Appendix M

Preliminary Site Contamination Investigations
Contaminated Land Assessment

Redoubt Road/Mill Road Corridor - Contaminated Land Assessment
Contaminated Land Assessment

Redoubt Road/Mill Road Corridor - Contaminated Land Assessment

Client: Auckland Transport

Prepared by

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<td>Ian Fones</td>
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Executive Summary

AECOM New Zealand Limited (AECOM) was engaged by Auckland Transport (AT) to undertake a Preliminary Site Investigation (PSI) – referred to herein as Contaminated Land Assessment (CLA) for the proposed upgrade of the Redoubt Road/Mill Road Corridor. The road upgrade works will predominantly be within, or in close proximity to, the existing Redoubt Road, Mill Road and Murphys Road corridors, in the suburbs of Goodwood Heights, Totara Park, Flat Bush, and Alfiston, Auckland (referred to herein as the Site).

The objective of the CLA is to identify locations with potential for contamination of soil at the Site, which may require management and/or remediation during the proposed upgrade and future operation of the corridor. This information is required as part of the Notice of Requirement (NoR), to ensure that appropriate conditions are placed on the designation to mitigate adverse environmental effects during construction and use (if required). To achieve the objective, a Site inspection was conducted and a review of Auckland Council’s (Council’s) environmental data bases and other historical references and information was conducted.

CLA Findings

From a review of the available historical information and a Site inspection, the following primary locations were identified as having the potential for adverse impacts to soil at or near the proposed development:
- Historic asbestos containing material (ACM) contaminated waste:
  - Properties within Flat Bush identified as having previously been contaminated with ACM. Hilltop Road subdivision - historic asbestos contamination including five properties at Rakaia Rise.
  - Hilltop closed landfill (adjacent Redoubt Road) – asbestos contamination within the roadside verge.
- Covered fuel storage, down gradient to the Site (130 – 136 Mill Road).
- Historic illegal landfill activities (140 Ranfurly Road).
- Possible use of coal tar within Redoubt Road, Mill Road and Murphys Road roadways.
- Possible use of pesticides in a small orchard/plantation (308 Mill Road).¹
- Reported tipping and unauthorised earthworks/stockpiling (295 Mill Road).

Whilst potential exists for groundwater contamination to be present, it is not considered further for the purposes of NoR and should be investigated prior to future consenting works. Based on the available information on the likelihood of contaminated potential to impact groundwater (including the proximity and nature of nearby HAIL properties and generally shallow excavation [generally less than 3.5 m bgl]), it is considered unlikely that the proposed disturbance activities will encounter impacted groundwater within the Site. In the vicinity of the Pony Club and Watercare Reservoir land, the cut is expected to be approximately 10 m bgl, which may intersect groundwater.

Surface water will be reviewed as part of future site investigations prior to consenting.

Conclusions

This CLA identifies the potential for contaminated soil from past activities conducted along the road corridor. Identified potential adverse effects relate to human or environmental exposure to contaminants.

Provided that the proper controls are put in place and implemented, adverse effects are readily mitigated. These controls are considered acceptable and include implementation of dust and erosion control plans, stormwater management plans, and health and safety plans. Site investigation as part of future detailed design will assist in further minimising these risks. On-site monitoring is required of soil, surface water and groundwater quality during construction to assure that waste is properly classified to also minimise risk to site workers, the public and the environment. Other standard construction controls, such as limiting site access, will also be necessary. Positive effects are possible in that contaminated soil may be removed from the area.

The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) applies to properties where Hazardous Activities and Industries List (HAIL) activities are being, have been, or are likely to have been conducted. Sections of the proposed road corridor development are considered HAIL sites due to the following past and present land use activities conducted at and adjacent to the Site:
- Possible use of persistent pesticide in orchard (category A.10);
- Dumping of asbestos (category E.1);
- Vehicle refuelling / storage (category F.8);
- Closed and Illegal landfilling (category G.3);

Prior to consenting, these HAIL activities should be characterised by a Detailed Site Investigation (DSI) in accordance with the NES. Based on the findings of the DSI, contamination identified as having potential to impact human health and the environment may be avoided, controlled or mitigated through the implementation of a CEMP.

¹ Note that this was only identified from a review of aerial photos (1988) and has not been substantiated from any other research.

02-Oct-2014
Prepared for – Auckland Transport – Co No.: N/A
1.0 Introduction

1.1 Preamble

AECOM New Zealand Limited (AECOM) was engaged by Auckland Transport (AT) to undertake a Preliminary Site Investigation (PSI) – referred to herein as Contaminated Land Assessment (CLA), for the proposed upgrade of Redoubt Road/Mill Road. The upgrade is intended to accommodate current and future growth in Papakura, Takanini and Flat Bush. The road upgrade works will predominantly be within, or in close proximity to, the existing Redoubt Road, Mill Road and Murphys Road corridors, in the suburbs of Goodwood Heights, Totara Park, Flat Bush, and Alfiston, Auckland (referred to herein as the Site).

The Site location is shown in Figure 1, Section A.1 (Appendix A). The Site is shown in Figure 2, Section A.1 (Appendix A) and the footprint of land identified within the Site is shown in the combined drawings in Section A.2 (Appendix A).

1.2 Background

The Redoubt Road-Mill Road Site provides an arterial road connection east of State Highway 1 (SH1) between Manukau, Papakura and Drury and covers a total of approximately 10.7 km plus side roads. ‘The route is coming under increasing pressure due to growth and traffic loading from commuter traffic and is expected to become more acute over time as the Flat Bush and Takanini growth areas develop’.

A number of legislative triggers require that contamination be considered as part of the Notice of Requirement (NoR) for the designation of the Site, including s43D(4) of the Resource Management Act, 1991 (RMA). This means that the requirements under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, Ministry for the Environment, 2011 (NES) for the Site must be identified and addressed in the NoR submission. The NES requires, in part, that a CLA be conducted where the Site may have had past or current activities that could have caused soil contamination. The NES takes precedence over the Auckland District Plan (Manukau and Papakura Sections) with regard to protection of human health, however the objectives of the rules still remain.

Statutory requirements prior construction will also include resource consent under the Auckland Council Regional Plan: Air, Land and Water 2013 (ACRP:ALW) and the Proposed Auckland Unitary Plan (PAUP), 2013. Refer to Section 5.0 for more information on planning requirements relating to contamination.

AECOM prepared a Preliminary Contamination Review (AECOM 21 September 2012) for the Scheme Assessment for the proposed alignment options. Information from this review has been incorporated into this CLA where relevant.

1.3 Objective

The objective of the CLA is to identify locations with the potential for soil contamination at the Site, which may require management and/or remediation during the proposed up-grade and future operation of the corridor. This information is needed as part of the Notice of Requirement (NoR) to ensure that appropriate conditions are placed on the designation to mitigate adverse environmental effects during construction and use (if required).

1.4 Scope of Works

To achieve the project objective, the scope of works outlined in Table 1 was undertaken.

<table>
<thead>
<tr>
<th>Work Activity</th>
<th>Description</th>
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<tr>
<td>Site Inspection</td>
<td>A site inspection was undertaken by David Dangerfield, a Senior Environmental Engineer of AECOM on 11 September 2012 to assess for visibly obvious potential contaminant sources. The agreed scope of the site inspection was limited to publically accessible land due to access restrictions to private properties.</td>
</tr>
</tbody>
</table>

2 Redoubt Road – Mill Road Corridor Study - Scheme Assessment Report, AECOM, 21 June 2013.
### Work Activity | Description
--- | ---
Review of Council Information | Records were provided by the Auckland Council (Council) Specialist Input Unit, including: available consents, permits or environmental incidents relating to contamination issues. The Closed Landfills Team, Groundwater Team and Health Team were also consulted.

Site history review | A desktop review of historical aerial photos and relevant historical documentation was completed, to identify potentially contaminating practices which may have occurred on or nearby the Site. Searches included a visit to the Council archives section to review key available permits/consents, reported incidents, previous environmental reports and the contaminated sites file from Council. A selection of historic title records for properties considered to have a higher contamination potential were obtained and reviewed.

Geological and hydrogeological review | A review of relevant geological and hydrogeological data to assess the sensitivity of the surrounding land-use as well as the location and geology of previous environmental investigations. This information was also used to evaluate the potential for migration of contamination to the Site.

Data Evaluation & Reporting | Preparation of this report summarising the findings of this CLA.

Note that location of construction staging areas were not available at the time this CLA was prepared and these locations have not been evaluated as part of this report.

### 2.0 Site Identification

Site details are summarised in Table 2 below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Site Address</td>
<td>Redoubt Road, Mill Road and Murphys Road Corridor, Flat Bush, Auckland, as defined by drawings in Section A.2 (Appendix A).</td>
</tr>
<tr>
<td>Lot and Deposition Plan Numbers</td>
<td>Within Redoubt Road, Mill Road and Murphys Road Corridor (undesignated) and private properties to be provided prior to final designation.</td>
</tr>
<tr>
<td>Certificate of Titles</td>
<td>Road Reserve and private properties to be provided prior to final designation.</td>
</tr>
<tr>
<td>Current Site Owner</td>
<td>Auckland Transport and Private Owners</td>
</tr>
<tr>
<td>District</td>
<td>Flat Bush</td>
</tr>
<tr>
<td>Region</td>
<td>Auckland</td>
</tr>
<tr>
<td>District Council</td>
<td>Auckland Council</td>
</tr>
<tr>
<td>Regional Council</td>
<td>Auckland Council</td>
</tr>
<tr>
<td>Current Zoning and Planning Overlays</td>
<td>Transport Corridor, Residential, School, Rural 2 (Countryside Living), Rural 3 (Intensive Countryside Living) and Rural (General). (Refer to Figure 3.7: Land Use Profile, AEE sourced from the Auckland District Plan (Manukau and Papakura Sections).)</td>
</tr>
<tr>
<td>Site Area</td>
<td>The approximate earthworks footprint is 6000,000 m².</td>
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<tr>
<td>Approximate Site Elevation (m AOD)</td>
<td>From approximately 20 to 123 m</td>
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<tr>
<td>Site Location Plan</td>
<td>Refer to Figure 1, Section A.1 (Appendix A)</td>
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<tr>
<td>Site Layout Plan</td>
<td>Refer to Figure 2, Section A.1 (Appendix A)</td>
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</table>

Notes: AOD- Above Ordinance Datum.
3.0 Site History Review

3.1 Aerial Photographs

Historical aerial photographs from 1939, 1960, 1972, 1988, 1997 and 2010 were obtained and reviewed. In summary, the review indicated:

- That until at least 1972, the Site was dominated by agricultural grassland and native bush with residences and some agricultural buildings.
- By 1997, the majority of the Site stretching along Redoubt Road appears to be extensively developed (residential), although the outlying areas of the Site remain grassland.
- Possible landfills were identified on Thomas Road (2010 aerial), and at 140 Ranfurly Road (1988 aerial) and earthworks are noted at a few intersections along the route in the 1997 and 2010 periods.

Additional details of the aerial photograph review are included in Table B.1 (Appendix B). Copies of the reviewed aerial photographs are provided in Appendix B. Note that no aerial photographs were available between 1939 and 1960.

3.2 Auckland Council Information

3.2.1 Auckland Council Contaminated Land Records

Available records of consents, permits, and environmental incidents relating to contamination were obtained for the Site and to approximately 50 m either side (the search area).

Thirty-two registered environmental incidents for the search area were obtained. The majority of registered incidents are considered by AECOM to have minor environmental (contamination) impact, including 14 cases relating to open burning and 12 cases relating to pollutants being discharged to either the public stormwater system or neighbouring streams.

A copy of the Site Contamination Enquiry from Council, dated 7 September 2012, is included in Section C.1 (Appendix C).

The following incidents were of particular note for potential soil contamination:

- Leachate from an illegal landfill at 140 Ranfurly Road (file reference 7-36-0409). Illegal dumping of domestic and industrial waste (including chemical drums) was reported at this location over a number of years prior to 1987. The filling disturbed the flow of a stream causing flooding of a neighbouring property. Council reports were viewed showing pending legal action taken against Mr Matthews, the owner of 140 Ranfurly Road. The stream is a tributary of Papakura stream. Refer to 1988 aerial photos for evidence of the landfill.
- Pollutants going to stream and earthworks without consent at 232 Mill Road Alfriston (incident #08/3289). Photos observed on council incident file and some minor spilling of waste oil was observed in 2008.
- An oil discharge to stormwater (less than 10 L) at 34 Murphys Road Flat Bush and a hydrocarbon spill on the adjacent road reserve (incident #11/3051). This was reported to be a result of a car crash and is inferred to be of minor impact.
- Paint and oil discharged to stream at 33 Murphys Road (incident # 10/2614). Council report stated that discolouration was natural from iron oxide and did not require further investigation.
- A reported asbestos dump on the Thomas Farm (presumed to be at 83 and 84 Thomas Road), however, no date or specific details about the asbestos dump were available. This property has since been rezoned for residential land-use and developed (T096-02-1246). Refer to Section C.2 (Appendix C) for a copy of an ARC site plan showing the historic extent of the Thomas farm and areas of asbestos containing material (ACM) disposal.

Eight registered Resource Consents and one registered Permitted Activity were identified from the enquiry for the search area. Three of the registered consents relate to the construction of a bore and five relate to the discharge of wastewater.
The permitted activity adjacent to the Site at 138-150 Redoubt Road, relates to the contaminated site discharge for the redevelopment of residential properties. The Council considered ‘the likelihood of contamination on the site to be remote and no intrusive environmental investigations were conducted’.

A resource consent (consent # 15671) was granted to authorise the discharge of up to 10.2 m³ per day of secondary treated domestic type wastewater and additional primary treated wastewater from Alfriston School to ground at 1373 Alfriston Road, located on the corner of Mill and Alfriston roads, adjacent to the Site.

3.2.2 Former Manukau City Council Information

The following information was obtained from the Auckland Council, Manukau (formerly Manukau City Council):

Southern Licensing & Compliance Services, Environmental Operations

In 1999, an investigation was undertaken to assess asbestos contamination in the Flat Bush area. The report titled ‘Asbestos Investigation Report: Flat Bush Study Area, Manukau City’ by Manukau Consultants Limited (MCL, now GHD, March 1999) was five volumes (one volume for the report and four volumes of appendices). A copy of this report has not been obtained from Council. An independent review of the report was undertaken by Alan Rogers OH&S Pty Ltd, (Review of the Flat Bush Asbestos Investigation, October 1999) and a copy of this was obtained and reviewed by AECOM.

The Alan Rogers OH&S Pty Ltd report provided the following information:
- The MCL report / investigation were conducted to a ‘relatively high quality’ and meet the original objective in defining the extent and sources of contamination.
- MCL conducted a comprehensive background search of Council files, extensive interviews with residents, review of historical aerial photographs, site walkover, and intrusive soil sampling.
- MCL reported that two sites were used for the disposal of asbestos waste material comprising broken asbestos cement (pipes/sheet), ‘uncured’ asbestos cement waste and unbound fibrous wastes sourced from an asbestos manufacturing factory. The material was distributed to other rural properties for use in filling of gullies and unsealed tracks. Development (primarily residential) has disturbed areas of contamination and has resulted in dispersal of impacted soils across a wide area although in ‘relatively low level asbestos contamination over some areas. Other areas remain uncontaminated’.
- Concentrations of asbestos in soil was identified to be in the order of 0.0001% and 0.001% (assumed weight for weight [w/w] although no units given) and predominantly comprised chrysotile (white) asbestos. Amosite (brown) and Crocidolite (blue) were also identified but were ‘a rarity’.
- The health risk to residents was considered to be well characterised and addressed.
- Management/control measures need to be in place for soil disturbance activities based on ‘site class’ and type of soil disturbance activity.
- For disturbance of areas of bulk deposits of asbestos containing material (ACM), dust control strategies are required to prevent spread of contamination.
- The desk study data found in the ‘File Search Methodology Report’ by MCL was considered to be extensive and was fundamental to understanding the original source locations and their likely spread.
- Delineation of the extent of ACM contamination from field sampling within the Flat Bush area was unclear.
- Results showed that of the samples that returned a positive result, approximately 75% were ≤ 0.0001% (w/w), a further 10% were ≤0.003% (w/w) and a small number of samples contained up to 0.03% (w/w). No guidelines were available for asbestos in soils at the time of the MCL investigation, however it is understood that a criteria of 0.01% w/w is understood to have been adopted although this could not be confirmed.

Request for information on two additional properties suspected of having HAIL landuses was requested (140 Ranfurly Road and 130-136 Mill Road) however Auckland Council did not hold any information that may indicate the presence of contamination at these sites.

Manukau Operative District Plan

There are a several conditions under the Manukau Operative District Plan that relate to contaminated land, specifically in relation to asbestos at Flat Bush. Figure 2, Section A.1 (Appendix A) identifies the location of the
area in which the ‘Flat Bush Variation Rules relating to Management of Asbestos Containing Materials Apply’. The areas are split into two categories based on the extent of identified asbestos contamination - Type 1 and Type 2.

1) Land identified in area 1 of Figure 1 - Flat Bush areas relating to the management of asbestos containing materials, except as provided in clause 4.5.10.1.2.2.4 below, and excluding grazing, the following activities will be non-complying activities:
   a) all land disturbing activities
   b) subdivision.

2) Land identified in area 2 of Figure 1 - Flat Bush areas relating to the management of asbestos containing materials, except as provided in clause 4.5.10.1.2.2.4 below, and excluding farming, the following activities shall be restricted discretionary activities:
   a) Any land disturbance activities required for the installation of services such as electricity, water, telecommunications, sewerage and drainage
   b) Any land disturbance activities required for the construction, renovation or demolition of buildings used for or in association with residential, business, recreational, educational or community activities
   c) Land disturbance activities involving earthworks in excess of 200 m³
   d) Subdivision.

3) Site investigation and remediation required by clauses 4.5.10.1.2.2.1 and 2 above must comply with Part 4.2.3.5 - Contaminated land, and Part 4.2.3.9 - Land disturbance activities.

4) The restrictions imposed by this clause, 4.5.10.1.2.2.1 and 2 above will no longer apply to a site where remediation has occurred and approved by council.

Former City of Manukau, Planning Department

An application was found at Auckland Council, Manukau for the redevelopment of an existing building to incorporate ‘covered fuelling space’ as well as other features. The property is located at 130 - 136 Mill Road (formerly known as Stock Route Road), Totara Park (or Alfriston) and is identified as Lot 1 DP 49293. No further information was available on the type of storage system or the type of fuel stored and it is unclear if the development occurred and no evidence was identified from the aerial photographs.

3.2.3 Former Papakura District Council Information

One property within the Papakura District Council was identified as having potential for HAIL landuses to have occurred. 295 Mill Road, Ardmore was tagged as a potentially contaminated site due to receipt of information from the council that tipping and unauthorised earthworks/stockpiling may have occurred on the site. The property file was obtained and reviewed for this property. The area of reported tipping and unauthorised earthworks is discussed in the property file including photographs, however no plans showing the location were observed. Refer to Section C.3 (Appendix C) for a selection of key files obtained from the property file showing evidence and location of filling which was reported to have been removed in 2010.

The council property file indicated that in 1991 illegal filling was occurring on property and it was blocking a watercourse; among the fill, plastic, refuse bags, tin, wood, rubber, paper and a cow carcass was also identified. There was no record of the exact location of this fill on site or whether it was removed.

In 2000 it was reported that 500 m³ of unauthorised fill was placed on site in a paddock close to Mill Road. A retrospective resource consent was obtained for the works. In 2010 the fill had been removed however no monitoring was completed by council. Truck dockets for the removal were later provided to council.

3.2.4 Closed Landfills Environmental Services Unit

The Contaminated Land and Closed Landfills team identified a closed landfill at corner of Hilltop Road and Redoubt Road. Council provided a six page report, included in Section C.2 (Appendix C). The report did not definitively locate the area of the closed landfill, however it identified the primary contaminant as ‘potential bulk ACM’ requiring further site assessment prior to major earthworks or major site development at this location. It appears that this area is within the District Plan map for asbestos contamination (identified in Figure 2, Section A.1 [Appendix A]). No indication of this closed landfill area was observed in the aerial photographs.
3.2.5 Groundwater Database Search

A search was undertaken of the Council bore records for consented monitoring wells located within 50 m of the Site. The information received indicates that there are three Registered Bore Consents. The nearest registered bore to the Site is located adjacent the Site at 294 Redoubt Road (Consent # 11086). The bore was installed for the purpose of groundwater extraction of domestic supply and was installed with a diameter of 100 mm to approximately 150 m below ground level (bgl) and with a steel casing to approximately 65 m. A consent was granted for a bore along Mill Road (consent # 12233) for the purpose of geotechnical investigations.

3.2.6 Land Information Memorandum

Three Land Information Memoranda (LIM) were obtained based on preliminary information collected from Council.

- 84 Thomas Road
  The LIM states under Register C.2328, LIR_00070218 that ‘asbestos containing materials have been removed off-site’ and the site is ‘suitable for residential use’. The site was validated and the remediation process was peer reviewed. Restrictions imposed by ‘rule 17.10.12.14 in variation No.13 Flat Bush shall no longer apply’. Copies of relevant reports were said to be ‘available’ at the customer service centre at Manukau. Note that the reports could not be obtained despite numerous attempts and formal requests.

- 104 Redoubt Road
  The LIM states under Register C.4451, LIR_00044568 that ‘this site was in an area investigated for the presence of ACM from 1998. Following investigations and based on an independent review of investigations, this site is deemed suitable for residential use and there are no additional or special restrictions on its use.’

- 140 Ranfurly Road
  Under Register C.658 (LIR_00009753), the site has received uncontrolled fill over finished ground and will not be suitable for construction of dwellings without specific design. A resource consent application (dated 27/12/92 is on file with a plan showing the area of fill (4377/140).

3.3 Historical Title Records

Historical title records were obtained for three selected properties within the vicinity of the proposed road upgrade, to identify previous ownership and potential historic land uses that fall within the Hazardous Activities and Industries List (HAIL), as defined by the Ministry for the Environment (MfE). Due to the number of properties adjacent to and within the Site and the preliminary nature of this investigation, title certificates were obtained for targeted properties where suspected asbestos dumping, illegal landfilling or fuel storage may have occurred and where potential for properties affected by HAIL was greatest.

The three selected properties were:

- 140 Ranfurly Road (former illegal landfill).
  This title indicates the original owner was a farmer from the ‘Port of Waikato’.

- 83 Thomas Road (asbestos waste disposal property).
  This title indicates original ownership by a farmer which is consistent with the land use. No occupations of other property owners pointed to HAIL activities and industries at the site.

- 130 – 136 Mill Road (fuel storage).
  The title indicates original ownership by a ‘contractor’ of Manurewa in 1963 although no additional information was available on occupations of the property owners.

Copies of the historic titles are available in Appendix D.

3.4 Media Search

A targeted web media search was undertaken for information relating to asbestos dumping in the Flat Bush area. The New Zealand Herald had an online article posted on 20 June 2001 titled: ‘Asbestos: the killer in the soil’ which provided a background summary to a widespread asbestos in soil problem in the Flat Bush area. The article stated that asbestos was uncovered in the soil at the 25 Hilltop Road subdivision and centred around five significantly contaminated properties on Rakaia Rise. The article indicated that discussions were being made to undertake the eventual removal of ‘all asbestos from the affected properties’.
A paper was also located online titled ‘Residents perceptions towards asbestos contamination of land and its impact on residential property values. Sandy Bond and David Cook’ (no date). This provided a detailed summary of the chronology of the Flat Bush asbestos study and community and government response. Refer to Section C.2 (Appendix C) for a copy of the paper.

A review of the online Council library provided a chronology of papers, news articles and technical reports on ‘the Flat Bush asbestos scare’, 10 October 1998 (www.manukau.infospecs.co.nz). This summary identifies the Flat Bush asbestos investigation report title as ‘Asbestos Investigation Report: Flat Bush Study Area, Manukau City,’ Manukau Consultants, March 1999 (summary volume plus four volumes of appendices).

3.5 Site History Summary

3.5.1 Findings

The following findings are summarised:

- A plantation or orchard of trees was observed in the 1988 aerial photographs on a portion of land at 306 Mill Road (part Lot 2, DP12981).
- A review of pollution incidents on or adjacent to the Site from Council’s Specialist Input Unit files identified an illegal landfill, pollution going to a stream and unconsented earthworks, oil discharge to stormwater and a hydrocarbon spill, paint and oil discharge to a stream, and an asbestos dump.
- The Auckland District Plan (Manukau Section) identified the location in which planning rules relating to the management of ACM apply. These are identified in Figure 2, Section A.1 (Appendix A).
- A consent application was found for refuelling activities undercover at 130 – 136 Mill Road. This is unlikely to affect the Site as the identified buildings is down gradient and approximately 100 m from the Site. It is also unclear if the building was constructed.
- A peer review report of the ’Flat Bush Asbestos Investigation’ was obtained from the former Manukau City Council office. The report provided an independent assessment of an extensive contamination investigation for the Flat Bush area.
- Two LIMs (84 Thomas Road, Flat Bush and 104 Redoubt Road) were obtained in the vicinity of the asbestos fill study area shown in Figure 2, Section A.1 (Appendix A) as Area 2 properties. Both properties indicate that they were the subject of contamination investigations for asbestos and that they are now classified as suitable for residential use. 84 Thomas Rd required remediation including off-site disposal.
- Historical titles were consistent with other historical information collected although no further information was available that might indicate specific activities undertaken at these properties.
- Historic illegal landflling at 140 Ranfurly Road appears to focus on the central area of the property, east of the Site and is unlikely to impact the Site.

The above findings identify that there is a contamination potential for which intrusive investigation, sampling and analysis is recommended to appropriately understand risks as part of preparing outline plan of works applications to enable construction and future operation of the up-grade.

3.5.2 Key Data Gaps

No information was available for the 306 Mill Road property to identify the nature of the plantation/orchard observed in the 1988 aerial photograph and the potential for use of pesticides at this property.

No details were available on the type of waste disposed of at the illegal landfill at 140 Ranfurly Road.

Peer Review: Flat Bush Asbestos Investigation, Alan Rogers, 1999.

- Anecdotally and from information reviewed on two LIM reports, it is understood that a large proportion of the sites have been remediated although it is unclear which sites (if any) have not been cleaned up.
- Due to the absence of available guidelines at the time the MCL investigation was completed, there are some minor uncertainties about the work undertaken. Specifically, it is unclear what portion of the ACM results were friable and which were bonded asbestos, whether or not any sites still require validation and what risk of contamination exists for the roadside verges within the identified Flat Bush contamination area (assumed to be the same area identified under the District Plan rules in Figure 2, Section A.1 [Appendix A]).
No site plans were available showing the extent of the study area although it was reported to be 925 ha with a population of 10,500 residents and may relate to the area defined in Figure 2, Section A.1 (Appendix A).

No information was available on the potential for coal tar to be present within the existing roadways of the Site. Coal tar was however historically used to seal roads and is often found within base course layers in the wider Auckland Region.3

4.0 Site Conditions and Surrounding Environment

4.1 Site Description

The Redoubt-Mill Road corridor provides an alternate north-south route to SH1 between Manukau, Papakura and Drury and covers a total of 8.9km, as defined by the consent drawings in Section A.2 (Appendix A). The corridor study area commences at the SH1 on and off ramps on Redoubt Road and runs east then south along Redoubt Road to the Mill Road intersection. From here, the corridor continues south along Mill Road, concluding just south of Alfriston Road near Pope Road. Two side roads are also included within the study, Murphys Road between Redoubt Road and Flat Bush School Road (1.8 km) and Hollyford Drive north of Redoubt Road (0.2km).

Table 3 Summary of Project Area

<table>
<thead>
<tr>
<th>NOR Divisions</th>
<th>Stage Divisions</th>
<th>Section Divisions</th>
<th>Route Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stage 1 and 2</td>
<td>Sections 1a, 1b, 2a and 2b</td>
<td>Redoubt Road (at SH1) west to approximately 200 m east of Hilltop Rd</td>
</tr>
<tr>
<td>2</td>
<td>Stage 3</td>
<td>Sections 2c, 3a, 3b, 3c and 4a</td>
<td>Approximately 200 m east of Hilltop Road to approximately 400 m east of the proposed Murphys Road intersection. Includes Murphys Rd terminating south of its intersection with Flat Bush School Road.</td>
</tr>
<tr>
<td>3</td>
<td>Stage 4, 5 and 6</td>
<td>Sections 4b, 4c, 4d, 4e and 5</td>
<td>Approximately 400 m east of the proposed Murphys Road intersection to approximately 300 m south of Alfriston Road.</td>
</tr>
</tbody>
</table>

A map displaying the greater area and environmental setting is shown in Figure 1, Section A.1 (Appendix A).

4.2 Current Land Use

The Site consists of the existing Redoubt, Mill and Murphys Roads as well as some additional land which diverges from the current Site onto adjoining properties and side road/intersection approaches. From the Southern Motorway (SH1) to Hilltop Road (including Sections 1a, 1b, 2ac and 2bc [also referred to as Stages 1 and 2]), the adjoining land use is primarily residential with some parkland to the south (see Figure 1, Section A.1 [Appendix A]).

Sections 2c, 3a, 4a and 4b (Redoubt Road and Murphys Road) are dominated by rural lifestyle blocks to the north and public parkland/reserve/pony club to the south. Section 3b, 3c (Murphys Rd) are dominated by farmland and bush/public reserve. Properties adjacent to or within Sections 4c, 4d, 4e and 5 (Mill Road) are farmland with some rural residences. A water reservoir is located on a large property on the north side of Mill Rd owned by Watercare Services. A public school is located on the corner of Mill Road and Alfriston Road, however the Site is approximately 100 m from the school.

4.3 Geology

A review of the New Zealand Geographical Society (NZGS) 1:250 000 Geological Map 3 Auckland (Institute of Geological and Nuclear Sciences [GNS], Auckland, NZ, 2001) indicates that the soils underlying the Site are

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comprised of predominantly Puketoka Formation pumecious mud, sand and gravel with muddy peat and lignite. These are underlain by the East Coast Bays Formation consisting of alternating sandstone, mudstone with variable volcanic content and volcaniclastic grit beds.

4.4 Site Topography and Drainage

4.4.1 Topography

The general topography varies from relatively flat urban terrain to rolling rural countryside. From the intersection of Redoubt Road and the southern motorway to Everglade Drive/Hollyford Drive, the land varies between being moderately flat to relatively steep as the land falls away from the Redoubt Road ridgeline.

From Hollyford Drive through to its intersection with Murphys Road, the Site is bordered by larger residential sections or countryside living and reserves (Totara Park). The Site through this section runs along a ridge with the residential grades generally falling away from the outer berms or road corridor. From Murphys Road onwards, the corridor runs through generally open farmland with steep terrain and two stream gullies. From approximately 200 m north of the Mill Road/Alfriston Road intersection the surrounding terrain is generally very flat with deep open roadside drains while land use is predominantly open paddocks with isolated residences.

Murphys Road is relatively flat at its intersection with Flat Bush Road and is surrounded by flat farm land. The terrain quickly changes as the Site tracks south up the hill toward the intersection with Redoubt Road on the ridge with a vertical grade of approximately 9%.

4.4.2 Drainage

The corridor is located within three main catchment areas, discharging into three main watercourses:
- Otara Creek (including Flat Bush) to the north.
- Puhinui Stream to the south, west end of Redoubt Road.
- Papakura Stream to the south from Mill Road.

The majority of the corridor is located along a ridgeline, with a number of stormwater discharges being at the head of catchments.

4.5 Site Inspection

A limited Site inspection was undertaken by David Dangerfield, a suitably experienced AECOM Senior Environmental Engineer on 11 September 2013. Due to the size of the Site, the inspection focused on areas where HAIL activities and industries were observed or known to have historically occurred. Access was limited to public land.

The objective was to identify site-specific features which may have contributed to the potential contamination of soil. The Site inspection was conducted in accordance with Contaminated Land Management Guidelines No. 5 (MfE, 2011). Photographs taken during the inspection are included in Appendix E.

Section 4c within Stage 4 of the Site deviates from Mill Road by some distance onto private land and was therefore not accessible during the inspection. The Site was not visible on parts of the Watercare Services land and adjoining properties in the vicinity of 130-136 Mill Road.

From the inspection of visible portions of the Site, no properties were observed to have active HAIL activities or industries present.

4.6 Review of Potential Sensitive Receptors

Surface water features (streams) intersect the corridor, including:
- Tributaries of Otara Creek were identified to the north of Redoubt Road and these also bisect Murphys Road at the northern end of Murphys Bush.
- Tributaries of Puhinui Creek (western end of Redoubt Road) and Papakura Stream (Mill Road).

Indigenous freshwater fish and crustacean species are known to occupy the catchments (refer to Notice of Requirement – Supporting Information and Assessment of Environmental Effects report, AECOM, July 2013).

Murphys Bush is located immediately adjacent to the Murphys Road corridor.
A “sensitive ridge” notation applies to Countryside Living and Rural zoned land either side of Redoubt and Mill Roads. The notation commences adjacent the eastern side of Hilltop Road and ends approximately 500 m north of the intersection of Mill Road and Ranfurly Road. The notation seeks to protect the rural character and landscape quality of the area and to ensure that activities are carried out in a sensitive manner.

The road corridor passes in close proximity to four areas of indigenous forest and scrub (Murphys Bush and three forest areas to the east of the current Mill Road). Murphys Bush, through which the proposed road corridor passes, is one of the largest remnants of indigenous forest remaining in the northern portion of the Manukau Ecological District (refer to the NoR report (AECOM, July 2013) for further information, including a copy of Figure 3.7 Land Use Profile).

The nearest human receptors would be the residential dwellings adjacent to the Site and Alfriston Public School, located on the corner of Alfriston Road and Mill Road, Alfriston, immediately adjacent to the corridor.

5.0 Applicable Standards and Regulatory Guidance

5.1 National Environmental Standard for Contaminants in Soil

The National Environmental Standard (NES) came into effect on 1 January 2012.

The NES applies to land where an activity or industry described in the MfE’s HAIL is being, or has been undertaken, or it is more than likely that such an activity or industry has been undertaken. The NES applies to HAIL sites where the following activities are occurring or planned:

1) Removal of fuel storage system(s).
2) Soil sampling.
3) Earthworks activities / soil disturbance.
4) Subdivision of land.
5) Change of land use.

With regard to earthworks activities and soil disturbance, specific activities which trigger the NES include:

- Where soil disturbance is >25 m$^3$ (in-situ volume) per 500 m$^3$ of land.
- Where soil removal is >5 m$^3$ (in-situ volume) per 500 m$^3$ year. Note that the soil must be disposed of at a facility authorised to receive the material.
- The period of soil disturbance is greater than 2 months.

Based on the currently available information, consenting under the NES will be necessary.

5.2 Auckland Regional Plan: Air Land and Water

The Auckland Regional Plan: Air, Land and Water (ARP:ALW) was made operative in September 2013 to control discharge of contaminants. The plan makes reference to contaminated land in various places throughout the document. Note that the ARP:ALW is addressed for reference purposes and will be considered further when specific contamination data is available prior to construction.

In general, the plan is more stringent than the NES, as it considers environmental impacts as well as impacts to human health. The plan allows investigation of contaminated sites as a permitted activity, provided the Council is notified prior to the investigation works.

Guidelines values provided under the ARP:ALW provide applicable land use criteria as well as define the baseline concentrations for background conditions applicable for future consents. Background concentrations are provided for volcanic and non-volcanic soils and groundwater.

The following rules will be relevant for future resource consenting under the ARP:ALW:

- Rule 5.5.41: The threshold for Permitted Activities for discharge of contaminants. Consent is not required where Schedule 10 and Schedule 11 background values are not exceeded. As insufficient data is available within the Site, compliance with this condition is unknown.
- Rule 5.5.43: Where discharge of contaminants to land or water from land containing elevated concentrations of contaminants that doesn’t meet the above rules, the activity is controlled.

- Rule 5.5.44: Controlled Activity requiring consent for discharge of contaminants due to land disturbance activities. Resource consent conditions are likely to require certain management or mitigation measures to be carried out relating to the identified contamination.

- Rule 5.5.45: Discretionary Activity where discharge of contaminants to land or water that is not otherwise provided for in the above rules.

Permitted soil and groundwater concentrations are provided in Schedule 10 for human health and for the environment (discharge criteria).

5.3 Auckland Council - Proposed Auckland Unitary Plan 2013

The Auckland Council Proposed Auckland Unitary Plan (PAUP) was notified in September 2013. The AC is required to manage both the use and land containing elevated concentrations of contaminants and the discharge of contaminants from land containing elevated concentrations of contaminants. Contaminated land discharge rules fall under Chapter H (Auckland-wide rules), Section 4.5 Natural Resources.

The following rules will be relevant for future resource consenting or notification to the AC for this project:

- Rule 4.5.2.1.1 – Discharge of contaminants from intrusive investigations that involve chemical testing or monitoring (Permitted Activity).
- Rule 4.5.2.1.3 – Discharges of contaminants from land not used for primary production (Permitted Activity).

In the event that Rule 4.5.2.1.3 permitted activities, can’t be met, the following rules may be applicable depending on the extent of contamination.

- Rule 4.5.2.2.1 – Discharges of contaminants from land not meeting the relevant Permitted Activity controls (Controlled Activities).
- Rule 4.5.2.2.2 - Discharges of contaminants from disturbance or remediation of land not meeting the relevant Permitted Activity controls (Controlled Activities).
- Rule 4.5.2.3.1 - Discharges of contaminants from land not meeting the relevant Controlled Activity controls (restricted discretionary activities).

Planning rule triggers under the PACRP are similar to the ACRP:ALW (refer Section 5.2), as well as background and Permitted Activity thresholds.

5.4 Auckland District Plan (Manukau and Papakura Sections)

The Auckland District Plan (Manukau and Papakura Sections) are applicable where the NES does not conflict. The NES takes precedence over the Auckland District Plan (Manukau and Papakura Sections) with regard to protection of human health. Other operative rules under the district plan deal primarily with Hazardous Facilities and Substances and are not considered relevant to this assessment. Refer to Section 3.2.2 for a detailed summary of Rules 4.5.10.1 for Flat Bush, which are applicable to the Site (Manukau Section).

The Site contamination issues are largely captured in the relevant Form B for each area (B5 for Manukau and B7 for Papakura) which is required to be completed when a resource consent application submitted to Council within that locality. Whilst these rules have been superseded by the NES, the objectives of the rules still remain.

6.0 CLA Findings - Potential Contamination (Source and Locations)

Based on review of the available data to date, the following primary locations were identified to have the potential for adverse impacts to soil at the Site:

- Historic ACM contaminated waste:
  - Properties within Flat Bush identified as having previously been contaminated with ACM. Properties within Land use development restriction due to asbestos. Includes historic asbestos disposal (83 and
84 Thomas Road). Affected properties are identified in dark green and orange on Figure 2, Section A.1 (Appendix A) as identified by the Auckland District Plan (Manukau Section) map.

- Hilltop Road subdivision - historic asbestos contamination including five properties at Rakaia Rise.
- Hilltop closed landfill (adjacent Redoubt Road) – asbestos contamination within the roadside verge.
- Covered fuel storage, down gradient to the Site (130 – 136 Mill Road) - included for completeness only.
- Historic illegal landfill activities (140 Ranfurly Road).
- Possible use of coal tar in the construction of Redoubt, Mill and Murphys Roads.
- Possible use of pesticides in a small orchard/plantation (308 Mill Road).

Whilst there is a potential for groundwater contamination to be present, it is not considered further for the purposes of NoR and should be investigated prior to future consenting works. Based on the available information on the likelihood of contaminated with potential to impact groundwater (including the proximity and nature of nearby HAIL properties and generally shallow excavation [generally less than 3.5 m bgl]), it is considered unlikely that the proposed disturbance activities will encounter impacted groundwater within the Site. In the vicinity of the Pony Club and Watercare Reservoir land, the cut is expected to be to approximately 10 m bgl, which may intersect groundwater.

Surface water will be reviewed as part of future site investigations prior to consenting.

It is considered that whilst there is potential for adverse impacts in the corridor relating to contamination, these can be appropriately managed under a Construction Environmental Management Plan (CEMP) and the Contamination DWP as outlined in Section 7.3.

7.0 Assessment of Effects on the Environment and Options for Avoiding, Remedy or Mitigating Adverse Effects

The actual and potential effects in relation to contamination have been evaluated based on the findings of this CLA, as described in Section 6.0. It should be noted that as physical soil data was not available for this evaluation, the assessment of effects is preliminary pending future site investigations.

The section below describes positive and adverse soil contamination effects related to construction. Table 4 lists activities/locations, contaminants of potential concern (CoPC), potential environmental effects and options for avoiding, remedying and mitigating potential adverse effects.

Note that air quality effects are discussed and addressed in the Air Quality Assessment report. The air quality report addresses the creation and management of airborne dust and odour emissions of potential contaminants resulting from the construction activity. Refer to the Air Quality Assessment report for further consideration of this effect and options for avoiding, remedy or mitigating this effect, particularly in regard to public exposure.

7.1 Positive Effects

Positive effects are possible as follows:

1. Removal of contaminated material will have a positive effect that will enhance the wider environment.
2. Dewatering of contaminated water has the potential to slightly decrease concentrations of contaminants in the localised groundwater and regional aquifer.

7.2 Adverse Effects: Construction

Adverse effects may occur when there is a pollutant linkage between the source, pathway, and receptor. During construction, there is potential for such linkages to be created during soil disturbance.

Only those potential adverse effects which are considered likely, based on the CLA findings (from Section 6.0), are addressed. Any additional effects identified (i.e., outside what is identified below) will need to be addressed in and will form part of a construction environmental management plan (CEMP) and, where appropriate, considered in future resource consents. In order to appropriately manage effects relating to contamination, Section 7.3 below outlines the framework and options for avoiding, remedy and mitigation of adverse effects for construction.
7.3 Assessment of Adverse Effects for Construction

A semi-quantitative assessment of risk with potential for environmental effects was carried out using principles outlined in the Australian/New Zealand Standard AS/NZS ISO 31000:2009 Risk management – Principles and guidelines using a likelihood versus consequence matrix. The ranking is based on the risk categories of Low, Medium and High and are summarised below in Table 4. This table reflects the ranking of risk the properties/land uses may present if disturbed. The risk has been determined based on the identified source locations, CoPC and any available information on the extent of contamination. Refer to Figure 2, Section A.1 (Appendix A) for locations of identified HAIL sites.

Table 4: Activities and Contaminants of Potential Concern – Assessment of Adverse Construction Effects

<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
</table>
| Historic asbestos contaminated waste – Flat Bush | Asbestos | Detailed site investigation and remediation works were conducted. Properties within Flat Bush identified as having previously been contaminated with asbestos. Properties within land use development restriction due to asbestos (Areas 1 and 2 respectively) identified in Figure 2, Section A.1 (Appendix A). | Low - Medium | - Inhalation exposure to workers and members of the public  
- Improper soil management  
- Cross contamination with clean material  
- Disposal of waste | - Construction Environmental Management Plan (CEMP) and Contamination DWP to control exposures (hierarchy of control, soil classification and management) and identify protocols for ACM discovery.  
- Implement dust and erosion control plans.  
- Proper disposal of impacted soils.  
- Future site investigation* |
| Hilltop Road subdivision including 5 properties on Rakaia Rise | Asbestos | Historic contamination which appears to have been remediated as not identified within land use development restriction area. Figure 2, Section A.1 (Appendix A). | Low | - Inhalation exposure to workers and members of the public  
- Improper soil management  
- Cross contamination with clean material.  
- Disposal of waste | - CEMP and Contamination DWP to control exposures (hierarchy of control, soil classification and management) and identify protocols for ACM discovery.  
- Implement dust and erosion control plans.  
- Proper disposal of impacted soils.  
- Future site investigation* |
<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
</table>
| Hilltop closed landfill Corner of Hill and Redoubt Roads (roadside verge). | Asbestos | Asbestos contamination within the grassed roadside verge. | Medium Likely to be encountered in road verge at this location. | - Inhalation exposure to workers and members of the public  
- Cross contamination with clean material  
- Disposal of waste | - CEMP and Contamination DWP to control exposures (hierarchy of control, soil classification and management) and identify protocols for ACM discovery.  
- Implement dust and erosion control plans.  
- Proper disposal of impacted soils.  
Future site investigation*. |

**Historic Illegal Landfill Activities**

<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
</table>
| 140 Ranfurly Road (Cnr Ranfurly and Redoubt Roads (140 Ranfurly Road, Lot 4 DP52585)) | TPH, PAH, heavy metals, nitrates, asbestos, methane and other hazardous gases | No contaminated land reports were available for the Site. The area of illegal landfilling was more than 100 m to the east of the Site. | Medium | - Dermal, ingestion and inhalation exposure to workers and members of the public  
- Creation of preferential pathways  
- Contaminated stormwater run-off  
- Disposal of waste | - CEMP and Contamination DWP to control exposures (hierarchy of control, soil and groundwater classification and management) and identify protocols for contamination discovery.  
- Seal excavations during civil works and implement dust, erosion and stormwater control plans.  
- Proper waste disposal.  
- Future site investigation*. |
<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>295 Mill Road</td>
<td>TPH, PAH, heavy metals, nitrates, asbestos, methane and other hazardous gases</td>
<td>Council property file indicated that in 1991 illegal filling was occurring on property, blocking a watercourse; among the fill, plastic, refuse bags, tin, wood, rubber, paper and a cow carcass was also identified. No record of the exact location of this fill on site or whether it was removed. In 2000 it was reported that 500 m³ of unauthorised fill was placed on site in a paddock close to Mill Road. A retrospective resource consent was obtained for the works. In 2010 the fill was reported to have been removed.</td>
<td>Low</td>
<td>- Dermal, ingestion and inhalation exposure to workers and members of the public. - Creation of preferential pathways - Contaminated stormwater run-off - Disposal of waste</td>
<td>- CEMP and Contamination DWP to control exposures (hierarchy of control, soil and groundwater classification and management) and identify protocols for contamination discovery. - Seal excavations during civil works and implement dust, erosion and stormwater control plans. - Future investigation if within construction footprint*.</td>
</tr>
</tbody>
</table>

**Coal Tar within roadways**

<p>| Coal tar residue, Redoubt Road, Mill Road and Murphys Road roadways | PAHs including but not limited to BaP and naphthalene | Potential for coal tar to be present within old surfaces and base layer of roadway. Corridor is a significant distance from the nearest former gasworks site. | Low | - Dermal, ingestion and inhalation exposure to workers and members of the public. - Disposal of waste - Creation of preferential pathways - Contaminated stormwater run-off | - CEMP and Contamination DWP to control exposures (hierarchy of control, soil and groundwater classification and management). - Seal excavations during civil works and implement dust, erosion and stormwater control plans. - Future investigation*. |</p>
<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchard or Plantation</td>
<td>Possible historic pesticide use. (part of 306 Mill Road, part Lot 2, DP12981)</td>
<td>Identified from 1988 aerial photograph. Site currently bisects this property.</td>
<td>Low</td>
<td>- Dermal, ingestion exposure to workers and members of the public. - Disposal of waste. - Contaminated stormwater run-off</td>
<td>- CEMP and Contamination DWP to control exposures (hierarchy of control, soil classification and management) and identify protocols for contamination discovery. - Seal excavations during civil works and implement dust, erosion and stormwater control plans. - Future investigation if within construction footprint.</td>
</tr>
</tbody>
</table>
### Covered Fuel Storage (unconfirmed) – included for completeness only

<table>
<thead>
<tr>
<th>Activity/Location</th>
<th>Contaminants of Potential Concern (CoPC)</th>
<th>Observation</th>
<th>Overall Risk / Comment</th>
<th>Potential Effects</th>
<th>Options for Avoiding, Remedy or Mitigating Effects</th>
</tr>
</thead>
</table>
| Possible bulk fuel storage. (Lot 1 DP 49293) | TPH, BTEX Lead | Identified from resource consent application. Development from 1973 was not confirmed. Property is bisected by the corridor but HAIL area is down gradient and more than 100 m from the corridor. | Low | - Dermal, ingestion and inhalation exposure to workers and members of the public.  
- Disposal of waste  
- Creation of preferential pathways  
- Contaminated stormwater run-off | - CEMP and Contamination DWP to control exposures (hierarchy of control, soil and groundwater classification and management) and identify protocols for contamination discovery.  
- Seal excavations during civil works and implement dust, erosion and stormwater control plans.  
- Future investigation if within construction footprint². |

**Notes:**

² Further investigations as part of future site investigations to support preliminary and / or detailed design and resource consents.

**Abbreviations:** Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl benzene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Benzo(a)Pyrene (BaP), Organochlorine Pesticides (OCP), Organophosphorus Pesticides (OPP). Heavy Metals include 8 priority metals unless stated (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc).

A number of other potential sources, which were not specifically identified but which could be present, include activities such as small quantities of dangerous goods, asbestos in building materials and other historic activities. Effects from these contaminants would be addressed subsequent to further investigation should they be identified. These effects are not considered for NoR as their presence was not verified during the CLA.

The above identified effects will be mitigated to address the health and safety of construction workers and the general public, together with environmental considerations. A Preliminary Remediation Plan (PRP) is provided in **Appendix F** which will form part of a future EMP. Implementation of control measures during construction will be addressed and managed under the CEMP. Basic principles required for a CEMP will be included in the future EMP as will a requirement for a Remedial Action Plan (RAP) and Hazardous Materials Removal Specification to form part of the CEMP at the time of construction once additional data gathered during detailed design has been incorporated.
7.4 Operational Effects

Mitigation measures for the operational phase will be developed under the framework of the monitoring and management programme implemented during the construction phase and will address worker and public protection for areas where contaminated soil may be excavated or re-used.

8.0 Conclusions/Recommendations

8.1 Findings

This CLA has identified the potential for soil contamination to exist along the proposed road corridor including asbestos, contaminants associated with landfill waste, polycyclic aromatic hydrocarbons, from roadbuilding materials4 and petroleum hydrocarbons. Potential adverse effects could arise from human or environmental exposure to the identified contaminants during excavation activities, stormwater runoff carrying contaminated sediment could impact off-site areas, or members of the public could be exposed to contaminants carried in airborne dust (refer to Air Quality Assessment; Assessment of Environmental Effects: Appendix K).

This CLA report has been scoped, compiled and reviewed by a suitably qualified and experienced practitioner in accordance with required by the NES.

8.2 Recommended Future Work

The following is an outline of the recommended approach to future work to support consenting for contamination:

- Provided that the proper controls are implemented, adverse effects can be mitigated with conventional construction management techniques including implementation of dust and erosion control plans, stormwater management plans, and health and safety plans as part of a Construction Environmental Management Plan (CEMP). In addition, the proposed Designation Conditions require preparation of a Contamination Delivery Work Plan (DWP). The objective of the Contamination DWP is to avoid, remedy or mitigate the adverse effects of construction on human health which may result from the disturbance of contaminated materials during construction.
- A Detailed Site Investigation (DSI) of potential soil and groundwater contamination could be undertaken as part of future detailed design and will assist in quantifying actual contamination and enabling the planning of appropriate management and mitigation measures.
- On-site monitoring of soil, surface water and groundwater quality during construction to ensure that waste is properly classified will also minimise risk to site workers, the public and the environment.
- Other standard construction controls, such as limiting site access, will also be necessary.

Positive effects are possible in that contaminated soil may be removed from the area.

8.3 Review of Resource Consent Requirements under the NES

The soil disturbance/earthworks are the primary activity within the road corridor which will trigger the NES during the development.

Sections of the proposed road corridor development are considered HAIL sites due to the following past and present land use activities conducted at or adjacent to the Site:

- Possible use of persistent pesticide in orchard (category A.10);
- Dumping of asbestos (category E.1);
- Vehicle refuelling / storage (category F.8);
- Closed and illegal landfilling (category G.3);

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4 Note that BTEX and cyanide could also be present if coal tar is found to be present in roadway materials.
Prior to consenting, these HAIL activities should be characterised by a DSI in accordance with the NES. Based on the findings of the DSI, contamination identified as having potential to impact human health and the environment may be avoided, controlled or mitigated through the implementation of a CEMP.

9.0 References

Asbestos Investigation Report: Flat Bush Study Area, Manukau City, Manukau Consultants Limited (MCL, now GHD, March 1999).


Contaminated Land Management Guidelines No. 1, (Reporting on Contaminated Sites in New Zealand), Ministry for the Environment, revised October 2011.

Contaminated Land Management Guidelines No. 5, (Site Investigation and Analysis of Soils), Ministry for the Environment, revised October 2011.


10.0 Limitations

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