Bayly Road – Detailed Site Investigation

Prepared for

Taranaki Regional Council

: February 2016



PATTLE DELAMORE PARTNERS LTD Level 1, 111 Customhouse Quay Wellington 6011 PO Box 6136, Wellington 6141, New Zealand

Tel +64 4 **471 4130** Fax +64 4 **471 4131** Website <u>http://www.pdp.co.nz</u> Auckland Tauranga **Wellington** Christchurch





Quality Control Sheet

TITLE Bayly Road – Detailed Site Investigation

CLIENT Taranaki Regional Council

VERSION Final

ISSUE DATE 2 February 2016

JOB REFERENCE W02050100

SOURCE FILE(S) W02050100_R003_Final

DOCUMENT CONTRIBUTORS

Prepared by

Mackentia SIGNATURE

Graeme Proffitt

Andrew Mackenzie

Melody Robyns

Reviewed by

Approved by

SIGNATURE

Bo Simkin

i i

Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Taranaki Regional Council, New Plymouth District Council, Southern Geophysical Limited and NZ Geomatics Limited, the excavation of test pit and drilling of boreholes, installation of monitoring wells, and the testing of soil, water and ground gases for a variety of analytes. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information. The site conditions as described in this report have been interpreted from, and are subject to, this information and its limitations and accordingly PDP does not represent that its interpretation accurately represents the full site conditions.

The information contained within this report applies to sampling undertaken on the date stated in this report. With time, the site conditions and environmental standards could change so that the reported assessment and conclusions are no longer valid. Accordingly, the report should not be used to refer to site conditions and environmental standards applying at a later date without first confirming the validity of the report's information at that time.

This report has been prepared by PDP on the specific instructions of Taranaki Regional Council for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.



Executive Summary

Taranaki Regional Council (TRC) engaged Pattle Delamore Partners (PDP) to undertake a detailed site investigation (DSI) of the property adjacent to Bayly Road and Ocean View Parade in New Plymouth. Ngāti Te Whiti intend to develop a marae at the site, with the future possibility of small commercial and residential areas. The culturally significant Waitapu Urupā is also located on the site, containing both marked and un-marked graves.

The site has a history of oil drilling activities, and the demolition of a large number of historical baches and other buildings has occurred. Three decommissioned oil wells are located on the site, the exact location of one of which is unknown. As a result of these past activities, there is the potential for soil and groundwater contamination, and the investigation has been undertaken to provide an appraisal of the sites contaminative status and to assess its suitability for the proposed development.

Site investigations were carried out in two phases in June and July, and September 2015 following an initial design and information-gathering phase. A geophysical survey investigated the urupā extent and aimed to identify the buried oil wells locations and areas of demolition material across the site. The excavation of test pits and hand augering around former oil wells and bach locations was undertaken to investigate potential contamination and collect soil samples for analytical testing. In addition, eight groundwater monitoring wells were installed to assess groundwater beneath the site.

An assessment of ground gas was carried out in the vicinity of the proposed marae and future commercial area and water samples were collected from a spring and wetland area to additionally assess surface water quality.

For locations where applicable human health criteria were available, all soil sampling results for heavy metals and hydrocarbons complied with the criteria, indicating the soils present an acceptable risk to human health under the proposed land use scenario. For the southern boundary of the urupā and the vicinity of Egmont 5 oil well, application human health criteria are not available, but based on the low likelihood or frequency of soil contact, the identified impacts in these areas are considered to present a minimal risk to human health. However, asbestos-containing material detected in shallow locations adjacent to Ocean View Parade and in the vicinity of the proposed marae, indicate a possible risk from asbestos-containing dusts during soil disturbance activities as part of the redevelopment.

An assessment of the soil against landfill acceptance criteria shows soil in the vicinity of the urupā soil mound and the proposed marae are acceptable for disposal at a Class A landfill. However, given the presence of asbestos, the soil in the vicinity of the proposed marae would be considered as special waste.



The analytical results of the soil samples obtained from the vicinity of the former baches parallel to Ocean View Parade indicate that this material would not be acceptable at a Class A landfill without additional assessment being undertaken at the time of development. Some samples from this location also contain asbestos.

Elevated concentrations of organic vapours were identified from locations within the building footprint of the proposed marae and future commercial area, indicating a possible inhalation risk may exist to people within the future buildings at the site. Results of subsequent indoor air modelling for the proposed marae found that predicted indoor air concentrations comply with target air concentrations and, therefore the ground vapours do not pose a risk to human health. Further assessment at the time of redevelopment is recommended to quantify the risk within the future commercial area.

All of the groundwater and surface water samples collected from the site were found to comply with applicable health criteria utilised for the investigation. It is therefore considered that both the risk to the aquatic environments of the wetland within the site or the nearby ocean is acceptable.

pop

BAYLY ROAD - DETAILED SITE INVESTIGATION

Table of Contents

SECTION		P A G E
Executiv	e Summary	ii
1.0	Introduction	1
1.1	Objectives	1
1.2	Scope	1
2.0	Site History	2
2.1	Urupā (Waitapu Urupā)	2
2.2	Bach and Marae Investigation Areas	3
2.3	Historical Oil Wells	4
3.0	Environmental Setting	5
3.1	Site Description	5
3.2	Geology, Hydrogeology	6
3.3	Hydrology	7
3.4	Sensitivity of the Underlying Aquifer	7
4.0	Proposed Development	8
4.1	Marae and Lagoon	8
4.2	Future Commercial and Residential Areas	8
5.0	Investigation and Risk Assessment Process	9
5.1	Conceptual Site Model	9
5.2	Investigation Rationale	11
5.3	Investigation Methods	13
5.4	Applicable Criteria	18
6.0	Waitapu Urupā Investigation	20
6.1	Investigation Strategy	20
6.2	Site Investigation Activities	21
6.3	Results	22
6.4	Assessment	23
7.0	Bach Investigation	24
7.1	Investigation Strategy	24
7.2	Site Investigation Activities	24
7.3	Results	25
7.4	Risk Assessment	26
8.0	Investigation in Vicinity of Proposed Marae	27
8.1	Investigation Strategy	27
8.2	Site Investigation Activities	27
8.3	Results	29
8.4	Assessment	30
9.0	Oil Well Investigation	32

pop

BAYLY ROAD - DETAILED SITE INVESTIGATION

9.1	Investigation Strategy	32
9.2	Site Investigation Activities	32
9.3	Results	34
9.4	Risk Assessment	36
10.0	Groundwater Investigation	36
10.1	Investigation Activities	36
10.2	Results	38
10.3	Risk Assessment	39
11.0	Surface Water Investigation	40
11.1	Site Investigation Activities	40
11.2	Results	40
11.3	Assessment	41
12.0	Conclusions	41
12.1	Waitapu Urupā	41
12.2	Bach Investigation	42
12.3	Investigation of Proposed Marae Vicinity	42
12.4	Oil Well Investigation	43
12.5	Groundwater and Surface Water Investigation	44
References		45

Table of Figures

Figure 1: Site Plan and Marae Development Layout
Figure 2: Waitapu Urupā and Egmont 5 – Soil Sampling Locations
Figure 3: Bach Investigation - Soil Sampling Locations
Figure 4: Marae Development Investigation - Soil Sampling Locations
Figure 5: Moturoa 2 and Moturoa 3 - Soil Sampling Locations
Figure 6: Groundwater and Surface Water Investigation (July 2015)

Table of Tables

Table 1: Waitapu Urupā Soil Mound Investigation - Soil Sampling Results - Heavy Metals

Table 2: Waitapu Urupā Drilling Mud Investigation - Soil Sampling Results – Total Petroleum Hydrocarbons and Heavy Metals

Table 3: Bach Investigation - Soil Sampling Results - Heavy Metals and Asbestos

Table 4: Ground Gas Investigation Results

v

DOO

BAYLY ROAD - DETAILED SITE INVESTIGATION

Table 5: Marae Investigation - Soil Sampling Results - Heavy Metals and Asbestos Table 6: Marae Investigation - Soil Sampling Results - TCLP Analysis Table 7: RISC Model Results Table 8: Moturoa 2 Investigation - Soil Sampling Results - Heavy Metals and Asbestos Table 9: Moturoa 2 Investigation - Soil Sample Results - Total Petroleum Hydrocarbons Table 10: Moturoa 3 Investigation - Soil Sampling Results - Heavy Metals Table 11: Moturoa 3 Investigation - Soil Sample Results - Total Petroleum Hydrocarbons Table 12: Egmont 5 Investigation - Soil Sampling Results - Heavy Metals Table 13: Egmont 5 Investigation - Soil Sampling Results - Total Petroleum Hydrocarbons Table 14: Well Details and Water Levels Table 15: Groundwater Sampling Results Table 16: Surface Water Sampling Results

Appendices

Appendix A: Figures Appendix B: Tables Appendix C: Historical Photographs Appendix D: Site Photographs Appendix E: Logs Appendix F: Geophysical Survey Report Appendix G: Laboratory Reports Appendix H: Well Purging and Sampling Forms Appendix I: Purge Water Manifest Forms Appendix J: Proposed Marae Development Architect Drawings



1.0 Introduction

Pattle Delamore Partners Limited (PDP) has been engaged by the Taranaki Regional Council (TRC) to undertake a detailed site investigation (DSI) of a property adjacent to Bayly Road and Ocean View Parade, New Plymouth (the site). The site is owned by Ngāti Te Whiti (Bayly Road Trust), having been recently returned to the hapū.

Ngāti Te Whiti intend to develop a marae within the site's central area, however, a history of oil drilling activities, nearby natural oil and gas seeps on Ngāmotu Beach, and the demolition of historical baches and buildings has resulted in the potential for soil and groundwater contamination at the site. The detailed site investigation has been undertaken to provide an assessment of the sites contaminative status and to assess the human health risks for the proposed development.

A phased approach has been adopted for the investigation, with an initial preliminary investigation of assembling background information in order to develop a conceptual site model and investigation strategy (PDP, June 2015). The DSI was subsequently carried out in two stages, with the main stage during June and July 2015, and a follow-up stage during September 2015.

This report details the results of the complete investigation. The report provides general information and information common to various parts of the investigation in sections 1 to 5, with sections 6 to 11 devoted to the detail and results for specific site areas and for the ground and surface water investigations. Conclusions are provided in Section 12.

1.1 Objectives

The objectives of the DSI were to:

- : Define the extent of the Waitapu Urupā using non-intrusive methods;
- : Identify the location of the former oil wells on the site;
- Undertake a ground investigation to determine whether the identified historical activities undertaken on the site have caused soil contamination; and
- Assess the human health risk arising from identified site contaminants in the context of the proposed development and future site users.

1.2 Scope

The scope of the DSI included:

• A geophysical survey across four areas of the site that included the eastern and western parts of the Waitapu Urupā, the northwestern and

1

central areas, around Moturoa 2 oil well and in the approximate locations of Moturoa 2 and Egmont 5 oil wells;

- The excavation and sampling of test pits around former oil well locations and suspected drilling mud locations to investigate the potential for contamination around these features;
- The installation of eight groundwater monitoring wells in up and downgradient positions of the former oil wells, the Waitapu Urupā, and the proposed lagoon area;
- The collection of groundwater samples from the monitoring wells, and surface water samples from selected site features (e.g. springs, drains) for analytical testing;
- Hand augering and test pitting in the areas of the former baches and buildings within the vicinity of the proposed marae and the proposed commercial zone to assess soil contamination arising from the historical demolition of the baches and other buildings; and
- The installation and monitoring of seven ground gas monitoring points within the proposed marae location and the commercial development area.

The majority of the work was carried out in the first stage of investigation, but access was not available for intrusive investigations in the vicinity of Egmont 5 and where drilling mud was suspected within the urupā. Test pitting for these areas was carried out during the follow-up stage. In addition, further gas monitoring, groundwater monitoring and surface water sampling was carried out in the follow-up stage.

2.0 Site History

Site history information was collected as part of the initial design stage (PDP, June 2015). Information was obtained from a variety of sources including New Plymouth District Council property files, historical reports, copies of historical titles, historical aerial photographs, a preliminary site investigation (PSI) carried out by BTW Company Limited (BTW, 2013) and anecdotal information from members of Ngāti Te Whiti. The history of the different investigation areas is summarised in the sections below.

2.1 Urupā (Waitapu Urupā)

The Waitapu Urupā is situated at the southwestern portion of the site and is culturally significant to both Ngāti Te Whiti and the local public (Photograph 1).

The urupā has been in use for burials from at least the mid-1800s to the present and contains both Māori and European graves, however, only a limited number



of the graves at the urupā are currently marked by headstones. Anecdotal evidence is that there may be a significant number of unmarked burials as a result of an influenza epidemic during the early 20th Century.

A review of historical aerial photos and council files suggests that filling and alteration of ground levels may have occurred within the southwestern quadrant of the urupā, possibly as a result of adjacent historical oil exploration activities.

The same sources indicate that the mound of soil present within the eastern area of the urupā (Photographs 2 and 3) was likely formed from the levelling of the land to the east of the urupā so as to facilitate the development of former baches and buildings within this area. An alternative suggestion (BTW, 2013) is that the mound dates back to the construction of the adjacent railway in the early 1900s, although this seems less likely with soil having to have been moved some distance by horse and cart or manually. The mound is understood to have human remains around the base of the northern side of the mound, having been relocated from the construction of the Puke Ariki Museum (Shaun Keenan, pers. comm.).

Suspected drilling mud was discovered buried in the wetland that exists within the southeastern part of the urupā (BTW, 2013). This discovery was made during the installation of a sub-soil drain. The origin of the mud is not known, but possibly relates to the original drilling of either the Egmont 5 or Moturoa 2 oil wells.

2.2 Bach and Marae Investigation Areas

Certificates of title (dated 1926 and 1995) identify the bach and marae investigation areas (Photographs 4 and 5) as former railway reserve, suggesting that the land may have been used as a camp for railway workers at one time.

A number of historical photographs were obtained from New Plymouth District Council (NPDC), Taranaki Regional Council (TRC) and the Alexander Turnbull Library (PDP, June 2015). The photos show approximately 45 buildings were previously located on the site, from as early as the 1920s, with the majority constructed in the 1940s and 1950s.

The historical photograph dated 1949 (Historical Photograph 1, appended) shows that about 25 baches were present between Ocean View Parade and the current access road to the site off Bayly Road, with a small number of structures present to the south of the access road, which includes the three buildings (two houses and a boat shed) currently on the site. At the eastern end of the access road there were 10 or more buildings between the road and the railway embankment on the southern boundary, with several more buildings located on the higher ground further east. Most of the structures within this area appear to have been baches, although more substantial houses also existed, and there was evidence of possible limited commercial activities. 3



00

Due to the age and nature of the structures, it is suspected that many of the baches and other buildings that historically occupied the site would have had asbestos-cement roofs or cladding as this was a common building material in New Zealand for several decades up until about 1985.

New Plymouth District Council building files contain a number of building consents for the demolition of the baches during 1996-97. This information indicates a number of dwellings were removed or relocated from the site, the remnants of which may remain in the ground. The files indicate that features such as garages and chimneys associated with the properties were demolished but do not specify whether these materials were removed from the site. There is no information on the files as to what happened to the demolition material or whether the surface soil was stripped.

A photograph sourced from the NPDC (Historical Photograph 2) shows the majority of the site to have been cleared of the buildings by what is thought to be the late 1990s (specific date of photograph unknown). As far as can be seen given the small scale of the photograph, the building clearance seems to have been reasonably thorough. Of note in the photograph, is what appears to be disturbed ground, presumably a trench, close to and parallel to the railway. At its eastern end this presumed trench turns northward at close to a right angle, presumably linking up with one of the manholes that now exist on the site.

2.3 Historical Oil Wells

The Moturoa oilfield was the subject of extensive oil drilling activities in several phases dating from the mid-1860s, with approximately 65 wells drilled over a 130-year period¹. Three oil wells existed on the site, Moturoa 2 and 3 and Egmont 5. Moturoa 2 is still present on the site, but no visible evidence exists of the other two wells.

A fourth well, Moturoa 4, was originally thought to be on the site but examination of historical photographs (PDP, 2015) showed the well to be on the beach (now a car park) opposite the northern end of Bayly Road.

2.3.1 Moturoa 2

Moturoa 2 well was drilled in 1931 and was in production until 1973 (Transfield Worley, 2003). This well, which still exists in a fenced compound, is located in the centre of the site (Figure 1). A photograph of the well taken in 1953 (Historical Photograph 3, Turnbull Library Ref. WA-33268-F) suggests that the original level of the wellhead was some metres below the current wellhead level, being at a similar level to the row of baches that existed further to the west at

4

¹ Taranaki Stories - *Moturoa black gold – 'the good oil'* by Sorrell Hoskin. Puke Arike Museum, New Plymouth <u>http://pukeariki.com/Learning-Research/Taranaki-Research-Centre/Taranaki-Stories</u>, accessed August 2015.

the time. The eastern end of what appears to be the original drill site is in the vicinity of the eastern part of the proposed marae development site (Figure 1).

The well was re-entered in 2003 by Greymouth Petroleum (Transfield Worley, 2003), however, it was reported that drilling muds, fluids and cuttings associated with the re-entry were contained and removed from site (Re-Source Exploration, 2001). The current oil well is shown in Photograph 6.

2.3.2 Moturoa 3

The Transfield Worley (2003) report identifies the Moturoa 3 well to have been drilled and abandoned in 1933, the well casing subsequently being recovered to approximately 195 m below ground level and the remainder of the well filled with sand and cement.

The well is shown in Historical Photograph 4, reported to have been taken around 1937 (Turnbull Library Ref. WA-55980-G), but more likely earlier given the well was abandoned in 1933. The photograph, of poor resolution, shows the well seemingly located on a bench or widened part of a track along the dune face which now overlooks Ocean View Parade towards the eastern end of the site (Figure 1).

2.3.3 Egmont 5

Historical Photograph 5 (Turnbull Library Ref. WA-47172-F) shows a drilling rig or derrick over the Egmont 5 well in 1958, four years after it was drilled (Transfield Worley, 2003).

A study of aerial photos prior to and following the drilling of the Egmont 5 well suggests the current ground level is higher than the level at the time of drilling the well. This may be associated with what appears to be the piping of the stream that existed at the time and partial filling of a gully which is apparent in the earlier 1949 photograph and the 1958 photograph.

The well was located in 2002/2003 by TRC as part of a limited intrusive investigation of this feature.

3.0 Environmental Setting

3.1 Site Description

The site is a long, truncated wedge-shaped site, approximately 650 m long and about 118 m wide at the Bayly Road (western) end and 25 m wide at its eastern end (Figure 1). The site covers approximately 4.3 hectares and comprises the legal descriptions of Lot 1 DP 18771 (3.59 ha), Section 198 Fitzroy District (0.75 ha, the Waitapu Urupā) and Section 227 Fitzroy District (0.016 ha).

ρορ

BAYLY ROAD - DETAILED SITE INVESTIGATION

The site is bounded by a railway line to the port on higher ground to the south and Ocean View Parade to the north. A sealed road provides access at the western end of the site, near the end of Bayly Road. Currently, the site is largely unoccupied and used for recreational purposes, although along the access road there are two houses near Bayly Road and what appears to be a boat shed further east.

An avenue of protected pohutukawa trees extends into the site from the western boundary along the access road. To the north of the trees, a level grassed area extends towards Ocean View Parade, where the baches once were. Land to the south of the eastern end of the access road is overgrown and boggy, and contains areas of flax and bamboo. The wetland extends to near the southwestern corner of the site, below where the railway crosses Bayly Road. The soil mound described in Section 2.1 is located towards the eastern end of the wetland (Figure 2).

The central part of the site rises from west to east and is predominantly mown grass. Moturoa 2 oil well is in the centre of the grassed area. The land slopes steeply down to Ocean View Parade from this area, with the slope heavily vegetated with flax.

The eastern-most northern site boundary and far eastern site extremity is also densely vegetated where the land slopes steeply down to Ocean View Parade (Photograph 7), but the eastern part of the site is otherwise a relatively flat, irregularly-shaped grassed terrace adjacent to the railway (Figure 1).

An overgrown track traverses west to east for about 250 m along the face of the steep slope above Ocean View Parade.

3.2 Geology, Hydrogeology

The Geological Map of the Taranaki Area (N.Z. Geological Survey Map, 1:250,000 scale) shows the site is underlain by beach deposits of marine terrace cover beds including conglomerate, sand, peat and clay.

Groundwater is estimated to flow in a general north to northwest direction, towards the port and the Tasman Sea.

Groundwater bore information was requested from TRC for groundwater bores and water-take resource consents within a 500 m radius of the site. The TRC records show 20 bores are present within an approximate 500 m radius of the site, all of which were related to oil well drilling activities and none identified to be used as potable supply.

Two resource consents for water takes were identified. The water takes are located in hydraulically upgradient positions and relate to taking groundwater from dewatering excavations and for bottled water production. The latter was located 850 m to the southeast of the site (Consent 5413-2). There is therefore

no known use of the shallow groundwater in the vicinity of the site. It should be noted, however, that small water takes (<20,000 L/day) do not require consent and may exist without TRC having a record.

7

A spring exits from the base of the railway embankment directly south of the soil mound. This spring was historically used for bathing when the baches existed (Shaun Keenan, pers. comm.), but is now overgrown and disused. It is intended the spring be the source of water for a lagoon proposed as part of the marae development (see Section 4.1).

3.3 Hydrology

A wetland area exists within the southern part of the land legally defined as the urupā. The wetland is fed from the spring and probably a number of other seeps along the base of the railway embankment. An ill-defined drainage channel orientated southwest to northeast (formerly the Waitapu Stream, now thought to be mainly piped) forms the northwestern extent of the wetland. The wetland drains northeast and north, partly within a sub-soil drain installed by Ngāti Te Whiti (which partially controls the wetland level), into a manhole on the edge of the access road. The manhole is connected to the stormwater system owned by Port Taranaki draining Ocean View Parade, and ultimately drains to Ngāmotu Beach, 35 m to the north of the site.

3.4 Sensitivity of the Underlying Aquifer

An assessment of the groundwater sensitivity beneath the investigation area has been carried out in accordance with Section 5.2.3 of the Ministry for the Environment's *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand* (MfE, 2011a):

- : The shallow aquifer beneath the site is not artesian;
- The depth to the first water bearing unit is less than 10 m below the potential contaminant source (considered to be the former oil wells and the urupā) and,
- The shallow aquifer in the vicinity of the site does not appear to be used for water supply purposes, based on the groundwater bore information available, and the fact that the area is serviced by the reticulated municipal water supply.

Therefore, based on the criteria above, the underlying shallow aquifer is not classified as sensitive with regard to groundwater use.

According to Section 5.2.3 of MfE (2011a), a surface water body greater than 100 m from a contaminant source is unlikely to be affected, given that natural attenuation processes generally limit the extent of dissolved phase hydrocarbon plumes to less than 100 m. Given that the spring and the wetland area are

present on the site and the sea is located approximately 35 m to the north of the site, the shallow aquifer may be considered sensitive with respect to the migration of impacted groundwater within or from the site.

4.0 **Proposed Development**

4.1 Marae and Lagoon

Ngāti Te Whiti intend developing Ngāmotu Marae in the central part of the site. This is to have a wharenui (communal house) and wharekai (dining hall), with an administration building and car parking at a higher level behind the wharekai and the possibility of a communal garden area. No residential use is currently proposed, although people are likely to sleep overnight in the wharenui.

A layout plan² of the proposed redevelopment is presented in Appendix J and the outline of the buildings, access way and parking is shown on Figure 1.

The area surrounding the marae is to be landscaped which is to include a wetland and lagoon. The lagoon is to be located at a lower level to the west of the buildings, immediately to the north of the soil mound and is to be fed by the spring draining from the base of the railway embankment. It is understood the lagoon will be lined to isolate it from the existing wetland and underlying groundwater.

There will need to be earthworks associated with preparing the building platforms, the parking areas and the access road. This will involve a combination of cutting and filling. There is likely to be a surplus of soil requiring disposal.

4.2 Future Commercial and Residential Areas

There is the possibility of a future commercial development in the northwest corner of the site, on the corner of Ocean View Parade and Bayly Road. At the time of writing, specific development proposals for this area had not been developed and are likely to be some years away. Such a development is likely to require at least stripping of the surface soil for disposal and may require small excavations for building foundations.

Additionally, there is the future possibility of residential development at the far eastern end of the site, such as pole houses along the bank overlooking Ocean View Parade and conventional smaller houses on the flat land above.

The possibility of residential development has not been considered as part of this investigation.

8

² Based on BTW Company Ltd drawing Pavement Layout, Drawing No. 14504-01-01 Marae_Driveway Option 1, Drawing No. A1.05



5.0 Investigation and Risk Assessment Process

5.1 Conceptual Site Model

The potential effects on the marae project and future commercial development from site contamination are outlined in a preliminary site conceptual model set out below. The following is an analysis of potential contaminants, receptors and pathways (linkages) between the two.

5.1.1 Hazardous substances and potential contaminants of concern

Hazardous substances potentially exist on the site as a result of past activities or natural occurrences. Different parts of the site have different likelihoods of various substances:

- Natural hydrocarbons in soil or groundwater anywhere on the site (historically, oil and gas seeps occurred along the beach front);
- Hydrocarbons in soil and drilling waste from oil drilling activities at three well sites. Drilling waste is thought to exist in the low-lying ground near the soil mound, as discussed in the PSI (BTW, 2013);
- Hydrocarbons in groundwater from drilling activities from leaking drill sites and disposal of drilling waste below the watertable;
- Volatile hydrocarbons (including methane/natural gas and monoaromatic compounds) in soil gas and ambient air from natural sources or well sites;
- Heavy metals (principally lead from lead-based paint and lead flashings) and asbestos (from asbestos-cement cladding) in soil in the vicinity of historically demolished buildings;
- Heavy metals in drilling waste from cuttings or mud additives; and
- Nitrate and other contaminants in groundwater from the urupā (Note: No intrusive investigation is to be carried out where burials have occurred, therefore contaminants in soil within this area have not been considered).

5.1.2 Potential receptors

Potential receptors will vary depending on location within the site:

- Marae staff and marae users/visitors;
- : Users of a possible communal garden;
- : Staff and users of the future commercial zone;
- : Excavation and construction workers during redevelopment;

10

complete.

÷

÷

5.1.3

Potentially complete pathways are:

BAYLY ROAD - DETAILED SITE INVESTIGATION

Ocean View Parade:

wetland area; and

Exposure pathways

• Recreational users of the site:

- : Direct contact with soil by communal garden users;
- : Consumption of produce grown in communal gardens;
- : Consumption of hangi cooked food;
- Direct contact with soil or groundwater during construction, maintenance of landscaped areas or subsurface maintenance works;

: Maintenance workers involved in excavation, including off-site in

: Ecological receptors within the proposed lagoon and the existing

Possible future residents at the eastern end of the site;

Ecological receptors within the coastal marine area.

A human health or environmental risk can occur only where there is complete pathway between contaminant sources and a receptor. It is expected that the majority of the site will not have exposed soil, although there will be landscaped areas that may have exposed soil. Building floors, paved areas and grass will largely or completely prevent contact with soil and therefore direct exposure pathways are or will be incomplete for such areas. There is no known use of the shallow groundwater and apart from the spring being used to fill the lagoon, future use is not expected, therefore this pathway is not considered to be

As noted above, there is no known groundwater use in the vicinity.

- : Inhalation of hydrocarbon vapours;
- Possible future contact with soil in a potential future residential area at the eastern end of the site;
- : Discharge of groundwater to the lagoon and wetland; and
- : Discharge of groundwater to the coastal marine.

With respect to human receptors, recreational users of the site are unlikely to have significant exposure because contact with contaminated media will be slight or non-existent and exposure durations short. Similarly, most visitors/users of the commercial zone or marae will have insufficient exposure to contaminated media for a risk to arise. A different hazard may arise from ground gases, which may be explosive (between 5 and 15 % by volume in air for methane) if sufficient build-up occurs within buildings. While not a conventional hazard for contaminated land, it is appropriate to consider this given the proximity to well sites.

5.2 Investigation Rationale

BAYLY ROAD - DETAILED SITE INVESTIGATION

The overall rationale for the DSI was to determine whether any of the historical activities on the site have caused soil contamination that would affect the proposed marae development and future use. The rationale for the individual investigation areas is set out below.

5.2.1 Waitapu Urupā

00

As part of the DSI, TRC requested the extent of the urupā be defined as best as possible using geophysical techniques, the intent being to ensure intrusive soil sampling works were not carried out where human remains may exist.

The general location of the Waitapu Urupā is known within its larger legal boundaries, being generally north of the wetland in its eastern half and, within its western half, approximately northeast of a line running between the urupā entrance off Bayly Road down the slight depression in the ground to where the depression meets the wetland. However, it was considered possible that burials have extended beyond this approximate area. The intent was therefore to define the boundary, whether as generally disturbed ground or individual graves.

As the soil mound within the boundary of the urupā may require removal as part of the site redevelopment, the soil samples from here were scheduled for analysis of seven heavy metals; arsenic, cadmium, chromium, copper, lead, nickel and zinc.

As discussed in Section 2.1, suspected drilling mud was encountered in this area during drainage works (BTW, 2013). The investigation in this area aimed at re-finding the locations reported in BTW (2013) so as to take samples and also to excavate a limited number of further test pits to determine whether the suspected mud was more widespread. Soil samples were analysed for heavy metals, with selected samples analysed for total petroleum hydrocarbons (TPH).

5.2.2 Former bach and marae investigation

While residential use is not normally considered to be a contaminating activity, there is a potential for shallow soil contamination from the demolition of the historical baches and buildings, if that demolition was not carried out carefully. This is because the baches and buildings within this area may have had asbestos cladding and the use of lead-based paint and lead flashings on roofs and windows was common when the baches were constructed and through much of their life. It is assumed that the demolition of the baches and buildings previously on the



site may have left remnant materials and foundations buried at shallow depth under the current grass, the contaminants of concern being asbestos and heavy metals, predominantly lead.

Any remnant contaminated demolition material would be expected to be primarily a development and/or construction issue (asbestos-containing dusts and soil disposal) rather than a potential long-term health risk postdevelopment. Post development, there will be little if any exposed soil (landscaped areas would normally be within imported soil if contamination was excessive) and therefore human health risks should be low from any demolition material contamination.

Soil samples from this area were analysed for a suite of heavy metals, with selected samples also analysed for TPH and asbestos (presence/absence).

While historically there were a small number of houses further to the east of the site (Historical Photograph 1), any contamination in this area was expected to be isolated and will not present a risk for the current proposal (including recreational use). House locations further east were therefore not investigated.

5.2.3 Oil well investigation

Contamination may have occurred as a result of historical oil drilling activities and contamination may also have occurred as a result of natural oil and gas seeps. There was also a concern that capping of abandoned wells was not always carried out properly (some old wells had been discovered to have been plugged with logs), with consequent possibility of leakage of gas or hydrocarbons.

Excavation in the vicinity of Egmont 5 by TRC in 2002/2003 found evidence of hydrocarbons a few metres below the surface. Also, as noted above, what was thought to be drilling mud was encountered during recent drainage works near the proposed marae site (BTW, 2013).

It was therefore considered desirable to identify the exact location of the wells, and to determine whether any contamination exists, the nature and extent of that contamination and, if possible with respect to Egmont 5 and Moturoa 3, locate the wellheads and determine whether they had been properly capped.

5.2.4 Ground gas

The past oil exploration activities suggest the potential for ground gases, whether toxic (volatile hydrocarbons) or explosive (methane), in the vicinity of the marae and future commercial zone. As such, it was considered that an assessment of ground gas in the vicinity of these two areas should be undertaken to assess the possible health risks.



5.2.5 Groundwater and surface water investigation

There is a potential for ground and surface water contamination at the site from hydrocarbons as a result of both on and off-site oil exploration activities, and also from various contaminants and nutrients from the urupā. Groundwater discharges to the coastal marine area as seeps or via the site drainage system, and has the potential to impact the coastal ecology.

Groundwater samples collected from monitoring wells were therefore analysed for TPH and BTEX compounds, on the assumption of possible contamination from historic oil well drilling activities, with samples from up and downgradient of the urupā also being subject to analysis for nitrate, ammoniacal nitrogen and formaldehyde. Selected samples were also analysed for zinc following discovery of elevated zinc in surface water samples (see below).

The intention to develop a lagoon and wetland as part of the marae development raised the possibility of surface water contamination if the groundwater is contaminated (although it was subsequently discovered that the intention is to line the lagoon). Surface water samples from within the wetland were therefore analysed for a suite of dissolved metals including arsenic, cadmium, chromium, copper, lead, nickel and zinc, with surface water samples also being scheduled for TPH analysis.

5.3 Investigation Methods

5.3.1 Geophysical survey

Southern Geophysical Ltd (SGL) undertook a geophysical investigation of selected site areas between 30 June 2015 and 2 July 2015 using non-intrusive ground penetrating radar (GPR) and magnetometry techniques.

Ground penetrating radar is an electromagnetic method of imaging objects buried in the ground. Pulses of radio energy penetrate the ground and are reflected back depending on the properties of the ground. The technique is capable of "seeing" to depths up to 10 m depending on the ground conditions and radio frequencies used.

The GPR data was collected by SGL using a GSSI SIR-20 GPR system. The GPR system was moved along a series of parallel transects across each of the four areas surveyed. The survey was designed to provide data that could identify disturbed ground, buried linear features or filled-in excavations, such as remnant building foundations, demolition materials, burial sites or drilling mud pits. A total of 143 GPR transects were completed across the site.

Magnetometers are used to measure the magnetic fields of buried metallic objects in the ground. The magnetometer survey was undertaken in the expected vicinity of the buried wellheads of the former Egmont 5 and Moturoa 3

oil wells using a field calibrated standard proton magnetometer (Geometrics G-856AX).

The location of each magnetometer reading was accurately surveyed using a GPS system. The magnetometer surveys were designed to provide data that could identify a buried wellhead to a depth of approximately 4 m. The readings were stored by the instrument in the field and subsequently processed by SGL

The geophysical report provided by SGL is appended (Appendix F).

Four areas of the site were surveyed:

- : The eastern and western parts of the Waitapu Urupā.
- : The area of former baches/buildings.
- The vicinity of Egmont 5 oil well.
- The vicinity of the Moturoa 3 oil well.
- 5.3.2 Groundwater monitoring well installation

Groundwater was investigated by installing eight monitoring wells and sampling of groundwater and also the water from the spring.

Prior to the commencement of any drilling activities, a review of all utility services on, and in the vicinity of the site was carried out. Detect Services Limited was engaged to identify the locations of on-site underground services.

The drilling and installation of the groundwater monitoring wells was undertaken by DCN Drilling Ltd using a track-mounted EP26 sonic drill rig. The monitoring wells were located in the expected up and downgradient positions from the known and assumed locations of the three on-site oil wells, and the proposed lagoon area. The wells up and downgradient of Egmont 5 are also up and downgradient of the western end of the Waitapu Urupā. Some of the monitoring wells were moved from the originally intended locations because of topographical constraints and access difficulties, or the presence of services.

Soil sampling was carried out during the drilling of the boreholes for the monitoring wells. In general, the samples were not analysed, as soil at depth is not of concern for the project unless the contamination is volatile, but samples were to be analysed if signs of contamination such as hydrocarbons were found.

The groundwater monitoring wells were installed as follows:

 Monitoring wells comprised 50mm diameter uPVC casing and 0.5 mm machine-slotted well screens. The screened section of each well was targeted to intersect the watertable with approximately 2 m of the screen extending below the watertable to allow for groundwater fluctuation.

- The screened section was backfilled with Industrial Mineral's "K1" sand (max size 1mm) to slightly above the screen, as a filter pack, followed by blinding sand and bentonite clay (at least 0.5 m thick) near the surface to prevent water ingress.
- The wells were completed with a flush-mounted toby box cemented in at ground level (Photograph 8). The exception was MW5 which was finished with a raised security cap due to its location in the wetland area.

Individual installation details for each monitoring well are recorded on the appended geological logs (MW1 to MW8 in Appendix E).

5.3.3 Test pitting and hand augering

Following the geophysical survey at the site, an intrusive investigation was carried out from 6 to 10 July 2015, and on 17 July 2015, with further intrusive works undertaken on 28 September 2015.

Investigation locations were generally set out on an approximate 20 m sampling grid as it was assumed that remnant demolition material was spread around during the demolition process and subsequent re-grading of the site to its current level prior to establishing grass. Prior to excavation, a review of all available utility plans was undertaken and all test pit locations were cleared for underground services by Detect Services Limited. Shallow test pitting, hand augering, or a combination of both, were carried out in seven areas of the site:

- : The area of the former baches adjacent to ocean view parade;
- : The area of the proposed marae development;
- : In the vicinity of the Moturoa 2 oil well;
- : In the suspected vicinity of the Moturoa 3 oil well;
- : In the vicinity of the Egmont 5 oil well;
- : In the southern part of the soil mound within the Waitapu Urupā; and
- : Along the southern boundary of the Waitapu Urupā.

Test pits were excavated using a hydraulic excavator provided by City Care Limited. Soil samples were collected from the near-surface soils and from areas with any obvious contamination. Auger holes and test pits were backfilled and compacted upon completion of sampling.

Soil samples were collected either from soil piles placed by the excavator, or directly from the hand auger. Samples were collected into individual glass jars and containers supplied by the laboratory (RJ Hill Laboratories Limited) under PDP chain of custody procedures. The samples were sent to the laboratory

either on the day of sampling, or the following day (with samples chilled over-night). Samples were received by the laboratory the day following dispatch.

In areas considered to have possible hydrocarbon contamination, duplicate soil samples were collected for the purpose of field screening using a photo-ionisation detector (PID³). These samples were collected into re-sealable plastic bags, which were half filled and sealed. The samples were allowed to stand for several minutes prior to the plastic being pierced with the PID nozzle and measuring the headspace vapour.

All hand sampling equipment used during the investigation was decontaminated between sampling collection using Decon 90 solution and a water rinse. A fresh pair of nitrile gloves was used to remove each soil sample directly from sampling equipment prior to transfer to a sample jar.

5.3.4 Ground gas investigation

The ground gas assessment was carried out by two means; the installation of shallow vapour monitoring points and subsequent monitoring, and an instantaneous surface monitoring (ISM) survey using a highly sensitive portable methane meter. Seven monitoring points were installed at selected locations within the proposed marae footprint and the future commercial area, both locations where vapour intrusion into buildings could be a potential human health issue.

The typical installation of the vapour monitoring points comprised:

- Hand augering a 50mm diameter hole to approximately 1.5 m bgl;
- Backfilling of the hole to approximately 1 m bgl with fine gravel to act as a collection zone (K1 industrial minerals – 1 mm gravel);
- Inserting a 20 mm diameter uPVC pipe into the hole with slots in the lower 0.5 m section of piping;
- Backfilling the annulus of the hole with auger cuttings to approximately
 0.2 m below the surface, the remainder being sealed with bentonite clay;
 and
- Installing a cap with valve and polyethylene tubing (folded over and secured using a cable tie) on the uPVC pipe.

A photograph displaying the ground gas monitoring point installation is provided in Appendix D (Photograph 9).

The initial intent was not to find the exact composition of gases which might be present, which would require taking air samples for laboratory analysis. Instead,

³ A PID measures most volatile photo-ionisable compounds, including petroleum hydrocarbons, providing they have an ionisation potential below 10.6 eV.



portable instruments were used to detect the possible presence of methane (with a landfill gas meter) and general volatile organic compounds (with a highly sensitive PID). If volatile compounds were detected, by assuming whatever was detected was all benzene, which is generally considered the most toxic of the naturally occurring hydrocarbons, a conservative assessment could be made whether there was a concern for human health. The decision could then be made whether additional assessment was warranted.

Monitoring was undertaken using a calibrated ppbRAE 3000 (ppbRAE) and a GA2000+ landfill gas analyser. The ppbRAE is a highly sensitive PID which measures volatile organic compounds (VOCs) in air at concentrations down to a few parts per billion (ppb). It is a thousand times more sensitive than the standard PID commonly used for contaminated land work.

The GA2000+ is a portable landfill gas analyser which is capable of measuring methane, carbon dioxide, carbon monoxide, hydrogen sulphide and oxygen at an accuracy that allows risks to human health to be determined (explosive risk, toxicity risk, or depressed oxygen/asphyxiation risk, as the case may be). In this case the target gases were methane and oxygen. The GA2000+ is also capable of measuring atmospheric pressure.

The gas monitoring points were initially monitored a week after installation on 17 July 2015 and again on 29 September 2015. At each point the ppbRAE was initially connected to the monitoring point's tubing, forming a seal, before removing the cable tie to allow air to be drawn into the ppbRAE for two minutes. The GA2000+ analyser was then connected to the monitoring point and the concentrations of methane and oxygen recorded each minute over a five-minute period. Barometric pressure was recorded at the same time with the GA2000+ at each monitoring location.

In addition, on 17 July 2015 an ISM survey was performed across the former bach and marae investigation areas using a RKI Eagle 72 infrared detector (IRD) calibrated for low-level detection of methane. Eagle 72 IRDs are extremely sensitive instruments with the ability for real time monitoring of the selected gases at low parts per million (ppm) concentrations.

The ISM survey was conducted by:

- Walking a grid of approximately 10 15 m spacing over the investigation areas; and
- Targeting locations where services exit from the ground and where there were any observable cracks in the ground.

During the ISM survey the sample probe, with an inverted funnel on the end, was held as close to the ground as possible (<50 mm).



5.4 Applicable Criteria

5.4.1 Soil criteria

The results of the soil analysis from the investigation area have been compared to applicable guideline values in order to undertake a human health assessment.

Soil contaminant standards (SCS) contained in the MfE's *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health* (MfE, 2011b) were utilised for this investigation. In the case where no SCS values exist for a particular contaminant, the appropriate values were selected in accordance with MfE *Contaminated Land Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values* (MfE, 2011c). This document prefers standards from New Zealand where they exist but, in the case where no New Zealand standards have been developed, a risk-based overseas standard may be used as a substitute.

There are SCS contained in MfE (2011b) for all the heavy metals analysed in the investigation with the exception of nickel and zinc. For nickel and zinc, the results have been compared to the *Australian National Environmental Protection* (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013) criteria.

With respect to petroleum hydrocarbons, the appropriate guidance is contained in the *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand* (MfE, 2011a) (typically referred to as the *Petroleum Guidelines*) using the 'clay', 'silty clay' and 'sand' soil types, as appropriate to the encountered soil type at the particular location, and depths of <1 m bgl and 1 - 4 m bgl. These soil types and depths are considered to best represent the soils encountered during the investigation.

The SCS and other criteria have values for different generic site uses, reflecting the different risks appropriate to each site use. However, MfE (2011b) and NEPC (2013) do not provide SCS specific to the proposed use of the site. For the heavy metals, the commercial/industrial unpaved criteria from MfE (2011b) and NEPC (2013) have been used as a conservative comparison for the marae development and bach investigation areas. It should be noted that these areas will generally be paved when in use and therefore the criteria over-estimate the potential human health risk. Such a comparison is appropriate for an initial assessment, but a less conservative site-specific assessment would be needed if the initial assessment suggested a risk was possible.

For petroleum hydrocarbons, criteria are available in MfE (2011a) for the long-term industrial commercial scenario and the shorter-term excavation/maintenance scenario. As risks from hydrocarbon are predominantly from vapours, assessment for both indoor (paved) and outdoor scenarios is appropriate.



Given the possibility of future residential use at the eastern end of the site, the SCS for a residential scenario have been used to assess soil results from the vicinity of Moturoa 3 oil well.

Soil contaminant standards do not exist for the existing (and ongoing) land uses in the vicinity of Egmont 5 and the urupā (open space/cemetery). Recreational criteria are not appropriate for these areas as such criteria are for active recreation when a person might get dirty, rather than the expected passive use of these areas. Simply as a means of comparison, results have been compared with expected background (natural) concentrations. In the absence of any background soil contaminant values for the Taranaki Region, heavy metal concentrations in soil have been compared against background soil concentrations for the Wellington Region (URS, 2003). Copper is known to be naturally elevated in some Taranaki soils and the Wellington values may underestimate the upper bound for background concentrations for copper for the site.

Soil disposal may be required as part of the site redevelopment to achieve design levels. The nearest landfill is the Colson Road Landfill (a Class A landfill). Soil sample results from all investigated areas have therefore been compared to appropriate screening criteria from MfE's Hazardous Waste Guidelines Module 2: Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

The analysis of asbestos was intended to provide a preliminary determination of the presence or absence of asbestos within the soil. The results have therefore not been assessed against any specific criteria.

5.4.2 Groundwater and surface water criteria

Ground and surface water criteria have been taken from two documents. For petroleum hydrocarbons, the groundwater and surface water sampling results have been compared with the MfE (2011a) route-specific groundwater acceptance criteria via the inhalation pathway for commercial/industrial land use.

For all other contaminants, water samples have been assessed against guideline values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000). The ANZECC guidelines use a precautionary approach for the freshwater assessment with the values for 'highly disturbed ecosystems', for which the site best represents, being the same as for 'slightly-moderately disturbed systems'. In this case, the guidelines allow for less stringent aquatic protection levels, provided this is acceptable to stakeholders. Although the site is considered to be a represent a 'highly disturbed ecosystem' the values for 'slightly-moderately disturbed systems' have initially been utilised (95% species protection), as directed by the guidelines.



5.4.3 Ground gas criteria

The target gases for this investigation were methane and volatile organic compounds. As a preliminary screen, methane has been assessed against a precautionary fraction of its lower explosive limit (LEL), being 5% by volume in air. A fifth of the LEL, or 1% by volume, has been taken as the precautionary value.

The ppbRAE PID is not specific as to which volatile organic compounds are detected, however, a conservative approach has been adopted in the first instance. As noted earlier, it has been assumed that all of the gas detected by the ppbRAE will be benzene, the most toxic of the compounds likely to be present. Benzene being the sole vapour is actually highly unlikely; normally there would be a mixture of hydrocarbons within detected vapours.

If the concentration measured by the ppbRAE is below the MfE (2011a) commercial/industrial target indoor air concentration for benzene (13 μ g/m³ or 4.1 ppb), then the risk to human health from the vapours will be deemed acceptable. However, if the measured concentration is in excess of the MfE target air concentration, then further assessment will be required.

In the case of the ISM survey, the locations of ambient methane concentrations in excess of 50 ppm would warrant further investigation as this would indicate that methane is gassing from the ground.

6.0 Waitapu Urupā Investigation

6.1 Investigation Strategy

Prior to the geophysical survey by SGL, the legal boundaries of the urupā were marked out by NZ Geomatics Ltd to assist the laying out of the geophysical survey lines by SGL. The eastern (called Cemetery East by SGL) and western (called Cemetery West) areas of the Waitapu Urupā were surveyed using GPR.

The areas surveyed are shown in the geophysical report included as Appendix F (SGL Report, Figure 1) and a more detailed description of the geophysical techniques employed is provided in that report.

As the soil mound within the boundary of the urupā may require excavation and/or removal as part of the site redevelopment works, a small number of soil samples were collected for laboratory analysis.



6.2 Site Investigation Activities

Investigations within the Waitapu Urupā have been carried out as follows:

- During 30 June and 1 July 2015, a GPR survey of the eastern and western parts of the urupā was undertaken by SGL.
- On 17 July 2015, hand augering and soil sampling was carried out on the southern half of the soil mound.
- On 28 September 2015, eleven test pits were excavated within the legal extent of the Waitapu Urupā, but to the south of the expected extent of burials, to identify possible oil well drilling impacts (drilling mud, mud pits and other possible drilling remnants from activities associated with the nearby Egmont 5 well) and the suspected drilling mud identified in the BTW (2013) report.

6.2.1 Geophysical survey

The 'Cemetery West" area was positioned from near the western site boundary to the marked graves within the urupā and comprised an area of approximately 60 m by 30 m (SGL Report, Figure 5). The survey of the Cemetery West area was extended to cover the location of the Egmont 5 oil well to the south. The 'Cemetery East' area was positioned on what was considered to be the eastern boundary of the urupā and measured approximately 30 m by 25 m (SGL Report, Figure 6). A total of 31 and 28 transects, spaced at 1 m intervals, were surveyed in a northwesterly to southeasterly orientation across the two respective areas.

6.2.2 Soil sampling

Five hand auger holes (SS40 – SS44) were advanced on the southern portion of the soil mound to between 0.7 and 1.5 m. Auger holes were positioned to provide good coverage across the southern-most half of the soil mound. The northern portion of the mound was not investigated due to the probable presence of human remains.

A total of 16 soil samples were collected from the mound. Samples were obtained from the surficial soil and at 0.5 m intervals through the soil profile. Four samples, including both shallow and deeper samples (SS41 0.1, SS41 1.0, SS43 0.7, SS44 0.5), were sent for analysis of heavy metals.

The hand auger sample locations are shown on Figure 2 and a representative geological log of the mound (SS40 to SS44) is appended (Appendix E).

Eleven test pits (TP16 - TP26) were excavated on the southern boundary of the urupā to assess the presence of drilling mud. Test pits TP16 – TP19 were targeted to drilling wastes within the urupā associated with the Egmont 5 well, with test pits TP20 – TP26 targeted to locations of suspected drilling mud as

identified in the BTW (2013) PSI report. Soil samples were collected where field observations and field screening suggested the presence of material associated with drilling activities. Three samples were sent for laboratory analysis (TP16 2.0, TP18 2.7 and TP21 0.2). Samples were variously analysed for TPH and/or heavy metals based on PID and visual observations.

The test pit locations are shown on Figure 2 and three representative geological logs (TP16-18, TP20-21, and TP25) are appended (Appendix E)

6.3 Results

6.3.1 Observations

BAYLY ROAD - DETAILED SITE INVESTIGATION

Heterogeneous soil conditions were encountered within the mound, likely reflecting the reworked nature of this material. A surficial dark brown soil was initially encountered, below which sandy clay, sandy silt or fine sand with varying amounts of clay, was present. No human remains were found. Field screening of the samples using a PID identified soil vapour concentrations to be insignificant at less than 0.6 ppm.

The soils encountered in test pits TP16 – TP19 comprised clay topsoil to approximately 0.1 m bgl, underlain by sands and silts with peat being identified in TP17 at a depth of 2.3 m bgl. The soils encountered in test pits TP20 – TP25 comprised fine silty sands underlain by sandy clay.

The PID measurements from soils collected from the test pits ranged from 0.5 to 89.8 ppm (at 2 m bgl in TP16). Groundwater was observed to seep into the test pits at depths ranging between 1.8 m bgl (TP21) and 3.5 m bgl (TP18).

6.3.2 Geophysical survey

The GPR survey within the western area of the urupā identified:

- A linear feature in the northwestern area about 1.5 m bgl, orientated approximately east/west and extending for about 10 m;
- : A possible buried pipe/drain at the southern end of the survey area;
- A complex subsurface in the central survey area, interpreted as heavily reworked fill material;
- Some evidence of non-European burials (vertical/shallow/multi-person) were identified in the northeastern corner; and
- : No specific evidence of burials in the northwest corner.

The GPR survey within the eastern part of the urupā identified:

- Possible burial features below a fill layer in the north-western portion;
- : An in-filled gully in the south unlikely to contain burial locations;

00

- : A sequence of fill between 0.5 2 m thick across the entire area;
- A filled-in slope to the north, and rock material approximately 1.5 m below the surface in the central-western portion of the area; and
- A relatively undisturbed area to the southeast.
- 6.3.3 Soil sampling results and comparison with applicable criteria

The results of the laboratory analysis from the soil mound and test pits are presented in appended tables 1 and 2, respectively.

All soil samples from the mound returned heavy metal concentrations above laboratory detection limits for all metals tested, with the exception of cadmium in two samples. In comparison to expected natural background concentrations, copper was identified as elevated in all of the samples from the mound, however, the remaining results appear similar to expected natural concentrations.

The metal concentrations of all samples obtained from the soil mound were below MfE (2004) Class A landfill screening criteria.

Soil sample TP18 2.7 recorded cadmium, chromium and copper concentrations above the expected background soil concentrations. Sample TP21 0.2 recorded a possibly slightly elevated copper concentration. All other heavy metal concentrations were within the expected natural range.

Soil sample TP16 2.0 recorded a concentration of 28 and 550 mg/kg for the C_{10} - C_{14} and C_{15} - C_{36} hydrocarbon ranges, respectively. All other hydrocarbon concentrations were below the laboratory level of detection.

6.4 Assessment

All soil samples from the urupā soil mound reported copper concentrations above the possible background concentration but this is of no particular significance particularly as Taranaki soils commonly have naturally elevated copper. Otherwise the soil appears to be at natural concentrations. Based on the results, the soil could be disposed of as ordinary soil, but as the site is listed as a HAIL site the soil should be disposed of to landfill. The soil is acceptable at a Class A landfill. If obvious signs of contamination are observed during excavation this assessment should be revisited by consulting a suitably qualified and experienced contaminated land practitioner.

Soil samples collected along the southern boundary of the urupā returned some heavy metal concentrations above expected background concentrations and some elevated hydrocarbon concentrations. Given the depth of these identified impacts it is considered that these marginal impacts present minimal risk to human health.



7.0 Bach Investigation

7.1 Investigation Strategy

The bach investigation assessed the potential for shallow soil contamination arising from the historical demolition of baches that formerly occupied the northeast portion of the site (Photograph 4). The investigation area in relation to the site is shown in Figure 1, located between the current access to the site from Bayly Road and Ocean View Parade. The investigation area is shown in Figure 3, which overlays the 1949 aerial photograph on the present-day layout. Figure 3 also shows the location of the possible future commercial zone in the northeastern corner of the site.

7.2 Site Investigation Activities

Site activities within the bach investigation area were carried out as follows:

- On 30 June and 1 July 2015, SGL undertook GPR surveying of the investigation area to confirm the existence of remnant demolition material within the investigation area;
- On 6 and 7 July, and on 17 July 2015, hand augering and soil sampling was carried out by PDP in the investigation area in order to assess ground conditions and soil contamination;
- On 10 July 2015 three test pits were excavated in order to confirm the soil conditions within the investigation area;
- On 10 July 2015 two vapour monitoring points were installed at the locations shown on Figure 3 (VP6 and VP7);
- On 17 July 2015, monitoring of the two vapour monitoring points was undertaken and an ISM survey was carried out over the area proposed for future commercial development; and
- Additional monitoring of the two vapour monitoring points on 29 September 2015.

7.2.1 Geophysical survey

The GPR survey of the bach investigation was undertaken by means of a series of north/south and east/west transects, spaced between approximately 5 m and 15 m (SGL Report, Figure 2). A total of 23 transects were surveyed within the bach investigation area.

7.2.2 Soil sampling

As noted earlier, the bach area was sampled on a 20 m grid. Given the dimensions of the investigation area, the 20 m grid resulted in a single row of auger locations. To improve the coverage, a number of auger locations were also

placed at intermediate positions to supplement the planned grid locations and to target the building footprints of former baches.

A total of 14 hand auger holes (SS01 – SS09, SS35 – SS39) were advanced to between 0.5 and 1.5 m bgl as part of the sampling grid. The three test pits (SS45 – SS47) were excavated in the central and northern part of the investigation area to a maximum depth of 1.5 m bgl.

Thirty-four soil samples were collected from the surficial soil, at intervals throughout the hole where a change in soil type was encountered and from any areas of obvious contamination. Thirteen soil samples were selected for heavy metals analysis (SS01 – SS09, and SS39). The depths of soil samples analysed ranged between 0.1 m bgl and 0.6 m bgl. Three of these samples (SS04 0.3, SS07 0.6 and SS39 0.3) were submitted for asbestos analysis due to the presence of suspected asbestos containing material (ACM). The hand auger and test pit sampling locations are shown on Figure 3 and logs representative of the geology encountered are appended (Logs SS03, SS07 and SS09 – Appendix E).

7.2.3 Ground gas monitoring points

The two vapour monitoring points (VP6 and VP7) were located in the area in which future commercial development is proposed. The locations of the monitoring points are displayed on Figure 3.

7.3 Results

7.3.1 Observations

The soils encountered in auger holes and test pits generally comprised a surficial brown clay, underlain by a brown, silty clay, interpreted as fill material. The thickness of the silty clay fill ranged from 0.2 to 0.7 m and contained minor demolition materials in places, including brick, metal and occasional suspected cement-asbestos fragments (Photograph 10). Beneath this fill layer, black very fine sand was encountered, considered to represent undisturbed natural ground.

The PID measurements from soil collected from the area was within the detection limit of the PID (<0.3 ppm). No visual or olfactory hydrocarbon impacts were observed at any sampling location. Groundwater was not encountered in any auger or test pit location.

7.3.2 Geophysical survey

The GPR survey (appendix F) across the bach investigation area indicated areas of subsurface disturbance, including:

• A filled-in channel area at the eastern end, possibly relating to subsurface excavation or remnant demolition waste material; and

- : A deep, 'chaotic' fill area at the western end.
- 7.3.3 Laboratory results and comparison to applicable criteria

The results of the laboratory analysis are presented in Table 3.

All soil samples analysed from the bach investigation returned heavy metal concentrations above the laboratory detection limit, with the exception of arsenic in samples SS08 0.3 and SS09 0.3, and cadmium in SS07 0.6. None of the analytical results for metals exceeded the utilised SCS.

Asbestos fibres, including Amosite and Chrysotile, were detected in all three samples submitted for analysis. The asbestos was described by the laboratory as both ACM debris and as loose fibres.

Eight samples exceeded MfE Class A landfill screening criteria for metals that included copper, lead and zinc. Two of these samples were from sample locations (SS01 and SS39) within the area proposed for future commercial development.

7.3.4 Ground gas

The ground gas results from the vapour monitoring points VP6 and VP7 are presented in appended Table 4.

The peak PID vapour concentrations recorded for monitoring points V6 and V7 on 17 July 2015 were 1048 ppb and 318 ppb, respectively, measured in the initial 10 seconds of monitoring. However, the peak concentrations are not considered representative, and the concentrations settled down to 316 ppb and 226 ppb, respectively. During repeat monitoring on 29 September 2015, the peak PID vapour concentrations for monitoring points V6 and V7 were 846 ppb and 616 ppb, settling down to 81 ppb and 153 ppb, respectively.

The peak methane concentrations recorded were 0.1% (VP6 and VP7 on 17 July 2015). The minimum oxygen concentration recorded was 16.3% (VP6 on 29 September 2015).

All methane concentrations measured during the ISM survey of the investigation area were ≤25 ppm.

7.4 Risk Assessment

All soil samples from the bach investigation area complied with the applicable health criteria for heavy metals, indicating that heavy metal contamination in the soil at the sampled locations presents an acceptable risk to human health under the proposed land use scenario.

The presence of loose asbestos fibres in all of the samples analysed for asbestos indicates that a possible health risk could arise from asbestos-containing dust

00

being mobilised during soil disturbance as part of the redevelopment. This should be addressed at the time.

The analysis results for soil from many locations within the bach area exceed the screening criteria for a Class A landfill. This does not mean the soil would not be acceptable as acceptance is by means of compliance with toxicity characteristic leaching procedure (TCLP) criteria. Such testing has not been carried out, but based on PDP's experience of such tests, most if not all of the soil should be acceptable. However, as the soil contains asbestos, it will be classified as special waste by the landfill regardless of leaching test results.

Although the majority of ground gases were present in concentrations below the various trigger values, concentrations of organic vapour measured by the ppbRAE in monitoring points VP6 and VP7 exceeded the target indoor air concentration for benzene during both monitoring events. Given the location of the monitoring points within the area of proposed commercial development, and assuming that all VOCs are benzene, a possible vapour intrusion risk may exist to occupants of any future buildings constructed as part of the site redevelopment. Further assessment at the time of any future development is recommended to evaluate the health risk from possible vapour intrusion into future buildings. Similar evaluation for the marae buildings found the risk was acceptable (see below).

Given that the ISM survey results fell below the preliminary trigger value, further assessment of ambient methane concentrations is not required.

8.0 Investigation in Vicinity of Proposed Marae

8.1 Investigation Strategy

In common with the bach investigation, the investigation in the vicinity of the marae was based on possible shallow soil contamination from the demolition of baches and buildings, and the possibility of hydrocarbon vapours emanating from the ground. The investigated area is shown on Figure 1.

The investigated area was based on the location of the historical baches and buildings in 1949, overlain in Figure 4. Figure 4 also shows the sampling locations and the footprint of the proposed marae development.

8.2 Site Investigation Activities

The marae investigation site activities were carried out as follows:

- Between 30 June and 2 July 2015, SGL undertook the GPR survey to confirm the existence of possible remnant demolition material;
- Between 7 and 9 July, and on 17 July 2015, test pitting and soil sampling;
- On 10 July 2015, five ground vapour monitoring points were installed (VP1 - VP5) within the proposed footprint of the marae buildings;

- On 17 July 2015 the vapour monitoring points were monitored and an ISM survey completed with further monitoring of the vapour points being undertaken on 29 September 2015;
- Toxicity characteristic leaching procedure testing of selected samples for waste disposal; and
- : Ground gas modelling assessment.
- 8.2.1 Geophysical Survey

The GPR survey in the vicinity of the proposed marae consisted of approximately north/south and east/west transects in areas that could be accessed, spaced approximately between 5 and 15 m (SGL Report, Figure 2). The GPR survey included 22 transects within the investigation area.

8.2.2 Soil sampling

Soil samples were taken on a grid aligned to best correspond to the former location of the baches and buildings. The locations also targeted the footprint of the proposed marae. The grid spacing was approximately 20 m east-west and 10 m north-south. Sampling locations included three hand auger holes (SS10, SS14 and SS15) advanced up to 0.6 m bgl and 22 test pits (SS011 - SS13, SS16 SS20, SS20A, SS21 – SS31, SS33 and SS34) excavated to a maximum depth of 4 m bgl.

Seventy soil samples were collected from the sampling locations. Twenty-eight soil samples were selected for a heavy metal analysis from sampling locations SS10 – SS17, SS19, SS20, SS20A, SS21, SS22, SS23, SS28, SS29, SS30 and SS34. The depths of soil samples analysed ranged between 0.1 m and 3.0 m bgl, the majority being obtained from near-surface soils. No TPH analyses were carried out given the absence of observed hydrocarbons (see next section).

The deeper samples (SS21 1.5, SS21 3.0 and SS34 1.5) were analysed as a result of the presence of demolition material (brick fragments, pipe, plastic) in these locations.

Five samples (SS10 0.1, SS15 0.3, SS19 0.3, SS20A 0.3 and SS23 0.3) were analysed for asbestos as a result of suspected ACM material being observed at these locations.

Logs representative of the geology encountered in the investigation area are appended (Logs SS10, SS13, SS15, SS17, SS20a, SS21, SS22 and SS23 – Appendix E).

8.2.3 Ground gas monitoring points

The five vapour monitoring points (VP1 – VP5) were located in the central part of the investigation area, within the proposed marae footprint. Two of the

monitoring points (VP 1 and VP2) were positioned so as to intercept possible ground gas from the Moturoa 2 oil well vicinity, northeast of the investigation area.

The locations of the monitoring points are displayed on Figure 4.

8.3 Results

8.3.1 Observations

The soils encountered in the vicinity of the marae generally consisted of a surficial brown clay underlain by brown, silty clay, interpreted as fill. The silty clay ranged in thickness across the investigated area, being absent in northwest and southeastern parts of the area, and up to 1.7 m thick in the central area. The silty clay commonly contained waste materials including glass, plastic, metal, brick, wire, concrete and terracotta (Photographs 11 and 12). Waste material was particularly common in the vicinity of the Moturoa 2 oil well (Photograph 13). Suspected ACM was found at locations SS10 and SS15.

The silty clay was underlain by black, fine sand considered to be natural dune material. This was encountered both at the surface (in the northwest and southeast), and, where overlain by clay, at a depth of 2 m bgl. In places the sand had been disturbed/reworked and these areas contained demolition-type materials.

The PID measurements from soil collected from the area ranged from the instrument's detection limit up to an insignificant 3.7 ppm. No hydrocarbon odour or visible hydrocarbon impacts were observed at any sampling location.

Groundwater was observed in four locations (SS12, SS13, SS21 and SS26) in the western part of the investigation area, ranging from 1.0 to 4 m bgl.

8.3.2 Geophysical survey

The GPR survey across the marae investigation area identified a large filled-in channel-like area in the central and northern portion, possibly relating to subsurface excavation or remnant demolition waste material.

8.3.3 Soil sample results and comparison to applicable criteria

The results of the laboratory analysis are presented in tables 5 and 6.

All analysed soil samples collected in the vicinity of the proposed marae returned heavy metal concentrations above the laboratory detection limit, with the exception of arsenic and cadmium in a number of samples. Lead and copper were noted to be significantly elevated (up to 1,710 mg/kg and 1,230 mg/kg respectively) in a number of samples, however none of the concentrations exceeded the applicable health criteria utilised for the site.

Chrysotile asbestos fibres were detected in three of the samples submitted for analysis (SS10 0.1, SS15 0.3 and SS20A 0.3). The asbestos was identified as ACM debris (SS15 0.3 and SS20A 0.3) and as loose fibres (all samples).

The majority of samples collected (20 out of 34) exceeded Class A landfill screening criteria for copper, lead and zinc. Given the screening criteria exceedances, five samples with the highest concentrations (SS11 0.3, SS15 0.1, SS20 0.2, SS29 0.1, and SS33 0.4) underwent additional TCLP analysis. All samples complied with the Class A landfill leachate criteria.

8.3.4 Ground gas

DO

The ground gas results from vapour monitoring points V1 - V5 located in the vicinity of the proposed marae are appended (Table 4).

Peak PID vapour concentrations for the July monitoring ranged from 236 ppb (VP5) to 976 ppb (VP2), with concentrations settling to a more representative range of between 130 ppb (VP5) and 330 ppb (VP1).

Peak vapour concentrations for the September monitoring ranged from 276 ppb (VP3) to 843 ppb (VP4), with concentrations settling to between 65 ppb (VP1) and 241 ppb (VP4).

The peak methane concentration for all monitoring points (VP1 – VP5) was 0.1%. All methane concentrations measured during the ISM survey were ≤15 ppm.

8.4 Assessment

8.4.1 Soil risk assessment

All soil samples collected in the vicinity of the proposed marae development complied with the applicable heavy metal human health SCSs, indicating the heavy metal contamination in the soil at the sampled locations presents an acceptable risk to human health under the proposed land use scenario.

The detection of loose asbestos fibres in three samples from the marae investigation area indicates a possible health risk could arise from asbestos-containing dusts during any soil disturbance. Precautions against mobilising air-borne asbestos fibres are likely to be required during the development works.

The possibility of being exposed to contaminants through hangi-cooked food is not considered in the assumptions used to derive the SCSs. Such exposure is most likely through the presence of volatile hydrocarbons, rather than non-volatile contaminants, and may be no more than tainting of the food if hydrocarbons were to exist. Given the apparent absence of hydrocarbons in the marae vicinity, the risk may be low. However, once the location of the hangi is chosen, it is recommended the vicinity be sampled.



Leaching tests for heavy metals demonstrated that surplus soil can be disposed of at a Class A landfill, however, the presence of asbestos means that the soil will be regarded as special waste.

8.4.2 Vapour risk assessment

The ISM survey results fell below the preliminary trigger value and further assessment of ambient methane concentrations is not required.

In the first instance, ground gas concentrations were compared with target air concentrations. As noted earlier, this is conservative.

The concentrations of methane within all monitoring points were below the chosen trigger value of 1%. However, in all cases, the volatile organic vapour concentrations were orders of magnitude above the screening target air criteria of 4.1 ppb. This indicated a need to carry out a less conservative analysis to allow for attenuation between the ground and indoor airspaces.

Vapours can migrate through cracks in a concrete floor into a building. This is known as vapour intrusion, and is driven by air pressure differences between the ground and the indoor space. However the concentration of vapour that builds up indoors will be less than the concentrations in the ground because of resistance to vapour flow and dilution in the building. It is possible to estimate the concentration of vapours that would exist in the internal spaces of the proposed marae. The vapour intrusion calculations have been carried out using industry standard modelling software, RISC5⁴, assuming all the vapours were benzene (an unlikely and therefore conservative situation).

The model assumed a floor thickness of 100 mm), a density of cracks of 0.01 and a ventilation rate of two air exchanges per hour, the latter two values being defaults from MfE (2011a).

It is also necessary to choose particular spaces to model. Small spaces generally have greater build-up of vapours than large spaces. The modelling was undertaken for four spaces, including the wharekai, a staff room, an ablutions and storage room, and the wharenui for two different vapour concentrations representing two different monitoring points. The dimensions of these spaces are shown in Table 7.

While the sub-slab vapour concentrations varied throughout the monitoring period, it is assumed for the purposes of the vapour intrusion modelling, that the highest concentrations measured for each vapour point will occur under each proposed room. The modelling software assumes that no biodegradation will occur as vapours migrate to the surface, although it is likely that this will occur.

⁴ See <u>http://www.bprisc.com/</u>

Results of the calculations are summarised in Table 7. Predicted indoor air vapour concentrations ranged from 0.0006 to 0.013 mg/m³, which are all within . the MfE (2011a) target guideline concentration for benzene for commercial/industrial land use. Consequently, the risk from vapour intrusion is acceptable for the measured concentrations.

9.0 Oil Well Investigation

BAYLY ROAD - DETAILED SITE INVESTIGATION

9.1 Investigation Strategy

The investigation of the Moturoa 2, Moturoa 3 and Egmont 5 oil wells aimed to determine the location of the wells, where not otherwise known, and investigate any historical or natural contamination associated with oil exploration activities in the vicinity of the wells.

The exact location of Moturoa 2 and the approximate location of Egmont 5 were known prior to the investigation, however, due to the early date of drilling and the lack of available information, only the approximate position of Moturoa 3 was known.

The Moturoa 2 and Moturoa 3 investigation areas and soil sampling locations are shown in Figure 5 and the location of the Egmont 5 well is shown in Figure 2.

9.2 Site Investigation Activities

The oil well site investigation activities were carried out as follows:

- On 30 July 2015, vegetation was cleared by City Care on the bench thought to be the possible location of Moturoa 3;
- Between 30 June and 2 of July 2015, SGL undertook geophysical surveying at and around the locations of Moturoa 2, Moturoa 3 and Egmont 5, in an attempt to identify features such as former flare pits, drilling waste, and potential fill material;
- On 8 July 2015, test pitting and soil sampling was carried out on the cleared bench area;
- On 9 and 10 July 2015, test pitting and soil sampling was carried out in the vicinity of Moturoa 2; and
- On 28 September 2015, test pitting and soil sampling was carried out in the vicinity of Egmont 5.

9.2.1 Geophysical survey

The GPR survey in the vicinity of the Moturoa 2 oil well was included as part of the bach and marae investigations. A total of 16 transects in a north-south and

east-west orientation were completed, spaced between approximately 5 m and 20 m apart (SGL Report, Figure 2).

Two GPR transects were completed across the northern part of the cleared Moturoa 3 bench area, in an approximate northeast-southwest orientation and spaced approximately 3 m apart (SGL Report, Figure 3). A magnetometer survey, consisting of more than 50 data points was also undertaken across the cleared area.

As describe in Section 6.2, the GPR survey of the urupā (SGL Report, Figure 4) was extended to include the area of the Egmont 5 oil well. A magnetometer survey was also conducted, consisting of over 100 data points using an evenly distributed grid pattern. Data points were spaced between 1 and 3 m apart.

9.2.2 Soil Sampling

9.2.2.1 Moturoa 2

Seven test pits (TP1 – TP7) were excavated around the Moturoa 2 oil well. Test pits extended laterally out from the oil well compound between 7 and 10 m and were excavated to between 1.1 and 3.5 m bgl.

Fourteen soil samples were collected from the test pits from areas of obvious contamination such as suspected oil well features including drilling mud and/or cuttings. Soil sample depths ranged from 0.5 to 2.1 m bgl. Nine samples (TP1 0.7, TP2 0.6, TP3 0.6, TP5 0.7, TP5 1.2, TP6 0.5, TP6 2.0, TP7 0.4 and TP7 2.1) were analysed variously for heavy metals and TPH. Sample TP6 2.0 was submitted for asbestos analysis as suspected ACM was identified.

Test pit and sampling locations are shown on Figure 5 and a representative log of the encountered geology IS appended (TP1 – 7 in Appendix E).

9.2.2.2 Moturoa 3

Five test pits (TP8 – TP12) were excavated along the bench area in the approximate Moturoa 3 oil well location (Photograph 14). Test pits were spaced approximately 5 m apart to give general coverage of the bench to target anomalies identified in the geophysical survey.

Test pits were excavated to between approximately 3.0 and 4.0 m bgl. Eleven samples were collected from the test pits, from depths of between 0.1 m to 4 m bgl. Two samples (TP8 0.1 and TP9 0.1) were analysed for heavy metals and one sample (TP8 0.5) was analysed for TPH, although no obvious signs of contamination were observed (see Section 9.3.1).

The test pit and sampling locations are shown on Figure 5 and representative geological logs (TP8 and TP10) are contained in Appendix E.

9.2.2.3 Egmont 5

Four test pits (TP13 – TP15) were excavated around the Egmont 5 oil well. Test pits were excavated to depths between 4 and 5 m bgl.

Four soil samples were collected from the test pits from areas of obvious contamination and were analysed for TPH and heavy metals.

Test pit and sampling locations are shown on Figure 2 and a representative log of the encountered geology (TP13 – TP15) is presented in Appendix E.

9.3 Results

9.3.1 Observations

9.3.1.1 Moturoa 2

In general, a brown silty clay was encountered in the Moturoa 2 test pits which was interpreted as fill. It contained demolition and refuse-type materials to a depth of up to 2.1 m bgl (Photograph 15). The fill was underlain by black, fine sand considered to be undisturbed dune sand.

The fill material typically consisted of general refuse such as metal, wood, concrete, ceramic pipe, plastic and electrical insulators (Photograph 16). Suspected ACM was found in test pit TP6 between 1.5 and 2.0 m bgl.

A 0.1 m thick lens of suspected drill cuttings was identified at 0.4 m bgl in two test pits (TP2 and TP4) to the east of the oil well compound. The material comprised compacted clay containing crystalline sulphur and other minerals.

Other evidence of the former oil well (e.g. flare pits, mud pits, etc.) was not identified in any of the other test pits.

The PID measurements from test pits ranged from the instrument's detection limit to 6.3 ppm. No groundwater was encountered in any of the test pits.

9.3.1.2 Moturoa 3

The test pits in the assumed vicinity of Moturoa 3 generally encountered a fine black sand up to 1 m thick underlain by brown silty clay between 2.0 - 2.7 m thick, beneath which a greyish-brown fine to medium sand was found (Photograph 17). Test pit TP8, at the northeast end of the bench, was the exception. Black/brown fine sand extended to the full depth of this pit.

No evidence of former oil well activities was identified in any of the test pits. The PID measurements ranged from the instrument detection limit to 18.0 ppm.

9.3.1.3 Egmont 5

00

The material encountered in the Egmont 5 test pits generally consisted of clay topsoil underlain by fine sands and silty clays. A large concrete footing, likely associated with the former pumpjack (beam pump or "nodding donkey"), was observed in TP14 at a depth of 0.5 m bgl (Photograph 18).

The PID measurements ranged from the instrument detection limit to 390 ppm (TP13A 2.5). Groundwater was observed at depths ranging between 2.5 (TP14) and 4 m bgl (TP13a). Groundwater was not observed in TP15.

9.3.2 Geophysical survey

The results of the geophysical surveys to investigate oil wells included:

- Moturoa 2: Extensive anomalous areas to the east and southeast of the oil well, orientated east/west and described as deep 'chaotic' fill. Anomalies are suggested to relate to excavation or remnant waste material.
- Moturoa 3: An anomalous zone was detected in the eastern part of the bench, interpreted as 'disturbed'. No magnetic anomalies were identified.
- Egmont 5: A large magnetic anomaly identified in the investigation area indicative of the buried wellhead. The co-ordinates of the anomaly were measured as 1690132E, 5675837N (NZTM).

9.3.3 Laboratory results and comparison to applicable criteria

The results of the laboratory analysis from the Moturoa 2, Moturoa 3 and Egmont 5 investigations are presented in tables 8 to 13.

All soil samples analysed from the Moturoa 2 and Moturoa 3 investigations returned heavy metal concentrations above the laboratory detection limit, with the exception of cadmium and arsenic in some samples. None of the analytical results for metals exceeded the utilised SCS for the Moturoa 2 and Moturoa 3 investigation areas, with all Moturoa 3 results appearing similar to expected background concentrations. Three samples from the vicinity of the Moturoa 2 oil well were found to exceed the MfE Class A landfill screening criteria, although it is expected the samples would comply with TCLP leaching criteria if tested.

Four samples analysed for TPH (TP2 0.6, TP5 0.7, TP5 1.2 and TP7 2.1) from the vicinity of Moturoa 2 oil well returned low concentrations of C_{15} - C_{36} hydrocarbons. The two remaining samples (TP3 0.6 and TP7 0.4) returned hydrocarbon concentrations below the laboratory detection limit. All samples from the Moturoa 2 oil well location complied with MfE (2011a) Tier 1 acceptance criteria.

00

Chrysotile asbestos fibres were detected in the soil sample submitted from the vicinity of Moturoa 2. The asbestos was identified as asbestos-cement and as loose fibres.

Heavy metal concentrations for Egmont 5 soil samples appear typical of background concentrations. However, all four samples analysed for TPH from the vicinity of Egmont 5 recorded elevated hydrocarbon concentrations with TPH concentrations ranging from 330 (TP13 3.0) to 8,100 mg/kg (TP13A 2.5).

9.4 Risk Assessment

All soil samples collected in the vicinity of Moturoa 2 and from the bench area in the assumed approximate location of Moturoa 3, complied with the applicable heavy metal health SCSs and hydrocarbon acceptance criteria. This indicates the soil in the sampled locations presents an acceptable risk to human health under the proposed land use scenarios.

The presence of ACM in one location near Moturoa 2 does not indicate a particular risk provided soil is not disturbed in this area, however, if development works extend into the fill containing demolition-type material, then a possible health risk could arise if asbestos-containing was mobilised.

Although some of the soil results around the Moturoa 2 oil well do not meet the Class A landfill preliminary screening criteria, it is expected that the soils would meet the TCLP criteria on the basis of the TCLP testing already undertaken within the marae development area. However, the presence of asbestos means that the soil will be regarded as special waste.

No development work is planned for the vicinity of Moturoa 3, however the soil appears to be consistent with natural, uncontaminated soil.

Hydrocarbon impacts were identified in all samples obtained from the vicinity of the Egmont 5 oil well. As noted earlier, there are no appropriate human health standards or guidelines for hydrocarbons for the expected limited use of the vicinity of Egmont 5 (and the southwestern part of the site generally). Given this limited use and the depth of the identified impacts, people are unlikely to come into contact with the impacted material. It is therefore considered that the identified impacts at Egmont 5 pose a minimal risk to human health.

10.0 Groundwater Investigation

10.1 Investigation Activities

The groundwater investigation activities were carried out as follows:

 Between 2 and 9 July 2015, DCN Drilling completed borehole drilling and installation of eight groundwater monitoring wells; 36

- On 16 July 2015, groundwater monitoring and collection of groundwater samples for laboratory analysis;
- : On 21 July 2015, the survey of monitoring well levels and locations; and
- On 29 September 2015, follow-up monitoring and collection of groundwater samples from selected wells.

10.1.1 Groundwater Monitoring Well installation

As noted earlier, groundwater investigation was carried out through the installation of groundwater monitoring wells along four transects across the site. The installation of monitoring wells was carried out following the geophysical survey by SGL, with the objective of more accurately locating the groundwater monitoring wells up and downgradient of the former oil wells. The lack of success finding evidence of Moturoa 3 means the monitoring wells for this well are no more than approximate. The locations of the eight monitoring wells are shown on Figure 6.

Prior to the drilling activities, each well location was checked for underground services and the well locations hand-cleared to depths of between 1.0 and 1.5 m bgl. The wells were installed to depths of between 3 and 12 m bgl. Individual installation details for each monitoring well are recorded on the appended geological logs (labelled MW1 to MW8 in Appendix E).

Following installation, the well levels (relative to mean sea level - Taranaki Datum 1970) and locations were surveyed by NZ Geomatics Ltd.

10.1.2 Soil sampling

Soil samples were typically collected at 0.5 m intervals down to 1.5 m bgl, below which deeper samples were collected at 0.5 m intervals above and below the expected groundwater level in each borehole.

Field screening of soil was undertaken using a PID during drilling. Soil samples were to be analysed where higher PID readings were recorded, however, as all PID readings were low (maximum of 3.1 ppm), no samples were analysed.

10.1.3 Groundwater Monitoring and Sampling

Groundwater sampling was undertaken in two phases, on 16 July and 29 September 2015.

During each phase of groundwater monitoring hydrocarbon vapours in the well headspace were first measured using a PID, following which the presence of light non-aqueous phase liquid (LNAPL) at the watertable was checked and the depth to water measured using an intrinsically safe interface probe (capable of detecting both water and separate phase hydrocarbons). Product finding paste placed on the tip of the probe was used to further check the presence of LNAPL. pop

BAYLY ROAD - DETAILED SITE INVESTIGATION

Groundwater level measurements were taken relative to the top of the PVC well casings.

The groundwater levels were calculated for each monitoring well in terms of metres above mean sea level (m amsl). A summary of the well and water level data is presented in Table 14. Groundwater contours and water levels are shown on Figure 6.

Prior to taking groundwater samples from each well, the wells were purged of at least three times the well volume or until the well was dry, and until key groundwater parameters (pH and electrical conductivity) had stabilised. Once purged, groundwater samples were collected from the wells using disposable plastic bailers. Samples were collected directly into laboratory-supplied bottles. Quality control/quality assurance samples were also collected during the July monitoring event.

All samples were stored in chilled containers and sent via courier to RJ Hill Laboratories Limited on the day of sampling, and received by the laboratory the day after the samples were dispatched from New Plymouth.

For the September monitoring event, groundwater samples were only collected from the three wells upgradient of the wetland area (MW4, MW5 and MW6), these being analysed for zinc. The follow-up zinc analysis was to ascertain whether zinc was naturally elevated in the groundwater, following elevated zinc being identified in the spring water in the earlier phase of sampling.

The sample chain of custody sheets and the groundwater monitoring sheets, with details of the purging process and field observations are appended (Appendix G and H respectively).

Purged water from the monitoring was placed into drums on-site and then disposed of by InterGroup Limited (waste manifest documentation is presented in Appendix I).

10.2 Results

10.2.1 Observations

10.2.1.1 Geology

The natural black sand geology encountered in the eight monitoring wells was consistent with the expected geology (i.e. beach deposits – Photograph 19). Surface fill material was encountered in all boreholes ranging from 0.1 to 2.2 m deep, with the most significant filled areas located in the central (MW3 and MW4) and southwestern (MW6) areas. In addition, what is thought to be approximately 1 m of reclamation fill associated with Port Taranaki's development of Ocean View Parade was encountered in MW8, which was located in the northeastern corner of the site on Ocean View Parade.



10.2.1.2 Well monitoring

Photoionisation detector headspace readings in the wells ranged from 0.2 ppm (MW5) to 1.8 ppm (MW6) during July and insignificantly low readings during the September monitoring event (Table 14). No measurable LNAPL was observed in any of the monitoring wells during either groundwater monitoring events. However, minor hydrocarbon sheen was observed on water purged from wells MW1, MW2 and MW6 in July event but no sheen was observed in September.

Groundwater was measured at depths between 2.34 m amsl (MW1, near Ocean View Parade) and 8.71 m amsl (MW5 on higher ground below the railway) on 16 July 2015 and depths of 2.25 m amsl (MW1) and 8.75 m amsl (MW5) on 29 September 2015.

Groundwater flow direction was confirmed to be in a northerly direction (Figure 6), with expected anomalies around the wetland area.

10.2.2 Groundwater sampling results compared with applicable criteria

The results of the groundwater analysis are presented in Table 15 and copies of the laboratory reports are appended.

All groundwater samples returned concentrations of hydrocarbons below the laboratory limit of detection.

The well downgradient of the urupā (MW1) returned concentrations of ammoniacal nitrogen, nitrite and nitrate of 0.29 mg/L, 0.009 mg/L and 0.23 mg/L, respectively, with concentrations of formaldehyde below the laboratory level of detection. The concentrations of these analytes in the upgradient well (MW6) were below the laboratory detection limit with the exception of nitrate, which returned a concentration of 3.1 mg/L.

Zinc concentrations ranged from 0.0038 to 0.0123 mg/L, in the upgradient wells monitored in September.

All of the samples analysed reported petroleum hydrocarbon concentrations below the applicable MfE Tier 1 groundwater acceptance criteria via indoor/outdoor air inhalation pathway in the context of a commercial/industrial land use. Nitrate in MW6 was noted to exceed the preliminary trigger value with ammoniacal nitrogen falling below the utilised criterion. Zinc concentrations in MW5 exceeded the ANZECC freshwater (95% protection) trigger value.

10.3 Risk Assessment

All of the samples collected from groundwater beneath the site complied with applicable groundwater acceptance criteria with the exception of the result for zinc in MW5 and nitrate in MW6, both of which exceeded the freshwater trigger value (95% level of species protection) but met the 80% species protection value which is considered more appropriate for the site. The zinc concentration in the

groundwater appears to be naturally slightly elevated (zinc was also elevated in the spring and wetland – see below).

It is also considered that the off-site risk to the marine environment is acceptable due to the large available dilution potential meaning that the slight exceedance of the marine trigger value for nitrate is not considered significant.

It is therefore considered, in the context of the proposed development, that the risk to human health (volatilisation from the watertable) and other environmental receptors is acceptable.

11.0 Surface Water Investigation

11.1 Site Investigation Activities

To investigate the possibility of surface water contamination in the proposed lagoon, an assessment of surface water at the site was carried out. Focus was placed on the spring and wetland area, as water from the spring will be used to fill the lagoon.

On 17 July 2015, the wetland area was inspected and water samples were collected from pooled water along the western boundary of the wetland area (SW01) and from pooled water from the spring (SW02). On 29 September 2015, follow-up water samples were collected from SW02 and from within a manhole (SW03) that receives water from the complete wetland area (Photograph 20).

The samples were collected into laboratory-supplied containers, chilled and sent to RJ Hill Laboratories Limited on the day of sampling, with the samples received the following day. Sample chain of custody documentation is appended.

11.2 Results

11.2.1 Observations

During the July sampling event, locations SW01 and SW02 possessed a metallic sheen on the water surface (Photograph 21). There was no observable flow at these locations. A metallic sheen was not observed at locations SW02 and SW03 during the September monitoring event. Orange iron precipitates were noted on the vegetation surrounding sampling locations SW01 and SW03. Water was observed to be flowing into the manhole at an estimated 0.25 L/s.

11.2.2 Sampling results and comparison with applicable criteria

The results of the surface water analysis are presented in Table 16 and copies of the laboratory reports are appended.

The surface water samples returned concentrations of dissolved metals above the laboratory level of detection for copper, lead and zinc. Zinc returned the



00

highest concentrations, ranging from 0.0016 mg/L (SW01) to 0.0173 mg/L (SW02).

Concentrations of hydrocarbon residues were below the laboratory detection limit in the sample collected from the spring (SW02) and the manhole (SW03).

All surface water samples complied with heavy metal water quality criteria for protection of the aquatic environment with the exception of zinc in both samples obtained from SW02 and the sample obtained from SW03, with concentrations exceeding the ANZECC (2000) freshwater quality guideline (95% protection). However, the samples obtained during September were noted to meet the 90% level of protection, the sample obtained from SW02 in July marginally exceeding this but meeting the 80% level of protection.

Zinc concentrations for the sample obtained from SW02 in July also marginally exceeded the utilised marine water trigger value (95% protection) but met the 90% species protection level.

11.3 Assessment

Given that the groundwater appears to be slightly elevated in zinc, there is no particular reason to suspect the spring water or wetland is contaminated with zinc, and the slightly elevated results appear to be natural. As a result, comparison with aquatic protection guideline values is not appropriate. In addition, it is noted that the ultimate receiving environment, the sea, provides very large dilution and these marginally elevated concentrations are not significant.

12.0 Conclusions

12.1 Waitapu Urupā

The geophysical survey to define the extent of the Waitapu Urupā was inconclusive. While disturbed ground was identified, categorical evidence of burials was not identified in the western area of the urupā and a southern boundary could not be identified. Anomalies indicative of possible burials were identified in the eastern portion of the urupā, however, since the anomalies all occur beneath a layer of fill the survey was unable to definitively confirm this.

Sampling of the soil in the urupā soil mound found it to be heterogeneous. All heavy metal concentrations in the samples were typical of expected background concentrations with the possible exception of copper, but the elevated copper may be natural. As the soil does not appear to be contaminated it does not present a health risk.

If required, the mound soil would be acceptable for disposal at a Class A landfill.

Investigation for drilling wastes along the southern boundary of the urupā found the soil to be comprised of clays, sands and peat, with no obvious wastes despite BTW (2013) finding suspected drilling mud. Sampling identified limited heavy metal and hydrocarbon impacts along the southern boundary of the urupā. The depth of these impacts and the use of the land as public open space mean that people are unlikely to come into contact with these contaminants and the risk to human health is considered to be limited.

12.2 Bach Investigation

BAYLY ROAD - DETAILED SITE INVESTIGATION

DO

Investigation of the former bach area parallel to Ocean View parade found minor demolition materials (e.g. brick, metal) and limited surface fill. All analytical soil results for heavy metals met the applicable human health criteria indicating that the concentrations of metals within the soil in the sampled locations presents an acceptable risk to human health under the proposed commercial/industrial land use scenario. However, asbestos fibres (ACM debris and associated loose fibres) were detected in shallow samples from three locations. This could result in a possible health risk if fibres are mobilised during site redevelopment activities and should be managed at the time of any future excavation.

Some samples exceeded the Class A landfill screening criteria for metals indicating a need for leaching (TCLP) testing if this material requires off-site disposal. However, given the minor exceedance of the screening criteria, the material is expected to comply with the leaching criteria and be acceptable at a Class A landfill. Regardless of leaching test results, given the identification of ACM and associated loose fibres within the soil, asbestos-impacted soil would be classified as a special waste.

The ground gas investigations did not identify significant concentrations of methane, however, volatile organic vapours above the utilised screening value were present in the monitoring points located within the proposed commercial zone. Further assessment at the time of any future development is recommended to evaluate the health risk from possible vapour intrusion into future buildings. Similar evaluation for the marae buildings found the risk was acceptable (see below).

12.3 Investigation of Proposed Marae Vicinity

The geophysical investigation in the vicinity of the marae identified an area of deep fill in the central and northern portion of this area. Tests pits confirmed this to be up to 1.7 m thick, and containing various demolition waste materials at shallow depth, particularly adjacent to the Moturoa 2 oil well.

A number of soil samples returned elevated heavy metal concentrations, however, all results complied with the human health criteria, indicating the soil in the investigated locations presents an acceptable risk to human health under the proposed land use. Asbestos fibres, including ACM debris and loose fibres,

were detected in shallow soil at three locations. Appropriate management of asbestos-impacted soil will be required during future site redevelopment activities.

The majority of the samples from the marae area exceeded the Class A landfill screening criteria for some heavy metals and subsequently five samples underwent TCLP analysis. The TCLP analysis results complied with the Class A landfill leachate criteria and consequently material can be disposed of at the Colson Road Landfill. However, given the identification of ACM and asbestos fibres within the soil, this material may be classified as special waste.

The ground gas investigation did not identify significant concentrations of methane, however, all monitoring points possessed elevated volatile organic vapours.

Indoor air modelling was undertaken to predict possible migration of sub-slab vapour into five rooms of the proposed marae. The results of the modelling show that predicted indoor benzene concentrations comply with MfE (2011a) target air concentrations for commercial/industrial land use, indicating an acceptable health risk from ground vapours.

12.4 Oil Well Investigation

The geophysical surveying and test pitting did not identify conclusive evidence of historical drilling activities in the presumed location of the Moturoa 3 oil well. The soils in the vicinity appeared natural.

The geophysical survey identified deep fill to the east and northeast of Moturoa 2 well, which, which was subsequently confirmed to contain demolition material in the immediate vicinity of the oil well. Limited evidence of contamination associated with oil exploration activities was identified.

All soil samples collected in the vicinity of Moturoa 2 complied with applicable health criteria for heavy metals and hydrocarbons, indicating acceptable risk to human health in the context of the proposed land use. Asbestos containing material and loose fibres were detected in one deep sample in the vicinity of Moturoa 2, and may present a risk if any deep excavation were to occur around the well.

Three samples from the vicinity of Moturoa 2 exceeded the Class A landfill screening criteria for some heavy metals. Further TCLP analysis will be required if any of this material is required to be disposed of at the Colson Road Landfill, however, other TCLP analysis carried out on similar soil complied with Class A leaching criteria. The soil may be classified as special waste given the identification of asbestos in one sample.

The geophysical survey accurately identified the position of the Egmont 5 oil well. Test pitting in the vicinity found a concrete structure thought to be a pump

00

foundation. Soil at depth was impacted with hydrocarbons. However, due to the depth of the impacts and the use of the land as public open space, the risk to human health is minimal.

12.5 Groundwater and Surface Water Investigation

The groundwater investigation confirmed the groundwater flow beneath the site to be generally towards the north.

Groundwater samples collected and analysed from the monitoring wells returned concentrations of hydrocarbons below the laboratory limit of detection, indicating that groundwater in the sampled locations has not been significantly impacted by off-site or on-site sources of hydrocarbons.

All of the samples collected from groundwater beneath the site complied with applicable groundwater acceptance criteria with the exception of the results for zinc and nitrate.

Surface water samples were collected from the on-site spring, the wetland area and from a manhole, to investigate the possibility of surface water contamination in the proposed lagoon and wetland area.

Zinc concentrations in the spring and the wetland appear to be slightly elevated, however, all other results complied with the applicable health and environmental criteria indicating an acceptable risk to human health and the environment.

Given the groundwater appears to be naturally slightly elevated in zinc, there is no particular reason to suspect the spring water or wetland is contaminated with zinc, with the elevated results thought to be natural. As a result, comparison with the aquatic protection guideline value is not appropriate.

It is also considered that the off-site risk to the marine environment is acceptable. The large available dilution means the slight exceedance of the marine trigger values for nitrate and zinc are not significant after mixing.

References

ANZECC, 2000. Australia and New Zealand Guidelines for Fresh and Marine Water Quality. Australia and New Zealand Environment Conservation Council, Kingston.

BTW, 2013. Preliminary Site Investigation Report. BTW Company, New Plymouth

MfE, 2011a. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (updated 2011), Ministry for the Environment, Wellington.

MfE, 2011b. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, Ministry for the Environment, Wellington.

MfE, 2011c. Contaminated Land Management Guideline No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values, Ministry for the Environment, Wellington.

MfE, 2004. *Module 2: Hazardous Waste Guidelines Landfill Waste Acceptance Criteria and Landfill Classification*, Ministry for the Environment, Wellington.

NEPC, 2013. Schedule B 1 - Guideline on Investigation Levels for Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure 1999 (April 2013), National Environmental Protection Council, Canberra

Re-Source Exploration Ltd., 2001. Assessment of Environmental Effects Associated with the Re-entry, Re-completion and commercial Assessment of the Existing Moturoa #2 Oil Well. Re-Source Exploration Ltd

Transfield Worley Ltd., 2003. *Report for Moturoa Oil Field Investigation: Stage 1*. Transfield Worley, New Plymouth.

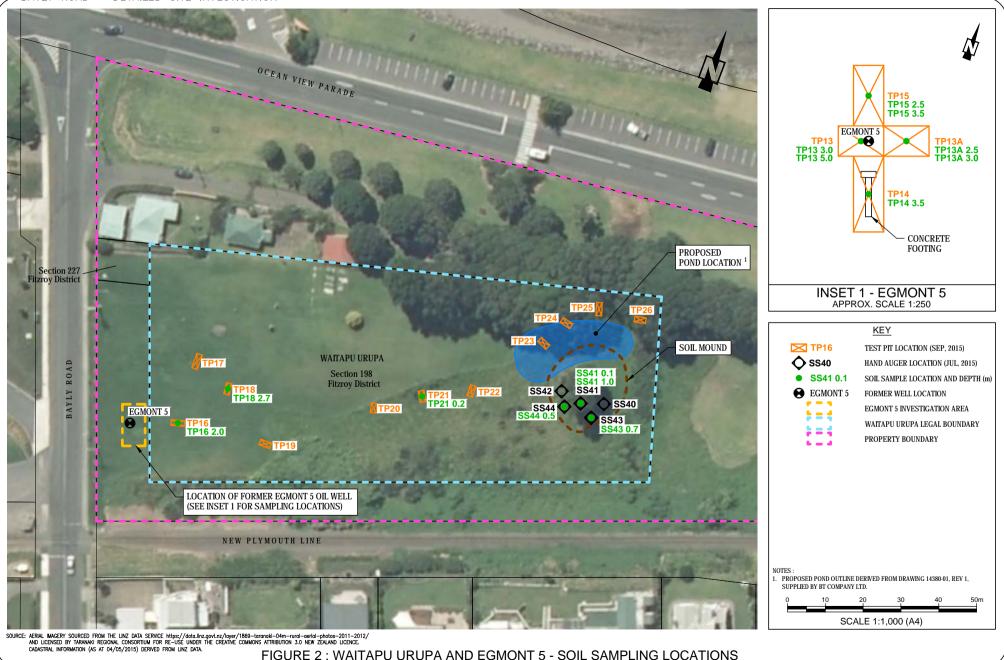
PDP, June 2015. *Bayly Road Conceptual Site Model and Investigation Strategy*. Report Prepared by Pattle Delamore Partners for Taranaki Regional Council.

URS, August 2003. Determination of Common Pollutant Background Soil Concentrations for the Wellington Region. URS, Wellington.



Appendix A: Figures

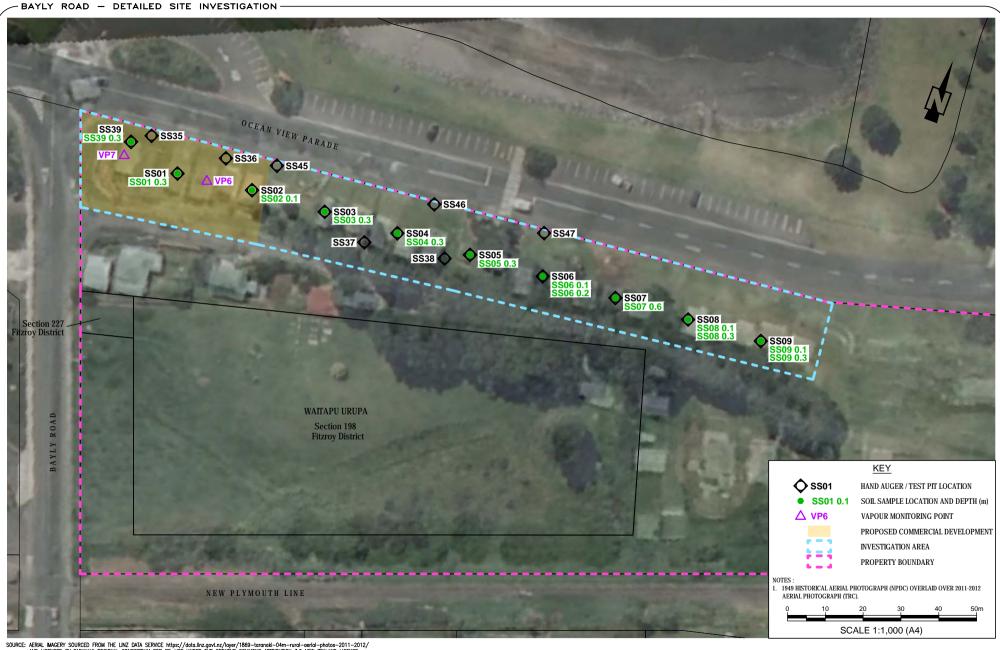




PATTLE DELAMORE PARTNERS LTD-

W02050100D001.dwg Feb-16 FINAL

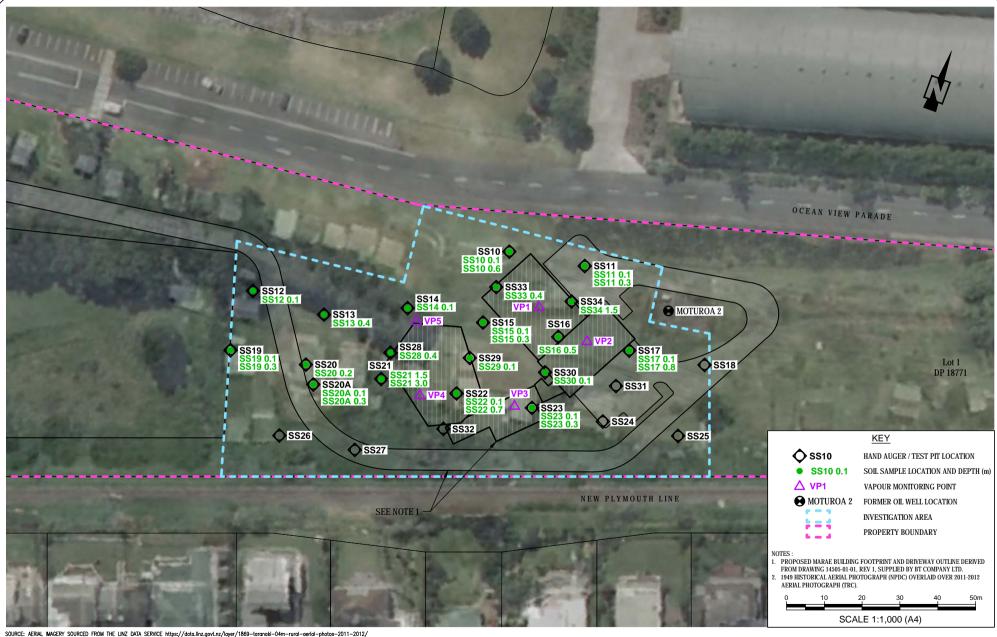
⁻ BAYLY ROAD - DETAILED SITE INVESTIGATION -



SOURCE: AERIAL IMAGERY SOURCED FROM THE LINZ DATA SERVICE https://dota.linz.gov/.nz/loyer/1869-taronadi-04m-turol-gerial-photos-2011-2012/ AND LICENSED BY TARANAKI REGIONAL. CONSORTIUM FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 3.0 NEW ZEALAND LICENCE. HISTORICAL AERIAL INFORMATION (SA AT 04/05/2015) DERVED FROM UNZ DATA. CANASTRAL INFORMATION (SA AT 04/05/2015) DERVED FROM UNZ DATA.

W02050100D001.dwg Feb-16 FINAL

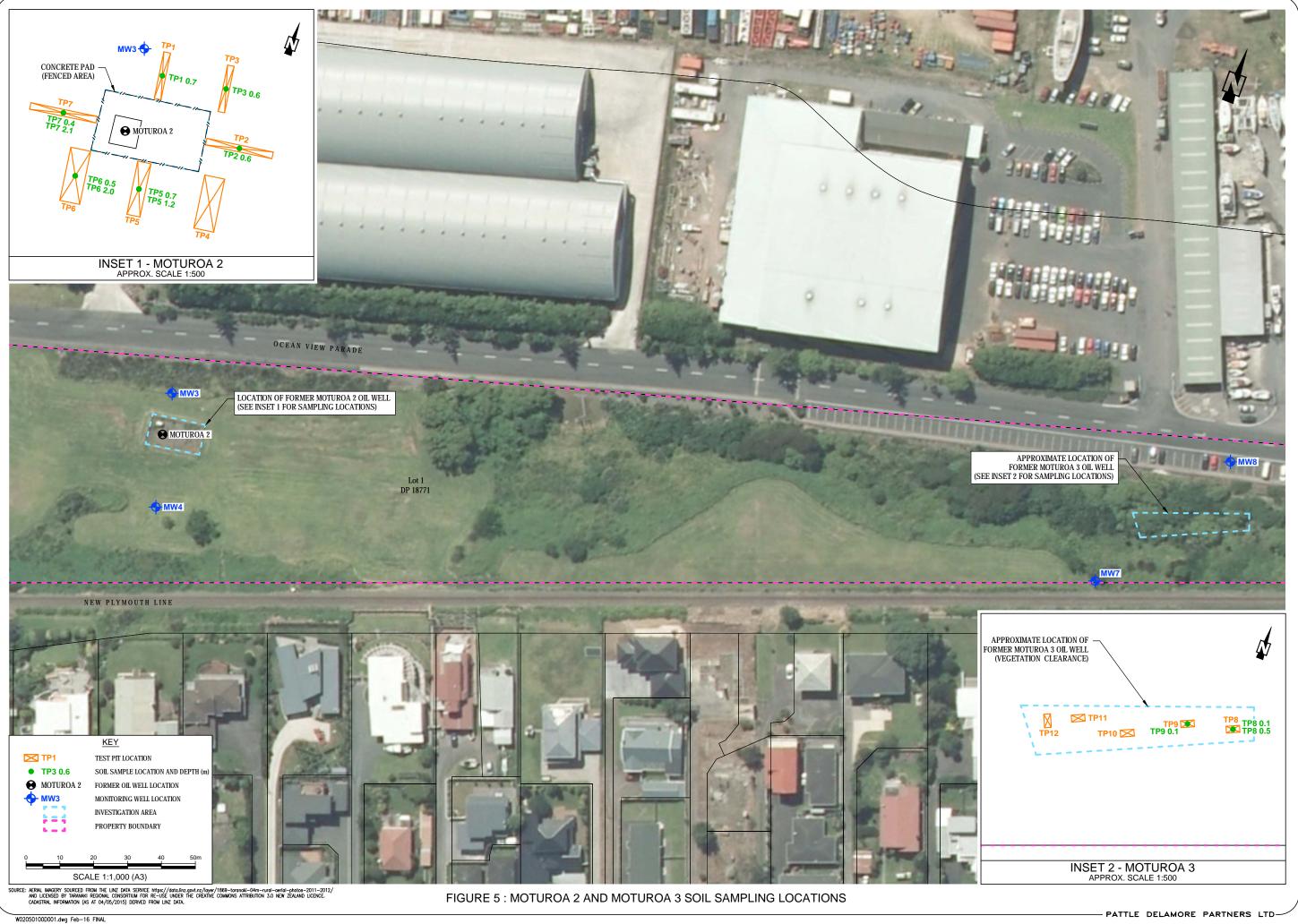
PATTLE DELAMORE PARTNERS LTD-



BAYLY ROAD - DETAILED SITE INVESTIGATION -

SOURCE: AERIAL INAGERY SOURCED FROM THE LINZ DATA SERVICE https://dota.linz.gov.nz/loyer/1869-toronold-04m-rurol-operiod-photos-2011-2012/ AND LICENSED BY TARANAKI REGIONAL CONSORTIUM FOR RE-USE UNDER THE OREATIVE COMMONS ATTRIBUTION 3.0 NEW ZEALAND LICENCE. HISTORICAL AERIA PHOTOGRAPH (DATE) 1949 SUPPLIED BY NEW PLYMOUTH DISTRICT COUNCIL CAASATRAL INFORMATION (AS AT 04/05/2015) DERVED FROM LINZ DATA. FIGURE 4 : MARAE INVESTIGATION - SOIL SAMPLING LOCATIONS

- BAYLY ROAD - DETAILED SITE INVESTIGATION -





Appendix B: Tables

Table 1: Waitapu Urupā Soil Mound Investigation - Soil Sampling Results - Heavy Metals

		Soil Samples Co	ollected at a Depth of 0	- 1 m Below Ground I	evel ¹	
Sample Name	SS41 0.1	SS41 1.0	SS43 0.7	SS44 0.5		
Laboratory Reference	1452027.21	1452027.23	1452027.30	1452027.32		
Sample Location	SS41	SS41	SS43	SS44	Typical Background Soil	Class A Landfill
Soil Type - Field	Clay	Silt	Silt	Sand	Concentrations for the Wellington Region (URS, 2003) ²	Screening Criteria ³
PID Reading (ppmv)	0.3	0.3	0.2	0.2	Region (0K3, 2003)	
Sample Depth (m bgl)	0.1	1.0	0.7	0.5		
Heavy Metals	·					
Arsenic	3	3	3	3	< 2 - 7	100
Cadmium	0.13	< 0.10	< 0.10	0.12	< 0.1 - 0.2	20
Chromium	10	12	17	9	6 - 21	100
Copper	46	68	95	48	3 - 25	100
Lead	44	12.5	16.8	6.9	4.5 - 180	100
Nickel	5	5	8	5	4 - 21	200
Zinc	87	43	71	51	24 - 201	200

Notes:

1. All results in mg/kg.

2. Concentrations from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003) as no background concentrations available for the Taranaki region.

3. Criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

Concentration above typical background soil concentrations for the Wellington region (URS, 2003).

	Soil Samples	Collected at a Depth of 0	- 3 m Below Ground Leve	el ¹
Sample Name	TP16 2.0	TP18 2.7	TP21 0.2	
Laboratory Reference	1481517.10	1481517.12	1481517.15	
Sample Location	TP16	TP18	TP21	Typical Background Soil Concentrations for the Wellington
Soil Type - Field	Silt	Clay	Sand	Region (URS, 2003) ²
Sample Depth (m bgl)	2.0	2.7	0.2	Region (ORS, 2005)
PID Reading (ppmv)	89.8	2.7	0.8	
C7-C9 hydrocarbons	< 11	-	< 9	
C ₁₀ -C ₁₄ hydrocarbons	28	-	< 20	
C ₁₅ -C ₃₆ hydrocarbons	550	-	< 40	
ТРН	580	-	< 70	
Heavy Metals				
Arsenic	-	3	< 2	< 2 - 7
Cadmium	-	0.35	< 0.10	< 0.1 - 0.2
Chromium	-	27	8	6 - 21
Copper	-	123	28	3 - 25
Lead	-	12.1	2.5	4.5 - 180
Nickel	-	12	6	4 - 21
Zinc	-	121	70	24 - 201

Table 2: Waitapu Urupā Drilling Mud Investigation - Soil Sampling Results - Total Petroleum Hydrocarbons and Heavy Metals

Notes:

1. All results in mg/kg.

2. Concentrations from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003) as no background concentrations available for the Taranaki region.

Concentration above typical background soil concentrations for the Wellington region (URS, 2003).

Table 3: Bach Investigation - Soil Sampling Results - Heavy Metals and Asbestos

	Soil Samples Collected at a Depth of <1 m Below Ground Level ¹														
Sample Name	SS01 0.3	SS02 0.1	SS03 0.3	SS04 0.3	SS05 0.3	SS06 0.1	SS06 0.2	SS07 0.6	SS08 0.1	SS08 0.3	SS09 0.1	SS09 0.3	SS39 0.3		
Laboratory Reference	1447355.14	1447355.16	1447868.2	1447868.13	1447868.15	1452027.3	1447868.17	1447868.20	1452027.5	1447868.21	1452027.6	1447868.23	1452027.16	Coll Contominant	
Sample Location	SS01	SS02	SS03	SS04	SS05	SS06	SS06	SS07	SS08	SS08	SS09	SS09	SS39	Soil Contaminant Standards:	Class A Landfill
Soil Type - Field	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Silt	Clay	Clay	Clay	Clay	Silt	Commercial/Industrial ^{2,3}	Screening Criteria ⁴
PID Reading (ppmv)	0.0	0.0	0.0	0.2	-	-	-	0.0	0.2	0.1	0.1	0.0	0.3	commercialy industrial	
Sample Depth (m bgl)	0.3	0.1	0.3	0.3	0.3	0.1	0.2	0.6	0.1	0.3	0.1	0.3	0.3		
Heavy Metals															
Arsenic	3	4	3	2	3	5	5	2	3	< 2	3	< 2	3	70	100
Cadmium	0.43	0.17	0.74	0.16	0.24	0.31	0.19	< 0.10	0.18	0.78	0.30	0.16	0.22	1,300	20
Chromium	10	16	13	22	16	18	12	21	13	12	13	11	25	6,300	100
Copper	135	69	72	91	68	68	49	85	148	23	174	50	134	NL ⁵	100
Lead	186	67	38	24	220	126	49	26	710	120	560	90	210	3,300	100
Nickel	6	7	8	12	9	9	6	11	8	5	10	6	11	6,000	200
Zinc	420	173	89	190	154	280	140	85	187	175	250	220	131	400,000	200
Asbestos ⁶															
Asbestos Detected (Presence / Absence)	-	-	-	Amosite and Chrysotile	-	-	-	Amosite and Chrysotile	-	-	-	-	Chrysotile		
Description of Asbestos		_		ACM Debris &	_		_	ACM Debris &		_		_	Loose Fibres	-	
Form	-	-	-	Loose Fibres	-	-	-	Loose Fibres	-	-	-	-	LOUSE FIDIES		

Notes:

1. All results in mg/kg.

2. Arsenic, cadmium, chromium, copper and lead criteria from MfE (2011b).

3. Nickel and zinc criteria from NEPC (2013).

4. Criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

5. No Limit.

6. (-) Indicates analysis was not performed.

Concentration above MfE (2004) Landfill Waste Acceptance Criteria and Landfill Classification for Class A Landfills.

Table 4: Ground Gas Investigation Results											
Vanour Monitoring Doint	Date	Peak PID	Peak CH₄	Min O ₂							
Vapour Monitoring Point	Date	ppb	%	%							
		4.1 ¹	1 ²	-							
Vapour Monitoring Points ³	Vapour Monitoring Points ³										
VP1	17/07/2015	899	0.1	12.2							
VFI	29/09/2015	305	0.0	14.1							
VP2	17/07/2017	976	0.1	17.3							
VP2	29/09/2015	580	0.0	17.6							
VP3	17/07/2017	741	0.1	19.2							
VFS	29/09/2015	276	0.0	20.1							
VP4	17/07/2015	882	0.1	18.7							
VP4	29/09/2015	843	0.0	19.1							
VP5	17/07/2015	236	0.1	18.8							
VPS	29/09/2015	356	0.0	18.1							
VP6	17/07/2015	1048	0.1	18.0							
VFO	29/09/2015	846	0.0	16.3							
VP7	17/07/2015	318	0.1	16.9							
V F /	29/09/2015	616	0.0	17.1							

Notes:

1. Converted from commercial/industrial target indoor air concentration for benzene (MfE 2011a).

2. One fifth of the lower explosive limit for methane.

3. Readings taken every minute for five minutes.

Concentration above Ground Gas Trigger Values.

Table 5: Marae Investigation - Soil Sampling Results - Heavy Metals and Asbestos

						S	oil Samples Co	llected at a Dep	th of <1 m Below	Ground Level ¹						
Sample Name	SS10 0.1	SS10 0.6	SS11 0.1	SS11 0.3	SS12 0.1	SS13 0.4	SS14 0.1	SS15 0.1	SS15 0.3	SS16 0.5	SS17 0.1	SS17 0.8	SS19 0.1	SS19 0.3		
Laboratory Reference	1452027.7	1447868.29	1452027.8	1447868.30	1449293.1	1449293.4	1452027.9	1452027.10	1447868.33	1448363.15	1452027.12	1448363.17	1449304.1	1449304.2	Call Cantania ant	
Sample Location	SS10	SS10	SS11	SS11	SS12	SS13	SS14	SS15	SS15	SS16	SS17	SS17	SS19	SS19	Soil Contaminant Standards:	Class A Landfill
Soil Type - Field	Clay	Clay	Clay	Clay	Clay	Sand	Clay	Clay	Sand	Clay	Clay	Clay	Clay	Sand	Commercial/Industrial ^{2,3}	Screening Criteria ⁴
PID Reading (ppmv)	0.1	0.2	0.1	0.2	0.7	0.7	0.1	1.1	1.2	0.3	1.1	1.6	1.6	1.6	commercial/moustrial	
Sample Depth (m bgl)	0.1	0.6	0.1	0.3	0.1	0.4	0.1	0.1	0.3	0.5	0.1	0.8	0.1	0.3		
Heavy Metals																
Arsenic	5	3	4	5	< 2	2	3	4	2	2	5	4	5	< 2	70	100
Cadmium	0.26	0.19	0.61	0.49	0.16	0.13	0.24	0.43	0.14	0.20	0.54	1.20	0.48	0.14	1,300	20
Chromium	11	11	12	12	10	9	11	11	11	7	13	17	11	5	6,300	100
Copper	137	84	98	173	33	26	112	290	56	23	184	630	116	17	NL ⁵	100
Lead	260	87	200	400	111	61	550	1,710	147	40	690	166	200	36	3,300	100
Nickel	8	5	8	9	5	5	8	8	7	5	9	25	7	3	6,000	200
Zinc	230	116	240	280	98	111	166	430	210	117	320	740	260	123	400,000	200
Asbestos ⁶																
Asbestos Detected (Presence / Absence)	Chrysotile	-	-	-	-	-	-	-	Chrysotile	-	-	-	-	Asbestos NOT detected		
Description of Asbestos Form	Loose Fibres	-	-	-	-	-	-	-	ACM Debris & Loose Fibres	-	-	-	-	-		

					Soil Sample	es Collected at a	Depth of <1 m	Below Ground	Level ¹				
Sample Name	SS20 0.2	SS20A 0.1	SS20A 0.3	SS22 0.1	SS22 0.7	SS23 0.1	SS23 0.3	SS28 0.4	SS29 0.1	SS30 0.1	SS33 0.4		
Laboratory Reference	1449304.4	1449304.7	1449304.8	1448363.25	1448363.27	1449302.4	1449302.5	1449302.7	1449304.10	1449304.12	1449304.15		
Sample Location	SS20	SS20A	SS20A	SS22	SS22	SS23	SS23	SS28	SS29	SS30	SS33	Soil Contaminant Standards:	Class A Landfill Screening
Soil Type - Field	Clay	Clay	Clay	Clay	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Commercial/Industrial ^{2,3}	Criteria ⁴
PID Reading (ppmv)	1.3	1.3	1.4	2.9	0.9	0.5	2.4	1.3	0.8	1.5	1.9		Citteria
Sample Depth (m bgl)	0.2	0.1	0.3	0.1	0.7	0.1	0.3	0.4	0.1	0.1	0.4		
Heavy Metals ⁶													
Arsenic	6	6	2	< 2	< 2	< 2	-	2	31	3	8	70	100
Cadmium	0.97	1.06	0.10	0.14	0.21	0.31	-	< 0.10	1.16	0.26	0.37	1,300	20
Chromium	13	13	9	12	12	8	-	10	37	13	13	6,300	100
Copper	390	370	52	76	22	17	-	16	1,230	199	94	NL ⁵	100
Lead	420	280	240	210	31	51	-	8.6	320	230	450	3,300	100
Nickel	119	19	8	7	5	5	-	5	60	9	6	6,000	200
Zinc	580	520	111	147	320	270	-	80	620	240	260	400,000	200
Asbestos ⁶													
Asbestos Detected (Presence / Absence)	-	-	Chrysotile	-	-	-	Asbestos NOT detected	-	-	-	-		
Description of Asbestos Form	-	-	ACM Debris & Loose Fibres	-	-	-	-	-	-	-	-		

	Soil Samples Collected at a Depth of 1 - 3 m Below Ground Level ¹										
Sample Name	SS21 1.5	SS21 3.0	SS34 1.5								
Laboratory Reference	1448363.22	1448363.23	1449293.11								
Sample Location	SS21	SS21	SS34	Soil Contaminant Standards:	Class A Landfill Screening						
Soil Type - Field	Sand	Sand	Clay	Commercial/Industrial ^{2,3}	Criteria ⁴						
PID Reading (ppmv)	1.9	1.6	1.6								
Sample Depth (m bgl)	1.5	3.0	1.5								
Heavy Metals											
Arsenic	2	< 2	2	70	100						
Cadmium	0.7	< 0.10	0.12	1,300	20						
Chromium	9	13	10	6,300	100						
Copper	64	28	35	NL ⁵	100						
Lead	190	17.1	67	3,300	100						
Nickel	6	5	5	6,000	200						
Zinc	580	117	152	400,000	200						

Notes:

1. All results in mg/kg.

2. Arsenic, cadmium, chromium, copper and lead criteria from MfE (2011b).

3. Nickel and zinc criteria from NEPC (2013).

4. Criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

5. No Limit

6. (-) Indicates analysis was not performed.

Concentration above MfE (2004) Landfill Waste Acceptance Criteria and Landfill Classification for Class A Landfills.

PATTLE DELAMORE PARTNERS LTD

Table 6: Marae Investigation - Soil Sampling Results - TCLP Analysis

Soil Samples Collected at a Depth of <1m below ground level ¹										
Sample Name	SS11 0.3	SS15 0.1	SS20 0.2	SS29 0.1	SS33 0.4					
Laboratory Reference	1447868.35	1452027.40	1449304.19	1449304.20	1449304.21					
Sample Location	SS11	SS15	SS20	SS29	SS33	Class A Landfill Leachate Criteria ²				
Soil Type - Field	Clay	Clay	Clay	Clay	Clay	Leachate Chiena				
Sample Depth (m bgl)	0.3	0.1	0.2	0.1	0.4					
Toxicity Characteristic Leaching Pro	ocedure									
Total Copper in Leachate	0.27	0.042	0.89	0.035	0.020	5				
Total Lead in Leachate	0.63	1.25	0.83	1.29	0.189	5				
Total Zinc in Leachate	1.72	1.72	9.6	0.47	1.32	10				

Notes:

1. Results in mg/L.

2. Criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

Table 7: RISC Model Results

	Model Input ^(1,2,3,4,5)										
	Room Size										
Monitoring Point	(L x W x H)	Air Exchange Rates (per hr) ⁽⁸⁾	Max Field Vapour Concentration (ppb)	Model Input Concentration – Soil-Gas (mg/m ³) ⁽²⁾	Calculated Indoor Air Concentration (mg/m ³)						
VP1	Wharekai	_									
(model ref. W02050100_VP1)	12.4 x 10.6 x 3.4	2	899	2.87	0.0023						
VP2	Wharekai (Staff)	_									
(model ref. W02050100_VP2)	5.8 x 4.1 x 2.4	2	976	3.11	0.0064						
VP3	Ablutions (Mattress Storage Room)										
(model ref. W02050100_VP3)	13.6 x 4.2 x 2.9	0.5	741	2.36	0.013						
VP4	Wharenui		222	2.01	0.0045						
(model ref. W02050100_VP4)	18 x 15 x 4	2	882	2.81	0.0015						
VP5	Wharenui										
(model ref. W02050100_VP5)	18 x 15 x 4	2	356	1.14	0.0006						

Notes:

1. All volatile compounds recorded using the PPB RAE assumed to be Benzene (78.11 g/mol). Very conservative assumption as other volatile compounds would also be present. Benzene is also very volatile and soluble so would readily degrade.

2. Concrete floor thickness of 10 cm.

3. Slab on grade, assuming sandy gravel fill material.

4. Floor crack ratio of 0.01 (cm² cracks/cm² total area) - MfE (2011a).

5. No bio-attenuation is occurring.

6. Modelling completed using RISC5.

7. Criteria from Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) (MfE, October 2011a).

8. Default air exchange rate of 2 per hr used - MfE (2011a). Lower rate used for mattress storage area given limited ingress points (i.e. storage area only).

9. Commercial/industrial use criteria used for all areas.

Generic Health-Based Indoor Air ncentration for Benzene (MfE, 2011)⁽⁷⁾ (mg/m³)

Commercial / Industrial ⁽⁹⁾

0.013

Table 8: Moturoa 2 Investigation - Soil Sampling Results - Heavy Metals and Asbestos

	Soil Samples Collected at a Depth of 0 - 2 m Below Ground Level ¹											
Sample Name	TP1 0.7	TP3 0.6	TP5 0.7	TP6 0.5	TP6 2.0	TP7 0.4						
Laboratory Reference	1449304.17	1449288.10	1449288.7	1449288.3	1449288.6	1449288.1	Call Cantania ant					
Sample Location	N of Moturoa 2	NE Moturoa 2	S of Moturoa 2	SW of Moturoa 2	SW of Moturoa 2	W of Moturoa 2	Soil Contaminant Standards:	Class A Landfill				
Soil Type - Field	Sand	Clay	Gravel	Silt	Silt	Gravel	Commercial/Industrial ^{2,3}	Screening Criteria ⁴				
PID Reading (ppmv)	0.9	0.4	-	1.2	0.4	0.0	Commercial/muustrial	Cillena				
Sample Depth (m bgl)	0.7	0.6	0.7	0.5	2.0	0.4						
Heavy Metals												
Arsenic	7	20	5	3	< 2	< 2	70	100				
Cadmium	0.25	< 0.10	0.44	0.18	< 0.10	0.14	1,300	20				
Chromium	13	8	12	7	8	5	6,300	100				
Copper	106	26	91	33	15	59	NL ⁵	100				
Lead	77	12	150	172	10.3	25	3,300	100				
Nickel	6	2	6	6	5	4	6,000	200				
Zinc	118	43	210	168	74	66	400,000	200				
Asbestos ⁶												
Asbestos Detected (Presence / Absence)	-	-	-	-	Chrysotile	-						
Description of Asbestos Form	-	-	-	-	Fibre cement & loose fibres	-						

Notes:

1. All results in mg/kg.

2. Arsenic, cadmium, chromium, copper and lead criteria from MfE (2011b).

3. Nickel and zinc criteria from NEPC (2013).

4. Criteria from Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).

5. No Limit.

6. (-) Indicates analysis was not performed.

Concentration above MfE (2004) Landfill Waste Acceptance Criteria and Landfill Classification for Class A Landfills.

Table 9: Moturoa 2 Investigation - Soil Sample Results - Total Petroleum Hydrocarbons

		:	Soil Samples Collected at a	Depth of <1 m Below Grou	nd Level ¹	
Sample Name	TP2 0.6	TP3 0.6	TP5 0.7	TP7 0.4	Tier 1 Soil Acceptance Criteria ^{2,3}	Tier 1 Soil Acceptance Criteria ^{2,}
Laboratory Reference	1449304.16	1449288.10	1449288.7	1449288.1	Commercial/ Industrial Land Use	Commercial/ Industrial Land Us
Sample Location	E Moturoa 2	NE Moturoa 2	S of Moturoa 2	W of Moturoa 2	ALL PATHWAYS	ALL PATHWAYS
Soil Fate	Remaining	Remaining	Remaining	Remaining		
Soil Type - Field	Silt	Clay	Gravel	Silt	Silty Clay	Clay
Soil Type - MfE (2011)	Silty Clay	Clay	Sand	Silty Clay		
Sample Depth (m bgl)	0.6	0.6	0.7	0.4	-1	-1
PID Reading (ppmv)	0.4	0.4	-	0.0	<1 m	<1 m
C7-C9 hydrocarbons	< 9	< 8	< 11	< 8	(8,800) ^{6,5v}	NA ⁴
C ₁₀ -C ₁₄ hydrocarbons	< 20	< 20	< 30	< 20	(1,900) ^{6,5x}	(1,900) ^{6,5x}
C ₁₅ -C ₃₆ hydrocarbons	210	< 40	48	< 40	NA ⁴	NA ⁴
ТРН	210	< 70	< 80	< 70	-	-

Soil Samples Collected at a Depth of 1 - 4 m Below Ground Level ¹

Sample Name	TP5 1.2	TP7 2.1	Tier 1 Soil Acceptance Criteria ^{2,3}	Tier 1 Soil Acceptance Criteria
Laboratory Reference	1449288.8	1449288.2	Commercial/ Industrial Land Use	Commercial/ Industrial Land U
Sample Location	S of Moturoa 2	W of Moturoa 2	ALL PATHWAYS	ALL PATHWAYS
Soil Fate	Remaining	Remaining		
Soil Type - Field	Silt	Gravel	Silty Clay	Sand
Soil Type - MfE (2011)	Silty Clay	Sand		
Sample Depth (m bgl)	1.2	2.1	4 4 -	4 4
PID Reading (ppmv)	-	6.3	1 - 4 m	1 - 4 m
C7-C9 hydrocarbons	< 10	< 9	(20,000) ^{6,5m}	120 ^{5m}
C ₁₀ -C ₁₄ hydrocarbons	< 20	< 20	(8,900) ^{6,5x}	(1,900) ^{6,5x}
C ₁₅ -C ₃₆ hydrocarbons	45	108	NA ⁴	NA ⁴
ТРН	< 70	108	-	-

Notes:

1. All results in mg/kg.

2. Criteria from Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Revised 2011 (MfE 2011a).

3. Criteria assume commercial/industrial land use, 'Clay', 'Silty Clay' and 'Sand' soil types and contamination depths of <1 m and 1 - 4 m below ground level.

4. NA indicates contaminant is not limiting as health based criterion is significantly higher than may be encountered on site (i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).

5. The following notes indicate the limiting pathway for each criterion: m - maintenance/excavation, x - PAH surrogate.

6. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

2,3	Tier 1 Soil Acceptance Criteria ^{2,3}						
Jse	Commercial/ Industrial Land Use						
	ALL PATHWAYS						
	Sand						
	<1 m						
	120 ^{5m}						
	(1,500) 6,5x						
	NA ⁴						
	-						
2,3							
Jse							

Table 10: Moturoa 3 Investigation - Soil Sampling Results - Heavy Metals

	Soil Sa	mples Collected at a	Depth of < 1 m Below Ground Level ¹		
Sample Name	TP8 0.1	TP9 0.1			
Laboratory Reference	1452027.34	1452027.38		Typical Background Soil Concentrations for the Wellington Region (URS, 2003) ⁴	
Sample Location	Moturoa 3	Moturoa 3	Soil Contaminant Standards:		
Soil Type - Field	Sand	Sand	Residential (10% Produce) ^{2,3}		
PID Reading (ppmv)	0.7	1.1			
Sample Depth (m bgl)	0.1	0.1			
Heavy Metals					
Arsenic	< 2	< 2	20	< 2 - 7	
Cadmium	< 0.10	< 0.10	3	< 0.1 - 0.2	
Chromium	7	10	460	6 - 21	
Copper	14	18	NL ⁵	3 - 25	
Lead	3.7	5.3	210	4.5 - 180	
Nickel	4	5	400	4 - 21	
Zinc 57		74	7,400	24 - 201	

Notes:

1. All results in mg/kg.

2. Arsenic, cadmium, chromium, copper and lead criteria from MfE (2011b).

3. Nickel and zinc criteria from NEPC (2013).

4. Concentrations from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003) as no background concentrations available for the Taranaki region.

5. No Limit.

Table 11: Moturoa 3 Investigation - Soil Sample Results - Total Petroleum Hydrocarbons

Soil Samples Collected at a Depth of <1 m Below Ground Level ¹ Tier 1 Soil Acceptance Criteria^{2,3} Sample Name TP8 0.5 Laboratory Reference 1452027.35 Residential Land Use Sample Location Moturoa 3 ALL PATHWAYS Soil Type - Field Sand Sand Soil Type - MfE (2011) Sand Sample Depth (m bgl) 0.5 <1 m PID Reading (ppmv) 2.8 120 ^{5m} C₇-C₉ hydrocarbons < 8 (470) ^{6,5x} C₁₀-C₁₄ hydrocarbons < 20 NA 4 C₁₅-C₃₆ hydrocarbons < 40 TPH < 70

Notes:

1. All results in mg/kg.

2. Criteria from Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, Revised 2011 (MfE 2011a).

3. Criteria assume residential 10% produce land use, 'sand' soil type and contamination depths of <1 m below ground level.

4. NA indicates contaminant is not limiting as health based criterion is significantly higher than may be encountered on site (i.e. 20,000 mg/kg for TPH, 10,000 mg/kg for other contaminants).

5. The following notes indicate the limiting pathway for each criterion: m - maintenance/excavation, x - PAH surrogate.

6. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons.

Table 12: Egmont 5 Investigation - Soil Sampling Results - Heavy Metals

	Son Samples Con	ected at a Depth of 0	- 5 III Below Ground		
Sample Name	TP13A 3.0	TP13 5.0	TP15 3.5	Typical Background Soil	
Laboratory Reference	1481517.21	1481517.5	1481517.9		
Sample Location	TP13A	TP13	TP15		
Soil Type - Field	Clay	Clay	Clay	Concentrations for the Wellington Region (URS, 2003) ²	
PID Reading (ppmv)	4.5	10.6	2.5	- Region (0K3, 2003)	
Sample Depth (m bgl)	3.0	5.0	3.5		
Heavy Metals					
Arsenic	2	< 2	3	< 2 - 7	
Cadmium	< 0.10	< 0.10	< 0.10	< 0.1 - 0.2	
Chromium	13	27	21	6 - 21	
Copper	93	84	66	3 - 25	
Lead	11.3	10.6	9.9	4.5 - 180	
Nickel	10	9	8	4 - 21	
Zinc	74	109	84	24 - 201	

Notes:

1. All results in mg/kg.

2. Concentrations from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region (URS, 2003) as no background concentrations available for the Taranaki region.

Concentration above typical background soil concentrations for the Wellington region (URS, 2003).

Table 13: Egmont 5 Investigation - Soil Sampling Results - Total Petroleum Hydrocarbons										
Soil Samples Collected at a Depth of 1 - 4 m Below Ground Level ^{1,2}										
Sample Name	TP13A 2.5	TP13 3.0	TP14 3.5	TP15 2.5						
Laboratory Reference	1481517.20	1481517.3	1481517.7	1481517.8						
Sample Location	TP13A	TP13	TP14	TP15						
Soil Type - Field	Sand	Clay	Clay	Clay						
Sample Depth (m bgl)	2.5	3.0	3.5	2.5						
PID Reading (ppmv)	390	223.1	40.8	160.9						
C ₇ -C ₉ hydrocarbons	26	< 12	< 12	12						
C ₁₀ -C ₁₄ hydrocarbons	1,630	75	270	670						
C ₁₅ -C ₃₆ hydrocarbons	6,400	250	1,030	2,200						
ТРН	8,100	330	1,300	2,800						

Notes:

1. All results in mg/kg.

2. No appropriate criteria available for land use.

Table 14: Well Details and Water Levels

Monitoring We	ll Ref.	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8
Total Depth of Well (m bel	ow ground level)	5.5	4.0	6.5	7.0	5.0	5.0	12.0	3.0
Screen Interval (m belov	v ground level)	1	1	2	2	1.5	1	6	0.5
Diameter (m	im)	50	50	50	50	50	50	50	50
TOC (m RL)	1	4.42	4.15	8.14	8.62	9.20	10.71	16.02	3.33
Depth to Product (m	16/07/2015	-	-	-	-	-	-	-	-
below TOC) ²	29/09/2015	-	-	-	-	-	-	-	-
Depth to Water (m below	16/07/2015	2.085	1.290	3.755	3.880	0.490	2.255	10.705	0.440
TOC) ²	29/09/2015	2.170	1.320	3.790	3.910	0.450	2.425	10.755	0.450
Motor Lough (m. DL) ¹	16/07/2015	2.34	2.86	4.39	4.74	8.71	8.46	5.32	2.89
Water Level (m RL) 1	29/09/2015	2.25	2.83	4.35	4.71	8.75	8.29	5.27	2.88
Petroleum Hydrocarbons	16/07/2015	Minor sheen on purge water. PID - 1.0	Minor sheen on purge water. PID - 1.1	PID - 0.8	PID - 0.7	PID - 0.2	Minor sheen on purge water. PID - 1.8	PID - 0.3	PID - 1.0
Observations	29/09/2015	No sheen on purge water. PID - 0.0	No sheen on purge water. PID - 0.0	PID - 0.0	PID - 0.0	PID - 0.0	No sheen on purge water. PID - 0.0	PID - 0.1	PID - 0.3

Notes:

1. Reduced Level recorded relative to mean sea level (Taranaki Datum 1970).

2. Water level measurements taken from top of casing.

TOC - Top of Casing.

Comula Location	Date	Sample	Sample	Sampl	e Laboratory	Tota	l Petroleum	Hydrocarbon	s ^{1,4}		Monocyclic Aron	natic Hydrocarbon	s ¹	Total	Nitrite-N ¹	Nitrate-N ¹	Formaldehyde ¹	Dissolve
Sample Location	Date	Number	Re	eference	C ₇ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₃₆	ТРН	Benzene	Toluene	Ethylbenzene	Total Xylenes ⁶	Ammoniacal-N ¹	mitrite-m	Mitrate-N	Formaldenyde	Zinc ¹	
MW1	16/07/2015	MW1	14	51328.12	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	0.29	0.009	0.23	< 0.02	-	
MW2	16/07/2015	MW2	14	51328.1	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
MW3	16/07/2015	MW3	14	51328.2	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
MW4	16/07/2015	MW4	14	51328.3	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
101004	29/09/2015	101004	14	82124.1	-	-	-	-	-	-	-	-	-	-	-	-	0.0064	
N 4) A / E	16/07/2015	MW5	14	51328.4	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
MW5	29/09/2015	101005	14	82124.2	-	-	-	-	-	-	-	-	-	-	-	-	0.0123	
MW6	16/07/2015	MW6A	14	51328.10	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	< 0.010	< 0.002	3.1	< 0.02	-	
	29/09/2015	MW6	14	82124.3	-	-	-	-	-	-	-	-	-	-	-	-	0.0038	
MW7	16/07/2015	MW7	14	51328.5	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
MW8	16/07/2015	MW8	14	51328.6	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
Trip Blank	16/07/2015	MW9	14	51328.7	< 0.3	< 0.7	< 1.4	< 3	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
Field Blank	16/07/2015	MW10	14	51328.8	< 0.15	< 0.4	< 0.8	< 1.4	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
Duplicate of MW6A	16/07/2015	MW11	14	51328.11	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.0010	< 0.0010	< 0.003	-	-	-	-	-	
Tier 1 Groundwater	Commercial/ Industrial Land	Indoor Air Inhalation	Sand	Depth to Groundwater	S ³	S ³	S ³	-	5.5	(480) ⁵	(120) ⁵	S ³						
cceptance Criteria ²	Use	Outdoor Air Inhalation	Sanu	- 4 m	S ³	S ³	S ³	-	(370) ⁵	S ³	S ³	S ³						
reshwater Trigger Val	ues (95% protection	n) ⁷			1								0.9 8	NG ⁹	0.7	NG ⁹	0.008	
Marine Water Trigger		7											0.91 8	NG ⁹	0.7	NG ⁹	0.015	

Notes:

1. All results in mg/L.

2. Criteria from MfE 2011a - refer to table 5.10 (Commercial/Industrial Inhalation) of the MfE Guidelines.

3. Calculated water criterion exceeds solubility limit for pure compound in water.

4. Measured TPH concentrations in groundwater are frequently dominated by the aromatic component of the TPH mixture. The aliphatic component of TPH generally exhibits very low solubility.

5. Values in brackets exceed solubility limit for compound in water when present as part of a typical gasoline mixture. Solubility is dependent upon composition of the gasoline mixture and so uncertainty arises as to the actual solubility mixture in water. 6. Total xylenes was calculated by adding the laboratory results of the individual xylene isomers with the sum rounded to the least number of significant figures of the two results. Where one of the xylene isomers was below the detection limit, a value of half the detection limit was used in the

sum. Where all compounds in the sum are non-detects, the overall detection limit is the sum of the detection limits.

7. Criteria from ANZECC 2000.

8. Based on the highest pH reading of 8.0 during groundwater monitoring (16 July 2015).

9. No Guideline.

0.0173

Concentration above ANZECC (2000) freshwater trigger value.

Concentration above ANZECC (2000) marine water trigger value.

Complete estimation	Data	Sample			Total Petroleum	Hydrocarbons ^{1,6}			r	Dissolve	
Sample Location	Date	Number	Sample Laboratory Reference	C ₇ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₃₆	ТРН	Arsenic	Cadmium	Chromium	Co
SW01	16/07/2015	SW01	1452027.13	-	-	-	-	< 0.0010	< 0.00005	< 0.0005	0.
014/02	16/07/2015	C14/02	1452027.14	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.00005	< 0.0005	0.
SW02	29/09/2015	SW02	1482124.4	-	-	-	-	-	-	-	
SW03	29/09/2015	SW03	1482124.5	< 0.10	< 0.2	< 0.4	< 0.7	< 0.0010	< 0.00005	< 0.0005	0.0
		Potab	le Use	18 ^{3,4}	0.35 4	S ⁵	-				1
-		Irrigati	on Use	S 5	1.8 4	S ⁵	-	_			
Tier 1 Groundwater Acceptance Criteria ²	Commercial/ Industrial Land	Indoor Air Inhalation	Depth to Sand Groundwater -	S ⁵	S ⁵	S ⁵	-	-			
	Use	Outdoor Air Inhalation	- Sand Groundwater - 4 m	S ⁵	S ⁵	S 5	-				
Freshwater Trigger Values	s (95% protection) 7							0.013 8	0.0002	0.001 9	0.0
Marine Water Trigger Val	ues (95% protection	ı) ⁷						NG ¹⁰	0.0055	0.0044 ⁹	0.

Notes:

1. All results in mg/L.

2. Criteria from MfE 2011a - refer to Table 5.10 (Commercial/Industrial Inhalation) of the MfE Guidelines.

3. Benzene fraction will be limiting.

4. Criterion exceeds solubility limit for most aliphatic hydrocarbons in this range.

5. Calculated water criterion exceeds solubility limit for pure compound in water.

6. Measured TPH concentrations in groundwater are frequently dominated by the aromatic component of the TPH mixture. The aliphatic component of TPH generally exhibits very low solubility.

7. Criteria from ANZECC 2000.

8. Value given for Arsenic (V).

9. Value given for Chromium (VI).

10. No Guideline.

0.0173

Concentration above ANZECC (2000) freshwater trigger value.

Concentration above ANZECC (2000) marine water trigger value.

lved Metals			
Copper	Lead	Nickel	Zinc
0.0005	0.00031	< 0.0005	0.0016
0.0011	0.00065	< 0.0005	0.0173
-	-	-	0.0115
0.0005	0.00012	< 0.0005	0.0086
0.0014	0.0034	0.011	0.008
0.0013	0.0044	0.07	0.015

BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix C: Historical Photographs



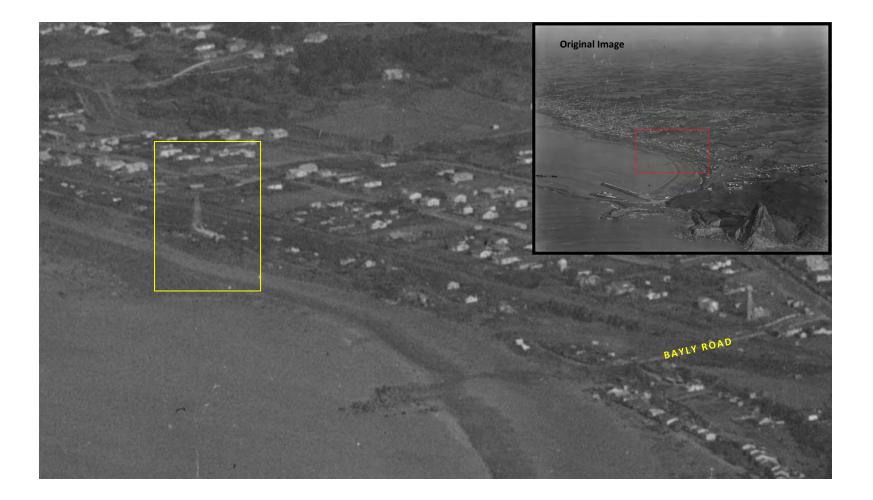
Historical Photograph 1: Bayly Road Site – 1949 Source: New Plymouth District Council



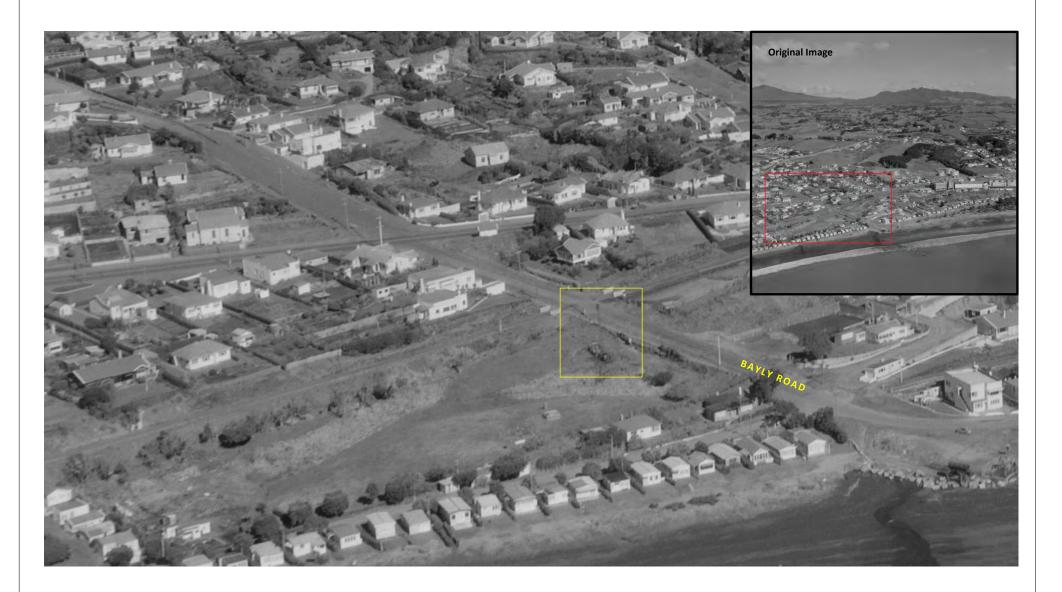
Historical Photograph 2: Bayly Road Site – late 1990s Source: New Plymouth District Council



Historical Photograph 3: Location of Moturoa 2 - 1953 Source: Alexander Turnbull Library, Ref: WA-33268-F



Historical Photograph 4: Location of Moturoa 3 - 1937 Source: Alexander Turnbull Library, Ref: WA-55980-G



Historical Photograph 5: Location of Egmont 5 – 1958 Source: Alexander Turnbull Library, Ref: WA-47172-F



BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix D: Site Photographs



Photograph 1: View of the Waitapu Urupā, looking west.



Photograph 2: The wetland area and soil mound in the background, in the south-western part of the site. Photograph looks east.



Photograph 3: The soil mound located in the Waitapu Urupā, looking south.



Photograph 4: Looking west across the bach investigation area in the north-western part of the site, with Ocean View Parade in the foreground.



Photograph 5: View of the Marae investigation area in the central part of the site, looking southeast.



Photograph 6: View of the Moturoa 2 oil well and the Marae investigation area, looking northwest.



Photograph 7: View of the eastern-most portion of the site, looking east.



Photograph 8: View of completed monitoring well (MW1).



Photograph 9: View of ground gas monitoring point installation.



Photograph 10: Soil encountered during the bach investigation including suspected cement-asbestos fragments.



Photograph 11: Soil and waste material encountered during the Marae investigation (SS21).



Photograph 12: Remnant building foundation encountered during the Marae investigation (SS20).



Photograph 13: View of soil and waste material encountered during the Marae Investigation (SS16).



Photograph 14: View of bench considered to be the approximate location of former oil well Moturoa 3.



Photograph 15: View of test pit during investigation of Moturoa 2 oil well.



Photograph 16: Electrical insulators encountered during investigation of Moturoa 2 oil well.



Photograph 17: Test pit excavated during the Moturoa 3 oil well investigation.



Photograph 18: Large concrete footing, likely associated with a former pumpjack, identified in test pit TP14.



Photograph 19: View of drill core at MW2.



Photograph 20: View of the manhole sampling location (SW03).



Photograph 21: View of the on-site spring sampling location (SW02).

BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix E: Logs

PATTLE DELAMORE PARTNERS LTD	LOG OF HA Bayly Road Detailed				ı	PIT NO. SS03 JOB NO: W02050100			
CLIENT: Taranaki Regional C	Council	LO	CATION: Bac	h Investig	ation Ar				
DATE: 6/07/2015	DATE BACKFILLED: 6/07/2015	LO	GGED BY: AI	M		SHEE	T 1 OF 1		
	DESCRIPTION OF SOIL	•	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
FILL. CLAY; brown. Moist, soft; [TOPSOIL].	plastic. Includes rootlets/organics	/		0.0	SS03	0.1	×0.0		
FILL. Silty CLAY; brown. Moist; s fragments and coarse gravel cl	soft; moderately plastic. Fill includes met asts [DEMOLITION WASTE].	al		- 0.2 - 0.4 - 0.6	• SS03 • SS03		×0.0 ×0.3		
Fine SAND; black. Moist, loose	y packed.		×××××	- 0.8 - 1.0 - 1.2 - 1.4	 SS03 SS03 		×0.1		
END OF HAND AUGER AT 1.5m									
Notes: 1. All test results are in ppm	hanics Society Field Description Guidelines (20)05)	Seepag Grab sa	lwater level ge inflow ample ading (ppm)		Method Datum: Ground Coordin Filenam	Level: hates:		

PATTLE DELAMORE PARTNERS LTD	Boyly Dead Datailed Site Investigation						PIT NO. SS07 JOB NO: W02050100				
CLIENT: Taranaki Regional C	Council	LO	CATION: Bac	h Investig	ation Ar	ea					
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LO	gged by: Ai	М		SHEE					
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS			
FILL. CLAY; brown. Moist, very s	oft, plastic. Rootlets/organics [TOPSOIL].			0.0	• SS07	0.1	× 0.2				
	k. Moist, soft; moderately plastic. board fragments [DEMOLTION WASTE].			-	 SS07 		× 0.1				
0.6m - orange staining Fine SAND; black. Moist, loosel	y packed.	_/		— 0.5 -	• SS07	0.6	× 0.0				
END OF HAND AUGER AT 0.7m				-			-				

Notes: 1. All test results in ppm	<u>KEY</u>	Method: Hand Auger
	Groundwater level	Datum:
	 Geopage inflow 	Ground Level:
	<i>.</i>	Coordinates:
	Grab sample	
	\times PID Reading (ppm)	Filename: W02050100B101

PATTLE DELAMORE PARTNERS LTD	LOG OF HAN Bayly Road Detailed				PIT NO. JOB NO	SS09 : W02050100		
CLIENT: Taranaki Regional Council LOCATION: Ba				ation Are	ea			
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015 LOGGED BY: AM					SHEET 1 OF 1		
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DEIAILS	TESTS	WATER OBSERVATIONS	
FILL. CLAY with fine-coarse grav Includes rootlets/organics [TOPS	rel; dark brown. Moist, soft; plastic. SOIL].		0.0	• SS09 (0.1	0.1		
	; brown. Moist, firm, moderately plastic; tal fragments [DEMOLITION WASTE].		— 0.2 _	• SS09 (0.3	0.0		
Fine SAND; black. Moist, loosel	y packed.		- 0.4 -	• SS09 (0.5	0.0		

END OF HAND AUGER AT 0.6m

Notes: 1. All test results in ppm	KEY Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Hand Auger Datum: Ground Level: Coordinates: Filename: W02050100B102
Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)		

PATTLE DELAMORE PARTNERS LTD	LOG OF HA Bayly Road Detailed				PIT NO. Job No	SS10 : W02050100	
CLIENT: Taranaki Regional C	Council	LOCATION: Ma	irae Devel	opment l	nvesti	gation Area	
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: A	M		SHEET	「1 OF 1	
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS
Rootlets, organics. Includes plas FILL. Silty CLAY with some sand	el; dark brown. Moist, very soft, plastic. ster fragment [TOPSOIL]. and trace gravel; brown. Moist, soft,		0.0	SS10SS10		×0.1 ×0.2	
moderately plastic.			- 0.4	SS10SS10		×0.2 ×0.2	
END OF HAND AUGER AT 0.7m							

Notes: 1. All test results in ppm	KE V	Y Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Datum: Ground Level Coordinates: Filename:	
Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)				

PATTLE DELAMORE PARTNERS LTD	LOG OF TEST PIT Bayly Road Detailed Site Investigation PIT NO. SS13 JOB NO: W02050100							
CLIENT: Taranaki Regional C	Council	LOCATION: Marae Development Investigation Area						
DATE: 9/07/2015	DATE BACKFILLED: 9/07/2015	LOGGED BY: AM SHEET 1 OF 1						
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS
FILL. Silty CLAY; brown. Moist, v	ery soft, plastic. Organics [TOPSOIL]			0.0	• SS13	0.1	× 1.8	
FILL. Fine SAND; black. Moist, I terracotta pipe and concrete blo	oosely packed. Fill includes pieces of ocks. [DEMOLITION WASTE].			— 0.2 - — 0.4	• SS13	0.4	× 0.7	
Fine SAND; black. Moist, loosel	y packed.			- 0.6 - 0.8 - 1.0 - 1.2	• SS13	0.7	× 1.6	
				- 1.4				<u> </u>
END OF TEST PIT AT 1.5m								
Notes: 1. All test results in ppm. 2. Groundwater encountered Logs based on New Zealand Geomeci	at 1.4 m bgl nanics Society Field Description Guidelines (2	2005)	 Seepag Grab sa 	lwater level ge inflow ample ading (ppm)		Methoo Datum: Ground Coordir Filenan	: Level: nates:	

Image: Contract of the second seco						SS15 : W02050100	
CLIENT: Taranaki Regional (LOCATION: Ma	arae Develo	opment li	nvestig	gation Area		
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: AM S				1 OF 1	
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DEIAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY; brown. Moist, very s glass and gravel [TOPSOIL].	oft, plastic. Rootlets/organics. Fill include		0.0	• SS15 (0.1	× 1.7	
	black, moist, loosely packed. Fill includes A - cement fibre board fragment		5 5 5 5	• SS15 (0.3	× 1.2	
Fine SAND; black. Moist, loosel	y packed.		- 0.4	• SS15 (0.5 >	× 0.2	

END OF TEST PIT AT 0.6M

Notes: 1. All test results in ppm	KEY Groundwater level Seepage inflow Grab sample X PID Reading (ppm)	Method: Mechanical Excavator Datum: Ground Level: Coordinates: Filename: W02050100B105

F	1							
PATTLE DELAMORE PARTNERS LTD	PIT N JOB I	IO. SS17 NO: W02050100						
CLIENT: Taranaki Regional (Council	LOCATION: Mar	OCATION: Marae Development Investigation Area					
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: AI	M	SHEET 1 OF 1				
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS		
FILL. CLAY with some coarse gra Rootlets/organics [TOPSOIL].	avel; brown. Moist, very soft, plastic.		0.0	• SS17 0.1	× 1.1			
FILL. Silty CLAY with coarse an includes pieces of asphalt, met cable [DEMOLITION WASTE].	gular gravel; Brown, moist, firm. Fill al, electrical equipment - fushackle, meta		— 0.4 - — 0.6 -	 SS17 0.3 SS17 0.8 	× 1.3 × 1.6			
Fine SAND; black. Moist, loosel	y packed.		- — 1.0					
Notes: 1. All test results in ppm		 Seepage Grab sa 	water level ge inflow ample ading (ppm)		n: nd Level: linates:	I Excavator 00B106		

Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed		PIT NO. SS20a JOB NO: W02050100				
CLIENT: Taranaki Regional C	council	LOCATION: Mar	rae Developi	ment Investi	gation Area		
DATE: 9/07/2015	DATE BACKFILLED: 9/07/2015	LOGGED BY: A	М	SHEET	SHEET 1 OF 1		
1	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS	
FILL. Silty CLAY; brown. Moist, v [TOPSOIL].	ery soft, plastic. Rootlets/organics		0.0	SS20a 0.1	×1.3		
	coarse gravel; brown; moist; soft, plastic blocks, metal pipe, glass fragments ; loosely packed.		- 0.2 - •	SS20a 0.3	×1.4		
			- - 0.6 - 0.8 -	SS20a 0.6	×1.3		
			1.0				
Notes: 1. All test results in ppm.		Seepag Grab sa PID Rea	lwater level ge inflow ample ading (ppm)	Method Datum: Ground Coordin Filenam	Level: ates:		
Logs based on New Zealand Geomech	nanics Society Field Description Guidelines (200)5)					

LOG OF TEST PIT Bayly Road Detailed Site Investigation								
CLIENT: Taranaki Regional Council	OCATION: Mar	CATION: Marae Development Investigation Area						
DATE: 8/07/2015 DATE BACKFILLED: 8/07/2015 I	OGGED BY: A	M	SHEE	T 1 OF 1)F 1			
DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS			
FILL. Sandy CLAY; dark brown. Moist; very soft, plastic. Rootlets/organics [TOPSOIL].		0.0 - 0.2	SS21 0.1	×2.7				
FILL. Silty CLAY with some fine - coarse gravel; dark brown; moist; soft; moderately plastic. FILL. Silty SAND; brownish-black; moist; loosely packed. Fill includes brick and asphalt pieces, pipe, plastic, medium - coarse gravels [DEMOLITION MATERIAL and REWORKED NATURAL MATERIAL].		-0.6 -0.8 -1.0 -1.2 -1.4 -1.4 -1.6 -2.0 -2.2 -2.4 -2.4 -2.6 -2.8	SS21 0.5 SS21 1.5 SS21 3.0	×2.3 ×1.9 ×1.6				
Fine SAND; black. Moist, loosely packed.		- 3.4 - 3.6 3.8 ●	SS21 3.8	×1.9	~~			
END OF TEST PIT AT 4.0m Notes: 1. All test results in ppm. 2. Groundwater encountered at 4.0 m bgl.	Seepag Grab sa	lwater level ge inflow ample ading (ppm)	Methoo Datum Ground Coordii Filenar	: d Level: nates:	Excavator			

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed		PIT NO. JOB NO	SS22 : W02050100			
CLIENT: Taranaki Regional Council LOCATION: Marae Development Inv						gation Area	
DATE: 8/07/2015	DATE BACKFILLED: 8/07/2015	LOGGED BY:	AM	SHEET	SHEET 1 OF 1		
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DEIAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY; brown. Moist, very s		0.0	• SS22 (0.1	×2.9		
FILL. Silty CLAY with some coars moderately plastic. Fine SAND; black. Moist, loosel		- 0.2 - 0.4 - 0.6	 SS22 (SS22 (×1.9 ×0.9		
				0022	0.1	<u></u>	
END OF TEST PIT AT 0.8m							

Notes:	1. All test results in ppm.	KE V	Groundwater level	Method: Datum: Ground Leve Coordinates: Filename:	
--------	-----------------------------	---------	-------------------	---	--

FILL. Clayey fine SAND; greyish-brown. Moist, loosely packed. Inlcudes organics [TOPSOIL]. 0.0 • SS FILL. Silty fine SAND; brownish-black. Moisit, loosely packed. Includes some glass and metal wire [DEMOLITION WASTE]. 0.2 • SS Fine SAND; black. Moist, loosely packed. 0.4 • O.4		HEET 1 OF 1	WATER OBSERVATIONS
DESCRIPTION OF SOIL Image: Second s	DETAILS SAMPLE S	×0.5 ×2.4	WATER OBSERVATIONS
FILL. Clayey fine SAND; greyish-brown. Moist, loosely packed. Inlcudes organics [TOPSOIL]. 0.0 • SS FILL. Silty fine SAND; brownish-black. Moisit, loosely packed. Includes some glass and metal wire [DEMOLITION WASTE]. 0.2 • 0.2 Fine SAND; black. Moist, loosely packed. 0.4 • 0.4 Fine SAND; black. Moist, loosely packed. 0.4 • 0.4 - 0.6 • SS - 0.7 • 0.4 - 0.8 - 0.6 - 0.8 - 0.8 - 1.0 - 1.2 - 1.4 - 1.4	523 0.1 523 0.3	×0.5 3 ×2.4	WATER OBSERVATIONS
FILL. Clayey line SAND; greyish-blowh. Molst, loosely packed. Includes organics [TOPSOIL]. • SS FILL. Silty fine SAND; brownish-black. Moisit, loosely packed. Includes some glass and metal wire [DEMOLITION WASTE]. • O.2 Fine SAND; black. Moist, loosely packed. • 0.4 Fine SAND; black. Moist, loosely packed. • 0.4 • 0.6 • SS • 0.7 • 0.8 • 0.8 • 0.8 • 1.0 • 1.0 • 1.2 • 1.4	623 0.3	3 ×2.4	
some glass and metal wire [DEMOLITION WASTE]. Fine SAND; black. Moist, loosely packed. -0.6 • SS -0.8 -1.0 -1.2 -1.4			
Fine SAND; black. Moist, loosely packed. - 0.6 • SS - 0.8 - 1.0 - 1.2 - 1.4	523 0.6	3 ×1.5	
END OF TEST PIT AT 1.5m			
Notes: 1. All test results in ppm.		thod: Mechan um: und Level: rrdinates:	ical Excavator

PATTLE DELAMORE PARTNERS LTD	LOG OF HAN Bayly Road Detailed							
CLIENT: Taranaki Regional Cour	ncil	LOCATION: Wai	tapu Urup	a Invest	igation	Area		
DATE: 17/07/2015 DA	TE BACKFILLED: 17/07/2015	LOGGED BY: AI	DGGED BY: AM SHEET 1 OF 1					
DES	CRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
FILL. Silty CLAY; dark brown. Moist, [TOPSOIL].	very soft, plastic. Rootlets/organics		0.0	• SS40 SS43	0.1	× 0.1, 0.3, 0.2, 0.3		
FILL. Sandy SILT with some clay; bro moderately plastic. Sand; very fine.	ownish orange. Moist, soft;	XXXXXXXX IXIIXIIXIX XXXXXXXX IXIIXIIXIX IXIIXIXIXIX	- 0.4 0.6 - 0.8	 SS44 SS40 SS42 SS43 SS43 SS43 SS42 SS44 SS42 SS44 	0.5 - 0.5, 0.5 0.7 1.0 - 1.0, 1.0 1.0,	× 0.1 × 0.1, 0.4, 0.3, 0.2 × 0.2 × 0.1, 0.3, 0.1, 0.2 × 0.2		
Notes: 1. All test results in ppm		 Seepage Grab sa 	lwater level ge inflow ample ading (ppm)		Method:			

PATTLE DELAMORE PARTNERS LTD		F TEST PIT iled Site Investigation				PIT NO. TP1-7 JOB NO: W02050100			
CLIENT: Taranaki Regional C	Council	LO	CATION: Mot	uroa 2 Inv	/estigati				
DATE: 8/07/2015	DATE BACKFILLED: 9/07/2015	LO	LOGGED BY: RWL SHEET 1 OF 1						
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
0.0-0.1m: FILL. Silty CLAY; dark brown. Moist - v organics/rootlets. [TOPSOIL]	vet; soft; plastic. Unit includes			0.0 - 0.2					
plastic. Unit contains refuse - e. plastic, elements, power pylon i fridges, etc. 0.1m: Medium gravel underlain 0.5m: As above in TP5 0.7m: As above in TP7 0.4m: FILL. [DRILL CUTTINGS] * Cemented sediments; light grey Dry; very stiff; non-plastic. FILL. [DEMOLTION WASTES] 0.7-2.1m: FILL. [REWORKED LC and 7 Gravelly fine SAND; black speck packed. Gravels are fine to coas above. 1.5m: Presence of asbestos con TP6. 1.9-2.1m: Novacoil sub-surface gravel	gravel; brown. Dry - moist; firm; slightly g. metal, wood, concrete, ceramic pipe, nsulators, fushackles, ceramic bottles, by geotextile/filter cloth in TP2			- - 0.6 - - 0.8 - - 1.0 - - 1.2 - - 1.4 - - 1.6 - - 1.8 - - 2.0	 TP7 0 TP2 0 FP2 0 FP2 0 FP2 0 FP2 0 FP3 0 FP4 1 FP4 1 FP4 1 FP4 1 FP6 1 FP6 1 FP6 2 FP7 2 	.5, 56; .67; .7 .0 .2; .23 .5	× 0.0 × 0.1, 1.2 × 0.4, 0.4 × 0.9, 0.9 × 2.6 × 0.6, 1.4 × 0.4 × 0.4 × 0.4		
END OF TEST PIT AT 3.5m				— 3.4				₽	
Notes: 1. Log describes lithology of 2. Groundwater seepage ide	multiple test-pits around Moturoa 2 ttified at approximately 3.5m bgl		SeepagGrab sa	water level ge inflow ample ading (ppm)		Method Datum: Ground Coordin Filenam	Level: ates:		

PATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detaile			ition		РІТ NO. ТР8 ЈОВ NO: W02050100			
CLIENT: Taranaki Regional (Council	LOC	CATION: Mot	uroa 3 In	vestigation				
DATE: 8/07/2015	DATE BACKFILLED: 9/07/2015	LOC	GGED BY: AN	M	SI	HEET 1 OF 1			
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS		
Fine SAND; black. Moist, loose Fine SAND; brown. Moist, loose END OF TEST PIT AT 4m				-0.0 -0.2 -0.4 -0.6 -0.8 -1.0 -1.2 -1.4 -1.6 -2.0 -2.2 -2.4 -2.6 -2.8 -3.0 -3.2 -3.4 -3.6 -3.8 -3.8 -3.8	 TP8 0.1 TP8 0.5 	× 0.7 × 2.8			
Notes: 1. All test results in ppm.	hanics Society Field Description Guidelines (SeepagGrab sa	water level ge inflow ample ading (ppm)	Da Gro Co	thod: Mechanic tum: ound Level: ordinates: ename: W020501	al Excavator 00B111		

PATTLE DELAMORE PARTNERS LTD		F TEST PIT led Site Investigation PIT NO. TP10 JOB NO: W02050100								
CLIENT: Taranaki Regional (Council	LOC	ATION: Mot	uroa 3 Inv	/estigati	on				
DATE: 8/07/2015	DATE BACKFILLED: 9/07/2015	LOG	GED BY: AN	N		SHEE	T 1 OF 1			
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS		
Fine SAND; black. Moist, loose	y packed [DUNE SAND MATERIAL].			0.0 0.2 0.4	• TP10	0.1	×0.5			
FILL. Silty CLAY, brown. Moist;	firm; moderately plastic.			- - 0.8 - - 1.0 - 1.2 - 1.4 - 1.4 - 1.6 - 1.8	 TP10 TP10 		×1.3 ×2.7 ×2.6			
Medium SAND, grey. Moist, loc	sely packed [DUNE SAND]			- 2.6 - 2.8 - 3.0 - 3.2 - 3.4 - 3.6 - 3.8 - 3.8			1.2 ×			
END OF TEST PIT AT 4.0m										
Notes: 1. All test results in ppm.	hanics Society Field Description Guidelines (2		I Excavator 00B112							

PATTLE DELAMORE PARTNERS LTD		OF TEST PIT stailed Site Investigation PIT NO. TP13 - JOB NO: W02050100								
CLIENT: Taranaki Regional (Council	LOCATION: Egr	nont 5 Inv	estigatio						
DATE: 28/09/2015	DATE BACKFILLED: 28/09/2015	LOGGED BY: A	M		SHEE	T 1 OF 1				
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS			
0.0-0.05m: FILL [TOP SOIL]. CL Organics.	AY; brown. Moist, very soft, plastic.		0.0			× 3.4				
packed. Reworked material. In and wood pieces, glass bottles.	blackish brown - grey. Dry - moist, loosel cludes refuse - concrete blocks, metal	, ,	× - - - - - - - - - -	• TP13/	A 0.5	× 2.3 - 4.8				
			- 1.0	• TP13	1.0	× 3.5 - 5.6				
1.5m: Circular hole feature and drainage hole for drill cuttings d 1.5m: Minor black staining in T			- 1.5	• TP14		× 7.5 - 20.8				
2.0-3.8m: FILL [REWORKED LO Silty CLAY; brown - black. Moist material. Moderately strong hyd 2.0m: Orange brown CLAY, no b	, soft; moderately plastic; reworked rocarbon odour.		2.0	• TP13	2.0	× 65.8				
			2.5	 TP13A TP15 		× 2.3 - 390	₽ ∛			
				 TP13 TP134 	'	× 4.5 - 223.1				
3.5m: Dark grey staining, minor	hydrocarbon odour in TP14.		> 3.5 > >	• TP14 TP15	,	× 2.5 - 40.8				
3.8-4.5m: FILL [REWORKED M/ Silty CLAY; brown with orangey material. Minor hydrocarbon od	red patches. Moist, soft, plastic; reworked		4.0	• TP13	4.0	× 2.8 - 11.2				
3.8-4.5m: CLAY and fine SAND loosely packed. No hydrocarbo	; orangey brown; CLAY, plastic; SAND, n odour in TP14 and TP15		× × × 4.5			× 4.1				
4.5-4.8m: FILL. Sandy CLAY; brown, moist, soft	· ·					· +.1				
4.8-5.0m DRILLING MUD. CLA highly plastic. Minor hydrocarbo	Y with some fine sand; grey-brown. Soft, n odour.		- 5.0	• TP13	5.0	× 10.6				
END OF TEST PIT AT 5.0m										
Notes: 1. End of test pit at 5.0 m b 2. All test results in ppm.	g	 Seepa Grab s 	dwater level ge inflow ample eading (ppm)		Methoo Datum: Ground Coordir Filenam	: Level: nates:				

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed S		ation		PIT NO. TP16 - TP18 JOB NO: W02050100						
CLIENT: Taranaki Regional (Council	LOCATION: Wai	itapu Uru	pa Investigatio	Investigation Area						
DATE: 28/09/2015	DATE BACKFILLED: 28/09/2015	LOGGED BY: A	M	SHE	ET 1 OF 1						
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS					
0.0-0.05m: FILL [TOP SOIL]. Cl plastic. Organics.	AY; orangey brown. Moist, very soft,		0.0		× 0.5,1.8						
Silt, non-plastic. Reworked ma	wn - black. Moist. Sand, loosely packed;		- 	• TP17 0.3	× 0.9 × 0.9 - 2.3						
			- 		× 1.3, 3.3						
1.5-2.5m: Organic rich - rootle	ts, branches in TP17 and TP18.		- - 1.5 -		× 1.7, 2.3						
1.8-2.5m: Black staining and s in TP16.	trong hydrocarbon odour fades with depth		2.0	● TP16 2.0	× 2.5, 89.8						
	ING MUD soft, plastic in TP16. CLAY with minor nly plastic in TP18 [DRILLING MUD].		- 2.5 -	• TP18 2.7	× 4.5 × 2.7						
2.5- 3.0m: Peat, black with tim SAND in TP17.	ber peices, then in-situ coarse black		- 3.0		× 3.1						
					× 2.1, 2.0						
3.5-4.0m: Clayey medium SAN	D; greyish green. Moist, loosely packed.		- 3.5 - - -			<u> </u>					
END OF TEST PIT AT 4.0m			<u>4.0</u>								
Notes: 1. End of test pit at 4.0 m b 2. All test results in ppm. 3. Groundwater encountered	-		dwater level ge inflow ample	Groun	2	xcavator					

CLIENT: Taranaki Regional Council		LOG OF TEST PIT Bayly Road Detailed Site Investigation							
5	L	OCATION: Wai	tapu Urup			W02050100 Area			
DATE: 28/09/2015 DATE BACKFILLED: 28	8/09/2015 L	OGGED BY: A	М		SHEET :	1 OF 1			
DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS		
0.0-0.3m: Silty very fine - fine SAND; blackish brown. M packed. Surficial organics.	loist, loosely	· · · · · · · · · · · · · · · · · · ·	0.0	• TP21	0.2 ×	0.8, 2.4			
0.3-1.0m: Silty fine SAND; brown. Moist, loosely packed 0.3-1.2m Silty CLAY; orangey brown. Wet, soft, moderat TP21.			- - 0.5 - - -	• TP21	0.6 ×	0.9 1.9			
1.0-2.0m: Sandy CLAY; orangey brown. Moist, plastic. S	Sand; fine.		1.0 1.5 	• TP20		1.5 2.0, 2.6	~		
2.0-3.0m: Silty fine SAND; black. Moist-wet, loosely pac angular coarse rock clasts.	cked. Includes		- - 2.0 - - - - 2.5 - - - - - - - - - - - -	● TP20		2.0, 2.8 5.2 2.9	<u> </u>		
END OF TEST PIT AT 3.0m Notes: 1. End of test pit at 3.0 m bgl. 2. All test results in ppm. 3. Groundwater encountered between approximately 1.8	8 - 2.8 m bgl.		Water level ge inflow		Method: Datum: Ground Le Coordinat		xcavator		

PATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detailed			ition		ріт NO. ТР25 Јов NO: W02050100				
CLIENT: Taranaki Regional C			CATION: Wai		a Invest					
DATE: 28/09/2015	DATE BACKFILLED: 28/09/2015	LO	GGED BY: AN	M		SHEET	1 OF 1			
	DESCRIPTION OF SOIL	•	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS		
organics.	k. Moist, loosely packed. Surficial			0.0 - 0.5 - 0.5 - 1.0 - 1.5	● TP25	0.5	× 2.1 × 2.6			
moderately plastic. 2.5m: Small timber inclusions				- - 			× 2.8 × 2.7	<u> </u>		
END OF TEST PIT AT 2.5m Notes: 1. End of test pit at 3.0 m b	gl.		KEY	2.5		Method:	: Hydraulic Đ	kcavator		
 All test results in ppm. Groundwater encountered 		2005)	Ground Ground Grab sa	water level ge inflow ample ading (ppm)		Datum:	Level: ates:			

P	PATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detai				tigati	on		o. M		
CLIE	ENT: Taranaki Regional Cou	incil	LOCATIO	DN: D	own-g	gradient	of Egn	nont 5			
	RT DATE: 2/07/2015 DATE: 2/07/2015	COORDINATES: 1690101.80 5675921.77	TOTAL C	EPTH:	5.5	m	LOGGE	D BY: R	WL	SHEET 1	OF 1
	OUND LEVEL: OF CASING: 4.42m AMSL DESCRIPTION (based on o	DF SOIL / ROCK cuttings etc.)	GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS	1	NSTALLATIC	DN
FILL	FILL. Silty CLAY; dark brown. includes organics/rootlets. [TC FILL. Silty fine SAND with son	DPSOIL]		0.0	-4	• MW1 0.5	×0.0		Flus	Concrete _ h Toby Box _ Bentonite _	
	includes refuse - wood. Fine SAND; black. Dry; loose! 0.9m colour change to light b 1.0m colour change to dark b	y packed. rown		1.0 -		• MW1 1.0	×0.0			Casing _ Sand _	
	1.2 colour change to black			-	-3	• MW1 1.5	×3.0				
S	2.0m unit is wet-saturated			2.0	-2	• MW1 2.0 • MW1 2.5	×2.6 ×2.5	2.335m AMSL			
& ASH DEPOSITS	2.9m colour change to brown 2.95m colour change to grey	/orange		- 3.0 —		• MW1 3.0	X2.1		Industri	al Minerals _	
DUNE SANDS	Sandy fine GRAVEL; light grey packed. Sand is fine. Fine SAND; light grey/blue. Sa			-	-1	• ^{MW1} 3.5	X1.7		(White	e Sand K1)	
	4.0m colour change to black			- 4.0 — -		• ^{MW1} 4.0	X2.5				
				-	-0	• ^{MW1} 4.5	X2.7				
	Silty CLAY with some sand; gr	ey/blue. Saturated; firm; non-	× <u>=</u> ××	5.0 —		• ^{MW1} 5.0	×1.8				
	END OF BOREHOLE AT 5.5m		<u> </u>		1	MW1 5.5	,0.6	1	<u> </u>		
Note	 as: 1. Hand-cleared to 1.5m; 200n 2. Tests are PID measurements 3. Coordindates are NZTM; elev 4. Log scale 0.30 				Vater G Vater Lo Grab sa	OSS		Drilled B Diamete Method: Datum: Filename	r: 150 Sonic MSL		1

P	ATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detai				tigati	on	HOLE NO. MW2 JOB NO: W02050100			
CLIE						gradient		-			
	RT DATE: 2/07/2015 DATE: 2/07/2015	COORDINATES: 1690234.35 5675937.06	TOTAL D	DEPTH:	4.0) m	LOGGE	ED BY: R	WL SHEET 1 OF 1		
TOP	UND LEVEL: OF CASING: 4.15 AMSL		00					/EL S	INSTALLATION		
INTERPRE- TATION	DESCRIPTION ((based on c		GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS			
	FILL. Silty CLAY; dark brown. N includes organics/rootlets. [TC			0.0	-4				Concrete		
FILL	FILL. Silty fine SAND with som tightly packed. Gravel is fine to			×		● ^{MW2} ●0.5	×0.5		Casing Bentonite		
	Fine SAND; black speckled gro	ey. Dry-moist; loosely packed.		1.0	-3	MW2 1.0	×0.8				
	1.3m colour change to black,	unit is wet-saturated		-		MW2 1.5	×0.8	 2.86m AMSL			
DEPOSITS				2.0 —	-2		×0.1				
DUNE SANDS & ASH [X0.7		Industrial Minerals		
DO				3.0 —	-1		×0.3				
	Gravelly fine SAND; black. Sat fine - coarse, rounded.	urated; tightly packed. Gravel is				₩W2 ●3.5	×1.3				
	Silty CLAY with some sand; gr Saturated; firm-stiff; non-plast			-							
	Gravelly fine SAND; black. (as	above)		4.0			×1.0				
	END OF BOREHOLE AT 4.0m										
Note	2. Tests are PID measurements				Vater G Vater L Grab sa	oss		Drilled B Diamete Method: Datum: Filename	rr: 150 mm Sonic MSL		

P	PATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detail				tigati	on		o. MV : W0205		
CLIE	ENT: Taranaki Regional Co	uncil	LOCATIO	DN: D	own-g	gradient	of Mot	uroa 2			
	RT DATE: 6/07/2015 DATE: 6/07/2015	COORDINATES: 1690361.75 5675955.55	TOTAL D	EPTH:	6.5	i m	LOGGE	d by: R	WL	SHEET 1	OF 1
	OUND LEVEL: OF CASING: 8.14m AMSL	OF SOIL / ROCK	GRAPHIC LOG	DEPTH (m)	(-	SAMPLES	S	WATER LEVEL GAIN / LOSS	11	NSTALLATIO	DN
INTEF	(based on	cuttings etc.)	GRAF		RL (m)	SAM	TESTS	WATE GAIN			
	FILL. Silty CLAY; dark brown.	Moist - wet; soft; plastic. Unit DPSOIL]/		0.0	-8				Flusl	Concrete – 1 Toby Box –	
		avel and boulder; dark brown. Dry; coarse, angular. Unit includes		-		• MW3 0.5	×0.0				
FILL	FILL. Gravelly fine SAND; blac Gravel is fine - coarse, round MATERIAL]		1.0	-7	• MW3 1.0	×0.0			Bentonite – Casing –	•	
	FILL. Clayey fine SAND with r grey/brown. Dry - moist; tight	ninor boulder and cobble; light ly packed.		-		MW3 1.5	X0.1			Sand –	
	Gravelly fine SAND; black. Mo coarse, rounded.	pist; tightly packed. Gravel is fine -		2.0	-6		X0.0 X0.1				
)0000000000000000000000000000000000000	- - 3.0	-5		×1.1				
POSITS	3.5m colour changes to blac saturated	k speckled brown, unit is wet-	00000			• MW3 3.5	×1.0	 4.385m AMSL		al Minerals – Sand K1)	
DUNE SANDS & ASH DEPOSITS				4.0	-4	• MW3 4.0 • MW3	×1.2 ×1.6			ata screen -	
DUNE SAN	Gravelly SAND with minor cla Saturated; tightly packed. Gra	y; black streaked orange. avel is fine - coarse, rounded.		- - 5.0 —		4.5	×0.4				
	Gravelly fine SAND; black. Sa fine - coarse, rounded.	turated; tightly packed. Gravel is	00000	-	-3		X3.1				
			00000000 00000000	- 6.0 — -	-2		×1.5		Backfil	(cuttings) –	
	END OF BOREHOLE AT 6.5m						~				
Note	 as: 1. Hand-cleared to 1.5m; 200r 2. Tests are PID measurements 3. Coordindates are NZTM; elev 4. Log scale 0.35 			Vater G Vater Lo Grab sa	OSS		Drilled B Diamete Method: Datum: Filename	r: 150 r Sonic MSL		3	

P	ATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detail				tigati	on		o. MV : W0205		
CLIE	NT: Taranaki Regional Co	uncil	LOCATIO	N: U	p-gra	dient of	Moturo	ba 2			
	RT DATE: 3/07/2015 DATE: 6/07/2015	COORDINATES: 1690368.99 5675922.38	TOTAL C	EPTH:	7.0) m	LOGGE	D BY: R	WL	SHEET	1 OF 1
TOP	UND LEVEL: OF CASING: 8.62m AMSL		c LoG	(m)		S		LEVEL	11	NSTALLATI	ON
INTERPRE- TATION		OF SOIL / ROCK cuttings etc.)	K GRAPHIC LOG	ODEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS			
ш	FILL. Silty CLAY; dark brown.	Moist - wet; soft; plastic. Unit OPSOIL]		- 0.0					Flus	Concrete n Toby Box	
	Gravelly fine SAND; black. Mo coarse, rounded.	oist; tightly packed. Gravel is fine -	00000000 000000000	- - 1.0 —	-8	• MW4 0.5 • MW4 1.0	× ^{0.1} × ^{0.4}			Bentonite Casing	
			0000000	-	-7	• MW4 1.5	× ^{1.2}			Sand	
			000000000000000000000000000000000000000	2.0	-6		×0.6 ×0.5				
SAND DEPOSITS			0000000 0000000	- 3.0 — -		• MW4 3.0	× ^{0.6}				
DUNE SAND	3.5m unit is wet-saturated			_	-5	3.5 • MW4 4.0	×0.9	⊥ 4.740m AMSL	(White	al Minerals Sand K1) ata screen	
				-	-4		× ^{0.4}				
				5.0			× ^{0.1}				
				-	-3		× ^{1.2}				
				6.0			× ^{0.7}				
			0000000		-2				Backfil	I (cuttings)	
	END OF BOREHOLE AT 7.0m										
	4. Log scale 0.38				Vater G Vater L Grab sa	OSS		Drilled B Diamete Method: Datum: Filename	r: 150 r Sonic MSL		04

P		adutions for your environment RE PARTNERS LTD	LOG Bayly Road De	OF BOR etailed S			tigati	on		o. M		
CLIE	NT: Tara	naki Regional Cou	ncil	LOCAT	ION: U	lp-gra	dient of	Wetlan	d			
	RT DATE:	7/07/2015 7/07/2015	COORDINATES: 1690249 5675859	9.43 9.60 TOTAL	DEPTH:	5.0) m	LOGGE	DBY: R	WL	SHEET 1	. OF 1
	UND LEVEL OF CASING	9.2m AMSL	DF SOIL / ROCK uttings etc.)	GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS		NSTALLATIO	N
	Unit inclu	des organics/rootlet	ack. Saturated; very soft; pla s. [SWAMP MATERIAL] aturated; very soft; plastic.		0.0	-9	• MW5 0.5	×1.0	- <u>∑</u> 8.71 m AMSL		Concrete _ Bentonite _	
FILL	TILL Silly	elat, biowijgrey. c	aturateu, very soit, plastic.		1.0 - - - 2.0 -	- 8	• MW5 1.0 • MW5 1.5 • MW5 2.0	×1.0 ×0.0 ×0.0			Casing _ Sand _	•
S	Silty CLAY	with some sand; br	own. Saturated; firm; plastic.		3.0 -	-		×0.1 ×0.3		Industri	al Minerals _	
SWAMP & ASH DEPOSITS	organics/r	ootlets and wood/pe	oft; plastic. Unit includes at inclusions. ey/brown. Saturated; soft;		-	- 6		×0.2 ×0.6		(White	e Sand K1) rata screen _	
		SAND with some cla ; tighly packed.	r; light grey streaked with yel			-		×1.1				
Notes	s: 1. Hand- 2. Tests a			иsl)		Water G Water L Grab sa	OSS		Drilled E Diamete Method: Datum: Filename	r: 150 Sonic MSL		5

P		solutions for your environment ORE PARTNERS LTD	LOG OF Bayly Road Detai				tigati	on	HOLE NO. MW6 JOB NO: W02050100			
CLIE	NT: Tar	anaki Regional Cou	ncil	LOCATIO	N: U	p-gra	dient of	Egmon	t 5			
	RT DATE: DATE:	7/07/2015 7/07/2015	COORDINATES: 1690130.63 5675829.16	TOTAL D	EPTH:	5.0) m	LOGGE	d by: R	WL	SHEET 1	OF 1
	OUND LEVE OF CASING	L: 3: 10.71m AMSL DESCRIPTION ((based on c		GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS	11	NSTALLATIO	DN
DUNE SAND, ASH & STREAM DEPOSITS	Fine SAN [REWOR] Fine SAN Silty CLA Silty CLA Silty CLA Silty CLA Silty CLA	organics/rootlets. [To ID; black speckled wi KED LOCAL] ID; black. Moist; tight Y with some sand; br Y with some sand; br	//////////////////////////////////////				 MW6 0.5 MW6 1.0 MW6 1.5 MW6 3.0 MW6 3.5 MW6 4.0 	×0.9 ×0.4 ×0.1 ×0.0 ×0.8 ×0.1 ×0.9 ×1.0 ×2.2	- <u>~</u> 8.455m AMSL	Industria (White	Concrete - h Toby Box - Casing - Bentonite - Sand - Sand -	
Note	2. Tests 3. Coord	-cleared to 1.5m; 200m are PID measurements dinates are NZTM; elevat cale 0.34				Vater G Vater Li Grab sa	OSS		Drilled B Diamete Method: Datum: Filename	r: 150 Sonic MSL		6

PATTLE DELAMORE PARTNERS LTD LOG OF						tigati		HOLE NO. MW7 JOB NO: W02050100				
CLIENT: Taranaki Regional Council				LOCATION: Up-gradient of Moturoa 3								
START DATE: 7/07/2015 END DATE: 8/07/2015 COORDINATES: 1690636.53 5675998.87			TOTAL DEPTH: 12.0 m LC					GGED BY: RWL SHE			OF 1	
GROUND LEVEL: TOP OF CASING: 16.02m AMSL		DF SOIL / ROCK uttings etc.)	GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS		INSTALLATION		
 LL	FILL. Silty CLAY; dark brown. N	Noist - wet; soft; non-plastic. Unit DPSOIL]		0.0	16	• MW7	×0.0		Flus	Concrete		
SITS	Fine SAND; brown. Dry; tightly packed 0.6m colour change to black speckled brown 1.0m colour change to dark brown 2.4m colour change to black				- 13	0.5 • MW7 1.0 • MW7 1.5	x0.0 x2.2 x0.2 x0.7 x0.0 x0.2 x0.2 x0.2 x0.2		Backfil	I (cuttings) – Casing	•	
DUNE SANDS & ASH DEPOSITS	Silty fine SAND; orange/brown	mottled black, Moist - wet:		- - 6.0 -	- 10	• MW7 5.5 • MW7	×0.2 ×0.2			Bentonite [_] Sand [_]		
	tightly packed.		×::×::×	-	- 10	6.0	×0.2					
	Fine SAND; black speckled lig tightly packed.	ht brown and white. Dry-moist;			-9	• MW7 6.5 • MW7 7.0 • MW7 7.5	×0.0 ×1.0 ×0.0 ×0.0					
	Silty CLAY; orange/brown. Wet	; stiff; non-plastic.		- 9.0 -	_				Industrial Minerals			
	Fine SAND; black. Moist; tight	ly packed.					X0.3		(White uPVC Str			
	Silty CLAY; orange/brown. Wet	; stiff; non-plastic.					X0.1					
	Fine SAND; black. Moist; tight	ly packed.	$x = \overline{x}$	10.0 -	-6		×0.0					
	Silty CLAY; orange/brown. Wet	; stiff; non-plastic.	í/	-			X0.3	5.315m				
	Fine SAND; black speckled wh	ite. Saturated; tightly packed.		11.0	-5		×0.1 ×0.1	AMSL				
	END OF BOREHOLE AT 12.0m			-12.0			~~ ~~~~		•			
lotes	 s: 1. Hand-cleared to 1.5m; 200m 2. Tests are PID measurements 3. Coordinates are NZTM; elevat 4. Log scale 0.65 				Vater 0 Vater L Grab sa	OSS		Drilled B Diamete Method: Datum: Filename	r: 150 Sonic AMSI	;	7	

PATTLE DELAMORE PARTNERS LTD LOG OF BO						tigati	on	HOLE NO. MW8 JOB NO: W02050100				
CLIE	NT: Taranaki Regional Cou	LOCATION: Down-gradient of Mot					•					
START DATE: 9/07/2015 COORDINATES: 1690661.64 END DATE: 9/07/2015 5676045.80			TOTAL D	TOTAL DEPTH: 3.0 m		LOGGED BY:		WL	SHEET 1 OF 1			
		DF SOIL / ROCK uttings etc.)	GRAPHIC LOG	DEPTH (m)	RL (m)	SAMPLES	TESTS	WATER LEVEL GAIN / LOSS		INSTALLATION		
FILL	FILL. Silty fine SAND with som]		0.0 -	-3	MW8 • 0.5 MW8 • 1.0	×0.0 ×0.0	2.890m AMSL	Flus	Concrete - A A A A A A A A A A A A A A A A A A		
DUNE SANDS & ASH DEPOSITS	Fine SAND; black speckled lig	ht brown. Saturated; tightly			-2	MW8 ●1.5	×0.4 ×0.2		(White	al Minerals e Sand K1)		
	Silty CLAY with some sand; lig stiff; non-plastic.	ht grey/brown. Saturated; very			-1		×0.2					
END OF BOREHOLE AT 3.0m Notes: 1. Hand-cleared to 1.5m; 200mm diameter. 2. Tests are PID measurements in ppm 3. Coordinates are NZTM; elevation is above mean sea-level (AMSL) 4. Log scale 0.20 Motes: Motes: PID Reading (ppm) Drilled By: DCN Drilling Diameter: 150 mm Water Cain Method: Sonic Datum: MSL Filename:												

BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix F: Geophysical Survey Report

AUGUST 2015

Geophysical Investigation Bayly Road Marae, New Plymouth

Report prepared for Pattle Delamore Partners



Southern Geophysical Ltd

3/28 Tanya St, Bromley Christchurch 8062 Tel. 03 384 4302 www.southerngeophysical.com Data collected and report prepared by:

- P. Boudreau, MSc Geophysics
- M. Finnemore, PhD Geology
- T. Grace, PgDip Geology
- M. King, BSc Engineering

Table of Contents

Introduction:	3
Objectives:	3
Methodology:	3
GPR	3
Magnetometer	4
GPS	5
Figure 1 – Areas of Investigation	7
Results:	8
Bach Area	8
Moturoa-3 Area	8
Egmont-5 Area	8
Cemetery West	9
Cemetery East	9
Figure 2 – Bach Area	10
Figure 3 – Moturoa-3 Area	11
Figure 4 – Egmont-5 Area	12
Figure 5 – Cemetery West Area	13
	1 Page

Figure 6 – Cemetery East Area	.14
Limitations:	.15
Disclaimer:	.16
Appendix A - Selected Radargrams	.17
Appendix B – Field Photographs	.24
Appendix C – Logs of Test Pits and Hand Augers	.27



SGL JOB #1127

Introduction:

Southern Geophysical Ltd (SGL) conducted geophysical investigations at a proposed marae on Bayly Road, New Plymouth, from 30 June to 2 July, 2015. SGL utilised Ground Penetrating Radar (GPR) and magnetometry to image the near surface over five areas.

The five areas were known to include a urupa (cemetery), a site that previously had baches built on it (but are now demolished) and petroleum wells (now disused). For ease of reference, we named these sites:

- Urupa Cemetery West and Cemetery East
- Demolished building area Bach Area
- Petroleum well sites Egmont-5 and Moturoa-3

Objectives:

The objectives of the geophysical surveys were to:

- In the Urupa site determine the extent of burials.
- In the demolished building area identify areas where data indicates subsurface anomalies, in order to target areas for further (future) invasive testing.
- In the petroleum well sites locate buried well sites.

Methodology:

GPR

GPR is a non-invasive electromagnetic method of imaging buried objects up to 10 metres below the ground surface. It uses pulses of radio energy in frequencies varying from 100 MHz to over 1600 MHz that penetrate the ground and reflect back up depending on the electrical properties of the subsurface. In general, higher frequencies produce a sharper image (higher resolution) while lower frequencies penetrate deeper. The best results occur in soils that are dry and free of clay minerals. Materials that conduct electricity such as metal, salt water, and clays reduce the penetration depth by turning the energy into dissipated heat, effectively absorbing the GPR signal.

GPR data is collected by pulling the radar antenna across the ground in a grid pattern of parallel lines. SGL used a GSSI SIR-20 GPR system connected to a 200 MHz antenna. The start and end points of each line are mapped. An odometer connected to the

antenna provides distance information along each profile. The data is transferred to a PC in the office for processing using the Reflexw software package.

Images of the subsurface, called radargrams, are usually displayed as 2-Dimensional representations of signal strength. The x-axis is usually distance and the y-axis is the time the signal takes to reach the antenna. Time is proportional to depth of penetration. Signal strength is shown as a shade of grey. Reflections occur when there is a contrast in electrical properties between materials. Smaller objects such as boulders or pipelines that cross a GPR line at an angle will produce a hyperbola shaped reflection as the GPR signal diffracts off the edge of the object. The reflection from a surface below ground will appear as a line in the GPR record. Mapping the spatial locations of points allows linear features such as utilities to be identified.

In the urupa site (Cemetery-East and Cemetery-West), the aim was to identify the extent of the burials. Depending on the age of burial, GPR has the ability to detect reflections and diffractions from structures associated with the burial such as concrete slabs, grave markers, and coffins, and sometimes from human remains. Older sites tend to have degraded signals as the contrast in electrical properties lessens.

In the demolished building site (Bach Area), the objective of the investigation was to identify areas with subsurface anomalies. GPR can detect remnant structures associated with linear concrete slab foundations, piles, excavations and possibly areas of concentrated waste materials from the demolition process.

The areas of investigation and GPR lines are shown in Figure 1. The GPR lines start and stop positions were collected using a GeoXH differential GPS system (± 15cm) and photographs were taken of key survey locations.

Magnetometer

Magnetometers measure magnetic fields. Buried ferric metals, such as well casing, alter the Earth's magnetic field and this alteration can be picked up by a magnetometer survey. Earth's magnetic poles are not at the same location as the rotational poles. The difference is known as magnetic declination. The angle at which the magnetic field lines enter the earth (inclination) also vary throughout the world. The angle is steepest at the magnetic poles and almost parallel to the surface of the earth near the equator. At New Plymouth, the magnetic declination is approximately +20.78° (toward the east) and magnetic inclination is 64.78° from horizontal. The magnetometer survey around well sites Egmont-5 and Moturoa-3 was undertaken using a standard proton magnetometer (Geometrics G-856AX) that measures the total magnetic field.

Due to the relatively small areas undertaken, magnetic drift and diurnal change were not measured using a base station. Geomagnetic conditions were monitored using <u>http://www.swpc.noaa.gov/products/solar-and-geophysical-event-reports</u>. Geomagnetic storm conditions at the time were calm. Before the survey, functional testing of the magnetometers was undertaken using a Geo Instruments proton magnetometer tester PMT-2, set at 66,666 nT and 50,000 nT.

The magnetometer was run in gradiometer mode, in which two magnetic sensors are separated vertically by one metre. The operator removed all metal objects and the operators position relative to the sensors was kept as constant as possible to reduce the effects of positional changes between the magnetometer and operator.

A single set of top and bottom magnetometer readings was collected at each location. The location of each set of readings was marked and the position was accurately surveyed (±15cm) using a GeoXH differential GPS system after the magnetometer operator had moved at least six metres away. All magnetometer readings were digitally recorded in the magnetometers internal memory. The screen values were also manually checked for data quality.

The magnetic data was processed using the following processing steps:

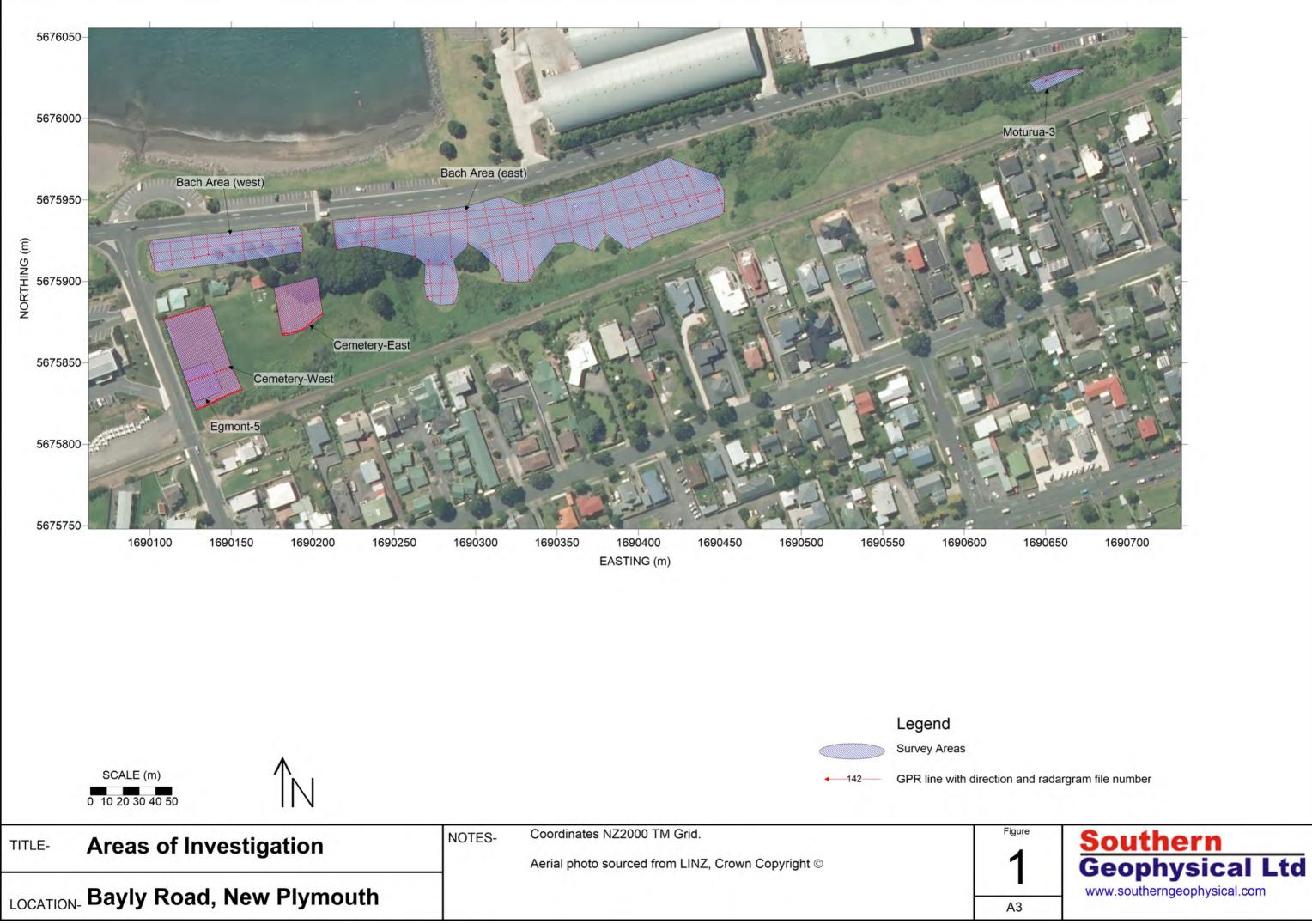
- The raw magnetometer readings were downloaded from the magnetometer using Magmap 2000.
- 2) The GPS position data for each set of gradiometer readings was recorded.
- The magnetometer readings and positions (nT, Easting, and Northing) were gridded and contoured using the Surfer software package.

Electromagnetic surveys utilising the EM-61 was specified in the original agreement as one of the survey methods used to locate the wellheads. However, this method was deemed inadequate to locate the wellhead due to the expected depth of the top of the wellhead was approximately 3.5m (personal communication).

GPS

All survey positions were recorded using a GeoExplorer 2008 Trimble GPS system with a Zephyr antenna. The GPS positions were differentially corrected using LINZ base station data from German Hill No. 2, New Plymouth, Golden Bay, Hamilton, Mahoenui and

Wanganui. The majority of the sites had good GPS coverage. The GPS system was calibrated using a nearby order 3 LINZ geodetic marker, and was accurate to < 6 cm. The GPS points were output using the New Zealand Geodetic Datum (NZGD) 2000, in the New Zealand Transverse Mercator (NZTM) 2000 zone. Each site had significant topographic variance, and the seismic refraction and MASW 2D profiles have been plotted with their elevation in Mean Sea Level (MSL), using a defined (EGM96) geoid model.



Results:

A total of 143 GPR lines were surveyed. The data collected was generally of high quality, with a depth of penetration averaging approximately 2-4m.

The GPR surveys were structured to provide data that could identify buried linear features with high amplitude reflections or filled-in excavations, indicative of remnant foundations, construction materials or burial sites. Several areas contained anomalous areas that are detailed below.

The magnetometer surveys were designed to provide data that could identify a buried wellhead to a depth of greater than 3m. The Egmont-5 area produced an anomalous response indicative of a wellhead as detailed below while the Moturoa-3 area did not contain any anomalies indicative of a buried well.

Bach Area

The Bach Area covers the majority of the site. Fifty-one GPR lines were surveyed in this area. The data indicates many distinct anomalies suggesting subsurface disturbance related to excavation or remnant waste material from the demolition process. Two possible filled in channels were also identified (Figure 2). Eleven test pits were dug to investigate this area and the results are shown in Figures A4 to A6. Based on the test pit results, most fill is limited to the upper metre. The exception was at test pit SS21, where fill was found to a depth of 3.5m.

Moturoa-3 Area

The Moturoa-3 Area is located at the eastern portion of the site. Two GPR lines were surveyed in this area for a total of 48 metres (Figure 3). The GPR data reveal an anomalous zone on the eastern portion of the survey area. The magnetometer survey did not indicate the presence of buried metal indicative of a well within the area. Two test pits were dug in this area (TP08, TP10) to a depth of 4 metres. See Figure A2 for interpreted radargrams.

Egmont-5 Area

The Egmont-5 Area is located at the south-western portion of the site and within the Cemetery-West Area. Thirty-one GPR lines were surveyed in this area (Figure 4) in addition to thirty lines from the southern end of the Cemetery West area. While the GPR scans provided no valuable data, the magnetometer produced a large anomalous zone indicative of a buried wellhead, which was confirmed by communication with onsite personnel.

Cemetery West

The Cemetery West Area is located on the western portion of the site between Bayly Road and the marked gravesites. Thirty-one GPR lines were surveyed in the northern portion of the area (Figure 5) for a total of 1245 metres. Another thirty-one lines were surveyed in the southern portion that also contains the Egmont-5 area. The GPR survey identified several anomalous areas. A buried linear structure near the northern portion of the site is of particular interest and may warrant further archaeological or invasive testing (See Figure A1 for GPR line NP033). A second linear structure is evident at the southern end of the site, which may be a buried pipe. A historical photo shows Egmont-5 being drilled, with an area that appears to be fill just north of it (See Fig B3). The middle portion of the area contains many point diffractions that indicate a complex subsurface and is unlikely to contain any burials.

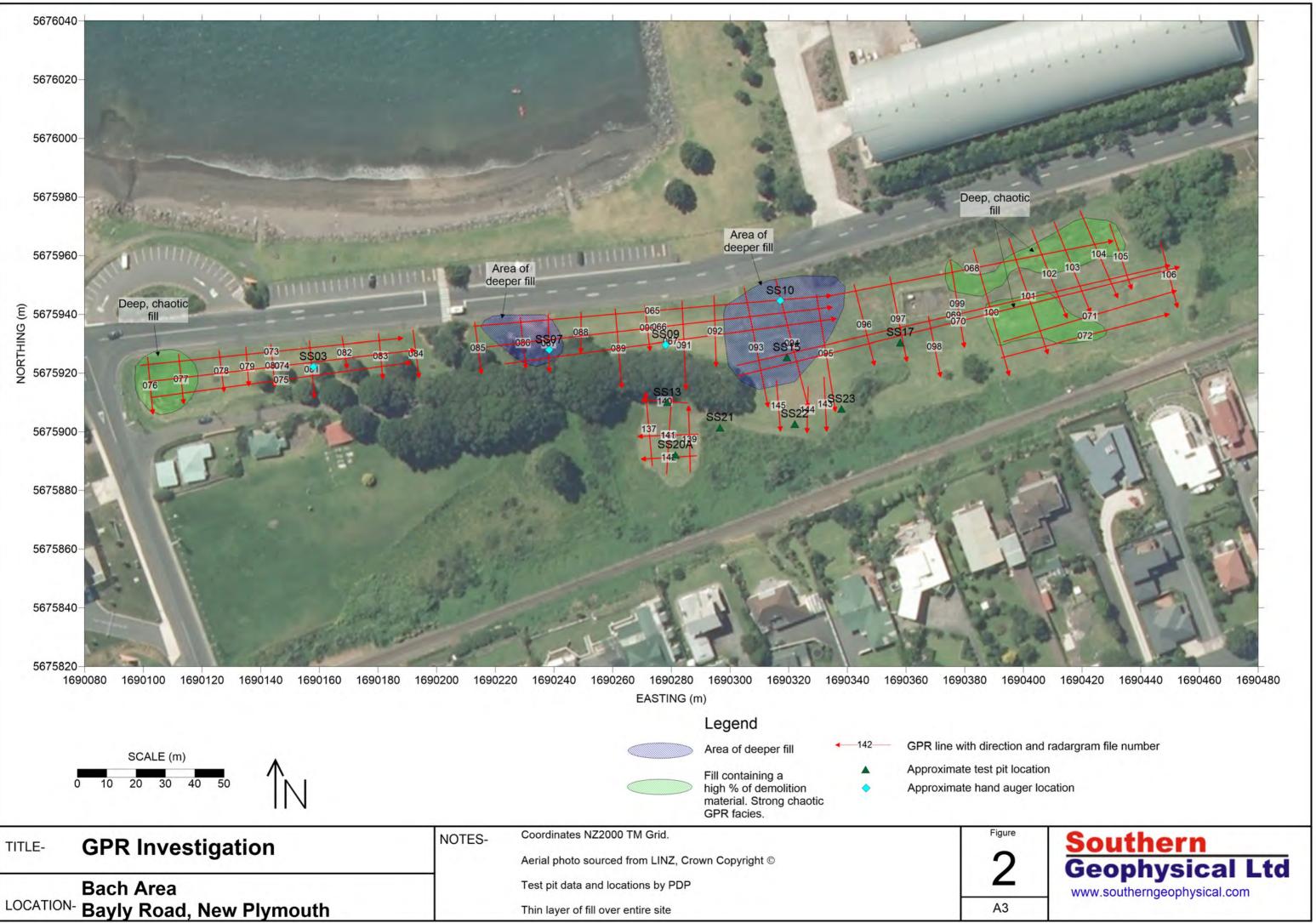
Cemetery East

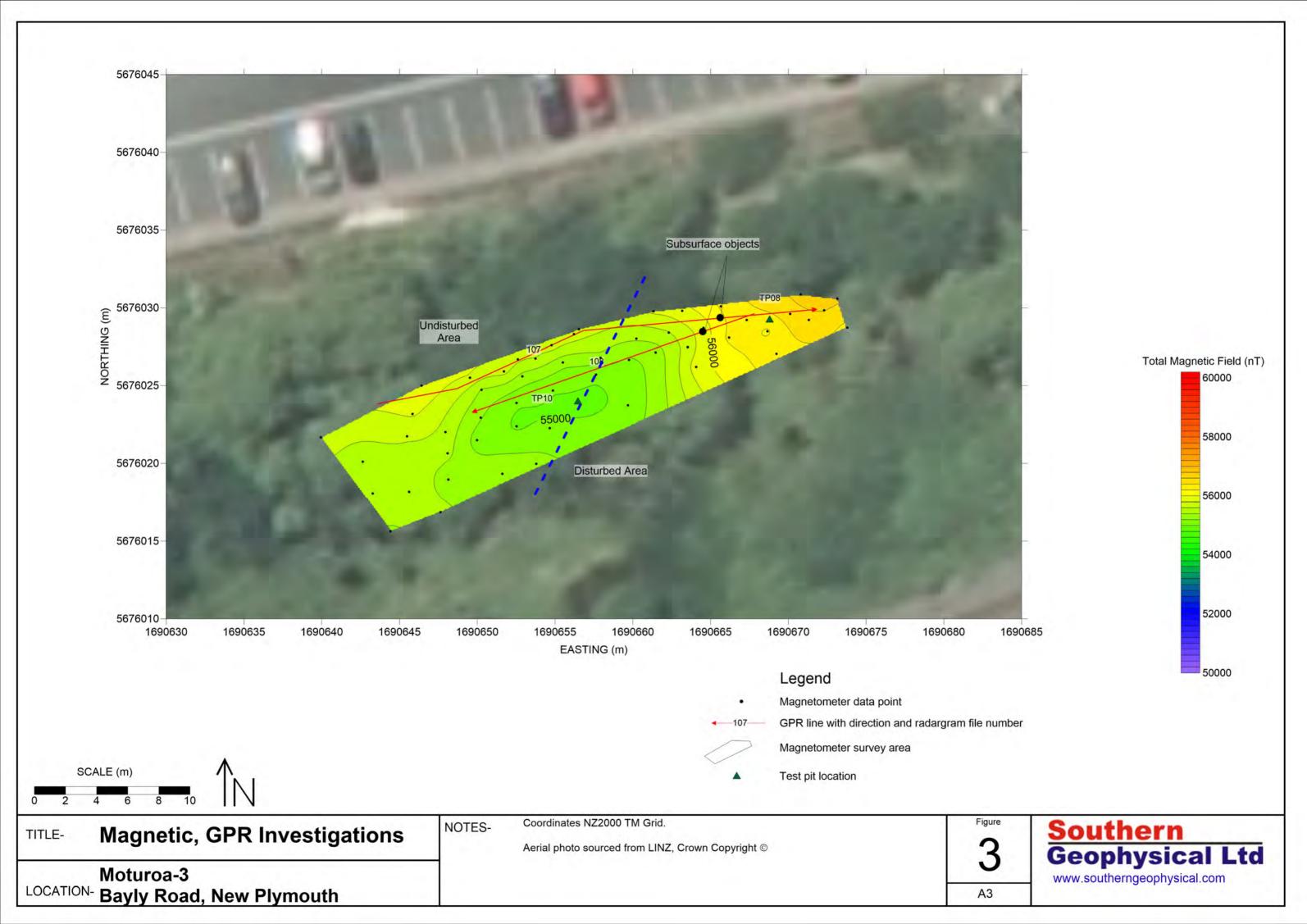
The Cemetery East Area is located on the western portion of the site east of the existing gravesites. Twenty-eight GPR lines were surveyed in this area for a total of 766 m (Figure 6). The GPR data indicate several features at this site:

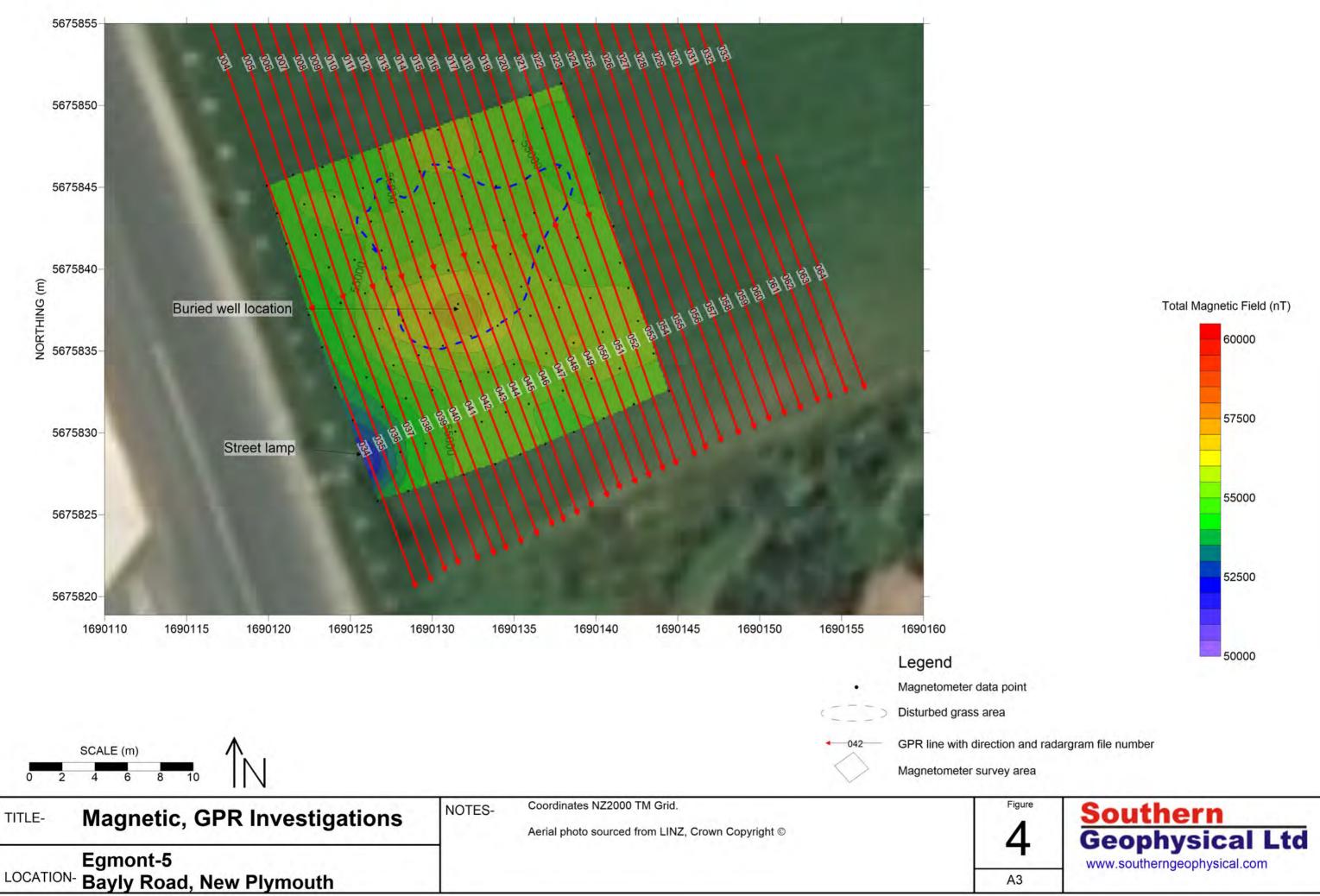
- A thick (0.5-2m) sequence of fill, most likely clean topsoil, overlies the entire site.
- A filled in slope at the northern part of the site.
- Rock approximately 1.5m below the surface at the western centre of the site.
- An in-filled gully at the southern portion of the site.
- Possible burial features below the fill at the north-western portion of the site.
- A relatively undisturbed area in the south-eastern portion of the site.

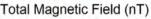
Anomalies within the in-filled gully are chaotic and mostly at the base. They may represent rock or other fill materials, but are unlikely to be a burial site. The relatively undisturbed area in the south-east contains some anomalies, but the radar facies indicates a fluvial marsh sedimentary sequence. Anomalies within this area are most likely to be tree stumps and branches.

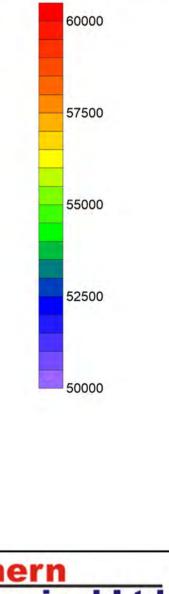
Anomalies indicative of burials were noted in the north-west part of the site. However, since the anomalies all occur beneath a layer of fill that was laid down at a later time, it is not possible to say conclusively.

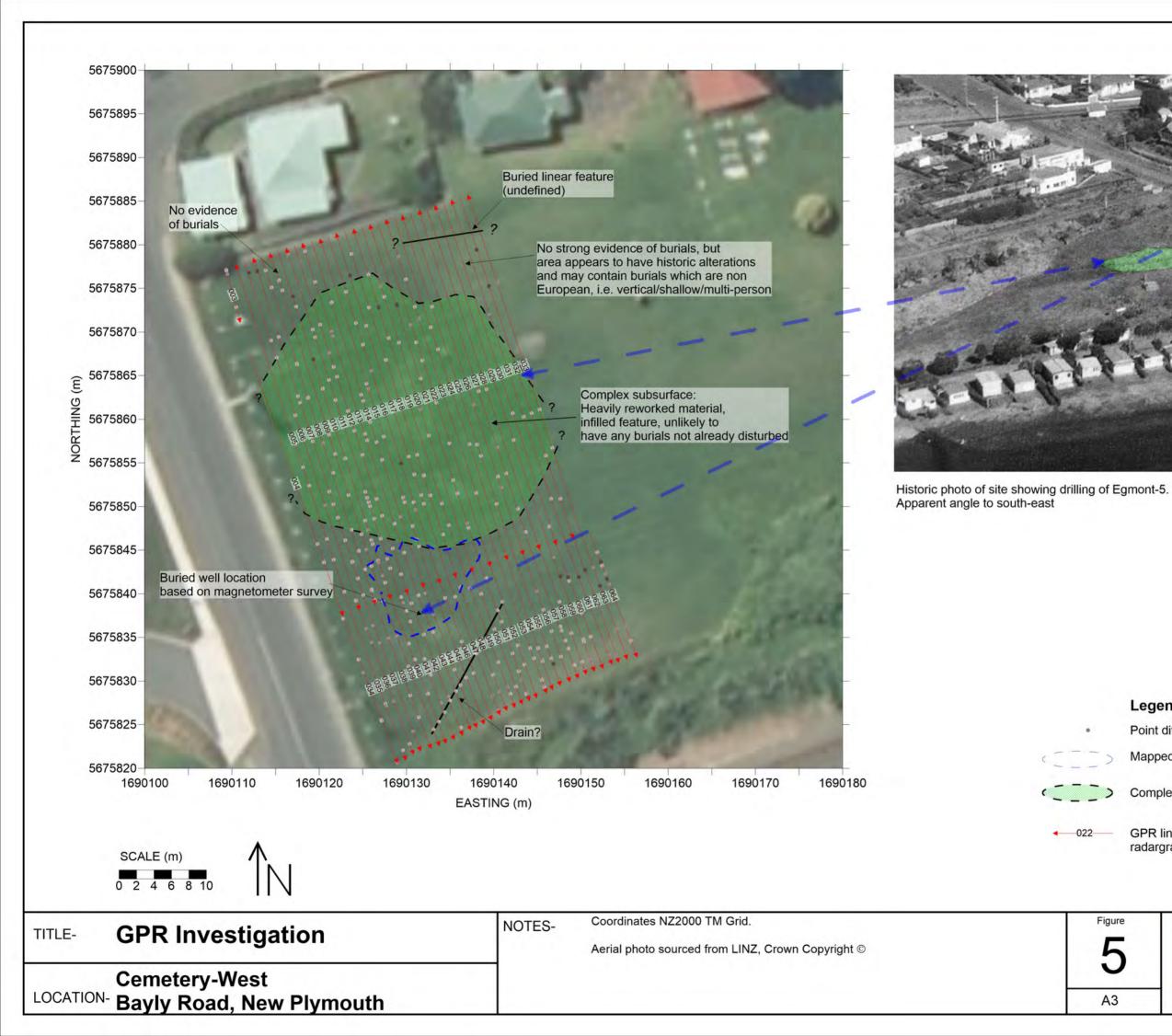














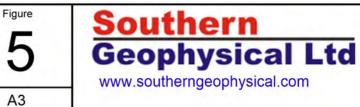
Legend

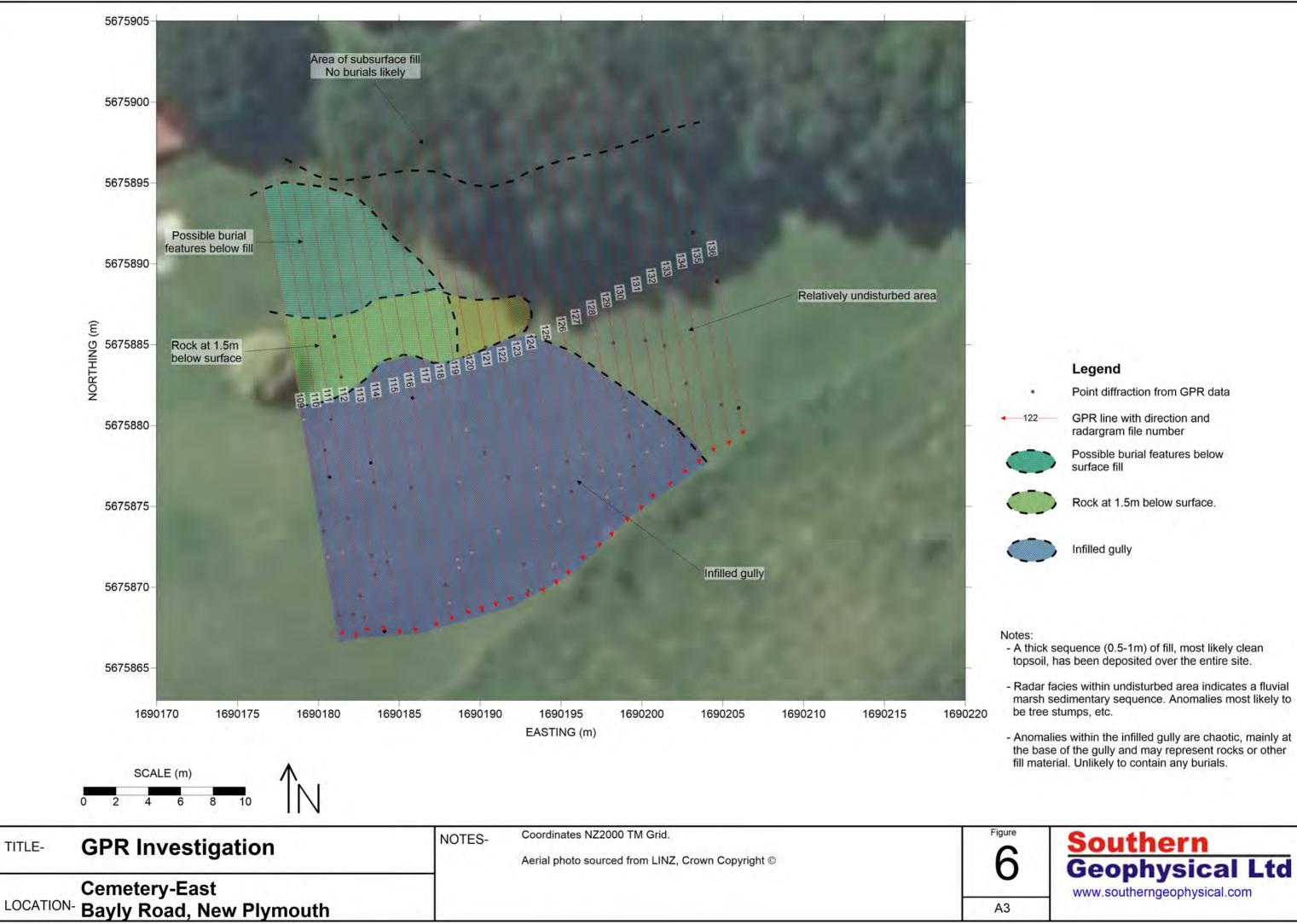
Point diffraction from GPR data

Mapped well area based on ground surface

Complex subsurface interpreted as fill >

GPR line with direction and radargram file number









Limitations:

Older cemeteries have a complex history and may undergo many changes in grave orientation and placement over the time of operation of the cemetery. Along with the documented activity of the cemetery there is likely to have been unsanctioned, unrecorded or undocumented burials. Many of these are likely to have occurred at the periphery of the cemetery and may be small or shallow. Such burial locations are likely to be extremely difficult to locate and identify geophysically and may result in some remains being found almost anywhere within the cemetery boundaries during excavation. Also, only a portion of the entire site was covered by the geophysical survey. Subsurface objects are likely to exist outside the areas covered in the survey.

Disclaimer:

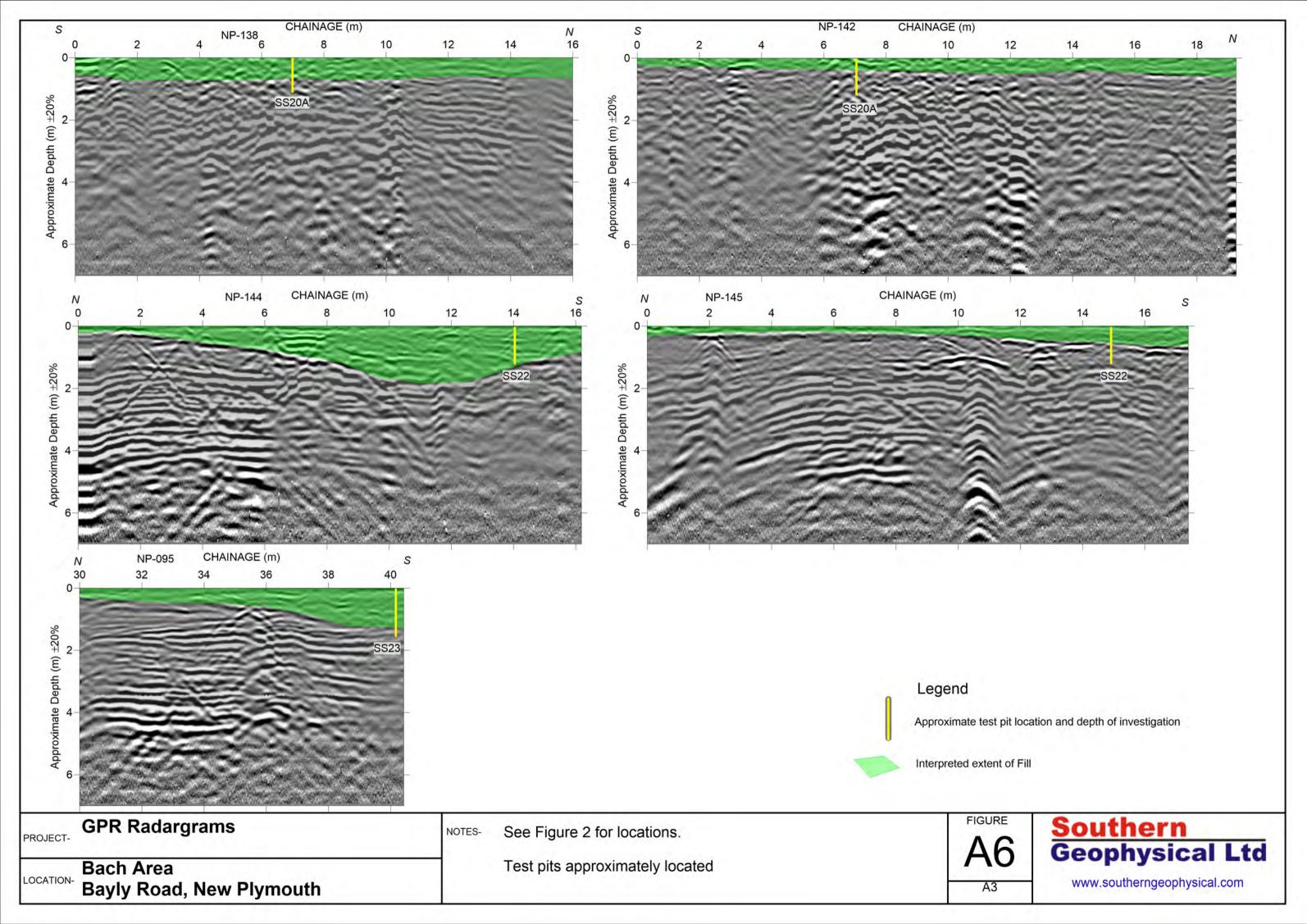
Southern Geophysical Ltd has provided this document subject to the following:

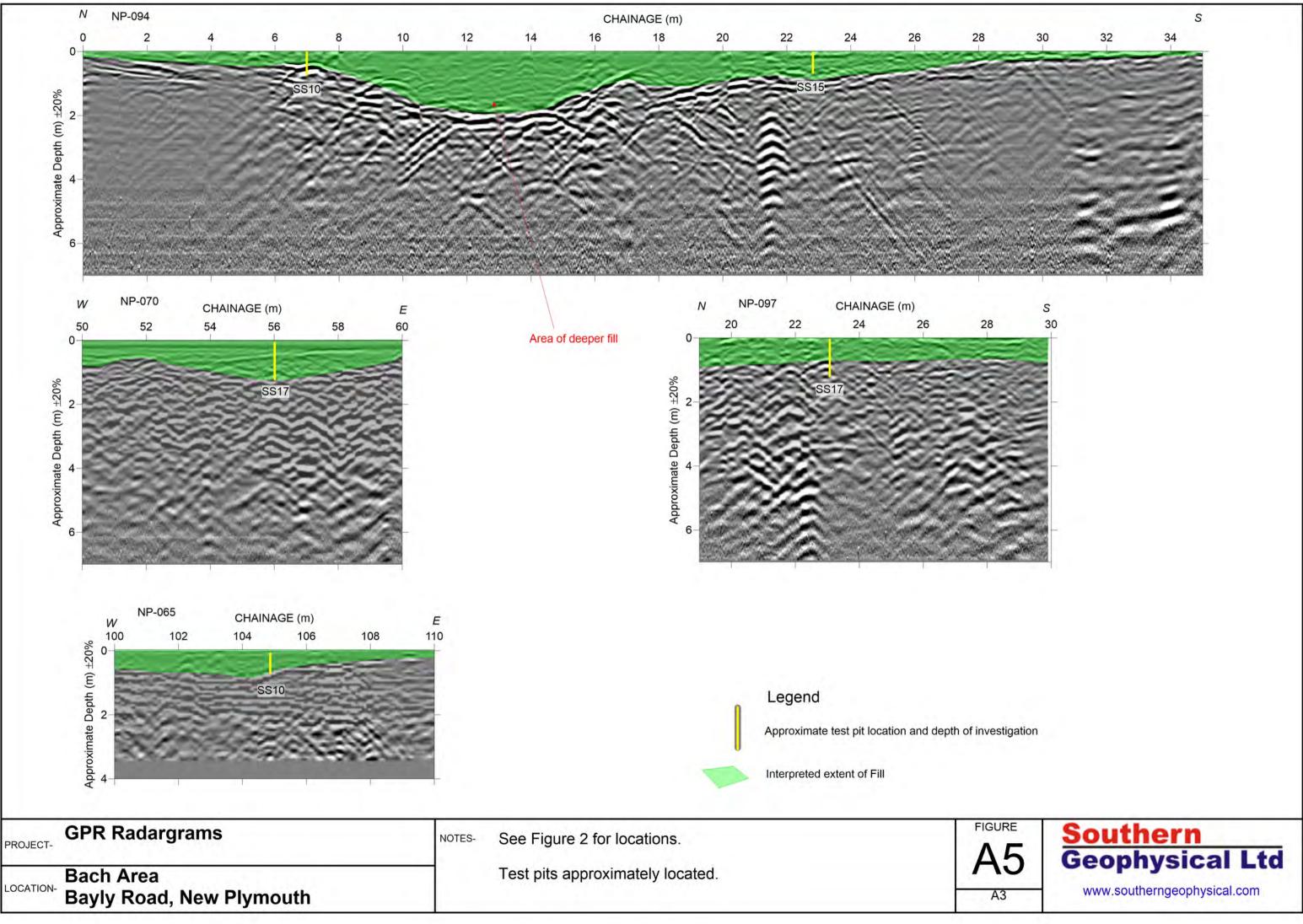
Non-invasive geophysical testing has limitations and is not a complete source of testing. Often there is a need to couple non-invasive methods with invasive testing methods such as drilling, especially in cases where the non-invasive testing indicates anomalies.

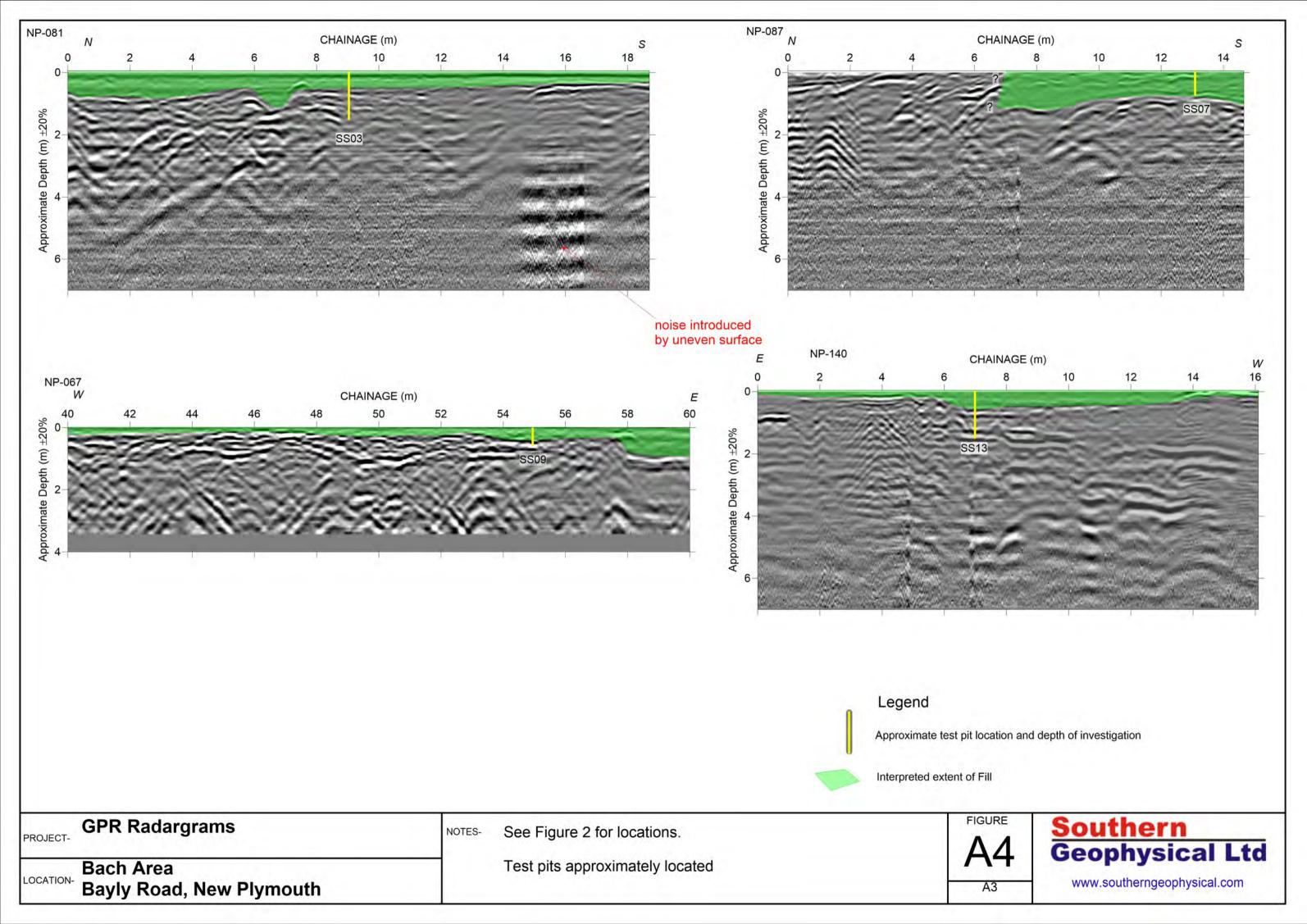
This document has been prepared for the particular purpose outlined in the project proposal and no responsibility is accepted for the use of this document, in whole or in part, in other contexts or for any other purpose. Southern Geophysical Ltd did not perform a complete assessment of all possible conditions or circumstances that may exist at the site. Conditions may exist which were undetectable given the limited nature of the enquiry Southern Geophysical Ltd was retained to undertake with respect to the site. Variations in conditions often occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account. Accordingly, additional studies and actions may be required by the client.

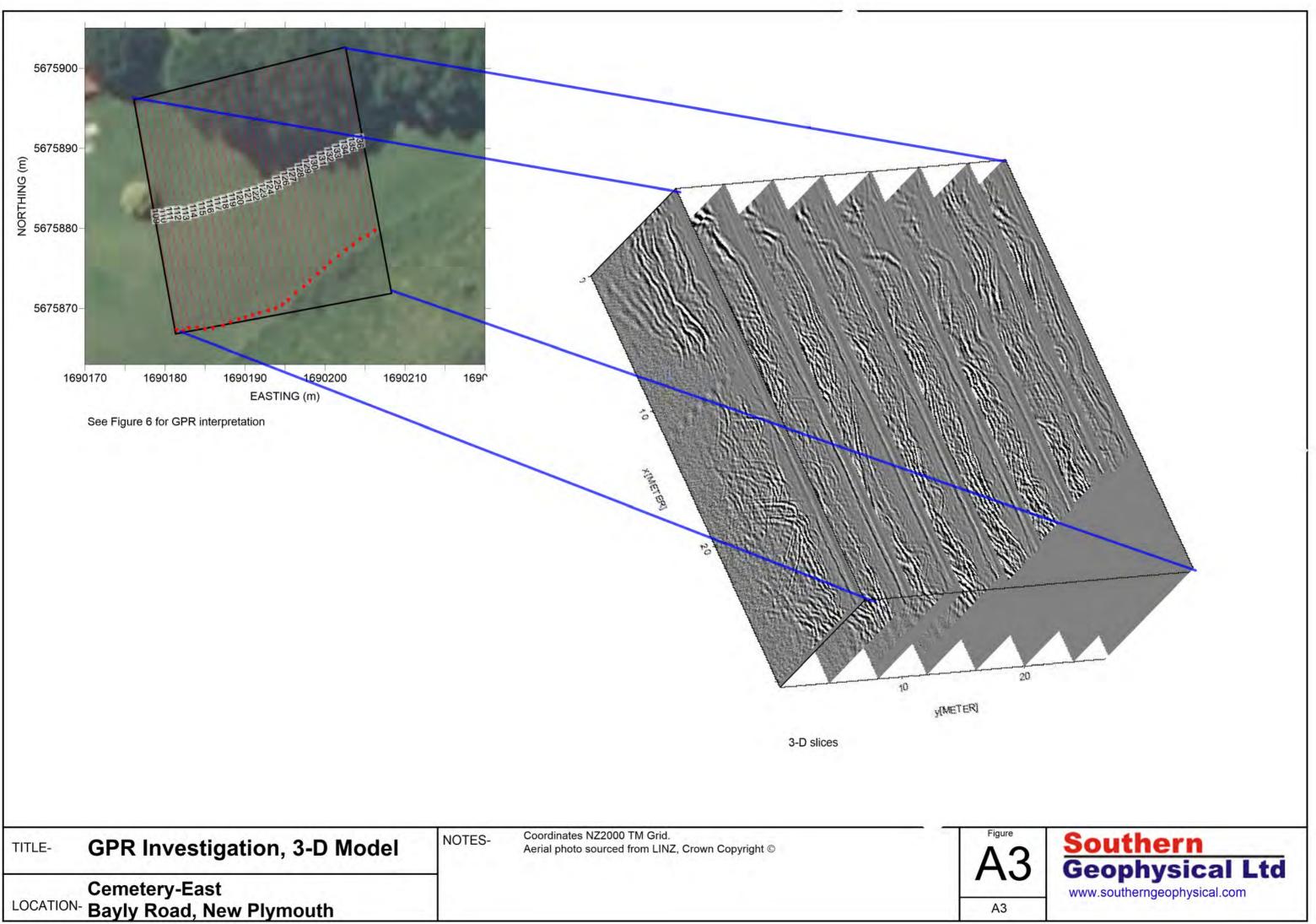
We collected our data and based our report on information which was collected at a specific point in time. The passage of time affects the information and assessment provided by Southern Geophysical Ltd. It is understood that the services provided allowed Southern Geophysical Ltd to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes for whatever reason. Where data is supplied by the client or other sources, including where previous site investigation data have been used, it has been assumed that the information is correct. Southern Geophysical Ltd accepts no responsibility for incomplete or inaccurate data supplied by others. This document is provided for sole use by the client and is confidential to that client and its professional advisers. No responsibility whatsoever for the contents of this document will be accepted to any person other than the client. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Southern Geophysical Ltd accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

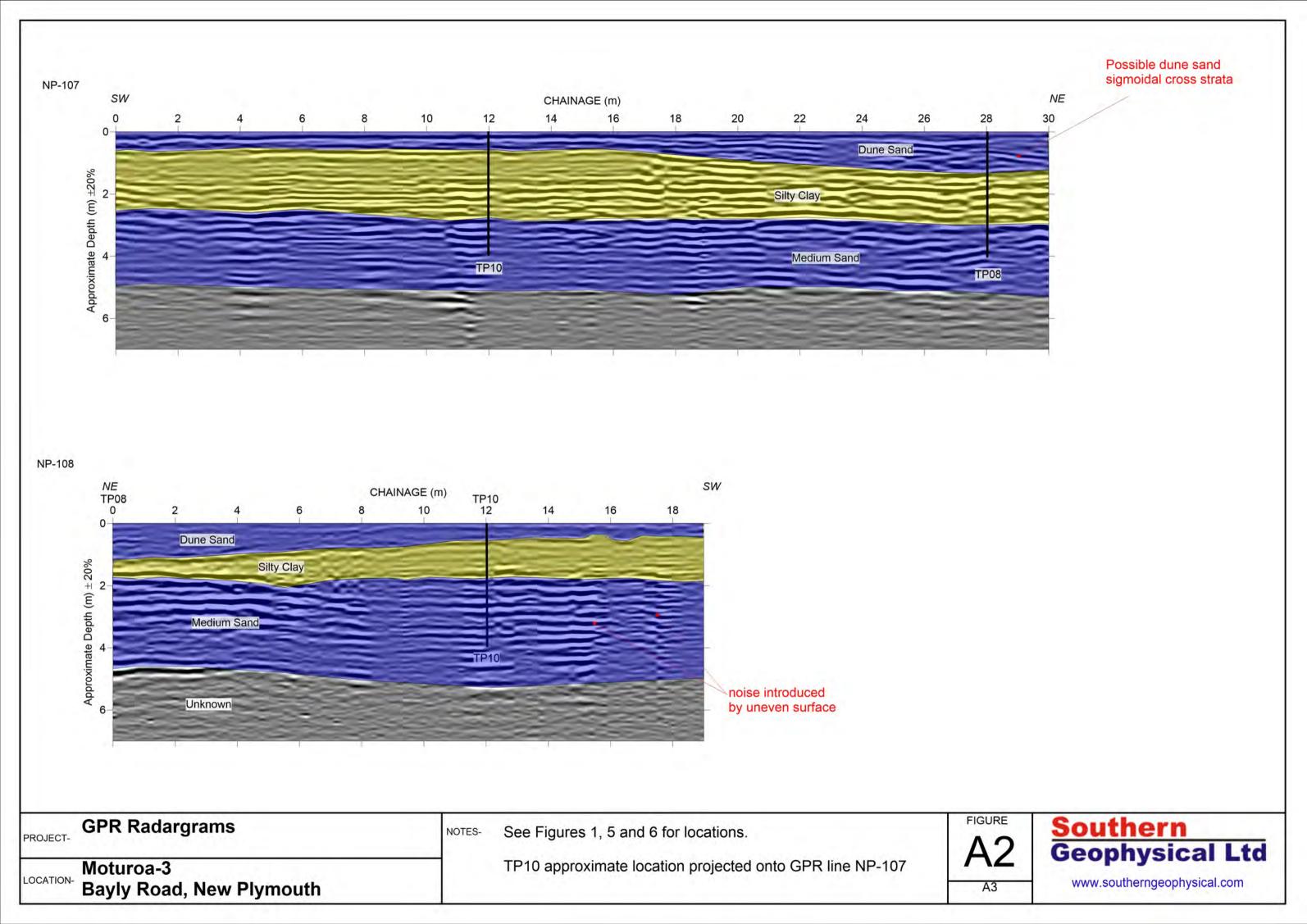
Appendix A - Selected Radargrams

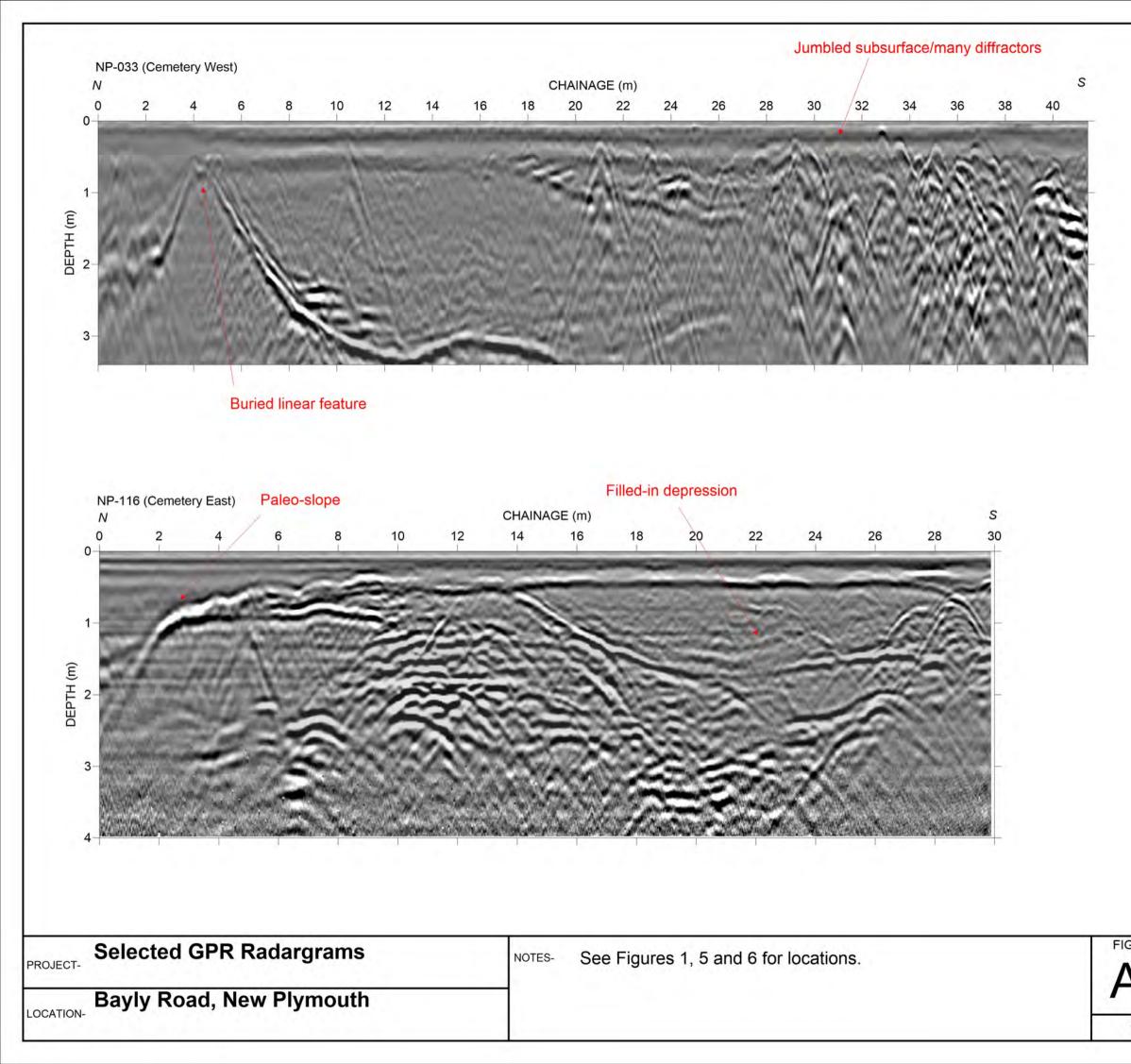














Appendix B – Field Photographs



Figure B1 – Collection of magnetometer data at the Moturoa-3 site.



Figure B2 – Collection of GPR data at the Moturoa-3 site.



Figure B3 – Historic photo showing drilling of Egmont-5

Appendix C – Logs of Test Pits and Hand Augers

PATTLE DELAMORE PARTNERS LTD	LOG OF HA Bayly Road Detailed				ı	PIT NO. SS03 JOB NO: W02050100			
CLIENT: Taranaki Regional C	Council	LO	CATION: Bac	h Investig	ation Ar				
DATE: 6/07/2015	DATE BACKFILLED: 6/07/2015	LO	GGED BY: AI	M		SHEE	T 1 OF 1		
	DESCRIPTION OF SOIL	•	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
FILL. CLAY; brown. Moist, soft; [TOPSOIL].	plastic. Includes rootlets/organics	/		0.0	SS03	0.1	×0.0		
FILL. Silty CLAY; brown. Moist; s fragments and coarse gravel cl	soft; moderately plastic. Fill includes met asts [DEMOLITION WASTE].	al		- 0.2 - 0.4 - 0.6	• SS03 • SS03		×0.0 ×0.3		
Fine SAND; black. Moist, loose	y packed.		×××××	- 0.8 - 1.0 - 1.2 - 1.4	 SS03 SS03 		×0.1		
END OF HAND AUGER AT 1.5m									
Notes: 1. All test results are in ppm	hanics Society Field Description Guidelines (20)05)	Seepag Grab sa	lwater level ge inflow ample ading (ppm)		Method Datum: Ground Coordin Filenam	Level: hates:		

PATTLE DELAMORE PARTNERS LTD		LOG OF HAND AUGER PIT NO. S Bayly Road Detailed Site Investigation						
CLIENT: Taranaki Regional Council LOCATION: Bach Investigation Area								
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: AM SHEET 1 OF 1						
	DESCRIPTION OF SOIL		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY; brown. Moist, very soft, plastic. Rootlets/organics [TOPSOIL].				0.0	• SS07	0.1	×0.2	
FILL. Sandy SILT; brownish-black. Moist, soft; moderately plastic. Suspected ACM - cement fibre board fragments [DEMOLTION WASTE].				- 0.2 - - 0.4	• SS07	0.3	×0.1	
0.6m - orange staining Fine SAND; black. Moist, loosel	y packed	_/		- — 0.6	 SS07 	0.6	×0.0	
END OF HAND AUGER AT 0.7m			<u></u>	ļ	I		I	

Notes: 1. All test results in ppm	KEY Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Hand Auger Datum: Ground Level: Coordinates: Filename: W02050100B101
		Filename: W02050100B101

Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)

PATTLE DELAMORE PARTNERS LTD	LOG OF HAND AUGER					SS09 : W02050100	
CLIENT: Taranaki Regional (LOCATION: Bac	ch Investig	ation Are	ea			
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: AM SHEET 1 OF 1					
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DEIAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY with fine-coarse grav Includes rootlets/organics [TOPS	rel; dark brown. Moist, soft; plastic. SOIL].		0.0	• SS09 (0.1	0.1	
	; brown. Moist, firm, moderately plastic; tal fragments [DEMOLITION WASTE].		— 0.2 _	• SS09 (0.3	0.0	
Fine SAND; black. Moist, loosel	y packed.		- 0.4 -	• SS09 (0.5	0.0	

END OF HAND AUGER AT 0.6m

Notes: 1. All test results in ppm	KEY Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Hand Auger Datum: Ground Level: Coordinates: Filename: W02050100B102
Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)		

PATTLE DELAMORE PARTNERS LTD	LOG OF HA Bayly Road Detailed	PIT NO. SS10 JOB NO: W02050100								
CLIENT: Taranaki Regional C	Council	LOCATION: Ma	irae Devel	elopment Investigation Area						
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: A	M		SHEET	「1 OF 1				
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS			
Rootlets, organics. Includes plas FILL. Silty CLAY with some sand	el; dark brown. Moist, very soft, plastic. ster fragment [TOPSOIL]. and trace gravel; brown. Moist, soft,		0.0	SS10SS10		×0.1 ×0.2				
moderately plastic.			- 0.4	SS10		×0.2 ×0.2				
END OF HAND AUGER AT 0.7m										

Notes: 1. All test results in ppm	KE V	Y Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Datum: Ground Level Coordinates: Filename:	
Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005)				

PATTLE DELAMORE PARTNERS LTD	LOG OF Bayly Road Detailed		tigation		PIT NO. SS13 JOB NO: W02050100				
CLIENT: Taranaki Regional C	Council	LOCATION: Mar	rae Develop	ment Invest	igation Area				
DATE: 9/07/2015	DATE BACKFILLED: 9/07/2015	LOGGED BY: A	М	SHEE	SHEET 1 OF 1				
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS			
FILL. Silty CLAY; brown. Moist, v	ery soft, plastic. Organics [TOPSOIL]			SS13 0.1	1.8				
FILL. Fine SAND; black. Moist, I terracotta pipe and concrete blo	oosely packed. Fill includes pieces of ocks. [DEMOLITION WASTE].		- 0.2 - - 0.4	sS13 0.4	0.7				
Fine SAND; black. Moist, loosel	y packed.		— 0.6 - • — 0.8 -	ss13 0.7	1.6				
			- 1.0 - 1.2 - 1.4			<u>¥</u>			
END OF TEST PIT AT 1.5m									
Notes: 1. All test results in ppm. 2. Groundwater encountered	at 1.4 m bgl nanics Society Field Description Guidelines (2	Seepag Grab sa PID Rea	lwater level ge inflow ample ading (ppm)	Method Datum: Ground Coordin Filenam	Level: nates:	al Excavator 00B104			

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed			tigatior	ı	PIT NO Job No	SS15 : W02050100	
CLIENT: Taranaki Regional (LOCATION:	Mar	ae Develo	pment	Investi	igation Area		
DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY	/: Al	N		SHEE	T 1 OF 1	
	DESCRIPTION OF SOIL	GRAPHIC LOG		DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY; brown. Moist, very s glass and gravel [TOPSOIL].	soft, plastic. Rootlets/organics. Fill include			0.0	• SS15	0.1	×1.7	
	black, moist, loosely packed. Fill includes M - cement fibre board fragment		9 0	0.2 0.4	• SS15	0.3	×1.2	
Fine SAND; black. Moist, loosel	y packed.			- 0.4	• SS15	0.5	×0.2	

END OF TEST PIT

Notes:	1. All test results in ppm	KE V	Y Groundwater level Seepage inflow Grab sample PID Reading (ppm)	Method: Datum: Ground Leve Coordinates: Filename:	

Market Lide Bayly Road Detailed Site Investigation Inst. W02050100 CLENT: Tarinaki Regional Council LOCATION: Market Development Investigation Arca HEET 1 OF 1 DTE: 7,07/2015 DATE BACKPILLED: 7,07/2015 LOGED EV: AM HEET 1 OF 1 Image: DESCRIPTION OF SOL 99 1.1 1.1 1.1 1.1 1.1 1.1 1.1 1.0 1.0 1.0 1.0 1.0 1.0		LOG OF T	EST PIT			PIT NO.	SS17			
Date: 7/07/2015 DATE BACKFILLD: 7/07/2015 LOGED BY: AM SHEET OF 1 DESCRIPTION OF SOL. 9	PATTLE DELAMORE PARTNERS LTD			tigatio	_					
DESCRIPTION OF SOL 90 Big Big Big Big Big Big Big Big Big Big	CLIENT: Taranaki Regional (Council	LOCATION: Mar	CATION: Marae Development Investigation Area						
FILL. CLAY with some coarse gravel; brown, Moist, very soft, plastic. 0.0 • SS17 0.1 1.1 Rodlets/organics (TOPSOL)L. 0.0 • SS17 0.1 1.1 FILL. Sity CLAY with some sangular gravel. Brown, moist, firm. Fill includes places of saphat, metal, electrical equipment - fushacide, metal cable (DEMOLITION WASTE). 0.0 • SS17 0.3 1.3 -0.4 -0.6 -0.6 -0.6 -0.6 -0.6 -0.6 -0.8 • SS17 0.8 1.6 -0.6 -0.6 -0.6 -0.6 Fine SAND; black. Moist, loosely packed. -0.0 -0.0 -0.0 -0.6 -0.6 END OF TEST PT at 1.1m -0.0 -0.0 -0.0 -0.0 -0.0 -0.0 Notes: 1.All test results in ppn	DATE: 7/07/2015	DATE BACKFILLED: 7/07/2015	LOGGED BY: AN	ED BY: AM SHEET 1 OF 1						
THL: CAY with solide grave, DOWN, Mole, Very Sol., please. • \$\$17 0.1 1.1 FIL: Sity CLAY with coarse angular gravel. Brown, molst, film. Fill -0.2 • \$\$17 0.3 1.3 Induktor gravel, DOWN, WASTEL. -0.4 -0.4 -0.4 -0.4 File. SaND; black. Molst, loosely packed. -0.3 • \$\$17 0.8 1.6 Fine SAND; black. Molst, loosely packed. -0.4 -0.4 -0.4 Fine SAND; black. Molst, loosely packed. -0.0 -0.4 -0.6 Fine SAND; black. Molst, loosely packed. -0.0 -0.4 -0.4 Fine SAND; black. Molst, loosely packed. -0.0 -0.4 -0.6 Fine SAND; black. Molst, loosely packed. -0.0 -0.4 -0.6 Fine SAND; black. Molst, loosely packed. -0.0 -0.6 -0.7 END OF TEST PIT at 1.1m -0.6 -0.7 -0.7 -0.7 Notes: 1. All test results in ppm		DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	UEIAILS	TESTS	WATER OBSERVATIONS		
Includes pieces of asphalt, metal, electrical equipment - fushacide, metal cable [DEMOLITION WASTE]. -0.6 -0.8 -		avel; brown. Moist, very soft, plastic.		0.0	• SS17 (0.1	1.1			
Fine SAND; black. Moist, loosely packed. END OF TEST PIT at 1.1m Notes: 1. All test results in ppm Notes: 1. All test results in ppm	includes pieces of asphalt, meta		al	- 0.4 0.6 -						
Notes: 1. All test results in ppm	Fine SAND; black. Moist, loosel	y packed.		- — 1.0						
Groundwater level Groundwater level Ground Level: Seepage inflow Ground Level: Coordinates: Brab sample PID Reading (ppm) Filename: W02050100B106 Logs based on New Zealand Geomechanics Society Field Description Guidelines (2005) Filename: W02050100B106			Ground Ground Grab sa PID Rea	ge inflow ample] ((Datum: Ground L Coordina	_evel: ates:			

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed		tigation		PIT NO. SS20a JOB NO: W02050100			
CLIENT: Taranaki Regional C	council	LOCATION: Mar	rae Developr	ment Investi	gation Area			
DATE: 9/07/2015	DATE BACKFILLED: 9/07/2015	LOGGED BY: A	М	SHEET	「1 OF 1			
1	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS		
FILL. Silty CLAY; brown. Moist, v [TOPSOIL].	ery soft, plastic. Rootlets/organics		0.0	SS20a 0.1	×1.3			
	coarse gravel; brown; moist; soft, plastic blocks, metal pipe, glass fragments ; loosely packed.		- 0.2 - •	SS20a 0.3	×1.4			
			- - 0.6 - 0.8 -	SS20a 0.6	×1.3			
			1.0					
Notes: 1. All test results in ppm.		Seepag Grab sa PID Rea	lwater level ge inflow ample ading (ppm)	Method Datum: Ground Coordin Filenam	Level: ates:			
Logs based on New Zealand Geomech	nanics Society Field Description Guidelines (200)5)		•				

PATTLE DELAMORE PARTNERS LTD LOG OF TE Bayly Road Detailed		tigation	PIT NC JOB N	o: W02050100				
CLIENT: Taranaki Regional Council	OCATION: Mar	DCATION: Marae Development Investigation Area						
DATE: 8/07/2015 DATE BACKFILLED: 8/07/2015 I	OGGED BY: A	M	SHEE	T 1 OF 1				
DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE DETAILS	TESTS	WATER OBSERVATIONS			
FILL. Sandy CLAY; dark brown. Moist; very soft, plastic. Rootlets/organics [TOPSOIL].		0.0 - 0.2	SS21 0.1	×2.7				
FILL. Silty CLAY with some fine - coarse gravel; dark brown; moist; soft; moderately plastic. FILL. Silty SAND; brownish-black; moist; loosely packed. Fill includes brick and asphalt pieces, pipe, plastic, medium - coarse gravels [DEMOLITION MATERIAL and REWORKED NATURAL MATERIAL].		-0.6 -0.8 -1.0 -1.2 -1.4 -1.4 -1.6 -2.0 -2.2 -2.4 -2.4 -2.6 -2.8	SS21 0.5 SS21 1.5 SS21 3.0	×2.3 ×1.9 ×1.6				
Fine SAND; black. Moist, loosely packed.		- 3.4 - 3.6 3.8 ●	SS21 3.8	×1.9	~~			
END OF TEST PIT AT 4.0m Notes: 1. All test results in ppm. 2. Groundwater encountered at 4.0 m bgl.	Seepag Grab sa	lwater level ge inflow ample ading (ppm)	Methoo Datum Ground Coordii Filenar	: d Level: nates:	Excavator			

PATTLE DELAMORE PARTNERS LTD	LOG OF T Bayly Road Detailed		stigatio		pit no. Job no	. SS22 D: W02050100	
CLIENT: Taranaki Regional C	LOCATION: Ma	arae Develo	opment li	nvesti	igation Area		
DATE: 8/07/2015	DATE BACKFILLED: 8/07/2015	LOGGED BY:	AM		SHEE	T 1 OF 1	
	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DEIAILS	TESTS	WATER OBSERVATIONS
FILL. CLAY; brown. Moist, very s	oft,plastic. Rootlets/organics [TOPSOIL].		0.0	• SS22 (0.1	×2.9	
FILL. Silty CLAY with some coars moderately plastic. Fine SAND; black. Moist, loosel		- 0.2 - 0.4 - 0.6	 SS22 (SS22 (×1.9 ×0.9		
				0022	0.1	×0.0	
END OF TEST PIT AT 0.8m							

Notes:	1. All test results in ppm.	KE V	Groundwater level	Method: Datum: Ground Leve Coordinates: Filename:	
--------	-----------------------------	---------	-------------------	---	--

CLIENT: Taranaki Regional Council LOCATION: Marae Development Investigation Area DATE: 9/07/2015 DATE BACKFILLED: 9/07/2015 LOGGED BY: AM SHEET 1 0 F 1 DESCRIPTION OF SOIL Image: Constraint of the source of the sour	PATTLE DELAMORE PARTNERS LTD LOG OF TE Bayly Road Detailed		tigation		PIT NO. JOB NO	SS23 : W02050100		
DESCRIPTION OF SOIL Image: Segment of the second	CLIENT: Taranaki Regional Council	LOCATION: Marae Development Investigation Area						
FILL. Clayey fine SAND; greyish-brown. Moist, loosely packed. Inicudes organics [TOPSOIL]. 0.0 \$\$\$23 0.1 \$\$<0.5	DATE: 9/07/2015 DATE BACKFILLED: 9/07/2015 L	LOGGED BY: AM SHEET 1 OF 1						
FILL. Slity fine SAND; brownish-black. Moisit, loosely packed. Includes some glass and metal wire [DEMOLITION WASTE]. • SS23 0.1 ×0.5 Fine SAND; black. Moist, loosely packed. • 0.4 • SS23 0.3 ×2.4 Fine SAND; black. Moist, loosely packed. • 0.4 • SS23 0.6 ×1.5 - 0.6 • SS23 0.6 ×1.5 - 1.0 - 1.2 - 1.4 - 1.4	DESCRIPTION OF SOIL	GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
some glass and metal wire [DEMOLITION WASTE]. • SS23 0.3 ×2.4 Fine SAND; black. Moist, loosely packed. -0.4 • SS23 0.6 ×1.5 -0.6 • SS23 0.6 ×1.5 -0.8 -1.0 -1.0 -1.2 -1.4 -1.4 -1.4				• SS23	0.1	×0.5		
Fine SAND; black. Moist, loosely packed. - 0.6 • SS23 0.6 ×1.5 - 0.8 - 1.0 - 1.2 - 1.4			-	• SS23	0.3	×2.4		
END OF TEST PIT AT 1.5m	Fine SAND; black. Moist, loosely packed.		- - 0.6 - - 0.8 - - 1.0 - - 1.2 -	● \$\$23	0.6	×1.5		
Notes: 1. All test results in ppm. Notes: 1. All test results in ppm. KEY Groundwater level Seepage inflow Coordinates:		Groundy			Datum: Ground	Level:	Excavator	

PATTLE DELAMORE PARTNERS LTD	ST PIT ite Invest	tigatio	n	PIT NC JOB N). TP8 0: W0205010	0		
CLIENT: Taranaki Regional	LO	CATION: Mot	turoa 3 In	vestigati	ion			
DATE: 8/07/2015	DATE BACKFILLED: 9/07/2015	LO	GGED BY: A	М		SHEE	T 1 OF 1	
		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
Fine SAND; black. Moist, loose Fine SAND; brown. Moist, loos END OF TEST PIT				- 0.0 - 0.2 - 0.4 - 0.6 - 0.8 - 1.0 - 1.2 - 1.4 - 1.6 - 2.0 - 2.2 - 2.4 - 2.6 - 2.8 - 3.0 - 3.2 - 3.4 - 3.6 - 3.8 - 3.8	 TP8 0 TP8 0 TP8 0 	0.1	×0.7 ×2.8	
Notes: 1. All test results in ppm.	echanics Society Field Description Guidelines (2		 Seepag Grab sa 	lwater level ge inflow ample ading (ppm)		Methoo Datum Ground Coordir Filenan	: I Level: nates:	al Excavator

PATTLE DELAMORE PARTNERS LTD	TEST PIT PIT NO. TP10 d Site Investigation JOB NO: W02050100							
CLIENT: Taranaki Regional (LOCATION: Moturoa 3 Investigation							
DATE: 8/07/2015	LOG	LOGGED BY: AM				T 1 OF 1		
		GRAPHIC LOG	DEPTH (m)	SAMPLE	DETAILS	TESTS	WATER OBSERVATIONS	
Fine SAND; black. Moist, loose			0.0 0.2 0.4	• TP10	0.1	×0.5		
FILL. Silty CLAY, brown. Moist;	firm; moderately plastic.			- - 0.8 - - 1.0 - 1.2 - 1.4 - 1.4 - 1.8 	 TP10 TP10 		×1.3 ×2.7 ×2.6	
Medium SAND, grey. Moist, loc			- 2.6 - 2.8 - 3.0 - 3.2 - 3.4 - 3.6 - 3.8 - 3.8			1.2 ×		
END OF TEST PIT AT 4.0m								
Notes: 1. All test results in ppm.	hanics Society Field Description Guidelines (2		SeepagGrab sa	water level ge inflow ample ading (ppm)		Methoo Datum: Ground Coordir Filenan	Level: nates:	I Excavator 00B112



BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix G: Laboratory Reports



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmHamilton 3240, New ZealandWe

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 1

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1447355	SPv1
Date Registered:	07-Jul-2015	
Date Reported:	20-Jul-2015	
Quote No:		
Order No:		
Client Reference:	W02050100	
Submitted By:	Andy Mackenzie	

Sample Type: Soil								
S	ample Name:	SS01 0.3 06-Jul-2015	SS02 0.1 06-Jul-2015					
	Lab Number:	1447355.14	1447355.16					
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn								
Total Recoverable Arsenic	mg/kg dry wt	3	4	-	-	-		
Total Recoverable Cadmium	mg/kg dry wt	0.43	0.17	-	-	-		
Total Recoverable Chromium	mg/kg dry wt	10	16	-	-	-		
Total Recoverable Copper	mg/kg dry wt	135	69	-	-	-		
Total Recoverable Lead	mg/kg dry wt	186	67	-	-	-		
Total Recoverable Nickel	mg/kg dry wt	6	7	-	-	-		
Total Recoverable Zinc	mg/kg dry wt	420	173	-	-	-		

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil								
Test	Method Description	Default Detection Limit	Sample No					
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	14, 16					
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	14, 16					
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	14, 16					

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

A

Ara Heron BSc (Tech) Client Services Manager - Environmental Division



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

	solutions for your er	wionment	P	Request fo	or Analyse	S	of these s	ease acknowledge re amples by signing th emailing to submitter	is
From: Pattle De	lamore Partne	ers Ltd		all the factor and the second s			<u>l bad</u>	25	
Address (Refer to ba		- 12 C	P Auckland		PDP Christchurch	Quote No.: _		1° - 11°	
Submitted by:				_ Ph No.: <u>02/0</u>	<u>-19-9-0-6</u>	PDP Job No.	: <u> WOZO</u>	ан на кана сталина стала сордение и сордение	
Chain of Custo	ody Record		調査		n an the second s			ate Recv. 07-Jul-15 05:31	
Sent:	1.A /	1 -		ved: 🖾 Room temp.	Chilled Temp. <u>/4</u> -C	² C Notes:	744	7355	
Name: Brd 101	w Macks	ontee	_ Name:	Hueban			Received by	Jennifer Singlewood	-
Signature: <u>Ald</u>		1. C. C. C.	_ Signati	ure: HRUUR					
Date and time:	<u>>-7-15</u>		_ Date a	nd time:	alahan dalam kana tertakan managan dari kana tertakan kana tertakan dari kana tertakan tertakan tertakan tertak		3114473550		
-	10			Rost We @pdp.co.nz	🗋 Mail (address b	elow) Pi	riority:	Normal 🗋 High 🔲 U	rgent
الع ا	Email other:	30 , Sim	rkin	@pdp.co.nz	🔲 Fax (number be	elow) R	esults required	by: / /	_
Invoice to:	PDP	🛛 Othe	r:				5332775511497846440099999999999999999994444988	(*)***********************************	
Sample ID	Sample type	No. bottles	ana wa ana ana ana ana ana ana ana	Ana	lyses requested	ma		Notes	
MW4 0.	S San	9	140	ADCOND					
Marky 10	6	đ.		to man					
Milly 30	\$								
Muly 2.5		ą		The second s		2			
parally Les	3 <u>x</u>	١							
MW3 OS	n je moto	and the second se							
MANUS 10		i)							
MWZ 15	, see	an state of the st		Non-Inc.					
pro 3 2.	a 🏅	and the second se						. <u></u>	
pauls 5-	5 "S	1							
MRAPS to	¢ .\$			- rettable hand a					
and the last	<u>,</u>	S.							
SS07 0.1	S	3					-		
38010.3	>	3							
SS010.6	s	Ş			17-000-0-1-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0				
9502 0.1	S	3						;	
н л 0,3	\$	3						NEXTON OF A CONTRACT OF A C	;
a " 6.5	.5	2							
1 × 110	Ś								<u>. </u>
e e 115	2	3		V					
				CAL D					
	Soil ED Sediment	GW Gro	undwater ta	SAL Seawater/saline TW Tradewaste	FW Freshwater WW Wastewater	LEACH Leach P Potable	ate GEO Ge Other:	othermol	
PDP Auckland PDP House, 235 Bro	Ann - 9400 KNN - 2400 - 200 - 24 - 2400	Not	e: Sample PDP	e s may contain dang Wellington	erous or hazardous	s substance: PDP	s Christchurch	Page	of

PDP House, 235 Broadway, Newmarket, Auckland PO Box 9528, Newmarket, Auckland 1149 Tel: +64 9 523 6900 | Fax: +64 9 523 6901 PDF Weilington iSOFT House, Level 1, 111 Customhouse Quay, Wellingto PO Box 6136, Wellington 6141 Tel: +64 4 471 4130 | Fax: +64 4 471 4131

Radio NZ House, 51 Chester St West, Christchurch PO Box 389, Christchurch 8140 Tel: +64 3 363 3100 | Fax: +64 3 363 3101



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

+64 7 858 2000 Tel Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 2

ob Information Summary

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

Lab No: Date Registered: Priority:	1447355 07-Jul-2015 10:04 am High
Quote No:	5
Order No:	
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	14-Jul-2015 4:30 pm

Т

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	MW4 0.5 03-Jul-2015	Soil	GSoil300	Hold Cold
2	MW4 1.0 03-Jul-2015	Soil	GSoil300	Hold Cold
3	MW4 3.0 03-Jul-2015	Soil	GSoil300	Hold Cold
4	MW4 3.5 03-Jul-2015	Soil	GSoil300	Hold Cold
5	MW4 4.0 03-Jul-2015	Soil	GSoil300	Hold Cold
6	MW3 0.5 03-Jul-2015	Soil	GSoil300	Hold Cold
7	MW3 1.0 03-Jul-2015	Soil	GSoil300	Hold Cold
8	MW3 1.5 03-Jul-2015	Soil	GSoil300	Hold Cold
9	MW3 2.0 03-Jul-2015	Soil	GSoil300	Hold Cold
10	MW3 3.5 03-Jul-2015	Soil	GSoil300	Hold Cold
11	MW3 4.0 03-Jul-2015	Soil	GSoil300	Hold Cold
12	MW3 4.5 03-Jul-2015	Soil	GSoil300	Hold Cold
13	SS01 0.1 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
14	SS01 0.3 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
15	SS01 0.5 06-Jul-2015	Soil	GSoil300, PSoil250Asb, cGSoil	Hold Cold
16	SS02 0.1 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
17	SS02 0.3 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
18	SS02 0.5 06-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
19	SS02 1.0 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
20	SS02 1.5 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

S F Μ R Μ М Δ Ο н D) E (\mathbf{O})

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil Test

Method Description

Default Detection Limit Sample No

Sample Type: Soil							
Test	Method Description	Default Detection Limit	Sample No				
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	14, 16				
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	14, 16				
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	14, 16				



R J Hill Laboratories LimitedT1 Clyde StreetFPrivate Bag 3205EHamilton 3240, New ZealandV

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 3

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

SPv2

Amended Report

This report replaces an earlier report issued on the 20 Jul 2015 at 3:07 pm TCLP copper, lead and zinc analysis added to sample SS11 0.3, as per the clients request.

Sample Type: Soil						
Sa	mple Name:	SS03 0.3	SS04 0.3	SS05 0.3	SS06 0.2	SS07 0.6
		06-Jul-2015	07-Jul-2015	07-Jul-2015	07-Jul-2015	07-Jul-2015
	ab Number:	1447868.2	1447868.13	1447868.15	1447868.17	1447868.20
Heavy metal screen level As,Cd,	Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	3	2	3	5	2
Total Recoverable Cadmium	mg/kg dry wt	0.74	0.16	0.24	0.19	< 0.10
Total Recoverable Chromium	mg/kg dry wt	13	22	16	12	21
Total Recoverable Copper	mg/kg dry wt	72	91	68	49	85
Total Recoverable Lead	mg/kg dry wt	38	24	220	49	26
Total Recoverable Nickel	mg/kg dry wt	8	12	9	6	11
Total Recoverable Zinc	mg/kg dry wt	89	190	154	140	85
Asbestos in Soil						
As Received Weight	g	-	228.6	-	-	227.6
Dry Weight	g	-	157.2	-	-	154.9
<2mm Subsample Weight	g ashed wt	-	61.1	-	-	60.5
Asbestos Presence / Absence		-	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.	-	-	Amosite (Brown Asbestos) and Chrysotile (White Asbestos) detected.
Description of Asbestos Form		-	ACM Debris & Loose Fibres	-	-	ACM Debris & Loose Fibres
Sa	mple Name:	SS08 0.3 07-Jul-2015	SS09 0.3 07-Jul-2015	SS10 0.6 07-Jul-2015	SS11 0.3 07-Jul-2015	SS15 0.3 07-Jul-2015
L	ab Number:	1447868.21	1447868.23	1447868.29	1447868.30	1447868.33
Individual Tests						
TCLP Weight of Sample Taken	g	-	-	-	100	-
TCLP Initial Sample pH	pH Units	-	-	-	6.6	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	-	1.7	-
TCLP Extractant Type*		-	-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	-	4.9	-
TCLP Post Extraction Sample pH	I pH Units	-	-	-	5.0	-
Heavy metal screen level As,Cd,	Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	3	5	2
Total Recoverable Cadmium	mg/kg dry wt	0.78	0.16	0.19	0.49	0.14
Total Recoverable Chromium	mg/kg dry wt	12	11	11	12	11
Total Recoverable Copper	mg/kg dry wt	23	50	84	173	56
Total Recoverable Lead	mg/kg dry wt	120	90	87	400	147
Total Recoverable Nickel	mg/kg dry wt	5	6	5	9	7





This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

	Sample Name:	SS08 0.3	SS09 0.3	SS10 0.6	SS11 0.3	SS15 0.3
	Campio Ramo.	07-Jul-2015	07-Jul-2015	07-Jul-2015	07-Jul-2015	07-Jul-2015
	Lab Number:	1447868.21	1447868.23	1447868.29	1447868.30	1447868.33
Heavy metal screen level As,	Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Zinc	mg/kg dry wt	175	220	116	280	210
Asbestos in Soil					I	
As Received Weight	g	-	-	-	-	338.1
Dry Weight	g	-	-	-	-	286.7
<2mm Subsample Weight	g ashed wt	-	-	-	-	61.7
Asbestos Presence / Absence	e	-	-	-	-	Chrysotile (White Asbestos) detected.
Description of Asbestos Form	1	-	-	-	-	ACM Debris & Loose Fibres
Sample Type: Aqueous	;					
	Sample Name:	SS11 0.3 [TCLP Extract]				
	Lab Number:	1447868.35				

Total Zinc	g/m³	1.72	-	-	-	-
Total Lead	g/m³	0.63	-	-	-	-
Total Copper	g/m³	0.27	-	-	-	-
Individual l'ests						

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil						
Test	Method Description	Default Detection Limit	Sample No			
Individual Tests						
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2, 13, 15, 17, 20-21, 23, 29-30, 33			
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2, 13, 15, 17, 20-21, 23, 29-30, 33			
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	2, 13, 15, 17, 20-21, 23, 29-30, 33			
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311	-	30			
Asbestos in Soil	·	•				
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	13, 20, 33			
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	13, 20, 33			
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	13, 20, 33			
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	13, 20, 33			
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	13, 20, 33			
TCLP Profile			·			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	30			
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	30			
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	30			
TCLP Extractant Type*	US EPA 1311.	-	30			
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	30			

Sample Type: Soil							
Test	Method Description	Default Detection Limit	Sample No				
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	30				
Sample Type: Aqueous							
Test	Method Description	Default Detection Limit	Sample No				
Individual Tests							
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	35				
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.011 g/m ³	35				
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.0021 g/m ³	35				
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.021 g/m ³	35				

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Graham Corban MSc Tech (Hons) Client Services Manager - Environmental Division

pot a	olalions for your e	avironment T D		Request	for Analyse	es	of these sa	ase acknowledge receip amples by signing this mailing to submitter.
From: Pattle Delamo				тимаанатия малиания и политика и как как как так так так так так так так	n	To: 1-1	el hab	P
Address (Refer to base o			P Auckland		n DPDP Christchurc		A Post P	
Submitted by: andrew Montenerie Ph No.: 02/419 946 PDP Job No.: U0205010							050100	
Chain of Custody	Record							Date Recv: 08-Jul-15 0
Sent:		¢ .			t Chilled Temp. 4			
Name: and own,			_ Name:	Chloe Veda	f	- Sata	MA P Rece	ived by: Jennifer Singlewo
Signature: <u>ALML</u>			_ Signati		· · · ·	_ Cola	el (g	
Date and time:	-7-1	<u></u>	Date a	nd time:	· <u>·····</u> ··· · ·····	_	3112	478588
Results by: 🗉 Éma	il submitte	: and or	HI, Mary	hern w@pdp.co.nz	🖾 Mail (address	helow) Pi	riority: 巨个	Jormal 🛛 High 🔲 Urgent
		Bo, Sir		@pdp.co.nz	E Fax (number t			ру; / /
nvoice to: PDP		D Othe				:		
Sample ID	Sample type	No. bottles		алининин на	nalyses requested	an a		Notes
5503 0.1	S	3	1102	D 607-0				
550303	S							
<u>- 5503 0.5</u> SS03 0.5	S	2		<u> </u>			·	
5503 110	<u> </u>	100000 3						۳۵۰۰۰۰ ۲۵۰۰۰۰ سربی
38031,5	2	3				and the second		
MWS 0.5 MWS 1.0	2	. In the second						724 · · · · · · · · · · · · · · · · · · ·
	600 (i i				······		
MWS 45	5	7 						<u> </u>
MWS 2-0	س ک					., <u></u>		
MWE 0-S MWE 1-0	م نہ 5.							
	د. خ					11 - 11 - 11 - 11 - 11 - 11 - 11 - 11		
MW6 1-5)						
<u>3504 0.3</u> + + 0.5	S S	- <u>(</u>)			•			
5050,3	22 	2						
· · 0.5	in t	2				PERMIX.		
3506 0.2	<u></u>	<u>.</u> 2.		and the second sec				2
5306 0. £	o S	2						
5507-0.3		2						· · ·
507 0.6	5					107200000000000000000000000000000000000		
SOF 0.3	ې چ	1 ¹⁰)		<u> </u>				
508 0.5	3 	2) 3		1				
mple type: S Soil	×117	GW Grou	ndwater	SAL Seawater/saline	FW Freshwater	10000	to 050 0	
SED Set	diment	BIO Biota		TW Tradewaste	WW Wastewater	LEACH Leacha P Potable		hermal
<u> XXXX</u>		Note	: Sample	10115	gerous or hazardou			Page _ 1 of _ 2
2 Auckland 2 House, 235 Broadway, Box 9528, Newmarket, J		et, Auckland	PDP V ISOFT	Vellington	Customhouse Quay, Wel	PDP C lington Radio	hristchurch	Chester St West, Christchurch

Ρ Р Tel: +64 9 523 6900 | Fax: +64 9 523 6901 auckland@pdn.co.nz

Tel: +64 4 471 4130 | Fax: +64 4 471 4131 wellington@ndn.co.nz

Tel: +64 3 363 3100 | Fax: +64 3 363 3101 abriataburah@n

rom: Pattle Delamo	re Partn	ers Ltd		a na ann an an an ann an ann an ann an a	To:	All Louds 3	
ddress (Refer to base of			P Auckland DePDP Wellington	PDP Christchurch	Quote No.:	en e	
ubmitted by: And	eq,		8	<u>419 946</u>	-	: WOZES	0100
hain of Custody R	lecord					alf Auges Strike Sa 1.84-002	
ient:			Received: C Room temp.	Chilled Temp.:	_°C Notes:		
lame: <u>Anklower</u>	Reta	£2472 C	Name:		Sec.	a de a fil sobre foto fil a comercia de la comercia	t-Por
ignature: <u>22494</u>	ster Een	vece	Signature:		10 2 4	addent de ageller	Sector States
ate and time: 🧷 👘	7 - 1	16	Date and time:		San	ngoles in	2 chilly
esults by: 🖸 Email	l submitter	: andres	. machenzel @pdp.co.nz	☐ Mail (address b	elow) Pr	iority: 🖾 Normal	High 🗍 Ur
🗗 Email	l other:	pe.	Sime hin @pdp.co.nz	🗖 Fax (number be		esults required by:	
woice to: PDP		D Other					
Sample ID	Sample type	No. bottles	Ar	alyses requested			Notes
5509 0.3	3	<u>\$</u>	1107-D CO	7-10			
35090,5	57	1					
male 3.0	.5	i					<u></u>
mwe 3.5	5	ş					
mule 40	<u>ن</u> ې	1					
510 0.3	.5	3		······································			
3810 0.6	<u> </u>	2					
35110.34	5	3					
\$14 0.3	8	2 					
5514 0.5	S	29 29					
3518 0.3	, 	<u>s</u>					
S15 0. 5	2	53	V/	the second s			:
				۰. 			
-							
				TEXTE Abdue due un 110° vertes en 112° estas			
1997	900-9011951 - F. erer 155	49 moldd menor mar					
				^ق ي .			
				●nne-makina araya ya ya sa sa sa kikina ya	۵ <u>.</u>		
ple type: S Soil SED Sedi	mont	GW Grour BIO Biota			LEACH Leachat		
	IN THE	DIO DIOTA	TW Tradewaste	WW Wastewater	P Potable	Other:	



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Tel +64 7 858 2000 Fax +64 7 858 2001 Emai mail@hill-labs.c I o.nz

Page 1 of 2

Job Information Summary

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

Lab No: Date Registered:	1447868 08-Jul-2015 11:07 am
Date Registered.	
Priority:	High
Quote No:	
Order No:	
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	17-Jul-2015 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS03 0.1 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
2	SS03 0.3 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
3	SS03 0.5 06-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
4	SS03 1.0 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
5	SS03 1.5 06-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
6	MW5 0.5 07-Jul-2015	Soil	GSoil300	Hold Cold
7	MW5 1.0 07-Jul-2015	Soil	GSoil300	Hold Cold
8	MW5 1.5 07-Jul-2015	Soil	GSoil300	Hold Cold
9	MW5 2.0 07-Jul-2015	Soil	GSoil300	Hold Cold
10	MW6 0.5 07-Jul-2015	Soil	GSoil300	Hold Cold
11	MW6 1.0 07-Jul-2015	Soil	GSoil300	Hold Cold
12	MW6 1.5 07-Jul-2015	Soil	GSoil300	Hold Cold
13	SS04 0.3 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	SS04 0.5 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
15	SS05 0.3 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
16	SS05 0.5 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
17	SS06 0.2 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
18	SS06 0.5 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
19	SS07 0.3 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
20	SS07 0.6 07-Jul-2015	Soil	GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
21	SS08 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
22	SS08 0.5 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
23	SS09 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
24	SS09 0.5 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
25	MW6 3.0 07-Jul-2015	Soil	GSoil300	Hold Cold
26	MW6 3.5 07-Jul-2015	Soil	GSoil300	Hold Cold
27	MW6 4.0 07-Jul-2015	Soil	GSoil300	Hold Cold
28	SS10 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
29	SS10 0.6 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
30	SS11 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
31	SS14 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
32	SS14 0.5 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
33	SS15 0.3 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
34	SS15 0.5 07-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2, 13, 15, 17, 20-21, 23, 29-30, 33
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2, 13, 15, 17, 20-21, 23, 29-30, 33
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	2, 13, 15, 17, 20-21, 23, 29-30, 33
Asbestos in Soil	<u>'</u>		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	13, 20, 33
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	13, 20, 33
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	13, 20, 33
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	13, 20, 33
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	13, 20, 33



R J Hill Laboratories LimitedTotal1 Clyde StreetFrPrivate Bag 3205EHamilton 3240, New ZealandW

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 2

ANALYSIS REPORT

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

Lab No:	1448363	SPv1
Date Registered:	09-Jul-2015	
Date Reported:	20-Jul-2015	
Quote No:		
Order No:		
Client Reference:	W02050100	
Submitted By:	Andy Mackenzie	

Sample Type: Soil						
9	Sample Name:	SS16 0.5	SS17 0.8	SS21 1.5	SS21 3.0	SS22 0.1
	Lab Number:	1448363.15	1448363.17	1448363.22	1448363.23	1448363.25
Heavy metal screen level As,C	d,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	2	4	2	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.20	1.20	0.70	< 0.10	0.14
Total Recoverable Chromium	mg/kg dry wt	7	17	9	13	12
Total Recoverable Copper	mg/kg dry wt	23	630	64	28	76
Total Recoverable Lead	mg/kg dry wt	40	166	190	17.1	210
Total Recoverable Nickel	mg/kg dry wt	5	25	6	5	7
Total Recoverable Zinc	mg/kg dry wt	117	740	580	117	147
S	Sample Name:	SS22 0.7				
	Lab Number:	1448363.27				
Heavy metal screen level As,C	d,Cr,Cu,Ni,Pb,Zn		1		1	I
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.21	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	12	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	22	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	31	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	5	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	320	-	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil								
Test	Method Description	Default Detection Limit	Sample No					
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	15, 17, 22-23, 25, 27					
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	15, 17, 22-23, 25, 27					
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	15, 17, 22-23, 25, 27					



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division

PATTLE DELAMORE PA) iconment D	R	equest fo	S	NOTE: Please acknowledge receipt of these samples by signing this form and emailing to submitter.			
From: Pattle Delam				anna an an an Arlan ann an Anna		To: 140	d into s	
Address (Refer to base of)P Auckland	PDP Wellington	DP Christchurch	Quote No::		
Submitted by: <u>And</u>				Ph No.: 021	419 946	PDP Job No.:	Unerreffe	100
Chain of Custody	Record.						6 a a	cv: 09-Jul-15 06:22
Sent:	ka da at	la seconda	Received		Chilled Temp.:5-3	°C Notes:	144 O	000
Name: <u>Andrea</u>	CARA P	C-9 & C.C. 	Name:	Daw		R	eceived by: Jenn	ifer Singlewood
Signature:		<u>7 6 6 -</u>	Signature		Nrg.			
Date and time: <u><u>\$ 7</u></u>	<u>15</u>		Date and	time:		-	3114483637	
Results by: 🗹 Em	ail submitter	:ondre	w.Moches	സ്പ് @pdp.co.nz	🗖 Mail (address b	pelow) Pri	ority: 🛛 🖾 Norm	nal 🗖 High 🛛 Urgent
🖾 Em	all other:	120.2	es kin	@pdp.co.nz	🗖 Fax (number be	elow) Re	sults required by:	//
Invoice to: M PDI	D	🗖 Oth	er:	annes i a and 110/22 - An is a standard march a standard a standard a standard a standard a standard a standard				
Sample ID	Sample type	No. bottles		Ana	ilyses requested			Notes
MUA OS	5	, Vilia	Hon.d	0 COVD				
MW7 10	-5	1						
Mu7 1.5	5	/						AT.
TP 1 4.0	\$	1			_			. <u>1. 1. 1998</u>
TP 2 2.0	$\sum_{k \in P} \sum_{k \in P} $	1						
TP3 2.0	5.	1 Jun						
TP 4- 2.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1				· · · · ·		
MW7 5.5	\$	ģ						
Mart 6 0		1				Postor,		
MW7-65	.\$	ŧ			11. China 11. A Constantino - 11. A Constantin			
MW770	S	1						· · · · ·
MW775	S	(
SS 11 0.5	S	3				······		
SS16 0.3	\$	3		~				
11 n 0,6	S							
SS17 0.3	5							
H W 1.6	5							
5518 0.1	S	Contract of the second s						a beau and a second a
11 11 0-3	5	Constant State						
1 11 0.5	5	Constant Contactor						
n n 0.7	5							
······································								
			100 C 100			LEACH Leach	ate GEO Geoth	
Sample type: S Sc	<u>, l</u> pil	GW G	roundwater	SAL Seawater/saline	FW Freshwater	LEACH LEACH		Allidi

PDF Hodge, 235 Broadway, Newmaniet, Adonat PO Box 9528, Newmarket, Auckland 1149 Tel: +64 9 523 6900 | Fax: +64 9 523 6901 iSOFT House, Level 1, 111 Customhouse Quay, Wellingto PD Box 6136, Wellington 6141 Tel: +64 4 471 4130 | Fax: +64 4 471 4131 wellington@ndp co.pz Radio NZ House, 51 Chester St West, Christchurch PO Box 389, Christchurch 8140 Tel: +64 3 363 3100 | Fax: +64 3 363 3101 christchurch@pdp.co.nz

solution solution) () () tions for your envi	ironment	R	lequest fo	r Analyse	S	of these s	ease acknowle amples by sig emailing to si	gning this
PATTLE DELAMORE PAR1				and was and a sub-state of the state of the sub-state of the sub-state of the sub-state of the sub-state of the		To: 14	ill be	Le f	
From: Pattle Delamor				Francis			Lordan		· ·
Address (Refer to base of Submitted by:			P Auckland	PDP Wellington				1 F. 187 1C.X	
Submitted by: <u>Wascow Ma</u>	er 5. 19 19 19 19 19 19 19 19 19 19 19 19 19	n ng		FILINU.;				a opes ten mo	
Chain of Custody R	lecord						in de la gard General de la gard		
Sent:	ist &	0 .		ed: 🔲 Room temp. 🗖		°C Notes: 	ample	na wa Uzy bi	they in
Name: <u>Andres 1</u>	~		Name: _) n l i	che L'	r. (^m .)
Signature: <u>Aladade</u>	Acris	60	Signatur	'e:		ي يونيني ((((((()))))) من جانب	thes: Contra CC i warmen and the Contra CC in the Contra C	weg or	<u>7. 37</u>
Date and time: 🕴 - 🤿	-15		Date an	d time:			The second s		
Results by:	L au (b == : 14 -	. and so	er, ntouch	(سکندر) @pdp.co.nz	🔲 Mail (address b	elow)	Priority: 🔲	Normal 🔲 Hig	th □Urgent
-				@pdp.co.nz	Fax (number be	,		1 by: /	
	I other:			@pap.co.nz	LI Fax (number be	71UW)			
nvoice to: 🗹 PDP	- With the Manual Providence of the Providence o	🗋 Othe	er:	a man such as a such was a state of the such as a s			N	······································	
Sample ID	Sample type	No. botties		Ana	lyses requested		New Concernation	N	otes
SS 210.1	5	3		Horp	CAPP-D				
4 5 0.5	1			- <u> </u>)			1	
n 115				- choose	1				
h 4 3,0	+								
11 11 3-8									
85220.1					<u> </u>				MARRING WAT
н н 0,4									
11 11 0.7							<u></u>		
5524 0.1									E
и и 0,3									
ц <i>ч ©</i> , 🖗		NOT THE REAL PROPERTY OF							
8825 0.1	<u> </u>								
и и 0.3					V				
\$1. *1 5	¥				ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ́ΥΫ				
					10 1999 Jacobie Constantino Constantino Constantino Constantino Constantino Constantino Constantino Constantino				
and a second		<u> </u>					- Mile Open		
								-	
					V2008105011				
					W # 00 1				
<u></u>	1								
								-	
Sample type: S Soi		 GW G	roundwater	SAL Seawater/saline	FW Freshwater	LEACH Lea	achate GEO	Geothermal	
	' Sediment	BIO E		TW Tradewaste	WW Wastewater	P Potable	Other	1	
				es may contain dan	erous or hazardou	is substan	ces		Page 📿 of
PDP Auckland PDP House, 235 Broadwa		rket, Auckl	PDP and iSOF	Y Wellington T House, Level 1, 111 (30x 6136, Wellington 61	Customhouse Quay, We	PE ellington Ra	DP Christchurch adio NZ House,	51 Chester St V istchurch 8140	

PO Box 9528, Newmarket, Auckland 1149 Tel: +64 9 523 6900 | Fax: +64 9 523 6901 aughtand@ndn.co.nt

PO Box 6136, Wellington 6141 Tel: +64 4 471 4130 | Fax: +64 4 471 4131 wellington@pdp.co.nz

Tel: +64 3 363 3100 | Fax: +64 3 363 3101 christchurch@pdp.co.nz



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

Tel +64 7 858 2000 Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 2

Job Information Summary

Client:	Pattle Delamore Partners Limited					
Contact:	B Simkin					
	C/- Pattle Delamore Partners Limited					
	PO Box 6136					
	WELLINGTON 6141					

Lab No:	1448363
Date Registered:	09-Jul-2015 10:39 am
Priority:	High
Quote No: Order No: Client Reference: Add. Client Ref:	W02050100
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	21-Jul-2015 4:30 pm

Т

Samples

1 2 3 4	MW7 0.5 MW7 1.0 MW7 1.5	Soil Soil	GSoil300	Hold Cold
3 4	MW7 1.5	Soil		1
4			GSoil300	Hold Cold
		Soil	GSoil300	Hold Cold
-	TP11 4.0	Soil	GSoil300	Hold Cold
5	TP12 2.0	Soil	GSoil300	Hold Cold
6	TP13 2.0	Soil	GSoil300, GSoil300	Hold Cold
7	TP14 2.0	Soil	GSoil300	Hold Cold
8	MW7 5.5	Soil	GSoil300	Hold Cold
9	MW7 6.0	Soil	GSoil300	Hold Cold
10	MW7 6.5	Soil	GSoil300	Hold Cold
11	MW7 7.0	Soil	GSoil300	Hold Cold
12	MW7 7.5	Soil	GSoil300	Hold Cold
13	SS11 0.5	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
14	SS16 0.3	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
15	SS16 0.5	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
16	SS17 0.3	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
17	SS17 0.8	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
18	SS18 0.1	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
19	SS18 0.3	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
20	SS21 0.1	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
21	SS21 0.5	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
22	SS21 1.5	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
23	SS21 3.0	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

No	Sample Name	Sample Type	Containers	Tests Requested
24	SS21 3.8	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
25	SS22 0.1	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
26	SS22 0.4	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
27	SS22 0.7	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
28	SS24 0.1	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
29	SS24 0.3	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
30	SS24 0.8	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
31	SS25 0.1	Soil	GSoil300, GSoil300, cPSoil250Asb	Hold Cold
32	SS25 0.3	Soil	GSoil300, GSoil300, cPSoil250Asb	Hold Cold
33	SS18 0.5	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
34	SS18 0.7	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	15, 17, 22-23, 25, 27
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	15, 17, 22-23, 25, 27
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	15, 17, 22-23, 25, 27



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Hamilton 3240, New Zealand Web www.hill-labs.co.nz

+64 7 858 2000 Tel Fax +64 7 858 2001 Email mail@hill-labs.co.nz

Page 1 of 4

SPv1

NALYSIS REPORT

Client:	Pattle Delamore Partners Limited			
Contact:	B Simkin			
	C/- Pattle Delamore Partners Limited			
	PO Box 6136			
	WELLINGTON 6141			

Lab No:	1449288
Date Registered:	11-Jul-2015
Date Reported:	17-Jul-2015
Quote No:	
Order No:	
Client Reference:	W02050100
Submitted By:	R Lidgard

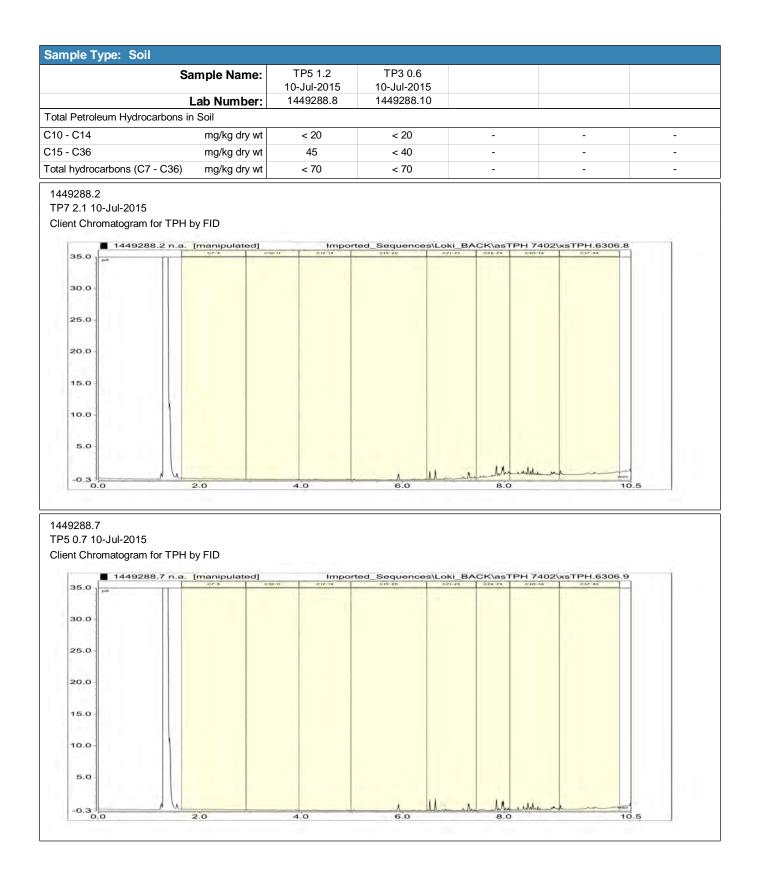
Sample Type: Soil						
	Sample Name:	TP7 0.4	TP7 2.1	TP6 0.5	TP6 2.0	TP5 0.7
	•	10-Jul-2015	10-Jul-2015	10-Jul-2015	10-Jul-2015	10-Jul-2015
	Lab Number:	1449288.1	1449288.2	1449288.3	1449288.6	1449288.7
Individual Tests						
Dry Matter	g/100g as rcvd	90	78	-	-	62
Heavy metal screen level As,C	Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	3	< 2	5
Total Recoverable Cadmium	mg/kg dry wt	0.14	-	0.18	< 0.10	0.44
Total Recoverable Chromium	mg/kg dry wt	5	-	7	8	12
Total Recoverable Copper	mg/kg dry wt	59	-	33	15	91
Total Recoverable Lead	mg/kg dry wt	25	-	172	10.3	150
Total Recoverable Nickel	mg/kg dry wt	4	-	6	5	6
Total Recoverable Zinc	mg/kg dry wt	66	-	168	74	210
Asbestos in Soil						
As Received Weight	g	-	-	-	406.7	-
Dry Weight	g	-	-	-	370.8	-
<2mm Subsample Weight	g ashed wt	-	-	-	67.4	-
Asbestos Presence / Absence	0	-			Chrysotile (White	-
					Asbestos) detected.	
Description of Asbestos Form	-	-	-	Fibre cement & loose fibres	-	
Total Petroleum Hydrocarbons	in Soil		1	I		
C7 - C9	mg/kg dry wt	< 8	< 9	-	-	< 11
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	< 30
C15 - C36	mg/kg dry wt	< 40	108	-	-	48
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	108	-	-	< 80
:	Sample Name:	TP5 1.2 10-Jul-2015	TP3 0.6 10-Jul-2015			
	Lab Number:	1449288.8	1449288.10			
Individual Tests						
Dry Matter	g/100g as rcvd	66	84	-	-	-
Heavy metal screen level As,C	d,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	-	20	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	-	8	-	-	-
Total Recoverable Copper	mg/kg dry wt	-	26	-	-	-
Total Recoverable Lead	mg/kg dry wt	-	12.0	-	-	-
Total Recoverable Nickel	mg/kg dry wt	-	2	-	-	-
Total Recoverable Zinc	mg/kg dry wt	-	43	-	-	-
Total Petroleum Hydrocarbons	I		-			



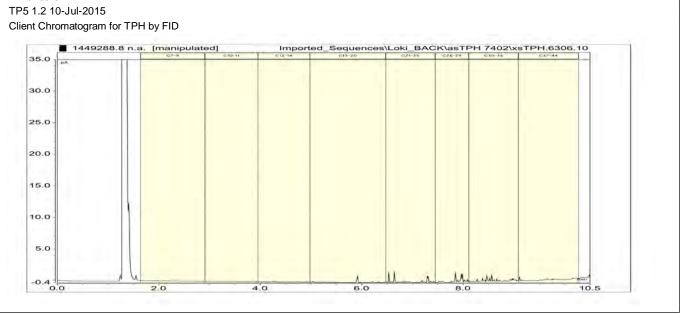


This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of

tests marked *, which are not accredited.



1449288.8



S S Μ U Μ Δ R 0 F Μ Ε Н \mathbf{O} D

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil						
Test	Method Description	Default Detection Limit	Sample No			
Individual Tests	·					
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 6-7, 10			
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 7-8, 10			
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 6-7, 10			
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1, 3, 6-7, 10			
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	1-2, 7-8, 10			
Asbestos in Soil						
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6			
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6			
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	6			
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	6			
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	6			

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division

	olutions for your en			Requesi	1			amples by sig	
ATTLE DELAMORE PA	_			······		r			
From: Pattle Delam					_	1	HILLS		
Address (Refer to base of Submitted by: ρ_{cV}			DP Auckland	Ph No.:			.:		
					<u>4 965</u>		No.: <u></u> 020	20100	
Chain of Custody	Record								
Sent:				red: 🗆 Room temp. 🗖		C Notes	-		
Name: <u></u>	₿.		Name:	Dener La	ese				
Signature:	/		Signatu	ıre:					
Date and time:	107-		Date a	nd time:					
Results by: KEma	ail submitter	r: 1000	t. lidge	@pdp.co.nz	☐ Mail (address b	elow)	Priority:	Normal 🗖 Hig	n □Urger
	ail other:		is a second	@pdp.co.nz	🔲 Fax (number be			d by: /	
nvoice to:								······································	
· · · · · · · · · · · · · · · · · · ·		1					· · · · · · · · · · · · · · · · · · ·	I	<u></u>
Sample ID	Sample type	No. bottles		Ana	lyses requested			No	tes
-72 2.4	.5	2						1	
7.07 2 ;	5	2							
726 GS	5	2							· · · · · · · · · · · · · · · · · · ·
726 1.0	5	2				:	·····		
7796 1-5							·	<u> </u>	
796 2.0	13	2	<u>~</u>	A JAME GUE	142.7365 4	£07 (4)£ \	571		
725 0-9	S	2		: <u>.</u>			1		·
	<u> </u>	2		······································					
TPS 12	<u> </u>	2	/	i					·
· · · · ·	5	2	/		· · · · · · · · · · · · · · · · · · ·			1	
TP3 06	\sim	stan.	-						
				· · ·					
		ļ	1	······································					
	_					;			
·····									
						· .			
					· · · · · · · · · · · · · · · · · · ·				
					,, <u></u>				
			P					1	<u>त्र</u> ा च
	1					· · · · · · · · · · · · · · · · · · ·			Received
Sample type: S So	<u> </u>	L GW G	iroundwater	SAL Seawater/saline	FW Freshwater	LEACH Le	achate GEO (
-	Sediment	BIO E	liota	TW Tradewaste	WW Wastewater	P Potable			Daniel
DP Auckland DP House, 235 Broadw		rket, Aucki	PDP and iSOF	es may contain dang Wellington FT House, Level 1, 111 C Roy 6136, Wellington 61	ustomhouse Quay, Wel	P Ilington R	DP Christchurch adío NZ House, 5	51 Ch:	9288
0 Box 9528, Newmarke el: +64 9 523 6900 ucklaad@ada.co.oz	et, Auckland	1149	PO { 1 Tel:	Box 6136, Wellington 61 +64 4 471 4130 Fax:	41	P Te	0 Box 389, Chris el: +64 3 363 3	tchurc 100	99



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

+64 7 858 2000 Tel Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 2

ob Information Summary

Client:	Pattle Delamore Partners Limited					
Contact:	B Simkin					
	C/- Pattle Delamore Partners Limited					
	PO Box 6136					
	WELLINGTON 6141					

Lab No:	1449288
Date Registered:	11-Jul-2015 10:54 am
Priority:	High
Quote No:	
Order No:	
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	R Lidgard
Charge To:	Pattle Delamore Partners Limited
Target Date:	20-Jul-2015 4:30 pm

Т

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP7 0.4 10-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
2	TP7 2.1 10-Jul-2015	Soil	GSoil300, GSoil300	Total Petroleum Hydrocarbons in Soil
3	TP6 0.5 10-Jul-2015	Soil	PSoil250Asb, GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	TP6 1.0 10-Jul-2015	Soil	PSoil250Asb, GSoil300, GSoil300	Hold Cold
5	TP6 1.5 10-Jul-2015	Soil	PSoil250Asb, GSoil300, GSoil300	Hold Cold
6	TP6 2.0 10-Jul-2015	Soil	PSoil250Asb, GSoil300, GSoil300	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
7	TP5 0.7 10-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
8	TP5 1.2 10-Jul-2015	Soil	GSoil300, GSoil300	Total Petroleum Hydrocarbons in Soil
9	TP4 1.2 10-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
10	TP3 0.6 10-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
11	TP2 0.5 10-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
12	TP6 1.5 [Misc] 10-Jul-2015	Miscellaneous	cpBag	Hold Cold

S R F Μ Ε Т Н **ODS** Μ Μ Α 0

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests		1	
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 6-7, 10
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 7-8, 10
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 6-7, 10
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1, 3, 6-7, 10
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	1-2, 7-8, 10
Asbestos in Soil	1	1	1

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	6
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	6
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	6



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmHamilton 3240, New ZealandWe

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 1

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1449293	SPv1
Date Registered:	11-Jul-2015	
Date Reported:	17-Jul-2015	
Quote No:		
Order No:		
Client Reference:	WO2050100	
Submitted By:	Andy Mackenzie	

Sample Type: Soil						
Sa	ample Name:	SS12 0.1m 09-Jul-2015	SS13 0.4m 09-Jul-2015	SS34 1.5m 09-Jul-2015		
	Lab Number:	1449293.1	1449293.4	1449293.11		
Heavy metal screen level As,Co	d,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	< 2	2	2	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.13	0.12	-	-
Total Recoverable Chromium	mg/kg dry wt	10	9	10	-	-
Total Recoverable Copper	mg/kg dry wt	33	26	35	-	-
Total Recoverable Lead	mg/kg dry wt	111	61	67	-	-
Total Recoverable Nickel	mg/kg dry wt	5	5	5	-	-
Total Recoverable Zinc	mg/kg dry wt	98	111	152	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil							
Test	Method Description	Default Detection Limit	Sample No				
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 4, 11				
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1, 4, 11				
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 4, 11				

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

arole Maple - Canoll

Carole Rodgers-Carroll BA, NZCS Client Services Manager - Environmental Division



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

PATTLE DELAMORE P	solutions for you	Carlormont LT D	Request f	or Analyse	5	of these samp	acknowledge receipt ales by signing this iling to submitter.
From: Pattle Delam	ore Partn			and the second	To: 1.6	CC 1. st. abr.	
Address (Refer to base	e of sheet):	F	PDP Auckland DPDP Wellington	PDP Christoburgh	0uote No :	C C ALL SHEW	3
Submitted by:	<u>e Cher</u> L	Weach	Ph No.: <u>021</u>	419 946		WOLDE	
Chain of Custody		States and a lot of the lot of the second	A STATUTE REPORT AND A DESCRIPTION OF A		and the second		
Sent:	Read In Car		Baselund. Die				
Name: <u>Asselve</u>	u u t	y we have a find	Received: Room temp.	Chilled Temp.: 2.4	°C Notes:		
Signature; <u>Alst</u>			Signature: 16 mm	deropsi			
1			Signature: 1/4 MAN @M	HT CALL			
Date and time:	and 1975 for our party of the second party of the second party of the second party of the second party of the s	Abaroante a sub de la company	Date and time:	J			
Results by: 🕢 Em	ail submitte	er and	er Macharilad @pdp.co.nz	Mail (address be	elow) Prio	zibe 🖂 News	
🖻 Em.	ail other:	De, Se	ertig @pdp.co.nz	🗋 Fax (number bel			nał 🔲 High 📋 Urgent
Invoice to: DPDF		🗋 Oth			(W) Res	uits required by:	
Sample ID	Sample type	No. bottles	Ana	lyses Requested	an a		Notes
3512 0.1	5	2	1.1.1.1.2	D COLA	d ^{1, w} .)		
11 11 O . 5	5	3		- Count Count And ant for	160 MAR		
SS130,1	5	3					
11 11 0.4	Con .						
11 110.7	5	2					
\$\$ 31 0.1	E _{ry}	r julija Marija					
55310,5	Contra Co	1900 - 10 1910 - 1 1910 - 10		- 47" SAVEL			(2.) (3:)
53340,1	S	with the					
h H 0,3	Second Second	en ander Ander An ander	· · · · · · · · · · · · · · · · · · ·				
1 90.6	~~~~ 	ما در می مراجع میرود مراجع مراجع					
10 11,5		Crimente Crimente					
353306	8	52 ·					
and and good in the	*~ <u>_</u>)						
		·	·				
		·					
							<u> </u>
						ti	
ple type: S Soll		GW Ground	dwater SAL Seawater/saline	FW Freshwater LEA	CH Leachate	GEO Geotheri	
SED Sedir	nent	BIO Biota	A REAL OWNER WITH THE PARTY OF	WW Wastewater P P	otable	Other:	
Auckland House, 235 Broadway, Na ox 9528, Newmarket, Auc 164 9 523 6900 Fax: + Iond@pdp.co.nz	ckland 114	Auckland	: Samples may contain dangero PDP Wellington CSC House, Level 1, 111 Customho PO Box 6136, Wellington 6141 Tel: +64 4 471 4130 Fax: +64 4 4 wellington@pdp.co.nz	us or hazardous subs use Quay, Wellington 171 4131	i tances PDP Christchu 295 Blenheim F PO Box 389, Ch	urch Road, Upper F nristchurch 8. 17100 Fax: +64	Daniel Watson 3 345 7101



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

+64 7 858 2000 Tel Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 1

ob Information Summary

Client:	Pattle Delamore Partners Limited					
Contact:	B Simkin					
	C/- Pattle Delamore Partners Limited					
	PO Box 6136					
	WELLINGTON 6141					

Lab No:	1449293
Date Registered:	11-Jul-2015 10:45 am
Priority:	High
Quote No:	
Order No:	
Client Reference:	WO2050100
Add. Client Ref:	
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	20-Jul-2015 4:30 pm

Т

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS12 0.1m 09-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
2	SS12 0.5m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
3	SS13 0.1m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
4	SS13 0.4m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	SS13 0.7m 09-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
6	SS31 0.1m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
7	SS31 0.5m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
8	SS34 0.1m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
9	SS34 0.3m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
10	SS34 0.6m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
11	SS34 1.5m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
12	SS33 0.6m 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

H S M R S U Μ F Μ Ε Α \mathbf{O} \mathbf{O} D

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 4, 11
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1, 4, 11
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 4, 11
1 1 11 1440000			D 4 4 4



R J Hill Laboratories Limited Tel 1 Clyde Street Private Bag 3205 Hamilton 3240, New Zealand

+64 7 858 2000 Fax +64 7 858 2001 Email mail@hill-labs.co.nz Web www.hill-labs.co.nz

Page 1 of 2

NALYSIS REPOR

Client:	Pattle Delamore Partners Limited			
Contact:	R Lidgard			
	C/- Pattle Delamore Partners Limited			
	PO Box 9528 Newmarket			
	Newmarket			
	AUCKLAND 1149			

Lab No:	1449302	SPv2
Date Registered:	11-Jul-2015	
Date Reported:	23-Jul-2015	
Quote No:		
Order No:		
Client Reference:	W02050100	
Submitted By:	B Simkin	

Amended Report This report replaces an earlier report issued on the 17 Jul 2015 at 3:10 pm Asbestos analysis added to sample SS23 0.3, as per clients request.

	Sample Name:	SS23 0.1 09-Jul-2015	SS23 0.3 09-Jul-2015	SS28 0.4 09-Jul-2015		
	Lab Number:	1449302.4	1449302.5	1449302.7		
Heavy metal screen level As,			1		I	1
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	2	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.31	-	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	8	-	10	-	-
Total Recoverable Copper	mg/kg dry wt	17	-	16	-	-
Total Recoverable Lead	mg/kg dry wt	51	-	8.6	-	-
Total Recoverable Nickel	mg/kg dry wt	5	-	5	-	-
Total Recoverable Zinc	mg/kg dry wt	270	-	80	-	-
Asbestos in Soil						
As Received Weight	g	-	365.5	-	-	-
Dry Weight	g	-	319.7	-	-	-
<2mm Subsample Weight	g ashed wt	-	65.4	-	-	-
Asbestos Presence / Abser	ce	-	Asbestos NOT detected.	-	-	-
Description of Asbestos Form	1	-	-	-	-	-

S W Ο V \Box

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil							
Test	Method Description	Default Detection Limit	Sample No				
Individual Tests							
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	4, 7				
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	4, 7				
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	4, 7				
Asbestos in Soil	·	1	-				
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	5				
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	5				
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	5				





This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil	Sample Type: Soil								
Test	Method Description	Default Detection Limit	Sample No						
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	5						
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	5						

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Peter Robinson MSc (Hons), PhD, FNZIC Client Services Manager - Environmental Division

Sample ID Sample No. Analyses requested MW2 0-5 5 1	0	solutions f) () for your environm	mont	Re	equest for	⁻ Analys		NOTE of the form _{Recei}	ved by: D		
Indees (Refer to based) ZIPP Auchland PR PD Weingson Prof Ensistence Rescitation International by: A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.				Ltd	eter en an fann anne again fan an fan an f	and a constant of the second and a second second and a second second second second second second second second	a na ang ang ang ang ang ang ang ang ang	To:	<u>+1///s</u>	4493020		
Immitted by: D.D./ A.M.H. PN No:: D.D./ SLUE, 46.2 PSP Jub No:: D.D./ SLUE neme					Auckland	V PDP Wellington	PDP Christchur	ch Quote I	No.:			
Antic Received: Drem temp. Chilled Temp: C Notes: arre: ALL A A Barture: A A A groture: ALL A Barture: Barture: A A A seate and time: 10/027 A Barture: Barture: A A A A seate and time: 10/027 A Barture: Bartur	mitted by: Ac.	<u>DLA</u>	MY.				<u>468</u>	PDP Jo		and the second	and the second	
Note: Received: Received: Commerce	Children William	LENAR Non			Sector Maryana		oning ang ang ang ang ang ang ang ang ang a				ni 20 Shidani. Kaominin	
Image: LAW	ain of Custo	ov ree			Received	d: 🗆 Room temp.	Chilled, Temp.:_	^C Not	es:			
Bandline: Order Sansture: Mail Part of the samilies add and time: O/O/2 A Add Gpdp.co.nc Mail (address below) Part fur. Normal KL High asatts by: <u>Remain samilies</u> : <u>Add Lid (address below)</u> Part further: Normal KL High Part further: Normal KL High Normal KL High		n					ulla_					
ale and time: 19/07 A M Date and time: And the Address below Plurity: December 10/07 A M Address below Plurity: December 10/07	6	. Lawrance			Signature	e.		·				
Benefit by: Renal submitter: Cold Ldgacd @odp.co.m. □ Moti (address below) Priority: □ Honthal E_regination Noice to: ØXPDP □ Other: □ Analyses requested Noice Muld 4: 0.3 5 5 1						and the second						
Bit Email submitte: Cold L200/22A endla cont Fax furmber below) Results required by: 1 voice to: Semple ID Sample bottles Analyses requested Not Sample ID Sample bottles: Analyses requested Not MUZE 0.5 S I Image: Cold Cold Cold Cold Cold Cold Cold Cold							🗖 Mail (addr	ess below)	Priority; E] Normal	🛍 High	Urgent
Eff Enal other: AM_LA Option voice to: Sample type Other Analyses requested Not Mu/2 0.3 5 1	sults by: 🛛 🕅	[Email ຣເ	ubmitter:	_lick	<u>11 dajes e</u>				Results require	ed by:	_/	/
Sample ID Sample brites Analyses requested Not Mul2 e-S S i Image: Sample brites Image: Sample brites </td <td>and the strength of the streng</td> <td></td> <td>ther:</td> <td>and former and the second second second</td> <td></td> <td>∯@pdp.co.nz</td> <td></td> <td></td> <td></td> <td>an an a</td> <td></td> <td></td>	and the strength of the streng		ther:	and former and the second second second		∯@pdp.co.nz				an a		
Sample ID Sample bottles Analyses requested MarX2 0-S S I Image: Solution of the second of the s	oice to: 5	KPDP		🗋 Othei		na tana kaominina dia kaomi Ny INSEE dia mampikambana mampikambana minina mampikambana dia kaominina dia kaominina dia kaominina dia kaomini					Notes	5
Mold (1) 3 1 Muld (1) 3 1 Muld (3) 3 1 S523 0:1 5 3 S523 0:6 5 3 S523 0:6 5 3 S523 0:4 5 3 S528 0:4 5 3 S527 0:1 5 3 S526 0:1 5 3 S266 0:1	Sample ID	ę	•			An	alyses requested			_		
MWZ (*d) S I MWZ (*d) S I SS23 0 I S 3 JS23 0 3 S 3 JS23 0 4 S 3 JS23 0 5 S 3 JS23 0 6 S 3	MWZ 0-S		S	1	1					_		
MUJ 8 1-3 J I SS 23 0-1 S 3 JS 23 0-3 S J JS 23 0-6 S J SS 23 0-6 S J SS 23 0-6 S J SS 25 0-4 S J SS 26 0-4 S J SS 28 0-6 S J SS 28 0-6 S J SS 27 0-1 S S SS 27 0-1 S S SS 26 0-8 S J SS 26 0-8 S J SS 26 0-8 S J SS 26 0-7 S S SS 26 0-8 S J SS 26 0-7 S S SS 26 0-7 S S <t< td=""><td></td><td></td><td>S</td><td>(</td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td></t<>			S	(-					
SS23 0:1 S 3 SS23 0:3 S 3 SS23 0:6 S 3 SS28 0:4 S 3 SS28 0:6 S 3 SS27 0:1 S 3 SS26 0:4 S 3 SS27 0:5 S 3 SS26 0:1 S 3 SS26 0:1 S 3 SS26 0:3 S 3 SS26 0:4 S S SS26 0:5 S S SS26 0:1 S S SS26 0:3 S S SS26 0:3 S S SS26 0:4 S S SS26 0:5			S	(
3523 0.3 S 3 5523 0.6 S 3 5523 0.4 S 3 5528 0.4 S 3 5527 0.1 S 3 5527 0.5 S 3 5527 0.5 S 3 5526 0.7 S 3 5526 0.7 S 3 5526 0.7 S 3 5526 0.5 S 3 5527 0.1 S 3 5528 0.5 S 3 5529 0.5 S 3 5529 0.5 S 3 5529 0.5 S 3 5529 0.5		ì	S	3								
SS23 0.6 S S Horp CATE ANALYDES REQUESTED SS28 0.4 S S Horp CATE ANALYDES REQUESTED SS28 0.4 S S S SS27 0.1 S S S SS24 0.3 S S S SS26 0.1 S S S SS26 0.5 S S C Temperature was measured on arbitrarily chosen samples in this babo. The Microbiology sample temperature will be recorded at Melville Lab bafore testing SS26 0.5 S S S C Chosen samples in this babo. S			~~	3								,
SS2:8 0:4 S S Hull D CATIL AMULDEST AL QUESTAR SS2:8 0:1 S S S SS2:8 0:4 S S S SS2:7 0:5 S S S SS2:6 0:1 S S S			S	3				2007				
SS 2.8 0 i S 3 SS 2.8 0 i S 3 SS 2.7 0 i S 3 SS 2.7 0 i S 3 SS 2.7 0 i S 3 SS 2.6 0 i S S SS 2.6 0 i S <		í	5	Š		HOLD CATE	ANALYUC	Es Re	QUALSTED.			
SS28 04 S 3 SS27 0.1 S 3 SS27 0.5 S 3 SS26 0.8 S 3 SS26 0.1 S 3 SS26 0.1 S 3 SS26 0.5 S S SS26 0.5 S S Temperature On Arrival			S	3								
3527 0.1 5 3 3527 0.5 5 3 3526 0.3 5 3 3526 0.1 5 3 3526 0.1 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3526 0.5 5 3 3527 0.5 5 3 3528 0.5 5 5 3529 0.5 5 5 3520 0.5			\$	3		·			-			
SS 27 O·S S 3 SS 26 O·B S 3 SS 26 O·I S 3 3 SS 26 O·I S <td></td> <td></td> <td>S</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			S	3								
5526 0-3 3 5526 0-1 5 5526 0-5 5 5526 0-5 5 5526 0-5 5 5526 0-5 5 6 0 0 7 Temperature On Arrival 6 0 7 Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. 0 0			S	3		/						
SS26 O:1 S 3 SS26 O:5 S 3 Temperature On Arrival Social Temperature Was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. OW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate	~	3	2.	2		ور میں اور میں						
SS26 0.5 S S SS26 0.5 S Image: SS26 0.5 S Im		s (S	3			an a		<u></u>			47000
Temperature On Arrival S.G. °C Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. GW Groundwater SAL Seawater/salline FW Freshwater LEACH Leachate GEO Geo	Page 1	gmilling and	5	3	7							
Signed C Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo	Sound Sound - S											
Signed C Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo			1									
Subscription Subscription Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo						Temperatur	re On Arriva					
Temperature was measured on arbitrarily chosen samples in this batch. The Microbiology sample temperature will be recorded at Melville Lab before testing. Be recorded at Melville Lab before testing. GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo			-			•						
GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo						Temperature was m	easured on arbitrari	ly ———			 I _	
GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo						The Microbiology sa	mple temperature w					
GW Groundwater SAL Seawater/saline FW Freshwater LEACH Leachate GEO Geo									۷ میں میں اور		403020	Pareived hyr
GW Groundwater SAL Seawater/saline FW Freshwater									LEACH Leachate	GEO Geo		
Sample type: S Son www. Wastewater P Potable Other	Sample type:	S S	ioil						P Potable	Other:		
SED Sediment BIO Biota TW Tradewaste WW Wastewater Protected SED Sediment BIO Biota TW Tradewaste WW Wastewater Protected Note: Samples may contain dangerous or hazardous substances		SED	Sedime	nt Bl	0 Biota	TW Tradewaste		3[64/0101				Wats



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmailHamilton 3240, New ZealandWeb

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 2

Job Information Summary

Client:	Pattle Delamore Partners Limited
Contact:	R Lidgard
	C/- Pattle Delamore Partners Limited
	PO Box 9528
	Newmarket
	AUCKLAND 1149

Lab No:	1449302
Date Registered:	11-Jul-2015 10:35 am
Priority:	High
Quote No:	
Order No:	
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	B Simkin
Charge To:	Pattle Delamore Partners Limited
Target Date:	20-Jul-2015 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	MW8 0.5 09-Jul-2015	Soil	GSoil300	Hold Cold
2	MW8 1.0 09-Jul-2015	Soil	GSoil300	Hold Cold
3	MW8 1.5 09-Jul-2015	Soil	GSoil300	Hold Cold
4	SS23 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	SS23 0.3 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Asbestos in Soil
6	SS23 0.6 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
7	SS28 0.4 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	SS28 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
9	SS28 0.6 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
10	SS27 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
11	SS27 0.5 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
12	SS26 0.8 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
13	SS26 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
14	SS26 0.5 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	4, 7
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	4, 7
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	4, 7
Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	5
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	5
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	5
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	5
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	5



R J Hill Laboratories LimitedT1 Clyde StreetFPrivate Bag 3205EHamilton 3240, New ZealandV

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 3

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1449304	SPv2
Date Registered:	11-Jul-2015	
Date Reported:	30-Sep-2015	
Quote No:		
Order No:		
Client Reference:	W02050700	
Submitted By:	Andrew Mackenzie	

Amended Report

This report replaces an earlier report issued on the 20 Jul 2015 at 4:27 pm TCLP copper, lead and zinc analysis added to samples SS20 0.2, SS29 0.1 and SS33 0.4, as per clients request.

Sample Type: Soil						
Sar	nple Name:	SS19 0.1	SS19 0.3	SS20 0.2	SS20A 0.1	SS20A 0.3
		09-Jul-2015	09-Jul-2015	09-Jul-2015	09-Jul-2015	09-Jul-2015
	ab Number:	1449304.1	1449304.2	1449304.4	1449304.7	1449304.8
Individual Tests						
TCLP Weight of Sample Taken	g	-	-	100	-	-
TCLP Initial Sample pH	pH Units	-	-	6.8	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	1.6	-	-
TCLP Extractant Type*		-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-
TCLP Extraction Fluid pH	pH Units	-	-	5.0	-	-
TCLP Post Extraction Sample pH	pH Units	-	-	5.0	-	-
Heavy metal screen level As,Cd,C	Cr,Cu,Ni,Pb,Zn					·
Total Recoverable Arsenic	mg/kg dry wt	5	< 2	6	6	2
Total Recoverable Cadmium	mg/kg dry wt	0.48	0.14	0.97	1.06	0.10
Total Recoverable Chromium	mg/kg dry wt	11	5	13	13	9
Total Recoverable Copper	mg/kg dry wt	116	17	390	370	52
Total Recoverable Lead	mg/kg dry wt	200	36	420	280	240
Total Recoverable Nickel	mg/kg dry wt	7	3	119	19	8
Total Recoverable Zinc	mg/kg dry wt	260	123	580	520	111
Asbestos in Soil						'
As Received Weight	g	-	378.3	-	-	282.7
Dry Weight	g	-	330.3	-	-	193.2
<2mm Subsample Weight	g ashed wt	-	66.1	-	-	63.2
Asbestos Presence / Absence		-	Asbestos NOT detected.	-	-	Chrysotile (White Asbestos) detected.
Description of Asbestos Form		-	-	-	-	ACM Debris & Loose Fibres
	nple Name:	SS29 0.1 09-Jul-2015	SS30 0.1 09-Jul-2015	SS33 0.4 09-Jul-2015	TP2 0.6 09-Jul-2015	TP1 0.7 09-Jul-2015
	ab Number:	1449304.10	1449304.12	1449304.15	1449304.16	1449304.17
Individual Tests		· · · · · · · · · · · · · · · · · · ·				
	g/100g as rcvd	-	-	-	76	-
TCLP Weight of Sample Taken	g	100	-	100	-	-
TCLP Initial Sample pH	pH Units	6.7	-	6.5	-	-
TCLP Acid Adjusted Sample pH	pH Units	1.6	-	1.7	-	-
TCLP Extractant Type*		NaOH/Acetic acid at pH 4.93 +/- 0.05	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-
TCLP Extraction Fluid pH	pH Units	5.0	-	5.0	-	-
TCLP Post Extraction Sample pH	pH Units	5.0	-	5.0	-	-





This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

S	ample Name:	SS29 0.1	SS30 0.1	SS33 0.4	TP2 0.6	TP1 0.7
		09-Jul-2015	09-Jul-2015	09-Jul-2015	09-Jul-2015	09-Jul-2015
	Lab Number:	1449304.10	1449304.12	1449304.15	1449304.16	1449304.17
Heavy metal screen level As,C			1			1
Total Recoverable Arsenic	mg/kg dry wt	31	3	8	-	7
Fotal Recoverable Cadmium	mg/kg dry wt	1.16	0.26	0.37	-	0.25
Total Recoverable Chromium	mg/kg dry wt	37	13	13	-	13
otal Recoverable Copper	mg/kg dry wt	1,230	199	94	-	106
otal Recoverable Lead	mg/kg dry wt	320	230	450	-	77
otal Recoverable Nickel	mg/kg dry wt	60	9	6	-	6
otal Recoverable Zinc	mg/kg dry wt	620	240	260	-	118
Total Petroleum Hydrocarbons	n Soil					
C7 - C9	mg/kg dry wt	-	-	-	< 9	-
C10 - C14	mg/kg dry wt	-	-	-	< 20	-
C15 - C36	mg/kg dry wt	-	-	-	210	-
otal hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	210	-
Sample Type: Aqueous						
S	ample Name:	SS20 0.2 [TCLP	SS29 0.1 [TCLP	SS33 0.4 [TCLP		
	-	Extract]	Extract]	Extract]		
	Lab Number:	1449304.19	1449304.20	1449304.21		
ndividual Tests			1	1		<u>,</u>
otal Copper	g/m ³	0.89	0.035	0.020	-	-
Total Lead	g/m ³	0.83	1.29	0.189	-	-
otal Zinc	g/m ³	9.6	0.47	1.32	-	-
TP2 0.6 09-Jul-2015 Client Chromatogram for TPH	. [manipulated]	Importe	d_Sequences\Lok	I_BACK\asTPH 740	02\xsTPH.6306.18	
Au						
30.0						
25.0						
20.0						
20.0						
15.0						
15.0						
15.0						
15.0						
15.0			he a sum	- Mark	Marray	

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil								
Test	Method Description	Default Detection Limit	Sample No					
Individual Tests								
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 4, 7-8, 10, 12, 15, 17					
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	16					
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 4, 7-8, 10, 12, 15, 17					

Test	Method Description	Default Detection Limit	Sample No
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1-2, 4, 7-8, 10, 12, 15, 17
Total Petroleum Hydrocarbons in Soil*	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	16
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311	-	4, 10, 15
Asbestos in Soil		l	1
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 8
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 8
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	2, 8
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	2, 8
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2, 8
TCLP Profile		1	1
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	4, 10, 15
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	4, 10, 15
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	4, 10, 15
TCLP Extractant Type*	US EPA 1311.	-	4, 10, 15
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	4, 10, 15
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	4, 10, 15
Sample Type: Aqueous	-	·	
Test	Method Description	Default Detection Limit	Sample No
Individual Tests		I	
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	19-21
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.011 g/m ³	19-21
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.0021 g/m ³	19-21
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd	0.021 g/m ³	19-21

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

ed. 2012.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division

PATTLE DELAMORE PAR	NERS LT	uroament	R	equest fo	r Analyse	S	of these sa	se acknowledge receipt mples by signing this nailing to submitter.
From: Pattle Delamor	e Partne	ers Ltd				То:/<	tel La	ha
Address (Refer to base of	-		P Auckland		PDP Christchurch			and the second second
Submitted by: Cender	cer No	lterkes	nie	Ph No.: 02/0	417946	PDP Job No.	word	50700
Chain of Custody R	ecord							
Sent:	A Second Second Second Second		Received	🗈 🗆 Room temp. 🛛	Chilled Temp.: <u>**2</u>	°C Notes:	and the second	
Name: <u>Chalne</u> w			Name	Klop Veda	lar	Seer	ngles	ulhin
Signature: <u>AllMan</u>	Acusz		Signature			2	chel	whin by bins
Date and time: <u>///~</u> ~	7-15		_ Date and	time:			``	ч ^р
Results by: Erail	l submitter	: andr	ew. Mark	@pdp.co.nz	Mail (address b	elow) P	riority: 🛛 🗸	Íormal 🗆 High 🖾 Urgent
_			en kis	@pdp.co.nz	Fax (number be			by: / /
Invoice to: PDP		D Othe				<u>I</u>		
	Sample	No.				1		
Sample ID	type	bottles		Ana	lyses requested	:		Notes
5519 01	2	3	HOLS	o corp				
5519 03	-5	3	····-··	:				:
5519 0-6	5	3			•• ,, · · · · ,			:
5520 0-2	L	3						•.
5520 1.0	2	3						•••
5525 1-3	2	3.						· · · · · · · · · · · · · · · · · · ·
SSZOA OV	2	3			i			
5.520A 0.3	S	3						
5520A 8-6	: 5	3	ation Second Second	· · · · · · · · · · · · · · · · · · ·		:		
.ss29 0-1	2	3						
5529 0-5	S	3		· · · · · · · · · · · · · · · · · · ·				
553c 01	5	3						
5530 8 S	5	3						
5533 0-1	5	3		11.7 × 19 9 Million				
5533 04	5	3						
TP2 0:6	5	1						
TP1 0.5	S	2		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				
791 13	\$	2						
								С.,
· .								77
a								Received by:
	<u> </u>							ad by: Date
Sample type: S Soil	ediment	GW Gr BIO BI	roundwater	SAL Seawater/saline	FW Freshwater WW Wastewater	LEACH Leac	hate GEO Geo Other:	
					erous or hazardou			
PDP Auckland Vouse, 235 Broadwa 9528, Newmarket 9 523 6900 F Ppdp.co.nz	, Auckland	rket, Auckla 1149	PDP W ind iSOFT PO Bo . Tel: +	/ellington	Customhouse Quay, We 41	PDP Illington Radi PO E Tel:	 Christchurch io NZ House, 51 Box 389, Christc -+64 3 363 310 stchurch@pdp.cd	Che: hurch DO F



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Tel +64 7 858 2000 Fax +64 7 858 2001 Emai mail@hill-labs.c I o.nz

Page 1 of 2

Job Information Summary

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

1449304
11-Jul-2015 10:32 am
High
W02050700
Andy Mackenzie
Pattle Delamore Partners Limited
20-Jul-2015 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS19 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
2	SS19 0.3 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
3	SS19 0.6 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
4	SS20 0.2 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	SS20 1.0 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
6	SS20 1.8 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
7	SS20A 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	SS20A 0.3 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
9	SS20A 0.6 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
10	SS29 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
11	SS29 0.5 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
12	SS30 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
13	SS30 0.5 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
14	SS33 0.1 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Hold Cold
15	SS33 0.4 09-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
16	TP2 0.6 09-Jul-2015	Soil	GSoil300	Total Petroleum Hydrocarbons in Soil
17	TP1 0.7 09-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

No	Sample Name	Sample Type	Containers	Tests Requested
18	TP1 1.3 09-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil Test	Method Description	Default Detection Limit	Sample No
	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 4, 7-8, 10, 12, 15, 17
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	16
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 4, 7-8, 10, 12, 15, 17
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	1-2, 4, 7-8, 10, 12, 15, 17
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	16
Asbestos in Soil	,		
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 8
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 8
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	2, 8
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	2, 8
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2, 8



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205 Hamilton 3240, New Zealand Web www.hill-labs.co.nz

+64 7 858 2000 Tel Fax +64 7 858 2001 Email mail@hill-labs.co.nz

Page 1 of 2

SPv1

NALYSIS REPOR T

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

1451328
17-Jul-2015
22-Jul-2015
70150
W02050100
W02050100
Andy Mackenzie

Sample Type: Aqueous						
Sa	mple Name:	MW2	MW3	MW4	MW5	MW7
L	ab Number:	1451328.1	1451328.2	1451328.3	1451328.4	1451328.5
BTEX in Water by Headspace G	C-MS					l
Benzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Total Petroleum Hydrocarbons in	Water					
C7 - C9	g/m ³	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Sa	mple Name:	MW8	MW9	MW 10	MW6A	MW11
L	ab Number:	1451328.6	1451328.7	1451328.8	1451328.10	1451328.11
Individual Tests						
Total Ammoniacal-N	g/m³	-	-	-	< 0.010	-
Nitrite-N	g/m³	-	-	-	< 0.002	-
Nitrate-N	g/m³	-	-	-	3.1	-
Nitrate-N + Nitrite-N	g/m³	-	-	-	3.1	-
BTEX in Water by Headspace G	C-MS					
Benzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Toluene	g/m ³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Ethylbenzene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
m&p-Xylene	g/m³	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Formaldehyde in Water by DNPH	1 & LCMSMS					
Formaldehyde	g/m³	-	-	-	< 0.02	-
Total Petroleum Hydrocarbons in	Water					
C7 - C9	g/m³	< 0.10	< 0.3	< 0.15	< 0.10	< 0.10
C10 - C14	g/m³	< 0.2	< 0.7	< 0.4	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 1.4	< 0.8	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 3	< 1.4	< 0.7	< 0.7
Sa	mple Name:	MW 1				
L	ab Number:	1451328.12				
Individual Tests					,	1
Total Ammoniacal-N	g/m³	0.29	-	-	-	-
Nitrite-N	g/m³	0.009	-	-	-	-
Nitrate-N	g/m³	0.23	-	-	-	-





This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of

tests marked *, which are not accredited.

Sample Type: Aqueous						
Sample	Name:	MW1				
Lab N	umber:	1451328.12				
Individual Tests	·					
Nitrate-N + Nitrite-N	g/m³	0.23	-	-	-	-
BTEX in Water by Headspace GC-MS	·					
Benzene	g/m³	< 0.0010	-	-	-	-
Toluene	g/m³	< 0.0010	-	-	-	-
Ethylbenzene	g/m³	< 0.0010	-	-	-	-
m&p-Xylene	g/m³	< 0.002	-	-	-	-
o-Xylene	g/m³	< 0.0010	-	-	-	-
Formaldehyde in Water by DNPH & LC	MSMS					
Formaldehyde	g/m³	< 0.02	-	-	-	-
Total Petroleum Hydrocarbons in Wate	r					
C7 - C9	g/m³	< 0.10	-	-	-	-
C10 - C14	g/m³	< 0.2	-	-	-	-
C15 - C36	g/m³	< 0.4	-	-	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	-	-	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
BTEX in Water by Headspace GC-MS	Headspace GC-MS analysis, US EPA 8260B [KBIs:26687,3629]	0.0010 - 0.002 g/m ³	1-8, 10-12
Formaldehyde in Water by DNPH & LCMSMS	DNPH derivatisation, extraction, LCMSMS	0.02 g/m ³	10, 12
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	0.10 - 0.7 g/m ³	1-8, 10-12
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	10, 12
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH ₄ -N = NH ₄ +-N + NH ₃ -N). APHA 4500-NH ₃ F (modified from manual analysis) 22 nd ed. 2012.	0.010 g/m ³	10, 12
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA $4500\text{-}NO_3$ I 22^{nd} ed. 2012 (modified).	0.002 g/m ³	10, 12
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m ³	10, 12
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO ₃ ⁻ I 22 nd ed. 2012 (modified).	0.002 g/m ³	10, 12

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division

AFTER BELAKONE PARTNERS From: Patile Delamore Part Address (Refer to base of shoel) Scomfitted by Control (Control) Chaim of Custoria, Record Name: Control (Control)	nora Lid D PDF	There is a state of the state o	Mr. C. H. d.	48
ddress (Refer to base of shoot) admitted by Chain of Custody Record	D PDF	the second secon		
conflued by Control Products	Falle Asin	Withhald Phote Avenueton Phote automotion and	Aci.:	# 3 1 June
ien-		ALC: THINKS	Nas Broch 200	the second se
			的國口商指導出制	1. A. 1. A
LAND ALL STREET	See.	Received: Room temp. Chillen Temp. To Note Name: Note:		A sea etc
Annes de la companya	- ALL-	1.181-	Son Calan	2.7
ilgrature: Children As	18	Signature	() Arine	multiche 16
3840 and Unve: 👘 👘 💷			1	Normal THer Lugent
Beaulits by: 🔄 Email notif 🗊 Email online	1	Image: State State State State State □ Merit (address below) Image: State State State □ Merit (address below) Image: State State □ First (number below)	1.	uk://
nvelce to: D'POP	Dam	r.		
	po No. boitles	Analyses Requested		Notes
Mar 2 3	12° 1	一下开 如何有多		
A176 6	1.21			
MILLA	-			
Mee'5				1
かびま				
Mar 2			4.	Rankloud 200
A:10 9			{l	Scelar - 11
Mai 26.	1	J.		
Antele	E	He & Eren	_	
No is Est				
Malazz a				
ALCON V	V V			
	_			
			_	
	_			
	-			
Semple type:		III Sas avanatory some to treate	CH Lomhain GEO etablo Oihi	Goothermal #:
poorveibuig	Neglitude of p	unples may contain dangerous or hazardous sub-		Page

Client Name Pattle Delamore Partners Limited 20755 Address PO Box 6136, WELLINGTON 6141	R J Hill Laboratories LM Phone: +64 7 858 2000 1 Clyde Street, Fax: +64 7 858 2000 Private Bag 3205, Email: mail@hill-abs.co.m Hamiltion 3240, New Zealand Web: www.hill-abs.co.m Office use Job No:
Phone 04 471 4130 Pax 04 471 4131 Client Reference Quote No 70150 Order No Primary Contact Andy Mackenzie 198611 Submitted By Andy Mackenzie 198611	Sent to Hill Laboratories Date & Time: Place & fix d you require COC to be willing back Name: Signature: Received at Hill Laboratories Date & Time:
Charge To Pattle Delamore Partners Limited 20755 Results To Mail Primary Contact Mail Submitter Fax Results	Name: Signature: Condition Temp: Room Temp Chilled Frozen
Enuil Results	Signature: Priority Low Normal Migh Urgent (ASAP, extra charge spoke, place contaction fml) NOTE: The automated contactual line for the types and number of samples and acceleres specified on the quote is by 4:30 pm, 8 working days following the day of escept of the samples at the laboratory.

Quoted Sample Types

Ground Water (ow)

Requested Reporting Date:

Not	Sample Name	Sample Date/Tinte Sample Type Tests Required
1		
2		
3	_	
4		
5		
6		
7		
8		
9		
10		





R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

+64 7 858 2000 Tel Fax +64 7 858 2001 Emai mail@hill-labs.c o.nz

Page 1 of 2

ob Information Summary

Client:	Pattle Delamore Partners Limited		
Contact:	tact: B Simkin		
	C/- Pattle Delamore Partners Limited		
	PO Box 6136		
WELLINGTON 6141			

Lab No:	1451328
Date Registered:	17-Jul-2015 10:54 am
Priority:	High
Quote No:	70150
Order No:	W02050100
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	24-Jul-2015 4:30 pm

Т

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	MW2	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
2	MW3	Ground Water	cTPH250, VOC40, VOC40	TPH + BTEX profile, Water
3	MW4	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
4	MW5	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
5	MW7	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
6	MW8	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
7	MW9	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
8	MW10	Ground Water	TPH250, VOC40, VOC40	TPH + BTEX profile, Water
9	MW6	Ground Water	Org500, TPH250, UP250, FN100, VOC40, VOC40	Hold Cold
10	MW6A	Ground Water	Org500, TPH250, UP250, FN100, VOC40	Nitrate-N; Total Ammoniacal-N; Formaldehyde in Water by DNPH & LCMSMS; TPH + BTEX profile, Water
11	MW11	Ground Water	Org500, cTPH250, UP250, FN100, VOC40	TPH + BTEX profile, Water
12	MW1	Ground Water	Org500, TPH250, UP250, FN100, VOC40, VOC40	Nitrate-N; Total Ammoniacal-N; Formaldehyde in Water by DNPH & LCMSMS; TPH + BTEX profile, Water

Η Μ Ε **ODS** S AR F Μ U Μ 0

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Test	Method Description	Default Detection Limit	Sample No
BTEX in Water by Headspace GC-MS	Headspace GC-MS analysis, US EPA 8260B [KBIs:26687,3629]	0.0010 - 0.002 g/m ³	1-8, 10-12
Formaldehyde in Water by DNPH & LCMSMS	DNPH derivatisation, extraction, LCMSMS	0.02 g/m ³	10, 12
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	0.10 - 0.7 g/m ³	1-8, 10-12
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	10, 12
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH4-N = NH4+-N + NH3-N). APHA 4500-NH3 F (modified from manual analysis) 22 nd ed. 2012.	0.010 g/m ³	10, 12

Sample Type: Aqueous				
Test	Method Description	Default Detection Limit	Sample No	
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO ₃ · I 22 nd ed. 2012 (modified).	0.002 g/m ³	10, 12	
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m ³	10, 12	
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO ₃ I 22 nd ed. 2012 (modified).	0.002 g/m ³	10, 12	



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmHamilton 3240, New ZealandWe

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 1

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1451861	A2Pv1
Date Registered:	17-Jul-2015	
Date Reported:	20-Jul-2015	
Quote No:	60811	
Order No:		
Client Reference:	W02050100	
Submitted By:	R Lidgard	

Sample Type: Building Material

			Commissions	
Sample Name	Lab Number	Sample Category	Sample size (weight or dimensions)	Asbestos Presence / Absence
TP6 1.5	1451861.1	Fibre Cement #1	256.98	Chrysotile (White Asbestos) detected.

Analyst's Comments

^{#1} Sample bag contained 2 x fibre cement fragments and 1 x roofing slate/tile (non-asbestos).

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Building Material						
Test	Method Description	Default Detection Limit	Sample No			
Asbestos in Bulk Material						
Sample Category	Assessment of sample type.	-	1			
Sample size (weight or dimensions)	Sample size. Weight or size as appropriate.	-	1			
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1			

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Rhodri Williams BSc (Hons) Asbestos Section Manager



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

45 186		ampen.	nequ	lest			form	and email	es by signi ing to sub	ng this mitter.
ived by: Melody Walk	ər	 sLtd	<u> </u>	<u></u>	<u></u>	To:	L. C. C.			
			P Auckland 🛛 🖸 PD	P Weilington [PDP Christchurch					
Submitted by:	400			-		PDP Job N	io.:	0205010	<u>10</u>	
Chain of Custody R	ecord									
Sent:			Received: 🛛 🖡	oom temp. 🛛 (Chilled Temp.: 74	°C Notes:		-		
Name: <u>Ron .</u>	/		Name:	the lace						
Signature:	-		Signature:	De-						
Date and time:	<u>;</u> ?		Date and time:							
Results by: S KEmail	submitter	: 173 M	.lidged	⊉pdp.co.nż	Mail (address b	elow)	Priority:	🗌 Norm	ai 🛛 High	🗆 ບ
Email			sinkin (🗍 Fax (number be		Results r	equired by:	/	_ /
nvoice to: 🗍 PDP		C Oth								
Sample ID	Sample	No.		Anaiy	ses requested				Note	25
-727 0.G	type ک	botties 2	<u></u>						<u>.</u>	
7,27 2 ;	<u>د.</u> ک	2	$\overline{}$	·····						
7-6 0.5	5	2								
TP6 10	5									
776 1.5	 	200		<u> </u>	in a star of a star	سيسرأ ببادمد ا	••••••			
TP6 2.0	5	N N	> HOLD	VATE A	ACTSES A	EC WEN	<u>, /</u>	<u> </u>		•
7/5 0-7	5	2		<u>.,</u>	<u></u>	<u></u>				
TPS 12		2		···· · · · · · · · · · · · · · · · · ·		<u></u>				
TP4 1.2	\$	2							<u></u>	
TP3 06	5	2	/		<u> </u>	····				
	,									
				rd.		:				
					······································					
			·							
				· · · · · · · · · · · · · · · · · · ·						
						· · · · ·	<u>.</u>			
						· · ·				
					······					
· · · · · · · · · · · · · · · · · · ·			······································							
Sample type: S Soil				Seawater/saline	FW Freshwater	LEACH Le		GEO Geothe		
SED S	ediment	EIO B	·····	adewaste	WW Wastewater	P Potable		Other:		R
PDP Auckland PDP House, 235 Broadwa			PDP Wellingt PDP Wellingt and iSOFT House PO Box 6136	on , Level 1, 111 Cu	stomhouse Quay, We	ellington R	DP Christo	ouse, 51 Chi	_	Ó

 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1
 1</t



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmaiHamilton 3240, New ZealandWeb

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Job Information Summary

Page 1 of 1

Client:	Pattle Delamore Partners	Limited	Lab I	No:	1451861
Contact:	B Simkin		Date	Registered:	17-Jul-2015 2:51 pm
	C/- Pattle Delamore Partne	ers Limited	Prior	ity:	High
	PO Box 6136		Quot	e No:	
	WELLINGTON 6141		Orde	er No:	
			Clien	nt Reference:	W02050100
			Add.	Client Ref:	
			Subr	nitted By:	R Lidgard
			Char	ge To:	Pattle Delamore Partners Limited
			Targe	et Date:	21-Jul-2015 4:30 pm
Samples					
	mnle Name	Sample Type	Containers	Tasts Raquas	tod

No	Sample Name	Sample Type	Containers	Tests Requested
1	TP6 1.5 10-Jul-2015	Building Material	ClientsAS	Hold



R J Hill Laboratories LimitedT1 Clyde StreetFPrivate Bag 3205EHamilton 3240, New ZealandV

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 4

ANALYSIS REPORT

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1452027	SPv3
Date Registered:	18-Jul-2015	
Date Reported:	02-Oct-2015	
Quote No:		
Order No:		
Client Reference:	W02050100	
Submitted By:	Andrew Mackenzie	

Amended Report

This report replaces an earlier report issued on the 31 Jul 2015 at 1:31 pm TCLP copper, lead and zinc analysis added to sample SS15 0.1, as per the clients request.

Sample Type: Soil						
Sa	mple Name:	SS06 0.1	SS08 0.1	SS09 0.1	SS10 0.1	SS11 0.1
		17-Jul-2015	17-Jul-2015	17-Jul-2015	17-Jul-2015	17-Jul-2015
	ab Number:	1452027.3	1452027.5	1452027.6	1452027.7	1452027.8
Heavy metal screen level As,Cd,	Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	5	3	3	5	4
Total Recoverable Cadmium	mg/kg dry wt	0.31	0.18	0.30	0.26	0.61
Total Recoverable Chromium	mg/kg dry wt	18	13	13	11	12
Total Recoverable Copper	mg/kg dry wt	68	148	174	137	98
Total Recoverable Lead	mg/kg dry wt	126	710	560	260	200
Total Recoverable Nickel	mg/kg dry wt	9	8	10	8	8
Total Recoverable Zinc	mg/kg dry wt	280	187	250	230	240
Asbestos in Soil			· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	
As Received Weight	g	-	-	-	226.6	-
Dry Weight	g	-	-	-	136.4	-
<2mm Subsample Weight	g ashed wt	-	-	-	Entire Fraction	-
Asbestos Presence / Absence		-	-	-	Chrysotile (White Asbestos) detected.	-
Description of Asbestos Form		-	-	-	Loose Fibres	-
Sa	mple Name:	SS14 0.1 17-Jul-2015	SS15 0.1 17-Jul-2015	SS17 0.1 17-Jul-2015	SS39 0.3 17-Jul-2015	SS41 0.1 17-Jul-2015
L	ab Number:	1452027.9	1452027.10	1452027.12	1452027.16	1452027.21
Individual Tests						
TCLP Weight of Sample Taken	g	-	100	-	-	-
TCLP Initial Sample pH	pH Units	-	6.3	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	1.7	-	-	-
TCLP Extractant Type*		-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-	-
TCLP Extraction Fluid pH	pH Units	-	4.9	-	-	-
TCLP Post Extraction Sample pH	pH Units	-	5.0	-	-	-
Heavy metal screen level As,Cd,	Cr,Cu,Ni,Pb,Zn		i L			
Total Recoverable Arsenic	mg/kg dry wt	3	4	5	3	3
Total Recoverable Cadmium	mg/kg dry wt	0.24	0.43	0.54	0.22	0.13
Total Recoverable Chromium	mg/kg dry wt	11	11	13	25	10
Total Recoverable Copper	mg/kg dry wt	112	290	184	134	46
Total Recoverable Lead	mg/kg dry wt	550	1,710	690	210	44
Total Recoverable Nickel	mg/kg dry wt	8	8	9	11	5
Total Recoverable Zinc	mg/kg dry wt	166	430	320	131	87
Asbestos in Soil						





This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil			1			
	Sample Name:	SS14 0.1 17-Jul-2015	SS15 0.1 17-Jul-2015	SS17 0.1 17-Jul-2015	SS39 0.3 17-Jul-2015	SS41 0.1 17-Jul-2015
	Lab Number:	1452027.9	1452027.10	1452027.12	1452027.16	1452027.21
Asbestos in Soil						
As Received Weight	g	-	-	-	216.8	-
Dry Weight	g	-	-	-	144.1	-
<2mm Subsample Weight	g ashed wt	-	-	-	69.0	-
Asbestos Presence / Absence	9	-	-	-	Chrysotile (White Asbestos) detected.	-
Description of Asbestos Form	1	-	-	-	Loose Fibres	-
	Sample Name:	SS41 1.0 17-Jul-2015	SS43 0.7 17-Jul-2015	SS44 0.5 17-Jul-2015	TP 8 0.1 17-Jul-2015	TP 8 0.5 17-Jul-2015
	Lab Number:	1452027.23	1452027.30	1452027.32	1452027.34	1452027.35
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	-	93
Heavy metal screen level As,	Cd,Cr,Cu,Ni,Pb,Zn		1			
Total Recoverable Arsenic	mg/kg dry wt	3	3	3	< 2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	12	17	9	7	-
Total Recoverable Copper	mg/kg dry wt	68	95	48	14	-
Total Recoverable Lead	mg/kg dry wt	12.5	16.8	6.9	3.7	-
Total Recoverable Nickel	mg/kg dry wt	5	8	5	4	
Total Recoverable Zinc		43	71	5	57	
	mg/kg dry wt	40	/ 1	51	57	-
Total Petroleum Hydrocarbon			1			
C7 - C9	mg/kg dry wt	-	-	-	-	< 8
C10 - C14	mg/kg dry wt	-	-	-	-	< 20
C15 - C36	mg/kg dry wt	-	-	-	-	< 40
Total hydrocarbons (C7 - C36	i) mg/kg dry wt	-	-	-	-	< 70
	Sample Name:	TP 9 0.1 17-Jul-2015				
	Lab Number:	1452027.38				
Heavy metal screen level As,	Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	10	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	18	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	5.3	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	5	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	74	-	-	-	-
Somolo Turos Anno			<u> </u>			
Sample Type: Aqueous	Sample Name:	SW01 17-Jul-2015	SW02 17-Jul-2015	SS15 0.1 [TCLP Extract]		
	Lab Number:	1452027.13	1452027.14	1452027.40		
Individual Tests			1	1	ı	
Total Copper	g/m³	-	-	0.042	-	-
Total Lead	g/m ³	-	-	1.25	-	-
Total Zinc	g/m ³	-	_	1.72	-	-
Heavy metals, dissolved, trace	-	7n		1.72		
•		·	. 0.0040			
Dissolved Arsenic	g/m ³	< 0.0010	< 0.0010	-	-	-
Dissolved Cadmium	g/m ³	< 0.00005	< 0.00005	-	-	-
Dissolved Chromium	g/m ³	< 0.0005	< 0.0005	-	-	-
Dissolved Copper	g/m ³	0.0005	0.0011	-	-	-
Dissolved Lead	g/m³	0.00031	0.00065	-	-	-
Dissolved Nickel	g/m³	< 0.0005	< 0.0005	-	-	-
Dissolved Zinc	g/m³	0.0016	0.0173	-	-	-
Total Petroleum Hydrocarbon	s in Water					
					1	
C7 - C9	g/m ³	-	< 0.10	-	-	-

SW01 17-Jul-2015 1452027.13	SW02 17-Jul-2015	SS15 0.1 [TCLP Extract]				
1/52027 12	1450007 14					
1452027.15	1452027.14	1452027.40				
Total Petroleum Hydrocarbons in Water						
-	< 0.4	-	-	-		
-	< 0.7	-	-	-		
	-	- < 0.4	- < 0.4 -	- < 0.4		

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Test	Method Description	Default Detection Limit	Sample No
Individual Tests	Method Description	Default Detection Limit	Sample No
	Air dried at 05% and signed - Orem fraction	_	2 5 40 40
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation.	-	3, 5-10, 12
ropalation	May contain a residual moisture content of 2-5%.		30, 32, 34,
			38
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	35
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	3, 5-10, 12 16, 21, 23, 30, 32, 34, 38
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	3, 5-10, 12, 16, 21, 23, 30, 32, 34, 38
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	35
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311	-	10
Asbestos in Soil		1	
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	7, 16
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	7, 16
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	7, 16
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	7, 16
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	7, 16
TCLP Profile		1	L
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	10
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	10
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	10
TCLP Extractant Type*	US EPA 1311.	-	10
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	10
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	10

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	40
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22 nd ed. 2012.	-	14
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.011 g/m ³	40

Sample Type: Aqueous						
Test	Method Description	Default Detection Limit	Sample No			
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.0021 g/m ³	40			
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22 nd ed. 2012.	0.021 g/m ³	40			
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.00005 - 0.0010 g/m ³	13-14			
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	0.10 - 0.7 g/m ³	14			

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Hortan

Graham Corban MSc Tech (Hons) Client Services Manager - Environmental Division



Tel +64 7 858 2000 Fax +64 7 858 2001 Emai mail@hill-labs.c 0.nz

Page 1 of 2

Job Information Summary

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No:	1452027
Date Registered:	18-Jul-2015 11:03 am
Priority:	High
Quote No:	
Order No:	A CONTRACTOR OF A
Client Reference:	W02050100
Add. Client Ref:	
Submitted By:	Andy Mackenzie
Charge To:	Pattle Delamore Partners Limited
Target Date:	22-Jul-2015 4:30 pm

ł

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS04 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
2	SS05 0.1 17-Jul-2015	Soll	GSoil300, PSoil250Asb	Hold Cold
3	SS06 0.1 17-Jul-2015	Soll	GSoli300, PSoli250Asb	Hold Gold LLater
4	SS07 0.1 17-Jul-2015	Soll	GSoll300, PSoll250Asb	Hold Cold
5	SS08 0.1 17-Jul-2015	Soll	GSoil300, PSoil250Asb	Hold Gold Keletala
6	SS09 0.1 17-Jul-2015	Soil	GSoll300, PSoil250Asb	Hold Gold Klelal
7	SS10 0.1 17-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	However Wetch, Adulto Me
8	SS11 0.1 17-Jul-2015	Soll	GSoll300, GSoil300, PSoil250Asb	Held-Bold Motels
9	SS14 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold WithEld
10	SS15 0.1 17-Jul-2015	Soll	GSoil300, PSoil250Asb	Hold Cold Kletell
an -	SS16 0.1 17-Jul-2015	Soil	GSoll300, PSoil250Asb	Hold Cold
12	SS17 0.1 17-Jul-2015	Soil	GSoll300, PSoil250Asb	Hold Cold Millich
13	SW01 17-Jul-2015	Surface Water	Org500, cTPH250, UP250, FN100, VOC40, VOC40	Bindued Trace Mitchily
14	SW02 17-Jul-2015	Surface Water	Org500, TPH250, UP250, VOC40, VOC40	Hold Cold
15	SS39 0.1 17-Jul-2015	Soll	GSoll300, PSoll250Asb	Hold Cold
16	SS39 0.3 17-Jul-2015	Soil	GSoll300, PSoll250Asb	Hold Cold Lidal, Aberles prenice.
17	SS39 0.6 17-Jul-2015	Soil	GSoll300, PSoil250Asb	Hold Cold
18	SS40 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
19	SS40 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
20	SS40 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
21	SS41 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Gold Letaly
22	SS41 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	
23	SS41 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Gold Wetch
24	SS41 1.5 17-Jul-2015	Soil	GSoil300, GSoil300	

No	Sample Name	Sample Type	Containers	Tests Requested
25	SS42 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
26	SS42 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Bold Rolling Held Cale
27	SS42 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	
28	SS42 1.5 17-Jul-2015	Soll	GSoil300, GSoil300	Hold Cold
29	SS43 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
30	SS43 0.7 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Aletely
31	SS44 0.2 17-Jul-2015	Soil	GSoil300, GSoil300	
32	SS44 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hatd-Bold Aletaly
33	SS44 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	
34	TP11 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hald Bold Malan
35	TP11 0.5 17-Jul-2015	Soll	GSoil300, GSoil300	
36	TP12 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	
37	TP12 0.6 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
38	TP15 0.1 17-Jul-2015	Soil	GSoii300, GSoil300	Held Cold Malaly
39	TP15 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold



R J Hill Laboratories LimitedTel1 Clyde StreetFaxPrivate Bag 3205EmaiHamilton 3240, New ZealandWeb

 Tel
 +64 7 858 2000

 Fax
 +64 7 858 2001

 Email
 mail@hill-labs.co.nz

 Web
 www.hill-labs.co.nz

Page 1 of 3

Job Information Summary

Client: Pattle Delamore Partners Limited Contact: B Simkin C/- Pattle Delamore Partners Limited PO Box 6136 WELLINGTON 6141

Lab No: Date Registered: Priority:	1452027 18-Jul-2015 11:03 am High
Quote No:	i ligit
Order No: Client Reference:	W02050100
Add. Client Ref:	Andy Maakanzia
Submitted By: Charge To:	Andy Mackenzie Pattle Delamore Partners Limited
Target Date:	28-Jul-2015 4:30 pm

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	SS04 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
2	SS05 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
3	SS06 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	SS07 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
5	SS08 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
6	SS09 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
7	SS10 0.1 17-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	SS11 0.1 17-Jul-2015	Soil	GSoil300, GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
9	SS14 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
10	SS15 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
11	SS16 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
12	SS17 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
13	SW01 17-Jul-2015	Surface Water	Org500, cTPH250, UP250, FN100, VOC40, VOC40	Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn
14	SW02 17-Jul-2015	Surface Water	Org500, TPH250, UP250, VOC40, VOC40	Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Water
15	SS39 0.1 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
16	SS39 0.3 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Asbestos in Soil; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
17	SS39 0.6 17-Jul-2015	Soil	GSoil300, PSoil250Asb	Hold Cold
18	SS40 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
19	SS40 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
20	SS40 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
21	SS41 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
22	SS41 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold
23	SS41 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
24	SS41 1.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested		
25	SS42 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
26	SS42 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
27	SS42 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
28	SS42 1.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
29	SS43 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
30	SS43 0.7 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn		
31	SS44 0.2 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
32	SS44 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn		
33	SS44 1.0 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
34	TP11 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn		
35	TP11 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Total Petroleum Hydrocarbons in Soil		
36	TP12 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
37	TP12 0.6 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		
38	TP15 0.1 17-Jul-2015	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn		
39	TP15 0.5 17-Jul-2015	Soil	GSoil300, GSoil300	Hold Cold		

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Test	Method Description	Default Detection Limit	Sample No
Individual Tests	Method Description	Deladit Detection Elimit	Campie N
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	3, 5-10, 12 16, 21, 23 30, 32, 34 38
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	35
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	3, 5-10, 12 16, 21, 23 30, 32, 34 38
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	3, 5-10, 12 16, 21, 23 30, 32, 34 38
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	35
Asbestos in Soil		1	
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	7, 16
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	7, 16
<2mm Subsample Weight	Sample ashed at 400°C, weight of <2mm sample fraction taken for asbestos identification if less than entire fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	-	7, 16
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	7, 16
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	7, 16
Sample Type: Aqueous	•		·
Test	Method Description	Default Detection Limit	Sample No

Sample Type: Aqueous						
Test	Method Description	Default Detection Limit	Sample No			
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22 nd ed. 2012.	-	14			
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level. APHA 3125 B 21 st ed. 2005.	0.00005 - 0.0010 g/m ³	13-14			
Total Petroleum Hydrocarbons in Water	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	0.10 - 0.7 g/m ³	14			



R J Hill Laboratories Limited 1 Clyde Street Private Bag 3205

+64 7 858 2000 Tel Fax +64 7 858 2001 Email mail@hill-labs.co.nz Hamilton 3240, New Zealand | Web www.hill-labs.co.nz

Page 1 of 4

SPv1

NALYSIS REPORT

Client:	Pattle Delamore Partners Limited
Contact:	B Simkin
	C/- Pattle Delamore Partners Limited
	PO Box 6136
	WELLINGTON 6141

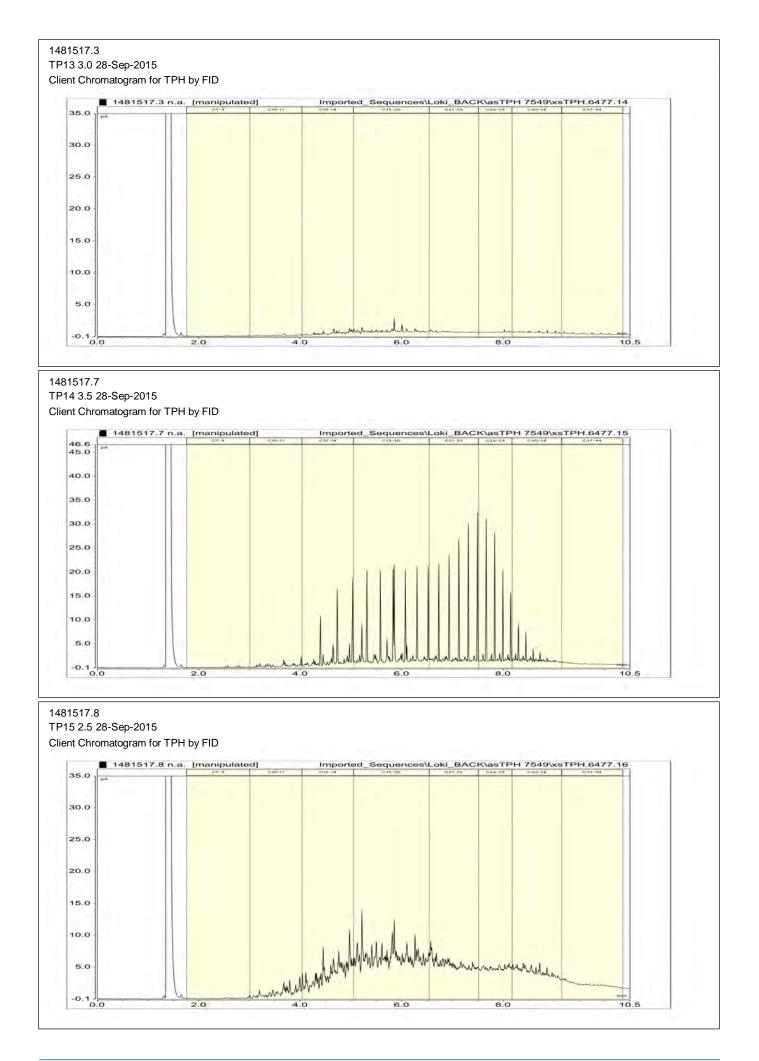
Lab No:	1481517
Date Registered:	29-Sep-2015
Date Reported:	07-Oct-2015
Quote No:	
Order No:	
Client Reference:	WO2050100
Submitted By:	Andrew Mackenzie

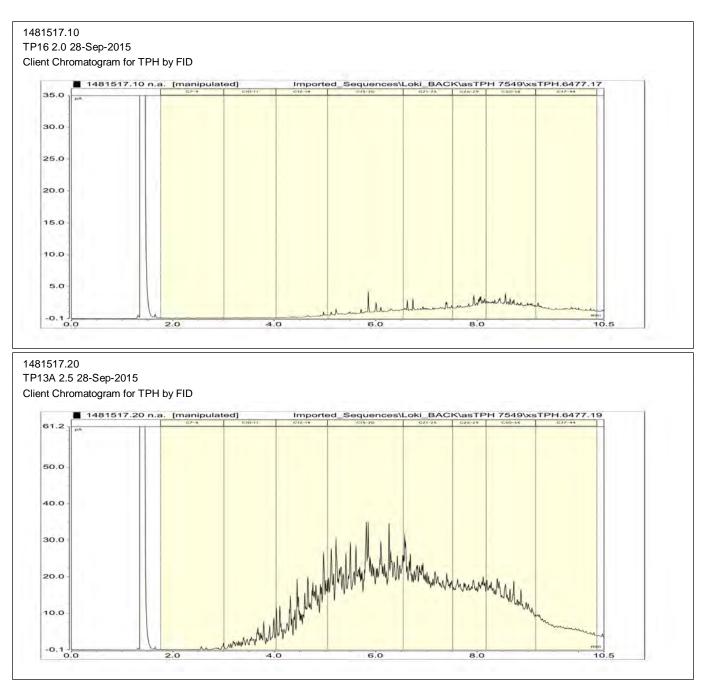
Sample Type: Soil			1			
	Sample Name:	TP13 3.0	TP13 5.0	TP14 3.5	TP15 2.5	TP15 3.5
		28-Sep-2015 1481517.3	28-Sep-2015 1481517.5	28-Sep-2015 1481517.7	28-Sep-2015 1481517.8	28-Sep-2015 1481517.9
Individual Tests	Lab Number:	1401317.3	1461517.5	1401317.7	1401317.0	1401317.9
	a/100 a oo toud	57		54	55	
Dry Matter	g/100g as rcvd	57	-	54	55	-
Heavy metal screen level As,0					1	
Total Recoverable Arsenic	mg/kg dry wt	-	< 2	-	-	3
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	-	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	27	-	-	21
Total Recoverable Copper	mg/kg dry wt	-	84	-	-	66
Total Recoverable Lead	mg/kg dry wt	-	10.6	-	-	9.9
Total Recoverable Nickel	mg/kg dry wt	-	9	-	-	8
Total Recoverable Zinc	mg/kg dry wt	-	109	-	-	84
Total Petroleum Hydrocarbons	s in Soil					
C7 - C9	mg/kg dry wt	< 12	-	< 12	12	-
C10 - C14	mg/kg dry wt	75	-	270	670	-
C15 - C36	mg/kg dry wt	250	-	1,030	2,200	-
Total hydrocarbons (C7 - C36)) mg/kg dry wt	330	-	1,300	2,800	-
	Sample Name:	TP16 2.0	TP18 2.7	TP21 0.2	TP13A 2.5	TP13A 3.0
	-	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015
	Lab Number:	1481517.10	1481517.12	1481517.15	1481517.20	1481517.21
Individual Tests						
Dry Matter	g/100g as rcvd	59	-	76	65	-
Heavy metal screen level As,	Cd,Cr,Cu,Ni,Pb,Zn					
Total Recoverable Arsenic	mg/kg dry wt	-	3	< 2	-	2
Total Recoverable Cadmium	mg/kg dry wt	-	0.35	< 0.10	-	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	27	8	-	13
Total Recoverable Copper	mg/kg dry wt	-	123	28	-	93
Total Recoverable Lead	mg/kg dry wt	-	12.1	2.5	-	11.3
Total Recoverable Nickel	mg/kg dry wt	-	12	6	-	10
Total Recoverable Zinc	mg/kg dry wt	-	121	70	-	74
Total Petroleum Hydrocarbons	s in Soil		1	1	1	,
C7 - C9	mg/kg dry wt	< 11	-	< 9	26	-
	mg/kg dry wt	28	-	< 20	1,630	-
C10 - C14	ing/ing only int i					
C10 - C14 C15 - C36	mg/kg dry wt	550	-	< 40	6,400	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of

tests marked *, which are not accredited.





SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	5, 9, 12, 15, 21
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	5, 9, 12, 15, 21
Total Petroleum Hydrocarbons in Soil*	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	3, 7-8, 10, 15, 20
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	3, 7-8, 10, 15, 20
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	5, 9, 12, 15, 21

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech) Client Services Manager - Environmental Division



BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix H: Well Purging and Sampling Forms

						· .					
		estant LTD	PDP	WELL P	URGING A	ND SAMPI	ING FO	RM			
Site;	B	aulu	Rd C	51	14.	/ell ID:		mivI.	10.00		
Job Num	her: ////	ayly 22050	910-	57				7-7.1	<u> </u>		S.
Weather:		The, or				ate(s):	····	$\frac{6}{1}$	>		
Purging r		~~~	aler	ver	50	ampler Name	(s): <u> </u>	Indy ,	<u> </u>		
_	g Equipment:	-	aler /	hitto	1.2			_			
WELL DE			uner /	- a a fe	0	Water Level					
	ng in neck o	fwoll: /	.0	(0000)	Re	eference Poin		p of PVC Cas		Vell	1997 - S. 1997 -
	ng diameter:		50	(ppm) (mm)	То			rcle as appro		the Her	h.
	th of Well:		2° 			by Key Type: ell Cap Type:		ngular?,/_aile cap?(/ screw			rej
Distance	of PVC casir	י וע		<u></u>	M	inimum Purge					
	low ground l	evel		(m)*	Vo	olume (L):	(3	well vol.)	18,8L		
Before Pu	0 WATER*: Irging ater level"):	2.0	85	(m)	, foi foi	r 50mm dia. v r non-50mm d	well= (tota diameter w	l depth[m] - ells see form	depth to wat ula below.	er[m]) x 6	
After Sam	pling:	2.16	ro	(m))TE: purde at	loort 2 wo			h = -	
Depth to I		Non		(m) (m)	sta	DTE: purge at abilized using	field paran	neters below	(or well is dr	nas y).	
Product T				(m)	t, j		1				
Product m	neasured	(interface pro	b) / bailer / proc		Ke	y Stabilisati	on Criteria	a: pH ± 0.1,	EC ± 3%, 1	± 0.2	
by: Volume of	f Product		baller (pioc		de	gree					
Removed:		-		L	Ad Mi	ditional Stabil nimum volur	isation Crit	eria: DO ± C n readings:).3 mg/L 1/2 well voi	lume	
								in readings.	T/Z Well VO	uune	
ù,	Time -		Volume	Water				Dissolved	Water	<u> </u>	
	Time Elapse	Time	Removed (L)	Temp. (°C)	pН	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level	Water	
Before	1000	10.00	0	67.4	696	451	(inv) 4	(118/L)	(m)*	Appearancet	11.55
During		10 114	7	19,4	6.97	479	U		†	black to	nd.
During			-12	110	703	469		-	FU	FTU, me	norshee
During			18	17:5	7-64	462		-		Til, nuno	sheen
During		10.34	28	° 1(4	6.99	445			~	FU, u	4
During_	After	10.45	<u>~</u>	<u> </u>					2.160		
During	·	·		<u> </u>	<u>+</u>						
During During						<u> </u>		 		· · · · · · · · · · · · · · · · · · ·	
During	<u> </u>	<u> </u>				╞───┤		1	<u> </u>		
During		6 / ^{- 14,5}			<u> </u>				<u> </u>		
During						· ·				<u>├</u>	
After					· ·						
† CL=clear Comments		y, TU=turbic	l, SI=silty, S	A=sandy	1 well volur	me Calculati me (L) = (total internal well c	depth[m] -	- depth to wat diameter in r	ter[m] x3.141	. x d² / 4000	
			A3	· · ·	1 Well Volu	ume (L) =					
M	inor 5	heen o	" merg	e val			Ind	inth	fin	2 black	r
- Sa	nd in	puche	A/ nec	for -							
			/			<u>.</u>					
Field Filter	od (motols :	only)?:	N								
	<u>eu (me</u> tais (JIIIY) C (Y A	IN		-						
	Sequired.	TDA	BTEV	11 -		C	11	/ /	1 -	1. A. I. D.	
Analyses F	Required: ottles Collec	<u>7 P H</u> ted: b	,BTEX	N, as	nm, Ny	Form	alder	hyde,	diss.	ingfals	

c

 $_{\rm c}$ $^{+}$ 5

1.5

, Ç \star = needs to be recorded each time you take a set of parameters

۰.

. '

. If pr

14 25,

. •											
pd	6 00	ð									7
PATTLE DEL	AMORE PARTNERS	+++vont	PDF	P WELL PI	URGING A	ND SAMP	LING FO	RM			
Site:	<u>k</u>	uply P	Rd		W	/ell ID:	1	142	11-2	3	
Job Num		101030				ate(s):		5-7-1	5		
Weather	: P	me, or	e shor	rev		ampler Name	(s)· 44	ndy n		<u>-</u>	÷ **
Purging			Barles				(0)		•		
	g Equipment:		" ")			Weter 1		_			
WELL DI						Water Level			• •	. X.	
	ing in neck o	fuelle	1.1	· ·	R	eference Poin		o of PVC Casi		Vell	
	ing in neck o ng diameter:	-	50	(ppm)	_			cle as approp		1 d	6
	oth of Well:		3,990	(mm)		by Key Type:				llocks itere	ney a
	of PVC casir	ng	31710	(m)		ell Cap Type: inimum Purge	<u></u> <u>H-c</u>	ap? screw of	cap?+/ push-	fit?	
	low ground le			(m)*		plume (L):		well vol.)	E.ZL		
DEPTH T	O WATER*:									· · · · · ·	
Before Pu ("static w	urging ater level"):		290	(m)	foi	r 50mm dia. r non-50mm (diameter w	ells see form	lepth to wat ula below.	er[m]) x 6	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
After Sam	npling:		295	<u>(m)</u>	NC	DTE: purge at	least 3 wel	I volumes AN	D until well	has	, ¹ · · · ·
Depth to	Product:	~		(m)	sta	abilized using	field param	eters below (or well is dry	y).	
Product T	hickness:		NA	 (m)							
Product n	neasured	interface pro	be / bailer / pro		Ke	ey Stabilisati	on Criteria	: pH ± 0.1.	FC + 3% T	+02	
by:					de	gree				± 0.2	
Volume o Removed		••••••		L_	Ad Mi	ditional Stabi nimum volur	lisation Crit ne betwee	eria: D0 ± 0 n readings:	.3 mg/L 1/2 well vol	ume	
	— —	I	Volume	Water	<u> </u>	r				r <u> </u>	
	Time		Removed	Temp.		EC	ORP	Dissolved Oxygen	Water Level	Water	
	Elapse	Time	(L)	(°C)	рН	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance†	fine
Before	0	11.27	C	14.7	7.98	250	5	-	1,290		~55 (SA)
During		11.33	5	14.8	7.45	2'50	5	-	r ,	TY, SA	ertshee
During	<u> </u>	11,38	12	14.8	6-90	198				TH. SA	1 4 4
During		11.43	20	14.7	6-94	192		L.		TU, no	sharn.
During	A 11	11,49	24	14.7	6,93	194	K	+		TU, H	4
During	Affer						<u> </u>	·	1:295		
During											
During					· · ·		<u> </u>				
During							_ <u></u>				
During							·				
During											
During											
After † CL=clea	r, CO=cloud	v Til=turbid	SI-silty S	A-candy							
Comments			, or – sirty, c		1 well volur	me Calculation me (L) = (total internal well c	depth[m] -	depth to wate diameter in n	er[m] x3.141 Im	. x d² / 4000	
		,		·	1 Well Volu	ume (L) =					1
- Me	nor c	il sh	een 1	nitra	blef, or	ere a	t en	I of p	inge		
BLe	Ehush	1 greet	when	r fo	purg	e nake	<u> </u>		- 0		2
								·			
	· _ · _										
				<u> </u>	·						
	ed (metals o	only)?: 'Y~/-	N								
Analyses F		<i>1</i> P	Et BY	EX.							
	ttles Collect	ed: 3			· · ·			······	<u> </u>		
<u>ab Quote</u>	No. to be record	ed each time		eot of norm	motor		<u> </u>		·		
- 10003		u caun unne	, уой таке а	ser or barar	neters			J. C.			
						X i		·.	f_{0}		
Field Templat	es\water%20samp	ing%20form_1709	02012.rtf				13	e S	105	1	
		-						i.			
				/				2	•		

i

à

۰.,

•										5 C I	
					•.						
			,			(¹					
						Te					
DO	6 00	Ô									-
PATILE DEL	AMORE PARTNERS	LTD	PDP			AND SAMP		DM			52
Site:	_k	Bayly	Rd D.	5/	V	Nell ID:	$_{\rm s} W$		ML	13 Q	400
Job Nun		020307				Date(s):	- 1	6-7-1			Ca pm
Weather	: Fr	ine, or	show	~		Sampler Nam		Indy	n	<u> </u>	
Purging	method:	F	aller			•		/			
Samplin	g Equipment:	:	7		*	Water Leve	Measurer	nent			
WELL D	ETAILS:					Reference Poin	1.11	p of PVC Cas	ng / Top of V	Nell	
PID read	ing in neck o	of well:	0.8 50	(ppm)				rcle as appro		WCII	
	ing diameter:			(mm)	Т	oby Key Type:	atria	angular? / alle	en key? / pa	Hock? Her	her
	oth of Well: of PVC casir	<u> </u>	.92	(m)		Vell Cap Type:	H-0	cap? / screw	cap? / push	-fit?	×
	low ground le		· · · ·	(m)*		linimum Purg olume (L):		well vol.)	136		
	O WATER*:		ML	3/10 0	1. 1.1						
Before Pr	urging ater level"):	3.7	. (3.7	Em fo	or 50mm dia. or noñ-50mm	weii= (tota diameter w	i depth[m] - ells see form	depth to wat jula below	er[m]) x 6	
After San	,	3.7		(m)	0100			<u>م</u> ر . مرجع	- t		
Depth to	. –			<u>(m)</u>	N	OTE: purge at abilized using	least 3 we	Il volumes AN	ND until well	has	
Product T			NIA	<u>(m)</u>				IELEIS DELOW	(or wents of	y).	
Product n				(m)	K	ey Stabilisat	ion Critoria	$n n H \pm 0.1$			
by:	(D) .	Interface pro	be / bailer / prød	uct baller	de	egree				± 0.2	
Volume o Removed		<u> </u>		7	Ac	ditional Stab	ilisation Crit	eria: DO ± C).3 mg/L		
		<u> </u>		<u>L</u>	IAI	inimum volu	me betwee	en readings:	1/2 well vo	lume	
	T		Volume	Water				Dissolved	Water	<u> </u>	
	Time Elapse	Time	Removed (L)	Temp. (°C)	Hq	EC ((µS/cm)	ORP (mV)	Oxygen	Level	Water	
Before	ŏ	1.13	1	17.1	7:35	756	(inv)	(mg/L)	(m)* 3.755	$\begin{array}{c} \text{Appearance}^{\dagger} \\ \text{Ch} \approx \mathcal{P}_{\text{c}} \end{array}$	5.54
During		1.16	5	17.1	1997,			-	-	TU bor	the stand
During	<u> </u>	720	12	16.7	7.24	280	2	-		Ty pro	412
During	After	1.27	26	(7.2	7-15	728	6	6 5		Tu, bro	n,
During	poper	<u> </u>			───			<u> </u>	3.760	white !	ubbleson
During									<u> </u>	Bre if	puzo
During		·			<u> </u>	·				nator	-
During									[
During									·	- <u> </u>	
During											
During											
After † CL=clea	r. CO = cloudy	v. Til=turbic	d, SI=silty, S						<u></u>		
,	, ee olouu	y, row carbic	1, OI-SHO, D	∿–sanuy	Well Volu	me Calculati	on			· · · ·	1 - 19
Comments			/	<i>1</i>	Where d =	me (L) = (tota internal well c	l depth[m] - asing (PVC)	 depth to wat diameter in n 	er[m] x3.141	. x d² / 4000	(A)
		<u> </u>			1 Well Volu						*
Tur	bid sc	nie 20	nd bar	tes br	VICH I'M		Va ch	er.			N
						<u> </u>	<u> </u>				
Field Filter			<u> </u>								
Analyses F	ed (metals o Required [.]		h A, B TBX								•.
	ttles Collect		11 -104	<u> </u>				:			
Lab Quote						· · · · · · · · · · · · · · · · · · ·	<u> </u>				
	·	<u>.</u>		<u> </u>	<u> </u>						

- · ---

 \mathbb{Z}^{I}

 \star = needs to be recorded each time you take a set of parameters

•

	VERS LTD	PDI		URGING A						
Site:	Bayly words	Rd 1	251	v	Vell ID:	/	MW4 6-7-1 Andy 1	eta a	3	i
Job Number:	words	2700		D	ate(s):		6-7-1	5		-
Weather:	Proce			. >	ampler Name	 (s):	Ander 1	<u>-</u>		-
Purging method:		Barlos		-						-
Sampling Equipme	ent:	1 7		****	Water Level	Measuro	nent			
WELL DETAILS:					eference Poin	-				
PID reading in neo	k of well:	$O \mathcal{F}$	(ppm)			ζ	p of PVC Cas	•	Well	
Well casing diame	ter:	50	(mm)	Тс	by Key Type:	h erz trie	rcle as appro angular?7 ⁻ ālīč	priate)		
Total Depth of We		6.01	(m)		ell Cap Type:	 H-	cap? (screw	can? Inuch	100K7	- [
Distance of PVC ca above/below groun	asing ad lovel			М	inimum Purge)	<u> </u>			•
DEPTH TO WATER			(m)*	Vo	olume (L):	(3	well vol.) 🦯	13.00	_	.
Before Purging ("static water level"	0	.880	(m)	foi foi	r 50mm dia. v r non-50mm d	well= (tota diameter w	l depth[m] - (ells see form	depth to wat ula below.	er[m]) x 6	
After Sampling:	.3	.880	(m)	NC	TE: purdo of	locat 2	11	_		
Depth to Product:	NI	A	(m)	sta	OTE: purge at abilized using	ieast ਤ we field paran	neters below	ID until well (or well is de	has vì	
Product Thickness:			(m)			1.0001			<i>)</i> /·	
Product measured		obe / bailer / proc	<u>_</u>	Ke	y Stabilisatio	on Criteri:	n: pH + ∩ 1	FC + 2% 7	. + 0 3	
by: Volume of Product				ae	gree		~		±,0.2	
Removed:			L	Ad	ditional Stabil	isation Crit	eria: DO ± 0	.3 mg/L	ر میں اور	
			<u></u>	141	nimum volun	le betwee	n reaαings:	1/2 well vol	ume	
		Volume	Water			<u> </u>	Dissolved	Water	T	
Time		Removed	Temp.							
L Elapse	e Time	1			EC	ORP	Oxygen	Level	Water	
Elapse Before		(L)	(°C)	pH	((µS/cm)	ORP (mV)	(mg/L)	Level (m)*	Appearance	+
	12.23	(L) 1	(°C) 16.7	7.48	((µS/cm) 193.9	(mV)	(mg/L)	Level	Appearance CL iff Pr	+ //
Before 🕖		(L) 1 5	(°C) 16.7 16.7	7.48	((µS/cm) 193.5 192	(mV)	(mg/L)	Level (m)*	Appearance CL ії Ру ТИ.	t 24
Before 🖉	12.23	(L) 1	(°C) 16.7	7.48	((µS/cm) 193.5 190 189.1	(mV)	(mg/L)	Level (m)*	Appearance CL & Pr TU. Tur.	t //
Before During During During During During	12.23 12,25 12.30	(L) 1 5 12	(°C) 16.7 16.7 16.8	7.48	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)*	Appearance CL ії Ру ТИ.	+
Before Ø During During During	12 23 12, 25 12.30 12.35	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1	(mV)	(mg/L)	Level (m)*	Appearance CL & Pr TU. Tur.	+
Before During Compared During Compare	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	
Before During During During During During During During During During	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	
Before During	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	
Before During During During During During During During During Uring	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	+ / · · · · · · · · · · · · · · · · · ·
Before During During During During During During During U	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	+ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
Before During During During During During During During Urin	12.23 12.25 12.30 12.35 12.38	(L) 1 5 12 20	(°C) 16.7 16.7 16.8 16.8	7-48 6-54 6-53 6- 49	((µS/cm) 193.5 190 189.1 188.5	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	
Before During During During During During During During Uring	12 23 12,25 12.30 12.35 12.38 12.42	(L) 1 5 12 20 24 	(°6) /6.7 16.7 16.8 16.8 16.8	7.48 6.54 6.53 6. 49 6.746	((µS/cm) 193.9 190 189.1 189.3 189.3	(mV)	(mg/L)	Level (m)* 3.550	Appearance CL & Pr TU. Tur.	
Before During During During During During During During Urin	12 23 12,25 12.30 12.35 12.38 12.42	(L) 1 5 12 20 24 	(°6) /6.7 16.7 16.8 16.8 16.8	7-48 6-53 6-53 6-49 6-746	((µS/cm) 193.9 190 189.1 189.3 189.3 189.3 189.4 ne Calculatio		(mg/L)	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before During During During During During During During Uring	12 23 12,25 12.30 12.35 12.38 12.42	(L) 1 5 12 20 24 	(°6) /6.7 16.7 16.8 16.8 16.8	7-46 6-53 6-53 6-49 6-746 	$((\mu S/cm))$ 193.9 197.9 189.1 189.3 189.3 189.3 0 0 0 0 0 0 0 0 0 0	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before During During During During During During During During Uring	12 23 12,25 12.30 12.35 12.38 12.42	(L) 1 5 12 20 24 	(°6) /6.7 16.7 16.8 16.8 16.8	7-48 6-53 6-53 6-49 6-746 	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	+ + + + + + + + + + + + + + + + + + + +
Before Image: Constraint of the second sec	12 23 12.25 12.38 12.38 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.25 12	(L) 1 2 2 2 2 4 	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before During During During Du	12 23 12.25 12.38 12.38 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.28 12.25 12	(L) 1 5 12 20 24 	(°6) /6.7 16.7 16.8 16.8 16.8	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before During During During Du	12 23 12.30 12.30 12.35 12.38 12.42 	(L) 1 2 2 2 2 4 	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before During During During Du	12 23 12.30 12.30 12.35 12.38 12.42 	(L) 1 2 2 2 2 4 	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before \bigcirc During During Uring Du	12 23 12.25 12.30 12.35 12.38 12.38 12.42 	(L) 1 2 2 2 2 4 	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before Image: Constraint of the system During During Uring During	12 23 12.25 12.30 12.35 12.38 12.38 12.38 12.42 udy, TU=turbic	(L) 1 4 12 20 24 24 1, SI=silty, S b 12227	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	
Before \bigcirc During During Uring Du	$ \begin{array}{c} 12 23 \\ i 2, 25 \\ i 2.30 \\ 12.35 \\ 12.38 \\ i 2.42 \\ \\ udy, TU=turbic \\ \\ \hline \\ \hline \\ sonly)?: \frac{4}{7}P L$	(L) 1 4 12 20 24 24 1, SI=silty, S b 12227	(°C) /6.7 /6.7 /6.8 /6.8 /6.8 A=sandy	7-46 6-53 6-53 6-49 6-746 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	((µS/cm) 193.9 197.9 189.1 189.7 189.9 189.9 (L) = (total internal well ca	(mV)	depth to wate	Level (m)* 3.580	Appearance CL & Pr TU. TU. TU.	

ţ.

* = needs to be recorded each time you take a set of parameters

						A			I.		
po		() 							· · ·		7
PATTLE DE	LAMORE PAHINERS	170	PDI	P WELL P	URGING A	ND SAMP	LING FOR	RW			
	C	· · · /	n 1 .		st i				œ .2	1.2	
Site:	_	ayly	RAD	15/	s N	/ell ID:	· · · /	nus	<u> </u>	<i>. 0</i>	
Job Nur		02030	700		D	ate(s):		6-7-15			
Weathe	r: <u>1</u> 2	ne, oz	e shon	2~	S	ampler Name	e(s):	Andy 1	'n,		
Purging	method:		parla	<u> </u>							
Samplin	g Equipment	: <u>* *</u>	n 1		*	Water Level	Measuren	nent	1. ft.	;	
	ETAILS:	a a a a a a a a a a a a a a a a a a a			Re	eference Poir	nt: (Top	of PVC Casin	g/-Top of	Well	
	ling in neck o	· · · · · · · · · · · · · · · · · · ·	0.2	(ppm)	1			cle as approp		14 Ser.	
	ing diameter	:	50	(mm)	To	by Key Type:		ngular? / aller		dlock	- prode
	pth of Well: e of PVC casi	<u>_\-</u>	545	- <u>55_(m)</u>		ell Cap Type:	H-c	ap? / screw c	ap? / push	-fit?	
	elow ground					inimum Purge plume (L):		well vol.)	300		
	O WATER*:				rk.		· · · ·				
Before P		10 4	4 g (b.	Toc)	foi	non-50mm	well= (total diameter w	depth[m] - deells see formu	epth to wai la below	ter[m]) x 6	
	vater level"):		<u>52</u>					."		190 CT	-5
After Sar	_	<u>h</u> .	ウメ	<u>(m)</u>	NC NC	DTE: purge at	least 3 well	volumes ANI) until well	has	1
	Product:	-		<u>(m)</u>	Ste	anılızed dşing	neio param	eters below (or well is dr	y).	
	Thickness: measured			(m)			× ·			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
y:		interface pr	be / bailer / pro	duct baller	. Ke de	y Stabilisati gree	on Criteria	: pH ± 0.1, E	EC ± 3%, 1	「±0.2	
'olume c lemoved	of Product	\ <u>~</u>			Ad	ditional Stabi	lisation Crit	eria: DO ± 0.3	3 mg/L		Disgini, A
emoved	l			<u> </u>	Mi	nimum voluı	ne betwee	n readings: 1	L/2 well vo	lume	11/10
		T	Volume	Water ·	T —	<u> </u>		Dissolved	Motor	1	
	Time	High.	Removed	Temp.		EC	ORP	Oxygen	Water Level	Water	1 Jac 1
oforo	Elapse	Time	(L)	(°C)	pH	((µS/cm)	(mV) -	(mg/L)	(m)*	Appearance†	, v.v.v.
efore uring		2123	te -	16,4	7.59	264		·	-	Ch inen.	the state
uring	<u> </u>	<u> </u>	15	16.4	7.61	263		<u> </u>		00	87
uring	1	2.34	27	16. 15	6183 6-71	265		╞───┤		TU	
uring		<u> </u>	23	16.6	6.72	269				1 UL	da
uring	Affer	02.42.							2.52		×
uring ,	ļ									A TRACK	1 .
uring	├ ──,										1 -
uring			a	<u> </u>		3]
uring				· 	· · · · ·						
uring uring		— —								<i>i.</i>	-
ter	· · · · · · · · · · · · · · · · · · ·				┼────┤	<u> </u>					
	ar, CO=cloud	L ly, TU=turbio	l d, SI=siltv. 9	I SA=sandv	┼─────┘	<u> </u>		<u> </u>		L	38) 1
				. Sound	1 well volun	ne Calculati ne (L) = (tota	l depth[m]	depth to wate diameter in m i	r[m] x3.14	L x d² / 4000	
mments	<u> </u>					-					***
	435. 5	het a	1 of	OVI ca	1 Well Volu	ime (L) =					
- 0	Tell n	ward	dres.	Pres	med.	into ~	· Fri-	her of	lanos		11
- 0. - h	7-1-		- J-	67	then to	med	leles	and and	- La	the cash	and)
- 0. - h	<u> </u>			ü	fter in	echarg	ing.			- <u>-</u> P	
- 0. - h			_	<u></u>							-
<u> </u>	· · · · ·					Ę					
- //	red (metals	only)?: Y /	-N		X - -						
eld Filter alyses I	Required:		N 17	14, B	Tarx	·····					r.
eld Filter alyses I mple Bo	Required: ottles Collec		₩ 17 3-1	14 , B	1232						
eld Filter	Required: ottles Collec		N 3-1	14 , B	TER						

4910

ŝ,

<u>.</u>...

· · ·								١	-	
		<u></u>	ij	· · ·		1				
								· · · ·		
PATTLE DELA	NORE PARTNERS L	t D	PDP	WELL PL	RGING AN	ND SAMPI	ING FO	RM		·
	A									
Site:	pu	ging r		,	We	ell ID: 🍦	·	we		
Job Numi	ber: <u> </u>	2050		<u> </u>		te(s):		6-7-1	5	
Weather:	<u> </u>	ne, u	et pres	vous d	ny Sa	mpler Name	(s): <u> </u>	Indy		
Purging n	nethod:	<u>13</u>	uler				₩			
Sampling	Equipment:	Pr	ulër		* \	Nater Level	Measurer	nent	. 1	. +
WELL DE	TAILS:				Re	ference Poin	t: 🕡	p of PVC Casir	Top of W	Vell
PID readi	ng in neck of	f well:	1-8-1	(ppm)	•		(ci	rcle as approp	riate)	
Well casir	ng diameter:		50	(mm)	Tol	oy Key Type:	tria	angular? / alle	n key? / pad	tock? /de»
	th of Well:		-,990	(m)		Il Cap Type:		cap? screw c	ap?/ push-	fit?
	of PVC casin ow ground le		ush	, (m)*		nimum Purge lume (L):		well vol.)	6.40	
	O WATER*:	<u>ייי</u> וטע, בריי רוי	A acro	<u>, (in) –</u>						·
Before Pu					for	50mm dia.	well= (tota	il depth[m] - d ells see formu	lepth to wate	er[m]) x 6
	ater level"):	2.2		(m)	, 101	non-ounim		eus see tormi	and DelOW.	`
After Sam	pling:	2.3	20	(m)	NO	TE: purge at	least 3 we	II volumes AN	D until well i	has
Depth to I	Product:		N/A	(m) n	U TAI	bilized using	field parar	neters below (or well is dry	/).
Product Th	nickness:		NIA	(m) e	hange	· .				
Product m	neasured	Interface pr	be / bailer / prod		Ke	y Stabilisati	on Criteria	a: pH ± 0.1,	EC ± <u>3%</u> , T	± 0.2
by: Volume of	Product		<u> </u>		•	grée litional Stabi	lipation Cri	teria: D0 ± 0.	0 m ơ/l	
Removed:				L				en readings:		ume
ेर. 						1 - N				<u>,</u>
		[Volume	Water	-3			Dissolved	Water	
	Time Elapse	Time	Removed	Temp.	n∐	EC	ORP (m)/)	Oxygen	Level	Water
Before	Elapse O		(L) *> C	(°C) 17,0	рН 6.16	((µS/cm) 263	(mV)	(mg/L)	<u></u> , (m)* J. 255	Appearance†
During			9	17.2	6.16	255			2.202	ry mus
During	· · · · · · · · · · · · · · · · · · ·		17	17.2	6.10	250				1711 "
Burling-	~ 15 mc	4	26	17.2	6,04	252	<u> </u>	-	7.320	TU Ive
During								-	strynu	
During		X.							<u> </u>	
During				i .		ज्ञाती.			· · · ·	*
During							÷.,			
During	, se							.' A' 	1	
During	•					14.4			N.	
During					$\gamma \beta C$			and the second sec		1. The second se
During							· · · · · · · · · · · · · · · · · · ·			
After	r, CO=cloud	y, TU=turbi	d, SI=silty, S	A=sandy	Well Volur	ne Calculati	on			
After		1.000			1 well volun	ne (L) = (tota	l depth[m]	 depth to wat 		L x d² / 4000
After					Where d =	internal well o	asing (PVC) diameter in n	nm	
After † CL=clea Comments	<u> </u>		. <u> </u>							
After † CL=clea	i				1 Well Volu	ime (L) =				
After † CL=clea Comments	V Tur	bird,	1 an	e sot	1 Well Volu barbar		1 <i>€ ⇒</i> .	last.		·
After † CL=clea Comments		biel,	Minor	2 1st	parle	volum	ne⇒. vone	last.	l of	purge,
After † CL=clea Comments	V. Tur		Minon	2 1st	parle	istern		last.	lof	purge,
After † CL=clea Comments			Minor	e sol	parler en/sl	istern		last.	l of	purge,
Comments	V Tur Dupli	cate :			parler en/sl	istern		last.	l of ,	purge,
After † CL=clea <u>Comments</u> Field Filter	V 7mr Duplus ed (metals o	cate :	N	le col	parler en/sl	istern		last. eb en	l of f	purgle,
After † CL=clea <u>Comments</u> <u>x</u> Field Filter Analyses F	V 7ur Duplus red (metals of Required:	cate s only)?: (D) TPU		le col	parler en/sl	istern		eb en	l of	purgl, Jebyali
After † CL=clea Comments × Field Filter Analyses F	V 7mr Duplus ed (metals o	cate s only)?: (D) TPU	N	le col	parler en/sl	istern		eb en	l of	purge,

 $r \geq s$

(s)

N:\Field Templates\water%20sampling%20form_17092012.rtf

....

-0274786

£.

	() () Linnin () RE PARIMERS L	5)) 		/		AND SAMPL		RM		
Site:	Bo	apply	Rd 0.	51	١	Well ID:	1	NWLAI	MWE	Mary
Job Numbe	r: W2	2050	100		•	Date(s);	16	-7-15		5), MWI:
Weather:	Fis					Sampler Name(a).	Andre in		<u>-</u>
Purging met	hod:		Bacler			sampler name(·/·	<u> </u>		
Sampling Ed	uipment:		67 69		*	· Water Level I	lescuror	mont		
WELL DETA	•••					Reference Point	_			
PID reading	in neck of	well:	0.8	(ppm)	1			p of PVC Casif		weil
Well casing			50	(mm)	Т	oby Key Type:		ircle as approp		dlock? Han
Total Depth	of Well:	\$	er MW			Vell Cap Type:		cap? / screw c		
Distance of I					N	linimum Purge			- Pi / Push	
above/below		vei		<u>(m)*</u>	V	olume (L):	(3	well vol.)		
DEPTH TO V Before Purgi	ng	-	A		fc fr	or 50mm dia. w or non-50mm d	ell= (tota	al depth[m] - d	epth to wa	ter[m]) x 6
"static wate		6	270	(m)	IC.	a non-oomm a	ameter M	vens see formu	na deiow.	
After Samplin	ng:			(m)	N	OTE: purge at le	ast 3 we	II volumes AN	D until well	has
Depth to Pro	duct:			(m)	st	abilized using f	eld paran	neters below (or well is di	y).
Product Thick				(m)						
<pre>Product mea v:</pre>	sured	interface pro	obe / bailer / produ	ıct bailer	K.	ey Stabilisatio	n Criteria	a: pH ± 0.1, I	EC ± 3%, '	Γ±0.2
olume of Pr	oduct					egree dditional Stabili	ation Crit	teria: DO + 0	3 mø/l	
emoved:				<u>L</u> _	м	inimum volum	e betwee	en readings: :	1/2 well vo	lume
			Volume	Water		T		Disastinut		
	Time	_	Removed	Temp.		EC	ORP	Dissolved Oxygen	Water Level	Water
	Elapse	Time	(L)	(°C)	pH	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance†
fore ring						<u> </u>				
ring						++		<u> </u>		
uring						+		+		<u> </u>
Iring				,		╀───┼		╁───┤		
uring					<u> </u>			┼──┼		
uring					<u> </u>					<u> </u>
ıring										<u> </u>
uring										
uring			┝────┤		ļ					
uring					<u> </u>	┦───┤				
ter			├───┼			┥────┤		<u> </u>		
	l O=cloudv	. TU=turbi	d, SI=silty, SA			L				
·	5	,	., , , .,	Ganay	Well Volu	me Calculatio) 			
mments					Where d =	me (L) = (total o internal well ca	eptn[m] - sing (PVC)	 depth to wate diameter in m 	r[m] x3.14: m	L x d ² / 4000
					1 Well Vol					
1	Re-Se	imple	ed dice	6	colle	fron a	\mathcal{P}_{a}	tu Mer a	Dop	amplis
- 6	uplie	nle s	ample	MU	1.1.1	and MC	UGA	coller	fed	ugnes
eld Filtered	uirod:	TPH.	BTEX, N	, am	m.N.	diss men	als.	formal	lehod.	e
alyses Req										
	s Collecte		(* 2)						- Je -	

I

 $(a_i)^{i}$

	Va					· · ·				
		<u>}</u>			•	ĥ.				
pd		S) Artenna		,		<u>1</u>				
PATTLE DEL	MORE PARINERS	LTD	PDP	WELL PL	URGING A	ND SAMP	LING FOF	RW		
Site:	Be	up his 1	Re Do	81	Ŵ	/ell ID:	n	1art		
Job Num	ber: 🗾	ous	700	· · · ·	D	ate(s):		16-7-	15	
Weather	12	ise			!	ampler Name	e(s); //	Indy	m.	
Purging r	nethod:	В	anter			·	···		<u>*`**</u>	<u> </u>
Sampling	g Equipment:		n 1		*	Water Level	Measurem	ient	1	
WELL DE	ETAILS:					eference Poin			ing Top of V	Veli
PID readi	ng in neck o	f well:	0.3	(ppm)		1		cle as appro		
1	ng diameter:		50	(mm)	То	by Key Type:				lock? 1.for
· ·	oth of Well: of PVC casir		12,32	(m)		ell Cap Type:	H-c	ap? / screw	cap?/)ush-	fit?
	low ground le		· · · · · · ·	(m)*		inimum Purge olume (L):		vell vol.)	9.76	
DEPTH T	O WATER*:	·								
Before Pu	ırging ater level");	10.	705	(m)	for	r 50mm dia. r non-50mm	weii= (total diameter we	aeptn[m] - ells see form	depth to wat	er[m]) x 6
After Sam			10.7	- <u> </u>	NIC	TEI DURGE I	lanat 0			
Depth to	-			<u> </u>	sta	OTE: purge at abilized using	field param	volumes AN eters below	ID until well (or well is do	has v).
Product T				(m)		U U			(,,,
Product n		interface pro	be / bailer / prod		Ke	y Stabilisati	on Criteria	; pH ± 0.1.	EC ± 3%. T	+ 0.2
by: Volume of	f Product				de	gree				- 0.2
Removed:		-		L	⊸ Ade Mi	ditional Stabi nimum volur	lisation Crite	eria: DO ± C n readings:).3 mg/L 1/2 well vol	umo
							no source	in reduings.	1/2 Well VU	une
	Time		Volume	Water				Dissolved	Water	·
	Elapse	Time	Removed (L)	Temp. (°C)	рH	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level (m)*	Water Appearance†
Before		3.12	2	16	6.45	168	1	((()))	10.705	The boy
During		ļ		· · ·						11 11
During		3-25	10	15.9	622	163		9-1-1 -1-1		4 2.64
During	A Play	2-29	12	15.9	6-61	163	6			TU, br
During During	Ayres								10,72	
During	. <u></u>									<u> </u>
During					<u> </u>					· · · · · · · · · · · · · · · · · · ·
During										
During										
During										
During										A Ý
After † CL=clea	r. CO=cloud	v. TU=turbic	I, SI=silty, S	A-sandy		`I				
1	, ee oleaa	<i>y</i> , 10 canble	, or—sity, 5	r⊸sanuy	Well Volum	ne Calculati	on			N. I
Comments					Where d =	ne (L) = (total internal well c	asing (PVC)	depth to wat diameter in r	er[m] x3.141 nm	. x d² / 4000
					1 Ŵell Volu					
	Pur	ye va	for d.	mini		rhei			 	<u> </u>
	č									1
					·				,	
Field Filter		-		·						
Analyses F	ed (metals c	only)?: Y /	174	BT	<u>5 × -</u>				<u> </u>	
	ttles Collect	ed:	<u></u>	, 134 1	37.1					
Lab Quote		. <u></u> , ,	<u>مو،</u>			<u></u>			,	
				·					<u></u>	
needs	to be record	ed each time	e you take a	set of parar	neters					

ý

pok) Averag	ע מעם			D SAMPL	ING FORM	Л		
PATTLE DECA	NURE PARTMENS LT	. u					8 5	2 Cpm	7	
Site:	B	ayly ,	RA DS	5/	Wel	I ID:	M	<u>* 0</u>		,,
Job Numl	per: W	00301	00 1		Dat	e(s);	16	-7-1	5	
Weather:	-			·		npler Name(s): Dr	dy M.	•	•
			uler			······				
Purging m		1	7		* 14	/ater Level I	Measureme	nt	'n	
• -	Equipment:					erence Point	· · · · · · · · · · · · · · · · · · ·		g/ Top of W	
WELL DE			.0		Ren	erence Point				Cii
	ng in neck of	WCII.	50	<u>(ppm)</u>	Tab		in the second	e as approp		ock? Here
	ng diameter:		<u> </u>	(mm)		y Key Type:	telget		ap? / push-f	
	th of Well: of PVC casin	o		<u>(m)</u>		i cap Type. imu <u>m</u> ∎Purge			<i>.</i>	
•	ow ground le	- 1	.994	(<u>m)*</u>		ume (L):		ell vol.)	15.36	•
Before Pu			61.0	(72)		50mm dia. v non-50mm d				er[m]) x 6
•	ater level"):		440	<u>(m)</u>	No	FC1 prover -*	In out 2 where		D untilised	225
After Sam				(m)		TE: purge at bilized using				
Depth to		·····	<u>~</u>	<u>(m)</u>	Star					
Product T		-**		(m)	Ker	/ Stabilisati	on Criterie	nH + 0.1	FC + 3% T	+ 0.2
Product n by:	leasured	interface prol	be / bailer / produ	ict bailer		ree	vn unterid; ¥	P11 - V11,		_ •.=
Volume o	f Product				Add	litional Stabi				
Removed		<u> </u>		<u> </u>	Min	imum volur	ne betweer	readings:	1/2 well vol	ume
			Volume	Water	<u>}</u>			Dissolved	Water	
	Time		Removed	Temp.		EC	ORP	Oxygen	Level	Water
·	Elapse	Time	(L)	(°C)	pН	((µS/cm)	<u>(mV)</u>	(mg/L)	(m)*	Appearance†
Before		3.50		153	6.80	473	- , <u> </u>			Ch_
During	· · · · ·	3,57	10	11 4	A , 88	411				<u> </u>
During		A:0	· · · · ·				· · · ·			
During	After	<u> </u>					,		0.470	
During		<u> </u>	<u> </u>					-1		
During	·								[· · · · · · · · · · · · · · · · · · ·
During	<u> </u>	<u> </u>					. Mata			
During		<u>F</u>	 							
	<u> </u>			<u> </u>					. det	
	· · · · ·		· · · · · · · · · · · · · · · · · · ·					<u> </u>	<u><u>x</u></u>	
During				· ·						
During During			1 1				L,			
During During During		- 15. 					「「「「「「「「」」」			
During During During After		dy Til-turbi	d SI-eilty S	A=sandy	-					
:		dy, TU=turbi	id, SI=silty, S	A=sandy	1 well volur	me Calculat me (L) = (tota internal well	al depth[m]#	depth to wa diameter in	ter[m] x3.14	1 x d² / 4000
During During During After † CL=cle		dy, TU=turbi	d, SI=silty, S	A=sandy	1 well volur	me (L) = (tota internal well	al depth[m]#	depth to wa diameter in	ter[m] x3.14	1 x d² / 4000
During During During After † CL=cle		dy, TU=turbi	d, SI=siity, S	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	depth to wa diameter in	ter[m] x3.14	1 x d² / 4000
During During During After † CL=cle		dy, TU=turbi	d, SI=silty, S	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	depth to wa diameter in	ter[m] x3.14	1 x d² / 4000
During During During After		dy, TU=turbi	d, SI=silty, S	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	depth to wa diameter in	ter[m] x3.14	1 x d² / 4000
During During During After † CL=cle		dy, TU=turbi	d, SI=silty, S	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	depth to wa	ter[m] x3.14	1 x d² / 4000
During During After † CL=clea	<u></u>		• •	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	diameter in	ter[m] x3.14	1 x d ² / 4000
During During After † CL=clea	<u></u>	dy, TU=turbi	• •	A=sandy	1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m]#	depth to wa	ter[m] x3.14 mm	1 x d ² / 4000
During During After † CL=clei Comment	<u></u>	only)?: Y	• •		1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m] (cashg (PVC)	depth to wa	ter[m] x3.14	1 x d ² / 4000
During During After † CL=cle Comment Field Filte Analyses	ered (metals	only)?: Y /			1 well volur Where *d , , =	me (L) = (tota internal well	al depth[m] (cashg (PVC)	depth to wa	ter[m] x3.14 mm	1 x d ² / 4000

1. . . .

ź

	~	11	5 /				0	11. 7	1.	
Site:	Bay	24K	1		Wel	I ID:	N	IW +	11	
ob Number:		~		-	Date	e(s):	20	1-9-14	5"	-
Veather:	- /	time		1.0	San	npler Name(s):	Indy A	1 >	3
Purging met	nod:	Bo	culer	-					.14	
Sampling Eq	uipment:	^	4		* W	ater Level N	leasureme	nt 🧖 📜	Sec. K	
VELL DETA			14		Ref	erence Point:	Тор с	of PVC Casing	g / Top of W	ell
PID reading	in neck of v	vell:	2-0	(ppm)			(circl	e as appropri	ate)	
Vell casing		1	2000	(mm)	Tob	y Key Type:	trian	gular? / allen	key? / padl	ock?
otal Depth	of Well:	4	4.51	(m)		ll Cap Type:	H-ca	p? / screw ca	p? / push-f	it?
Distance of	-			(m)*		imum Purge ume (L):	1 (3 W	ell vol.)		3
above/below		ei		<u>(m)</u>	-				the transfer	
DEPTH TO V Before Purgi			the state		for	50mm dia. w non-50mm d	ell= (total o iameter wel	see formul	a below.	er[[11]) X Q
"static wate		2	170	(m)						
After Sampli	ng:	-		(m)	NO	TE <mark>: p</mark> urge at l	east 3 well	volumes AND) until well I	nas
Depth to Pro		-		(m)	stal	bilized using f	ield parame	eters below (c	or well is dry	/).
Product Thic		None	2	(m)			and the	1		
Product mea	-	interface prot	e/ bailer / produ	ct bailer		y Stabilisatio	on Criteria:	pH ± 0.1, E	EC ± 3%, T	± 0.2
oy: /olume of P	raduat		/		Ade	gree ditional Stabili	isation Crite	ria: $DO \pm 0.3$	3 mg/L	
Removed:	rouuci			L	Mir	nimum volun	ne betweer	n readings: 1	L/2 well vo	lume
	F gt									
			Volume	Water		EC	ORP	Dissolved Oxygen	Water Level	Water
	Maria I.		Removed	Temp.			URF	Oxygen	LCVCI	and the second second
	Time	Time	(1)	(°C)	Hq	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
Before	Time Elapse	Time	(L)	(°C)	pН	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
5		Time	(L)	(°C)	рН	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
Before During During		Time	(L)	(°C)	pH	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
5		Time	(L)	(°C)	pH	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
During During		Time	(L)	(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During		Time	(L)	(°C)	pH	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance
During During During During	Elapse	Time	(L)	(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During	Elapse	Time	(L)	(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During During During During	Elapse	Time	(L)	(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During During During During During During	Elapse	Time	(L)	(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During During During During During During During	Elapse	Time		(°C)	pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During During During During During During During During	Elapse	Time			pH		(mV)	(mg/L)	(m)*	Appearance
During During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu		ion al depth[m]	- depth to wa	ter[m] x3.14	Appearance
During During During During During During During During During During During During During After	Elapse	y, TÜ=turbi			Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	
During During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	Ime Calculat mme (L) = (tota	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During After † CL=clear	Elapse	y, TŪ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000
During During During During During During During During During During After † CL=clear	Elapse	y, TÜ=turbi	d, SI=silty, S		Well Volu 1 well volu Where d =	me Calculat ime (L) = (tota = internal well	ion al depth[m]	- depth to wa	ter[m] x3.14	1 x d ² / 4000

1.2

litor	Be	usla	Rel		We	II ID:	M	102		
Site:		29	L GDT			te(s):	20	152 2-9-15		
lob Numb	er:					mpler Name(s	1.00			
Weather:	M	ne	1		58	mpler Marile(S				
Purging m	ethod:	De	uler			an a	200000000000000000000000000000000000000	3		
Sampling	Equipment:	- 1/				Vater Level N			S	
NELL DE	TAILS:				Re	ference Point:		of PVC Casing		ell
PID readir	ng in neck of v	vell:	8.0 50	(ppm)				le as appropri		
Vell casin	ng diameter:		20	(mm)		by Key Type:		gular? / allen		
	th of Well:	3	. 520	(m)		ell Cap Type:	_H-ca	ap? / screw ca	p? / push-t	
	of PVC casing ow ground lev	ol		(m)*		nimum Purge lume (L):	(3 w	vell vol.)		
				(11)		50mm dia. w		donth[m] do	onth to wate	or[m]) v 6
Before Pu	O WATER*:		1.1.1		for	non-50mm dia. w	liameter we	lls see formul	a below.	
	ater level"):	11	320	(m)						
After Sam	pling:	-	-	(m)	NC)TE: purge at l	east 3 well	volumes AND	until well	has
Depth to I		A	one	(m)	sta	abilized using f	held param	eters below (o	or well is dry	<i>y</i>).
	hickness:	-	_	(m)						
	neasured	interface pro	be / bailer / produ			y Stabilisatio	on Criteria	: pH ± 0.1, E	C ± 3%, T	± 0.2
by:	_	Intendee pre	be / build / prode		de	gree ditional Stabil	isation Crite	eria: D0 + 0.3	3 mg/L	
/olume of Removed:	f Product			L	Mi	nimum volun	ne betwee	n readings: 1	L/2 well vo	lume
(cilloved.								. ~	×	
			Volume	Water		50	000	Dissolved	Water Level	Water
	Time Elapse	Time	Removed (L)	Temp. (°C)	pН	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	(m)*	Appearance
Before										
During		<u> </u>	4.000						11	
During										
During										
During	-									
During	-							-		
During		-								
During	-	-								
During										
							4			
During	-		+							
During During	ar CO-clour		sheer		1 well vol	ume Calculat ume (L) = (tot = internal well	al depth[m]	– depth to wat C) diameter in I	ter[m] x3.14 mm	41 x d² / 4000
		HIC			1 Well Vo	olume (L) =				
During During After † CL=cle	its Mo	HC						4		
During During After † CL=cle		HC								
During During After † CL=cle		ЩC								
During During After † CL=cle		HC								
During During After † CL=cle		HIC								-
During During After † CL=cle	its No			NIA						-
During During After † CL=cle Commen				N/A						-

13 %

Site	R	and in The	21				hA	W3 (. 9-9-1. M	right	brack
Site: Job Numb		up of h				ell ID:	10	9.9.1	5	
Weather:	-	ne				ate(s): ampler Name(:	A A	m		
Purging m		-			50	ampier Name(5):	t		
	Equipment:		-		*	Water Level I	loacurom	ont		
WELL DET				1 All		eference Point		of PVC Casin	r / Top of \	Noll
	g in neck of	Ewoll:	0.0) Att	Re	elerence Point		cle as appropr		ven
	g diameter:	wen:	2	(ppm) (mm)	То	by Key Type:	1 cm	ngular? / aller		llock2
Total Dept	5	5	-785.	85)(m)		ell Cap Type:	×	ap? / screw c	1	
Distance o	of PVC casin				M	inimum Purge			api / paeri	
	w ground le			(m)*	Vo	olume (L):	(3 \	well vol.)		
DEPTH TO Before Pur ("static wat	0 0	3.	790 (-	3.790) (m)		r 50mm dia. w r non-50mm d				er[m]) x 6
After Samp		*		(m)	NO	DTE: purge at l	east 3 wel	l volumes ANI	D until well	has
Depth to P		Nor	re	(m)		abilized using 1				
Product Th		-	_	(m)						
Product me		(interface pro	be/ bailer / produ			ey Stabilisatio	on Criteria	: pH ± 0.1, I	EC ± 3%, 1	ſ±0.2
oy: Volume of	Product					e gree Iditional Stabil	eation Crit	eria: DO + O	3 mg/l	
Removed:	TTOUGUE			L		inimum volun				lume
		1							1.1.1.1	
	Time		Volume Removed	Water Temp.		EC	ORP	Dissolved Oxygen	Water Level	Water
	Elapse	Time	(L)	(°C)	pН	((µS/cm)	(mV)	(mg/L)	(m)*	Appearance†
Before										
During				_				-		
During							_			
During										
During During		-								-
During										
During						5				2
During										
During										
During										
During										
After	00	to The sub-		A anada						
CL=clear		ıy, 10=turbi	d, SI=silty, S	A=Sanuy	1 well volu	i me Calculati ime (L) = (tota = internal well c	depth[m]			1 x d² / 4000
Comments					1 Well Vo	lume (L) =				
Comments										
Comments										
Comments										
Comments										
Comments										
Field Filter		only)?: Y /	' N							
Field Filter Analyses F			' N							

* = needs to be recorded each time you take a set of parameters

1.5.50

Site:	B	ayly.	Rd		w	/ell ID:	M	w4			
Job Nun	nber:	1			Da	ate(s):	1	iv 4 29-9-15	-		
Weather	r: Fa	ine			Sa	Sampler Name(s):		Am.			
Purging	method:		Barler				(0).	4 / L+			
Samplin	g Equipment:		h u		* 1	Water Level	Measurer	nont			
WELL D						eference Point		p of PVC Casir	Top of	Mall	
	ling in neck of	f well:	0.0	(ppm)	110		_			weii	
	ing diameter:		50	(mm)	То	by Key Type:		rcle as approp angular? / aller		dlool	
	pth of Well:	-	5,80	(m)		ell Cap Type:		cap? / screw c	0.101		
Distance	istance of PVC casing			(11)		inimum Purge			2	-111.?	
	EPTH TO WATER*:				Vo	olume (L):	(3	well vol.)	'Zh		
Before P	PEPTH TO WATER*: efore Purging static water level"): 3,9(0) (m)					r 50mm dia. w r non-50mm c	vell= (tota diameter w	l depth[m] - d ells see formu	epth to wat la below.	ter[m]) x 6	
After Sar					NC						
	Product:		vone	(m)	NC	DE: purge at l	least 3 we	Il volumes ANI neters below (d	D until well	has	
				(m)	510	and a and	noia paran			y).	
	Thickness: measured		\ \	(m)	Ka	w Stabilizatio	on Oritoria		0 1 00/ -		
by:		interface pro	be/ baiter / produ	uct bailer		gree	on Griteria	a: pH ± 0.1, E	$\pm 3\%, 1$	1 ± 0.2	
	of Product	-			Add	ditional Stabili	isation Crit	teria: D0 \pm 0.	3 mg/L		
Removed				L	Mi	nimum volum	ne betwee	en readings: 1	L/2 well vo	lume	
			Volume	Water	1			Dissolved	-		
	Time		Removed	Temp.		FC	ORP	Owgen	Water	Wator	
	Time Elapse	Time	Removed (L)	Temp. (°C)	рН	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level (m)*	Water Appearance	
Before	Elapse 10-53	Time	(L) 1		6.06			Oxygen (mg/L)	Level	Water Appearance	
During	Elapse 10.53 (0.56		(L) <i>I</i> <i>3</i>	(°C) (6-Z (F-1	6.06	((µS/cm) 331.4 286			Level	Appearance Clearent TY	
During During	Elapse 10-53 (0-56 [0.58		(L) 1 3 6	(°C) 16-Z 14-1 16.,0	6.06	((µS/cm) 331.4 286 272			Level	Appearance	
During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During	Elapse 10-53 (0-56 [0.58		(L) 1 3 6	(°C) 16-Z 14-1 16.,0	6.06	((µS/cm) 331.4 286 272			Level	Appearance Cleared TU TU	
During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During During During During During	Elapse 10.53 (0.56 [0.58 11.00		(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) <u>(6-2</u> <u>14-1</u> <u>16-0</u> <u>16-1</u>	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
During During During During During During During During During During fter	Elapse 10.53 (0.56 10.58 11.00 11.07	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) [6-2 14-1 16.0 16-1 16-1	6.06 6.09 6.09 6.09 6.09	((µS/cm) 331.4 286 272 262			Level	Appearance Clearet TU TU TU TU	
Before During During During During During During During During During fiter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>1</u> <u>3</u> <u>6</u> <u>4</u>	(°C) [6-2 14-1 16.0 16-1 16-1	6.06 6.09 6.09 6.10 Well Volur 1 well volun	((µS/cm) 331.4 286 272 262 2.75 	(mV)		Level (m)*	Appearance Clearsf TY TY TY TY TU	
During During During During During During During During During During fter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) [6-2 14-1 16.0 16-1 16-1	6.06 6.09 6.09 6.10 Well Volur 1 well volun	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Clearsf TY TY TY TY TU	
During During During During During During During During During During fter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) <u>(6-Z</u> <u>IF-I</u> <u>Ib-jo</u> <u>Ib-1</u> <u>Ib-1</u> <u>Ib-1</u> <u>A=sandy</u>	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Clearsf TY TY TY TY TU	
During During During During During During During During During During fter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) <u>(6-Z</u> <u>IF-I</u> <u>Ib-jo</u> <u>Ib-1</u> <u>Ib-1</u> <u>Ib-1</u> <u>A=sandy</u>	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Cleared TY TY TY TY TU	
During During During During During During During During During During fter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) <u>(6-Z</u> <u>IF-I</u> <u>Ib-jo</u> <u>Ib-1</u> <u>Ib-1</u> <u>Ib-1</u> <u>A=sandy</u>	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Cleared TY TY TY TY TU	
During During During During During During During During During During fter CL=clea	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	0	(L) <u>T</u> <u>3</u> <u>6</u> <u>4</u> <u>13</u> <u></u>	(°C) <u>(6-Z</u> <u>IF-I</u> <u>Ib-jo</u> <u>Ib-1</u> <u>Ib-1</u> <u>Ib-1</u> <u>A=sandy</u>	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Cleared TY TY TY TY TU	
During During During During During During During During During Uring Uring CL=clea Omments	Elapse 10.53 10.55 10.58 11.00 11.02 11.02 ar, CO=cloudy s M6 Suspe wefey	\mathcal{O} , TU =turbin \mathcal{H}/\mathcal{C}	(L) <u>T</u> <u>3</u> <u>6</u> <u>9</u> <u>13</u> <u>13</u> <u>13</u> <u>13</u> <u>4</u> <u>5</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>8</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>8</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u>	(°C) <u>(6-Z</u> <u>IF-I</u> <u>Ib-jo</u> <u>Ib-1</u> <u>Ib-1</u> <u>Ib-1</u> <u>A=sandy</u>	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Cleared TY TY TY TY TU	
During During During During During During During During Uring Uring Uring Uring Uring Uring CL=clea Omments	Elapse 10-53 10-56 10-56 10-56 10-56 11-00 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 11-02 10-56 1	\mathcal{O} , TU =turbin \mathcal{H}/\mathcal{C}	(L) <u>T</u> <u>3</u> <u>6</u> <u>9</u> <u>13</u> <u>13</u> <u>13</u> <u>13</u> <u>4</u> <u>5</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>8</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>8</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>13</u> <u>5</u> <u>6</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u> <u>7</u>	(°C) (6- Z 14-1 16.0 16-1 16-1 A=sandy fungo	6.06 6.09 6.09 6.10 6.10 Well Volur 1 well volun Where d =	((µS/cm) 337.8 286 272 262 2.75 	(mV)	(mg/L)	Level (m)*	Appearance Cleared TY TY TY TY TU	

* = needs to be recorded each time you take a set of parameters

	MORE PARTNERS L	10	PDP	WELL PL	IRGING A	ND SAMPI	LING FOR	RM		
Site:	Ba	gly 1	Rd		W	/ell ID:	N	wg		
Job Num					D	ate(s):	Z	8-7-	-15	
Weather:	Fi	he		-		ampler Name	(s):	on.		
Purging r	method:		Barler					N.		
Sampling	g Equipment:		n n		*	Water Level	Measuren	nent		
WELL DE	TAILS:				/	eference Point	1 4	of PVC Casi	Top of	Mall
PID readi	ng in neck of	well:	0.0	(ppm)	A CONTRACT			cle as approp		Vell .
	ng diameter:		50	(mm)	То	by Key Type:		ngular? / alle		llock2
	oth of Well:	4	5:565	(m)	A	ell Cap Type:	ted at the	cap? / screw c		
	of PVC casin low ground le	g	bone.	1.1.2	Mi	inimum Purge	E I			
		vel	room.	(m)*	Vo	olume (L):	(3)	well vol.)	3.1	
Before PL	O WATER*:		1.0		for	r 50mm dia. V	well= (total	l'depth[m] - c	lepth to wat	er[m]) x 6
	ater level"):	0	.450	(m)	for	r non-50mm d	diameter w	ells see formu	ula below.	
After Sam	pling:	2	~ 16	(m)	NO	DTE: purge at	least 3 wel	I volumes AN	D until well	has
Depth to	Product:	NO	ne	(m)	sta	abilized using	field param	neters below (or well is dr	y).
Product T	hickness:	N	1A	(m)		14 -	A	(the !		
	neasured	Interface pr	be / bailer / prod		Ke	y Stabilisati	on Criteria	: pH ± 0.1,	EC ± 3%, 1	1 ± 0.2
y: /olume.ot	f Product		sao) ballol / pica		de	gree	ż	14 int	1	1
Removed:		-	-	LIN	Mi	ditional Stabil nimum volun	isation Crit	eria: $DO \pm 0$.	.3 mg/L	lumo
				1			17			iunic
	1		Volume	Water	1	1.11	Sec. Sec.	Dissolved	Water	
	Timo						000	1.1	and a state	
	Time Elapse	Time	Removed (L)	Temp. (°C)	рНа	EC ((uS/cm)	ORP (mV)	Oxygen (mg/L)	Level	Water
efore		Time Ø	Removed (L)	(°C)	рН 6 731	((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level (m)*	Water Appearance†
	Elapse		(L)		рН 6:31 6-21				23.77.87.87	Appearance†
ouring	Elapse	0 4 8	(L) 1 5 10	(°C) 16:4	631 621 647	((µS/cm)			23.77.87.87	1000000000
Ouring Ouring Ouring	Elapse	0 4	(L) 2 5	(°C) 16:4 16:4 16:4 16:4 16:3	6:31	((µS/cm) 169.5 160	(mV)		23.77.87.87	Appearance†
During During During During	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261 261	(mV)		23.77.87.87	Appearance†
ouring ouring ouring ouring ouring	Elapse	0 4 8	(L) 7 7 75 75	(°C) 16:4 16:4 16:4 16:4 16:3	6:31 6-21 6-47 6-46	((µS/cm) UGG.S UGU ZGY ZGI	(mV)		23.77.87.87	Appearance†
ouring ouring ouring ouring ouring ouring	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261 261	(mV)		23.77.88	Appearance† LO CO TY TY TY
During During During During During During During	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261 261	(mV)		23.77.88	Appearance† LO CO TY TY TY
During During During During During During During During During	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261	(mV)		23.77.88	Appearance† LO CO TY TY TY
uring uring uring uring uring uring uring uring uring	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261	(mV)		23.77.88	Appearance† LO CO TY TY TY
uring uring uring uring uring uring uring uring uring uring uring	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261	(mV)		23.77.88	Appearance† LO CO TY TY TY
Puring Puring Puring Puring Puring Puring Puring Puring Puring Puring Puring Puring	Elapse	0 4 8	(L) 7 5 10 15 70	(°C) 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6,47	((µS/cm) 269.5 160 264 261 261	(mV)		23.77.87.87	Appearance† LO CO TY TY TY
During During During During During During Uring Uring Uring Uring Uring Uring Uring Uring	Elapse	0 24 88 133 .	(L) 7 5 10 15 70	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47	((µS/cm) 269.5 260 261 261 261 265	(mV)		23.77.87.87	Appearance† LO CO TY TY TY
Before During During During During During During Uring	Elapse	0 24 88 133 .	(L) 2 5 10 15 70 3 1 0 15 70 3 1 0 15 70 3 1 0 15 70 15 70 15 70 15 70 15 70 75 70 75 70 75 70 75 70 75 70 75 70 75 70 75 70 75 70 75 70 75 70 70 75 70 70 75 70 70 70 70 70 70 70 70 70 70	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47	((µS/cm) 269.5 269 261 261 261 265 1 me Calculation me (L) = (total	(mV)	(mg/L)	(m)*	Appearance† LO CO TU TU TU
Puring Pu	r, CO=cloudy	0 74 8 13	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47	((µS/cm) 269.5 269 261 261 261 265 1 265 1 me Calculation	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
During During During During During During Uring Uring Uring Uring Uring Uring Uring CL=clea	r, CO=cloudy	0 24 88 133 .	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47	((µS/cm) <i>UG</i> , 5 <i>UGU</i> <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 7 <i>G</i> ,	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
Puring Pu	r, CO=cloudy	0 74 8 13	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) <i>UG</i> , 5 <i>UGU</i> <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 7 <i>G</i> ,	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
Puring Pu	r, CO=cloudy	0 74 8 13	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) <i>UG</i> , 5 <i>UGU</i> <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 7 <i>G</i> ,	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
Puring Pu	r, CO=cloudy	0 74 8 13	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) <i>UG</i> , 5 <i>UGU</i> <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 7 <i>G</i> ,	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
uring uring uring uring uring uring uring uring uring uring ter CL=clea	r, CO=cloudy	0 74 8 13	(L) 2 5 10 15 70 3 4 5 70 15 70 3 4 5 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 15 70 10 15 70 10 15 70 10 15 70 10 15 70 10 10 10 10 10 10 10 10 10 1	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) <i>UG</i> , 5 <i>UGU</i> <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 6 <i>G</i> , 7 <i>G</i> ,	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU
uring uring uring uring uring uring uring uring uring uring cL=clea	Elapse O r, CO=cloudy W H/C	0 Z4 S 13	(L) 2 5 10 15 20 3 4 SI=silty, S	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) <i>UG</i> , 5 <i>VG</i> , 6 <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>VG</i> <i>V</i>	(mV)	(mg/L)	(m)*	Appearance† LO CO TU TU TU
Puring Pu	r, CO=cloudy	0 24 8 13	(L) 2 5 10 15 20 3 4 SI=silty, S	(°C) 16:4 16:4 16:4 16:3 16:3 16:3	6:31 6-21 6-47 6-46 6-47 6-47 6-47 0-47 0-47 1 well Volur 1 well volur Where d =	((µS/cm) 269.5 269 261 261 261 265 7 me Calculation me (L) =	(mV)	(mg/L)	(m)*	Appearance† LO (O TU TU TU

Fa

N:\Field Templates\water%20sampling%20form_17092012.rtf



.

Citor		Early .	Rd				n	146					
Site:	CAD	- jug				ell ID:			-				
Job Numb						te(s):		9-9-15 Indy m	~	63			
Weather:		ene	1		Sa	mpler Name(s	s):	Andy m &					
Purging m	nethod:		arter			2.2							
Sampling	Equipment:		1 1		* V	Water Level N	Measurem	ent					
WELL DE	TAILS:				Re	ference Point:	top	of PVC Casin	g / Top of V	Vell			
PID readir	ng in neck of	well: 0	-0	(ppm)		+	(circ	cle as appropr	riate)				
Well casin	ng diameter:		50	(mm)	Tob	by Key Type:	triar	ngular? / aller	h key? / pad	lock?			
	th of Well:		4,99	(m)		ell Cap Type:	H-ca	ap? / screw c	ap? / push-	fit?			
	of PVC casing ow ground le			(m)*		nimum Purge	(2)		IGL				
			15	((1))	VOI	lume (L):	(3 1	vell vol.)					
Before Pu			1 2.4	15		50mm dia. w non-50mm d				er[m]) x 6			
	ater level"):												
After Sam	pling:		2.470	(m)		TE: purge at l							
Depth to F	Product:	n	one	(m)	sta	bilized using f	ield param	eters below (or well is dr	/).			
Product Th	hickness:	-	-	(m)				0.1					
Product m	neasured	interface prol	ber bailer / prod	uct bailer		y Stabilisatio	on Criteria	: pH ± 0.1, I	EC ± 3%, T	± 0.2			
by: Volume of	Product		/			gree ditional Stabili	sation Crite	aria: $DO + O$	2 mg/l				
Removed:		~		L		nimum volum			-	lume			
				6. P									
			Volume	Water				Dissolved	Water	1.1.1.1.1.1.1			
	Time	Timo	Removed	Temp.	p]]	EC	ORP	Oxygen	Level				
Doforo	Elapse	Time	Removed (L)	Temp. (°C)	pH	((µS/cm)	ORP (mV)	a service of the serv	- E				
			Removed (L) Z	Temp. (°C) /6.8	6.28	((µS/cm) を75		Oxygen	Level	Appearan			
During	Elapse		Removed (L) Z	Temp. (°C) /6.8 /6-8	6.28	((µS/cm) をア5 Z70		Oxygen	Level	Appearan T			
During During	Elapse		Removed (L) Z · 3 6	Temp. (°C) 16.8 16-8 16-9	6.28 8.28 6-23	((μS/cm) をすち 270 270 271		Oxygen	Level	Appearan t Tu Tu			
During During During	Elapse		Removed (L) 2 .3 .6 10	Temp. (°C) 16.8 16-8 16-9 16-9	6.28 6.28 6.23 6.24	((μS/cm) 275 270 271 273		Oxygen	Level	Appearan TU TU TU TY			
During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During	Elapse		Removed (L) 2 .3 .6 10	Temp. (°C) 16.8 16-8 16-9 16-9	6.28 6.28 6.23 6.23 6.24	((μS/cm) 275 270 271 273		Oxygen	Level	Appearan TU TU TU TY			
During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
During During During During During During During During During During During During During	Elapse		Removed (L) 7 .3 .6 .70 .73	Temp. (°C) 16.8 16-8 16-9 16-9 16-8	6.28 6.28 6-23 6.24 6.24	((µS/cm) 275 270 270 271 273 273		Oxygen	Level	Appearan t TU TU TU			
Before During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 0 - 24	$\frac{((\mu S/cm))}{2.75}$ $\frac{2.75}{2.70}$ $\frac{2.71}{2.73}$ $\frac{2.71}{2.71}$ me Calculation $(L) = (total)$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 2 .3 .6 .10 .13 .16	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 0 - 24	$((\mu S/cm))$ 275 270 271 273 273 271 0 0 0 0 0 0 0 0	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During tfter	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 0 - 24	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During During During After † CL=clea	Elapse	r, e o y, TU=turbio	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearant TU TU TU TU TU TU TU			
During During During During During During During During During During During After † CL=clea	Elapse	1. 60 y, TU=turbio 10/C	Removed (L) 7 .3 .6 .10 .13 .16 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearan t TU TU TU TU TU 			
During During During During During During During During During During During During During Comments	Elapse	1. 60 y, TU=turbio 10/C	Removed (L) 7 -3 -6 -7 -6 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur 1 well volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	Appearan t TU TU TU TU TU 			
During Comments Field Filter	Elapse	1. 60 y, TU=turbio 10/C	Removed (L) 7 -3 -6 -7 -6 	Temp. (°C) /6-8 /6-8 /6-8 (6-8 (6-8	6 - 28 6 - 23 6 - 23 6 - 24 6 - 24 6 - 24 6 - 24 9 - 24 1 well Volur 1 well volur Where d =	$((\mu S/cm)) = \frac{275}{270} = \frac{276}{273} = \frac{271}{273} = \frac{271}{273} = \frac{271}{271} = \frac{1}{100} = \frac{1}{$	(mV)	Oxygen (mg/L)	Level (m)*	74 74 74 74			

Site:	Bac	ply 1	d		We	II ID:	MO	-7 9-9-15					
Job Numbe	er:	//			Da	te(s):	2	9-9-15					
Weather:	Pu	re		9	Sa	mpler Name(s	s):	n					
Purging me	ethod:	5											
	Equipment:	-			* V	Vater Level N	leasurem	isurement					
WELL DET		-			Re	ference Point:	Тор	Top of PVC Casing/ Top of Well					
PID reading	g in neck of v	well: 🟉	-7	(ppm)			(circ	(circle as appropriate)					
	g diameter:	~	0	(mm)	Tol	by Key Type:	triar	ngular? / allen	key? / pad	lock?			
Total Dept		1	12.05 (m)			ell Cap Type:	H-ca	ap? / screw ca	p? / push-	fit?			
Distance o	f PVC casing		-	()+		nimum Purge	(2)	(all vol.)					
	ove/below ground level		-	(m)*		lume (L):		vell vol.)		1.1.1.1.1			
	EPTH TO WATER*: efore Purging static water level"): 10-755				for	50mm dia. w	/ell= (total	depth[m] - de ells see formul	epth to wat	er[m]) x 6			
("static wat		10.7	55	(m)	TOP	non-somm d	nameter we		a bolow.				
After Samp		-	1	(m)	NC	TE: purge at I	east 3 well	volumes AND	until well	has			
	Arter Sampling: Depth to Product: None Product Thickness: Product measured interface prober / balter / product				sta	bilized using t	field param	eters below (o	or well is dr	y).			
1.0000000000000000000000000000000000000							on Criteria	: pH ± 0.1, E	C ± 3%, 1	ſ±0.2			
by:		Intenace pro	be / baller / produ			gree	ination Crit	eria: D0 ± 0.3	2 mg/l				
Volume of Removed:	Product			L	Ad Mi	nimum volun	ne betwee	n readings: 1	L/2 well vo	lume			
nemoved.													
			Volume	Water			-	Dissolved	Water				
	Time Elapse	Time	Removed (L)	Temp. (°C)	pН	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level (m)*	Water Appearance†			
Before													
During								-		-			
During					r								
During		-											
During									_				
During								1	7				
During													
During													
During													
During During													
During													
After													
† CL=clea		ly, TU=turb	id, SI=silty, S	SA=sandy	1 well volu	ume Calculat ume (L) = (tota = internal well	al depth[m]	– depth to wat) diameter in r	ter[m] x3.14 nm	41 x d² / 4000			
					1 Well Vo	olume (L) =							
			-										
	ered (metals	only)?: Y	/ N	ALTA									
	ered (metals Required:	only)?: Y	/ N	NA									

* = needs to be recorded each time you take a set of parameters

Site:	B	ales	Rd		We	ell ID:	ALL	18						
Job Num	her ur	MITON	(3-1)			te(s):	2	2-9-15	-					
Weather:		0.	00			mpler Name		Ander a	n.					
	Put	A/1	A		Sa		(3).	/						
Purging m		101	10			* Water Level Measurement								
	Equipment:	N	A											
WELL DE	TAILS:				Re	ference Poin		Top of PVC Casing / Top of Well						
PID reading	ng in neck of v		.3	(ppm)			(circ	(circle as appropriate)						
Well casir	ng diameter:		10	(mm)		by Key Type:		ngular? / allen						
	th of Well:	-	2.99		ell Cap Type:		ap? / screw ca	ap? / push-	fit?					
	of PVC casing ow ground lev		_	(m)*		nimum Purge lume (L):		vell vol.)						
	fter Sampling:							depth[m] - de		er[m]) x 6				
			(m)	for non-50mm diameter wells see formula below.										
			~		NIC	TE: purdo ot	loast 2 woll	volumes ANE		has				
			11	(m)				eters below (c						
		n	14	(m)										
Product T				(m)	K-		on Orlitoria		C + 20/ 1	+02				
Product n by:	heasured	interface pro	be / bailer / produ	uct bailer		y Stabilisati gree	ion Griteria	: pH ± 0.1, E	U ± 3%, I	± 0.2				
Volume o	f Product						ilisation Crite	eria: D0 ± 0.3	3 mg/L					
Removed				L	Additional Stabilisation Criteria: D0 \pm 0.3 mg/L Minimum volume between readings: 1/2 well volume									
			Volume	Water		50	000	Dissolved	Water	Watar				
	Time	Time	Removed (L)	Temp. (°C)	DH	EC ((µS/cm)	ORP (mV)	Oxygen (mg/L)	Level (m)*	Water Appearance				
	Elapse	IIIIIe		(°C)										
Before	Elapse	nine					(1117)	(
	Elapse	IIIIe					(
During	Elapse	nine						(118-2)						
During During	Elapse	IIIIe												
During During During	Elapse	IIIIe												
During During During During	Elapse													
During During During During During	Elapse													
During During During During During During	Elapse													
During During During During During During During	Elapse													
During During During During During During During During	Elapse													
During During During During During During During During During	Elapse													
During During During During During During During During During During	Elapse													
During During During During During During During During During During During	Elapse													
During During During During During During During During During During During After	Elapse													
During During During During During During During During During During During After					1 well volu	me Calcula me (L) = (tot	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During During After † CL=cles	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]			1 x d ² / 4000				
During During During During During During During During During During During After † CL=clea	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During During After † CL=cles	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During During After † CL=cles	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During During After † CL=cles	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During During After † CL=cles	ar, CO=cloud				1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]	- depth to wate		1 x d ² / 4000				
During During During During During During During During During During After † CL=cles	ar, CO=cloud	y, TU=turbi	d, SI=silty, S		1 well volu Where d =	me Calcula me (L) = (tot internal well	tion rail depth[m]	- depth to wate		1 x d ² / 4000				

* = needs to be recorded each time you take a set of parameters

and he



BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix I: Purge Water Manifest Forms



P O Box 7076 New Plymouth Ph: 06 755 9150 Fax: 06 755 1611

DESTRUCTION CERTIFICATE 2015-0493

This is to certify that Intergroup Ltd has rendered the following products unidentifiable and disposed of it in accordance with TRC and other local authority requirements. Prattle Delamore Partners - Inv 699226/JD63035658 CLIENT : **Contaminated Ground Water** (Hydrocarbons) **PRODUCT:** 300 Litres QUANTITY: **TREATMENT / DESTRUCTION DATE:** 23/07/2015 **TREATMENT / DESTRUCTION METHOD:** Physical and chemical degradation in Intergroup treatment processes. FINAL DEPOSITORY: Solids to New Plymouth District Council landfill. Liquids to trade waste interceptor operated by Intergroup Ltd at 28 Hudson Road, Bell Block.

SIGNED:

Ross Maindonald

WITNESSED:

eganbickley Megan Buckley

SECTION 1: TO BE COMPLETED BY TH	HE ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR
	pervisor: Pattle Delanione Partners Pe
SID Project Number: Ref H	
Site Name: Bayly Rd	
Site Address: <u>51 Ocean</u>	View Parade, New Plymonth
Consultant/Main Contractor:	relien Markenzie / Bo Simkin
Description of Contaminant	2
	Diesel Other
	contaminated GU (hydrocarton
Waste Type (Please Tick):	Hazardous 🗆 Non-Hazardous
	Solid 🗹 Liquid
Declaration By Environmental Consul	Itant/Main Contractor
I declare that the above waste is accu accordance with the applicable nation	rately described and is in a proper condition for transport in nal and local regulations.
Name: Andrew Machenn	i Signature: alMacherrie
Title: En Geelogist	Date: 17/07/15
Estimated Qua	ntity of Waste:
SECTION 2: TO BE COMPLETED BY TH	HARAMAN THINK THE THE THE THE THE THE THE THE THE
	TETRAINSPORTER
I acknowledge the receipt of the wast	e consignment describes the above;
Name: Murray Sutte	e consignment describes the above; Signature:
Name: Murray Sutte Title: Yurdman	e consignment describes the above; Signature: Date: 23/1/5
Name: Murray Sutte	e consignment describes the above; Signature: Date: 23/1/5
Name: <u>Murrey Sutte</u> Title: <u>Yudman</u> Estimated Quar SECTION 3: TO BE COMPLETED BY TH	e consignment describes the above; Signature: Date: 23/1/5 ntity of Waste:
Name: <u>Murren Sutte</u> Title: <u>Yurdman</u> Estimated Quar SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consign	e consignment describes the above; Signature: Date: 23/1/5 ntity of Waste: HE DISPOSER/STORER ment described has been received
Name: <u>Murren</u> Sutte Title: <u>Yurdman</u> Estimated Quan SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consign Name of Facility: <u>Murren</u>	e consignment describes the above; Signature: Date: 23/115 ntity of Waste: HE DISPOSER/STORER ment described has been received Build a been received
Name: Murrey Sutte Title: Yudman Estimated Quan SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consign Name of Facility: Integrate Address of Facility: 28 Hinds	e consignment describes the above; Signature: Date: 23/115 ntity of Waste: HE DISPOSER/STORER ment described has been received BLDd Band Bell Block
Name: Murrey Sutte Title: Yudman Estimated Quan SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consign Name of Facility: Integrate Address of Facility: 28 Hinds Name: Murrey Sutte	e consignment describes the above; Signature: Date: 23/115 ntity of Waste: IE DISPOSER/STORER ment described has been received BAD BAD BAD BAD BAD BAD BAD BAD
Name: <u>Murren Sutte</u> Title: <u>Yudman</u> Estimated Quan SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consign Name of Facility: <u>Integrap</u> Address of Facility: <u>28 Huds</u>	e consignment describes the above; Signature: Date: $23/15$ ntity of Waste: E DISPOSER/STORER ment described has been received 24/5 Bignature: Date: $23/15$
Name: Murray Sutter Title: Yurdman Estimated Quar SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consigned Name of Facility: Margara Address of Facility: 28 Hurds Name: Murray Sutter Title: Yurdman	e consignment describes the above; Signature: Date: $23/15$ ntity of Waste: E DISPOSER/STORER ment described has been received 25/15 Date: $23/15$ Quantity: 1005
Name: Murrey Sutte Title: Yudman Estimated Quar SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consigned Name of Facility: Integrate Address of Facility: 28 Hudse Name: Murrey Sutte Title: Yudman Method of Disposal 🗆 Landfill	e consignment describes the above; Signature: Date: 23/15 ntity of Waste: IE DISPOSER/STORER ment described has been received Lbd Acad Bell Block Signature: Date: 23/15 Quantity: 100 L Managed Fill Treatment G Storage
Name: Murrey Sutte Title: Yudman Estimated Quar SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consigned Name of Facility: Integrate Address of Facility: 28 Hudse Name: Murrey Sutte Title: Yudman Method of Disposal 🗆 Landfill	e consignment describes the above; Signature: Date: 23/15 ntity of Waste: HE DISPOSER/STORER ment described has been received BADA BADA BADA Date: 23/15 Quantity: 100 L Managed Fill Treatment Storage
Name: <u>Murren</u> Sutte Title: <u>Yudman</u> Estimated Quar SECTION 3: TO BE COMPLETED BYTH I acknowledge that the waste consign Name of Facility: <u>Druggan</u> Address of Facility: <u>28 Huds</u> Name: <u>Murren</u> Sutte Title: <u>Yudman</u> Method of Disposal <u>Landfill</u> This form has to be completed in conju	e consignment describes the above; Signature: Date:
Name: <u>Murrey Sutter</u> Title: <u>Judman</u> Estimated Quar SECTION 3: TO BE COMPLETED BY TH I acknowledge that the waste consigned Name of Facility: <u>Durgray</u> Address of Facility: <u>28 Huds</u> Name: <u>Murrey Sutter</u> Name: <u>Murrey Sutter</u> Title: <u>Judman</u> Method of Disposal <u>Landfill</u> his form has to be completed in conjuget eturned to the above address and sho	e consignment describes the above; Signature: Date: 23/15 ntity of Waste: E OISPOSER/STORER ment described has been received C Date: 23/15 Date: 23/15 Quantity: 100 Managed Fill Treatment Storage storage Managed Fill Treatment Storage
Name: <u>Murren</u> Sutte Title: <u>Yudman</u> Estimated Quar SECTION 3: TO BE COMPLETED BYTH I acknowledge that the waste consign Name of Facility: <u>Druggan</u> Address of Facility: <u>28 Huds</u> Name: <u>Murren</u> Sutte Title: <u>Yudman</u> Method of Disposal <u>Landfill</u> This form has to be completed in conju	e consignment describes the above; Signature: Date:

	OMPLETED BY THE ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR
	ontractor Site Supervisor: Pattle Delamore Partners (PD)
ID Project Number	: if ref It woroso100
ite Name: <u>Br</u>	ayly Road
ite Address: <u>5</u>	I Ocean View Parade, New Plymonth,
Consultant/Main Co	ontractor: Andrew Mackensie Bo Simkin
Description of Conta	aminant /
Petro	DI Diesel 🗹 Other
Comments: Pote	enhally contaminated groundwater (hydro care
Waste Type (Please	
	🗆 Solid 🖬 Liquid
Declaration By Envir	ronmental Consultant/Main Contractor
	ove waste is accurately described and is in a proper condition for transport in
ccordance with the	applicable national and local regulations.
	W Mackennie Signature: almarkenne
Title: Enno	mmental Geof Date: 17/07/15
	Estimated Quantity of Waste: ~ 2002
ECTION 2: TO BE C	OMPLETED BY THE TRANSPORTER
acknowledge the re	eceipt of the waste consignment describes the above;
Name: Mu	von litter Signature:
	duen Date: 23/7/15
Title: Yav	
Title: Yay	Estimated Quantity of Waste:
	Estimated Quantity of Waste:
ECTION 3: TO BE C	
ECTION 3: TO BE C acknowledge that t	OMPLETED BY THE DISPOSER/STORER
ECTION 3: TO BE C	OMPLETED BY THE DISPOSER/STORER
ECTION 3: TO BE C acknowledge that t Name of Facility:	OMPLETED BY THE DISPOSER/STORER he waste consignment described has been received Integrap Ltd 28 Hidson Road Bell Block
SECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility:	OMPLETED BY THE DISPOSER/STORER he waste consignment described has been received Integrap Ltd 28 Hidson Road Bell Block
SECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility: Name:	OMPLETED BY THE DISPOSER/STORER he waste consignment described has been received Integrap Ltd 28 Hidson Road Bell Block my Entre Signature
ECTION 3: TO BE C acknowledge that t lame of Facility: ddress of Facility: Name: <u>My</u> Title: <u>Y</u>	OMPLETED BY THE DISPOSER/STORER the waste consignment described has been received Integrap Utd 28 Hidson Road Bell Block of Entry Signature: Date: 23/7/15 Quantity: 2000
ECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility: Name: <u>My</u> Title: <u>Yard</u> Method of Disposal	OMPLETED BY THE DISPOSER/STORER the waste consignment described has been received Integrap Utd 28 Hidson Road Bell Block my Entre Signature: Date: 23/2/15 Quantity: 2000
ECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility: Name: <u>My</u> Title: <u>Yard</u> Method of Disposal	OMPLETED BY THE DISPOSER/STORER the waste consignment described has been received Integrap Integrap Value Value Value Date: 23/715 Quantity: Date: 23/715 Quantity: 2000 Index of the accompanying dangerous goods form and e address and should accompany waste invoices. Return the completed form to: Pattle Delamore Partners Ltd
DECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility: Name: My Title: Yard Method of Disposal	OMPLETED BY THE DISPOSER/STORER the waste consignment described has been received Integrap Utd 28 Haden Poad Bell Block multiple Signatures Date: 23/7/15 Quantity: 200C I Landfill I Managed Fill I Treatment I Storage completed in conjunction with the accompanying dangerous goods form and e address and should accompany waste invoices. Return the completed form to: Pattle Delamore Partners Ltd (Delete if not applicable)
ECTION 3: TO BE C acknowledge that t Name of Facility: Address of Facility: Name: <u>My</u> Title: <u>Yard</u> Method of Disposal	OMPLETED BY THE DISPOSER/STORER the waste consignment described has been received Integrap Utd 28 Haden Poad Bell Block multiple Signatures Date: 23/7/15 Quantity: 200C I Landfill I Managed Fill I Treatment I Storage completed in conjunction with the accompanying dangerous goods form and e address and should accompany waste invoices. Return the completed form to: Pattle Delamore Partners Ltd (Delete if not applicable)



P O Box 7076 New Plymouth Ph: 06 755 9150 Fax: 06 755 1611

DESTRUCTION CERTIFICATE 2015-0620

the followin	to certify that Intergroup Ltd has r og products unidentifiable and disp h TRC and other local authority re	osed of it in
CLIENT :	Pattle Delamore Par	tners
PRODUCT:	Ground Water	
QUANTITY:	40 Ltrs + 2 x 20 Ltrs Co	ntainers
TREATMENT / DES		29/09/2015
	STRUCTION METHOD: cal degradation in Intergroup treat	ment processes.
FINAL DEPOSITO		
	outh District Council landfill. Liqui d by Intergroup Ltd at 28 Hudson F	
<u>SIGNED:</u>	S	Stephen Bowles
<u>WITNESSED:</u>	Meganbuckley	Megan Buckley

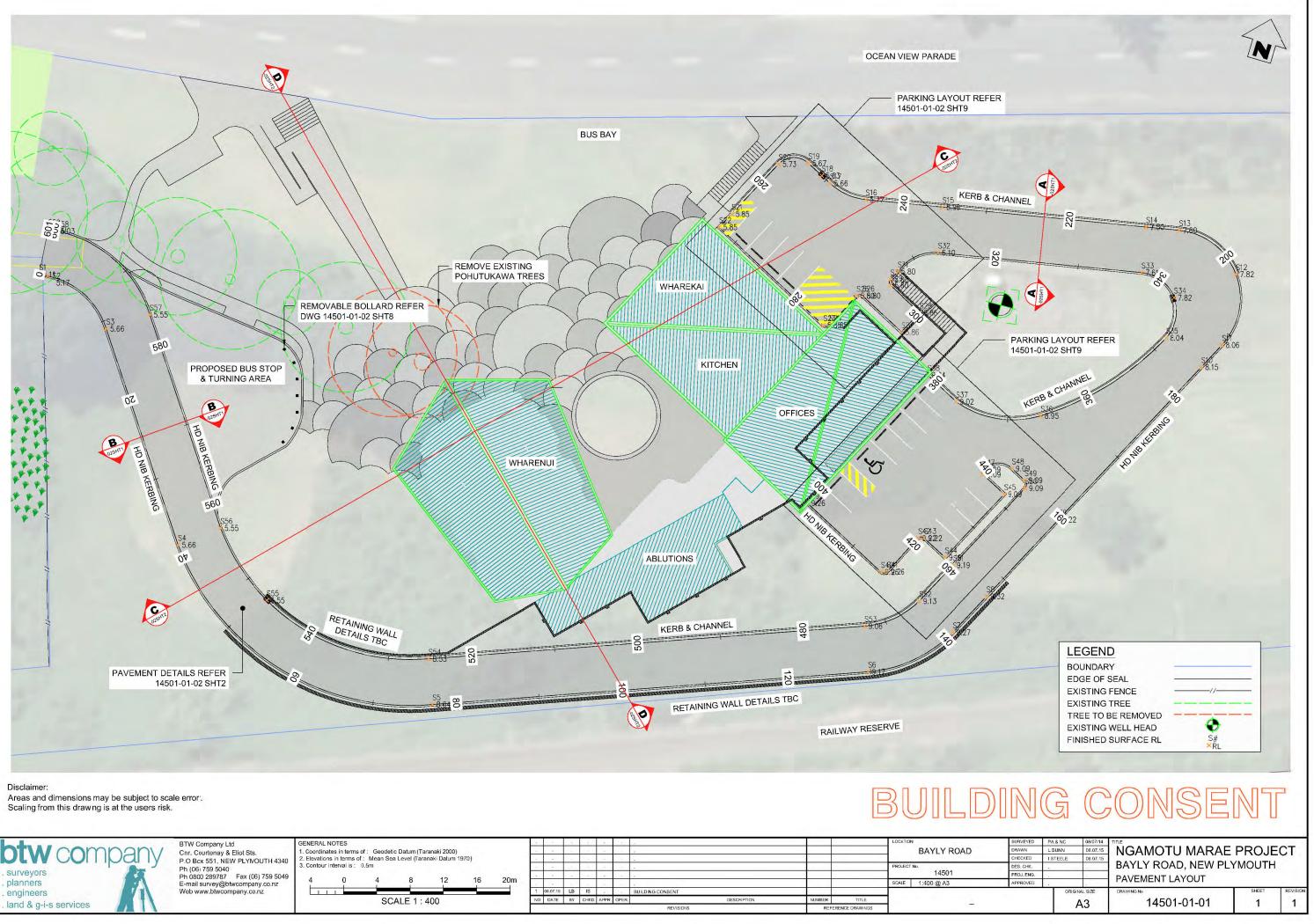
SECTION 1: TO BE COMPLETED	BY THE ENVIRONMENTAL CONSULTANT/MAIN CONTRACTOR
	e Supervisor: Pattle Delamore farther.
SID Project Number: Work	
Site Address: Corner	Rd, New Plymouth Bayly Rd & Ocean View Para
Consultant/Main Contractor:	PPP
Description of Contaminant	
Petrol	Diesel I Other Groundwafer
Comments:	3
Waste Type (Please Tick):	🗆 Hazardous 🗹 Non-Hazardous
	🗆 Solid 🗹 Liquid
Declaration By Environmental Co	onsultant/Main Contractor
	accurately described and is in a proper condition for transport in
accordance with the applicable n	ational and local regulations.
	onte Signature: almachenrie
Title: Envronmental	
Title: Environmental Geologist Estimated	
	Quantity of Waste:
Grologist Estimated SECTION 2: TO BE COMPLETED F	Quantity of Waste:
Grologist Estimated SECTION 2: TO BE COMPLETED F	Quantity of Waste:
Geologist Estimated SECTION 2: TO BE COMPLETED F I acknowledge the receipt of the	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above;
Geologist Estimated SECTION 2: TO BE COMPLETED F I acknowledge the receipt of the Name: Title:	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature:
Geologist Estimated SECTION 2: TO BE COMPLETED F I acknowledge the receipt of the Name: Title:	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste:
Geologiest Estimated SECTION 2: TO BE COMPLETED B I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED B	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste:
Geologiest Estimated SECTION 2: TO BE COMPLETED I I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED I I acknowledge that the waste com	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER
Geologist Estimated SECTION 2: TO BE COMPLETED B I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED B I acknowledge that the waste com Name of Facility:	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER Insignment described has been received
Geologist Estimated SECTION 2: TO BE COMPLETED B I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED B I acknowledge that the waste con Name of Facility: Address of Facility: 28	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER Insignment described has been received RCROW MD
Geologist Estimated SECTION 2: TO BE COMPLETED B I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED B I acknowledge that the waste con Name of Facility: Address of Facility: 28	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Date: Quantity of Waste: BY THE DISPOSER/STORER Insignment described has been received RCROW MD MUCSON KOAD, Bew block
Geologist Estimated SECTION 2: TO BE COMPLETED B I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED B I acknowledge that the waste cor Name of Facility: Address of Facility: Name:	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER Insignment described has been received RGROUP UTD MUCSON ROAD, Berr Brock Signature: Signature:
Geologist Estimated SECTION 2: TO BE COMPLETED 6 I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED 6 I acknowledge that the waste cor Name of Facility: Name of Facility: Address of Facility: Name: Title: Name: Mamage	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER nsignment described has been received RGROUP MUCON MUCON North Date: OI - 10 - 15
Geologiest Estimated SECTION 2: TO BE COMPLETED F I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED F I acknowledge that the waste con Name of Facility: Address of Facility: Address of Facility: Name: Name: Mame: Mame: Mame: Lar Method of Disposal Lar his form has to be completed in	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER BY THE DISPOSER/STORER Musson Koab, beru brock Musson Koab, beru brock Date: Date: Date: OI - 10 - 15 Quantity: Do Uhrs
Geologiest Estimated SECTION 2: TO BE COMPLETED F I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED F I acknowledge that the waste con Name of Facility: Address of Facility: Address of Facility: Name: Name: Mame: Mame: Mame: Lar Method of Disposal Lar his form has to be completed in	Quantity of Waste: BY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: BY THE DISPOSER/STORER BY THE DISPOSER/STORER Insignment described has been received Reference Reference Date: OI - 10 - 15 Quantity: Date: Date: </td
Guidgest Estimated SECTION 2: TO BE COMPLETED I I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED I I acknowledge that the waste com Name of Facility: I acknowledge that the waste com Name of Facility: I acknowledge that the waste com Name of Facility: I acknowledge that the waste com Name: Address of Facility: I acknowledge that the waste com Name: Address of Facility: Itile: Mamaged Method of Disposal Lar his form has to be completed in e eturned to the above address an PDP Job Number:	Quantity of Waste: SY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: Sy THE DISPOSER/STORER how for the state Sy THE DISPOSER/STORER Image: Date: Outres By THE DISPOSER/STORER Image: Date: Date: Date: OI - 10 - 15 Quantity: Date: Date: OI - 10 - 15 Quantity: Date:
Geologiest Estimated SECTION 2: TO BE COMPLETED 6 I acknowledge the receipt of the Name: Title: Estimated SECTION 3: TO BE COMPLETED 6 I acknowledge that the waste con Name of Facility: Address of Facility: Name: Name: Mame: Mame: Mame: Mame: Mame: Lar Method of Disposal Method of Disposal Lar his form has to be completed in eturned to the above address an	Quantity of Waste: SY THE TRANSPORTER waste consignment describes the above; Signature: Date: Quantity of Waste: Sy THE DISPOSER/STORER how for the state Sy THE DISPOSER/STORER Image: Date: Outres By THE DISPOSER/STORER Image: Date: Date: Date: OI - 10 - 15 Quantity: Date: Date: OI - 10 - 15 Quantity: Date:

SECTION 1. TO BE COMPLETE	D BY THE ENVIRONM	IENTAL CONSULTANT/MAIN CONTRACTOR	ffe
Consultant/Main Contractor	Site Supervisor:	attle Delamore fartne.	15
SID Project Number: 000	2050700		
Site Name: Bayly	, Rd, New	Plymouth	
Site Address: Corner	- Bayly H	Plymouth Rd & ocean View Para	le
	06		
	PPP		
Description of Contaminant			
Petrol	Diesel	I Other Groundwater	ч.
Comments:	5	and the second s	
Waste Type (Please Tick):	□ Hazardous	Mon-Hazardous	- Q -
	□ Solid	🗹 Liquid	
Declaration By Environmental	Consultant/Main Con	ntractor	
I declare that the above waste	is accurately described	d and is in a proper condition for transport in	
accordance with the applicable	national and local reg	gulations.	
Name: Andrew Mors	Conzie Signature:	almachenrie	_
Title: Knorronmenfal	Date:	•	
Geologist -			
Geologist Estimate	d Quantity of Waste:		
			FH.
SECTION 2; TO BE COMPLETED	BY THE TRANSPORTE	R/////////////////////////////////////	111
SECTION 2; TO BE COMPLETED	BY THE TRANSPORTE	escribes the above;	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the	BY THE TRANSPORTE	describes the above;	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title:	BY THE TRANSPORTE e waste consignment of Signature:	describes the above;	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste:	describes the above;	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST	eR describes the above;	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST	describes the above; ORER has been received	
SECTION 2: TO BE COMPLETED I acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED I acknowledge that the waste co	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST	ORER has been received	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co Name of Facility: Address of Facility:	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described	ORER has been received	
SECTION 2: TO BE COMPLETED I acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED I acknowledge that the waste co Name of Facility: Address of Facility:	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described ERCROUP	ORER has been received LTD KOAD BER BLOCK	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co Name of Facility: Address of Facility: Name:	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described RCROW	$\frac{1}{ORER}$ has been received $\frac{1}{OAD}$ $\frac{1}{OAD}$ $\frac{1}{OI-10-15}$	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co Name of Facility: Address of Facility: Name: Stephen be Title: Manager	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described ERGROUP MUSS Signature: Date: Date: Quantity:	$\frac{1}{10}$	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co Name of Facility: Address of Facility: Name: Staphanbe Title: Managev Method of Disposal	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described CRACOP MADON Signature: Date: Quantity: Autom	$\frac{ORER}{has been received}$ $\frac{ORER}{has been received}$ $\frac{DTO}{BER Brack}$ $\frac{DTO - 15}{20 \text{ Utrs}}$ $\frac{DTO - 15}{20 \text{ Utrs}}$	e
SECTION 2: TO BE COMPLETED I acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED I acknowledge that the waste co Name of Facility: Address of Facility: Name: Stephen be Title: Mamager Method of Disposal	BY THE TRANSPORTE waste consignment of Signature: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described CALE Signature: Date: Quantity: ndfill	$\frac{1}{10}$	e
SECTION 2: TO BE COMPLETED I acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED I acknowledge that the waste co Name of Facility: Address of Facility: Name: Stephen be Title: Manager Method of Disposal La bis form has to be completed in	BY THE TRANSPORTE waste consignment of Signature: Date: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described RCROW Dubberry Signature: Date: Date: Quantity: ndfill	Image: Barrier Storage ORER has been received LAD Kondo BERC Brack DI -10 - 15 20 Line aged Fill Treatment Storage accompanying dangerous goods form and waste invoices. pleted form to:	
SECTION 2: TO BE COMPLETED acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED acknowledge that the waste co Name of Facility: Address of Facility: Name: Stephen be Title: Mamage Method of Disposal La bis form has to be completed in turned to the above address ar	BY THE TRANSPORTE waste consignment of Signature: Date: Date: BY THE DISPOSER/ST onsignment described CAROUP MUDDON Date: Date: Date: Date: Date: MudDon Mana conjunction with the d should accompany Return the comp (Delete if not an	Image: Rest invoices. ORER has been received LAD Kons Base Brack DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab Image: Rest Brack DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab DI - 10 - 15 20 Lab Di - 10 - 15 20 Lab 20 Lab Di - 10 - 15 20 Lab aged Fill Treatment Storage accompanying dangerous goods form and waste invoices. policable PO Box 9528, Newmarket, Auckland	
SECTION 2: TO BE COMPLETED I acknowledge the receipt of the Name: Title: Estimate SECTION 3: TO BE COMPLETED I acknowledge that the waste co Name of Facility: Address of Facility: Name: Stephenbe Title: Manager Method of Disposal La Dis form has to be completed in turned to the above address ar	BY THE TRANSPORTE waste consignment of Signature: Date: Date: d Quantity of Waste: BY THE DISPOSER/ST onsignment described RCROUP (MUDEN H Signature: Date: Quantity: ndfill Date: Autor Management Date: Date: Conjunction with the d should accompany Return the comp (Delete if not ap	Image: Barrier Storage ORER has been received LAD Kondo BERC Brack DI -10 - 15 20 Line aged Fill Treatment Storage accompanying dangerous goods form and waste invoices. pleted form to:	

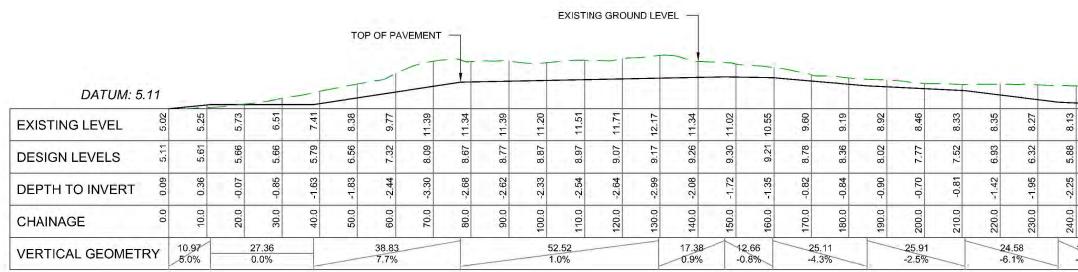


BAYLY ROAD - DETAILED SITE INVESTIGATION

Appendix J: Proposed Marae Development Architect Drawings



btw company	BTW Company Ltd Cnr. Courtenay & Eliot Sts. P.O Bcx 551, NEW PLYNOUTH 4340 Db /06: 750 540	GENERAL NOTES 1. Coordinates in terms of : Geodetic Datum (Taranaki 2000) 2. Elevations in terms of : Mean Sea Level (Taranaki Datum 1970)	1 1 1 1 1 2 1 1 1 1 3 1 1 1 1 4 1 1 1 1		BAYLY ROAD
. surveyors . planners	Ph (06) 759 5040 Ph 0800 289787 Fax (06) 759 5049 E-mail survey@btwcompany.co.nz	3. Contour Interval Is : 0.5m	Image: Second		PROJECT No. 14501 SCALE 1:400 @ A3
. engineers . land & g-i-s services	Web www.btwcompany.co.nz	SCALE 1 : 400	1 06.07.15 LB IS . . BUILDING CONSENT NO DATE BY CHKD APPR OPER DESCRIPTION REVISIONS	NUMBER TITLE REFERENCE DRAWINGS	-



KERB LONGSECTION CH0 - CH300

SCALE V 1:500, H 1:1000

														EXISTI	NG GRO	UND LEV															
						тс	P OF PAV	EMENT	1																						
DATUM: 4.	90			-			-	-	-+		-1	-				-1				-	1		-	1							
EXISTING LEVEL	8.50	8.39	8.59	8.57	8.57	8.84	8.87	8.58	8.25	7.81	8.40	10.16	9.90	9.63	8.44	9.40	10.65	10.65	10.32	9.49	8.39	8.24	8.70	9.28	8.68	7.83	6.85	5.90	5.37	5.24	4.88
DESIGN LEVELS	5.81	5.94	6.53	7.14	17.7	8.14	8.65	8.98	9.19	9.26	9.26	9.26	9.23	9.17	9.11	9.13	9.18	9.08	8.98	8.88	8.78	8.68	8.58	8.07	7.12	6.17	5.55	5.55	5.55	5.35	5.82
DEPTH TO INVERT	-2.69	-2.46	-2.06	-1.43	-0.86	-0.70	-0.23	0.40	0.94	1.45	0.86	-0.90	-0.68	-0.46	0.67	-0.26	-1.47	-1.57	-1.34	-0.61	0.39	0.44	-0.12	-1.21	-1.56	-1.66	-1.30	-0.35	0.18	0.10	0.04
CHAINAGE	300.0	310.0	320.0	330.0	340.0	350.0	360.0	370.0	380.0	390.0	400.0	410.0	420.0	430.0	440.0	450.0	460.0	470.0	480.0	490.0	500.0	510.0	520.0	530.0	540.0	550.0	560.0	570.0	580.0	590.0	6.69.8
VERTICAL GEOMETI		42.28 5.60 -0.1% 5.49		24.58 6.1%		0.45	17.88 5.1%	10.0	67 4.69 % 5.1%		33.20 0.0%			28.73 -0.69		15.		13.31 -1.0%			52.78 -1.0%				31.3 -9.5			27.19 0.0%		-3.2	.03 2%

KERB LONGSECTION CH300 - CH593.7

SCALE V 1:500, H 1:1000

Disclaimer: Areas and dimensions may be subject to scale error. Scaling from this drawng is at the users risk.



btw company surveyors planners engineers

land & g-i-s services

BTW Company Ltd Cnr. Courtenay & Eliot Sts. P.O Bcx 551, NEW PLYNOUTH 4340 Ph (06i 759 5040 Ph 0800 289787 Fax (06) 759 5049 E-mail survey@btwcompany.co.nz Web www.btwcompany.co.nz GENERAL NOTES 1. Coordinates in terms of ; Geodetic Datum (Taranaki 2000) 2. Elevations in terms of : Mean Sea Level (Taranaki Datum 1970) 3. Contour interval is : -

1 :							REVISIONS	REFE	ERENCE DRAWINGS					40	14001-01-01	2				
NO	DA	TE	BY	CHKD.	APPR	OPER	DESCRIPTION	NUMBER	TITLE	 A. 1000 				43	14501-01-01		1			
1	06.07	7,15	LB	IS	-	100	BUILDING CONSENT	= 1 (2 (1	1. 1. 1. 1.			ORIGI	NAL SIZE	ERAWING No	SHEET	REVISIO			
1			-			12-2	14			SCALE	AS SHOWN	APPROVED		- ·	KENDING LONGSECTION					
1.				1.4		1.0.		and the second		14501		PROJ. ENG.		1.	KERBING LONGSECTION					
l pro-		-		1.1.1			*			PROJECT		DES. CHK.			BAYLY ROAD, NEW PL'	YMOUTH				
1											Statistical replacedor	CHECKED	ISTEELE	06.07.15						
12	1		-		-			1.		BAYLY ROAD		DRAWN	L BUNN	06.07.15	NGAMOTU MARAE	PRO.JF	FCT.			
1.0		-		0		- (<u> </u>	(m			LOCATIO	N	SURVEYED	PA & NC	08/07/14						

7.56	7.14	7.31	7.68	8.10	8.50
5.65	5.77	5.84	5.83	5.82	5.81
-1.91	-1.37	-1.46	-1.85	-2.28	-2.69
250.0	260.0	270.0	280.0	290.0	300.0

BUILDING CONSENT

CTATION	NORTHING	FACTING	
STATION	NORTHING	EASTING	LEVEL
S1	808240.00	384019.74	5.11
S2	808240.10	384020.77	5.17
53	808236.00	384029.30	5.66
S4	808213.50	384044.87	5.66
S5	808203.73	384079.67	8.64
S6	808222.26	384128.81	9.17
S7	808229.65	384137.24	9.27
S8	808234.94	384139.91	9.32
S9	808246.24	384145.62	9.22
S10	808268.65	384156.94	8.15
S11	808271.89	384158.58	8.06
S12	808280.53	384157.84	7.82
S13	808283.67	384149.76	7.6
S14	808282.92	384145.82	7.5
S15	808278.33	384121.67	5.99
S16	808276.61	384112.59	5.77
S17	808277.27	384107.90	5.66
S18	808277.87	384106.70	5.63
519	808278.86	384104.74	5.67
S20	808277.74	384101.31	5.73
S21	808270.39	384097.55	5.85
S22	808268.45	384096.56	5.85
S23	808260.68	384111.94	5.85
524	808260.90	384112.62	5.85
S25	808265.20	384114.79	5.8
S26	808265.42	384115.46	5.8
S27	808262.53	384121.17	5.86
S28	808265.39	384122.61	5.86
529	808267.56	384118.32	5.8
\$30	808268.23	384118.10	5.8

STATION	NORTHING	EASTING	LEVEL
S31	808269.38	384118.68	5.80
S32	808272.93	384122.69	6.10
S33	808277.51	384146.85	7.61
S34	808275.73	384151.44	7.82
S35	808270.82	384151.87	8.04
\$36	808257.59	384140.05	8.95
S37	808256.36	384129.81	9.02
S38	808258.48	384125.63	9.24
S39	808239.64	384116.11	9.26
S40	808234.19	384126.92	9.26
S41	808234.41	384127.59	9.26
S42	808239.35	384130.08	9.22
S43	808239.57	384130.75	9.22
S44	808238.04	384133.79	9.19
S45	808247.32	384138.48	9.09
S46	808248.89	384135.37	9.09
S47	808249.45	384135.18	9.09
S48	808250.55	384138.54	9.09
S49	808249.62	384140.39	9.09
\$50	808248.72	384140.71	9.09
S51	808237.42	384135.00	9.19
S52	808232.13	384132.33	9.13
S53	808227.40	384126.87	9.06
\$54	808208.86	384077.69	8.53
S55	808210.12	384057.01	6.55
S56	808216.88	384049.22	5.55
S57	808239.09	384033.85	5.55
S58	808245.57	384020.28	5.03
\$59	808245.48	384019.25	5.00
S60	808245.48	384019.25	5.00

-

BUILDING CONSENT

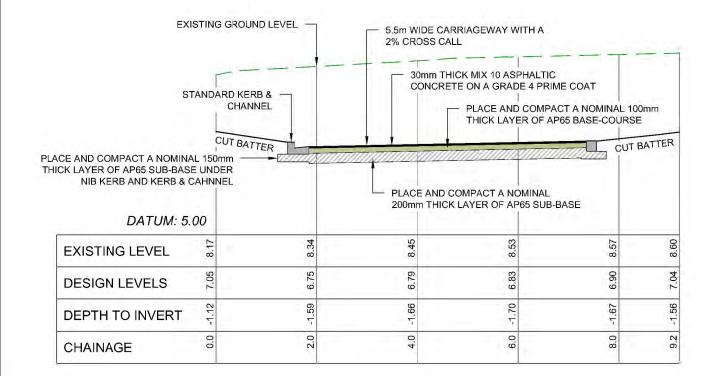
BAYLY ROAD PROJECT No. 14501 2 2 2 - A - 1 1 06.07.15 LB IS . BUILDING CONSEN SCALE -NO DATE BY CHKD. APPR. OPER. NUMBER TITLE REFERENCE DRAWINGS DESCRIPTIO REVISIONS

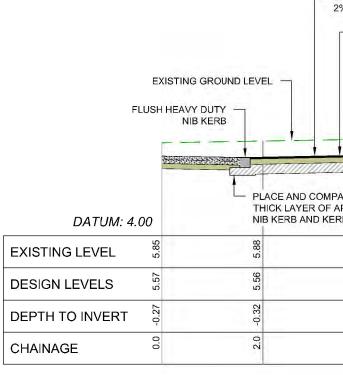


BTW Company Ltd Cnr. Courtenay & Eliot Sts. P.O Bcx 551, NEW PLYNOUTH 4340 Ph (06i 759 5040 Ph 0800 289787 Fax (06) 759 5049 E-mail survey@btwcompany.co.nz Web www.btwcompany.co.nz

GENERAL NOTES 1. coordinates in terms of : Geodetic Datum (Taranaki 2000) 2. Elevations in terms of : Mean Sea Level (Taranaki Datum 1970) 3. Contour interval is : -

			ORIGINAL SIZE		ERAWING No 14501-01-01	SHEET 3	REVISION							
1	APPROVED	ΠL.	1000		KERBING SETOUT DATA	Section and								
	PROJ. ENG.	U. ENG.			KERBING SETOUT DATA	KEDDING SETOUT DATA								
-	DES. CHK.				BAYLY ROAD, NEW PL	YMOUTH	2							
	CHECKED	IS	TEELE	06.07.15										
	DRAWN	LB	UNN	06.07.15	NGAMOTU MARAE PROJECT									
	SURVEYED	PA	PA & NC 08/07/14		TITLE	S. 18. 18. 19. 2								





CROSS SECTION AA SCALE 1:75

CROSS SE SCALE 1:75

- 5

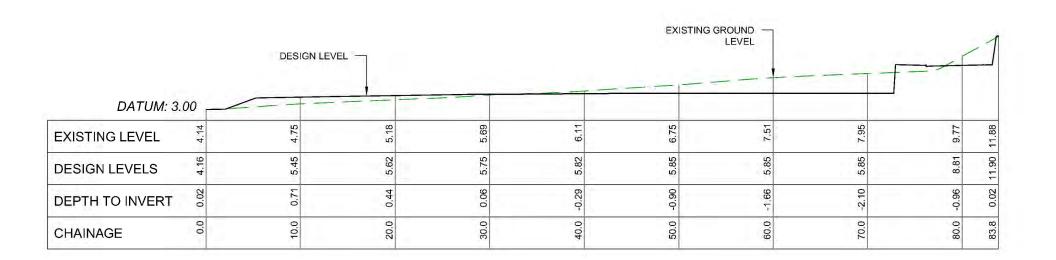
D

btw company	BTW Company Ltd Cnr. Courtenay & Eliot Sts. P.O Bcx 551, NEW PLYVOUTH 4340	GENERAL NOTES 1. Coordinates in terms of : NA 2. Elevations in terms of : NA			
. surveyors . planners	Ph (06) 759 5040 Ph (800 289787 Fax (06) 759 5049 E-mail survey@btwcompany.co.nz	3. Contour interval is : NA 0.5 0 0.5 1 1.5 2 2.5 3 3.5m			PROJECT No. 14501 SCALE 1:75 @ A3
. engineers . land & g-i-s services	Web www.btwcompany.co.nz	SCALE 1 : 75	1 06.07.15 LB IS . . BUILDING CONSENT NO DATE BY CHKD APPR DPER DESCRIPTION REVISIONS REVISIONS REVISIONS REVISIONS REVISIONS REVISIONS	NUMBER TITLE REFERENCE DRAWINGS	-

SUB-BASE UNDER CAHNNEL 200mm THICK LAYER OF AP65 SUB-BASE 50 50 50<	CONC)0mm
Image: constrained by the series of the s		THICK LAYE		John
A NOMINAL 150mm PLACE AND COMPACT A NOMINAL 20mm THICK LAYER OF AP65 SUB-BASE SUB-BASE UNDER PLACE AND COMPACT A NOMINAL 20mm THICK LAYER OF AP65 SUB-BASE Image: Sub-BASE UNDER Image: Sub-BASE Under Sub-BASE Image: Sub-BASE Under Sub-BASE Image: Sub-BASE Under Sub-BASE Image: Sub-BASE Under Sub-BASE Under Sub-BASE Image: Sub-BASE Under Sub-BASE Image: Sub-BASE Under Sub-BASE Und				
A NOMINAL 150mm PLACE AND COMPACT A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image: Compact A NOMINAL 200mm THICK LAYER OF AP65 SUB-BASE Image:			NIB KE	RB
A NOMINAL 150mm SUB-BASE UNDER TO NOMINAL 150mm CAHNNEL D D D D D D D D D D D D D D D D D D D	T		CUTBA	nc.
200mm THICK LAYER OF AP65 SUB-BASE UNDER 200mm THICK LAYER OF AP65 SUB-BASE 50 60 </td <td>N/III</td> <td></td> <td></td> <td></td>	N/III			
<u>с с с с с с с с с с с с с с с с с с с </u>	SUB-E	BASE UNDER	200mm THICK LAYER	
<u>TION BB</u>	5.91	5.95	6.04	6.09
<u>TION BB</u>		5.63	5.93	
TION BB	-0.32	-0.31	-0.10	
<u>TION BB</u>	0	0.0		
		G C (PA&NC 08/07/14 TITL	E	
	JRVEYED AWIN #CKED ES. CHK.	CG 08/07/14 L BUNN 06/07/15 ISTEELE 06/07/15		AE PROJE PLYMOUTH
ECKED LISTERIE DRAZIE	RVEYED BAWN HECKED SO JEKG	PA & NC 08/07/14 LBUNN 08.07.15 ISTEELE 06.07.15 	BAYLY ROAD, NEW PAVEMENT CROSS SEC	AE PROJE PLYMOUTH CTIONS

		EXISTI	NG GROUND		DESIG							
DATUM: 3.	00											~
EXISTING LEVEL	7.99	7.64	7.23	6.37	6.53	6.33	6.60	6.85	7.41	7.89	7.88	6.65
DESIGN LEVELS	7.88	5.71	5.83	5.83	5.85	5.85	5.85	5.85	5.85	5.76	6.09	6.65
DEPTH TO INVERT	-0.11	-1.93	-1.41	-0.54	-0.68	-0.48	-0.75	-1.00	-1.56	-2.13	-1.79	00.00
CHAINAGE	0.0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0	105.3

CROSS SECTION CC SCALE 1:400



CROSS SECTION DD SCALE 1:400

htwoompony	BTW Company Ltd Cnr. Courtenay & Eliot Sts.	GENERAL NOTES 1. Coordinates in terms of	f: NA							LOCATION	BAYLY ROAD	SURVEYED DRAWN	PA&NC L BUNN	08/07/14 06.07.15		PROJE	ECT
, surveyors	P.O Bcx 551, NEW PLYNOUTH 4340 2. Elevations in terms of : NA		: NA							PROJECT		CHECKED DES. CHK,				BAYLY ROAD, NEW PLYMOUTH	
	Ph (06) 759 5040 Ph 0800 289787 Fax (06) 759 5049			10 10 00		· ·				PROJECT	14501	PROJ. ENG.	i.		SITE CROSS SECTIONS		
, planners	E-mail survey@btwcompany.co.nz		4 8	8 12 16 20m	a					SCALE	1:400 @ A3	APPROVED		1 9	SITE CROSS SECTIONS	5 M	
. engineers	Web www.btwcompany.co.nz				1 06.07,15 LB IS .	BUILDING CONSENT		11000		1 1 1 1			ORIGI	VAL SIZE	ERAWING No	SHEET	REVISION
. land & g-i-s services		1. Contract 1. Con	SCALE 1 :	: 400	NO DATE BY CHKD APPR O	REVISIONS	DESCRIPTION	NUMBER REFER	TITLE RENCE DRAWINGS	<u>-</u>				43	14501-01-02	2	1





Disclaimer: Boundary Information and Photographic imagery has been imported from external sources. Areas and dimensions may be subject to scale error. Scaling from this drawng is at the users risk.

16 20m 12 SCALE 1 : 400

Ω

GENERAL NOTES 1. Coordinates in terms of : Geodetic Datum (Taranaki 2000) 2. Elevations in terms of : Mean Sea Level (Taranaki Datum 1970) 3. Contour interval is : 0.5M

NGAMOTU MARAE EXISTING CONTOURS