

REPORT

Waikato District Council

Tuakau Structure Plan area
Preliminary contaminated land
assessment



Tonkin & Taylor

ENVIRONMENTAL AND ENGINEERING CONSULTANTS





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Report prepared for:

Waikato District Council

Report prepared by:

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Distribution:

Waikato District Council

2 copies

Tonkin & Taylor Ltd (FILE)

1 copy

June 2014

T&T Ref: 61814.001



Table of contents

List of acronyms	1
1 Introduction	2
1.1 Background	2
1.2 Objective and scope of work	2
2 Tuakau structure plan area description	4
2.1 Location	4
2.2 Geology and hydrogeology	4
3 Assessment methodology	6
3.1 Information sources	6
3.1.1 Aerial photographs	6
3.1.2 WDC database	7
3.1.3 Other published information	7
3.1.4 Site observations	7
3.2 GIS database	7
3.3 Limitations	8
4 Findings of the assessment	9
4.1 Aerial photographs	9
4.2 WDC database	9
4.3 Other published information	10
4.4 Site observations	10
4.5 Summary of assessment findings	11
5 Implications for future development	12
5.1 Regulatory framework	12
5.2 Further information requirements	12
5.3 Constraint to development	13
6 Summary	15
7 Applicability	16
Appendix A: Figures	
Appendix B: Summary of identified HAIL activities and potential contaminants	
Appendix C: Ministry for the Environment HAIL (2011)	

Executive summary

Tonkin & Taylor Ltd (T&T) has been commissioned by the Waikato District Council (WDC) to provide preliminary contaminated land information for the Tuakau structure plan area in relation to proposed future growth. The extent of the Tuakau structure plan area as defined by WDC is presented in Figure 1 (Appendix A).

Urban growth within the Tuakau structure plan area is likely to include a range of land uses in defined areas including standard and rural residential land use, industrial land use, and retail/ commercial land use. This may include “greenfields” development of rural land, or re-development of existing urban land within the structure plan area.

The identification of potentially contaminated land in this assessment has been carried out through the identification of potential HAIL activities (as defined by the Ministry for the Environment in their list of Hazardous Activities and Industries (HAIL)) which have the potential to result in ground contamination. These sites have been identified through a review of available information including:

- Historical and recent aerial photographs.
- WDC database of potentially contaminated sites.
- T&T database.
- Published information regarding HAIL activities.
- Site observations.

The assessment identified that HAIL activities may affect approximately 537 ha (40%) of the structure plan area. Horticultural activities, including market gardening and orchards, cover the largest proportion of this area and are typically located in rural, greenfields areas. This is likely to be the most common HAIL activity encountered during development within the structure plan area. A significant number of industrial related HAIL activities were also identified, however these are typically located in established areas of industrial land use, and do not typically impact on un-developed, rural areas of the structure plan area.

While the methodology used in this assessment has some limitations, the information gathered from the different information sources presents a consistent picture of a community developed around its use of the available natural resources for food production. The most significant HAIL activities affecting the area are considered to have been identified and any individual sites or activities that may have been missed are unlikely to have a significant impact on the outcomes of this assessment, or broad scale decisions about future development within the structure plan area.

The available information, and past experience with investigation and remediation of contaminated land has been used to define a relative constraint to development with regard to ground contamination. The majority of the land identified as being potentially affected by a HAIL activity is likely to present a low overall relative constraint to development. Areas of potentially medium and high overall development constraint are typically located in established industrial parts of the structure plan area, and are local in scale.

Additional assessment and reporting on a site specific basis will be required for any development on any HAIL sites identified in this assessment. All works should be carried out by a suitably qualified and experienced practitioner, and undertaken in accordance with the Ministry for the Environment Contaminated Land Management Guidelines.

List of acronyms

BTEX – Benzene, toluene, ethylene and xylenes

DDT - dichlorodiphenyltrichloroethane

DSI – Detailed Site Investigation

GIS – Global Information System

HAIL – Hazardous Activities and Industries List

NES Soil – National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

PAHs – Polycyclic aromatic hydrocarbons

PCBs – Polychlorinated biphenyls

PCP - Pentacholophenol

PSI – Preliminary Site Investigation

RAP – Remediation Action Plan

SVR – Site Validation Report

TBT – tributyl tin

WDC – Waikato District Council

WRC – Waikato Regional Council

1 Introduction

Tonkin & Taylor Ltd (T&T) has been commissioned by Waikato District Council (WDC) to provide preliminary contaminated land information for the Tuakau structure plan area in relation to proposed future growth. The extent of the Tuakau structure plan area as defined by WDC is presented in Figure 1 (Appendix A).

The persons undertaking, managing reviewing and certifying this report are suitably qualified and experienced practitioners as defined in the NES Soil regulations¹.

This work was undertaken in accordance with our proposal dated 27 March 2014.

1.1 Background

WDC is seeking preliminary information about the potential constraints with regard to ground contamination for land development within areas which are flagged for potential urban growth across the Waikato District. Urban growth is likely to include a range of land uses in defined areas including standard and rural residential land use, industrial land use, and retail/ commercial land use. This may include “greenfields” development of rural land, or re-development of existing urban land within the structure plan area.

As part of this project, a preliminary assessment of potentially contaminated land has been undertaken for the Tuakau and Ngaruawahia structure plan areas. Although no specific details of potential development within these structure plan areas have been provided by WDC, it is assumed that the majority of new development within these areas will be greenfields.

Other potential urban growth areas within the District were not included in this assessment as the scale of future development in these areas means contaminated land is likely to be more easily assessed on a site specific basis.

This report focuses on the land defined within the Tuakau structure plan area (as shown on Figure 1, Appendix A).

1.2 Objective and scope of work

The objectives of this work are to:

- Identify areas of potential ground contamination including the specific HAIL classification as stated by the Ministry for the Environment².
- Assess the overall relative constraint for land development of the identified HAIL areas (i.e. low, medium, or high categories).
- Provide indicative information regarding works that are likely to be required to address ground contamination issues and enable development of identified HAIL areas.

The following scope of work was undertaken to achieve the above objectives:

- Liaison with the Environmental Health Team at WDC to discuss the information they hold and what they consider are the key issues associated with ground contamination within the structure plan area.

¹ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

² Ministry for the Environment, 2011, Hazardous Activities and Industries List.

- Review of information held by WDC³ on potentially contaminated sites within the structure plan area.
- Review of three sets of historical aerial photographs from the Tonkin & Taylor library dating back to 1942, and recent aerial photographs from Google Earth.
- Review of T&T database and other published information regarding HAIL activities.
- Broad scale ground truthing of reviewed information by site observation (from the road reserve only) within the structure plan area.
- Preparation of a GIS database of the identified HAIL activities.
- Assessment of identified HAIL sites in terms of constraint to development (i.e. low, medium or high categories).
- Preparation of this report documenting the methodology and findings of the assessment and providing indicative information regarding works likely to be required to address ground contamination issues and enable development of identified HAIL areas.

³ Data sharing between Waikato Regional Council and WDC means that WDC's information reflects information held by both councils; therefore, no liaison with Waikato Regional Council was undertaken.

2 Tuakau structure plan area description

2.1 Location

The Tuakau structure plan area surrounds the North Waikato township of Tuakau, and is located on the northern side of the Waikato River, approximately 6.7 km west of Pokeno and State Highway 1. The location and extent of the Tuakau structure plan area is presented in Figure 1 (Appendix A). The structure plan area covers approximately 1,353 ha.

The land within the structure plan area is dominated by horticultural and agricultural land uses, with the residential and commercial areas of Tuakau township also occupying a significant portion of the area. Other land uses currently occurring within the structure plan area include rural residential, commercial, light industrial and heavy industrial land uses. The North Island Main Truck railway line runs through the northern part of the structure plan area and through the centre of Tuakau township.

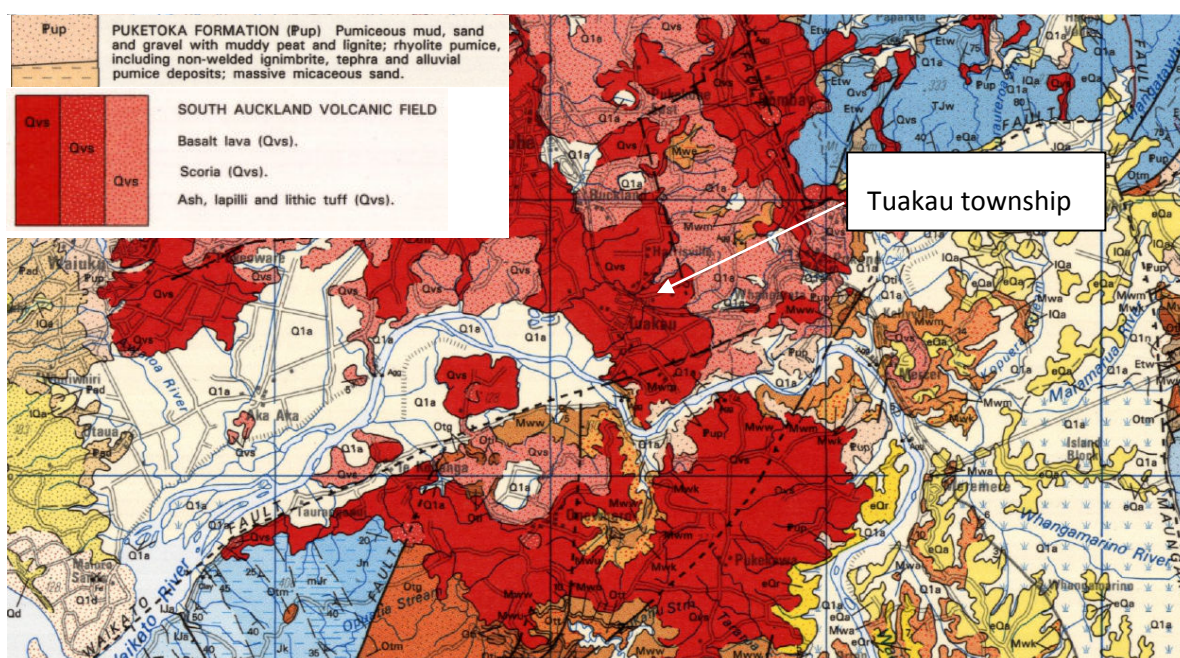
The commercial/retail area of the Tuakau township is located in the northern, central part of the structure plan area with predominantly residential land surrounding it to the south, west, north and northeast. Industrial land is located immediately east of the town centre. Outside of the township, the structure plan area is dominated by horticultural and agricultural land including market gardens, orchards and pastoral land, with small clusters of rural residential land use. Two clusters of industrial land are located beyond the township; on Bollard Road in the eastern part of the structure plan area, and on River Road, in the southwestern part of the structure plan area.

The topography of the structure plan area is typically gently undulating with relatively flat terraces incised by natural water courses. Some hills are present in the northern and northeastern part of the structure plan area. The area generally slopes down towards the west and southwest, with lowlying plains present beyond the southwestern boundary of the structure plan area. The southernmost part of the area, is steep and hilly. The Waikato River bounds the structure plan area to the south.

2.2 Geology and hydrogeology

The published geology of the area indicates that the majority of the Tuakau structure plan area is underlain by basalt lava flows of the Kerikeri Volcanic Group⁴ as shown in the Geological map below. The area forms part of the South Auckland Volcanic Field. Along the northeastern boundary of the structure plan area the lava is overlain by pyroclastic deposits. In the southern part of the structure plan area small pockets of alluvial deposits are present along the Waikato River. These deposits are part of the Puketoka Formation which comprises pumiceous mud, sand and gravel with muddy peat and lignite; rhyolite pumice, including non-welded ignimbrite, tephra and alluvial pumice deposits; massive micaceous sand.

⁴ Edbrooke, S. W. (compiler), 2001, *Geology of the Auckland Area. Institute of Geological and Nuclear Sciences 1:250,000 geological map 3*, Institute of Geological and Nuclear Sciences



Geological map of Tuakau structure plan area.

The majority of the groundwater used within the area is expected to be from the basalt rocks and associated air fall deposits. Groundwater is expected to follow topography and flow in a generally south to southwest direction, towards the Waikato River which discharges to the Tasman Sea approximately 25km east-south-east of Tuakau township.

3 Assessment methodology

The identification of potentially contaminated land in this assessment has been carried out through the identification of potential HAIL activities. The Ministry for the Environment has developed a list of Hazardous Activities and Industries (HAIL) which have the potential to result in ground contamination. A copy of the current HAIL is attached in Appendix C.

The approximate extent of the HAIL activities identified from the various data sources have been collated into a GIS database as shape files. Each identified area/ land parcel is referred to as a “HAIL site” in this assessment. The source of the information, and the HAIL classification (from MfE’s list) for each HAIL site is included in the database.

In some areas the potential for HAIL activities has been identified but no specific HAIL activity was determined. For example where industrial buildings were observed but the activities occurring within them are unknown, or where fill is thought to be present but limited information is available about it. In these instances the sites have been included as HAIL classification “I” – Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

Some sites may have been subject to multiple HAIL activities. The information included in this assessment identifies the key HAIL activity however for sites involving industrial activities in particular, consideration of other potential HAIL activities should also be given during planning for any proposed development.

The information sources and the methodologies employed in this assessment are outlined below.

3.1 Information sources

Identification of potential HAIL activities within the structure plan area has been undertaken through the review of available information including:

- Historical and recent aerial photographs.
- WDC database of potentially contaminated sites.
- T&T database.
- Published information regarding HAIL activities.
- Site observations.

3.1.1 Aerial photographs

Historic aerial photographs from 1942, 1961 and 1980/81 were reviewed to identify potential HAIL activities. This imagery was sourced from the Tonkin & Taylor library. Review of more recent photographs available on Google Earth was also undertaken as part of this assessment. Table 1 presents a list of photographs and sources that were reviewed.

Table 1: Aerial photography reviewed

Year	Source
1942	SN 0192 Run 280, photos 30, 32, 34, 36. Run 281, photos 26, 28, 30, 31. Run 282, photos 89, 90, 92
1961	SN 1397 Run 3251 photos 30, 31. Run 3252, photos 25, 27, 29. Run 3253, photos 18, 19
1980/81	SN 1397 Run Z photos 13-14
2001-2014	Google Earth

The lateral extent of potential HAIL activities as observed in the respective aerial photographs was captured and the relevant HAIL classification applied.

Pastoral land has the potential to have been affected by contaminants in fertilisers which have been applied to these areas. However fertiliser application is not specifically included as a HAIL activity. As agreed with WDC (Kelly Deihl pers. com.), pastoral land observed in the aerial photograph review which shows no evidence of HAIL activities has not been included in this assessment.

3.1.2 WDC database

A copy of the WDC database of potentially contaminated sites was provided in GIS format. The information within the database was used to define the relevant HAIL classification for each land parcel for inclusion in this assessment.

WDC holds additional information regarding many of the HAIL sites on their database, including site specific reports and laboratory results. This information has not been reviewed as part of this assessment but will be an important source of information if development on a particular HAIL site is proposed.

Waikato Regional Council (WRC) also maintains a database of potentially contaminated sites in the region. However, as a result of data sharing between WRC and WDC, the WDC information reflects information held by both councils. Therefore, no liaison with WRC was undertaken.

3.1.3 Other published information

Other readily available published information has also been reviewed including:

- Milsearch, 2011, Desktop review – potential ammunition and explosives contaminated sites in the Waikato Region, prepared for Waikato Regional Council.
- Environment Waikato, 1993, Timber Treatment Sites in the Waikato Region.

3.1.4 Site observations

Following review of the available information, a broad scale visual assessment of the structure plan area was undertaken with observations made from the roads and other public places. This allowed for confirmation of current HAIL activities, and identifying additional HAIL activities which were not already identified through the other information sources.

3.2 GIS database

The boundaries of the HAIL activities identified in the above reviews have been collated into an ArcGIS database as shape files.

This report should be read in conjunction with the GIS database (electronic version or figures) that has been delivered to WDC as part of this assessment. Each GIS database shape file includes:

- Information source
 - WDC – WDC database
 - AP – Aerial photograph review
 - SO – site observations.
- HAIL classification/s relevant to the land area
 - As described in MfE's 2011 HAIL.

- Relative constraint to development
 - Low, medium or high.
- Other information provided by WDC
 - Additional attribute information included with the WDC database shape files has been retained.

The figures within this report, provided in Appendix A, have been derived from the GIS database and are intended to show key outcomes of the investigation.

Particular limitations of the GIS database are:

- Shape files are based on a desk top study and limited visual observations only. Site specific inspections and intrusive investigations have not been undertaken.
- The areas identified may not be an accurate representation of the extent of a HAIL activity. For example land adjacent to a HAIL activity may have been impacted by that activity, alternatively a HAIL activity may be isolated to one part of a land parcel but the whole land parcel has been identified.
- Geo-referencing of aerials over successive years has resulted in slight variations in HAIL activity boundaries. Some boundaries identified by aerial photography have been manually adjusted within the GIS database to minimise these variations.

3.3 Limitations

It must be noted that this assessment identifies potential HAIL activities and does not confirm if any land within the structure plan area is or is not contaminated.

Some specific limitations of this assessment are:

- The aerial photograph review was limited by the quality and scale of the photographs. Some potential historical HAIL sites may have been missed as a result of this limitation.
- The aerial photograph review was limited to three historical photographs between 1941 and 1980, with more frequent photographs from 2001 to present. Additional historical HAIL activities may have occurred in the times between the historical photographs that were reviewed.
- Historical HAIL activities which largely occur indoors or under cover may not have been identified such as retail service stations, small scale/ light industrial activities, drycleaners, and printing premises.
- Current and historical HAIL activities with a small footprint may not have been identified such as sheep dips, agricultural activities such as storage and mixing areas for agrichemicals and above and underground fuel storage tanks.

Despite these limitations, the methodology that has been applied is likely to provide a broad scale assessment of potential ground contamination issues within the structure plan area.

This assessment does not meet the requirements of a preliminary site investigation under the NES Soil Regulations, and additional work will be required on a site specific basis to confirm if the land is covered by the NES Soil, and to confirm the requirements for a proposed future development under these regulations. No site specific inspections or investigations were undertaken as part of this assessment.

4 Findings of the assessment

The findings of this assessment are discussed in this section with regard to the relevant information source. A summary of identified HAIL activities is provided in Figure 2 (Appendix A). Refer to the GIS database for more details.

4.1 Aerial photographs

The principal source of information for this assessment is the historical aerial photographs as described in Section 3.1.1. The key findings of the aerial photograph review are outlined below:

- Tuakau township is located through the central third of the structure plan area and includes a small retail and commercial centre, with areas of mainly residential land use to the west, south west, and northeast of the town centre. Industrial activities are located in three main areas, immediately to the east of the town centre, and an area approximately 1km east of the town centre, on Bollard Road, and on River Road, approximately 2.3km south of the town centre.
- Identification of HAIL activities within Tuakau township was difficult from aerial photographs as much of this area is largely built up, with little indication of the use of the buildings. Heavy industrial activities such as timber treatment and storage sites, the railway yards and stockyards were identified in the aerial photographs.
- The area surrounding Tuakau township includes a mix of horticultural and agricultural land uses. The current extent of horticultural land use is largely consistent with historical observations. Historical and current HAIL activities identified in the area surrounding the township include market gardening, orchards, poultry farms, glass houses and potential agricultural buildings.
- The southern part of the structure plan area is dominated by a steep, hilly areas bounded by the Waikato River on three sides. This area appears to have been used for pastoral farming for the past 70 years. No evidence of HAIL activities was identified from the aerial photograph review for the area.
- There is no evidence of large scale earthworks or filling within the structure plan area from the aerial photographs reviewed.

4.2 WDC database

Waikato District Council maintains a database containing known and potentially contaminated land within the district. This information was provided to T&T as part of this assessment. The WDC database includes approximately 140 entries within the Tuakau structure plan area. Some of the sites have multiple entries in the database as they cover several land parcels. The HAIL sites included in the WDC database cover a wide range of HAIL activities reflecting the history of horticultural activity in the area, and the services required to support these activities.

The main HAIL activities included in the database (in terms of land area) are summarised in Table 2.

Table 2: Summary of main HAIL activities in WDC database

HAIL classification	No. of entries	Approx land area	Comments
A10 – persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glasshouses or spray sheds	23	46.7 ha	Multiple sites mostly within the area to the southeast of the township, between Whangarata Road and the railway line.
F4 – Motor vehicle workshops	12	16.2 ha	Multiple sites within Tuakau township, on Bollard Road and River Road (east and south of the township respectively).
A18 – Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside	19	11.1 ha	Multiple sites within the business area of Tuakau township, and on Bollard Road, to the southeast of the township.
F8 – Transport depots or yards	6	5.8 ha	5 separate sites scattered throughout the structure plan area.
A6 – Fertiliser manufacture or bulk storage	9	1.9 ha	Two separate sites, one to the west of the town centre, and the other adjacent to the railway line also to the west of the town centre.

Six land parcels identified as HAIL sites in the WDC database contained insufficient information to determine what HAIL activities had occurred there. These sites cover a very small area and the missing information has not significantly impacted on the results of this assessment. These sites are identified as “U” for unknown land use.

The information included in the WDC database is associated with land parcels, therefore the boundaries of the shape files may not accurately reflect the boundaries of the HAIL activities.

4.3 Other published information

Other readily available published information regarding HAIL activities has also been reviewed including:

- Milsearch, 2011, Desktop review – potential ammunition and explosives contaminated sites in the Waikato Region, prepared for Waikato Regional Council.
- Environment Waikato, 1993, Timber Treatment Sites in the Waikato Region.

No HAIL sites within the structure plan area were identified in the Milsearch report. One timber treatment site within the structure plan area was identified in the Environment Waikato report, the HAIL site is located on Bollard Road and has been captured through the aerial photograph review and the WDC database.

4.4 Site observations

Broad scale ground truthing of reviewed information by site observation (from the roads and other public places) was undertaken by a T&T Contaminated Land Specialist on 13 May 2014. The site observations were made in conjunction with WDC Environmental Health Officer Kelly Deihl.

Observations made during this exercise helped to confirm the HAIL classifications identified through the other information sources and gain a general sense of the land uses occurring within the structure plan area. In particular, site observations allowed for industrial buildings to be differentiated from agricultural/ horticultural buildings or residential buildings, and allowed the inclusion of small scale industrial activities.

Site observations confirmed that HAIL activities captured through the other information sources appear to be a relatively accurate reflection of actual land uses within the structure plan area. There are unlikely to be significant information gaps in this assessment, and the majority of potential HAIL sites are likely to have been captured through at least one of the information sources used in this assessment.

4.5 Summary of assessment findings

Our assessment of potential ground contamination issues within the Tuakau structure plan area has identified widespread horticultural related activities over large parts of the structure plan area. These sites are mainly located to the west and east of Tuakau township, with limited presence to the north and south of the township. This is the main HAIL activity affecting non-urban parts of the structure plan area. The main horticultural land uses identified were market gardens and orchards, however agricultural buildings, glass houses and playing fields (due to the potential bulk storage and use of persistent pesticides) were also identified within the area.

A significant number of industrial type HAIL activities have also been identified including timber treatment and storage sites, stock yards, chemical/fuel storage, and railway related activities. These sites are mainly located within the industrial areas of the structure plan area; immediately east of the town centre, on Bollard Road, and on River Road, 2.3km south of the town centre.

Some areas were found to have relatively few HAIL sites including the northern portion of the structure plan area (north of the railway line), the main residential area of Tuakau, the southern section of George Street (including Dromgools Road and the western end of Whangarata Road), and the southernmost, hilly portion of the structure plan area.

More than 200 individual HAIL sites have been identified within the structure plan area covering approximately 537 ha (40%) of the area.

22 different HAIL classifications have been identified within the structure plan area. A list of all of the potential HAIL activities identified is provided in Appendix B along with the hazardous substances that are typically associated with that activity or industrial⁵, and the potential likelihood, extent and magnitude of ground contamination.

⁵ Hazardous substance information is sourced from Appendix C of the NES Soil Users' Guide; Ministry for the Environment, April 2012, *Users' Guide – National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*.

5 Implications for future development

The potential for ground contamination needs to be taken into account if future development on potential HAIL sites is proposed. The information included in this section provides an indication of the potential implications for future development in these areas.

The identification of a HAIL site in this assessment is unlikely to preclude development from occurring, however additional assessment of any HAIL sites will be required if development is proposed on those properties, and investigation, resource consents and remediation may also be required.

5.1 Regulatory framework

The rules relating to the control of potentially contaminated land in the Tuakau area are specified in the following documents:

- The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Soil).
- The Waikato Regional Plan.
- The Waikato District Plan.

Land that has been used for, or potentially used for HAIL activities, is covered by the NES Soil regulations, but may also be subject to the requirements for works on contaminated land in the Waikato District Plan and Waikato Regional Plan.

This may require additional investigation, resource consents and remediation.

5.2 Further information requirements

Additional assessment and reporting on a site specific basis will be required for any HAIL sites identified in this assessment that are subject to a change in land use, site disturbance (earthworks) or subdivision under the NES Soil. Further site specific assessment may also be required under the District Plan or Regional Plan.

The individual site requirements will differ, however all works should be carried out by a suitably qualified and experienced practitioner, and undertaken in accordance with the Ministry for the Environment Contaminated Land Management Guidelines. Typical reporting requirements for potentially contaminated sites include:

- Preliminary Site Investigation (PSI)
 - To confirm if the site is (or is not) covered by the NES Soil regulations and if there is likely to be a potential risk to human health from the proposed activity.
 - To indicate if the site is likely to present a risk to the environment.
- Detailed Site Investigation (DSI)
 - If the PSI indicates a potential risk to human health or the environment, and/or the proposed activity does not comply with the permitted activity criteria in the NES Soil, a DSI may be required to assess the actual extent and concentrations of contaminants at the site, and assess the potential effects on human health and the environment.
- Remediation Action Plan (RAP)
 - If the DSI identifies contamination in excess of appropriate standards for the proposed land use, remediation of the site may be required to allow the development to proceed. Environmental effects may also require remediation.

- Site Validation Report (SVR)
 - Following any remedial works, validation of the site is likely to be required, including completion of an SVR, to confirm that the objectives of the RAP have been met.
- Ongoing monitoring and management plan
 - Depending on the remedial techniques applied, an ongoing monitoring and management plan may be required to ensure the integrity of the remedial works is maintained for the life of the works.

5.3 Constraint to development

To assist with determining the likely implications for future development within the Tuakau structure plan area, an overall assessment of the likely constraint to development has been undertaken. This assessment takes account of the typical characteristics of the individual HAIL activity, our knowledge of the nature and characteristics of contamination associated with these activities, and published information. This information is provided in the HAIL table in Appendix B and has been summarised in the context of the Tuakau structure plan area and the objectives of this assessment to determine an overall level of constraint to development.

An overall constraint class of low, medium or high has been assigned to each identified HAIL site. The broad definition of each of these classes, and the HAIL activities which are typically associated with each class is presented in Table 3.

The overall level of constraint considers standard and rural residential land use, industrial land use, and retail/ commercial land uses. However, if a particularly sensitive land use such as a school or childcare facility is proposed, issues associated with ground contamination may present a more significant constraint than indicated in this broad level assessment.

The likely costs involved in addressing any potential ground contamination issues have not been directly considered, however it can be expected a higher constraint to development, and/or a more sensitive land use will result in higher costs to address ground contamination issues.

The main consideration for determining the overall level of constraint to development has been the potential effects on human health. A higher degree of constraint may apply to sites which include, or are located close to sensitive environmental receptors.

The overall constraint to development as a result of ground contamination is presented in Figure 3 (Appendix A).

Table 3 – Overall constraint to development description

Overall constraint to development class	Typical HAIL activities identified by this assessment	Potential magnitude and extent of contamination, and likely requirements to enable development
Low	<ul style="list-style-type: none"> • Horticultural activities including market gardens, orchards, glass houses and sports turfs 	<ul style="list-style-type: none"> • Contamination typically present at low concentrations (potentially above background but within standards for protection of human health), affecting the whole or part of the site uniformly, and only affecting near surface soils. • Potential for localised hotspots of contamination which may present a higher constraint for isolated areas. • As a minimum, a PSI may be sufficient to establish that the proposed development can comply with the permitted activity requirements. • Limited soil sampling may be required to support the findings of the PSI. • Resource consents in relation to ground contamination may not be required if concentrations are within background ranges or earthworks volumes comply with the permitted limits within the NES Soil*.
Medium	<ul style="list-style-type: none"> • Industrial activities such as workshops, manufacturing, chemical storage, timber storage, scrap yards, and railway yards • Transport depots • Waste disposal and treatment sites 	<ul style="list-style-type: none"> • Contaminant concentrations may be non-uniform across the site and may exceed appropriate standards for the protection of human health or the environment in some areas. • A PSI (and probably a DSI) will be required to characterise the contamination and enable appropriate controls and/or small scale remedial works to be developed in order for the proposed development to proceed. • Resource consents in relation to ground contamination are likely to be required from WDC and potentially WRC. • Resource consents for discharges of contaminants to land and water during development may be required from WRC.
High	<ul style="list-style-type: none"> • Landfills • Timber treatment sites • Power stations and switchyards 	<ul style="list-style-type: none"> • Significant contamination may be present in all or parts of the site with the potential for migration of contaminants away from the source. • A PSI and DSI will be required to characterise the contamination which may include soil and groundwater investigations. • Significant remedial works may be required to allow for redevelopment of the site. • Resource consents in relation to ground contamination and discharges to air and water are likely to be required from WDC and WRC.

* The permitted activity requirements for earthworks on land covered by the NES Soil include volume limits which are irrespective of the presence of contamination. Depending on the level of earthworks proposed, resource consent under the NES Soil may still be required irrespective of the potential risk to human health.

6 Summary

This investigation has been undertaken to identify preliminary contaminated land information that may influence future land development in the Tuakau Structure plan area. The investigation involved analysis of historical aerial photographs, Council provided information, other readily available information, and broad scale site observations.

The assessment identified that horticultural activities, including market gardening and orchards, cover a significant proportion of the structure plan area and are typically located in rural, greenfields areas. These HAIL activities are likely to be the most common activity encountered during development within the structure plan area. A significant number of industrial related HAIL activities were also identified, however these are typically located in established areas of industrial land use, and do not typically impact on un-developed, rural areas of the structure plan area. In total, HAIL activities may affect approximately 538 ha (40%) of the structure plan area.

While the methodology used in this assessment has some limitations, the information gathered from the different information sources presents a consistent picture of a community developed around its use of the available natural resources for food production. The most significant HAIL activities affecting the area are considered to have been identified and any individual sites or activities that may have been missed are unlikely to have a significant impact on the outcomes of this assessment, or broad scale decisions about future development.

The available information, and past experience with investigation and remediation of contaminated land has been used to define a relative constraint to development with regard to ground contamination. The results of this assessment show that the majority of the land identified as being potentially affected by a HAIL activity is likely to present a low constraint to development. These areas may exhibit widespread but low concentrations of contamination, with smaller areas of potentially more significant contamination within them. Areas of potentially medium and high development constraint are typically located in established industrial parts of the structure plan area, and are local in scale.

To meet the requirements the NES Soil regulations, and the WDC and WRC contaminated land rules, additional assessment and reporting on a site specific basis will be required for any HAIL sites identified in this assessment that is subject to a land use change or disturbance. All works should be carried out by a suitably qualified and experienced practitioner, and undertaken in accordance with the Ministry for the Environment Contaminated Land Management Guidelines.

7 Applicability

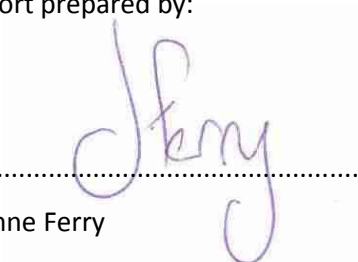
This report has been prepared for the benefit of Waikato District Council with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Recommendations and opinions in this report are based on the historical data that has been reviewed. The nature and continuity of potential HAIL sites and associated contamination are inferred and it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:



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Joanne Ferry

Contaminated Land Specialist

Authorised for Tonkin & Taylor Ltd by:



.....
Peter Cochrane

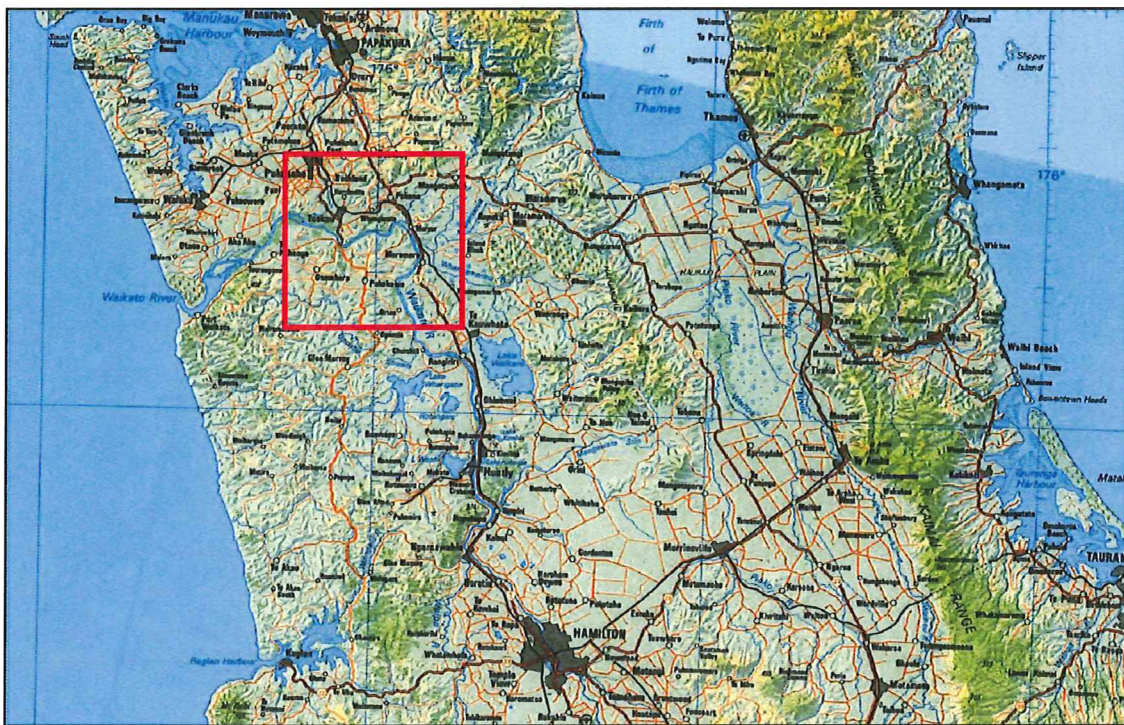
Project Director

JMC

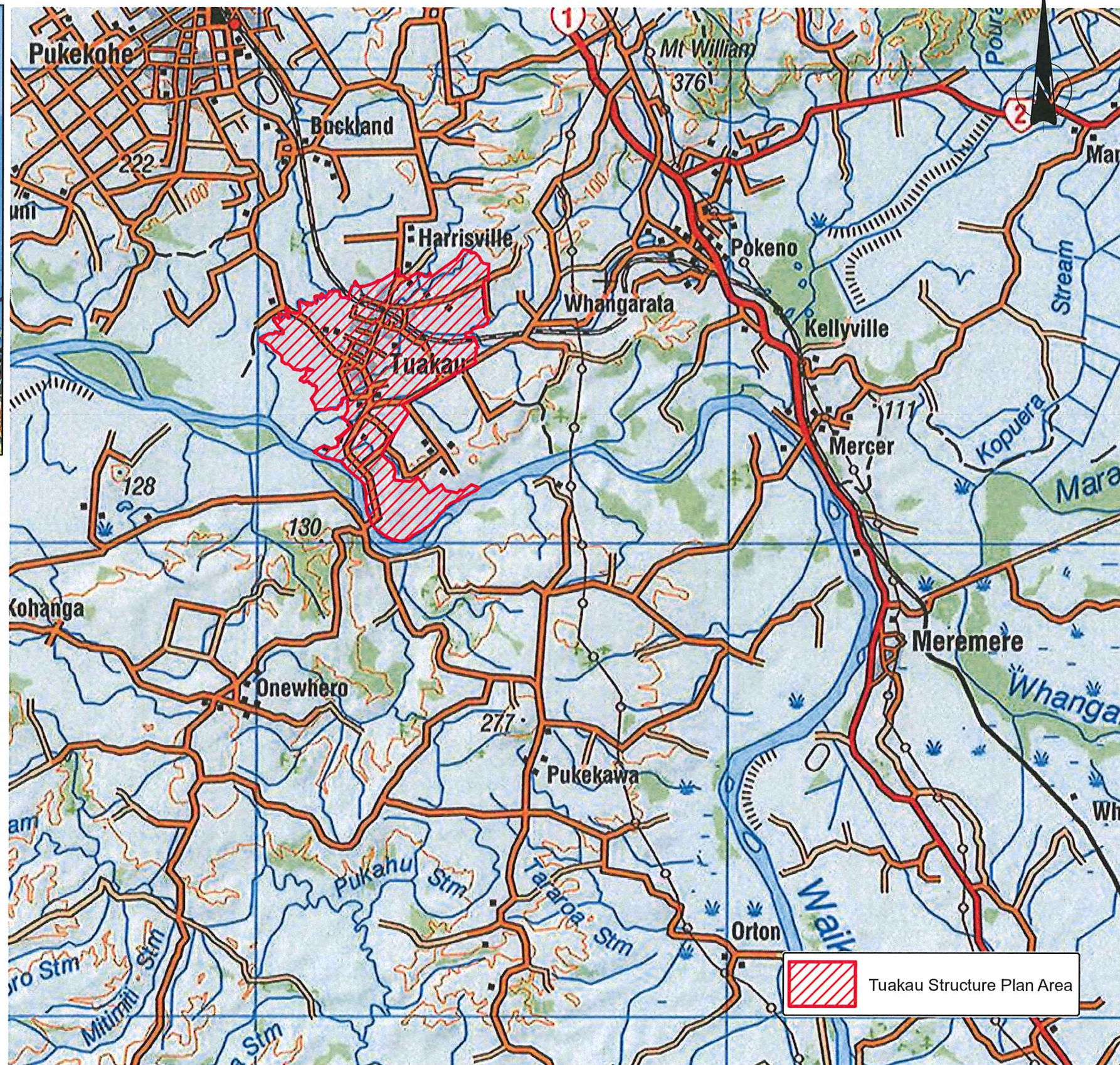
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Appendix A: Figures

- **Figure 1 – Site location plan**
- **Figure 2 – Potential HAIL sites**
- **Figure 3 – Constraint to development**

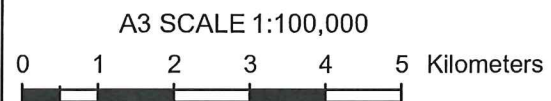


LOCATION MAP
SCALE 1:1,000,000



 Tuakau Structure Plan Area

Notes: Topomaps sourced from Land Information New Zealand (Crown Copyright Reserved)

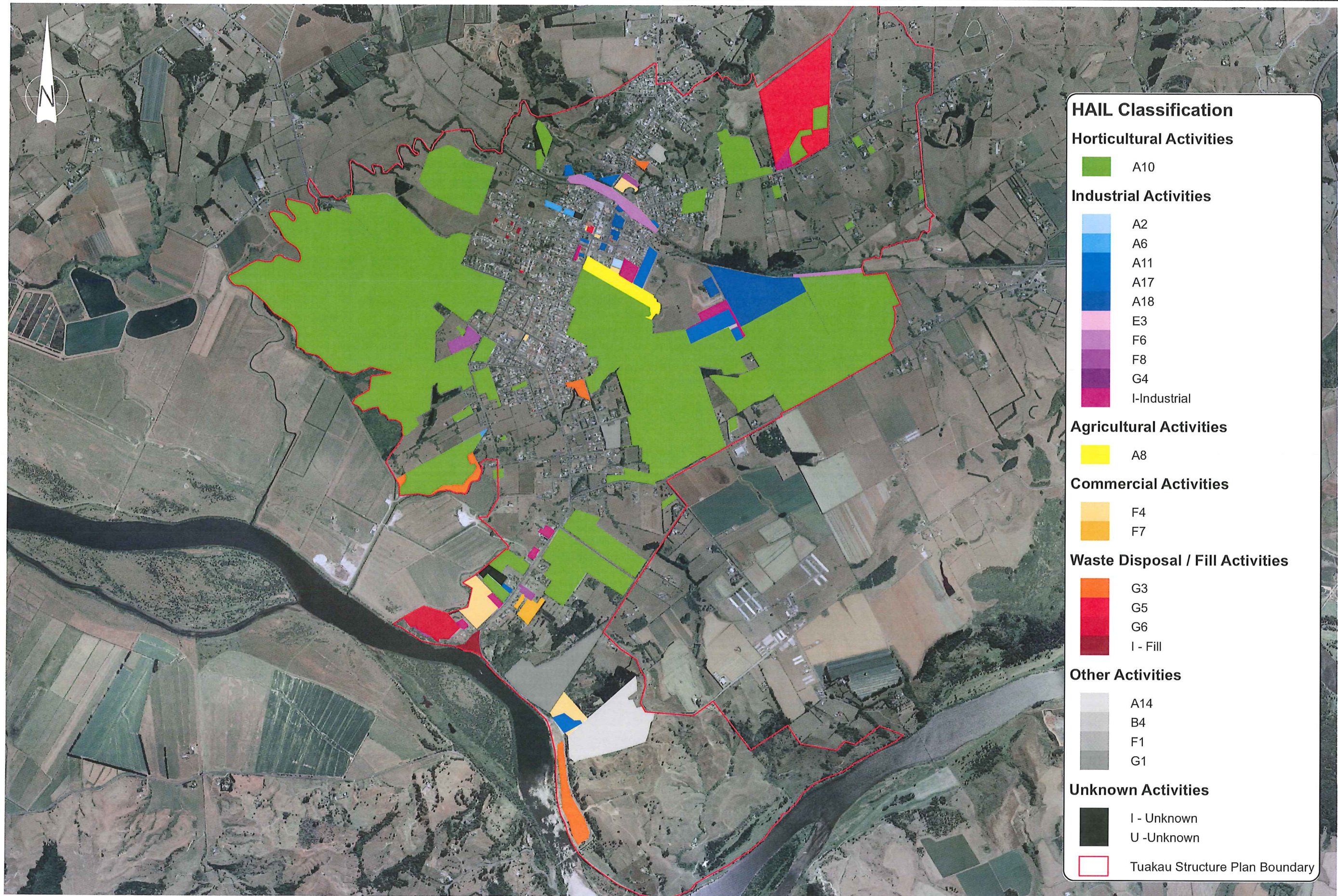


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CHECKED	KCG	19/14
APPROVED	JRC	16/14
ARCFILE 61814.001-F01.mxd		
SCALE (AT A3 SIZE) 1:100,000		
PROJECT No. 61814.001		

WAIKATO DISTRICT COUNCIL
CONTAMINATED LAND ASSESSMENT OF
TUAKAU STRUCTURE PLAN AREA
Site Location Plan

FIGURE No. Figure 1
Rev. 0



HAIL Classification

Horticultural Activities

- A10

Industrial Activities

- A2
- A6
- A11
- A17
- A18
- E3
- F6
- F8
- G4
- I-Industrial

Agricultural Activities

- A8

Commercial Activities

- F4
- F7

Waste Disposal / Fill Activities

- G3
- G5
- G6
- I - Fill

Other Activities

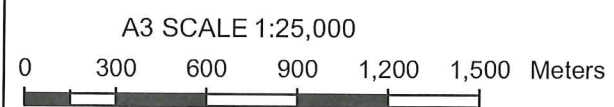
- A14
- B4
- F1
- G1

Unknown Activities

- I - Unknown
- U - Unknown

□ Tuakau Structure Plan Boundary

Notes: Aerial photograph Copyright 2002-2005 Terralink International Limited



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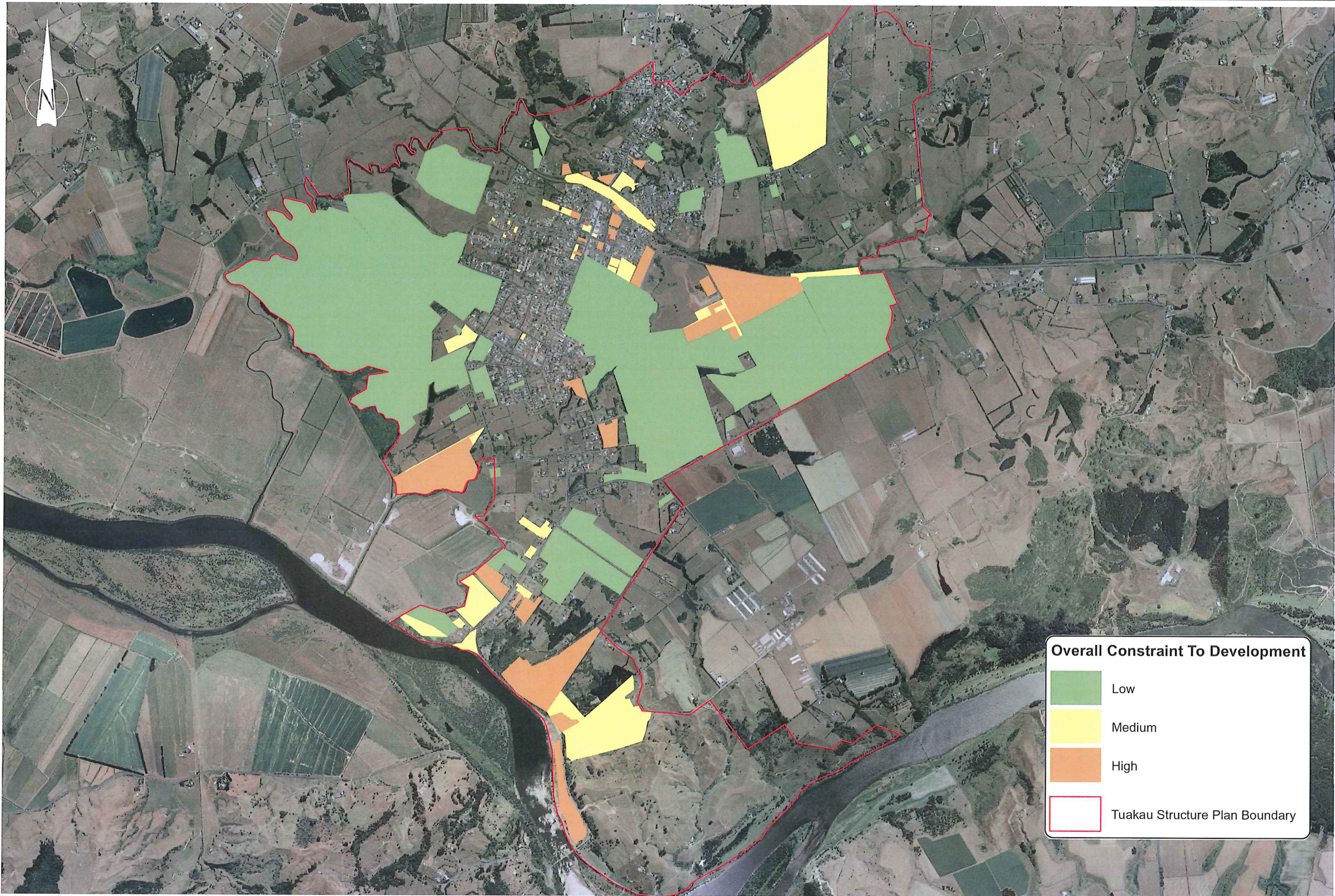
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APPROVED	SMC 6/14
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PROJECT No.	61814.001

WAIKATO DISTRICT COUNCIL
CONTAMINATED LAND ASSESSMENT OF
TUAKAU STRUCTURE PLAN AREA
 Identified HAIL Sites

FIGURE No. Figure 2

Rev. 0

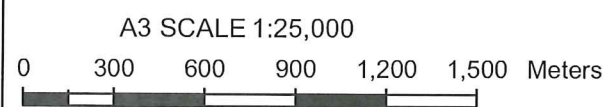
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Overall Constraint To Development

- Low
- Medium
- High
- Tuakau Structure Plan Boundary

Notes: Aerial photograph Copyright 2002-2005 Terralink International Limited



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APPROVED	<i>[Signature]</i>	16/14
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PROJECT No.	61814.001	

**WAIKATO DISTRICT COUNCIL
CONTAMINATED LAND ASSESSMENT OF
TUAKAU STRUCTURE PLAN AREA**

Overall Constraint to Development

FIGURE No. Figure 3

Rev. 0

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Appendix B: Summary of identified HAIL activities and potential contaminants

List of all potential HAIL activities identified within the Tuakau structure plan area

HAIL classification	Activity or industry	No. of sites identified ⁵	Hazardous substances ¹	Potential likelihood, extent and magnitude of contamination ²	Relative constraint to development ³
A2	Chemical manufacture, formulation or bulk storage	4	Wide range of organic and inorganic compounds	Variable contaminant concentrations likely across site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Medium to high
A6	Fertiliser manufacture or bulk storage	9	Calcium phosphate, calcium sulphate, copper chloride, sulphur, sulphuric and phosphoric acid, molybdenum, selenium, iron, cadmium, nitrates, and ammonia	Nitrates are very mobile in groundwater so may present a high risk if receptors (surface water or groundwater wells) are nearby.	Medium to high
A8	Livestock dip or spray race operations	2	Arsenic, organochlorines (eg, aldrin, dieldrin, DDT, lindane) and organophosphates, carbamates, and synthetic pyrethroids	High probability of significant contamination to depth in immediate vicinity of dip structure. Lower contaminant concentrations possible across wider areas associated with dipping activities.	Low to medium
A10	Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	74	Arsenic, lead, copper, mercury; wide range of organic compounds including acidic herbicides, organophosphates, and organochlorines (eg, endosulfan on golf and bowling greens)	Potentially low contaminant concentrations affecting near surface soils across large areas with hotspots of contamination centred around sheds and mixing/ storage areas.	Low to medium
A11	Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application	1	Arsenic, cyanide, strychnine, mercury, phosphorus, 1080, organochlorines and organophosphates, carbamates, synthetic pyrethroids, and other commercial preparations	Variable contaminant concentrations likely across each site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Medium to high
A14	Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges	1	Wide range of chemicals and solvents	Variable contaminant concentrations likely across each site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Low to medium
A17	Storage tanks or drums for fuel, chemicals or liquid waste	11	Wide range of chemicals (organic and inorganic), and biological hazards	Wide range of activities and land uses potentially include this activity. High probability of contamination, potentially significant, in the vicinity of the storage tanks, reducing with depth and distance from the source. Potential for contamination associated with waste disposal from systems which use fuel/ chemicals, eg: boilers. Contamination may affect groundwater as well as soil.	Medium to high
A18	Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside	21	Pentachlorophenol (PCP), copper, arsenic, chromium, boron, PAHs, phenolics (creosote), antisapstain, organochlorine pesticides, fungicides, and tributyltin (TBT)	Potential for significant contamination affecting surface and deeper soils in the vicinity of timber treatment activities. Potential for more widespread, albeit typically lower concentrations, of contamination in near surface soils across areas where treated timber has been stored outside.	Medium to high
B4	Power stations, substations or switchyards	2	PCBs, asbestos, metals including boron, arsenic (in fly ash), water treatment chemicals (thermal stations), and hydrocarbons (eg, diesel in generators)	Potential for significant contamination affecting surface and deeper soils beneath electrical equipment.	Medium to high
D5	Engineering workshops with metal fabrication ⁴	9	Metals and oxides of iron, nickel, copper, chromium, magnesium and manganese; range of organic compounds used for cleaning including BTEX, solvents	Variable contaminant concentrations likely across site depending on where different activities were carried out. Typically limited to shallow soils but potential for deep contamination if activities have included hydrocarbons or solvents, or if underground storage tanks were present.	Low to medium

HAIL classification	Activity or industry	No. of sites identified⁵	Hazardous substances¹	Potential likelihood, extent and magnitude of contamination²	Relative constraint to development³
E3	Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process	1	Lime, calcium hydroxide, alkalis; boron and arsenic in fly ash	Variable contaminant concentrations possible across site depending on where different activities were carried out. Potential contamination associated with areas used for disposal of ash and other site wastes.	Low to medium
F1	Airports including fuel storage, workshops, washdown areas, or fire practice areas	1	Petroleum hydrocarbons including lube oils; metals and PAHs in fire practice areas, potential for dioxins in fire practice areas	Typically localised contamination in the vicinity of fuel storage, transfer and workshop areas.	Low to medium
F4	Motor vehicle workshops	12	Hydrocarbons including PAHs, solvents, and metals contained in waste oil	Variable contaminant concentrations likely across site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Low to medium
F6	Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas	3	Hydrocarbons including PAHs, solvents, creosote/phenols, and metals	Variable contaminant concentrations likely across site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Low to medium
F7	Service stations including retail or commercial refuelling facilities	5	Petroleum hydrocarbons (BTEX, PAHs) and lead	High probability of contamination, potentially significant, in the vicinity of the storage tanks, reducing with depth and distance from the source. Contamination may affect groundwater as well as soil.	Medium to high
F8	Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances	7	Wide variety of chemicals, dependent on products being transported	Potential for low contaminant concentrations across site with localised hotspots in areas where specific activities were carried out. Potential for deep contamination if refueling occurred on site.	Low to medium
G1	Cemeteries	11	Nitrates, lead, mercury, formaldehyde, and biological hazards	High probability of biological contamination within recent burial areas. Potential effects on groundwater.	Medium to high
G3	Landfill sites	11	Dependent on original waste composition, wide range of hydrocarbons and metals, organic acids, landfill gas, and ammonia	High probability of contamination, potentially significant, within fill material. Potential for release of landfill gas and leachate which may affect offsite receptors.	Medium to high
G4	Scrap yards including automotive dismantling, wrecking or scrap metal yards ⁴	13	Metals, petroleum hydrocarbons (particularly lube oils), solvents used for cleaning, and PCBs	Variable contaminant concentrations likely across site depending on where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Low to medium
G5	Waste disposal to land (excluding where biosolids have been used as soil conditioners)	4	Depends on type of waste – biological hazards (bacteria, viruses), metals, PAHs, semi-volatile organic compounds, and solvents	Potential for contamination within waste depending on source and composition. If volatile or mobile contaminants are present, contamination may affect offsite receptors.	Low to medium
G6	Waste recycling or waste or wastewater treatment	2	Depends on type of waste – biological hazards (bacteria, viruses), metals, PAHs, semi-volatile organic compounds, and solvents.	Potential ground contamination as a result of discharges from site activities. Variable concentrations possible across site depending on processes occurring, and where different activities were carried out.	Low to medium

HAIL classification	Activity or industry	No. of sites identified ⁵	Hazardous substances ¹	Potential likelihood, extent and magnitude of contamination ²	Relative constraint to development ³	
I	Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment	I - Industrial	11	Dependent on industry involved	Variable contaminant concentrations possible across site depending on the industry involved and where different activities were carried out. Potential for deep contamination if activities have been occurring for a prolonged period or if underground storage tanks were present.	Medium to high
		I - Fill	7	Dependant on source of fill	Potential for contamination within fill depending on source and composition. If volatile or mobile contaminants are present, contamination may affect offsite receptors.	Low to medium
		I - Unknown	1	Dependant on the type of activity	Unknown contamination potential. High constraint applied as a conservative approach.	High
-	Unknown	6	Dependant on the type of activity	Unknown contamination potential. High constraint applied as a conservative approach.	High	

Notes:

1. Hazardous substances information sources from MfE NES Users' Guide 2012
 2. Potential likelihood, extent and magnitude of contamination based on past experience and published information regarding different HAIL activities
 3. See report text for description of low/ medium and high constraint to development
 4. Several land parcels identified as D5 are also identified as G4
 5. Numbers of sites refers to numbers of shape files in the GIS database. Some sites will be duplicated across different information sources and some businesses will be counted multiple times where they cover multiple land parcels
- See List of acronyms in report for chemical descriptions

Appendix C: Ministry for the Environment HAIL (2011)



Hazardous Activities and Industries List (HAIL)

October 2011

A Chemical manufacture, application and bulk storage

1. Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application
2. Chemical manufacture, formulation or bulk storage
3. Commercial analytical laboratory sites
4. Corrosives including formulation or bulk storage
5. Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents
6. Fertiliser manufacture or bulk storage
7. Gasworks including the manufacture of gas from coal or oil feedstocks
8. Livestock dip or spray race operations
9. Paint manufacture or formulation (excluding retail paint stores)
10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
11. Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application
12. Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides
13. Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground
14. Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges
15. Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)
16. Skin or wool processing including a tannery or fellmongery, or any other commercial facility for hide curing, drying, scouring or finishing or storing wool or leather products
17. Storage tanks or drums for fuel, chemicals or liquid waste
18. Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside

B Electrical and electronic works, power generation and transmission

1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)

2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment
3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices
4. Power stations, substations or switchyards

C Explosives and ordinances production, storage and use

1. Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging
2. Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors
3. Training areas set aside exclusively or primarily for the detonation of explosive ammunition

D Metal extraction, refining and reprocessing, storage and use

1. Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material
2. Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds
3. Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds
4. Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals
5. Engineering workshops with metal fabrication

E Mineral extraction, refining and reprocessing, storage and use

1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
2. Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)
3. Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process
4. Commercial concrete manufacture or commercial cement storage
5. Coal or coke yards
6. Hydrocarbon exploration or production including well sites or flare pits
7. Mining industries (excluding gravel extraction) including exposure of faces or release of groundwater containing hazardous contaminants, or the storage of hazardous wastes including waste dumps or dam tailings

F Vehicle refuelling, service and repair

1. Airports including fuel storage, workshops, washdown areas, or fire practice areas
2. Brake lining manufacturers, repairers or recyclers
3. Engine reconditioning workshops
4. Motor vehicle workshops
5. Port activities including dry docks or marine vessel maintenance facilities

6. Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas
7. Service stations including retail or commercial refuelling facilities
8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances

G Cemeteries and waste recycling, treatment and disposal

1. Cemeteries
2. Drum or tank reconditioning or recycling
3. Landfill sites
4. Scrap yards including automotive dismantling, wrecking or scrap metal yards
5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)
6. Waste recycling or waste or wastewater treatment

H Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

I Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment



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