proposal has been ongoing since 2014.

1.2 Proposal Description

The proposal is located within the Pittwater local government area (LGA) and is within the Roads and Maritime Sydney Region. The western part of the proposal area is primarily within a bushland setting with Katandra Bushland Sanctuary located on the northern side of Mona Vale Road and part of Ingleside Chase Reserve on the southern side. The eastern section of the proposal is more urbanised and is characterised by adjacent residential development, light industry, commercial land uses, recreational areas and Mona Vale Cemetery. The proposal area is situated within the Narrabeen Lagoon Catchment and several drainage lines flow beneath Mona Vale Road in a south easterly direction, with Narrabeen Creek the most prominent.

The existing two-lane road has a steep vertical alignment and no overtaking opportunities east of Manor Road. Traffic congestion within the proposal area occurs for variety of reasons, including:

- High and increasing traffic volumes using this arterial road.
- 'Bottlenecking' caused by traffic merging from two lanes into a single lane at both ends of the proposal area.
- Heavy vehicles travelling below the posted speed as they climb or descend the steep hill within the proposal area.

As a result of the steep grades, heavy vehicle use, and lack of overtaking opportunities, road users frequently experience major traffic delays both during and outside of peak periods, as traffic flow behind heavy vehicles is slowed. In addition to the traffic congestion, this section of Mona Vale Road has a high crash rate indicating safety issues for vehicles using this road.

The proposal is needed to reduce congestion and improve road safety. In addition, the concept design provides for anticipated future growth in the region.

The key features of the proposal generally include:

- Widening Mona Vale Road between Manor Road and Foley Street from two lanes to four lanes (two-lanes in each direction).
- Provision of a central concrete safety barrier along the length of Mona Vale Road between east of Manor Road to east of Daydream Street.
- Provision of three metre wide shoulders along the length of Mona Vale Road between Manor Road and Foley Street to allow for breakdowns and on-road cyclists.
- Provision of fauna connectivity measures at the end of Lane Cove Road (near Narrabeen Creek) by duplicating an existing culvert.
- Provision of a truck arrester bed behind the shoulder of the Mona Vale Road eastbound lane approaching Walana Crescent.
- Relocation of the eastbound bus stop on Mona Vale Road, near the Ponderosa Parade and Samuel Street intersection, about 250 metres further east.
- Replacing the existing roundabout at the intersection of Ponderosa Parade and Samuel Street with new traffic control signals and signalised pedestrian crossings. Approaches to the new signalised intersection would include:
  - Provision of two through lanes (eastbound) and two through lanes (westbound).
  - Provision of bus priority lanes on Mona Vale Road on the approaches to and departures from the intersection of Ponderosa Parade and Samuel Street.
  - Provision of dedicated turning lanes from Mona Vale Road (eastbound) to Samuel Street (dedicated left turn lane), and to Ponderosa Parade (dedicated right turn lane).
  - Provision of dedicated turning lanes from Mona Vale Road (westbound) to Samuel Street (dedicated right turn lane), and to Ponderosa Parade (dedicated left turn lane).
- Reconfiguration of the intersection with Emma Street to left turn in and left turn out only.
- Upgrading the existing signalised T-intersection at Foley Street and Mona Vale Road to provide a westbound left turn lane into Foley Street and a westbound left turn lane out of Foley Street.
- Providing a 3.5 metre wide shared path (for pedestrians and cyclists) on the southern side of Mona Vale Road between Ponderosa Parade and Foley Street.
- Providing additional pedestrian connectivity in the form of a minimum 1.5 metre wide concrete path along Lane Cove Road linking to Mona Vale Road near Walana Crescent. Pedestrian connectivity for the proposal would be provided away from the Mona Vale Road corridor due to the steep descent from the Warriewood escarpment.
- Undertaking utilities relocation where required including the provision of a utility corridor along Lane Cove Road, away from the Mona Vale Road corridor.
- Posted speed limit of 80 kilometres per hour once the road upgrades when both the proposal and the proposed Mona Vale Road West upgrade, McCarrs Creek Road to Powder Works Road, are complete.
- Posted speed limit of 60 kilometres per hour for truck and buses eastbound descending the escarpment.
- Provision of steep descent signage with flashing lights.
- Upgrade of the existing pavement and cross drainage systems including the construction, reconstruction and extension of pavement drainage lines.
- Construction of retaining walls, up to about six metres in height, at various locations within the proposal area.
- The proposal would include about five main cuttings, up to 16 metres in height, at various locations within the proposal area.
- Installation of traffic monitoring cameras at all signalised intersections to assist with traffic management.
- Landscaping over the length of the proposal.
- Establishing temporary site compounds and stockpiles during construction.

The proposal would be funded by the NSW Government. Subject to approval and funding, construction works are expected to commence in the first half of 2017, and construction is expected to take a minimum of 30 months to complete, weather permitting.

1.3 Purpose of this report

This Stage 1 Contamination Assessment has been developed to identify the past practices in relation to the proposal area and surrounding areas that may have caused contamination. The assessment will be used to determine if further investigations of the proposal area are required and to provide information to:

- determine the potential chemicals of concern on the proposal area;
- determine the chemicals to be assessed in any physical investigations on the proposal area, and;
- in the event that further investigation is deemed necessary, determine the sampling program for soil, groundwater, surface water or other investigations that may be required.

This specialist input is required to inform the environmental assessment (EA) for the Mona Vale Road East Upgrade.
2 EXISTING ENVIRONMENT

2.1 Site Location and Description
The proposal is located within the Pittwater local government area (LGA) and is within the Roads and Maritime Sydney Region. The western part of the proposal area is primarily within a bushland setting with Katandra Bushland Sanctuary located on the northern side of Mona Vale Road and part of Ingleside Chase Reserve on the southern side. The eastern section of the proposal is more urbanised and is characterised by adjacent residential development, light industry, commercial land uses, recreational areas and Mona Vale Cemetery. The western portion of the proposal area is within the Narrabeen Lagoon Catchment and section of the eastern portion drain to the Cahill Creek Catchment. Several drainage lines flow beneath Mona Vale Road in a south easterly direction, with Narrabeen Creek the most prominent. The extent of the proposal area is presented in Figure 1, Appendix A.

Several locations within the proposal area are considered potential sources of anthropogenic contamination. They include:

- Former market garden sites - numerous locations within the proposal area.
- Asbestos contamination area – located on the northern side of Mona Vale Road, west of Mona Vale Cemetery and south of the Wallaby Circuit housing development.
- Truck roll over area – southern side of Mona Vale Road between Ponderosa Parade and Emma Street, Mona Vale.
- Uncontrolled fill material placement – southern side of Mona Vale Road opposite intersection of Mona Vale Road and Emma Street.
- Uncontrolled fill material placement – northern side of Mona Vale Road at the terminated intersection of Lane Cove Road - Lot 3 DP502582
- Uncontrolled fill material placement - northern side of Mona Vale Road 127 Mona Vale Road - Lot 1 DP784516.
- Potential waste storage area – 119 Mona Vale Road Ingleside Lot 1 DP 124602 and Lot 2 DP 124602 northern side of Mona Vale Road.
- Potential waste storage area - 120 Mona Vale Road Warriewood Lot 3 DP 124602, Lot 4 DP 124602 and Lot 5 DP 124602 southern side of Mona Vale Road east of Narrabeen Creek
- Potential waste storage area – 122 Mona Vale Road Warriewood Lot 1 DP 383009 and Lot 5 DP124602 southern side of Mona Vale Road east of Narrabeen Creek
- The location of identified potential areas of contamination is presented in Figure 2, Appendix A.

2.2 Topography and Landforms
The proposal area encompasses the existing Mona Vale Road alignment from Manor Road / Lane Cove Road, Ingleside to Foley Street, Mona Vale including those sections of land parcels adjacent to the existing Mona Vale Road which form part of the proposed road alignment expansion.
Mona Vale Road, from Manor Road / Lane Cove Road, Ingleside to Foley Street, Mona Vale, is situated on the upper slopes and crests of a rugged sandstone ridgeline. The majority of Mona Vale Road is cut into the edge of a hillside overlooking the Warriewood Valley. The land adjoining Mona Vale Road is characterised by steep hillsides with numerous rock overhangs, crevices, cliffs and boulders (some loose and unstable) on both sides of the road. Much of the length of the proposal area slopes steeply to the south, towards the Warriewood Valley.

In addition the proposal area contains numerous loose boulder, some large floating sections and areas of deep fill. The existing steep and high batters (up to eight metres) start immediately adjacent to the kerbline. About 85 per cent of the length of the proposal is on rock escarpment with about 70 per cent of the length of the proposal being areas of class 1 -2 rock (Hawkesbury Sandstone) with the remaining 15 per cent is the softer class 3 - 4 rock (Narrabeen Sandstone).

2.3 Regional Geology

Reference to the 1:100,000 Geological Series Sheet for Sydney shows the site to be underlain by Hawkesbury Sandstone comprising of medium to coarse grained quartz sandstone, very minor shale and laminate lenses. Reference the 1:100,000 Landscape map for Sydney shows the site belongs to Hawkesbury Group which is characterised by rugged, rolling to very steep hills on Hawkesbury Sandstone, with local relief of 40m to 200m, ground surface slopes of more than 25 per cent, rock outcrop of more than 50 per cent, narrow crests and ridges, narrow incised valleys, steep side slopes with rocky benches and broken scarp and boulders.

The subsurface soil in this group is likely to be shallow, less than 0.5m, stony, highly permeable and susceptible to extreme erosion and mass movement hazards. The soils of the proposal area are known to have severe sheet erosion hazard, particularly after fires have removed the understorey layers and after heavy rainfall (RMS, 2013). Pittwater Council have identified a corridor that runs north to south through the study area between Laurel Road and Walana Crescent, as a slip risk area and potentially affected by landslips.

2.4 Regional Lithology

A description of the various soil landscape profiles that are mapped within the proposal area are provided below.

Somersby

- **Soils** - moderately deep to deep red earths and yellow earths overlying laterite gravels and clays on crests and upper slopes; yellow earths and earthy sands on mid slopes; grey earths, leached sands and siliceous sands on lower slopes and drainage lines; gleyed podzolic soils in low lying poorly drained areas..

- **Limitations** – localised permanently high water tables, areas of laterite and stony soil, very low soil fertility, highly permeable soil.

Lambert

- **Soils** - shallow, discontinuous earthy sands and yellow earths on crest and inside benches. Shallow siliceous sands on leading edges; shallow to moderately deep
leached sands, grey earths and gleyed podzolic soils in poorly drained areas; localised yellow podzolic soils associated with shale lenses.

- **Limitations** – very high soil erosion hazard, rock outcrop, seasonally perched water table, shallow, highly permeable soil, very low soil fertility.

**Hawkesbury**

- **Soils** - shallow soils associated with rock outcrop. Earthy sands, yellow earths and some podzolic soils on inside of benches and along joint and fractures. Localised yellow and red podzolic soils associated with shale lenses and siliceous sands and secondary yellow earths along drainage lines.

- **Limitations** - extreme soil erosion hazard, mass movement (rock fall) hazard, steep slope, rock outcrop, shallow, stony, highly permeable, low soil fertility.

**Watagan**

- **Soils** - shallow to deep Lithosols Siliceous Sands and Yellow Podzolic Soils on sandstones; moderately deep brown podzolic soils, red podzolic soils and gleyed podzolic soils on shales.

- **Limitations** - mass movement hazard, steep slopes, severe soil erosion hazard and occasional rock outcrop.

**Erina**

- **Soils** - moderately deep to deep yellow podzolic soils on sandstone crests and slopes; moderately deep red podzolic soils on shale crests and steeper slopes; deep yellow podzolic soils on shale lower slopes; some deep yellow earths on colluvial foot slopes.

- **Limitations** - very high soil erosion hazard, impermeable plastic low wet-strength subsoil, localised run-on, seasonal waterlogging of foot slopes.

**Tuggerah**

- **Soils** - Deep podsols on dunes and podzol / humus podzol intergrades on swales.

- **Limitations** - extreme wind erosion hazard, non-cohesive, highly permeable soil, very low soil fertility, localised flooding and permanently high water tables.

Figure 3, Appendix A identifies the approximate location of the various soil landscapes in relation to the Proposal Area.

### 2.5 Regional and Local Hydrogeology

The proposal area occurs on the mid slopes of a hillside and is traversed by a number of natural drainage lines that flow beneath Mona Vale Road in a south-easterly direction into adjoining bushland. Narrabeen Lakes is located about three kilometres to the south east of the proposal area, where the local catchment runs to before running out into the ocean. Upstream areas of the catchment include a mixture of bushland and semi-urban landuses which contribute to the quality of water flowing through the proposal site. Run-off from the existing road corridor would also contribute to water quality within the proposal area.

Narrabeen Creek is the largest drainage line within the proposal area. It captures runoff from a large catchment area on the northern side of Mona Vale Road and flows south east...
into the Warriewood Valley and Boondah Reserve at North Narrabeen and ultimately into Narrabeen Lakes. Flow is the creek is generally low except after periods of heavy rainfall.

The remainder of the drainage lines in the proposal area are small concrete lined culverts and channels. One of these channels in the western portion of the proposal area appears to connect with Mullet Creek to the south of the study area and flow into Narrabeen Lagoon about three kilometres south east of the study area. Within the eastern portion of the proposal area, stormwater collected from a portion of the proposal area is conveyed north into the Cahill Hill Creek catchment. The catchment encompasses land on the northern side of Mona Vale Road from Boundary Street to Emma Street including a section to the south of Mona Vale Road between Daydream Street and Ponderosa Parade.

Stormwater management in the eastern end of the proposal is primarily managed through the urban stormwater system. The existing road corridor through the bushland areas in the middle and western end of the proposal includes primarily formed table drains running parallel to the road. No formal stormwater management system exists in this section of the proposal with water running off into the adjacent bushland.

A stormwater quality detention basin exists on the southern side of Mona Vale Road, between Boundary Street and Daydream Street. The basin provides stormwater management for an industrial development on the southern side of Mona Vale Road, west of Daydream Street.

A second stormwater quality detention basin exists on the northern side of Mona Vale Road, on the western side of the Mona Vale Cemetery. This basin provides stormwater management for the Warriewood housing development currently under construction on the northern side of Mona Vale Road.

A search of the Department of Water and Energy Online Database on the 5th January 2015 identified groundwater bores within the vicinity of the site. The search indicated that there are four (4) boreholes registered under the database within 200m of the Proposal Area. Table 1 details the groundwater bores identified within 200m of the proposal area.

Table 1 – Summary of groundwater bores

<table>
<thead>
<tr>
<th>GW ID</th>
<th>Location</th>
<th>Water level / water quality data</th>
</tr>
</thead>
<tbody>
<tr>
<td>GW108450</td>
<td>South of Mona Vale Road – Lot 86, DP 12115. Waratah Road, 80m west of Manor Road, Ingleside.</td>
<td>Standing water level 41.3m</td>
</tr>
<tr>
<td>GW060467</td>
<td>South of Mona Vale Road - Corner of Manor and Waratah Road, Ingleside.</td>
<td>No data</td>
</tr>
<tr>
<td>GW104217</td>
<td>North of Mona Vale Road – Lot 25 DP 12115, west of Ingleside Road, Ingleside.</td>
<td>No data</td>
</tr>
<tr>
<td>GW105648</td>
<td>North of Mona Vale Road – Lot A DP 372094, west of Boundary Street, Warriewood.</td>
<td>Standing water level 31m</td>
</tr>
</tbody>
</table>

With the exception of standing water levels identified in GW 108450 and GW105648, no other information was provided within the logs that could be used to determine regional or local hydrogeological conditions.
Figure 4, Appendix A shows the locations of the identified groundwater bores in relation to the proposal area.

2.6 Acid Sulfate Soil Risk
Acid sulfate soils are acidic soil horizons (layers) resulting from the aeration of soil materials rich in iron sulfides. Acid sulphate soils generally occur within the following locations:

- Marine or estuarine sediments deposited during the Holocene period.
- Soils >5m above sea level.
- Marine or estuarine settings/environments.

No known acid sulfate soils are mapped by the New South Wales Natural Resource Atlas (OEH 2013) in the vicinity of the proposal.

2.7 Sensitive Receptors
Sensitive receptors in proximity to the proposal area which may be impacted as a result of contamination include the following:

- Residential, commercial, industrial and recreational land uses in proximity to the proposal area;
- Places of worship and community centres;
- Mona Vale Cemetery;
- Water courses including Mullet Creek, Narrabeen Creek, Cahill Creek and other unnamed drainage lines;
- Areas of biodiversity value including Katandra Bush Land Sanctuary and Ingleside Chase Reserve.
3 SITE HISTORY

3.1 Methodology
The methodology for the Phase 1 assessment of the Proposal Area for the Mona Vale Road East Upgrade consisted of the following:

- A site inspection on 6 November 2014 by SMEC environmental scientist to visually assess present and past potentially contaminating activities, current landforms and site condition.
- Review of past and present aerial photographs obtained from the NSW Department of Lands. Aerial Photographs from 1965, 1978, 1991 and present were reviewed.
- Database search of search of registered groundwater bores within the Proposal Area via NSW Natural Resource ATLAS online resource, held by the NSW Department of Primary Industries Office of Water.
- Identification of the Proposal Area, including location of surrounding infrastructure, area, boundaries, and a review of the physical site setting including regional and local geology, hydrology and hydrogeology.
- Database search of NSW Environmental Protection Authority (EPA) contaminated land record and public record for licences, applications and notices.
- Database search of NSW EPA environment protection licences, applications, notices, audit or pollution studies and reduction programs.
- A desktop review of information relevant to the history of sites within the proposal area to determine past and present land uses.
- Development of a conceptual site model for any identified Areas of Environmental Concern (AEC)
- Preparation of a Draft Phase 1 report presenting information gained during the above tasks.
- Preparation of Final Phase 1 report including consideration of comments from relevant stakeholders.

3.2 Site History

3.2.1 Review of Historical Aerial Photographs
Aerial imagery dated between 1965 and 1991 were reviewed to assess major changes to land use in the Proposal Area overtime. Table 2 lists the historical aerial photographs that were obtained and the review observations. Historical aerial photographs with the proposal area overlayed are located in Appendix B.
## Table 2 – Summary of Historical Aerial Photograph Information

<table>
<thead>
<tr>
<th>Year</th>
<th>Proposal Area</th>
<th>Surrounding Area</th>
</tr>
</thead>
</table>
| 1965  <br> (Fig 1B, App B) | **Manor Road / Lane Cove Road to Boundary Street** - In general, land adjacent to Mona Vale Road alignment, on the northern and southern sides, appears to be bushland reserve and is undeveloped except for some access tracks / roads which intersect Mona Vale Road including Ingleside Road and Laurel Road East. Areas where significant land clearing has occurred includes:  
  - South east of the intersection of Waratah Road and Manor Road (southern side of Mona Vale Road).  
  - Eastern side of Laurel Road (northern side of Mona Vale Road); and  
  - Between Narrabeen Creek and Boundary Street (southern side of Mona Vale Road).  
Land between Narrabeen Creek and Boundary Street on the southern side of Mona Vale Road appears to be used for agricultural activities (e.g. market gardens).  
**Boundary Street to Foley Street (North and south)** – Land use is largely dominated by agricultural activities with shade houses visible on most land parcels. Mona Vale Cemetery is present on the northern side of Mona Vale Road. Some access tracks / roads which intersect Mona Vale Road are evident including Daydream Street, Samuel Street, Emma Street and Foley Street. Some small built structures (presumed to be residential) are visible to the east of the eastern end of the Proposal Area. | Bush land reserve with minor land clearance and further agricultural land usage. |
| 1978  <br> (Fig 2B App B) | **Manor Road / Lane Cove Road to Boundary Street** – Land use north and south of Mona Vale Road remains consistent with previous image with some minor increases in land clearing where existing agricultural activities were identified.  
**Boundary Street to Foley Street (North)** – This area is mainly the southern extent of the Mona Vale Cemetery and residential housing low density occurs on the eastern side of Samuel Street.  
**Boundary Street to Foley Street (South)** – This area is mainly the northern extent of small scale rural activities including market gardens. |  
Bush land reserve with minor land clearance and further agricultural land usage |
| 1991  <br> (Fig 3B App B) | **Manor Road / Lane Cove Road to Boundary Street** – Land use north and south of Mona Vale Road remains consistent with previous image with some minor increases in land clearing where existing agricultural activities were identified.  
**Boundary Street to Foley Street (North)** – This area is mainly the southern extent of the Mona Vale Cemetery and residential housing low density occurs on the eastern side of Samuel Street.  
**Boundary Street to Foley Street (South)** – This area is mainly the northern extent of decreasing rural activity and cleared lands. | Minimal change from previous image. |
<table>
<thead>
<tr>
<th>Year</th>
<th>Proposal Area</th>
<th>Surrounding Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present 2012 (Fig 4B, App B)</td>
<td><strong>Lane Cove Road to Boundary Street (North)</strong> – This area is reserve land and is largely original vegetation with the exception some minor clearing and landfilling apparent at the terminated intersection of Lane Cove Road and Mona Vale Road and at 127 Mona Vale Road. Some limited residential development at Ingleside Road and Laurel Road West. Potential waste storage has also been identified adjacent to the Mona Vale Road alignment at Lane Cove Road former intersection and 119, 120 and 122 Mona Vale Road. <strong>Manor Road to Boundary Street (South)</strong> - This area is reserve land and is largely original vegetation with the exception some limited down gradient residential development at Waratah Road and Ingleside Road Ingleside Road and Laurel Road West. <strong>Boundary Street to Foley Street (North)</strong> – This area is mainly the southern extent of the Mona Vale Cemetery and residential housing low density. <strong>Boundary Street to Foley Street (South)</strong> – This area is mainly the northern extent of the Warriewood Industrial estate. Industrial activity includes bulky goods warehousing, restaurants and pharmaceutical business manufacturing or distribution. Unknown fill material was identified adjacent to the road corridor on the southern side of Mona Vale Road opposite Emma Street</td>
<td>Minimal change from previous image.</td>
</tr>
</tbody>
</table>

The results of the aerial imagery review indicate that potential contamination issues may be present where agricultural land use (e.g. market gardens), uncontrolled fill material placement and waste storage has been undertaken. These results are further discussed in Section 4.1.1.

### 3.2.2 NSW EPA Online Record Search

An online search of the NSW EPA Contaminated Land Records Database (http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx) was conducted on the 23rd December 2014. No notice records or management notices were identified within the area of the Proposal Area.

The closest notified site is identified below:

- Mona Vale Bus Depot, 58 Darley Street, Mona Vale – located approximately 1.1 km north east of the eastern extent of the Proposal Area. The site has 1 current Notice (20141101 issue 11/11/2014).

The notice relates to Total Petroleum Hydrocarbons (C10–C36), Polycyclic Aromatic Hydrocarbons including Naphthalene contamination. In particular the EPA has found Phase Separate Hydrocarbon contamination offsite.

An online search of the NSW EPA Protection of the Environment Operations Act public register conducted on 23rd December 2014 identified the following Notices within the Proposal Area:

- Cootes Transport Group Pty Ltd - Clean Up Notice (no. 1517470) (refer to Appendix C) was issued for an incident in which a truck carrying 33,000 litres of fuel including E10, UL95, UL98 and diesel, rolled over and caught fire. Fuel and fire-water resulting from the incident and the incident response entered the stormwater
system that discharges to Cahill Creek which flows through Bayview Golf Course and into Winnerserremy Bay. The roll over resulted in a spill of hydrocarbons on the southern side of Mona Vale Road between Ponderosa Parade and Emma Street, Mona Vale.

Due to the location and distance of the identified sites from the proposal area, it is expected that only the area on the southern side of Mona Vale Road between Ponderosa Parade and Emma Street, will have an impact on the proposal.

### 3.2.3 Review of Existing Literature

The following reports were reviewed during this investigation:


In April 2014, Noel Arnold and Associates (NAA) was contracted by Pittwater Council to conduct an Asbestos Contamination Investigation (ACI) in an area approximately 60m x 40m in dimension (2,400m²) located to the south-west of the main cemetery between Mona Vale Road to the south, Walana Crescent to the north-west and the Wallaby Circuit housing development to the north-east of the site. The ACI comprised a combination of test pitting, inspections and calculation of soil as asbestos concentrations.

Patchy occurrences of Asbestos-Containing Materials (ACM) fragments were identified throughout the majority of the site, with three asbestos contamination hotspots identified at test pit locations TP04, TP07 and TP09. The identified depth of ACM impacted fill at test pits TP04, TP07 and TP09 was 0.4m, 0.4m and 0.9m respectively. Asbestos impacted soils were thoroughly raked and all identified ACM fragments collected for the calculation of Soil Asbestos Concentrations as % Asbestos in Soil w/w. With the exception of test pit hotspots TP04, TP07 and TP09, calculated ACM concentrations at all other investigated test pit locations were below the adopted soil investigation level of 0.02%.

A licensed Asbestos Removal Contractor was engaged to remediate the areas where ACM hotspots were identified. Excavation and off-site disposal of upper fill layers within a 3m radius of each hotspot was undertaken including a thorough inspection of the exposed ground surfaces across the site, and removal of any identified ACMs.


NAA conducted a visual inspection across the designated asbestos remediation area subsequent to completion of remediation works. The inspection included a comprehensive walkover of the exposed ground surfaces across the site as well as the remediated hotspots to identify suspected asbestos materials. All suspected asbestos cement fragments identified during the inspection were collected and removed from site. NAA stated that no visible suspected asbestos fragments remained on the exposed ground surfaces of the inspected areas at the conclusion of the inspection.

The report identified that during the remediation works, asbestos formwork was identified under a buried cement pathway in the Eastern Remediation Area and it cannot be confirmed that the entire path was uncovered/removed. Due to the potential for asbestos contamination to be present below the surface, it was recommended that if the area was to be developed that an Environmental Consultant be consulted prior to any development of this area. The Asbestos Clearance Certificate has been included in Appendix D.
GHD. (2014). Mona Vale Road/Ponderosa Parade intersection improvement minor works review of environmental factors

Pittwater Council notified Roads and Maritime on 26 May 2014 regarding asbestos contamination within an area 100 metres west of the Mona Vale Cemetery. A recent assessment undertaken by Pittwater Council in May 2014 identified bonded asbestos on the ground surface, mostly to the west of the contaminated area. The above reports by Noel Arnold and Associates (2014) detail Pittwater Council's management of asbestos contamination.

GHD. (2014). Mona Vale Road, Mona Vale Remediation and Validation Report

In October 2013 an incident in which a truck carrying 33,000 litres of fuel including E10, ULP95, ULP98 and diesel, rolled over and caught fire. Fuel and fire-water resulting from the incident and the incident response entered the stormwater system that discharges to Cahill Creek which flows through Bayview Golf Course and into Winnererremy Bay. The roll over resulted in a spill of hydrocarbons on the southern side of Mona Vale Road between Ponderosa Parade and Emma Street, Mona Vale.

A targeted soil investigation was undertaken by GHD in 2013 which identified the presence of hydrocarbons exceeding the selected screening levels within four of the eleven sampling locations. Remedial works were undertaken which entailed the removal of identified contaminated soil and validation of the excavations via sampling, analysis and comparison of results against nominated validation criteria. The validation samples were analysed for total recoverable hydrocarbons (TRH) and benzene, toluene, ethyl benzene and xylene (BTEX). The results of validation sampling undertaken indicate that hydrocarbon impacts remain present within a service trench immediately west of the BH2 remediation excavation and appear to be confined to soil in the vicinity of where samples V_BH2_W7 and BH13_0.25_A were collected.

The report identified there was a risk to intrusive maintenance workers potentially being exposed to hydrocarbon vapour intrusion in the vicinity of validation sample V_BH2_W7 and contamination characterisation sample BH12_0.25_B. The report recommended that the Roads and Maritime Services should include procedures for managing the contamination (if encountered) in their construction environment and management plan for the proposed Mona Vale Road widening works.

3.2.4 Site Inspection

A SMEC environmental scientist conducted a visual site inspection on 6 November 2014. The purpose of the site inspection was to ensure Areas of potential Environmental Concern (AEC) were identified and to verify in field the desktop information.

During the visual site inspection non-invasive data was gathered to support the conceptual understanding of the spatial extent of historic activities and disturbed areas across the site. In order to achieve this, general site observations were made and the location of AEC’s and potential environmental receptors were noted.

The site inspection concentrated on identifying, locating and mapping the following surface features should they be found to exist in the Proposal Area:

- Disturbed ground possibly in the form of trenches or mounds.
- Waste storage or disposal, including stockpiled soil, domestic rubbish and building rubble, including asbestos (fragments and sheets).
- Stained or odorous soils.
- Eroded soils.
- Unnatural changes in vegetation (including evidence of cleared ground or vegetation potentially impacted by contamination).
- The location of site structures, including evidence of potential underground structures.
- Potential environmental receivers.

During the site inspection, potential uncontrolled fill material was identified on the southern side of Mona Vale Road opposite Emma Street. The origin of the fill material is unknown. Uncontrolled fill material was also identified at 127 Mona Vale Road on the northern side of Mona Vale Road Lot 1 DP784516 and also at the terminated intersection of Lane Cove Road and Mona Vale Road. These results are further discussed in Section 4.1.4

### 3.3 Site History Summary

On the basis of historical records, previous investigations conducted at the site and a site inspection, the most likely sources of contamination within the site comprise of the following Areas of Environmental Concern (AEC):

- **Former Market Garden Sites** - Potential contamination issues relating to market garden operation include soil and water impacts from the application of fertilizers, spray drift from pesticides and herbicides. These areas are further detailed in Section 4.1.1.

- **Asbestos Contamination Area** – Asbestos Containing Material (ACM) may be present below the soil surface and in the vicinity of the buried cement pathway in the eastern section of the remediation area, located on the northern side of Mona Vale Road, west of Mona Vale Cemetery and south of the Wallaby Circuit housing development.

- **Truck Roll Over Area** - There is a risk to intrusive maintenance workers potentially being exposed to hydrocarbon vapour intrusion in the vicinity of truck roll over area located on Mona Vale Road near Samuel Street, Mona Vale.

- **Uncontrolled Fill Material Placement** - Imported fill material located on the southern side of Mona Vale Road opposite Emma Street, at the terminated intersection of Lane Cove Road and Mona Vale Road and at 127 Mona Vale Road may contain uncontrolled fill materials. ACM may occur within the fill.

- **Potential Waste Storage Areas** - Potential waste storage areas have been identified from aerial photography adjacent to the Mona Vale Road alignment at Lane Cove Road former intersection, 119, 120 and 122 Mona Vale Road. Stored material may comprise of construction and demolition waste, uncontrolled fill, plant, machinery and fuel / oil drums. Potential contamination issues associated include petroleum hydrocarbon impacts on soil and groundwater, OCP’s OPP’s and asbestos.

- **Coal tar, bitumen and road base within the existing road surface of the Proposal Area.** As detailed in the NSW Government Gazette (DPC, 2012), roads constructed prior to 1987 are typical areas where asphalt is likely to contain coal tar.

These AEC provide sources of historical contamination and generate the following Contaminants of Concern (COC) to be included in proposed environmental investigation:
- Heavy metals
- Asbestos (ACM)
- Petroleum hydrocarbons (BTEX/TPH)
- Pesticides (OCP/OPP)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Phenols
- Volatile organic compounds (VOCs)
- Elevated levels of Nitrogen (N) and Phosphorus (P) at leachable concentrations
4 PRELIMINARY CONCEPTUAL SITE MODEL

This section discusses the potential presence of contamination based observations made during the site inspection conducted 6 November 2014, historical observations from aerial photography and literature reviews and how this might affect human health and or the environment and proposed works. It does not assess contamination that should be dealt with in relation to offsite disposal or site management. Further assessment of the areas of potential contamination as detailed, should be considered for the purposes of offsite disposal or site management.

A level of low, medium or high risk from a contamination perspective has been based on qualitative judgment from observations made during the site inspection, information obtained during the desktop review and the extent of the proposed works for the proposal as described in Section 1.2 of this report. Table 3 provides the risk summary criteria developed to assess the AECs.

<table>
<thead>
<tr>
<th>Risk Summary</th>
<th>AEC Risk Assessment Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low potential of residual soil and/or groundwater contamination to exist within the extent concept proposal footprint. Low probability of engaging any potential contaminated land associated with identified AEC due to extent of proposed works.</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium potential of residual soil and/or groundwater contamination to exist within the extent concept proposal footprint. Contaminated soil and/or groundwater associated with identified AEC may be engaged due to the extent of the proposed works.</td>
</tr>
<tr>
<td>High</td>
<td>High potential of some level of residual soil and/or groundwater contamination to exist within the extent concept proposal footprint. Contaminated soil and/or groundwater associated with identified AEC are likely to be engaged due to the extent of the proposed works. Further investigations recommended.</td>
</tr>
</tbody>
</table>

It should be noted that whilst the risk ranking system categorises the various AECs as ‘high’ to ‘low’ risk, this does not indicate that contamination has or has not occurred but instead highlights the need that further assessment may be required. Further data would give greater confidence on these risk levels. The location of each identified AEC is presented in Figure 2, Appendix A.

4.1 Areas of Environmental Concern

4.1.1 Former market garden sites

Site history

Historical aerial photography suggests that land between Narrabeen Creek and Foley Street was used for agricultural activities (e.g. market gardens). Presently shade houses are still evident on land to the west of Boundary Street south of Mona Vale Road. Potential contamination issues relating to market garden operation include soil and water impacts from the application of pesticides and herbicides.
Potential sources
Market Gardens have been previously located within <10 m from the current Mona Vale Road Alignment. Existing shade houses located west of Boundary Street are approximately 200m south of Mona Vale Road. There is a low potential for Organochlorine pesticides (OCP) and Organophosphorus Pesticides (OPP), contaminants to be present within excavated soils in proximity to Boundary Street given the site is located approximately 200m south of the Proposal Area. The potential for OCP’s and OPP’s to be present at other former market garden sites adjacent to Mona Vale Road is considered low due to low expose rates likely and natural attenuation.

Potential pathways
During the construction phase e.g. during excavation works, there are potential pathways for human exposure to the potential contaminants identified in Section 4.1.1.2. The associated exposure may include:

- Direct contact or inhalation with soil and potentially groundwater.
- Ingestion of soils and dust.

There is an existing potential for vertical and lateral migration of contaminants through groundwater flow in the direction of the hydraulic gradient. Based on information obtained for groundwater (see Section 2.6) it is considered that there is a low potential that OCP or OPP impacted soil or groundwater will be encountered during the construction phase of the Proposal.

Potential receptors
Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
- Environment – soil and groundwater.

Potential source-pathway-receptor linkage
There is a low potential for the exposure to contaminants in the underlying soil profile and groundwater during excavation works within area of former market gardens.

4.1.2 Asbestos contamination area

Site history
As detailed previously in Section 3.2.3, Pittwater Council engaged NAA to perform an asbestos contamination investigation on an area located to the south-west of the main cemetery between Mona Vale Road to the south, Walana Crescent to the north-west and the Wallaby Circuit housing development to the north-east. NAA identified three asbestos contamination hotspots at test pit locations TP04, TP07 and TP09 at depths of 0.4m, 0.4m and 0.9m respectively. A licensed Asbestos Removal Contractor was engaged to remediate the areas where ACM hotspots were identified. During the remediation works, asbestos formwork was identified under a buried cement pathway in the Eastern section of the asbestos contamination area.

Excavation and off-site disposal of upper fill layers within a 3m radius of each hotspot was undertaken. The pathway was reportedly removed however it cannot be confirmed that the entire path was uncovered / removed. In May 2014, NAA conducted a visual
inspection across the asbestos contamination area subsequent to completion of remediation works and found that no visible suspected asbestos fragments remained on the exposed ground surfaces of the inspected areas. However, NAA stated that there was potential for ACM to be present below the soil surface and in the vicinity of the buried footpath in the eastern section of the site.

**Potential sources**
The asbestos contaminated area is located within the proposed alignment of the lane widening. There is a medium potential for ACM to be present with excavated soils given that the road widening at this location may require disturbance or partial disturbance.

**Potential pathways**
During the construction phase e.g. during excavation works, there are potential pathways for human exposure to potential contamination recorded in Section 4.1.2.2. The associated exposure is through of inhalation of asbestos fibres.

**Potential receptors**
Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
- Environment – soil and groundwater.

**Potential source-pathway-receptor linkage**
There is a medium potential for the exposure to asbestos in the asbestos contaminated area excavation works for the proposed widening of Mona Vale Road. ACM is likely to be present below the soil surface and in the vicinity of the buried cement pathway in the eastern section of the remediation area, located on the northern side of Mona Vale Road, west of Mona Vale Cemetery and south of the Wallaby Circuit housing development.

### 4.1.3 Truck roll over area

**Site history**
In October 2013 an incident in which a truck carrying 33,000 litres of fuel including E10, ULP95, ULP98 and diesel, rolled over and caught fire. Fuel and fire-water resulting from the incident and the incident response entered the stormwater system that discharges to Cahill Creek which flows through Bayview Golf Course and into Winnererremy Bay. The roll over resulted in a spill of hydrocarbons on the southern side of Mona Vale Road between Ponderosa Parade and Emma Street, Mona Vale. As detailed in Section 3.2.2 soil testing and remediation of the site was undertaken by GHD in October 2013. However, the results of validation sampling undertaken indicated that hydrocarbon impacts remain present within a service trench immediately west of the BH2 remediation excavation and appear to be confined to soil in the vicinity of where samples V_BH2_W7 and BH13_0.25_A were collected.

**Potential sources**
The site of the fuel spill is located within the proposed alignment of the lane widening. There is a high potential for hydrocarbons to be present with excavated soils given the site is directly impacted by the Proposal.
Potential pathways

During the construction phase e.g. during excavation works there are potential pathways for human exposure to potential contamination recorded in Section 4.1.3.2. The associated exposure may include:

- Direct contact or inhalation with soil and potential groundwater.
- Ingestion of soils and dust.
- Inhalation of vapours from soils and potential groundwater.

There is an existing potential for vertical and lateral migration of contaminants through preferential pathways, the saturated zone and horizontal migration within the groundwater in the direction of hydraulic gradient.

Potential receptors

Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
- Environment – soil and groundwater.

Potential source-pathway-receptor linkage

There is a medium potential for the exposure to contaminants in the underlying soil (and possibly groundwater) profile from excavation works within proximity to the BH2 remediation excavation and soil in the vicinity of where samples V_BH2_W7 and BH13_0.25_A were taken.

4.1.4 Uncontrolled fill material placement

Site history

Potential uncontrolled fill material was identified during the site inspection on the southern side of Mona Vale Road opposite Emma Street, at the terminated intersection of Lane Cove Road and Mona Vale Road and at 127 Mona Vale Road, Lot 1 DP784516 northern side of Mona Vale Road. The origin of the fill material is unknown. Potential contamination issues relate to the use of uncontrolled anthropogenic fill material.

Potential sources

There is a low to medium potential for Metals, PAH, TPH, BTEX and asbestos contaminants to be present within excavated soils given that the road widening at this location may require removal or partial removal of this fill site.

Potential pathways

During the construction phase e.g. during excavation works, there are potential pathways for human exposure to potential contamination recorded in Section 4.1.4.2. The associated exposure may include:

- Direct contact or inhalation with soil.
- Ingestion of soils and dust.
- Inhalation of vapours from soils and potentially groundwater.
There is a potential that existing uncontrolled fill materials may contain a variety of contaminants including hydrocarbons, heavy metals and asbestos.

**Potential receptors**
Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
- Environment – soil and groundwater.

**Potential source-pathway-receptor linkage**
There is a medium potential for the exposure to contaminants in the uncontrolled fill during excavation works for the proposed widening of Mona Vale Road. Contaminates are likely to be present within the uncontrolled fill material on the southern side of Mona Vale Road opposite Emma Street and at the terminated intersection of Lane Cove Road and Mona Vale Road.

4.1.5 Potential waste storage areas

**Site history**
Potential waste storage areas have been identified from aerial photography and or the site inspection adjacent to the Mona Vale Road alignment at the following locations:

- Terminated intersection of Lane Cove Road and Mona Vale Road
- 119 Mona Vale Road Ingleside Lot 1 DP 124602 and Lot 2 DP 124602,
- 120 Mona Vale Road Warriewood Lot 3 DP 124602, Lot 4 DP 124602 and Lot 5 DP 124602 southern side of Mona Vale Road east of Narrabeen Creek; and
- 122 Mona Vale Road Warriewood Lot 1 DP 383009 and Lot 5 DP124602 southern side of Mona Vale Road east of Narrabeen Creek

Stored material may comprise of construction and demolition waste, uncontrolled fill, plant, machinery and fuel / oil drums. Potential contamination issues associated include petroleum hydrocarbon impacts on soil and groundwater, OCP’s OPP’s and asbestos.

**Potential sources**
There is a low potential for Metals, PAH, TPH, BTEX, asbestos contaminants to be present within excavated soils where the proposal area incorporates the immediate area where waste is currently stored within the properties identified.

**Potential pathways**
During the construction phase e.g. during excavation works there are potential pathways for human exposure to the potential contaminants identified in Section 4.1.5.2. The associated exposure may include:

- Direct contact or inhalation with soil and potentially groundwater.
- Ingestion of soils and dust.
- Inhalation of vapours from soils and potentially groundwater.
There is potential for vertical and lateral migration of contaminants through preferential pathways, the saturated zone and horizontal migration within the groundwater in the direction of hydraulic gradient.

**Potential receptors**
Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
- Environment – soil and groundwater.

**Potential source-pathway-receptor linkage**
There is low potential for the exposure to contaminants in the underlying soil (and possibly groundwater) profile from excavation works for the proposed widening of Mona Vale Road in the vicinity of the properties identified.

### 4.1.6 Potential for Coal Tar Containing Asphalt

**Site history**
The road pavement in this location may contain coal tar containing pavement layers. This may occur in old pavements constructed prior to 1987 and buried alignments. All pavement locations of this nature contain this potential for Coal Tar to occur.

**Potential sources**
There is a low potential Metals, PAHs, TPH and Phenols contaminants to be present within old pavements and buried pavement alignments. The Proposal area incorporates the immediate area where original pavement layers may exist.

**Potential pathways**
During the construction phase e.g. during excavation works there are potential pathways for human exposure to the potential contaminants identified in Section 4.1.6.2. The associated exposure may include:

- Direct contact or inhalation with soil and potentially groundwater.
- Ingestion of soils and dust.
- Inhalation of vapours from soils and potentially groundwater.

There is not potential for vertical and lateral migration of contaminants through preferential pathways, the saturated zone and horizontal migration within the groundwater in the direction of hydraulic gradient.

**Potential receptors**
Potential receptors during the construction phase may include:

- Human - workers, general public and nearby residents, commercial properties or road users.
Potential source-pathway-receptor linkage

There is low potential for the exposure to contaminants in the underlying pavements profile from excavation works for the proposed widening of Mona Vale Road in the vicinity of the properties identified.

4.2 Summary of AECs

The potential sources of contamination associated with the identified AEC’s include the following:

- Potentially contaminated heterogeneous fill material within subsurface strata.
- Coal tar, bitumen and road base within the existing road surface of the Proposal Area;
- OCP’s and OPP’s within soils and ground water at the current and former market garden sites;
- Petroleum hydrocarbons in soils at the site of the truck roll over on the southern side of Mona Vale Road between Ponderosa Parade and Emma Street, in uncontrolled fill between on the south side of Mona Vale Road opposite Emma Street, at the terminated intersection of Lane Cove Road and Mona Vale Road and at potential waste storage areas at 119, 120 and 122 Mona Vale Road;
- Potential ACM in the asbestos contamination area below the soil surface and in the vicinity of the buried cement pathway in the eastern section of the remediation area located on the northern side of Mona Vale Road, west of Mona Vale Cemetery and south of the Wallaby Circuit housing development.
- Potential ACM and heavy metals in uncontrolled fill on the south side of Mona Vale Road opposite Emma Street, at the terminated intersection of Lane Cove Road and Mona Vale Road, at 127 Mona Vale Road and at potential waste storage areas at 119, 120 and 122 Mona Vale Road;
- Potential PCB’s in uncontrolled fill on the south side of Mona Vale Road opposite Emma Street and at the terminated intersection of Lane Cove Road and Mona Vale Road.

4.3 Potential AECs Requiring Further Investigation

No further investigations are considered necessary for any identified AEC within the proposed works with the exception of the truck roll over area and the asbestos contamination area.

Existing environmental reports regarding the truck roll over area (see Section 3.2.3) have confirmed TPH impacted soils are present at elevated levels within a service trench immediately west of the BH2 remediation excavation and appear to be confined to soil in the vicinity of where samples V_BH2_W7 and BH13_0.25_A were collected. Additional environmental investigation works may be required in these locations to assess the current status of the soil condition as recent lane adjustments works may have disturbed this area or created voids where soil vapours may form. If recent lane widening works are found to have disturbed this location, additional soil testing would be required to assess if TPH impacted soil has been removed or if migration of contaminates has occurred down gradient potentially impacting previously unaffected areas.
The clearance certificate issued for the asbestos contamination area detailed that ACM may be present below the surface and in the vicinity of the buried cement pathway in the eastern section of the site.

Construction activity in the vicinity of other AECs may require inspection during the following activities:

- Pavement removal
- Underground service relocation
- Ancillary site preparation and operation
- Excavation
- Generation of construction waste
- Importing, handling, stockpiling and transporting material resources

The risk of contaminated material being engaged during asset maintenance is low, however potential exists for latent contaminants to be encountered during construction of the proposal.
5 POTENTIAL IMPACTS

5.1 General Construction Activities
General construction activities that have the potential to impact on AEC’s or potentially increase contamination issues in accordance with the Proposal include:

- Pavement removal.
- Underground service relocation.
- Ancillary site preparation and operation.
- Excavation.
- Generation of construction waste.
- Importing, handling, stockpiling and transporting material resources.
- Use of fuel and chemicals during construction.

5.2 General Construction Impacts
Soil and surface water quality
During the construction of the Proposal, ground disturbance from excavation, pavement and vegetation removal has the potential to generate sediment laden runoff during rainfall events. Soil may also be tracked from exposed surfaces and deposited on to the local road network from construction plant and vehicles. Potential impacts include:

- Water quality impacts related to potential pollution of stormwater run-off with sediments, fuels and other hazardous materials from the construction/contaminated sites and equipment.
- Soil erosion and sedimentation from exposed surfaces and stockpiles as a result of exposure to wind and rainfall.

5.2.1 Groundwater
During construction works groundwater quality could potentially be affected by infiltration of pollutants into the soils, where if not appropriately managed, pollutants may reach perched groundwater. General sources of potential groundwater pollution during construction works include infiltration or runoff from the truck roll over area, contaminated sites, contaminated soil stockpiles, hydrocarbon or chemical spills during construction works.

5.2.2 Ancillary sites
Ancillary sites required during the construction of the Proposal may include activities that have a potential to impact soil and water quality through spills of pollutants. The following construction activities present a risk of impact on soil and water quality:

- Storage of chemicals.
- Vehicle wash-down areas.
- Vehicle refuelling areas.
- High frequency of vehicle movements.
- Material storage and stockpile areas.
- Office compounds.

### 5.2.3 Contaminated land

As identified in Section 4, there is potential for contaminated land to be encountered as a result of construction activities associated with the proposal. Table 4 identifies the AEC’s likely which present a risk of impact associated with construction of the proposal, details the potential impacts on the proposal and the risk of occurrence identified from the AEC’s.

**Table 4 – Summary of AECs**

<table>
<thead>
<tr>
<th>Potential AEC</th>
<th>Risk Classification</th>
<th>Potential COC</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former Market Gardens Area</td>
<td>Low</td>
<td>Metal and pesticides.</td>
<td>Surface soil impacted by pesticide spray applied to adjacent lands.</td>
</tr>
<tr>
<td>Asbestos Contaminated Area</td>
<td>Medium</td>
<td>Asbestos</td>
<td>Excavation works associated with the proposed road widening could potentially expose soil impacted by ACM.</td>
</tr>
<tr>
<td>Truck Roll Over Area</td>
<td>Medium</td>
<td>Metals, TPH and BTEX</td>
<td>Within the pavement formation and below raised pavement and drainage assets.</td>
</tr>
<tr>
<td>Uncontrolled Fill Material</td>
<td>Low</td>
<td>Metals, PAHs, TPH, BTEX and asbestos.</td>
<td>Within the pavement formation and below raised pavements and drainage assets. Excavation works could potentially expose soil impacted by uncontrolled fill material.</td>
</tr>
<tr>
<td>Waste Storage Area</td>
<td>Low</td>
<td>Metals, PAHs, TPH, BTEX</td>
<td>Within the pavement formation and below raised pavement and drainage assets.</td>
</tr>
<tr>
<td>Entire Proposal Area</td>
<td>Low</td>
<td>Coal Tar, PAHs.</td>
<td>Contaminating road materials such asphalt, coal tar may have been historically used within roads throughout the Proposal Area. The proposed road widening could potentially expose such materials.</td>
</tr>
</tbody>
</table>

In particular, excavation required as part of the road widening on the southern side of Mona Vale Road opposite Emma Street and on the northern side of Mona Vale Road south of the Wallaby Circuit housing development is likely to encounter contaminated material. It is also possible that contaminated land may exist in adjoining sites as a result of historical contamination events.

Potential environmental impacts associated with the proposed works include:

- Increasing waste volumes from excavated (potentially contaminated) materials.
- Adverse effects on human health (construction personnel, travelling public or nearby communities).
- Movement of contaminated sediments via surface runoff into stormwater systems.
5.2.4 Acid Sulfate Soil

As per Section 2.6 of this report, Acid Sulphate Soils (ASS) was not identified as a risk within the Proposal Area Footprint therefore ASS are not expected to be exposed during the proposed construction activities.

5.3 Operational phase

5.3.1 Soil and surface water quality

Soil erosion and sedimentation is unlikely to present further environmental impacts post upgrade of Mona Vale Road considering exposed surfaces will be stabilised with pavement or landscaping.

The receiving water quality within the Proposal area may be impacted as a result of the Proposal due to increased surface runoff volume from changes in road catchments and drainage. Increased volumes of vehicular traffic would increase pollutant levels within road surface runoff. Heavy metals of concern in road runoff include cadmium, chromium, copper, nickel, lead and zinc. The concentrations of metals found in road runoff, especially from heavily trafficked areas are usually in excess of current ANZECC (2000) guidelines for the protection of fresh and marine waters.

Elevated levels of nutrients such as phosphorous and nitrogen are also found in road runoff and can contribute to the accelerated growth of nuisance aquatic plants and cause a reduction in the levels of dissolved oxygen. Nutrients are usually associated with the fine suspended sediment in runoff.

5.3.2 Contaminated land

It is not expected that there would be any ongoing impacts to or from the identified AECs during the operation of the Proposal.

5.3.3 Groundwater

During operation, the Proposal has a low potential to result in changes in local recharge of groundwater.
6 SAFEGUARDS AND MANAGEMENT MEASURES

This section identifies safeguards and management measures to reduce any potential soil and water impacts associated with Mona Vale Road Upgrade between Manor Road / Lane Cove Road Ingleside and Foley Street Mona Vale.

6.1 Construction Phase

6.1.1 Further Investigations

Truck roll over area

Additional environmental investigation works is required in the location of the service trench immediately west of the BH2 remediation excavation and in the vicinity of where samples V_BH2_W7 and BH13_0.25_A were collected. The purpose of this investigation is to assess the current status of the soil condition and the impact of recent lane adjustments works may have had on this area. If recent lane widening works are found to have disturbed this location, additional soil testing would be required to assess if TPH impacted soil has been removed or if migration of contaminates has occurred down gradient potentially impacting previously unaffected areas.

Asbestos Contamination Area

Visual monitoring of excavation works will be required where impact to the asbestos contamination area will occur. Monitoring is to undertaken by a suitably qualified person to verify the presence of ACM during excavation works within the area. If ACM is identified occurring during the works within the area, it will be managed in accordance with the Unexpected Finds Procedure as detailed in Section 6.1.3.1.

All other AECs

Other AEC’s will require inspection when the following construction activities are being undertaken in close proximity to assess the presence of CoC’s as detailed in Table 4:

- Pavement removal
- Underground service relocation
- Ancillary site preparation and operation
- Excavation
- Importing, handling, stockpiling and transporting material resources

6.1.2 Soil and water quality

Soil and Water Management Plan

A Soil and Water Management Plan (SWMP) would be developed for the proposed works. The SWMP should be developed by a RMS registered soil conservationist or a certified practitioner in erosion control (CPESC) in accordance with the principles and practices detailed in Managing Urban Stormwater: Soils and Construction (Landcom, 2004). The SWMP would contain as a minimum the following elements:

- Consideration of appropriate erosion and sediment control during staging of the main widening and replacement construction works.
Consideration of appropriate erosion and sediment controls at ancillary sites with particular consideration of sediment basins at batch plant sites or where significant material processing or stockpiling will occur.

Measures to develop, maintain, monitor and improve progressive, site specific Erosion and Sedimentation Control Plans (ESCPs).

Identification of site conditions or construction activities that could potentially result in erosion and associated sediment runoff.

Methods to minimise potential adverse impacts of construction activities on the water quality within surrounding waterways.

Details of specific measures to protect sensitive areas.

Details of measures to minimise any adverse impacts of sedimentation on the surrounding environment.

Details of measures to minimise soil erosion caused by all construction works including clearing, grubbing and earthworks.

Details of measures to make site personnel aware of the requirements of any SWMP by providing information within induction, toolbox and training sessions.

Details of the roles and responsibilities of personnel responsible for implementing the SWMP.

Details of measures for the inspection and maintenance of construction phase water treatment devices and structures.

The SWMP would form part of the Construction Environmental Management Plan (CEMP) for the proposal.

Surface Water Quality Measures

Preference is to be given to the reuse of surface water collected post rainfall within site works (e.g. excavations, temporary basins etc.). Where reuse (e.g. in compaction activities or for dust suppression etc.) is not feasible, water discharge is to be managed in accordance with EPA guidelines.

Water quality control measures are to be used to prevent any materials (e.g. concrete, grout, sediment etc.) entering drain inlets.

Spills of oil, fuel and chemicals etc. are to be contained and cleaned up immediately in accordance with spill response procedures.

Construction plant is not be washed down or cleaned outside of formal containment structures (e.g. wash bay).

Erosion and Sediment Controls

Erosion and sediment control measures in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) are to be implemented and maintained to:

- Divert clean 'run on' water around the construction site.
- Minimise soil erosion and runoff velocity by minimising slope lengths and gradient.
- Capture sediment entrained in surface water runoff during rainfall.
Minimise the movement of sediment off-site and sediment laden water entering any drainage lines or drainage inlets.

Minimise the amount of material transported from site to surrounding pavement surfaces.

- Erosion and sedimentation controls are to be checked and maintained on a regular basis (including clearing of sediment from behind barriers) and records kept and provided on request.
- Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised.
- Work areas are to be stabilised progressively during the works.
- Vegetation clearing and grubbing should be staged in order to maintain as much natural vegetation as possible during construction.
- Disturbed areas should be re-vegetated progressively during construction.

**Groundwater**

If groundwater is encountered during the construction of the proposal it would be managed and disposed of in accordance with EPA requirements, including the *Waste Classification Guidelines* (DECCW, 2009).

### 6.1.3 Contaminated lands

**Contaminated Land Management Plan**

A Contaminated Land Management Plan (CLMP) would be developed to comply with the *Contaminated Land Management Act 1997* and relevant EPA Guidelines in relation to disturbance or treatment of potentially contaminated land. The CLMP would detail the following:

- Procedure for identifying contamination by monitoring for:
  - Discolouration or staining of soil.
  - Bare soil patches both on-site, and off-site adjacent to site boundary.
  - Visible signs of plant stress.
  - Presence of drums or other waste material.
  - Presence of stockpiles or fill material.
  - Odours.

- Unexpected Finds Procedure to be developed to address the management of potentially contaminated material if encountered during works.

- Contaminated land legislation and guidelines including any relevant licences and approvals to be obtained.

- Identification of locations of known or potential contamination and preparation of a map showing these locations.

- Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint.
- Contamination management measures including waste classification and reuse procedures and unexpected finds procedures.

- In the event that indications of contamination are encountered (known and unexpected, including odorous or visual indicators), work in the immediate area will immediately cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate.

- Investigate potentially contaminated land to determine the concentration and type of contaminants and the extent of contamination. This should include investigation of the AECs identified in Section 4.1, where the project interacts with AECs.

- Protect the environment by implementing control measures to divert surface runoff away from the any AEC or other identified contaminated land.

- Capture and manage any surface runoff impacted by exposure to an AEC or other identified contaminated land.

- Assess the requirement to notify relevant Authorities, including the EPA.

- Manage the remediation and subsequent validation of the contaminated land, including any certification required.

- A process for reviewing and updating the plan

**Waste Management**

Excavated material that is not suitable for on-site reuse or recycling, such as contaminated material should be transported to a site that may legally accept that material for reuse or disposal. Soils leaving the site should be waste classified so that correct resource recovery and or off-site disposal occur.

Where excavated material cannot be classified as virgin excavated natural material, it would need to be classified and disposed of (when it cannot be re-used) to an appropriately licensed landfill in accordance with the *Waste Classification Guidelines – Part 1: Classifying Waste* (DECCW, 2009) and *Part 2: Immobilisation of Waste* (DECC, 2008).

A classification system should be used to control the excavation, stockpiling and disposal of all potentially contaminated materials. Soils should be classified (where possible) in-situ prior to excavation or when stockpiled during excavation, depending on available time and room for stockpile areas. Any unexpected finds should follow the same procedures.

**Asbestos Management**

If previously unidentified asbestos contamination is discovered during construction, an Asbestos Management Plan should be developed, in accordance with the *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* (Western Australia Department of Health, 2009). Work in the affected area must cease immediately, and an investigation must be undertaken and report prepared to determine the nature, extent and degree of the asbestos contamination. The level of reporting must be appropriate for the identified contamination in accordance with *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011), any relevant WorkCover Guidelines and include the proposed methodology for the remediation of the asbestos contamination. Remediation activities must not take place until receipt of the investigation report by occupational health professional.
Works may only recommence upon receipt of a validation report from a suitably qualified contamination specialist that the remediation activities have been undertaken in accordance with the investigation report and remediation methodology.

### 6.1.4 Ancillary Sites

Bulk stockpiles of materials or storage of fuels or chemicals should be located greater than 100 metres from any drainage line.

Vehicles and machinery should be properly maintained to minimise the risk of fuel/oil leaks.

All fuels, chemicals and hazardous liquids should be stored within impervious bunded areas in accordance with Australian Standards and EPA Guidelines.

### 6.2 Operational Phase

Consideration should be given in the detailed design phase to providing water quality controls where required to minimise further potential environmental impacts from increase pollutant loads from the upgraded road surface.
7 REFERENCES


Geological Survey of New South Wales, Department of Mineral Resource (1983) Sydney Geology Map, 1:100,000 Geological Series Sheet 9130 (Edition 1),


NSW EPA - Search for Environment Protection licences, applications, notices, audits or pollution studies and reduction programs – (http://www.epa.nsw.gov.au/prpoeoapp/default.aspx?range=Licence&searchrange=general,


NSW EPA (1994) Guidelines for Assessing Service Station Sites


Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale

Proposal Area

Fig. 1

Vector base dataset RoadNet © MDS 2014

Last updated by: RERADNARTRRDRTLSADTSADCSVCVCLRCDSNDU0.5

Location: \projects\30011633 - Mona Vale Rd REPD\DA VS GIS\Maps\M VRE_Figure1_Contam_proposal_area.mxd
Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale

Areas of Environmental Concern

- Asbestos contamination area
- Former market garden
- Potential waste storage area
- Spill
- Uncontrolled fill material placement
- Proposal area
- Property boundaries

Location: I:\projects\30011633 - Mona Vale Rd\REF\GIS\GIS\Maps\M VRE_Figure2_Contam_AEC.mxd

Last updated by: LR11993 on 27/02/2015 at 14:36
Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale

Location of Identified Groundwater Bores

Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale

Location: I:\projects\30011633 - Mona Vale Rd REF\A6 DA WNS GIS\Maps\M VRE_Figure4_Contam_GWbores.mxd

Last updated by: CRWE on 27/02/2015 at 16:24
APPENDIX B – HISTORICAL AERIAL PHOTOGRAPHS
Upgrade of Mona Vale Road between Manor Road, Ingleside and Foley Street, Mona Vale

Fig. 4B
NOTICE OF CLEAN-UP ACTION

BACKGROUND

A. The Environment Protection Authority ("EPA") is responsible for the administration and enforcement of the Protection of the Environment Operations Act 1997 ("the Act").

B. At approximately 15:40 on 1 October 2013, a fuel tanker owned and operated by Cootes Transport Group Pty Ltd ("Cootes") was involved in an incident on Mona Vale Rd near Samuel Street in Mona Vale NSW.

C. The fuel tanker, carrying approximately 33,000 litres of fuel including E10, ULP95, ULP98 and diesel, rolled on Mona Vale Road and caught fire ("the Incident").

D. Fuel and fire-water resulting from the Incident and the Incident response entered the stormwater system that enters Cahill Creek that flows through Bayview Golf Course and into Winnererrmy Bay Pittwater.

E. The EPA attended the Incident from about 17:50 on 1 October 2013 and provided advice and assistance in relation to environment protection and clean-up efforts.

F. Pollution control measures were implemented at the scene of the Incident. A dam was constructed in Cahill Creek adjacent to the 14th hole on Bayview Golf Course in order to contain waters contaminated with fuel, products of fire and fire-water and to prevent them from entering Winnererrmy Bay.

G. Liquid flowing from the stormwater drain into Cahill Creek had visual and olfactory indicators of contamination. The EPA observed the waters were black with a hydrocarbon sheen and foam. Strong odours of products of fire and hydrocarbons were present.
H. The contaminated waters were contained within the constructed dam adjacent to the 14th hole at the Bayview Golf Course.

I. Section 91 of the Act provides that the appropriate regulatory authority may issue a notice to require clean-up action to occur, in circumstances where it reasonably suspects that a pollution incident has occurred or is occurring.

J. Section 93 of the Act provides that a regulatory authority may give a clean-up direction orally. A direction given under s93 ceases to have effect 72 hours after the direction was issued, unless the regulatory authority which gave the oral direction provides a written clean-up notice.

K. Based on observations of the Incident, the EPA formed a reasonable suspicion that a pollution incident had occurred and was occurring, due to the unknown amount of fuel and fire-water that had entered the stormwater system as a result of the Incident.

L. At about 22:10 on 1 October 2013, the EPA issued Clean Up Directions orally to representatives of Cootes in accordance with section 93 of the Act that included:

1. Do not let waters contaminated with fuel, products of fire or fire-water resulting from the fuel truck incident on the corner of Samuel Street and Mona Vale Road Mona Vale breach the dam adjacent to the 14th hole in the Bay View Golf Course.

2. Immediately take action to ensure compliance with Direction 1.

M. The following directions to take clean-up action confirm those verbal directions referred to in L above.

**DIRECTION TO TAKE CLEAN-UP ACTION**

The Environment Protection Authority (EPA) directs Cootes Transport Group Pty Ltd to take the following clean-up action:

1. Do not let waters contaminated with fuel, products of fire or fire-water resulting from the fuel truck incident on the corner of Samuel Street and Mona Vale Road Mona Vale breach the dam adjacent to the 14th hole in the Bay View Golf Course.

2. Immediately take action to ensure compliance with Direction 1.

**FEE TO BE PAID**

- You are required by law to pay a fee of $466 for the administrative costs of issuing this notice. An invoice for the fee has been attached to this notice.

- It is an offence not to pay this fee. However you can apply for an extension of time to pay the fee or for the fee to be waived. At the end of this notice there is information about how and when to pay the fee and how to apply for an extension or a waiver of the fee.

Molly Tregoning  
Unit Head  
Waste & Resources - Waste Management  
(by Delegation)
INFORMATION ABOUT THIS CLEAN-UP NOTICE

- This notice is issued under section 91 of the Protection of the Environment Operations Act 1997.
- It is an offence against the Act not to comply with a clean-up notice unless you have a reasonable excuse.

Penalty for not complying with this notice

- The maximum penalty for a corporation is $1,000,000 and a further $120,000 for each day the offence continues. The maximum penalty for an individual is $250,000 and a further $60,000 for each day the offence continues.

Cost recovery from the person who caused the incident

- If you comply with this clean-up notice but you are not the person who caused the pollution incident to which the notice relates, you have a right to go to court to recover your costs of complying with the notice from the person who caused the incident.

Deadline for paying the fee

- The fee must be paid by no later than 30 days after the date of this notice, unless the EPA extends the time to pay the fee, or waives the fee.

How to pay the fee

- Possible methods of payment are listed on the last page of the attached invoice/statement.
- Please include the payment slip from the attached invoice/statement with your payment.

How to apply for an extension of time to pay/waive the fee

- Any application for and extension of time to pay the fee or for the fee to be waived should be made in writing to the EPA. The application should set out clearly why you think your application should be granted.

Other costs

- The Protection of the Environment Operations Act allows the EPA to recover from you reasonable costs and expenses it incurs in monitoring action taken under this notice, ensuring the notice is complied with and associated matters. (If you are going to be required to pay these costs and expenses you will later be sent a separate notice called a “Notice Requiring Payment of Reasonable Costs and Expenses”).

Continuing obligation

- Under section 319A of the Act, your obligation to comply with the requirements of this notice continues until the notice is complied with, even if the due date for compliance has passed.

Variation of this notice

- This notice may only be varied by subsequent notices issued by the EPA.
APPENDIX D – ASBESTOS CLEARANCE CERTIFICATE
Asbestos Clearance Certificate

Mona Vale Cemetery, Fazzolari Avenue, Mona Vale, NSW 2103

Pittwater Council

16th June 2014
Our Ref: C108278:J127129
Asbestos Clearance Certificate
Pittwater Council
Mona Vale Cemetery, Fazzolari Avenue, Mona Vale, NSW 2103

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Figure 2: Remediation Areas....................................................................................4

Statement of Limitations
This report has been prepared in accordance with the agreement between Pittwater Council Pty Ltd and Noel Arnold & Associates Pty Ltd.

Within the limitations of the agreed upon scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of the profession and consulting practice. No other warranty, expressed or implied, is made.

This report is solely for the use of the Pittwater Council and any reliance on this report by third parties shall be at such party's sole risk. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by Noel Arnold & Associates Pty Ltd.
## Clearance Certificate

### 1. Client Details

<table>
<thead>
<tr>
<th><strong>Client</strong></th>
<th>Pittwater Council, PO Box 882, Mona Vale, NSW 1660</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Client Contact</strong></td>
<td>Paul Cook, Streetscapes Supervisor South</td>
</tr>
<tr>
<td><strong>Certificate Date</strong></td>
<td>Thursday 19th June 2014</td>
</tr>
<tr>
<td><strong>NAA Reference</strong></td>
<td>C107859:J127129 Pittwater Council - Clearance Inspection Report - Mona Vale Cemetery - June 2014</td>
</tr>
</tbody>
</table>

### 2. Removal Details

<table>
<thead>
<tr>
<th><strong>Site Name &amp; Address</strong></th>
<th>Mona Vale Cemetery, Fazzolari Avenue, Mona Vale, NSW 2103</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific Locations &amp; Asbestos Removed</strong></td>
<td>Asbestos Remediation Area – Refer to Figures 1 and 2. Impacted fill layer from top 400 - 900mm of excavation areas.</td>
</tr>
<tr>
<td><strong>Date of Remedial Work</strong></td>
<td>Monday 16th June 2014</td>
</tr>
<tr>
<td><strong>Removal Contractor</strong></td>
<td>Matthews Contracting, a Class B (bonded) license Asbestos Removal Contractor (ARC)(Lic No. AD211356) as issued under the NSW Work Health and Safety Regulation 2011 by NSW WorkCover Authority, conducted the asbestos remedial works.</td>
</tr>
</tbody>
</table>

**Background:**

In May 2014, Noel Arnold and Associates (NAA) conducted an Asbestos Contamination Investigation (ACI) of the site, as identified in Figure 1. The ACI comprised a combination of test pitting, inspections and calculation of soil as asbestos concentrations. Patchy occurrences of Asbestos-Containing Materials (ACM) fragments were identified throughout the majority of the site, with three asbestos contamination hotspots identified at test pit locations TP04, TP07 and TP09.

NAA recommended that a licensed ARC was engaged to remediate the areas where asbestos cement hotspots were identified. The recommended remediation strategy chosen by Pittwater Council was the excavation and off-site disposal of upper fill layers within a 3m radius of each hotspot and a thorough inspection of the exposed ground surfaces across the site, and removal of any identified ACMs.

**Work Completed:**

The recommendations of the ACI report were implemented by Matthews Contracting.

**Inspection Findings:**

A minor quantity of fragments of suspected asbestos cement sheet were identified during the clearance inspection. All of the fragments identified were removed by Matthews Contracting prior to completion of the inspection.

### 3. Air Monitoring/Inspection Details

<table>
<thead>
<tr>
<th><strong>Inspection Date</strong></th>
<th>Monday 16th June 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Inspection</strong></td>
<td>Subsequent to completion of remediation works, China Jut of NAA conducted a visual inspection across the designated asbestos remediation area as outlined in Figure 2. The inspection included a comprehensive walkover of the exposed ground surfaces across the site as well as the remediated hotspots to identify suspected asbestos materials. All suspected asbestos cement fragments identified during the inspection were collected and removed from site. It is the opinion of Noel Arnold and Associates that no visible suspected asbestos fragments remained on the exposed ground surfaces of the inspected areas at the conclusion of the inspection.</td>
</tr>
</tbody>
</table>
Air Monitoring: NAA conducted asbestos fibre air monitoring during the removal works to assess the air quality in surrounding areas. Please refer J127129.002. All air monitoring results were below the reporting limit of 0.01 fibres/mL with filters examined by a NATA-accredited laboratory in accordance with the Guidance Note on the Membrane Filter Method for the Estimation of Airborne Asbestos Fibres 2nd Edition (NOHSC:3003 (2005)).

4. Limitations

This Clearance Certificate relates only to the asbestos-containing materials and remedial works described above. The licensed asbestos removalist was engaged directly by the client and scope of works arranged with the client.

5. Recommendations

The following recommendations are provided:

- During the remediation works, asbestos formwork was identified under a buried cement pathway in the Eastern Remediation Area. This pathway was reportedly chased out by Matthews Contracting, however it cannot be confirmed that the entire path was uncovered/removed. An experienced Environmental Consultant should be consulted prior to any development of this area.
- As an additional "safeguard" to minimise future unearthing of ACM fragments due to surface erosion by inclement weather, human activity etc. ACM impacted areas should be capped with Virgin Excavated Natural Material (VENM) to a depth of approximately 100mm.
- Due to the potential for asbestos contamination to be present below the surface, an experienced Environmental Consultant should be consulted prior to any development of the site.

Regards,

NOEL ARNOLD & ASSOCIATES PTY LTD

China Just
Environmental Consultant
Asbestos Clearance Certificate
Pittwater Council
Mona Vale Cemetery, Fazzolari Avenue, Mona Vale, NSW 2103
Figure 1: Site Locality
Asbestos Clearance Certificate

Pittwater Council

Mona Vale Cemetery, Fazzolari Avenue, Mona Vale, NSW 2103

Figure 2: Remediation Areas
Figure 2:

Pittwater Council
C108278
J127129
Clearance Inspection
Mona Vale Cemetery, NSW
Remediation Areas

Address:
Level 2, 11-17 Khartoum Road
North Ryde NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name: Pittwater Council
Client Number: C108278
Project Number: J127129
Project Description: Clearance Inspection
Address: Mona Vale Cemetery, NSW
Figure 2: Remediation Areas

Site Boundary
Remediation Area
metres