

WDC LIM REPORT - PART 2



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CONTAMINATED LAND MANAGEMENT

PSI ASSESSMENT

GOLF HARBOUR DRIVE
WHANGAREI

For: Keay Family Trust

Ref: 14037

Date: 18 December 2014

Filename: 14037_NES PSI_121214

Revision: 3

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EXECUTIVE SUMMARY

The proposed residential subdivision at Golf Harbour Drive, Maunu has necessitated a site contamination assessment under the National Environmental Standard Regulation 2011 due to the presence of activities listed under the Hazardous Activities and Industries List (HAIL Oct 2011). The current land activities of orchard operations have the potential to create hazardous land contamination. A site plan showing the intended residential subdivision, proposed building sites and soil sampling locations is included in Appendix 1.

The scope considered by this report is to ascertain from site history whether HAIL activities have occurred on the property, and if so to assess the likelihood of soil contamination from these activities and to assess the risk to human health.

This report finds that Hazardous Activities resulting in land contamination have occurred on the subject land. From the CLMG RSS screening exercise it is considered that the risk to human health is medium. Generally the hazardous substances used on the land have low toxicity, low mobility and are likely to have degraded by microbial activity and weathering since time of application, presenting a low risk to human health. Altacor insecticide is one of the chemicals that does not readily degrade however the only identified hazard is via the oral route over a chronic duration and is not expected to pose a significant risk to residential land use.

Migration of hazardous contaminants from the neighbouring properties is likely with surface water runoff from the adjacent golf course directed through the property, however the deposition of hazardous substances is restricted to the designated OLFP and is remote from proposed building sites.

Due to the historic use of agrichemicals at the property a series of soil samples taken across the development site have been analysed for potentially hazardous substances. With consideration of the proposed residential land use and likely exposure paths for humans, the analysis results were verified against MFE SGVs which are considered as threshold concentrations for the soil contaminants. The soil analysis identified a number of common heavy metals at detectable levels, however all results are less than the SGVs indicating that any adverse effects on human health are likely to be no more than minor

Based on the findings of this PSI, for the residential development of lots 1 to 9 as identified in the Appendix 1 (Reyburn & Bryant scheme plan S 13114) it is highly unlikely that there will be a risk to human health from land contamination associated with the past land use.

1. SCOPE OF WORK

Keay Family Trust proposes to construct a nine lot residential subdivision at Golf Harbour Drive, Whangarei. The proposed development includes the formation of nine residential lots within the site, six of which are positioned at the front portion of the site adjacent to SH14 and two further lots located in the rear of the site.

The proposed development includes the formation of nine residential lots with Lots 6-9 positioned in the south of the property and access via a new ROW formed from Golf Harbour Drive. Lots 3-5 are located adjacent to an existing ROW access and vehicle crossing in the centre of the property, while Lot 2 is accessed via an existing formed ROW along the eastern boundary. Lot 1 balance of the land and is accessed via the existing vehicle crossing and existing ROW access. Scheme plans of the proposed development are included in Appendix 1.

Whangarei District Council has identified that a HAIL activity or industry (market gardens and orchards) has previously been undertaken on the site. This assessment details a preliminary site investigation (PSI) which is a desktop study with some representative sampling and analysis of the soil. The main objectives of a PSI are to gather information about the land to determine whether it may potentially be contaminated, to assess the suitability of the land for its current or intended land use, and to design a detailed site investigation (if required).

This assessment has been undertaken based on desktop study, interviews, site walkover inspections and selected soil sampling and analysis. In the event that HAIL activities have been undertaken the likelihood, location and extent of contaminants of concern and potential risk to human health shall be assessed and further investigation incorporated within a detailed site investigation.

2. SITE IDENTIFICATION

The site is located at Golf Harbour Drive, Maunu approximately 6km west of Whangarei CBD and is positioned adjacent to State Highway 14. The legal description is Lot 1 DP 392286 and Lot 2 DP 437647 and is sized 4.88ha in total. WDC planning maps indicate that the property is located within an Urban Transition Environment and is classified as a Low Instability Hazard area. No flood susceptible areas are mapped at the subdivision site.

The property is currently used as an orchard with a majority of the site planted with avocado trees. An area of bush covenant is located on the western boundary adjacent to Sherwood Golf Course and a small area retained in pasture is located in the northeast corner of the property as visible in Figure 1 below. The property contains two farm sheds built around what was formerly a milking shed and stock yard. The timber sheds are used to house equipment and materials for use on the property and for occasional sheep management.

Vehicle access is available from Golf Harbour Drive via an existing vehicle crossing. Figure 1 below taken from WDC GIS shows the site and surrounds including the existing vegetation, farm sheds and access arrangements.



Figure 1: WDC GIS aerial image

The site has gently rolling topography and is generally crowned in the centre, falling to the north and south. Surface water runoff from the north is discharged from the site via an existing culvert under an adjacent ROW access, while the south of the property ponds in a shallow basin adjacent to Golf Harbour Drive prior to over topping the carriageway and draining east.

A detailed site plan showing local drainage patterns, historic and current buildings and proposed subdivision development is included in Appendix 1.

3. SITE HISTORY

3.1 Ownership

The property has not changed ownership in the past 10-15 years and is currently held by Keay Family Trust. The previous owners are understood to be Clive and Gail Mudgway who have relocated to Australia and are not presently contactable. A site history has been established by interviewing the present land occupiers who have good knowledge of the site and immediate surrounds, plus through review of historical records. Keay Family Trust have completed the pre-lodgement questionnaire included in Appendix 4 and the supplementary site specific questions below.

No drainage services are documented at the property, however it is expected that the farm buildings on the property have a power supply available.

3.2 Historical Photographs

A series of historical photographs are included in Appendix 2 which document the historical uses of the property and adjacent land. The photos cover the period from 1942 through to October 2013.

The photos reveal that the land was generally in pasture until sometime between 1979 and 1998 when avocado trees were planted on the front part of the property. Prior to this time the land is expected to have formed part of larger dairy farm with the existing sheds at the property providing a small scale milking shed. In approximately 2002 a second northern part of the site was planted in avocado trees, and in approximately 2007 the balance of the land was planted in avocado trees, except for a small portion in the north eastern corner which has been retained in pasture.

The area of covenanted bush on the western boundary is visible in images since 1942 and the footprint has remained largely unchanged. The over land flow path through the northern part of the property is clearly visible in the early photographs and appears to have remained largely unchanged in position.

Structures at the location of the current farm buildings are visible from 1942 onwards, however it is not obvious from the early photographs if the buildings are the same. It is expected that the current buildings have been in place since at least 1979.

3.3 Site Specific Questions

- The site is currently used for horticultural activities. How long have the avocado trees been planted for?

The front block of avocado trees were present when we purchased the property but we have planted the balance of the trees since ownership within the past 10-12 years.

- There is a HAZCHEM 2WE sign on the front gate to the property. What type of agrichemicals does this apply to?

We are advised by Fresh Max who market and distribute the avocados for domestic and international markets and on their recommendation we have installed the sign simply because we spray the avocado trees.

- Who carries out the spraying and what types of spray are used?

We are advised by Fresh Max who market and distribute the avocados for domestic and international markets. They provide technical advice on the growing and post harvest operations and we engage an independent contractor to carry out the spraying on an as required basis. Spraying is only carried out if recommended by Fresh Max and the old block at the front of the property hasn't been sprayed for 2-3 years. Roundup is regularly used as a herbicide for weed control and the knapsack sprayer is filled and cleaned on the concrete pads in the old milking shed. Roundup is stored on site in small containers. Mavrik spray is used occasionally as an insecticide.

- Where did you store, fill and washout agrichemicals?

Agrichemicals are not stored on site. Because we use an independent contractor they bring the agrichemicals to site on an as required basis and do not wash out any containers on site. All filling and cleaning of the spray equipment has been done off-site. We have used very few agrichemicals.

- Did you store bulk fertiliser on the property?

Bulk fertiliser is not stored on the property. Fertiliser is bought as required in 40kg bags and applied soon after purchase. We use regular avocado mix supplied by horticulture and it is a standard NPK fertiliser. We applied a small amount of copper to the old trees at the front of the property about 7-8 years ago but no copper has been used since then.

- Have you stored bulk pesticides on the property?

We don't use pesticides.

- Were fertilisers or sprays applied through an irrigation system?

We don't apply fertiliser or sprays through an irrigation system. They are applied as sprays from a quad bike or tractor

- Does the site receive sprays from neighbouring farms or do the shelter belts limit this?

There are shelter belts around most of the avocado trees and they are effective at preventing spray to and from the property.

- There are two shipping containers near the bush covenant. What is inside?

The shipping containers are filled with household furniture, appliances, tools, equipment and belongings that are yet to make it to our house.

- There is an old gasoline drum on a trailer by the shipping containers. Has that been used for refuelling vehicles at the site?

No the gasoline drum belonged to the previous owners and is quite rusted out. It has not held fuel since we have owned the property.

- How are the tractors refuelled on site?

Diesel is bought in as required in 20 litre containers

- In the tractor shed there are several empty drums. What are these used for and what did they contain?

They contained a variety of products including teat spray, fertiliser, detergent but none have been used or stored on site. The drums were used at our farm off-site, cleaned out and brought here for general storage.

- There is oil staining and leakage on the concrete floor of the tractor shed. What is this from?

The oil stains are from years of maintenance and general use of machinery.

- There are two sheep on the property. Did you spray or dip sheep on site and if so where?

We do not spray or dip sheep on site. The sheep are present only temporarily to keep the grass under control. The sheep are not treated on the site for flystrike, worms, footrot, etc.

- Was the old milking area used as a spray race?

During the time we have owned the property the milking shed has not been used as a spray race.

- The old milking shed looks to be set up for shearing and drenching sheep. Is this carried out on site?

We occasionally shear the sheep on site and drench as required.

- What are the buckets of empty yellow syringes stored in the old milking shed?

The syringes are pressure loaded injection systems to directly inject the tree trunks.

- There are small bags of fertiliser stored in the old milking shed. What are these used for?

They are just 40kg bags of general fertiliser used as required. One is for vegetables and the other is a Bittersalz magnesium sulphate from Ravensdown.

- What is the empty tank at the old milking yards used for?

It was an old water tank that we have decommissioned.

3.4 Agrichemical Use

Keay Family Trust have confirmed that a HAIL activity has been carried out on the property during their ownership, consisting of a commercial orchard producing avocado fruit. From the discussions and questionnaire presented, Keay Family Trust has confirmed that bulk storage of agrichemicals has not been carried out at the site but conventional avocado chemicals have been used on the property over the period of their ownership. The agrichemicals used at the property are typical of commercial avocado orchards with the primary chemicals used being:

- Topstar insecticide – a systemic insecticide for the broad-spectrum control of a range of pests with thiacloprid as the active ingredient
- Altacor insecticide – a targeted pesticide with low toxicity to non-target species for the control of leaf roller caterpillars in avocados with chlorantraniliprole as the active ingredient

- Mavrik Aquaflow insecticide - synthetic pyrethroid insecticide for the control of insect pests in fruit crops with taufluvinate as the active ingredient
- Foscheck fungicide - systemic fungicide for the control of root rot with Phosphorous acid as the active ingredient
- NPK fertiliser – general fertiliser to assist the health and production of the avocados across the land
- Roundup – a broad-spectrum systemic herbicide used to kill weeds with glyphosate as the active ingredient

It is also expected that the following insecticide and miticide may have been used in the past on the property:

- Lorsban 50 EC insecticide – for general control of insects in agricultural crops and tree and vine fruit with chlorpyrifos as the active ingredient
- ParaMite miticide – specific for use on avocados to control six spotted mites with etoxazole as the active ingredient

A small amount of copper was used approximately 7-8 years ago to treat the avocados in the front of the property. The agrichemicals used on the older front block are largely unknown as they pre-date the current ownership tenure, however it is likely that copper has been used in the past as historically the regular application of copper fungicides was used for control of avocado fruit rots. Copper is a heavy metal that readily accumulates in orchard soils and can be present in levels that are considered hazardous to human health. In most soils, copper residues are likely to remain indefinitely, and will continue to influence the health of the soil.

A normal fertilisation program has been carried out to assist the health and production of the avocados. Nitrogen and potassium are necessary to produce large high quality fruit. A balanced fertilizer is generally used after trees begin to bear fruit to provide the needed nitrogen and potassium.

Keay Family Trust was not aware, nor saw evidence of, any hazardous activities occurring on the site prior purchasing the property.

3.5 Common Contaminants

The Maunu area has a well developed horticultural industry, centred mainly on the growing of avocados and citrus. Both viticulture and avocado orchards have the potential to have detrimental effects on the environment, particularly soil health. Copper use as a fungicide to control avocado rots can cause significant environmental impact because it does not readily degrade however the use of copper, particularly in Northland has reduced significantly in recent years and has not been used at the site at all in the past 7-8 years.

From discussions with Keay Family Trust and based on site observations with consideration of the existing and historic land use the following contaminants commonly associated with these activities (from Contaminated Land Management Guidelines) are tabulated below. The findings and potential for the presence of hazardous substances are summarised in Table 1 below.

Activity or Industry	Hazardous Substances	Interview Response	Inspection & Desktop Study
Agrichemicals filling, storing or washing out tanks for agrichemical application.	Arsenic, lead, copper, organochlorine pesticides, organophosphate pesticides, herbicides, fungicides, carbamates, and synthetic pyrethroids	Minimal use of Roundup across the land but no other bulk filling, storage or washing	No evidence observed or indicated
Fertiliser bulk storage	Calcium phosphate, calcium sulphate, copper chloride, sulphur, sulphuric acid, molybdenum, selenium, boron, cadmium, nitrates, ammonia	Small quantities of fertiliser stored in 40kg bags for use as required	Bulk storage not observed or indicated
Livestock dip or spray race operations	Arsenic, organochlorines and organophosphates, carbamates, and synthetic pyrethroids.	Activity not undertaken.	No suspected dip site identified.
Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred	Arsenic, lead, copper, mercury, organochlorines and organophosphates, carbamates, and synthetic pyrethroids	Activity undertaken. Variety of common agrichemicals used	Several common agrichemicals for the management of avocado trees have been used at the site
Persistent pesticide bulk storage or use	Arsenic, lead, copper, mercury, organochlorines and organophosphates, carbamates, and synthetic pyrethroids	Activity not undertaken.	No evidence observed or indicated for bulk storage of pesticide
Bulk storage of petroleum or petrochemicals above or below ground	Hydrocarbons, including BTEX, PAHs, solvents, lead	Activity not undertaken.	No above or below ground fuel storage tank observed
Storage tanks or drums for fuel, chemicals or liquid waste	Wide range of chemicals, biological hazards	Activity not undertaken.	Used chemical drums observed on-site which have been used off-site, cleaned and imported for general storage
Motor vehicle / engine reconditioning workshops	Hydrocarbons including PAHs, solvents, PCBs, and metals contained in waste oil	Activity not undertaken	Oil staining on concrete shed floor
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			Adjacent golf course with surface water runoff directed via open channel / swale through northern part of site
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			No evidence observed or indicated

Table 1: Potential Hazardous Activity and associated hazardous substances

4. SITE CONDITION AND SURROUNDING ENVIRONMENT

4.1 Surrounding Environment

The property boundary is located in a well-established horticulture production area in Maunu and many of the surrounding properties are actively producing and selling avocado and citrus produce for human consumption. Recent subdivision and urban infill however, has led to an increase in residential properties and a reduction in productive land. Figure 1 depicts the site and immediate surrounding environment, along with the aerial photographs included in Appendix 2. Migration of contaminants from adjacent orchards is not likely due to the presence of shelter belts and local drainage patterns.

There is an existing golf course adjacent to the west boundary of the property. It is expected that a variety of agrichemicals are used on the golf course on a regular basis. From discussions with golf course staff the following is a summary of activities undertaken on the site:

- Fungicides and insecticides are applied only to the greens and under favourable conditions to avoid runoff. The main insecticide used on the golf course has chlorpyrifos as the active ingredient, similar to Lorsban 50 EC used on the subject site.
- Herbicides used in recent times on the golf course are mainly to control broadleaf and typically include Saxon (broad spectrum broadleaf weed control with active ingredients Mecoprop, MCPA and Fluroxypr) and Quantum (selective herbicide for the control of broadleaf weeds with active ingredient diflufenican).
- Fertiliser is mainly applied to the greens on a regular basis but also two times a year to the fairways and under favourable conditions to avoid unnecessary runoff. The applied fertiliser is normally ammonia sulphate.

At the time of inspection chlorpyrifos has been applied at the greens and fringes.

Migration of contaminants from this area is likely due to the topography of the site and surface water runoff from a large portion of the golf course is directed via the overland flow path through the northern part of the property.

The topography and hydrology of the site is described further in Section 5 and is depicted in the site plans included in Appendix 1. WDC planning maps indicate that the property is located within an Urban Transition Environment and was previously zoned as a Countryside Environment.

4.2 Site Condition

The site is generally in good condition and appears to be well maintained. Post and wire fences of varying age and condition are present on all boundaries, along with shelter belts as indicated in Figure 1. Two small buildings are present on the property which are constructed around what was formerly a milking shed and stock yard. The timber sheds are used to house equipment and materials for use on the property and for occasional sheep management. The small stockyard may have historically been used as a milking shed but is only suitable for a small number of sheep and not a large scale commercial operation. It is possible that the races or stockyards were used for spraying stock in the past but this has

not occurred in recent times. From the aerial photographs it is likely that the existing buildings have occupied the site for the past 40 years.

Some visible signs of contamination were apparent, particularly within the tractor shed where oil staining and discolouration of the concrete ground slab were observed. Used drums were also present within the tractor shed, however these are understood to have been used and cleaned on another property and relocated to this site for general storage. Strong chemical odours were present in the used drums.

No evidence of stressed plants were identified within the property. Similarly no evidence of land instability or erosion was observed at the site.

5. GEOLOGY AND HYDROLOGY

5.1 Mapped Geology

The geology of the area is defined on the Institute of Geological and Nuclear Sciences Geological Map 2: Geology of the Whangarei Area as basaltic lava flows of the Kerikeri Volcanic group.

The geomorphology of the general area is that of eroded basalt flows within the Puhipuhi-Whangarei Volcanic field which usually pre-date the present topography. The distribution of volcanoes near Whangarei is partly related to the local fault pattern and has formed the young and well preserved volcanic features of shield volcanoes built up from thin lava flow sequences, steep sided scoria cones and thick lava flows. Areas of basalt lava flows are expected to remain relatively stable unless underlain by soft rocks.

Two concealed faults are mapped in close proximity to the subdivision site with Otaika Fault to the southwest and Maunu Fault to the north. The subdivision site located on the downthrown side of the concealed Maunu fault.

New Zealand Land Inventory map NZMS 290 Sheet Q 06/07 defines the pedology as a combination of Maunu silt loam and Maunu boulder silt loam being well to moderately well drained soils of rolling land, moderately to strongly leached red loams.

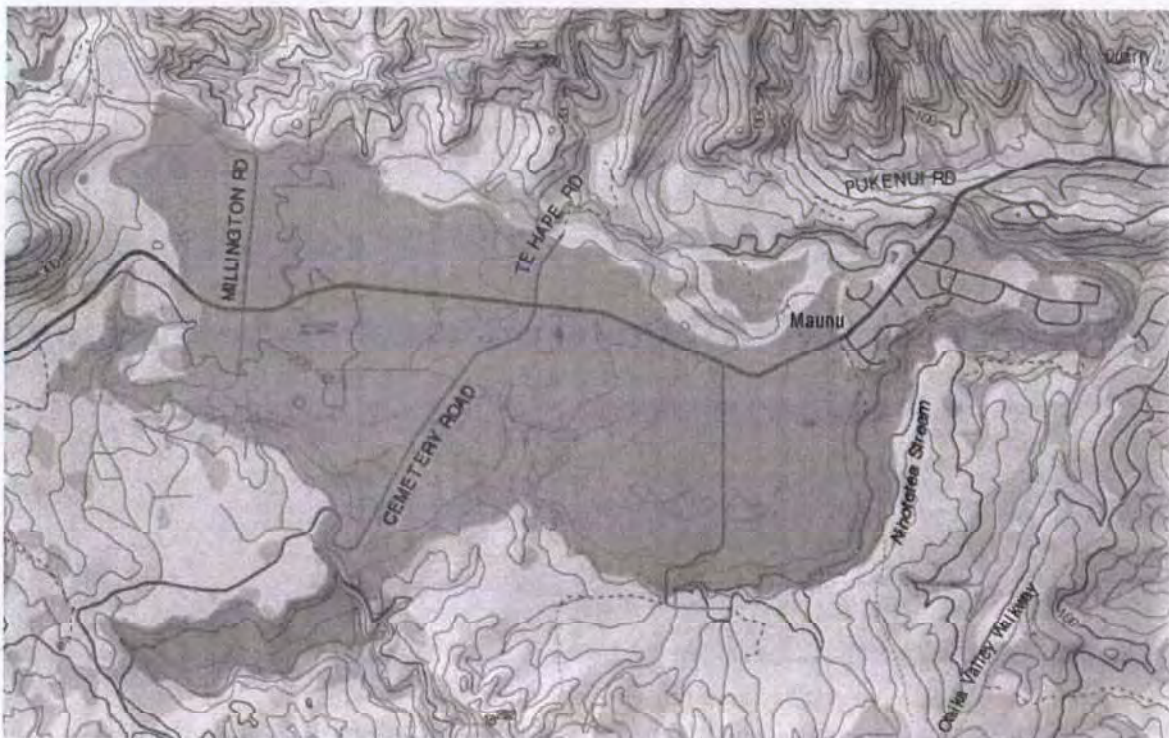


Figure 2: Landcare Research soil distribution

Landcare Research maps record the site as having negligible observed soil erosion, suitable for intensive horticulture and weak igneous surface rock types. The soil at the property is mapped as orthic oxidic soils (Figure 2 above), being clayey soils that have formed as a result of weathering over extensive periods of time in volcanic ash or dark volcanic rock. Despite high clay contents the soils are friable with low plasticity and fine structure.

They contain appreciable amounts of iron and aluminium oxides and are only known in the Auckland and Northland regions. Parent materials are derived from strongly weathered andesite, dolerite or basalt rock or ash. They cover < 1% of New Zealand.

Site observation of paddock boulders and the surficial soils encountered during subsurface investigations are considered to be consistent with the geological description for the site.

5.2 Hydrology

The existing site drainage is achieved by general surface runoff following the natural topography of the property. The subdivision site is effectively in two catchments with the north draining to an open channel passing through the site and the south ponding in a localized depression. The subdivision site has a catchment that extends beyond the property boundary and additional surface runoff is expected to enter the site from adjacent properties, particularly from the golf course and further west of Millington Road. The area forms the upper catchment of Te Hihi Stream and ultimately drains to Whangarei Harbour via Raumanga Stream. A detailed site plan showing local drainage patterns is included in Appendix 1.

5.2.1 Flood Susceptible Areas

Whangarei District Council and Northland Regional Council hazard maps do not indicate flood susceptible areas located in or adjacent to the proposed development. The site has relatively flat to gently rolling topography ground slopes increasing locally at the incised overland flow path visible in Figures 4 & 5. The southern end of the property has a gentle slope grading down to a low point adjacent to Golf Harbour Drive and during extreme rainfall events localized flooding occurs in the low points is indicated in Figure 3 below.



Figure 3: Existing shallow ponding basin adjacent to Golf Harbour Drive

The subdivision site accepts surface water runoff from adjacent properties (golf course) and beyond via concentrated flows following the natural contours of the land. The overland flow path in the north of the subdivision site is designated via an easement passing through the property, allowing surface water to be conveyed from west to east. The concentrated flow is piped under the formed ROW access on the northeast boundary via a DN600 culvert.

The flow restriction created by the limited capacity culvert and the flood basin in Figure 3 above are considered to be the primary source of flooding at the site.



Figure 4: Existing drainage easement in proposed Lot 2 for conveying surface water



Figure 5: Existing drainage easement in proposed Lot 2 prior to being piped under ROW access

5.2.2 Groundwater

Northland Regional Council GIS maps indicate the site is being positioned within the Maunu aquifer which is classified as a semi unconfined Principal Aquifer in Taheke Basalt overlying sandstone/mudstone with a saturated thickness of 8-58m. Ground water collection is common in the area and several water bores are mapped in proximity to the subdivision site, with one positioned within proposed Lot 2.



Figure 6: NRC GIS aerial image

6. SAMPLING AND ANALYSIS PLAN AND SAMPLING METHODOLOGY

6.1 Sampling and Analysis Plan

The sampling pattern, location and depths were selected to gain a broad coverage of the subdivision site and in particular the residential development sites and nominated building platforms. The areas selected were those most likely to be used for residential occupancy and human contact and included a total of 14 samples.

The samples were taken from the near surface soils (topsoil zone 0-150mm) to best represent the most common pathways of exposure (soil ingestion, produce consumption, inhalation of particulates and volatiles, and dermal absorption) for residential occupancy and risk to human health. Two additional samples were taken at 500mm depth to provide an indication of vertical contaminant movement.

All samples were submitted to Hill Laboratories for analysis and included the following suite of tests for expected hazardous substances associated with the historic land use:

- Heavy metals screen (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg)
- Glyphosate suite in soil LCMSMS in Organics
- Organonitro & phosphorus Pesticides Screen in Soil by GCMS

The following table lists the sample number corresponding to the site plan in Appendix 1 and the depth at which the sample was taken.

Sample Number	Location	Depth
1	Lot 6	0-75mm
2	Lot 9	0-75mm
3	Lot 8	75-150mm
4	Lot 8	0-75mm
5	Lot 6	75-150mm
6	Lot 7	0-75mm
7	Lot 4	75-150mm
8	Lot 4	0-75mm
9	Lot 5	0-75mm
10	Lot 3	0-75mm
11	Lot 2	0-75mm
12	OLFP	0-75mm
13	Lot 4	500mm
14	Lot 7	500mm

Table 2: Potential Hazardous Activity and associated hazardous substances

6.2 Sampling Methodology

The physical soil sampling was carried out by Geocivil using the following general sampling method.

Sampling procedure

All sampling gear (hand trowel and spade) cleaned then rinsed with distilled water and patted dry with a fresh paper towel and placed in a clean plastic bag until needed for sampling.

2 types of sampling containers were used, glass with steel lid and small plastic jar with plastic lid.

All samples stored at room temperature sealed in labelled jars in polystyrene box the sample jars were delivered in.

Surface sampling 0-75mm and 75-150mm

Where necessary and vegetation (grass, etc) removed by hand, then wearing fresh set of latex gloves and clean trowel soil sample dug out and placed on a clean plastic bag, when enough sample is excavated to the plastic bag, sample mixed and placed into labelled sample jars supplied by testing laboratory and closed.

Sub surface sampling up to 500mm

Using clean spade soil is excavated to desired sample depth, using a clean trowel surface and latex gloves of base of hole removed, then wearing fresh set of latex gloves and clean trowel soil sample dug out from base of excavated hole and placed on a clean plastic bag, when enough sample is excavated to the plastic bag, sample mixed and placed into labelled sample jars supplied by testing laboratory, and closed.

7. BASIS FOR GUIDELINE VALUES

The guideline values adopted for this PSI assessment are derived from the Ministry for the Environment Environmental Guideline Value (EGV) Database which has been developed as a companion to the Contaminated Land Management Guidelines No. 2. The EGV database provides the guideline values contained in the reference documents discussed in CLMG No. 2 and is considered to be an appropriate source of values for the hazardous substances listed in Table 1.

CLMG No. 2 provides a hierarchy of environmental guideline values as contained in reference documents which determines the order in which guideline values should be used for site assessment with priority given to New Zealand documents that derive risk-based guideline values. For the purposes of this assessment the land use is taken as standard residential which allows for low-density residential property with home-grown vegetables contributing 10 percent of the total intake.

The risk-based values are derived from a given exposure scenario for the protection of human health. For soil media the guideline values are typically derived using designated exposure scenarios that relate to different land uses with the pathways of exposure considered to include soil ingestion, inhalation of particulates and volatiles, and dermal absorption. For residential scenarios produce consumption is also used as an exposure pathway.

If the site complies with the Soil Guideline Values (SGVs) for the particular land use then the risk from hazardous substances at the site is considered acceptable for the proposed land use without restrictions. Compliance with SGVs is deemed as sufficient proof that land does not have, or is not reasonably likely to have, hazardous substances on or in it, at levels that would lead to unacceptable adverse effects on human health under that particular land use.

Guideline values have also been assessed against the New Zealand Avocado Industry Council Avocado Quality Manual which provides a registered chemical list for avocados plus the required Withholding Periods (WHP) and Maximum Residual Levels (MRL's) for active ingredients used in avocado production.

8. RESULTS

The soil testing completed by Hill Laboratories has covered a suite of hazardous substances that have been used at the property and identified as a potential risk to human health. The testing has included:

- Heavy metals screen (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg)
- Glyphosate suite in soil LCMSMS in Organics
- Organonitro & phosphorus Pesticides Screen in Soil by GCMS

The results of the testing carried out is included as Appendix 5.

From the results obtained across the property the following hazardous substances have been identified with the associated exposure paths for humans and estimation of effects assessed to determine the allowable maximum concentration of chemicals in the soil which did not pose an unacceptable risk to human health. The relevant exposure pathways considered for the proposed residential land use include:

- Ingestion of contaminated soil
- Consumption of produce
- Dermal absorption
- Inhalation of volatiles (indoors and outdoors)
- Inhalation of particulates

With priority given to MFE SGVs the following values have been considered as threshold concentrations for the soil contaminant at which the exposure is judged to be acceptable because any adverse effects on human health for most people are likely to be no more than minor. The soil acceptance criteria are designed to be conservative overestimating the risk to human health and the environment to ensure adequate level of protection is provided where uncertainty in the input parameters prevents a more accurate assessment of the risk.

8.1 Heavy Metals

8.1.1 Arsenic

Arsenic was detected in all samples taken across the property with the lowest concentrations obtained from the deeper samples (13 & 14) at 500mm depth and the greatest concentrations obtained in the two samples (11 & 12) adjacent to the old milking shed and yards. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 7.4 mg/kg
- SGV: 20 mg/kg

8.1.2 Cadmium

Cadmium was detected in all samples taken across the property with the lowest concentrations obtained in the two samples (11 & 12) adjacent to the old milking

shed and yards. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 0.9 mg/kg
- SGV: 5 mg/kg (pH 5)

The SGV for cadmium increase with soil pH (660 mg/kg at pH 8) with the default value being the SGVs at a pH value of 5 when soil pH is not measured.

8.1.3 Chromium

Chromium was detected in all samples taken across the property with no distinct variation in concentrations from the sample set. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 109 mg/kg
- SGV: 560 mg/kg (Chromium VI)

The SGV for Chromium III is 280,000 mg/kg and a concentration this high is unlikely to be encountered, however concentrations at this level are well in excess of those likely to have a significant effect on plants.

8.1.4 Copper

Copper was detected in all samples taken across the property with the lowest concentrations obtained from the deeper samples (13 & 14) at 500mm depth. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 82 mg/kg
- SGV: 32,000 mg/kg

The SGVs for copper is well in excess of the level likely to have a significant effect on plants.

8.1.5 Lead

Lead was detected in all samples taken across the property at consistent levels except elevated concentrations were obtained in the two samples (11 & 12) adjacent to the old milking shed and yards being 63 mg/kg and 152 mg/kg respectively. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 34 mg/kg
- SGV: 730 mg/kg

8.1.6 Mercury

Mercury was detected in all samples taken across the property at low levels slightly above detection limits. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 0.2 mg/kg

- SGV: 380 mg/kg

8.1.7 Nickel

Nickel was detected in all samples taken across the property at consistent levels. For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 28 mg/kg

Various SGVs have been assessed using international risk based guidelines recommended by the CLMG No.2:

- SGV: 130 mg/kg (UK EA Land contamination SGVs 2009)
- SGV: 400 mg/kg (NEPM Guideline Investigation Levels For Soil and Groundwater 2013)

8.1.8 Zinc

Zinc was detected in all samples taken across the property with the lowest concentrations obtained from the deeper samples (13 & 14) at 500mm depth. Variation in concentrations are apparent across the property with the highest values obtained from samples 2 (410 mg/kg) and 6 (470 mg/kg). For the exposure pathways listed above the near surface samples have been considered with the average values taken to be representative of the level of exposure.

- Average concentration (Samples 1-12): 215 mg/kg

Various SGVs have been assessed using international risk based guidelines recommended by the CLMG No.2:

- SGV: 23,500 mg/kg (US EPA Regional Screening Levels (RSLs) for Chemical Contaminants November 2014)
- SGV: 7,400 mg/kg (NEPM Guideline Investigation Levels For Soil and Groundwater 2013)

8.2 Glyphosate Suite

A Glyphosate suite of tests was carried out on the soil samples with detectable levels identified only in samples 10 and 11 in the northern part of the site. AMPA (degraded Glyphosate) was detected in sample 11 at 0.14mg/kg, while Glyphosate was detected in samples 10 and 11 at 0.03 mg/kg and 0.04 mg/kg respectively. Glufosinate levels were below detectable levels in all samples.

A SGV of 6160 mg/kg is adopted based on US EPA Regional Screening Levels (RSLs) for Chemical Contaminants (November 2014).

8.3 Organonitro & phosphorus Screen

An Organonitro & phosphorus screen was carried out on the soil samples which included a total of 90 potentially hazardous substances. The tests carried out were below detectable levels for all samples.

9. SITE CHARACTERISATION

9.1 Orchard Activities

The site is currently used as a commercial orchard producing avocado fruit and a combination of conventional agrichemicals have been used on the property to assist with the growth and production of the avocados. The agrichemicals have primarily been applied via spraying directly on to the trees from quad bike or tractor, however Foscheck is applied via direct injection to the trunk of the trees. The following agrichemicals used on the property and their potential for land contamination and subsequent risk to human health have been assessed:

9.1.1 Topstar Insecticide

Topstar is a systemic insecticide for the broad-spectrum control of a range of pests with thiacloprid as the active ingredient.

The Avocado Quality Manual (AQM) lists the Topstar product rate as 15ml/100 litres and an application rate of 300ml/ha. With thiacloprid as the active ingredient the AQM has a 14 day WHP and 0.05 MRL for this product.

The USEPA indicates that thiacloprid readily degrades under aerobic conditions with an average soil half life of 7 – 21 days. Soil mobility is low and because of limited mobility thiacloprid is not likely to leach to ground water. However, thiacloprid has a high water solubility that results in the potential contamination of surface water following rainfall events.

Thiacloprid is of moderate acute toxicity via both the oral route and inhalation but is not acutely toxic by the dermal route. It is not a skin or eye irritant. Thiacloprid is rapidly absorbed and is rapidly excreted with little remaining in the tissues. Thus it is not expected to cause poisoning to humans under normal conditions and the potential for bioaccumulation is low.

9.1.2 Altacor insecticide

Altacor is a targeted pesticide for the control of leaf roller caterpillars in avocados with chlorantraniliprole as the active ingredient.

The AQM lists the Altacore product rate as 9g/100 litres and an application rate of 200h/ha. With chlorantraniliprole as the active ingredient the AQM has a 14 day WHP and 0.5 MRL for this product.

Chlorantraniliprole is not readily biodegradable and may be characterized as persistent and mobile in terrestrial and aquatic environments. Extended chlorantraniliprole use is expected to cause accumulation of residues in soil from year to year. Major routes of dissipation are expected to be alkaline-catalyzed hydrolysis, photodegradation in water, leaching, and runoff.

Chlorantraniliprole may contaminate water through surface runoff and has a high potential for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product, but a well maintained vegetative buffer strip will reduce the potential for contamination of water from runoff. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.

Due to the persistence of chlorantraniliprole, there is potential for short term post application dermal (adults and children) and incidental oral (children only) exposure (inhalation exposure is not expected due to low vapor pressure). However, due to the lack of toxicity over the acute short term via the oral and dermal routes no risk is expected from these exposures.

Long-term (greater than 6 months) dermal exposure to is not expected because the use pattern of residential locations, and dislodgeable foliar residue (DFR) data indicate a maximum half-life of only 30 days on foliage. While chlorantraniliprole's persistence in soil (half-life up to 1130 days in dissipation studies on bare ground plots) increases the possibility of long-term exposure for toddlers via incidental ingestion, the daily quantity of soil a toddler would need to eat to reach the cPAD is not feasible (more than 1.8kg/day, even when accounting for accumulation).

Although there is potential exposure to chlorantraniliprole from food, drinking water and residential use sites, the only identified hazard is via the oral route over a chronic duration. Residential exposures are expected to occur over a short or intermediate term duration and the lack of toxicity resulting from chlorantraniliprole exposure is not expected to pose a significant risk to residential land use. It is also understood that Altacor has been applied on only one single occasion by the existing owners, minimising the risk to human health.

9.1.3 Lorsban 50 EC

Lorsban 50 EC is an insecticide used for general control of insects in agricultural crops and tree and vine fruit with chlorpyrifos as the active ingredient.

The (AQM) lists the Lorsban 50 EC product rate as 50 – 75 ml/100 litres and an application rate of spray until runoff. With chlorpyrifos as the active ingredient the AQM has a 14 day WHP and 0.2 MRL for this product.

Chlorpyrifos has short to moderate persistence in the environment as a result of several dissipation pathways that might occur concurrently. Degradation is expected in the soil environment within days to weeks and under aerobic soil conditions the half-life is generally 30-60 days. It is relatively immobile in soil, limiting the potential for groundwater contamination and is unlikely to move off the site of application with rain or irrigation water and has a moderate potential for bio-accumulation.

Toxological information indicates that ingestion and inhalation are not likely to cause injury but may cause moderate irritation to eyes. Prolonged dermal exposure is not likely to cause significant skin irritation but prolonged skin contact may result in absorption of harmful amounts.

9.1.4 ParaMite

ParaMite is a miticide specific for use on avocados to control six spotted mites with etoxazole as the active ingredient.

The AQM lists the ParaMite product rate as 35 ml/100 litres. With etoxazole as the active ingredient the AQM has a 14 day WHP and 0.1 MRL for this product.

Residual soil activity for contamination of soil and waterways by ParaMite is considered not significant by the EPA and is low toxicity. There is considered to be no significant risk with respect to human health from ParaMite with mild eye and skin irritation being the listed toxological effects. There is however a significant risk to the aquatic environment as

etoxazol, is toxic to fish and very toxic to aquatic invertebrates. The low concentration in the formulation are mitigating factors greatly reducing the risk of damage to the environment. The magnitude of these effects are thus minimal, and the level of risk insignificant.

9.1.5 Mavrik Aquaflo

Mavrik Aquaflo is a synthetic pyrethroid insecticide for the control of insect pests in fruit crops with taufluvalinate as the active ingredient

The AQM lists the Mavrik Aquaflo product rate as 25 ml/100 litres and is applied as an oil in water emulsion. With taufluvalinate as the active ingredient the AQM has a 14 day WHP and 0.1 MRL for this product.

The USEPA indicates that taufluvalinate is not soluble in water and adheres strongly to all soil types, meaning the chemical has low mobility and is unlikely to move off the site of application with rain or irrigation water. It is not expected to dissipate into the air after application and is likely to degrade to less than half of the applied concentration in less than one week when the application is outside and above ground. The hazard of chemical persistence is rated low based on the half-life for outdoor and above ground applications. Taufluvalinate is expected to bind well to fish or animal tissue and potentially bioaccumulate, however is rated low in risk for accumulation with elimination of 50% or more of a chemical within 24-hours.

A chronic human toxicity risk assessment carried out by USEPA indicated that potential long-term exposures from all dietary sources combined with a calculated worst-case concentration of contaminated drinking water is rated low in hazard

9.1.6 Foschek fungicide

Foschek is a systemic fungicide for the control of root rot with Phosphorous acid as the active ingredient. Foschek is applied by direct injection to the tree trunks.

The AQM lists foschek as having nil WHP and as being exempt from MRL.

The product information lists Foschek as being slightly harmful to fish, not toxic to worms or terrestrial vertebrates and invertebrates. No specific toxicological information is listed apart from the possibility of skin and eye irritation with ingestion rated as a low toxicity and inhalation not likely to cause a problem. The method of application by pressure loaded injection direct to the tree trunks limits the potential for soil contamination and mobilisation to waterways or groundwater.

9.1.7 Roundup

Roundup is a broad-spectrum systemic herbicide used to kill weeds with glyphosate as the active ingredient.

Roundup has a USEPA Toxicity class of III for oral and inhalation exposure. Thus, the EPA requires that products containing glyphosate carry a label that warns against oral intake, mandates the use of protective clothing, and instructs users not to re-enter treated fields for at least 4 hours. No harmful effects are expected if normal precautions are followed.

Adsorption studies indicate that glyphosate has very low mobility and readily degrades with a field half life of approximately 47 days. Glyphosate is strongly adsorbed by soil and therefore becomes practically immobile minimising the risk of ground and surface water

contamination. Glyphosate does not bioaccumulate and breaks down variably quickly depending on the particular environment and therefore is considered a low risk to human health.

9.1.8 NPK fertiliser

A normal fertilisation program has been carried out across the orchard to assist the health and production of the avocados. The primary concern with general fertiliser use is the impact on water quality from surface water runoff and leaching of nitrogen and phosphorus. Given the application rates of fertiliser used on this site is not likely to present a risk to human health.

9.2 Livestock Management

At the time of inspection two sheep were present in the grassed paddock to the northeast of the property and livestock management at the property is on a nominally small scale, limited to occasional shearing and drenching of the sheep as required. It is possible that the old shed facility and stockyards were used for spraying stock in the past and low levels of arsenic, copper and lead may be present in vicinity of the building and stockyards.

The existing farm sheds and associated yards will be demolished and removed from site as part of the subdivision works. Removal of the building materials, fences and concrete yard slab and stripped soil disposed off site is expected to mitigate any potentially hazardous substances associated with these buildings.

9.3 Adjacent Land Use

The site is located immediately adjacent to and downstream of a golf course. Surface water runoff from the golf course and additional farmland to the west is directed through the property via a designated overland flow path in the form of an open swale and drain. The area forms the upper catchment of Te Hihi Stream and ultimately drains to Whangarei Harbour via Raumanga Stream.

The upstream catchment is very flat across the golf course and there is potential for agrichemicals used on the course to be mobilised via surface water runoff onto the property. However the runoff is contained within the designated overland flow path and it is not possible for residential construction to occur in this zone.

9.4 Risk Screening System

The human and ecological risks have been assessed for the surface water, ground water, and direct contact pathways calculated in accordance with the Contaminated Land Management Guidelines: No. 3 Risk Screening System (*Ministry for the Environment, 2004*). The RSS summary tabulated below indicates Low-Low-Medium for surface water, groundwater and direct contact respectively, classifying the land as a medium risk overall.

The RSS analysis is based on site observations only and provides a conservative risk assessment. The toxicity and mobility of the contaminants expected at the site are variable with all but Alcatraz expected to present a low risk for direct contact. Subsurface soil, groundwater or surface water sampling and testing has not been carried out to determine the presence of otherwise of the agrichemicals used at the site.

Site: 14032 - Keay Family Trust				
Assessment Type: Current Use				
Comments: Avocado orchard				
Date: 4/08/2014				
Assessor: A.MacPherson				
	Parameter	Value	Confidence	Comments
Surface Water	Toxicity	0.2	high	Agrichemicals used typically have low toxicity
	Extent/Quantity	0.6	high	Large extent of land but in small quantities
	Mobility	0.3	high	Mobility is low for all agrichemicals used except for Altacor
	Containment	1	high	No containment provided
	Runoff/Flood Potential	1	high	High potential for runoff from surface water
	Water Use	0.2	high	Surface water not used
Groundwater	Toxicity	0.2	high	Agrichemicals used typically have low toxicity
	Extent/Quantity	0.6	high	Large extent of land but in small quantities
	Mobility	0.3	high	Mobility is low for all agrichemicals used except for Altacor
	Containment	1	high	No containment provided
	Thickness	0.7	high	Estimated 5m low permeability soils over basalt aquifer
	Distance to User/Aquifer Type	0.6	high	Closest bore approximately 50m away
Direct Contact	Water Use	1	high	Groundwater take from aquifer for potable reuse
	Toxicity	0.2	high	Agrichemicals used typically have low toxicity
	Quantity	0.6	high	Large extent of land but in small quantities
	Mobility	0.3	high	Mobility is low for all agrichemicals used except for Altacor
	Containment	1	high	No containment provided
	Surface Cover	0.8	high	Limited access with grassed surface cover
	Permeability	0.6	high	Low to medium permeability soil
	Hazard Depth	1	high	Hazard considered to be in shallow surficial soils
	Land Use	1	high	Residential land use proposed
SITE RISK: LOW - LOW - MEDIUM				

Table 3: CLMG Risk Screening System summary (MFE, 2007)

10. CONCLUSIONS AND RECOMMENDATIONS

This PSI based on visual inspection, desktop study, discussions with the current land owners and selected soil testing has confirmed that the subject land has been used in the past and is currently used for a HAIL activity. The current land activities of orchard operations have the potential to create hazardous land contamination. Several agrichemicals common to the commercial growing of avocado trees have been used on the land in recent years.

Generally the products that have been used on the land have low toxicity and present low risk to human health. The spray residue is most likely to have degraded by microbial activity and weathering since time of application. Altacor insecticide is one of the chemicals that does not readily degrade however the only identified hazard is via the oral route over a chronic duration and is not expected to pose a significant risk to residential land use.

The hazardous substances identified in this PSI typically have low mobility in soils, limiting the potential for ground water and surface water contamination. Altacor however is characterized as mobile in terrestrial and aquatic environments and extended use is expected to cause accumulation of residues in the soil from year to year. Given the expected low levels of use of this chemical the potential for ground water and surface water contamination is low.

Migration of contaminants from the neighbouring properties is likely with surface water runoff from the adjacent golf course directed through the property, however the deposition of hazardous contaminants is restricted to the designated OLFP and is remote from proposed building sites.

Two buildings are present within proposed lot 2 and have occupied the site since at least 1979. The exact historic use of the sheds and associated stock yards is unknown and as part of the subdivision works the sheds and associated yards are to be demolished and removed from site. Removal of the building materials for disposal off site is expected to mitigate any potentially hazardous substances associated with these buildings.

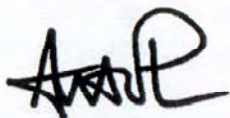
Due to the historic use of agrichemicals at the property a series of soil samples taken across the development site have been analysed for potentially hazardous substances. With consideration of the proposed residential land use and likely exposure paths for humans, the analysis results were verified against MFE SGVs which are considered as threshold concentrations for the soil contaminants. The soil analysis identified a number of common heavy metals at detectable levels, however all results are less than the SGVs indicating that any adverse effects on human health are likely to be no more than minor.

Based on the findings of this PSI, for the residential development of lots 1 to 9 as identified in the Appendix 1 (Reyburn & Bryant scheme plan S 13114) it is highly unlikely that there will be a risk to human health from land contamination associated with the past land use.

11. LIMITATIONS

This report has been prepared for the benefit of Keay Family Trust as our client with respect to residential subdivision at Golf Harbour Drive, Whangarei and for Whangarei District Council approval. No liability is accepted by Base Group Consulting where other parties rely on the information or opinions contained in this report and any other person who relies upon any matter contained in this report does so entirely at their own risk. Any recommendations, opinions, or guidance provided by Base Group Consulting in this report are limited to technical engineering requirements and are not made under the Financial Advisers Act 2008.

Base Group Consulting have performed the services for this site assessment in accordance with the standard agreement for consulting services and current professional standards. No guarantees are either expressed or implied.



A S MacPherson
Chartered Professional Engineer
BE Civil (Hons), CPEng, MIPENZ, IntPE(NZ)

Ref: 14037 Filename: 14037_NES PSI_121214

NES PSI Assessment
Golf Harbour Drive, Whangarei

APPENDIX 1: SITE PLANS

LOCATION OF EXISTING FORMED ROW ACCESS
AND PROPOSED ACCESS TO LOT 1.

ALTERNATIVE BUILDING SITE WITHIN PROPOSED
LOT 1

EXISTING OVERLAND FLOW PATH WITH
DESIGNATED COVENANT FOR CONVEYANCE OF
SURFACE WATER RUNOFF FROM ADJACENT
GOLF COURSE THROUGH PROPERTY, OPEN
CHANNEL / SWALE DISCHARGES UNDER
FORMED ROW ACCESS VIA DN600 CULVERT

EXISTING FARM SHEDS AND CATTLE YARDS
WITHIN PROPOSED LOT 2 TO BE DEMOLISHED
AND REMOVED FROM SITE AS PART OF
SUBDIVISION WORKS.

EXISTING BUSH COVENANT AREA

LOCATION OF EXISTING VEHICLE CROSSING
FROM GOLF HARBOUR DRIVE AND PROPOSED
ACCESS FOR LOT 2

LOCATION OF SHALLOW FLOODING BASIN
WITHIN PROPOSED LOT 2 WITH SURFACE
FLOW CONSTRAINED BY GOLF HARBOUR DRIVE
CARRIAGEWAY, FLOOD WATERS OVERTOP
CARRIAGEWAY AND DRAIN VIA ADJACENT ROW
ACCESS.

INDICATIVE EXTENT OF EARTHWORKS FILLING
OPERATIONS TO RAISE BUILDING PLATFORMS
WITHIN LOTS 5, 6 & 9 TO BE MINIMUM 0.5M
ABOVE LOW POINT IN GOLF HARBOUR DRIVE.

20 0 20 40 60 80 100 120 140
SCALE 1:2000

STATE HIGHWAY 14

GOLF HARBOUR DRIVE

STATE HIGHWAY 14



Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME

- PROPERTY BOUNDARY
- INDICATIVE BUILDING SITES
- EXISTING BUILDINGS
- SOIL SAMPLING LOCATION
- LOCAL FLOODING BASIN WITHIN PROPOSED LOT 6&9

B	SUBDIVISION SCHEME AMENDED AND SOIL SAMPLING LOCATIONS ADDED	22-12-2014	AM
A	EXISTING FARM SHEDS TO BE DEMOLISHED AND EXTENT OF FLOOD BASIN REFINED.	30-9-2014	AM
Rev	Description	Date	App

CONSENT

KEY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU

BASE GROUP CONSULTING
Chartered Professional Engineers

PO Box 1052, Whangarei 0140, New Zealand
P 09 437 3432 E info@basegroup.co.nz www.basegroup.co.nz

SITE LOCATION PLAN

Scale:	1:2,000 @ A3	Date:	5 AUG 2014	Drawn:	AM	Checked:	
Drawing No.:	14037/NES1	Rev:	B				

APPENDIX 2: AERIAL PHOTOGRAPHS



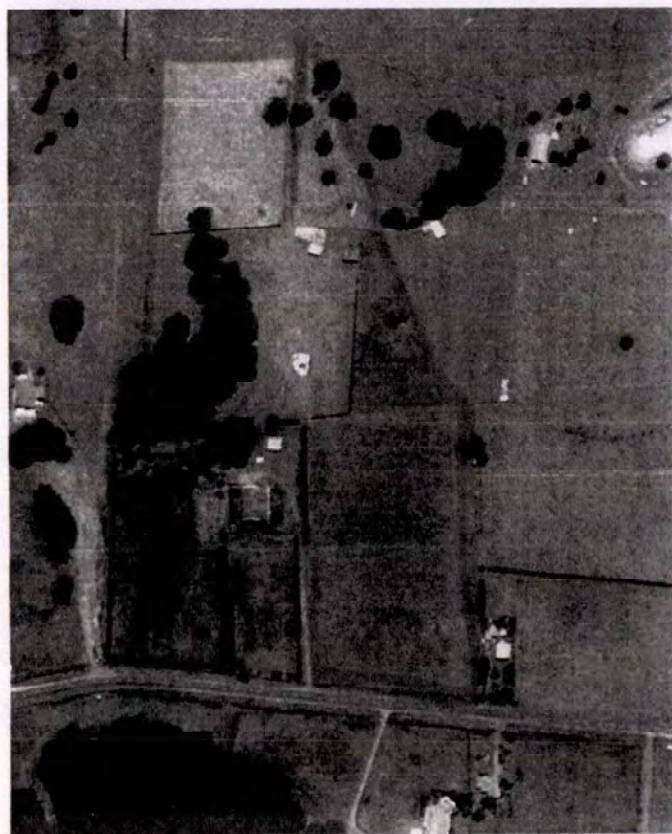
1942 Aerial image



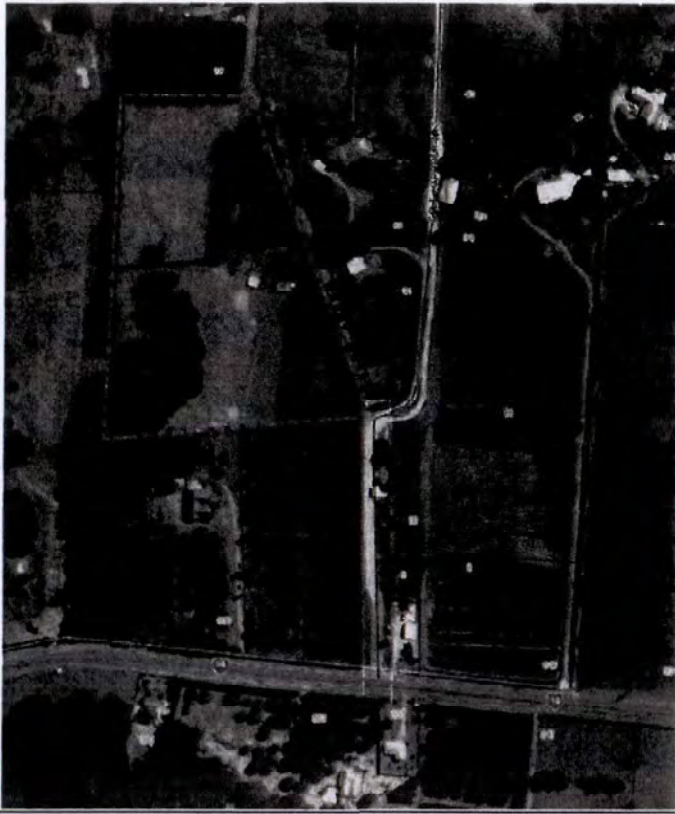
1961 Aerial image



1970 Aerial image



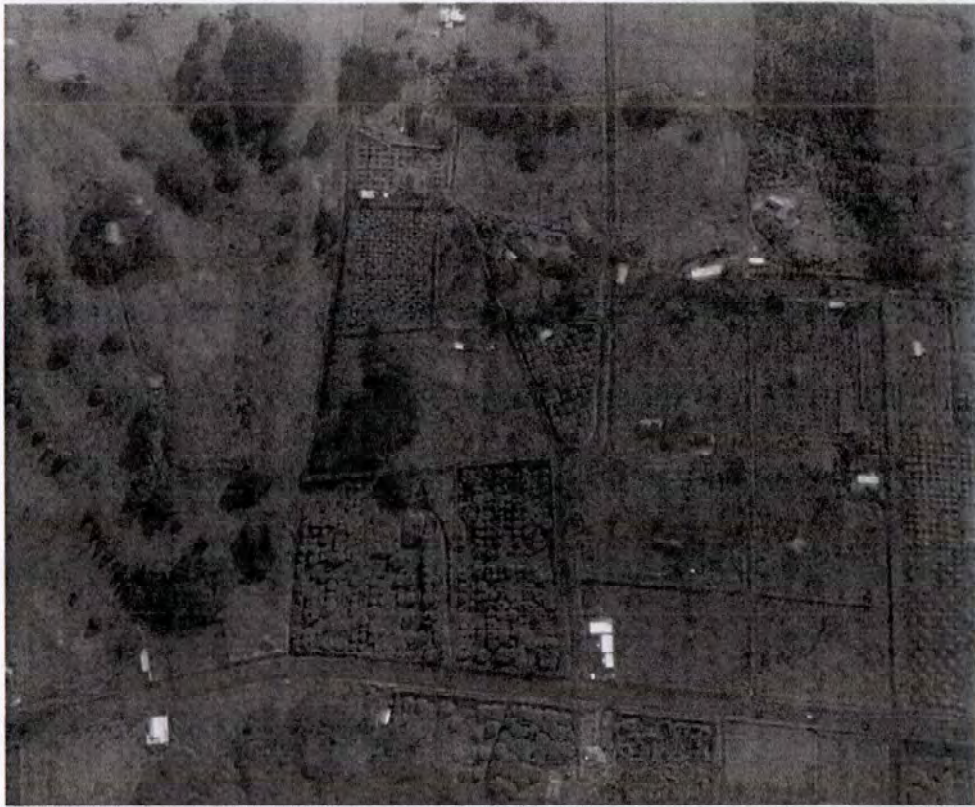
1979 Aerial image



1998 Aerial image



2002 Aerial image



2003 Aerial image



2008 Aerial image



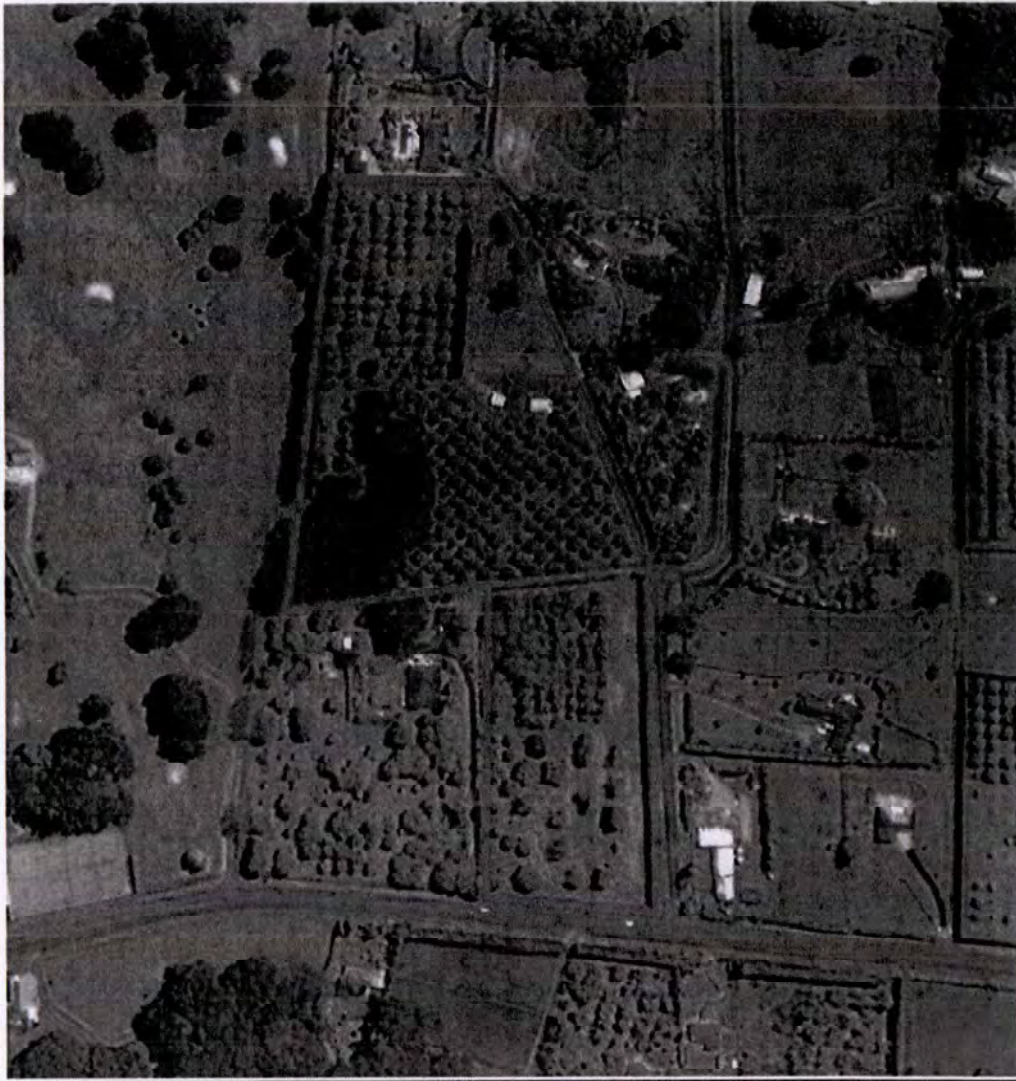
2011 Aerial image



May 2013 Aerial image

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October 2013 Aerial image

Ref: 14037 Filename: 14037_NES PSI_121214

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Golf Harbour Drive, Whangarei

APPENDIX 3: HAIL CHECK LIST

Hazardous Activities and Industries List (HAIL) Checklist

A Chemical manufacture, application and bulk storage	Yes	No
Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application	☐	☒
Chemical manufacture, formulation or bulk storage	☐	☒
Commercial analytical laboratory sites	☐	☒
Corrosives including formulation or bulk storage	☐	☒
Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents	☐	☒
Fertiliser manufacture or bulk storage	☐	☒
Gasworks including the manufacture of gas from coal or oil feedstocks	☐	☒
Livestock dip or spray race operations	☐	☒
Paint manufacture or formulation (excluding retail paint stores)	☐	☒
Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	☒	☐
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	☐	☒
Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides	☐	☒
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	☐	☒
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	☐	☒
Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)	☐	☒
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	☐	☒
Storage tanks or drums for fuel, chemicals or liquid waste	☐	☒
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		
Batteries including the commercial assembling	☐	☒
Electrical transformers including the manufacturing	☐	☒
Electronics including the commercial manufacturing	☐	☒
Power stations	☐	☒
C Explosives and ordinances production, storage and use		
Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging	☐	☒
Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors	☐	☒
Training areas set aside exclusively or primarily for the detonation of explosive ammunition	☐	☒

D Metal extraction, refining and reprocessing, storage and use		Yes	No
Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material		☐	☒
Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds		☐	☒
Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds		☐	☒
Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals		☐	☒
Engineering workshops with metal fabrication		☐	☒
E Mineral extraction, refining and reprocessing, storage and use			
Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition		☐	☒
Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)		☐	☒
Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process		☐	☒
Commercial concrete manufacture or commercial cement storage		☐	☒
Coal or coke yards		☐	☒
Hydrocarbon exploration or production including well sites or flare pits		☐	☒
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			
Airports including fuel storage, workshops, washdown areas, or fire practice areas		☐	☒
Brake lining manufacturers, repairers or recyclers		☐	☒
Engine reconditioning workshops		☐	☒
Motor vehicle workshops		☐	☒
Port activities including dry docks or marine vessel maintenance facilities		☐	☒
Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas		☐	☒
Service stations including retail or commercial refuelling facilities		☐	☒
Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances		☐	☒
G Cemeteries and waste recycling, treatment and disposal			
Cemeteries		☐	☒
Drum or tank reconditioning or recycling		☐	☒
Landfill sites		☐	☒
Scrap yards including automotive dismantling, wrecking or scrap metal yards		☐	☒
Waste disposal to land (excluding where biosolids have been used as soil conditioners)		☐	☒
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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APPENDIX 4: PRE-LODGEMENT QUESTIONNAIRE

NES Contaminated Soils – Pre-lodgement Questionnaire

A Resource Management Act Regulation entitled National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health ('NES') came into force from 1 January 2012. The NES controls changes to the use of land where the use might introduce a risk to the health of people using the land, or where activities such as subdivision and earthworks are intended to be undertaken on sites where it is likely that past uses have contaminated the soil. Your application cannot be processed by Council without knowing whether or not this Regulation applies.

You will need to determine whether it is more likely than not, that the site of your activity will take place on land that either currently is, or has previously been, used for an activity that may potentially contaminate the soil. A list of those activities considered to contaminate the soil is called the Hazardous Activities and Industries List ('HAIL') and information regarding the Regulation is available on the website <http://www.mfe.govt.nz/laws/standards/contaminants-in-soil/>. A brochure with general information on the NES for landowners and developers can also be obtained through this website. Hard copies are available at Council's Customer Service Centre.

Does the NES apply to the piece of land and activity you are proposing under this consent application?

The following table asks a number of questions to determine whether the regulations are applicable. Please answer the following questions and provide evidence where appropriate (i.e. old aerial photographs, written correspondence from previous land owners confirming previous uses etc)

Question	Comments	
How long have you owned/occupied the piece of land to which this application applies (or larger area that included the subject property?)	10-15 years	
What is the current use of the piece of land to which this application applies?	Avocado orchard	
Question	Answer (✓)	Comments
Is an activity described on the HAIL currently being undertaken on the piece of land to which this application applies? Please refer to the attached HAIL checklist	☒ Yes ☐ No	Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred
Has an activity described on the HAIL ever been undertaken on the piece of land to which this application applies? Please refer to the attached HAIL checklist	☒ Yes ☐ No	Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred
Is it more likely than not that an activity described on the HAIL is being or has been undertaken on the piece of land to which this application applies?	☒ Yes ☐ No	Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred
Are you aware of any activities listed in the HAIL that are currently being, or have been undertaken in the vicinity of the piece of land to which this application applies?	☒ Yes ☐ No	Orchards and golf course where the use of persistent agricultural chemicals occurred
If 'No' to all of the above, you will not need to fill out the following sections as the NES is not applicable to your proposed activity.		
If 'Yes' to any of the above, then the NES may apply. Please check the five activities to which the NES applies:		



Question	Answer (✓)	Comments
Does the activity you are proposing involve removing or replacing a fuel storage system or parts of it?	☐ Yes ☒ No	
Does the activity you are proposing involve sampling soil?	☐ Yes ☒ No	
Does the activity you are proposing involve disturbing soil?	☒ Yes ☐ No	Minor earthworks involved with access formation and building platform creation
Does the activity you are proposing involve the subdivision of land?	☒ Yes ☐ No	Residential subdivision for nine building sites
Does the activity you are proposing involve changing the use of the land?	☒ Yes ☐ No	Residential subdivision for nine building sites

If 'Yes' to any of the above activities, then the NES for Assessing and Managing Contaminants in Soil to Protect Human Health is likely to apply. You will need to assess the permitted activity criteria provided in Regulation 8(1) – 8(4) of the NES.

Please note that in accordance with Regulation 5(8) if the piece of land on which your proposed activity is to take place is considered production land (as defined in section 2 of the Resource Management Act 1991) the regulations only apply if you want to:

- remove or replace a fuel storage system
- sample or disturb
 - soil under existing residential buildings on the piece of land
 - soil used for the farmhouse garden or other residential purposes in the immediate vicinity of existing residential buildings
 - soil that would be under proposed residential buildings on the piece of land
 - soil that would be used for the farmhouse garden or other residential purposes in the immediate vicinity of proposed residential buildings
- subdivide the land in a way that causes the piece of land to stop being production land
- change the use of the piece of land in a way that causes the piece of land to stop being production land.

If you have any questions regarding the application of the NES to your consent application please contact Council's Duty Planner on 09 430 4200.

Ref: 14037 Filename: 14037_NES PSI_121214

NES PSI Assessment
Golf Harbour Drive, Whangarei

APPENDIX 5: HILL LABORATORIES ANALYSIS REPORT

STATEMENT OF PASSING OVER

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