

DETAILED SITE INVESTIGATION (DSI)

362 MATAKANA VALLEY ROAD, MATAKANA, AUCKLAND



REFERENCE NUMBER: REP-1165/DSI/APR18

PREPARED FOR: THREE BLOKES LTD

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STATEMENT

This site investigation has been prepared in accordance with the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011. It has been managed by a suitably qualified and experienced practitioner (SQEP); and reported on in accordance with the current edition of the Ministry for the Environment's *Contaminated Land Management Guidelines No.1 – Reporting on Contaminated Sites in New Zealand*.

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Thank you for the opportunity to carry out this investigation. Should you have any queries regarding this report please do not hesitate to contact us on 09 475 0222.

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EXECUTIVE SUMMARY

The property at 362 Matakana Valley Road, Matakana, is currently the location of a sawmill, and has historically been the location of timber treatment activities. It is proposed to develop a portion of the south of the property into a market through the establishment of boutique workshops for the production of small craft good (i.e pottery and woodwork).

As part of the investigation into the site history, Geosciences Ltd (GSL) undertook a desktop study of former reports, council documents, and historic aerial images to ascertain the historic land uses of the portion of the property undergoing proposed development. As a result, GSL identified that the area of proposed development was the location of timber drying sheds and the outdoor storage of milled timber. The timber treatment, and bulk storage of treated timber, is listed as Item A.18 of the Ministry for the Environment Hazardous Activities and Industries List (HAIL) as potentially contaminating activity.

GSL undertook a visual inspection of the property on 19 March 2018, at which time staff were accompanied by the current owner, Dean Munro. Mr Munro corroborated the desktop observations of GSL, and outlined the current operation does not treat timber, and generally only processes hardwood timbers, which are stored to dry once processed. Mr Munro considers that the current operation is very similar to that which operated historically, and he did not anticipate that significant quantities of treated timber were stored onsite historically. Mr Munro noted that the bulk of treated timber in the area was handled by the former sawmill and treatment plant which was located on the corner of Leigh Road and Matakana Valley Road.

Following a review of the desktop study information, alongside visual observations of the property, GSL developed a conceptual model of the high risk soil contamination locations, in order to develop a soil sampling strategy. Desktop investigation determined that the primary potential contaminating activity was the bulk storage of treated timber which would be expected to concentrate impacts in the soil surface and attenuate quickly with depth. Based on the proposed development area, and the recommended sampling density set out in MfE CLMG No. 5, nine discrete soil samples were collected from the proposed development. While fill material was identified onsite as part of the investigation, anecdotal evidence suggests that this is locally derived, and as such any potential for soil contamination would likely be limited to the contaminants of concern associated with potentially contaminating activities identified at the property.

GSL submitted nine discrete soil samples for laboratory analysis of total recoverable arsenic, boron, chromium, copper, alongside pentachlorophenol where appropriate, which are the contaminants of concern associated with timber treatment and bulk storage of treated timber.

Of the nine soil samples submitted, two returned concentrations of arsenic and/or copper which were in excess of the expected naturally occurring concentrations of non-volcanic soil of the Auckland region. None of the analytical results returned exceeded the applicable commercial/industrial outdoor worker (unpaved) land use standard of the MfE *National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES), or the *Auckland Unitary Plan - Operative in Part* (AUP(OP)) permitted activity soil acceptance criteria.

As soil samples returned concentrations of arsenic and copper which were in excess of the soil background range, the regulations of the NES will apply to the proposed development. That said,

soil at the property does not meet the AUP(OP) definition of *land containing elevated levels of contaminants* and as such, the contaminated land provisions of AUP(OP) Chapter E30, will not apply to the proposed development.

With respect to the regulations of the NES, it is noted that there were no exceedances of the applicable land use criteria for the proposed development and as such, the proposed change in landuse is assessed as being highly unlikely to present any risk to human health or the environment. As a result, , the proposed development may be regarded as a permitted activity under NES Regulation 8, provided it can meet the requirements outlined in Section 14.1 of this report. Should the proposed development not meet the required standards, the proposed development will be regarded as a controlled activity under NES Regulation 9.

Regardless of activity status, the NES requires appropriate controls be in place and effective throughout soil disturbance activities on site to ensure that any potential risks associated with the potential mobilisation of contaminants is managed to an acceptably low level. Such controls have been provided in Section 15 of this report.

1 INTRODUCTION

Geosciences Ltd (GSL) has prepared the following report for Three Blokes Ltd in accordance with the GSL proposal, Ref: *Pro-1456/Feb18*, dated 23 February 2018.

This report has been prepared in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 - "*Guidelines for Reporting on Contaminated Sites in New Zealand*", and No. 5 - "*Site Investigation and Analysis of Soils*" (References 1 and 2).

2 PROPERTY DETAILS

Location: 362 Matakana Valley Road, Matakana, Auckland
Legal Description: Sec 1 SO 400726, Pt Allot 51 Psh Of Matakana SO 1044
Size: 2.6672 Ha
Zoning: Rural Production Zone

The property at the above address is located within an area of rural land approximately 1.2km north-west of the Matakana township (Figure 1), and has been, and still is, the location of a timber mill. The property is situated on a flat to slight east facing slope adjacent to a tributary of the Matakana River. Consequently the Matakana River is the receiving environmental for any environmental discharged from the property.

3 PROPOSED DEVELOPMENT

It is proposed to develop an approximate 2,400m² portion adjacent to the south-western property boundary into boutique market. It is intended that market vendors will have the ability to produce goods onsite (i.e. pottery, timber products) alongside the sale of goods. The investigation undertaken focuses solely on the proposed area of development, and is hereafter referred to as 'the site' (Figure 2).

To facilitate the proposed development, two existing sheds onsite (totalling approximately 580m²) will be repurposed and redeveloped into small units for individual vendors. The remaining area will be landscaped to facilitate parking for both vendors and customers, and outdoor areas as part of market operations. It is anticipated the majority of internal and external surfaces will be sealed as part of the development, with the exception being the potential establishment of ornamental gardens in outdoor areas.

GSL has not cited earthworks plans for the above, however minor earthworks are anticipated to permit the installation of services for the market buildings, establishment of paved surfaces and any necessary landscaping requirements.

A copy of the proposed development plans are attached as Appendix A.

4 STANDARDS AND REGULATIONS

Because of the proposed development outlined above it will be necessary to address the requirements of the following standards, rules, and regulations applicable for the site.

4.1 NATIONAL ENVIRONMENTAL STANDARD (NES)

The *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health* (NES) (Reference 3) ensures that land affected by contaminants in soil is appropriately identified and assessed. When soil disturbance and/or land development activities take place it should be, if necessary, remediated or the contaminants contained to make the land safe for human use.

Under the NES, land is considered to be actually or potentially contaminated if an activity or industry on the MfE Hazardous Activities and Industries List (HAIL) has been, is, or is more likely than not to have been, undertaken on the land. Consequently, a development requires a preliminary site investigation (PSI) of the land to determine if there is a risk to human health because of any current or former activities that are occurring, or may have occurred, on the land under investigation.

4.1 AUCKLAND UNITARY PLAN - OPERATIVE IN PART (AUP(OP))

The Auckland Unitary Plan (AUP), which was formally notified on 30 September 2013, is a combined regional policy statement, regional coastal plan, regional plan, and district plan. Auckland Council notified an operative in part version of the plan (Auckland Unitary Plan (Operative in Part)) on 15 November 2016.

Chapter E.30 of the AUP(OP) (Reference 4) deals specifically with contaminated land and maintains that Council is required to manage both the use of land containing elevated levels of contaminants and the discharge of contaminants from land containing elevated levels of contaminants. As no appeals have been lodged on Chapter E.30, the provisions of that section can be considered operative under Section 87 of the Resource Management Act 1991. For all purposes of this investigation, the relevant provisions of the AUP(OP) relating to soil contamination have legal jurisdiction and those provisions have been considered where they may have an impact on the proposed subdivision and development.

5 DSI OBJECTIVES

The objectives of this investigation were to assess:

- if the land is covered by the NES as a result of current or former HAIL activities;
- the extent of current or former HAIL activities on site;
- if the activity can comply with NES permitted activity conditions;
- what, if any, contaminated land rules of the AUP(OP) apply to the proposed development;
- the soil quality and associated risk to human health and the environment as a result of former activities on the site; and

- the need, if any, for further investigations.

6 SCOPE OF WORKS

To achieve the objectives of the PSI, GSL has undertaken the following:

- a review of historic aerial photographs of the site;
- a review of the property file held by Council;
- a review of former site investigations;
- an interview with the current landowner;
- a visual site inspection of the piece of land;
- the collection of nine discrete soil samples;
- the laboratory analysis of the discrete soil samples for the contaminants of concern associated with former landuse activities; and
- the preparation of a letter report in accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG): No. 1 - "*Guidelines for Reporting on Contaminated Sites in New Zealand*", detailing the findings of this investigation and the need, if any, for further work.

7 SITE HISTORY

A desktop study of publically available files and photographs was undertaken to determine the history of the site with respect to any current or historic potentially contaminating landuses.

7.1 CERTIFICATE OF TITLE

GSL has reviewed a copies of the current and historic Certificates of Title for the aforementioned property, including any instruments on the title which detail relevant property information such as: current ownership, registered interests, easements, covenants, lease restrictions and transmissions, to determine if pre-existing consent notices or other restrictions / notifications which may be relevant to historic uses or potential soil contamination are held against the property. No notes of interest were recorded on the titles. Copies of these documents are attached in Appendix B.

7.2 HISTORIC AERIAL PHOTOGRAPHS

Retrolens NZ hold aerial images from 1976, 1992, and 1996, while Auckland Council hold an historic aerial image from 2010. Google Earth has satellite images from 2014 and 2018. The findings of the historic aerial photograph review are summarised below, while copies of these aerial photographs have been attached in Appendix C.

- 1976** At this stage, the wider property has clearly been developed into a timber mill, with the site itself appearing to be under a hardstand surface, but not occupied by any distinct activities. The entirety of the sawmill infrastructure is situated north of the site boundary, while the wider area is a mixture of large vegetation and pasture.
- 1992** This is a clearer image than the previous one, and shows site features more clearly. The site has been developed, with two large sheds located occupying the bulk of the site footprint, one near the centre, and one along the southern most extent. There is timber stored along the western boundary and in the space between the two sheds. The wider property is maintained as a sawmill, and the majority of the infrastructure associated with the operation remains to the north of the site.
- 1996** There is little significant change the site in this image aside from the eastward extension of the shed in the centre of the site. The reminder of the site and wider property remains in use as a sawmill.
- 2010 to 2018.** There is little significant difference in these images when compared to 1996, with the site infrastructure the same and still utilised as part of wider sawmill operations.

7.3 PROPERTY FILE

GSL requested the property file from Auckland Council for review of historic activities. Copies of relevant historic plans, correspondence, permits, and consents have been attached in Appendix D. It is noted that the property file includes significant information to the entire property parcel, however only the items of note below pertain to the site under investigation:

- 1990** Building consent application, notes and plans for the construction of a timber drying shed, located within the site.
- 2017** Geotechnical report for the site prepared by Hutchinson Consulting Engineers. This report is further reviewed in Section 7.4 of this report.

7.4 FORMER INVESTIGATIONS

The following former investigations have been conducted at the site:

- 2005** Groundwater and Environmental Services - *Additional Environmental Investigation, Matakana Sawmill, 362 Matakana Valley Road, Matakana*, dated 7 September 2005.
- 2017** Hutchinson Consulting Engineers - *Geotechnical Investigation Report* (Ref: L20145), dated October 2017

The aforementioned investigations are reviewed in the sections below.

7.4.1 GROUNDWATER AND ENVIRONMENTAL SERVICES REPORT

Groundwater and Environmental Services undertook an environmental investigation of the 362 Matakana Valley road property in 2005. The report involved a review of council held information, historic aerial photographs, interviews with former owners/workers, site walkover, and review of limited soil samples collected historically. It is considered that the report, and information

contained therein, would be sufficient to meet the definition of a preliminary site investigation under current regulations and industry guidelines.

GSL has reviewed in information contained within this report in light of the site currently being investigated.

Having reviewed the information in light of the site being investigated, GSL notes that the sawmill at the property began operation in 1947 and since this time has primarily been utilised for the milling of native and exotic hardwood timbers. Small scale timber treatment of softwood occurred from the 1950 until the mid-2000s at which time the treatment equipment and plant were decommissioned. Timber treatment occurred at property through the use of a boric spray tunnel and small scale pressure treatment using copper, chromium, and arsenic (CCA), with the infrastructure to facilitate this located within the northern portion of the property away from the site being investigated (Figure 3). Landowner/worker interviews undertaken did not recall the use of pentachlorophenol (PCPs) for timber treatment, however detectable concentrations of PCP were found in one soil sample that was reviewed as part the investigation.

The northern half of the property was also the location of an underground fuel storage tank (also shown on Figure 3) which was removed in the 1997 and soil remediated to the applicable industrial guidelines of the time.

Based on the information supplied in this report, GSL notes that the site footprint has been the location of a timber storage and drying sheds only, and no other infrastructure has been located therein. Timber drying referred to has been documented as the drying of 'wet' recently harvested timber that had been milled, rather than the stacking of freshly treated timber. That said, there is still the potential for some treated timber to have been stored within the site at some stage during sawmill operations at the property.

A copy of this report can be made available upon request.

7.4.2 HUTCHINSON CONSULTING ENGINEERS REPORT

Hutchinson Consulting Engineers undertook a geotechnical investigation of the property at 362 Matakana Valley Road in October 2017. The investigation included advancing a total of seven hand auger boreholes to a maximum depth of 7m. Four of the seven boreholes advanced were located within the footprint of the site, namely BH4, BH5, BH6, and BH7. Borehole logs provide the following information on those boreholes:

- BH4 encountered aggregate to 400mm, and fill material to a depth of 1.2m at which point underlying natural clayey silt was encountered. The fill material was described as 'non-plastic grey silt' with intermixed gravel inclusions.
- BH5 encountered aggregate to 200mm and fill material to 600mm, which overlays underlying natural clayey silt. The fill material was brown clayey silt, with black/dark grey patched and intermixed gravel inclusions.
- BH 6 encountered aggregate to 100mm and clayey silt fill material to 300mm, which overlies the underlying clayey silts.
- BH7 encountered fill material to a depth of 500mm which overlay underlying natural silty clay. The fill material was described as brown silty clay with black inclusions and grey patches.

None of the borehole logs reviewed noted any discernible odours, staining, or rubbish inclusions, which would be indicative of potential soil contamination.

A copy of the borehole logs cited can be made available on request.

8 SITE INSPECTION & INFRASTRUCTURE

GSL staff undertook a visual inspection of the site on 19 March 2018 prior to the collection of soil samples. At the time of inspection, the site appeared very similar to the 2018 aerial image.

The site infrastructure was limited to two drying sheds, both of which were constructed out of timber with corrugated iron roofing. The floor of each shed was comprised of compacted gravel hardstand, which had a small accumulation of sawdust and timber fragments across the surface from the long term storage of timber within the structures.

The outdoor area of the site was entirely under gravel hardstand, on which milled timber had been stacked. No staining of the gravel surface which would indicate incidental fuel spills from the use of machinery onsite was observed, nor was any evidence of chemicals associated with the storage of treated timber (i.e. distinct green staining from CCA processes).

While there was no evidence of bulk fill operations visible from the site topography, aside from minor landscaping to facilitate accessways onsite, GSL was aware that fill material was present at the site from the above review of geotechnical borehole logs. The fill material noted in the geotechnical logs was observed during test pit excavations, which are summarised in Section 10.1.

Site photographs are attached as Appendix E.

8.1 INTERVIEW WITH LANDOWNER

Whilst onsite, GSL met with Dean Munro, who has owned the site since the early 2000s. The sawmill operation at the property encompassing the site has continued under Mr Munro, as 'Matakana Sawmill' and focussed primarily consists of the milling and planing of hardwood timbers onsite. Mr Munro noted that no timber treatment occurring onsite as part of this process, and he could not recall any evidence of treatment infrastructure being present on site. It was further noted that there is no storage of treated timber, fuels, or other chemicals within the site footprint currently, and has not been for the duration Mr Munro has owned the site.

The site itself is the location of two drying sheds which are used for the stacking and air drying of milled hardwood timber, prior to it being made available for sale. The outdoor areas surrounding the drying sheds are used for the storage for timber that is ready for sale or further processing where required.

When asked about the fill material onsite, Mr Munro could not recall any specific earthworks activities which occurred as part of the sawmill operations historically which would have resulted in the emplacement of fill material. However, having lived in the area since a young age, Mr Munro did recall that the portion of the Matakana Valley Road adjacent to the site had been realigned historically, with a portion of the former road corridor now encompassed by the site. In Discussion with GSL, it was considered likely this road corridor works could have resulted localised disturbance and placement of soil to facilitate this.

Mr Munro could not identify any other actions or activities that had been undertaken on site since his ownership that would be considered actually or potentially contaminating, nor could he recall anything from his long association with the area.

8.2 GEOLOGY & GEOHYDROLOGY

The local geology is described by Edbrooke (Reference 5) as pumiceous alluvium and colluvium with interbedded peat of the Tauranga Group.

The site is not situated within a high-use or quality sensitive aquifer management area identified by the AUP(OP).

8.3 TOPOGRAPHY AND DRAINAGE

The site is a predominantly flat piece of land with an east facing slope, situated between 25m above mean sea level (amsl) along the western boundary and 23m amsl along the eastern most limit of the proposed development.

As the site is predominantly covered in a hardstand surface, drainage occurs via overland flow process, which are directed offsite into the neighbouring stream by the topography, however there are no significant overland flow paths noted on the Auckland GEOMaps server within the site footprint.

9 CONCEPTUAL SITE MODEL

Following a review of the available historic information above, GSL has developed a conceptual site model of potential soil contamination based on identified HAIL items. The HAIL items identified are listed in Table 1 below, and the locations of the HAIL items shown in Figure 4.

TABLE 1. CURRENT & FORMER HAIL ACTIVITIES AND POTENTIAL HAZARDOUS SUBSTANCES

ACTIVITY	POTENTIAL HAZARDOUS SUBSTANCES
Bulk Storage of treated timber within drying sheds and outdoor areas (HAIL Item A.18)	Arsenic, Copper, Chromium, PCP.
Emplaced Fill Material (HAIL Item I)	Heavy metals and organic compounds depending on source

With respect to the above identified activities, GSL considers that the bulk storage of treated timber within the site represents the primary potential source of contamination while emplaced fill of unknown origin represents a secondary source.

Any potential contaminants resulting from the bulk storage of timber are expected to be concentrated to the soil surface, and decrease with depth as a result of potential drips of timber treatment chemicals, or from rainfall causing leaching within freshly treated timber.

With respect to contaminants from emplaced fill material is expected to be limited to the emplaced fill material itself only, with limited potential impacts on surrounding soil depending on the type and nature of contaminants within the fill.

10 SOIL SAMPLING AND ANALYSIS

Under the requirements of CLMG No.5, a site of this size requires a minimum of nine soil sample locations where seeking a circular hotspot of 21.5 m diameter. Based on the above conceptual model, GSL considers that any impacts within the site footprint would be localised to the stacks of potentially treated timber stored therein, with onsite observations suggesting that the packets of stored timber covered between 10 m² and 20 m² depending on the lengths of timber milled. Packets were stored close together which would cause distinct overlaps with any discharges from the storage bays. Based on those observations alongside the conceptual site model, GSL considered that a judgemental soil sampling methodology, targeting the portions of the site which represented the highest potential risk for soil contamination was an appropriate mechanism for assessing risk and nine discrete locations would provide sufficient certainty in light of the conceptual model presented. Soil sampling targeted the locations of timber storage and the fill material noted by geotechnical borehole logs reviewed prior to the site visit. Soil sample locations are shown in Figure 5.

As the site surface was covered in hardstand, soil sampling was facilitated at each sample location through the excavation of a testpit using a 2 tonne excavator, breaking through the hardfill and emplaced fill until underlying natural soil was encountered or the excavator could no longer continue. A summary of the test pit logs and discussion on the observations is provided in Section 10.1 below.

Soil samples were collected from the target depths from the test pit side wall using a stainless steel hand auger. Soil samples were placed directly into laboratory supplied jars appropriate for the intended analysis. Sample jars were labelled with the sample point identifier, depth, date, and samplers initials. All sampling equipment was cleaned between soil samples using a soft soap solution in accordance with GSL internal quality control procedures.

The sampling protocol followed was in accordance with the *'Contaminated Land Management Guidelines (CLMG) No. 5 – Site Investigation and Analysis of Soils'*.

10.1 TEST PIT OBSERVATIONS

During the excavation of each testpit, GSL logged the material encountered to ensure that soil samples collected were representative of soil conditions encountered in the field. A summary of the testpit observations is provided in Table 2 below.

TABLE 2. TESTPIT OBSERVATIONS

SAMPLE LOCATION	TESTPIT OBSERVATIONS
SS1	0 - 100mm Gravel Hardstand 100 - 500mm (EOH) - Natural Clay (inferred)
SS2	0 - 300mm Gravel Hardstand 300-500mm Limestone Hardpack 500mm - 1.5m (EOH) Dark Grey silt (minor clay and sand) with organic/vegetative inclusions

SS3	0 - 200mm Gravel Hardstand 200 - 500mm Orange/Brown Clay Fill 500mm - 1m (EOH) Blue Grey Silts
SS4	0 - 300mm Poorly Sorted Gravel Hardstand 300 - 500mm (EOH) Brown Clay/Silt
SS5	0 - 300mm Gravel/Clay Fill 300 - 500mm Limestone Hardpack 500 - 700mm (EOH) Brown Clay/Silt Fill
SS6	0 - 400mm Clay Fill 400mm to 1.5m (EOH) Dark Coloured Fill Material with some brick inclusions, burnt timber.
SS7	0 - 150mm Gravel Hardstand 150 - 700mm (EOH) Brown Clay/Silt
SS8	0 - 300mm Gravel Hardstand 300mm - 600mm (EOH) Brown Grey Clay/Silt
SS9	0 - 300mm Clay/Gravel Hardstand 300 - 600mm Brown Clay/Silt, some organic inclusions.

The observations of GSL staff during soil sampling matched those documented during the geotechnical investigation reviewed in Section 7.4.2, with three of the nine testpits advanced noting the presence of likely fill material.

10.2 SOIL SAMPLE RATIONALE

Following the findings of the desktop study, conceptual site model and observations made in the field, GSL submitted the soil samples listed below for laboratory analysis. The rationale for each soil sample and associated analytes is also provided in Table 3.

TABLE 3. SOIL SAMPLE RATIONALE

Soil Sample No.	Rationale	Indicated Laboratory Analysis
SS1 100-200mm	Location of observed long-term outdoor timber storage. Sample collected from gravel hardstand/soil interface.	Arsenic, Boron, Chromium, and Copper
SS2 500mm	Location of observed long-term outdoor timber storage. Sample collected from limestone hardpack/soil interface	Arsenic, Boron, Chromium, and Copper
SS3 200mm	Location of observed long-term outdoor timber storage and emplaced fill material. Soil sample collected from the overlying gravel hardstand/fill material interface.	Arsenic, Boron, Chromium, Copper, and Pentachlorophenol

SS4 300mm	Location of long-term timber drying, which may have historically included treated timber. Soil sample collected from the gravel hardstand/soil surface interface.	Arsenic, Boron, Chromium, and Copper
SS5 200mm	Location of long-term timber drying, which may have historically included treated timber. Soil sample collected from the gravel hardstand/soil surface interface.	Arsenic, Boron, Chromium, Copper, and Pentachlorophenol
SS6 500mm	While this sample was the location of long-term outdoor timber storage, test pit excavations noted the presence of fill material and seemingly burnt timber which may or may not have been treated. Soil sample was collected from within the fill matrix which visually appeared to consist of a significant portion of burnt timber.	Arsenic, Boron, Chromium, Copper, and Pentachlorophenol
SS7 200mm	This location is within an established access way used to move timber and materials at the site, which may include treated timber and timber treatment chemicals. The soil sample was collected from the gravel hardstand/soil interface.	Arsenic, Boron, Chromium, and Copper
SS8 300mm	This location is within an established accessway used to move timber and materials at the site, which may include treated timber and timber treatment chemicals. The soil sample was collected from the gravel hardstand/soil interface.	Arsenic, Boron, Chromium, and Copper
SS9 0-150mm	Location of long-term timber drying, which may have historically included treated timber. Soil sample collected from the soil surface due to the significant quantity of fine material within the gravel/fill matrix.	Arsenic, Boron, Chromium, Copper, and Pentachlorophenol

11 LABORATORY ANALYSIS AND QUALITY CONTROL

Sample jars were placed in a box with a chain of custody form (COC) indicating the analysis to be performed. Soil samples were dispatched to Eurofins Mgt in Melbourne for the analysis of the contaminants of concern outline in the table above.

Eurofins Mgt are accredited by the National Association of Testing Authorities, Australia (NATA), for the analysis undertaken.

12 ACCEPTANCE CRITERIA AND RELEVANT GUIDELINES

The NES mandates fourteen soil contaminant standards (SCS) for the protection of human health for organic compounds and inorganic elements for various landuse criteria. The NES human health

SCS criteria for a commercial/industrial outdoor worker (unpaved) has been applied to the proposed development.

The AUP(OP) sets the permitted activity soil acceptance criteria for environmental discharge from potentially contaminated land for the Auckland region against which the results have been compared.

Results are also compared to the background concentration ranges of inorganic elements in soils in the Auckland Region for non-volcanic soils (Reference 6).

13 ANALYTICAL RESULTS

A comparison of the analytical results with the relevant guideline criteria is provided in Table 4 below. Copies of the laboratory chain of custody document (COC) and analytical transcripts are attached in Appendix F, while a discussion of the results is provided below.

TABLE 4: ANALYTICAL RESULTS¹

	Arsenic	Boron	Chromium	Copper	Pentachlorophenol
SS1 100-200mm	2.1	<10	21	5.4	-
SS2 500mm	4.4	<10	18	20	-
SS3 200mm	4.0	<10	34	21	<1
SS4 300mm	3.7	<10	39	34	-
SS5 200mm	51	<10	44	68	<1
SS6 500mm	4.4	<10	14	19	<1
SS7 200mm	4.8	<10	24	16	-
SS8 300mm	3.4	<10	20	<5	-
SS9 0-150mm	24	<10	28	30	<1
NES ²	70	>10,000	>10,000	>10,000	360
AUP(OP) ³	100	-	400	325	-
Non-Volcanic Soil Background Range ⁴	0.4 - 12	<0.1 – 0.65	1 - 55	1 - 45	-

Notes:

1. All metal concentrations measured in mg/kg.
2. National Environmental Standards (NES) for assessing and managing contaminants in soil to protect human health – Commercial/Industrial Worker Outdoor (unpaved) 10% Produce (Reference 1).
3. Auckland Unitary Plan Operative in Part, Table E30.6.1.4.1 Permitted Activity Soil Acceptance Criteria (Reference 4)
4. Auckland Regional Council Technical Publication No.153 (2001) (Reference 6).
5. Values in **BOLD** exceed the NES criteria, values in **BOLD** exceed the AUP(OP) criteria, values in **BOLD** exceed the Background Ranges.
6. NA = Not applicable / NL = No Limit / ND= not detected

13.1 HEAVY METALS

All of the soil samples analysed returned concentrations of heavy metals that did not exceed the applicable NES soil contaminant standards or the AUP(OP) permitted activity environmental soil acceptance criteria.

Sample SS5 returned a concentration of arsenic and copper, while soil sample SS9 returned an arsenic concentration which were above the expected naturally occurring non-volcanic soil background range for the site.

13.2 PENTACHLOROPHENOL

None of soil samples analysed returned detectable concentrations of pentachlorophenol at the laboratory limit of detection at screen level.

14 CONCLUSIONS

As a result of the former HAIL activities that have been historically, or are currently, undertaken at the site, GSL developed a conceptual model of the potential for soil contamination that may have occurred, or be occurring, at the site. Based on the historical information gathered, GSL concluded that the piece of land had been potentially subject to the bulk storage of treated timber alongside the emplacement of unverified fill.

While fill material was identified onsite, anecdotal evidence suggests that this was locally derived, and as such the contaminants of concern associated with the site were considered limited to those associated with the production and storage of treated timber (HAIL Item A.18).

In accordance with CLMG No.5, GSL collected soil samples from nine discreet locations on a judgemental basis, targeting the areas identified as being of highest risk.

Analytical results of soil samples demonstrated that no soil samples returned an analytical result in excess of the applicable NES Soil Contaminant Standard for commercial / industrial landuse or in excess of the AUP(OP) permitted soil acceptance criteria. Of the nine samples submitted, two soil samples returned concentrations of arsenic and / or copper in excess of the expected naturally occurring background range confirming that soil on site has been subject to low level impacts as a result of current and historic sawmill activities.

14.1 THE NATIONAL ENVIRONMENTAL STANDARDS (NES)

Under the NES, land is considered to be actually or potentially contaminated if an activity or industry on the Hazardous Activities and Industries List (HAIL) has been, is, or is more likely than not to have been, undertaken on the land.

Previous investigations identified that the property at 362 Matakana Valley Road has been used to process and treat timber historically (HAIL Item A.18), while this investigation has found the site may have been used for the bulk storage of treated timber during its history.

Analytical results of soil sampling indicate that while arsenic and copper soil concentrations have been impacted to above the soil background range for the site, the soil is compliant with the NES commercial/industrial outdoor work land use criteria which is applicable to the proposed

development. As a result, the proposed change in land use and development is assessed as being highly unlikely to present any risk to human health.

While the soil is compliant with the applicable land use criteria, the elevated heavy arsenic and copper concentrations which exceed the naturally occurring background ranges for non-volcanic soils of the Auckland Region will preclude the activity from being able to meet the requirements of the NES under Regulation 5(9). Therefore, to comply with the permitted activity criteria of NES Regulation 8(3):

- Controls to minimise the exposure of humans to any potentially mobilised contaminants must be in place for the durations of the activity until soil is reinstated to an erosion resistant state;
- Soil must be reinstated to an erosion resistant state within one month of serving the purpose for which it was done;
- Soil disturbance must not exceed 25m³ per 500m² (120m³);
- Soil removed from site must not exceed 5m³ per 500m² (24m³); and
- Any soil removed from site must be disposed of at a facility appropriately licensed to receive said material (i.e. cleanfill, managed fill, or land fill).

If the proposed development cannot adhere to the above, it may be regarded as a controlled activity under NES Regulation 9.

Regardless of whether or not the activity meets the permitted standard or is assessed as controlled, GSL notes that appropriate controls to manage the potential mobilisation of contaminants during soil disturbance activities must be in place and effective for the duration of the activity, until soil is reinstated to an erosion resistant state. Appropriate controls commensurate with the scale and degree of risk identified are presented in Section 15 below.

14.2 AUCKLAND UNITARY PLAN - OPERATIVE IN PART (AUP(OP))

While soil samples returned concentrations of arsenic and copper which are in excess of the soil background range of the site, none of the heavy metal concentrations returned are in excess of the AUP(OP) permitted activity soil acceptance criteria. Consequently, soil onsite does not meet the AUP(OP) definition of *land containing elevated levels of contaminants*, and as a result the contaminated land provisions of Chapter E30 will not apply to the proposed development.

15 SITE MANAGEMENT PLAN

It is noted that the concentrations of arsenic and copper do not exceed the applicable NES land use criteria or the AUP(OP) permitted activity criteria and as such do not require any remedial works. It is therefore considered highly unlikely that there will be any risk to human health or to the environment during future disturbance of this soil and that the standard dust, erosion, and sediment controls as required under the AUP(OP) for general earthworks are more than sufficient to mitigate any potential risk to human health or the environment that could arise through the potential mobilisation of contaminants during such soil disturbance activities; as such, no specific additional actions are considered necessary in light of the analytical results obtained, however to

ensure that the NES is appropriately addressed, additional consideration must be given to soil disturbance activities.

In light of the analytical results obtained, and the expectations of Auckland Council, the following site management practices and procedures will be implemented during soil disturbance activities on site:

- The consent holder or appointed site manager, will be responsible for the implementation of these procedures during any future earthworks activities on site and ensure that a copy of this report is available during earthworks;
- GSL will be available on call as a Contaminated Land Advisor (CLA) to provide direction in relation to any accidental discoveries of contamination and disposal issues that may arise during the works;
- During earthworks dust will be controlled by by light frequent water spraying. Water spraying should be frequent enough to suppress the generation of dust but not as heavy as to generate sediment laden water run-off.
- Appropriate erosion and sediment control devices will be installed to manage any potential runoff during soil activities in general accordance with Auckland Council Guidance Document 05 (GD05) *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (June 2016)*;
- If any asbestos containing material is encountered during any earthworks on site, all works shall cease (including the excavation and disposal of affected materials) until the provisions of the *Health and Safety at Work (Asbestos) Regulations 2016* are exercised. The site manager must notify GSL of the discovery who will advise on the required steps to be taken, including notification to Auckland Council if necessary;
- All soil disturbed during construction activities may be temporary stockpiled for re-use as topcover and landscaping following completion of construction of the dwellings. Where soil cannot be accommodated within the final development, it must be disposed of offsite to a licensed managed fill facility;
- The site manager shall ensure that disposal manifests / dockets are kept for any soil removed from site; and
- Any temporary stockpiles are to be managed appropriately to minimise any dust generation or sediment laden runoff.

16 REFERENCES

1. Ministry for the Environment (2003) — *Contaminated Land Management Guidelines No.1: Reporting on contaminated Sites in New Zealand*. Ministry for the Environment, Wellington, New Zealand.
2. Ministry for the Environment (2003) — *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*. Ministry for the Environment, Wellington, New Zealand.
3. Ministry for the Environment (2012) - Users Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington, New Zealand.
4. Auckland Council (2016) —*Auckland Unitary Plan - Operative in Part*, Auckland, New Zealand.
5. Edbrooke, S.W (2001) — *Geology of the Auckland Urban Area*, Institute of Geological and Nuclear Sciences Geological Map 3, Lower Hutt, New Zealand.
6. Auckland Regional Council (2001) — *Background Concentrations of Inorganic Elements in Soils from the Auckland region (TP153)* – Auckland.
7. Auckland Council (2017) - *Auckland Council GEOMaps Server*.
<https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>

17 LIMITATIONS

The conclusions and all information in this Report are given strictly in accordance with and subject to the following limitations and recommendations:

1. The assessment undertaken to form this conclusion is limited to the scope of work agreed between GSL and the client, or the client's agent as outlined in this Report. This report has been prepared for the sole benefit of the client and neither the whole nor any part of this report may be used or relied upon by any other party.
2. The investigations carried out for the purposes of the report have been undertaken, and the report has been prepared, in accordance with normal prudent practice and by reference to applicable environmental regulatory authority and industry standards, guidelines and assessment criteria in existence at the date of this report.
3. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by GSL for use of any part of this report in any other context.
4. This Report was prepared on the dates and times as referenced in the report and is based on the conditions encountered on the site and information reviewed during the time of preparation. GSL accepts no responsibility for any changes in site conditions or in the information reviewed that have occurred after this period of time.
5. Where this report indicates that information has been provided to GSL by third parties, GSL has made no independent verification of this information except as expressly stated in the report. GSL assumes no liability for any inaccuracies in or omissions to that information.
6. Given the limited Scope of Works, GSL has only assessed the potential for contamination resulting from past and current known uses of the site.
7. Environmental studies identify actual sub-surface conditions only at those points where samples are taken and when they are taken. Actual conditions between sampling locations or differ from those inferred. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated and GSL does not guarantee that contamination does not exist at the site.
8. Except as otherwise specifically stated in this report, GSL makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or materials from such buildings disposed of on the site, the site may contain asbestos or ACM.
9. No investigations have been undertaken into any off-site conditions, or whether any adjoining sites may have been impacted by contamination or other conditions originating from this site. The conclusion set out above is based solely on the information and findings contained in this report.
10. Except as specifically stated above, GSL makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.
11. The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.
12. Use, development or re-development of the site for any purpose may require planning and other approvals and, in some cases, environmental regulatory authority and accredited site auditor approvals. GSL offers no opinion as to whether the current use has any or all approvals required, is operating in accordance with any approvals, the likelihood of obtaining any approvals, or the conditions and obligations which such approvals may impose, which may include the requirement for additional environmental works.
13. GSL makes no determination or recommendation regarding a decision to provide or not to provide financing with respect to the site. The on-going use of the site and/or use of the site for any different purpose may require the owner/user to manage and/or remediate site conditions, such as contamination and other conditions, including but not limited to conditions referred to in this report.
14. Except as required by law, no third party may use or rely on, this report unless otherwise agreed by GSL in writing. Where such agreement is provided, GSL will provide a letter of reliance to the agreed third party in the form required by GSL.
15. To the extent permitted by law, GSL expressly disclaims and excludes liability for any loss, damage, cost or expenses suffered by any third party relating to or resulting from the use of, or reliance on, any information contained in this Report. GSL does not admit that any action, liability or claim may exist or be available to any third party.
16. Except as specifically stated in this section, GSL does not authorise the use of this report by any third party.

FIGURES



Title:	Figure 1 - Site Location	Reference: J1163
Project name:	362 Matakana Valley Road, Matakana, Auckland.	Date: 16 Apr 2018
geosciences Ltd ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	Drawn: BR
		Approved: COB



Title:	Figure 2 - Proposed Development Area	Reference: J1163
Project name:	362 Matakana Valley Road, Matakana, Auckland.	Date: 16 Apr 2018
geosciences ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	Drawn: BR
		Approved: COB



Title:	Figure 3 - Historic Property Infrastructure	Reference: J1163
Project name:	362 Matakana Valley Road, Matakana, Auckland.	Date: 16 Apr 2018
geosciences ENVIRONMENTAL	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	Drawn: BR
		Approved: COB



Title:	Figure 4 - HAIL Locations	Reference: J1163
Project name:	362 Matakana Valley Road, Matakana, Auckland.	Date: 16 Apr 2018
geosciences ENVIRONMENTAL ltd	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	Drawn: BR
		Approved: COB



Title:	Figure 5 - Soil Sample Locations	Reference: J1163
Project name:	362 Matakana Valley Road, Matakana, Auckland.	Date: 16 Apr 2018
geosciences ENVIRONMENTAL ltd	Level 1, 47 Clyde Road, Browns Bay, 0630, Tel: (09) 475 0222	Drawn: BR
		Approved: COB

APPENDIX A PROPOSED SCHEME PLAN



SCALE: 1:400 @ A3
DATE: NOVEMBER 2017

APPENDIX B CERTIFICATES OF TITLE



**COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952**

Limited as to Parcels

Search Copy




R. W. Muir
Registrar-General
of Land

Identifier **433045**
Land Registration District **North Auckland**
Date Issued 09 July 2008

Prior References

427112 NA1107/152

Estate	Fee Simple
Area	2.6672 hectares more or less
Legal Description	Part Allotment 51 Parish of Matakana and Section 1 Survey Office Plan 400726

Proprietors

Three Blokes Limited

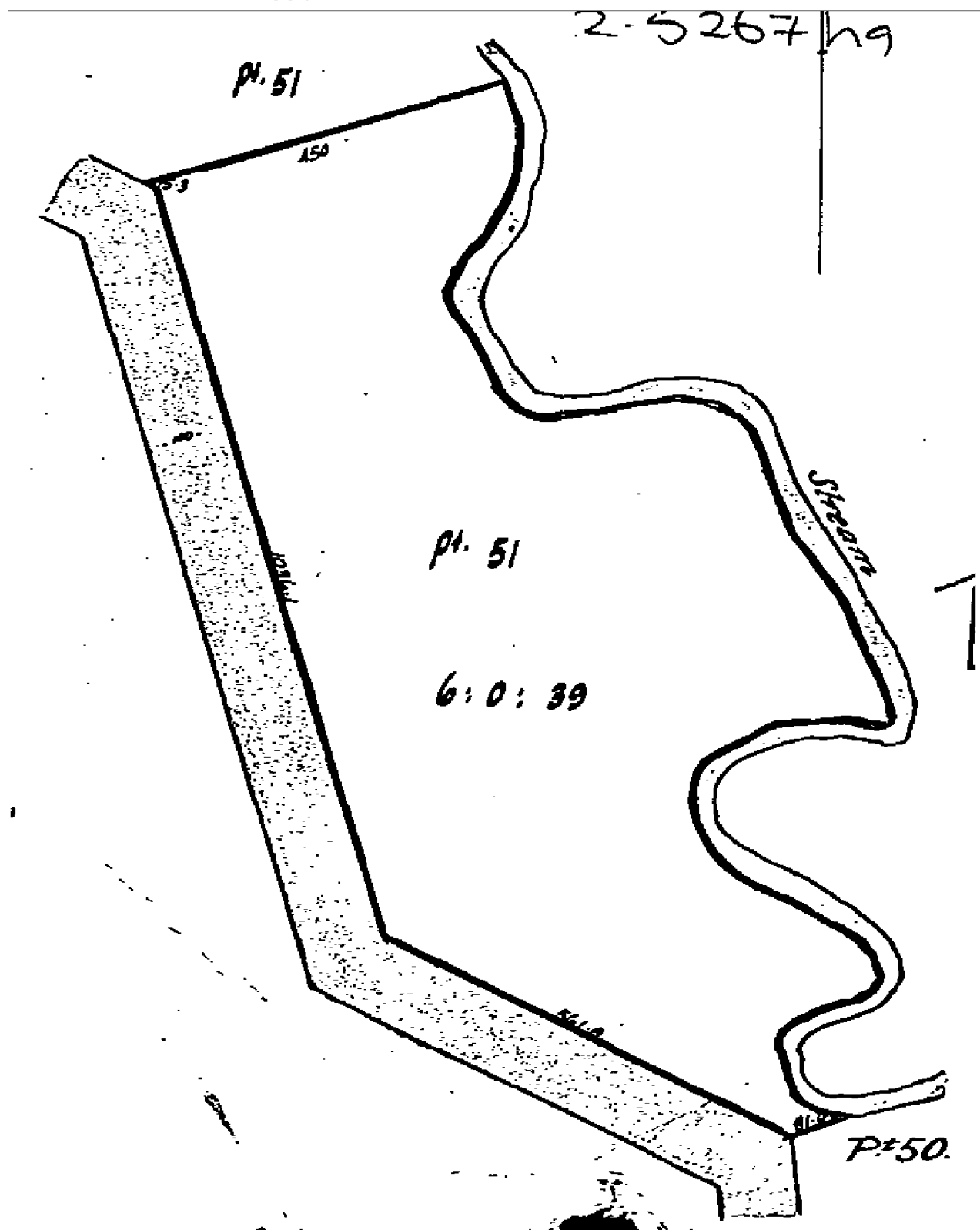
Interests

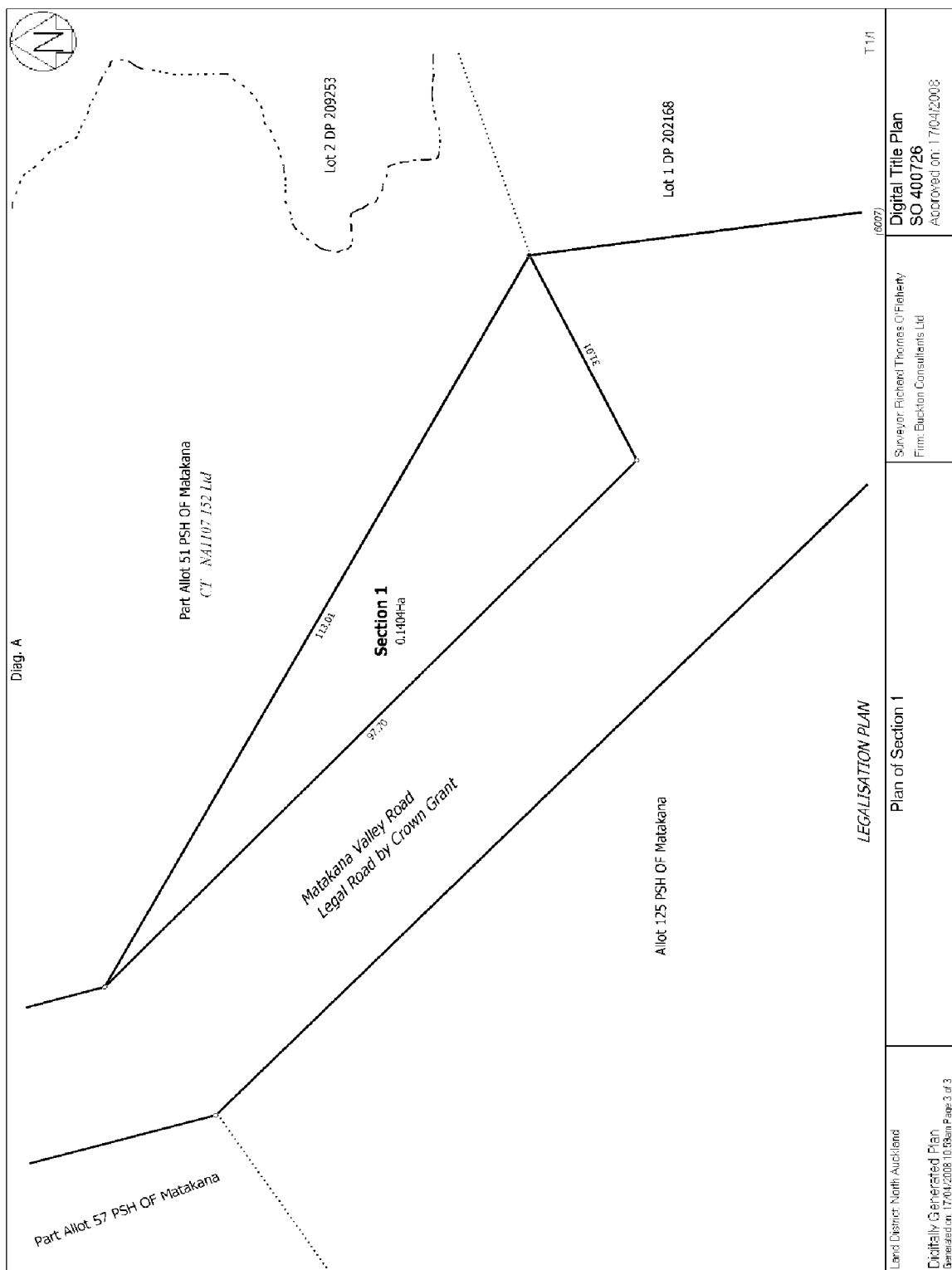
Subject to Section 345(2A)(a) Local Government Act 1974

Part allotment 51 Parish of Matakana is Limited as to Parcels

9545653.2 Mortgage to Bank of New Zealand - 1.11.2013 at 11:31 am

11037764.1 Notification that a building consent issued pursuant to Section 72 Building Act 2004 identifies
inundation as a natural hazard - 21.2.2018 at 4:43 pm







COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Limited as to Parcels

Historical Search Copy




R. W. Muir
Registrar-General
of Land

Identifier 433045
Land Registration District North Auckland
Date Issued 09 July 2008

Prior References

427112 NA1107/152

Estate	Fee Simple
Area	2.6672 hectares more or less
Legal Description	Part Allotment 51 Parish of Matakana and Section 1 Survey Office Plan 400726

Original Proprietors

Three Blokes Limited

Interests

Subject to Section 345(2A)(a) Local Government Act 1974

Part allotment 51 Parish of Matakana is Limited as to Parcels

8656123.1 Mortgage to Bede Anthony Haughey - 15.12.2010 at 4:00 pm

8980164.1 Discharge of Mortgage 8656123.1 - 10.2.2012 at 4:07 pm

8980164.2 Mortgage to Simpson Dowsett Mackie Lawyers Nominee Company Limited - 10.2.2012 at 4:07 pm

9315754.1 Variation of Mortgage 8980164.2 - 15.4.2013 at 2:02 pm

9545653.1 Discharge of Mortgage 8980164.2 - 1.11.2013 at 11:31 am

9545653.2 Mortgage to Bank of New Zealand - 1.11.2013 at 11:31 am

11037764.1 Notification that a building consent issued pursuant to Section 72 Building Act 2004 identifies inundation as a natural hazard - 21.2.2018 at 4:43 pm

APPENDIX C HISTORIC AERIAL IMAGES



geosciences Ltd
ENVIRONMENTAL

Level 1, 47 Clyde Road, Browns Bay, 0630
Tel: (09) 475 0222st

Title:

Historic Aerial Images

Project name:

362 Matakana Valley Road, Matakana, Auckland

Reference: J1163

Date: 11 Apr 2018

Drawn: BR

Approved: COB



geosciences Ltd
ENVIRONMENTAL

Level 1, 47 Clyde Road, Browns Bay, 0630
Tel: (09) 475 0222st

Title:

Historic Aerial Images

Project name:

362 Matakana Valley Road, Matakana, Auckland

Reference: J1163

Date: 11 Apr 2018

Drawn: BR

Approved: COB



geosciences Ltd
ENVIRONMENTAL

Level 1, 47 Clyde Road, Browns Bay, 0630
Tel: (09) 475 0222st

Title:

Historic Aerial Images

Project name:

362 Matakana Valley Road, Matakana, Auckland

Reference: J1163

Date: 11 Apr 2018

Drawn: BR

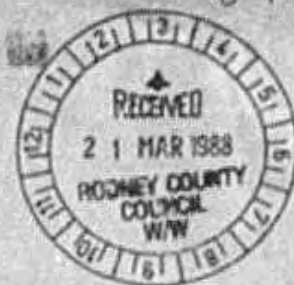
Approved: COB

APPENDIX D PROPERTY FILE EXTRACTS

NAME KOWHAI TIMBER LTD.
 PERMIT No. FO42309
 RIDING 169-03-88
 DATE 15-4-88
 ADDRESS MATAKANA WAHEY RD. MATAKANA.
DRYING SHED.



TYPE OF CHECK	DATE	NO. OF	NO. OF
1. SITE & FIELD CHECK			
2. FILL CHECK	28/3/88	1	✓
DISTRICT SALES			
3. FILL CHECK			
COUNTY SALES			
4. FILL CHECK			
STRUCTURE STRENGTH	2		✓
5. FILL CHECK			
6. FILL CHECK	W/W	3	✓
ADDITIONAL OR REMARKS			



COMPLETED
 Signed [Signature]
 Date 20.9.90

SENT FOR ISSUE 13-4-88

COMPLETED
 Signed _____
 Date _____

Rochester County Council No.

Inspector: M

File No.

Receipt No. 151-03-88

Date Permit Issued 15/4/88

OWNER	
Name	Kawhai Timber Ltd
Mailing Address	Motukoa Valley Rd Motukoa

BUILDER	
Name	As Owner
Mailing Address	

PROPERTY ON WHICH BUILDING IS TO BE ERECTED/DEMOLISHED

SITE	
Street No.	
Street Name	Motukoa Valley Road
Town/District	Motukoa
Riding	Motukoa

LEGAL DESCRIPTION	
Valuation Roll No.	900-89
Lot	51 - of Motukoa Bk
Section	
Block	III
Survey District	Motukoa

DESCRIPTION OF PROPOSED WORK AND MAIN PURPOSE OF USE

New Drying Shed

FLOOR AREA	
Whole Sq. Metres	210

DWELLING UNITS

Number
Erected

ESTIMATED VALUES	
Building	26,250
Planting	
Drainage	
G.S.T.	
TOTAL	26,250

NATURE OF PERMIT (TICK BOX)

- ☒ NEW BUILDING
- exclude domestic garages and domestic outbuildings
- ☐ FOUNDATIONS ONLY
- ☐ ALTERED, REPAIRED, EXTENDED, CONVERTED, RESTORED
- include installation of heating appliances
- ☐ NEW CONSTRUCTION
OTHER THAN BUILDINGS - include demolitions
- ☐ DOMESTIC GARAGES
AND DOMESTIC OUTBUILDINGS

FEES APPLICABLE

Building Permit	\$ 304	Water Connection	\$
Street Damage Deposit	\$		\$
Building Research Levy	\$ 2970		\$
Plumbing	\$		\$
Drainage	\$		\$
Sewer Connection	\$		\$
Vehicle Crossing Levy	\$		\$
M.S. Plumbing	\$		\$
G.S.T.			\$
TOTAL			\$ 3370

Receipt No. W 4134

Date of Payment 20/03/88

Authorized Officer

Special Conditions:

INSPECTIONS ARE REQUIRED AS FOLLOWS

(1) FOUNDATIONS/FLOOR SLABS - WHEN STEEL IS FIXED READY TO POUR CONCRETE OR HOLES READY FOR SETTING IN FOUNDATION PILES.

(2) WHEN BOND BEAMS ARE FIXED AND STEEL PLACED READY FOR CONCRETE.

(3) WHEN FRAMEWORK IS COMPLETE AND READY FOR LINING.

(4) WHEN BUILDING WORK IS COMPLETED IN ACCORDANCE WITH APPROVED PLANS.

THE BUILDING INSPECTOR SHALL BE GIVEN 24 HOURS' NOTICE THAT WORK IS READY FOR INSPECTION.

To comply with the conditions endorsed on the approved plans and specifications

Date Inspected REMARKS (e.g. stage reached with work)

Date Inspected

COMPLETED (Signature)

Mr. [Signature]

Date

2019 190

APPLICATION NO

169-03 88

PERMIT NO

F042304

DISTRICT OFFICE NO

89

DATE ISSUED

15 4 88

RODNEY COUNTY COUNCIL

CENTREWAY ROAD, OREWA

PRIVATE BAG, OREWA

PHONE HBC 65-188

DISTRICT OFFICES: HEDAP RD 25-6300 WARKWORTH 8538

BUILDING PERMIT APPLICATION

IMPORTANT PLEASE READ INSTRUCTION ON PAGE 3 AND COMPLETE THE FOLLOWING INFORMATION

OWNER OF SECTION:

NAME KOWHAI TIMBER LTD

(BLOCK CAPITALS)

PHONE NO. BLK

PHONE NO. PVT

2123 WW

PRESENT POSTAL ADDRESS

BUILDER:

NAME C. R. CASHMORE

PHONE NO

ADDRESS

(PERMIT WILL BE POSTED TO BUILDER UNLESS OTHERWISE REQUESTED)

PREVIOUS OWNER OF SECTION: NAME AITKEN HEND HOLDINGS LTD ← owner

LEGAL DESCRIPTION OF SECTION:

(SEE RATES FORM)

BLK III MATAKANA RD.

LOT PT ALLOT 51 D.P. MATAKANA PSH BLK

STREET OR ROAD NUMBER

VALUATION NO

900-89

STREET OR ROAD NAME MATAKANA VALLEY RD

LOCALITY

MATAKANA

AREA OF SECTION

3.5268

HECTARES
SQUARE METRES

RIDING

DESCRIPTION OF PROPOSED WORK:

DRYING SHED

FLOOR AREA:

210

SQ METRES

CARPORT/GARAGE

ADDITION

BASEMENT

GROUND FLOOR

210

FIRST FLOOR

OTHERS

TOTAL AREA

210

VALUE OF BUILDING WORK ONLY \$ 26,250

(The decision of the Building Inspector shall be final as to estimated cost)

SIGNATURE OF APPLICANT

C. R. Cashmore

FOR OFFICE USE ONLY

PERMIT FEES

WORK

VALUE

FEE

RECEIPT NO

DATE

BUILDING

26,250 -

304 -

W4154

27.01.88

PLUMBING

-

-

DRAINAGE

-

-

SUB TOTAL

26,250

304 -

BUILDING RESEARCH L&V

29-70

TOTAL PERMIT FEE

333-70

WATER CONNECTION

-

ROAD DAMAGE DEPOSIT

-

TOTAL PAYABLE

333-70

SUNDY FEES

BUILDING PERMIT APPLICATION FEES

ESTIMATED VALUE OF WORK VALUE OF WORK NOT EXCEEDING	INCLUSIVE OF GST
\$ 1,001	\$ 1,000 \$ 33
\$ 2,001	\$ 2,000 \$ 44
\$ 4,001	\$ 4,000 \$ 66
\$ 6,001	\$ 6,000 \$ 87
\$ 8,001	\$ 8,000 \$ 113
\$ 10,001	\$ 10,000 \$ 131
\$ 15,001	\$ 15,000 \$ 200
\$ 20,001	\$ 20,000 \$ 239
\$ 25,001	\$ 25,000 \$ 271
\$ 30,001	\$ 30,000 \$ 304
\$ 35,001	\$ 35,000 \$ 334
\$ 40,001	\$ 40,000 \$ 373
\$ 50,001	\$ 50,000 \$ 400
\$ 60,001	\$ 60,000 \$ 433
\$ 70,001	\$ 70,000 \$ 465
\$ 80,001	\$ 80,000 \$ 498
\$ 90,001	\$ 90,000 \$ 530
\$ 100,001	\$ 100,000 \$ 563
\$ 120,001	\$ 120,000 \$ 594
\$ 140,001	\$ 140,000 \$ 633
\$ 160,001	\$ 160,000 \$ 659
\$ 180,001	\$ 180,000 \$ 693
\$ 200,001	\$ 200,000 \$ 727
	\$ 250,000 \$ 790

ABOVE \$250,000 AN ADDITIONAL \$25 FOR EVERY ADDITIONAL \$20,000 OR PART THEREOF.

BUILDING RESEARCH LEVY

THE LEVY IS \$1.00 (PLUS GST) FOR EACH \$1,000 (OR PART \$1,000) OF THE TOTAL VALUE.

NOTE: THIS LEVY IS PAYABLE ON ALL WORK VALUED \$10,000 AND OVER.

INSPECTION FEE FOR OLD OR USED TIMBER OR SECONDHAND BUILDINGS

- (a) INSPECTIONS OUTSIDE COUNTY \$100
(b) INSPECTIONS WITHIN THE COUNTY \$40

PROVIDED THAT WHERE AN INSPECTION IS REQUIRED OUTSIDE A RADIUS OF 50 KILOMETRES FROM THE APPROPRIATE DISTRICT OFFICE OR HEAD OFFICE OF THE COUNTY, PUBLIC SERVICE MILEAGE RATES SHALL BE LEVIED IN ADDITION TO THE ABOVE CHARGES.

LOCALITY SKETCH TO SHOW LOCATION OF BUILDING SITE

THIS IS NOT ACCEPTED AS A SITE PLAN

APPLICATION APPROVED BY

BUILDING INSPECTOR
 HEALTH INSPECTOR
 PLUMBING & DRAINAGE INSPECTOR
 TOWN PLANNING OFFICER
 STRUCTURAL ENGINEER
 GEOTECH. ENGINEER
 DISTRICT ENGINEER

DATE	
13.4.88	<i>An. Breidhant</i>
	<i>AP</i>
	<i>AP</i>

DISTRICT SCHEME ZONING

Rural General North

INITIALS

ELECTRICITY TRANSMISSION LINES

PRESENT/NOT PRESENT

NO

COUNCIL SEWER

PRESENT/NOT PRESENT

NO

COUNCIL STORMWATER DRAIN

PRESENT/NOT PRESENT

NO

(DELETE NOT APPLICABLE)

PERMIT ISSUED SUBJECT TO FOLLOWING CONDITIONS

DATE COMMENTS BY OFFICER

22.8.88 HAVE RUNF FEE AMOUNT. CARBON TO BE DELIVERED. *AK*
 28.3.89 Site inspected *OK* *ML*
 20.7.89 David Gorman of New Urban to General info on Deni Deck. *RLH*
 8.7.89 received *RLH*

BONE DOBSON ASSOCIATES

CONSULTING ENGINEERS AND INDUSTRIAL DESIGNERS

P.O. Box 10000, Regina, Saskatchewan

Robert Harris
Rodney County Council



~ copy of technical info. Re: 'Purlindeck'
as requested

~ note that span for 22g is ~~is~~ greater
than recommended as 15% increase in
allowable stresses is permitted for 'Farm

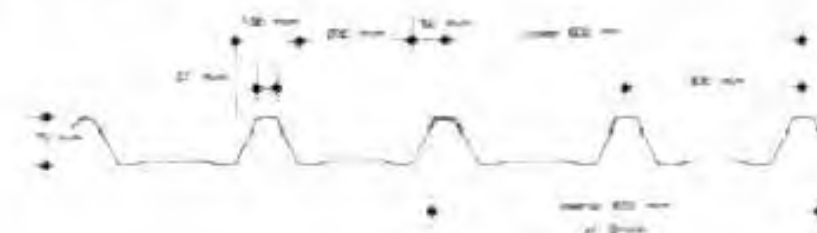
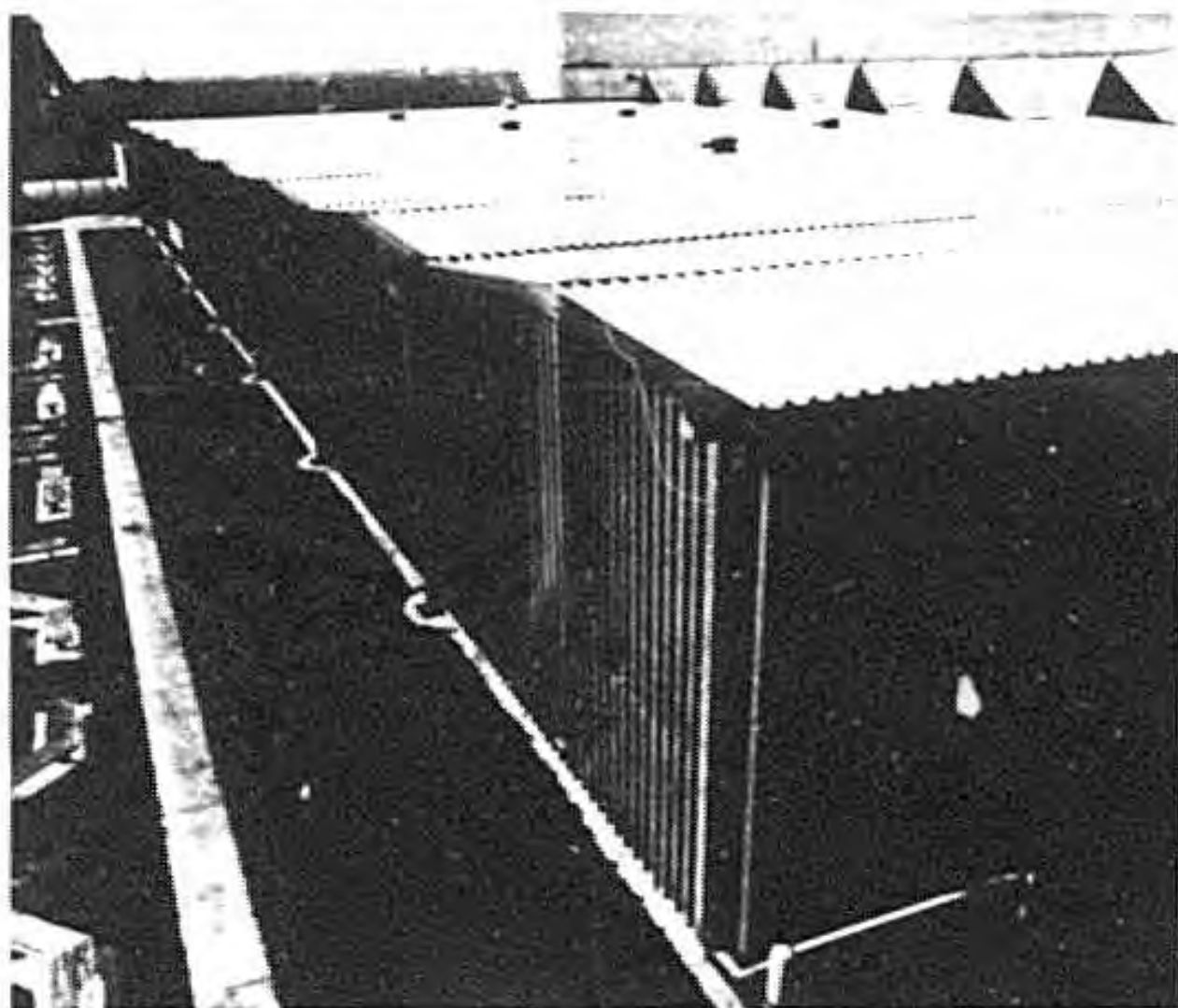
With Compliments Buildings'



PURLINERSM 20

Purlinless Roof Decking and Cladding

Formsteel Industries Ltd



PROFILE

Shaping to eliminate lap joints and edge joints and provide maximum strength and rigidity with no side bolting.



No. 1 (page 1) - 10/78

No. 2 (page 2) - 1/79

Author: Design No. 20/21

Description

Purline 20 is a cold rolled metal profile with a six metre load bearing span capability designed for use as a long span roofing, wall cladding, underslung roof decking and floor decking.

Purline 20 is a proven product in engineering research and complies with current code requirements for loadings without purlins or sub framing. Purline has a true profile shape to eliminate lap joints and edge joints and provide positive interlocking of sheets to form a tight structure.

Standards

AS 423 1978 Code of practice for general structural design and design loadings for buildings.

AS 160 1975 Design and installation of supporting metal roofing within dimensions 404.

BS 575 1975 Code of practice for

BS 575 1975 Code of practice for design and installation of metal roofing.

Purlinless Roof Decking and Cladding

Formsteel Industries Ltd

Related Documentation
Reports 273/76, 326/76, 408/76 and 321/77 published by Materials and Testing Laboratory Ltd, Auckland, record loading tests conducted according to NZS 4203:1976 and AS 1562:1973. Copies of the reports are available to designers from Formsteel Industries Ltd.

Materials
Purlindex Span 20 is manufactured in the following:
Material
Galvanneal steel galvanneal to total covering of 400 g/m²
Total coated thickness
0.45 mm, 0.6 mm, 0.8 mm
Finish
Pre-painted based acrylic and epoxy chip finish available
Length
Available up to 30 m and longer, custom-cut, dependent on available transport

Design Data
Minimum Fall
Purlindex Span 20 should be laid to a minimum fall of 30 mm in 3 metres (1 in 60). Up to 3° pitch, Span 20 may be radius curved, where unbroken lengths are required. For changes in pitch or break in direction the ribs may be cut and capped with a custom rib capping.
Maximum Span
Maximum load bearing span for 0.8 mm Purlindex is six metres (5m) for wind load conditions in accordance with NZS 4203:1976 and AS 1562:1973.

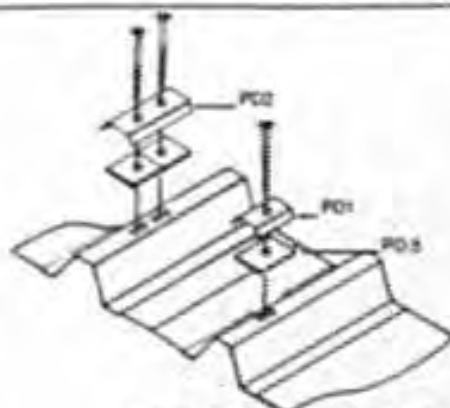
Gauge Thickness	Maximum span *Simple/double span roofing & cladding	Max. eaves overhang	Mass kg/m ²
22 g 0.75mm	6.0 m	1.8 m	9.076
24 g 0.55mm	4.5 m	1.2 m	6.748
26 g 0.40mm	3.0 m	0.6 m	5.623

These maximum spans have been tested to support 100 kg point loading.

* It is recommended to reduce the simple spans by 500 mm if fixed without a light strongback to distribute weight from web to web, at midspan. Lap stitch 0.8 mm Purlindex with 2 rows of Tek screws at 1/3 of span points. Stop end, turn down tools available. Purlindex span 20 may be fixed to timber or steel portal frames and trusses, eliminating the need for purlins and girts.

Fixing Method A

For 0.6 and 0.8mm Purlindex the fixing method provides for fixing through the crest of the rib with 105 mm Tek screws (to steel purlins) and 120 mm wood screws (to timber purlins). Fix through metal washer (PD1) with neoprene washer (PD2) between metal washer and roofing. Expansion and contraction are allowed for when lengths exceed 25 metres by using two teflon coated neoprene washers (PD3 and PD4) with teflon faces in contact. Slotted holes are cut in roofing with tool available from the manufacturer for lengths exceeding 25 m.



Double fixing on spans 5m and over is recommended also at perimeter zones and high wind load areas.

Purlindex Span 20 may be used as permanent formwork for composite metalconcrete tray flooring systems. This consists of an in-situ concrete floor slab poured over reinforcing mesh within the inverted Span 20 profile.

Accessories
Suspended ceiling clip - besides its primary function this clip also provides supports for ceiling lighting fixtures. Wire passed through upper hole is used to tension building paper and netting where necessary.

Flush strip - available for flat ceiling applications and soffits. Produces a flush surface acceptable for decorative finish applications.

Elevated roof light - Durside 7' or Purlindex profiled translucent sheeting supported with galvanneal steel straps at 1000 mm centres. Stop ends, ridge flashings, rib cappings, fixing clips and screws are available from Formsteel Industries Ltd.

Durability, Maintenance
Marine, salt or sulphurous atmospheres are injurious to unprotected galvanneal steel surfaces. Once painted, durability depends on the maintenance of the paint film. The maintenance schedule recommended by the manufacturer allows for six months weathering before priming with zinc chromate etch primer. Prime under all flashings with two coats of cold galvanneal, particularly at stop ends, under overhangs or where areas are not exposed to the weathering action of rain water. Purlindex should be stored under cover at all times. Care should be taken during handling to avoid distortion or damage to the corners, ribs and the clipping edges. Where clipping edges are deformed they should be straightened before installation and fixing.

Storage, Handling
Available from Formsteel Industries Ltd and through distributor fixers. The manufacturer maintains a technical design and quotation service for designers and specifiers.

Supply, Service
Technical data and laboratory test results are available to designers and specifiers. Also available are fixing instructions and details.

Further Information
Contact: Formsteel Industries Ltd
400A Albert Street
Christchurch, Auckland 6
PO Box 23-718, Paparua
Tel: 0800 911 275/089
Cables: FORMSTEEL

Where Publications Bureau 7 1979

CALCULATIONS

for

NEW TIMBER DRYING SHED

for

KOWHAI TIMBER LTD

at

MATAKANA

Peter C Bone B.E. M.I.P.E.N.Z. Reg Eng
CONSULTING ENGINEER
P.O. BOX 10-084 BALMORAL
Ph 773-877 778-193

Ref: 2163.1

Date: MARCH 88

Refer to Timber Drying Shed for Ka-hoi Timber Ltd. Matukona

by Loads

David Branner

(i) Roof

$$\begin{aligned} \text{Dead} &= 0.15 \\ \text{Live} &= \frac{0.25}{0.4} \text{ kPa} \quad (L_e) \end{aligned}$$

$$\text{or } L_e = 10 \text{ m}$$

(ii) Wind

$$\begin{aligned} h &= 4 \text{ m} \\ S_1 &= 10 \end{aligned}$$

$$\begin{aligned} \text{class B} \\ S_2 &= 0.705 \end{aligned}$$

$$\begin{aligned} \text{GR 2} \\ V &= 31 \text{ m/s (25 yr return)} \end{aligned}$$

$$q_s = 613/1000 (1.0705 \times 31)^2 = 0.295 \text{ kPa}$$

$$C_{pi} + C_{pe} = -5 + 10 = 15 \text{ } \Rightarrow 0.381 \text{ kPa } \uparrow$$

$$-5 + 5 = 0 \text{ } \Rightarrow 0.176 \text{ kPa } \downarrow$$

(iii) Wind Loading Cases

$$D+W \downarrow = 0.15 + 0.176 = 0.326 \text{ kPa } \downarrow$$

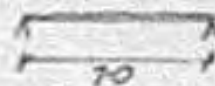
$$-70 + W \uparrow = -7 \times 0.15 - 0.381 = 0.276 \text{ kPa } \uparrow$$

~ this building has been designed according to NZS 1900
Order 11.2 (form buildings)

By Roof Members

(Bi) Roof Beam

$$\begin{aligned} w_L &= 0.25 \times 5.5 = 0.88 \text{ kN/m} \\ L_e &= 10 \text{ m} \quad \text{--- as worst case} \end{aligned}$$



$$w_D = 0.15 \times 5.5 = 0.53 \text{ kN/m} \quad \text{--- as worst case}$$

$$M_{max} = 8.64 \text{ kNm}$$

$$M_D = 3.25 \text{ kNm}$$

check 2/250, 50 MoI F.G.

Dry Pinus Radiata

$$\begin{aligned} f_{bc} &= 9.95 \text{ MPa} \\ F_{bc} &= 14.14 \end{aligned}$$

$$\begin{aligned} f_{bc} &= 9.71 \text{ MPa} \\ F_{bc} &= 9.43 \end{aligned}$$

$$\begin{aligned} k_1 &= 1.0 \\ k_2 &= 1.14 \end{aligned}$$

$$F_b = 8.27 \text{ (NZS 1900)}$$

note: roof sheathing will provide adequate lateral restraint to beam

Refers to: Kawthor Timber Ltd

(B1) - continued

check splice in 250 x 50

16T5 Tylak R top & bottom

$$\text{Moment capacity} = 4.91 \times 24 = 118 \text{ kNm}$$



~ as both members not spliced at same position

$$M = (118 + \frac{8.27 \times 1.5 \times 4.5}{1.6 \times 1.5 \times 2}) \times 1.4 = 7.43 \text{ kNm}$$

as splice will occur 6m from support, $M_{\text{reqd}} = 4.57 \text{ kNm} < 7.43$ (OK)

~ deflection not considered as not critical for this type of bldg.

(B2) Roof Bracing

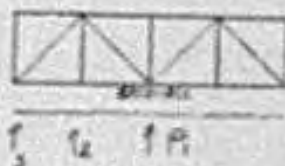
$$C_p = 0.6 + 0.5 = 1.1$$

$$P = 0.295 \times 1.1 = 0.322 \text{ kPa}$$

$$P_1 = 0.322 \times 7.2 = 2.32 \text{ kN}$$

$$P_2 = 2.32 + 1.5 \times 2 = 5.42 \text{ kN}$$

$$P_3 = 5.42 + 0.322 \times 3.5 \times 2 = 7.02 \text{ kN}$$



~ strut in compression length = 7.0m

$$F_{ac} = 6.2 \times 1.5 \times 0.66 = 6.14 \text{ kPa}$$

$$P_{ac} = 6.77 \text{ kN}$$

$$700/46 = 15 < 15$$

check 100 x 50 No 1 F.G.

Dry Pines Radiata

Ten screws @ 1000 c/c to roofing

$$f_{ac} = 6.77 / 91 \times 46 = 1.6 \text{ kPa} < 6.14 \text{ (OK)}$$

~ end bracing length = 5.0m

$$F_{ac} = 6.2 \times 1.5 \times 0.44 = 4.14 \text{ kPa}$$

$$P_{ac} = (6.77 / 0.545) \times 0.5 = 6.27 \text{ kN}$$

$$700/91 = 7.7 < 15$$

check 100 x 100 1 1/2" F.G.

Dry Pines Radiata

$$f_{ac} = 6.27 / 91 = 0.7 \text{ kPa} < 4.14 \text{ (OK)}$$

Refers to: Kowhai Timber Ltd

~ Forcing Wire as trace

$$P_{w0} = (6.77 / \cos 45^\circ) 1.3 = 12.45 \text{ kW}$$

8 Gauge wire diam = 4.1 mm

$$F_{u2} = 410 \times 0.6 = 246 \text{ MPa}$$

$$P_{w0} = (\pi \times 4.1^2 / 4) 246 = 3.25 \text{ kW per strand}$$

∴ 4 strands required.

Refers to: Kaitiaki Timber Ltd

Cp Columns

(Ci) check column

$$p_{oc} = 0.4 \times 7.55 = 3.0 \text{ W}$$

abt YY axis

$$k_{12} = 3.1 \text{ ~table 26}$$

$$k_{12} = 10$$

$$L = 40$$

$$I = 2 \left[\frac{189 \times 146^3}{12} + 189 \times 146 \times 75^2 \right] + 46 \times \frac{189^3}{12} = 60.59 \times 10^6 \text{ mm}^4$$

$$A = 2 \left[189 \times 146 \right] = 17,580 \text{ mm}^2$$

$$S_y = 10 \times 3.1 \times 4000 / 35 \left(\frac{60.59 \times 10^6}{17,580} \right)^{0.5} = 38.07 < 50$$

abt XX axis

$$S = 200 / 140 = 2.14$$

→ YY axis critical $k_{12} = 0.22$

$$F_{oc} = 62.15 \times 0.22 = 2.05 \text{ MPa}$$

$$f_{oc} = 3.0 / (189 \times 146.2 + 10 \times 146) = 0.41 \text{ MPa} < 2.05 \quad \text{OK}$$

(Ci) check pole foundation

300 SED pole, 450 of hole, embedded 1000

$$p_{oc} = 3.0 \text{ W}$$

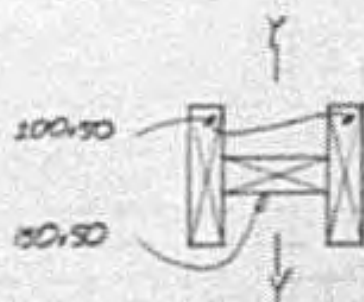
$$p_{oc} = 0.561 \times 7.55 = 4.23 \text{ W}$$

$$P_{allow} = 100 \text{ kPa}$$

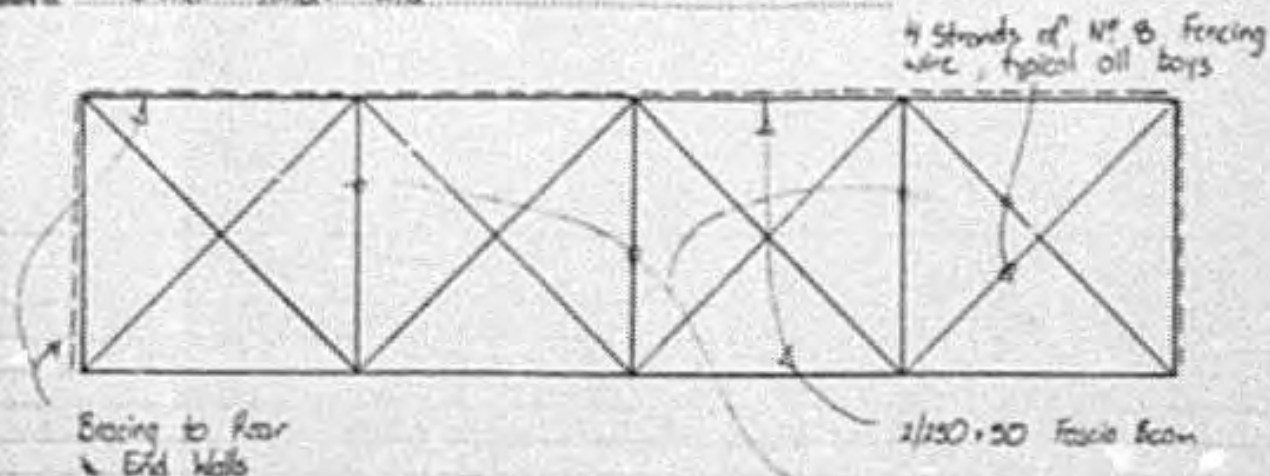
$$\text{Pole friction} = 22 \text{ kPa (pole top 400)}$$

$$B_c = 225 \times \pi \times 100 + 45 \times \pi \times 5 \times 22 = 34.97 > 3.0$$

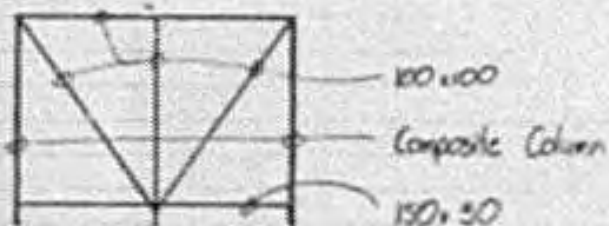
$$P_{oc} = 10.66 \text{ W} > 4.23$$



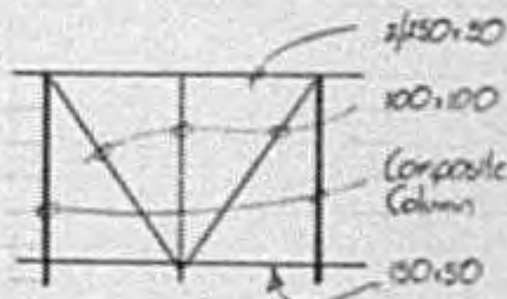
Project No. Kaitiaki Timber Ltd



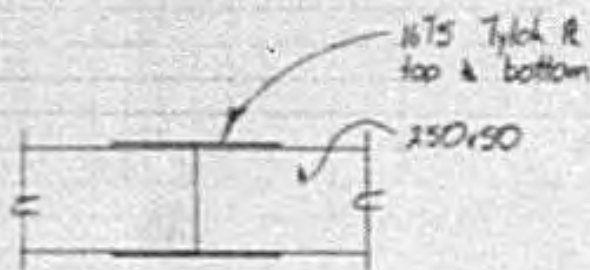
ROOF PLAN
NTS



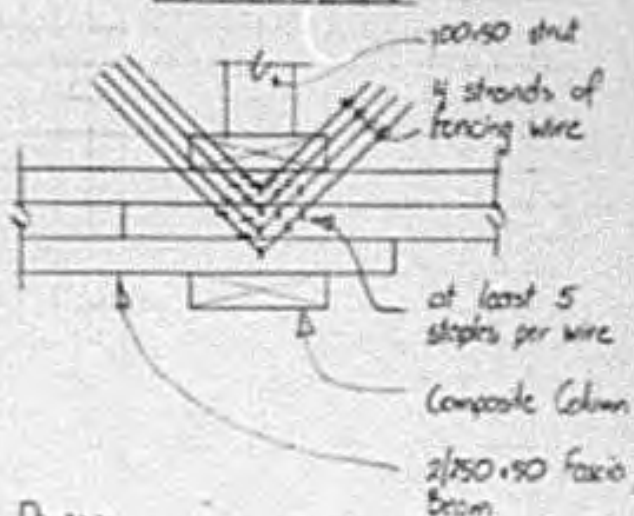
END WALL ELEVATION
NTS



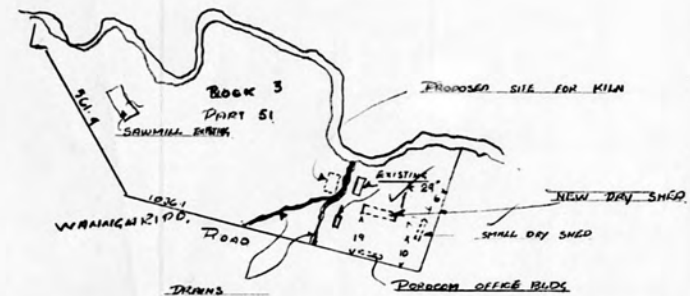
REAR WALL BRACING
- TYPICAL BAY



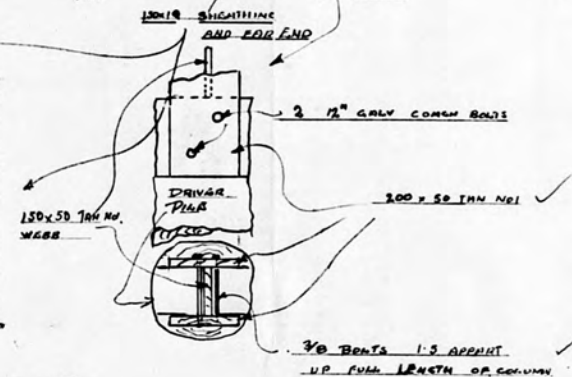
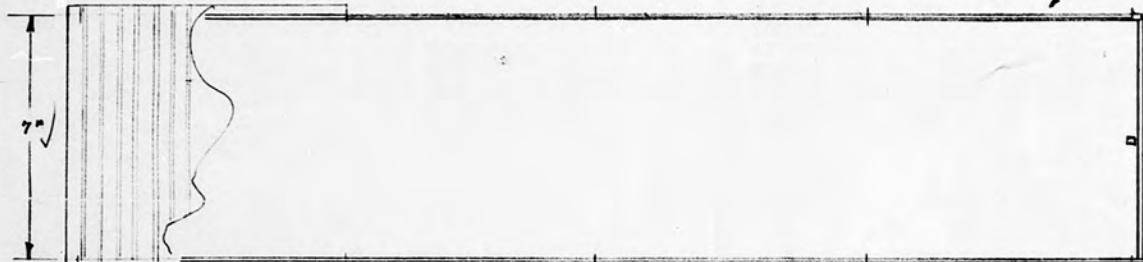
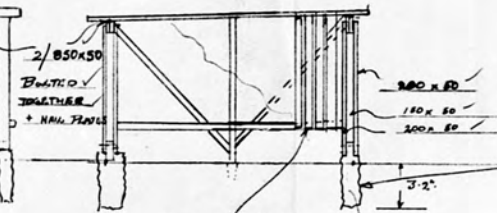
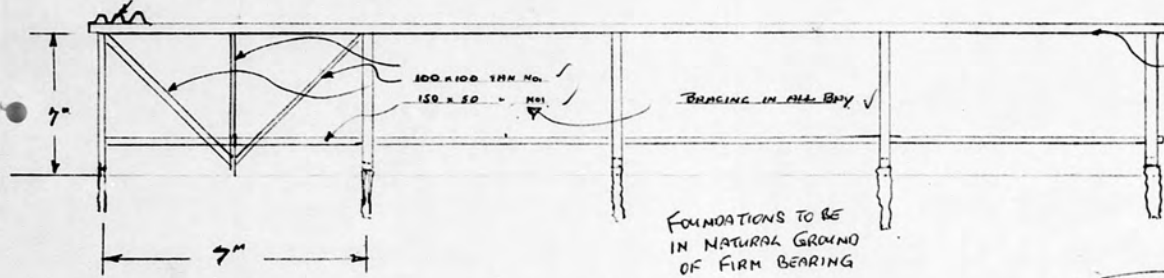
DETAIL OF SPLICE
IN FASCIA BEAM



PLAN
ROOF BRACING DETAIL



PERIN DACK 20 (229 0.75mm thick)



PLANS
AND SPECIFICATIONS
APPROVED
SUBJECT TO SUCH
CONDITIONS AS ARE
TO BE ENDORSED ON
OR APPENDED TO
BUILDING PERMIT.
SIGNED: *[Signature]*
DATE: 13.4.88
BUILDING INSPECTOR

TIMBER DRYING SHED FOR KOWHAI TIMBER LTD

MATAKANA

77

18.6.88.

APPENDIX E SITE PHOTOGRAPHS



PLATE 1: Large Timber Drying Shed in Centre of Proposed Development Area



PLATE 2: Outdoor Timber Storage adjacent to Matakana Valley Road



PLATE 3: Outdoor Timber Storage and Small Timber Drying Shed



PLATE 4: Proposed Development Area Looking North

APPENDIX F LABORATORY TRANSCRIPTS

Certificate of Analysis

Geosciences Ltd
First Floor, 47 Clyde Road
Browns Bay
Auckland NZ 0630



NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or
measurements included in this document are traceable
to Australian/national standards.

Attention: Brodie Rowse

Report 590070-S
Project name 362 MATAKANA VALLEY ROAD
Project ID J1163
Received Date Mar 20, 2018

Client Sample ID			SS1 100-200MM	SS2 500MM	SS3 200MM	SS4 300MM
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			Z18-Ma22455	Z18-Ma22456	Z18-Ma22457	Z18-Ma22458
Date Sampled			Mar 19, 2018	Mar 19, 2018	Mar 19, 2018	Mar 19, 2018
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
Pentachlorophenol	1.0	mg/kg	-	-	< 1	-
Heavy Metals						
Arsenic	2	mg/kg	2.1	4.4	4.0	3.7
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Chromium	5	mg/kg	21	18	34	39
Copper	5	mg/kg	5.4	20	21	34
% Moisture	1	%	21	22	19	20

Client Sample ID			SS5 200MM	SS6 500MM	SS7 200MM	SS8 300MM
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins mgt Sample No.			Z18-Ma22459	Z18-Ma22460	Z18-Ma22461	Z18-Ma22462
Date Sampled			Mar 19, 2018	Mar 19, 2018	Mar 19, 2018	Mar 19, 2018
Test/Reference	LOR	Unit				
Phenols (Halogenated)						
Pentachlorophenol	1.0	mg/kg	< 1	< 1	-	-
Heavy Metals						
Arsenic	2	mg/kg	51	4.4	4.8	3.4
Boron	10	mg/kg	< 10	< 10	< 10	< 10
Chromium	5	mg/kg	44	14	24	20
Copper	5	mg/kg	68	19	16	< 5
% Moisture	1	%	14	36	17	24

Client Sample ID			SS9 0-150MM
Sample Matrix			Soil
Eurofins mgt Sample No.			Z18-Ma22463
Date Sampled			Mar 19, 2018
Test/Reference	LOR	Unit	
Phenols (Halogenated)			
Pentachlorophenol	1.0	mg/kg	< 1
Heavy Metals			
Arsenic	2	mg/kg	24
Boron	10	mg/kg	< 10
Chromium	5	mg/kg	28
Copper	5	mg/kg	30
% Moisture	1	%	8.5

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Phenols (Halogenated)	Melbourne	Mar 22, 2018	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soils by GCMS			
Heavy Metals	Melbourne	Mar 23, 2018	180 Day
- Method: LTM-MET-3030 by ICP-OES (hydride ICP-OES for Mercury)			
% Moisture	Melbourne	Mar 20, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Company Name: Geosciences Ltd
Address: First Floor, 47 Clyde Road
Browns Bay
Auckland NZ 0630

Project Name: 362 MATAKANA VALLEY ROAD
Project ID: J1163

Order No.:
Report #: 590070
Phone: 0011 64 9 4760 454
Fax:

Received: Mar 20, 2018 2:00 PM
Due: Mar 27, 2018
Priority: 5 Day
Contact Name: Brodie Rowse

Eurofins | mgt Analytical Services Manager : Natalie Krasselt

Sample Detail						Arsenic	Boron	Chromium	Copper	Pentachlorophenol	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217											
Brisbane Laboratory - NATA Site # 20794											
Perth Laboratory - NATA Site # 23736											
External Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
1	SS1 100-200MM	Mar 19, 2018		Soil	Z18-Ma22455	X	X	X	X		X
2	SS2 500MM	Mar 19, 2018		Soil	Z18-Ma22456	X	X	X	X		X
3	SS3 200MM	Mar 19, 2018		Soil	Z18-Ma22457	X	X	X	X	X	X
4	SS4 300MM	Mar 19, 2018		Soil	Z18-Ma22458	X	X	X	X		X
5	SS5 200MM	Mar 19, 2018		Soil	Z18-Ma22459	X	X	X	X	X	X
6	SS6 500MM	Mar 19, 2018		Soil	Z18-Ma22460	X	X	X	X	X	X
7	SS7 200MM	Mar 19, 2018		Soil	Z18-Ma22461	X	X	X	X		X
8	SS8 300MM	Mar 19, 2018		Soil	Z18-Ma22462	X	X	X	X		X
9	SS9 0-150MM	Mar 19, 2018		Soil	Z18-Ma22463	X	X	X	X	X	X

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Sample Detail	Arsenic	Boron	Chromium	Copper	Pentachlorophenol	Moisture Set
Melbourne Laboratory - NATA Site # 1254 & 14271	X	X	X	X	X	X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Test Counts	9	9	9	9	4	9

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCB	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank										
Phenols (Halogenated)										
Pentachlorophenol				mg/kg	< 1			1.0	Pass	
Method Blank										
Heavy Metals										
Arsenic				mg/kg	< 2			2	Pass	
Boron				mg/kg	< 10			10	Pass	
Chromium				mg/kg	< 5			5	Pass	
Copper				mg/kg	< 5			5	Pass	
LCS - % Recovery										
Phenols (Halogenated)										
Pentachlorophenol				%	58			30-130	Pass	
LCS - % Recovery										
Heavy Metals										
Arsenic				%	109			80-120	Pass	
Boron				%	111			70-130	Pass	
Chromium				%	118			80-120	Pass	
Copper				%	113			80-120	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Phenols (Halogenated)										
Pentachlorophenol	M18-Ma24301	NCP		%	91			30-130	Pass	
Spike - % Recovery										
Heavy Metals										
Arsenic	Z18-Ma22457	CP		%	90			75-125	Pass	
Boron	Z18-Ma22457	CP		%	86			70-130	Pass	
Chromium	Z18-Ma22457	CP		%	93			75-125	Pass	
Copper	Z18-Ma22457	CP		%	95			75-125	Pass	
Test	Lab Sample ID	QA Source		Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
Heavy Metals										
Arsenic	Z18-Ma22456	CP		mg/kg	4.4	4.3	1.0	30%	Pass	
Boron	Z18-Ma22456	CP		mg/kg	< 10	< 10	<1	30%	Pass	
Chromium	Z18-Ma22456	CP		mg/kg	18	19	6.0	30%	Pass	
Copper	Z18-Ma22456	CP		mg/kg	20	20	1.0	30%	Pass	
Duplicate										
Heavy Metals										
Arsenic	Z18-Ma22457	CP		mg/kg	4.0	4.1	1.0	30%	Pass	
Boron	Z18-Ma22457	CP		mg/kg	< 10	< 10	<1	30%	Pass	
Chromium	Z18-Ma22457	CP		mg/kg	34	35	3.0	30%	Pass	
Copper	Z18-Ma22457	CP		mg/kg	21	21	1.0	30%	Pass	
Duplicate										
% Moisture										
% Moisture	Z18-Ma22459	CP		%	14	14	4.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

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Alex Petridis	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)



Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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