

SOUTH TARANAKI DISTRICT COUNCIL

Special Environment and Hearings Committee Agenda

**Monday 2 December 2013
Council Chamber 9.00 am**



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Alive with opportunity



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Councillor B Bigham
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Next Meeting Date
Closing Date for Reports (Elected Members)

Monday 3 February 2014
Monday 20 January 2014

SOUTH TARANAKI DISTRICT COUNCIL

A meeting of the Special Environment and Hearings Committee will be held in the Council Chamber, Administration Building, Albion Street, Hawera on Monday 2 December 2013, commencing at 9.00 am.

A G E N D A

- 1. APOLOGIES**
- 2. REPORT**
 - (a) Planner, Maria Cashmore**
 - (i) Proposed Two Lot Residential Subdivison in a site included on the Hazardous Activities and Industries List, 16 Richmond Street, Patea. See page 4.**



Subdivision Consent Report

RMS12035

To	Environment and Hearings Committee
From	Maria Cashmore, Planner
Date	22 November 2013
Subject	Proposed Two Lot Residential Subdivision in a site included on the Hazardous Activities and Industries List, 16 Richmond Street, Patea

Applicant: John Groat and Rebecca White
Zone: Residential
Activity Status: Subdivision - Controlled (District Plan)
 - Restricted Discretionary (NES)
 Land Use - Discretionary
Date of Site Visit: 30 November 2012

APPLICATION

Sue Robb, Planner of BTW Company Limited, has submitted a resource consent application (refer to Appendix 2) on behalf of John Groat and Rebecca White to subdivide the property at 16 Richmond Street, Patea into Lot 1 of 2,810 m² and Lot 2 of 2,420 m².

The site has five allotments (Lot 1 DP 6456, Lots 9-11 DP 53 and Lot 3 DP 6868) identified in separate Certificates of Title: Lot 1 DP 6456 is in TN165/94, Lots 9-11 DP 53 are in TN130/193 and Lot 3 DP 6868 is in TN193/52. TN165/94 shows a Memorandum of Acceptance imposing a Building Line Restriction (BLR) on Lot 1 DP 6456. Prior to 1991, BLRs were used on titles to ensure that future road widening could occur.

The site includes the Men's and former Women's Bowling Clubs which have frontage onto Meredith Street (north) and Richmond Street (south) respectively. The site is known as the Patea Bowling Club. The Men's Bowling Club has a clubhouse, several sheds and a bowling green and is still operating. The Women's Bowling Club has been closed for several years with the existing clubhouse and grounds in a state of disrepair.



Lot 1 would include the Men's Bowling Club and Lot 2 would include the Women's Bowling Club. The existing buildings were built-over boundaries of each allotment and are not permitted in accordance with the Building Act. The proposed new boundaries of the subdivision would correct this non-compliance.

Lot 1 would continue to be used as a Bowling Club and the applicants intend to use Lot 2 for residential purposes. The existing building in Lot 2 would be converted to a dwelling to cater for this purpose. Although the subdivision would correct the non-compliance in terms of the Building Act, the new internal boundaries of the subdivision would be placed close to existing buildings and would not comply with the applicable yard setback requirements of the District Plan: five metres from the rear boundary and 1.5 metres from the side boundary (for a dwelling), one metre from the rear and side boundaries (for an accessory building). The application includes yard dispensations for the above non-compliance. A fire wall would be constructed in between two existing buildings abutting each other. The buildings would comply with the applicable height-to-boundary requirements of the District Plan.

Since the advent of the Resource Management Regulations 2011 (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health), activities that potentially create contaminants in the soil and cause adverse effects on human health are scheduled in a list called the Hazardous Activities and Industries List (HAIL). Bowling Clubs are included in the HAIL and are required to be assessed in accordance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

This application is presented to the Environment and Hearings Committee (EHC) for decision making because it is the first application received by the Council which relates to a site included in the HAIL. The decision of the EHC to grant or decline the application may provide guidance in terms of considering subsequent resource consent application of similar nature.

The application includes a Detailed Site Investigation (DSI) to meet the requirements of NES (refer to Appendix 2). Six soil samples were collected in Lots 1 and 2 and were tested for organochlorine pesticide traces, polycyclic aromatic hydrocarbons and endosulfan (known to have been used in the past). The soil tests reveal arsenic (heavy metal) levels in excess of both the Soil Contaminant Standard (SCS) residential 10% (20 mg/kg) and the rural-residential 25% SCS home produce consumption (17 mg/kg). Dieldrin (organochlorine pesticides) levels exceed the rural-residential 25% SCS but are within acceptable limits for residential 10%. There are no elevated levels of polycyclic aromatic hydrocarbons of concern to human health were detected. Because the DSI revealed that the soil contamination for Arsenic and Dieldrin exceeds the applicable standard, the proposal is treated as a Restricted Discretionary Activity in accordance to NES.

The site is located in the Residential Zone and has a typical residential environment where the primary land use is residential.

EVALUATION

The proposal includes three different activity statuses: Controlled for the proposed subdivision, Discretionary for the yard non-compliance and Restricted Discretionary for the contaminated site. These statuses are discussed below.

Yard Non-Compliance

The new internal side boundary between Lots 1 and 2 would be placed in between the existing buildings on both lots and would not meet the one metre (accessory building) and 1.5 metre (dwelling unit) side yard requirements of the District Plan respectively. The new internal rear boundary shared by Lots 1 and 2 would be located 1.58 metres from the existing clubhouse which would be converted to a dwelling and would not meet the five metre setback requirement of the District Plan.

The yard non-compliance is considered as a Discretionary Activity because the buildings in Lots 1 and 2 would not comply with all of the applicable performance standards of the District Plan and must be considered in terms of Objectives 2.04.1 (a), 5 and Policy 5(a) of the Plan (refer to Appendix 1). These Objectives and this Policy are in place to ensure that activities maintain the character and amenity values of the residential environment. They also ensure that there is adequate open space around buildings.

In my opinion, the yard non-compliance would not be readily visible by the public or adjoining property owners and occupiers because it would relate to existing buildings. The proposed new boundaries would simply correct the non-compliance of the buildings being built over boundaries in terms of the Building Act.

The application includes retaining the bowling green in Lot 1 and does not include any proposed new buildings in the bowling green of Lot 2. Because these areas would remain un-built, although there would be reduced yards from both shared internal boundaries of both lots, this un-built areas would provide access to open space.

The northern internal rear boundary shared by Lots 1 and 2 would be abutting the existing clubhouse. To ensure that the eaves and spouting would not protrude over the boundary and to ensure that stormwater is contained on-site, I recommend a consent condition reflecting these matters.

Subdivision

The application for subdivision is subject to the performance standards of the District Plan in respect of utilities, services and access.

Utilities and Services

The District Plan requires all lots to connect to reticulated services where these are available within 200 metres vicinity of the property. Hamish Stevenson, the Council's Development Control Engineer, has confirmed that water and sewer reticulation services are available. There are no reticulated stormwater services available within the area for private properties to connect to.

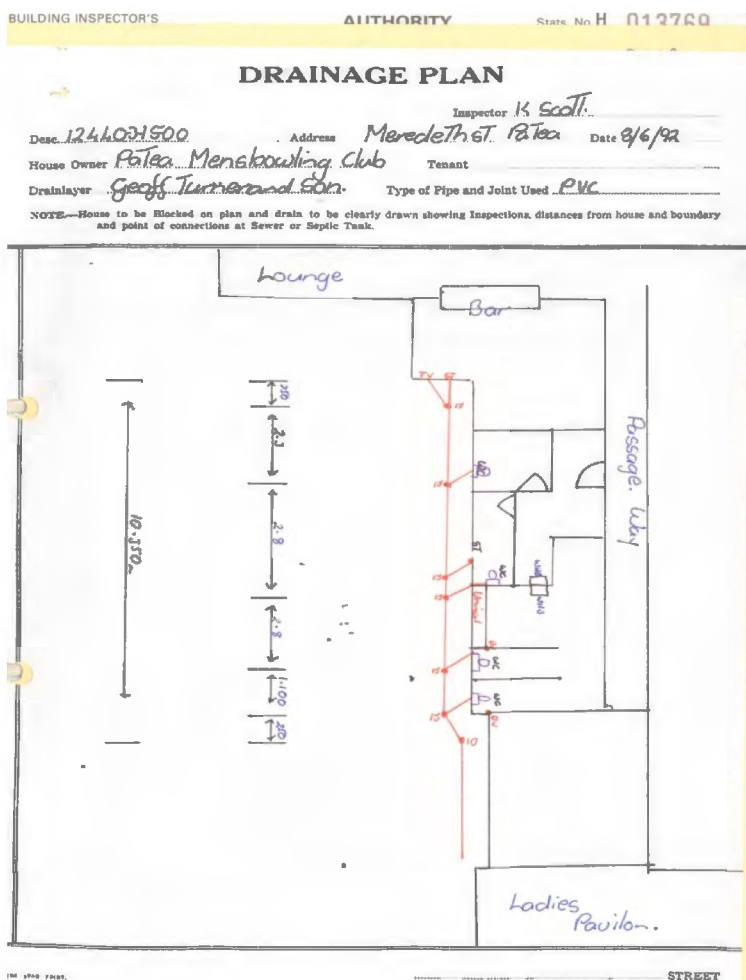
Water

According to the Council's Development Control Engineer, there are 100mm diameter Council water mains in Richmond Street and Meredith Street. Lot 1 has a metered water connection off the Meredith Street water main. Lot 2 has no water connection and should have a water connection installed. The property does not require a metered connection under our Water Metering Policy. A consent condition requiring this is recommended.

Sewer



The Council's Development Control Engineer has advised that there are 150mm diameter Council sewer mains in Richmond Street and Meredith Street and a 225mm diameter Council sewer main running through Lot 2 and through 12 Lincoln Street parallel to the west boundary of Lot 1.



Lot 1 is connected to this 225mm main (please refer to the above drainage diagram). Lot 2 shares the connection and should have a separate connection. There would need to be an easement in favour of Lot 1 over Lot 2 for the section of pipe that is within Lot 2.

Stormwater

The Council's Development Control Engineer has advised that there is a stormwater main running right through Lot 2. The stormwater main is intended to drain stormwater from the road reserve and private properties are not allowed to connect.

The application mentions that both lots would dispose stormwater through soak holes. In my opinion, this is appropriate and would meet the requirements of the District Plan. A consent condition is recommended to ensure that this is met.

Vehicle Access

The District Plan requires that all lots to have vehicle access onto a formed legal road.

Lots 1 and 2 have existing vehicle crossings onto Meredith and Richmond Street respectively. According to the Council's Development Control Engineer, these crossings meet the Council's Urban Property Entrance specifications and no work is required.

Reserve Fund Contributions

It is the Council's practice to require financial contributions in the form of reserve fund contributions for subdivisions located in the Residential Zone. As this application would reduce the number of lots from seven to two instead of creating new additional lots, I consider it inappropriate to request land to be set aside as reserve or require a reserve fund contribution (7.5% of the land value of any new lot created).

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

The activity is considered as a Restricted Discretionary Activity because it is not considered as a Permitted Activity or Controlled Activity and because the DSI has found the soil contamination for arsenic exceeds the applicable standard.

The Environment and Hearings Committee (the EHC) has restricted matters of discretion in considering the activity. The EHC is able to assess the following matters:

- Adequacy of the DSI,
- Suitability of the piece of land for the proposed activity,
- Approach to the remediation of the piece of land,
- Transport, disposal and tracking of soil and other materials taken away in the course of the activity,
- The need to require a financial bond,
- Timing and nature of the review of the conditions and
- Restrictions on the duration of the resource consent.

Adequacy of the DSI and suitability of the piece of land for the proposed activity

To assess the adequacy of the DSI and the suitability of the piece of land for the proposed activity, I requested Jonathan Findon of Geohazard Environmental, the Council's Environmental Scientist Consultant, to assess the DSI and to provide his recommendations (refer to Appendix 3). According to Mr. Findon, overall the DSI meets the reporting requirements of NES. After further statistical analysis of the laboratory results, he confirms that any samples collected at the site would be likely to exceed the guideline values. Remediation is required at the site prior to use for residential purposes. The existing Men's Bowling Club remains suitable for recreational land use without any remediation.

Approach to the remediation of the piece of land

The DSI proposes a capping method as a remediation method for Lot 2 to address the risk posed by the contaminants to human health. The bowling green would be covered by a minimum of 300 mm of clean fill. It is proposed that excavations below 300m cap would be restricted and controlled.

According to the Council's Environmental Scientific Consultant, the significant exposure route for arsenic uptake is through ingestion of soil and capping the site is a valid remediation method. The proposed minimum cap thickness of 300 mm is appropriate because of the moderate influence of vegetable consumption at a standard residential site. He further recommends that a Remediation Action Plan is provided to and approved by the Council prior to the approval of the Survey plan for the subdivision. Consent conditions requiring the above are recommended. In my opinion, the above proposed restriction on excavations below 300m cap would be best to be applied as an on-going condition to ensure that this is

registered on the Certificate of Title to inform future owners of the property, in the event that this property is sold.

The DSI recommends works to be undertaken prior to capping which include restricting vegetable gardens to raised beds (minimum 600mm above the existing ground level), no planting of fruit trees in the area, isolating and managing any excavated soil from the contaminated zone to avoid impacts on human health. The DSI also recommends works to be undertaken after capping which include restricting vegetable gardens to raised beds (minimum 300mm above the capped ground level, 600mm above existing), isolating and managing any excavated soil (excavations below 300mm) from the contaminated zone to avoid impacts on human health. The above works are proposed to be applied as on-going conditions. According to the Council's Environmental Scientific Consultant, the above are not necessary and would be impractical to monitor. In addition, given that the significant exposure route for arsenic uptake is through ingestion of soil and because of the moderate influence of vegetable (including fruit consumption) at a standard residential site, I believe that the above would not be necessary to be applied as on-going conditions.

The need to require a financial bond

I do not think that a requirement of a financial bond is appropriate in this case. I believe that the remediation of the land would adequately address the effects of the contaminated soil in terms of human health.

Transport, disposal, and tracking of soil and other materials taken away in the course of the activity

In the event of future site works and excavation in Lot 2 and when the lot is sold to a new owner, the DSI recommends an on-going condition providing information of the requirements of the NES around soil disturbance and removal. The Council's Environmental Scientific Consultant advises that the above is appropriate to advise future owners that contaminants are present in the soil at depths greater than 300mm. Minor excavation for fence posts and planting of shrubs are unlikely to present a significant risk to human health therefore a consent notice warning against this activity is considered unnecessary.

The DSI recommends a consent condition requiring the results of any soil tests and any remedial action undertaken to be made available to the TRC. In my opinion, the above is not included in the matters of discretion of the EHC and cannot be applied as a consent condition. Furthermore, the levels of arsenic are not expected to degrade within a reasonable period of time and therefore any further soil testing and any on-going monitoring is considered to be unnecessary.

The DSI recommends an advice note regarding animals known to have grazed on-site be placed on the consent that these animals be identified as not suitable for human consumption. I think this is appropriate.

Timing and nature of the review of the conditions

The application does not mention when remediation would be undertaken. To assess the appropriate timing of remediation works, I've asked the advice of the Council's Environmental Scientist Consultant. According to the Council's Consultant, the Tauranga City Council and Rotorua District Council both take the approach that remedial works are required prior to obtaining the final approval of the survey plan. The rationale is that the site is to be considered "suitable for use" for the end user of the site, who may not make their own due diligence research, nor be aware of potential cost of remediation. Given the approach by other District Councils, the Council's Environmental Scientific Consultant recommends that

remediation works be completed prior to the approval of the final Survey plan. The conditions applied to the consent would be reviewed in terms of compliance at this time.

Restrictions on the duration of the resource consent

The proposal does not include any transport, disposal and tracking of soil or other materials. I do not think it is necessary to apply a condition restricting the duration of the resource consent due to the nature of the proposal.

Part 2 of the Resource Management Act 1991

I consider that the proposed subdivision is consistent with Section 5(c) of the Act, with regards to the purpose of sustainable management. The conditions applied, if consent is granted, would ensure the effects of the subdivision on the surrounding environment would be avoided, remedied or mitigated.

Section 7(c) requires that, in achieving the purpose of the Act, all persons shall have regard to the maintenance and enhancement of amenity values. The assessment of environmental effects concludes that the reduced yards would not compromise the amenity of the surrounding environment because this relates to existing buildings. There are no new proposed buildings associated with the proposal.

I further consider that the proposed subdivision would not compromise the character or amenity of the surrounding environment because of there would be no changes to the existing use of Lot 1. Lot 2 would be used for residential activities which would be consistent with the adjoining activities. The subdivision simply would simply separate the Men and Women's Bowling Club and correct the non-compliance in terms of buildings being built over boundaries.

This application does not involve any matters of national importance or known cultural issues.

CONCLUSION

I consider that the position of the new boundaries being closer to existing buildings would not give rise to any more than minor adverse effects in terms of amenity because there would be no physical change arising from the proposal. The proposed subdivision would not compromise the character and amenity of the area. Conditions imposed on the consent would ensure that the subdivision would not result in any adverse effects that are more than minor. The remediation conditions including on-going conditions would ensure that the subdivision would adequately cater for residential use of Lot 2 and would also ensure that the contaminated soil would not adversely impact on human health. The proposal is consistent with the purpose and principles of the Resource Management Act 1991 and the applicable Objectives and Policies of the District Plan.

RECOMMENDATIONS

THAT consent be granted to John Groat and Rebecca White to subdivide a site included in the Hazardous Activities and Industries List located at 16 Richmond Street, Patea (Lot 1 DP 6456, Lots 9-11 DP 53 and Lot 3 DP 6868) into Lot 1 of 2,810 m² and Lot 2 of 2,420 m² pursuant to Sections 104, 104C and 108 of the Resource Management Act 1991 and Section 10 of Resource Management Regulations 2011 (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health).

THAT consent be granted to John Groat and Rebecca White for yard dispensations to position the new internal northern boundary of the above subdivision 1.58 metres from the existing building in Lot 2 and to position the new internal eastern side boundary in between the existing building in Lots 1 and 2 of the above property pursuant to Sections 104, 104B and 108 of the Resource Management Act 1991.

For the following reasons:

1. The position of the new boundaries being closer to existing buildings would not give rise to any more than minor adverse effects in terms of amenity because there would be no physical change arising from the proposal.
2. The proposed subdivision would not compromise the character and amenity of the area. Conditions imposed on the consent would ensure that the subdivision would not result in any adverse effects that are more than minor.
3. The remediation conditions including on-going conditions would ensure that the subdivision would adequately cater for residential use of Lot 2 and would also ensure that the contaminated soil would not adversely impact on human health in terms of both lots.
4. The proposal is consistent with the purpose and principles of the Resource Management Act 1991 and the applicable Objectives and Policies of the District Plan.

Subject to the following conditions:

1. That the eaves and spouting of the existing building in Lot 2 do not protrude over the new northern rear boundary of this lot.
2. That Lot 2 has a connection to the Council's water main in Richmond Street.
3. That Lot 2 has a separate connection to the Council's sewer main.
4. That all lots are self-sufficient in terms of stormwater disposal and that there shall be no cross boundary effects.
5. That, where installed, electricity, telecommunication and gas distribution lines are installed underground.
6. That an easement to drain sewage in favour of Lot 1 over Lot 2 for the section of pipe that is within Lot 2 is duly granted and reserved, and shown on the Land Transfer Plan.
7. That easements in gross registered for the Council's sewer and stormwater mains within Lot 2 are duly granted and reserved, and shown on the Land Transfer Plan.
8. That a Remediation Action Plan for Lot 2 is provided to and approved by the Group Manager Environmental Services and should include the following:
 - An outline of the site (location and summary of sampling results)
 - Objectives of the remediation
 - A plan showing areas to be remediated and approximate volumes of soil to be removed or imported
 - Confirmation of any consents obtained, if required
 - Outline of soil handling (includes by hand or by machine)
 - Site environmental management (includes silt fences, if required)

- Disposal and transportation of disposed soil, if required
 - Origin of clean soil to be used on-site
 - Method of site validation to ensure that the site is suitable for use when remediation has been completed
 - Health and Safety (includes protection for workers against dust)
9. That the remediation of Lot 2 is undertaken in accordance with the approved Remedial Action Plan.
10. That a consent notice with the following wording is registered against the Certificate of Title for both lots in accordance with Section 221 of the Resource Management Act 1991:

“Lots 1 and 2 have been identified as having contaminants above levels that may affect human health. Remediation or further investigation may be required prior to any future site works, excavation, or change of land use.”

“Any food for human consumption grown on Lots 1 and 2 shall only be grown in raised beds of clean soil that have a minimum depth of 600mm above the original soil height.”

Advice note:

1. *All animals known to have grazed on-site are identified as not suitable for human consumption.*

[Prepared by]
Maria Cashmore
Planner

[Seen by]
Blair Sutherland
Planning

APPENDIX 1:

DISTRICT PLAN REQUIREMENTS

SECTION 4: RESIDENTIAL ZONE

4.01.4 DISCRETIONARY ACTIVITIES

- (a) Any activity, other than an activity listed in Sections 4.01.5 or 4.01.6 below which cannot meet the performance standards set out or referred to in Sections 4.02 and 4.03 below which and has not been granted a resource consent as a controlled activity.

4.02 PERFORMANCE STANDARDS - PERMITTED ACTIVITIES

4.02.1 Bulk and Location

All Activities

1. Front sites directly adjacent to a public road:
 - (a) A building (other than an accessory building), shall be located no closer than:
 - (i) 3 metres to another building not being an accessory building on a different site; and
 - (ii) 1.5 metres to its side boundaries; and
 - (iii) 4.5 metres to its road boundary; and
 - (iv) 5 metres to its rear boundary.
 - (b) An accessory building shall be located:
 - (i) To the rear of a dwelling if a dwelling is on the site; or 20 metres from its road boundary if no dwelling is on the site; and
 - (ii) No closer than 1 metre to the rear or side boundary.

5. No part of any building may extend above the natural ground level at the nearest site boundary by more than 3 metres plus the horizontal distance between that part of the building being measured and the nearest site boundary.

SECTION 8: SUBDIVISION

8.01.2 Controlled Activities

- (c) Subdivision that fully complies with the performance standards set out or referred to in Section 8.02 and is not listed in Sections 8.01.3, 8.01.4 and/or 8.01.5.

8.02 Performance Standards

8.02.1 Utilities and Services

1. Where public water, sewerage and/or drainage services are available within 200 metres of any boundary of any lot of a proposed subdivision, all lots shall be connected to such available services at the time of subdivision, unless it can be demonstrated that there is a more sustainable option.
2. Where public water, sewerage and/or drainage services are not available within 200 metres of a proposed subdivision, all lots shall be self-sufficient in terms of water supply, drainage and effluent disposal. Sufficient regard to suitability in respect of topography, soils, water tables and proximity to water bodies must be demonstrated.
3. In residential, commercial and industrial zones, and in other zones where power lines, gas distribution pipes and communication lines are available within 200 metres of any boundary of any lot of a proposed subdivision, the services, where installed, shall be provided underground to the subdivided land.
4. At the time of subdivision sufficient land for transformers and associated ancillary services shall be set aside.
5. All necessary easements for the protection of utilities and services to the lot(s) shall be provided by the subdivider, and duly granted and reserved.
6. NZS 4404:2004 Land Development and Subdivision Engineering shall be complied with where necessary.

8.02.2 Vehicle Access

1. All lots shall provide vehicle access, in accordance with the Council's vehicle crossing standards (set out in Appendix VI), to a formed legal road.
2. NZS 4404:2004 Land Development and Subdivision Engineering shall be complied with, including (where necessary) the requirements for upgrading and/or forming vehicle crossings, roads and rights-of-way in all zones.

Advice Note:

Subdivision must also comply with all other relevant rules of the District Plan and in the case of this application, Section 4.

SECTION 2: GENERAL OBJECTIVES AND POLICIES

Policies

- 1(c) To manage the subdivision of land.

Objective 5

Maintain and where practicable improve the environment around people's homes, farms, business activities and community facilities.

Objective 5.1

Maintain and where practicable improve the social, cultural, and physical health, safety and well-being of the residents and communities of the District.

Policies

- 5(a) To enable a variety of activities to establish provided that they do not reduce the quality, amenity values, character or sustainability of the environment.

2.04 THE RESIDENTIAL ZONE**2.04.1 OBJECTIVES**

- (a) Maintain and improve the character and amenity values of residential neighbourhoods ensuring:

* Activities do not detract from those amenity values

2.04.2 POLICIES

- (a) To control the bulk and location of building to maximise the penetration of daylight and sunlight to adjacent sites, the availability of open space around dwelling units and the accessibility of dwelling units for vehicles.

Other Legislation**Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011****10 Restricted Discretionary Activities**

- (1) This regulation applies to an activity described in any of regulation 5(2) to (6) on a piece of land described in regulation 5(7) or (8) that is not a permitted activity or a controlled activity.
- (2) The activity is a restricted discretionary activity while the following requirements are met:
- (a) a detailed site investigation of the piece of land must exist:
 - (b) the report on the detailed site investigation must state that the soil contamination exceeds the applicable standard in regulation 7:
 - (c) the consent authority must have the report:
 - (d) conditions arising from the application of subclause (3), if there are any, must be complied with.
- (3) The matters over which discretion is restricted are as follows:
- (a) the adequacy of the detailed site investigation, including—
 - (i) site sampling:
 - (ii) laboratory analysis:
 - (iii) risk assessment:
 - (b) the suitability of the piece of land for the proposed activity, given the amount and kind of soil contamination:
 - (c) the approach to the remediation or ongoing management of the piece of land, including—

- (i) the remediation or management methods to address the risk posed by the contaminants to human health:
- (ii) the timing of the remediation:
- (iii) the standard of the remediation on completion:
- (iv) the mitigation methods to address the risk posed by the contaminants to human health:
- (v) the mitigation measures for the piece of land, including the frequency and location of monitoring of specified contaminants:
- (d) the adequacy of the site management plan or the site validation report or both, as applicable:
- (e) the transport, disposal, and tracking of soil and other materials taken away in the course of the activity:
- (f) the requirement for and conditions of a financial bond:
- (g) the timing and nature of the review of the conditions in the resource consent:
- (h) the duration of the resource consent.

APPENDIX 2: APPLICATION



Application for Resource Consent & Assessment of Environmental Effects

Proposed Subdivision of Lots 9-11
Deeds Plan 53, Lot 3 DP 6868 & Lot
1 DP 6456

by *BTW Company Ltd*

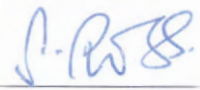
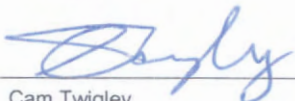
for R White & R Groat



Proposed Subdivision of Lots 9-11 Deeds Plan
53, Lot 3 DP 6868 & Lot 1 DP 6456
12217

for R White & R Groat

Reviewed

Report Author		<u>3.10.12</u>
	Sue Robb	Date
Reviewed by		<u>3.10.12</u>
	Cam Twigley	Date

12263
10/2012

SUMMARY

BTW Company, on behalf of applicants Rebecca White and Rob Groat, hereby applies for resource consent to subdivide the property at 16 Richmond Street Patea, legally described as Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456, into two lots.

The application is classified as controlled under 8.01.2 (c) of the South Taranaki District Plan (STDP) as it fully complies with all performance standards for subdivision under the STDP.

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Figure 1.2:	View NE showing bowling green's concrete nib (painted, centre of image), being proposed new boundary between Lots 1 & 2. Building in foreground is Women's clubhouse, with roof damage and partially boarded up. Building line is 1.58m back from proposed boundary (concrete nib).	5
Figure 1.3	View SW on new boundary, showing small shed housing mower (RHS of image) to remain within Lot 1. Concrete pad and ramp leads onto green. Shed on LHS of image to remain within Lot 2, with new boundary 1.3m off each shed.	5
Figure 1.4.	Existing vehicle crossing to proposed Lot 1 from Meredith Street.	6
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1 INTRODUCTION

1.1 Application Details

<i>Applicant:</i>	Rebecca White & Rob Groat
<i>Land Location:</i>	16 Richmond Street, Patea
<i>Legal Description:</i>	Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456
<i>Certificates of Title:</i>	TN130/93, TN164/94, TN193/52
<i>Consent Sought:</i>	Subdivision Consent
<i>Zone:</i>	Residential
<i>Activity Status:</i>	Subdivision – Controlled
<i>Site Status:</i>	No notable items, streams or covenants

1.2 Site Description

The subject land contains the Patea Bowling Club, comprising the Patea Men's Bowling Club fronting Meredith Street, and the Patea Women's Bowling Club fronting Richmond Street

The site lies within Patea's residential zone, on the western edge of the township. Vehicle access to the site is from Meredith Street in the north (Men's Bowling Club) and Richmond Street in the south (Women's Bowling Club). The site is flat and fully fenced on the perimeter. The Men's Bowling Club is fully functional and contains a clubhouse, several sheds and a well maintained green (proposed Lot 1). The Women's Bowling Club clubhouse and grounds are disused and in a state of disrepair, and are surplus to club requirements (proposed Lot 2).

1.3 Subdivision Proposal

Rebecca White & Rob Groat ('the applicants') hereby apply to subdivide the property at 16 Richmond Street into two allotments, as shown on attached scheme plan BTW Company Ltd Drawing No. 12217-01-Rev02 (Appendix C). The property is currently held in three certificates of title, being Lots 9-11 Deeds Plan 53 & Lot 3 DP 6868 and Lot 1 DP 6456 (See Appendix B, Certificates of Title). The club buildings straddle the boundary between two certificates of title (TN130/193 and TN164/94), but the proposed subdivision will rectify that situation.

Proposed Lot 1 will continue to function as the Patea Bowling Club. The applicant proposes to redevelop proposed Lot 2 for residential purposes, repairing and converting the Women's clubhouse into a dwelling.

Proposed lots are shown in Table 1.1 below:

Table 1.1: Proposed lots and areas

PROPOSED LOT	AREA
1	2795m ²
2	2435m ²

As TN130/193 (Lot 9-11 Deeds Plan 53) is limited as to parcels, final area of proposed Lot 1 may vary from that shown on the scheme plan.

The Men's and Women's clubhouse buildings abut each other along the south-eastern boundary of proposed Lot 1, forming a continuous frontage with a veranda roof over a concrete walkway along the south-east of the green. A fire-rated wall will be required between the two existing buildings as they will both be retained. The new boundary between Lots 1 and 2 will then follow the concrete nib wall on the south-eastern side of the bowling green on Lot 1, terminating between two sheds on the south-west boundary. The shed to the north of this point houses a mower used for maintaining the green, and will be retained within Lot 1, and the shed to the south will be retained for Lot 2's use. Both sheds comply with setback rules of 1m from the new boundary.

Figure 1.1: View SW across Men's Club green to continuous frontage of club buildings on SE side of green. Women's club house is partially boarded up and temporary tarpaulins utilised to prevent further deterioration from roof damage.



Figure 1.2: View NE showing bowling green's concrete nib (painted, centre of image), being proposed new boundary between Lots 1 & 2. Building in foreground is Women's clubhouse, with roof damage and partially boarded up. Building line is 1.58m back from proposed boundary (concrete nib).



Figure 1.3: View SW on new boundary, showing small shed housing mower (RHS of image) to remain within Lot 1. Concrete pad and ramp leads onto green. Shed on LHS of image to remain within Lot 2, with new boundary 1.3m off each shed.



Figure 1.4: Existing vehicle crossing to proposed Lot 1 from Meredith Street



Figure 1.5: Existing vehicle crossing to proposed Lot 2 from Richmond Street



2 SOUTH TARANAKI DISTRICT PLAN

An assessment of all aspects of the applicant's proposal against the relevant South Taranaki District Plan (STDP) subdivision rules has been undertaken.

2.1 South Taranaki District Plan (STDP) Subdivision Rules Assessment

2.1.1 Classification of the Activity under the STDP

The property to be subdivided is located in the Residential Zone of the South Taranaki District Plan (STDC) as shown on STDP Planning Map No. 43. The activity is governed by the following planning rule:

Table 2.1: STDP subdivision rules

Activity	Comment
8.01.2 (c) Subdivision that fully complies with the performance standards set out or referred to in Section 8.02 and is not listed in Sections 8.01.3, 8.01.4 and/or 8.01.5	Complies with all Performance Standards of the STDP, as shown below Controlled Activity

The proposed subdivision is a controlled activity as it meets all performance standards under STDP Section 8.02. The proposed lots would be used for club and residential purposes, both permitted activities within the current zoning.

2.1.2 Subdivision Performance Standards – Controlled Activity

The subdivision will meet the performance standards set out in the STDP as follows:

Table 2.2: Assessment of proposal against STDP Performance Standards

Performance Standard	Comment
Utilities and services	<p>Water. The men's clubhouse on Lot 1 has a metred water supply from Meredith Street. Water to the women's clubhouse was disconnected in 2009 to save on rates. A new water connection will be made from Richmond Street for Lot 2. No easements are required.</p> <p>Power to the property currently comes from Richmond St. This connection will be retained for Lot 2 and a new connection laid underground for Lot 1 from Meredith St.</p> <p>Stormwater and sewerage. Both lots will drain stormwater to soakholes without cross-boundary effects.</p> <p>Due to the historic shared sewer connection to the two clubhouses, a new sewer connection will be required for proposed Lot 2. The current connection to the site is from the sewer manhole at the SW corner of Lot 1. Investigation is currently underway to verify the exact location of the sewer within Lots 1 and 2. As the exact location of the sewer pipe within the property is not known, easements cannot be shown on the scheme plan, but will be verified at time of final survey and all necessary easements created</p>

Proposed Subdivision of Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456

Building Platform	Both lots contain existing buildings. No new building platforms are required.
Bulk and Location	<p>Installation of a fire-rated wall on the new boundary between the Men's and Women's club buildings will be required, as shown on the scheme plan. The building line of the Women's club house lies 1.58m back from the new boundary, thus complying with STDP performance standards. The damaged veranda roof will be removed back to the building and a new roof installed with a shallower 0.4m eave. All rebuilding work will ensure the buildings comply with bulk and location rules relative to the new boundaries.</p> <p>Both sheds at W end of new boundary meet setback rules from the new boundary.</p>
Vehicle Access	Proposed Lot 1 has an existing vehicle crossing from Meredith St. Proposed Lot 2 has an existing crossing from Richmond St suitable for residential use. Sight distances on Richmond St and Middlesex St meet STDP standards of 45m for the 50km/hr posted legal speed.
Heritage Items	No SNA or Waahi tapu has been identified on the application site.

3 THE RESOURCE MANAGEMENT ACT 1991 (RMA)

3.1 Section 104

The matters that Council must have regards to in considering the application under Section 104 of the Act are all subject to Part 2 of the RMA. Part 2 deals with the purpose and principles of the Act.

As a Controlled activity, the proposal must be considered pursuant to Section 104 and 104A of the Act. In considering an application pursuant to Section 104 and subject to Part 2 of the Act, the consent authority shall have regard to specific matters. Those relevant to this application include:

- (a) *Any actual or potential effects on the environment of allowing the activity; and*
- (b) *Any relevant provisions of –*
 - (i) *a national environmental standard;*
 - (ii) *other regulations;*
 - (iii) *a national policy statement;*
 - (iv) *a New Zealand Coastal Policy Statement;*
 - (v) *a regional policy statement or proposed regional policy statement;*
 - (vi) *a plan or proposed plan, and*
- (c) *Any other matter that the consent authority considers relevant and reasonably necessary to determine the application.*

Comment: The South Taranaki District Plan is the plan of relevance to this application and is discussed along with potential effects on the environment in sections 2 and 4 of this report. There are no national environmental standards, national policy statements, New Zealand Coastal Policy Statements, regional policy statements or proposed regional policy statements or other regulations that need to be considered in any detail when determining this application.

3.2 Section 104A

Under Section 104A of the Act the consent authority –

- (a) must grant the resource consent, unless it has insufficient information to determine whether or not the activity is a controlled activity; and
- (b) may impose conditions on the consent under section 108 only for these matters –
 - (i) over which control is reserved in national environmental standards or other regulations; or
 - (ii) over which it has reserved its control in its plan or proposed plan.

It is considered that this application meets all relevant STDP standards for a controlled activity and may be assessed accordingly under s104A.

3.3 Part 2

The matters that Council must have regard to in considering the application under Section 104 of the Act are all also subject to Part 2 of the Act. Part 2 deals with the purpose and principles of the Act.

Section 5(1) of Part 2 states – “*the purpose of this Act is to promote the sustainable management of natural and physical resources*”

Further guidance on the manner in which resources are to be managed is provided for in Part 2, Sections 6 – 8 of the Act, as follows:

Section 6 of Part 2 of the RMA deals with matters of national importance.

Comment: There are no matters of national importance associated with this application.

Section 7 of Part 2 of the RMA deals with matters to which particular regard shall be given in exercising functions under the Act. The relevant aspects of that section are considered to be:

- b) The efficient use and development of natural and physical resources;*
- c) The maintenance and enhancement of amenity values.*
- f) Maintenance and enhancement of the quality of the environment*

Comment: The application is for a boundary adjustment between the Patea Men’s and Women’s Bowling Clubs. This represents an efficient use and development of physical resources as it enables the bowling club (Lot 1) to realise capital from the sale of the now defunct Women’s Club (Lot 2). In turn the existing buildings on Lot 2 can be restored and converted into residential quarters for the applicants. Both lots have existing vehicle crossings, and all urban services are available to both sites. Off-site effects are negligible. Use of Lot 1 as the Patea bowling club would be unchanged from that at present. The redevelopment of Lot 2 would have positive benefits for the environment and the immediate neighbourhood as the building is currently partially derelict and the grounds disused. Use of Lot 2 will be residential, as per the zoning, and resultant activity levels will be compatible with the neighbouring residential zone.

As the clubhouses abut each other on the proposed boundary, a firewall will be required, as indicated on the scheme plan (Appendix B). The clubhouse on Lot 2 is set back 1.58m from the proposed boundary and both sheds have setbacks of 1m minimum, in accordance with STDP 4.02.1(1). Both lots will therefore be able to comply with the permitted activity standards for bulk and location, with no measurable effects on amenity.

For these reasons the subdivision will result in an efficient use and development of the site which will be in accordance with the purpose outlined in Section 5 of the RMA.

Section 8 of Part 2 of the RMA requires that the principles of the Treaty of Waitangi are taken into account.

Comment: There are no waahi tapu sites identified on the application site and no natural features on the site that have been statutorily identified as being of importance to tangata whenua. For these reasons no consultation with iwi has been undertaken. The subdivision is not considered to be contrary to the principles of the Treaty of Waitangi.

3.4 Summary of RMA Assessment

It is not considered that the proposal is contrary to any Regional Plan or Policy Statement. The proposed subdivision is not contrary to Sections 5, 6, 7 and 8 and it has been illustrated that it will promote the sustainable management of natural and physical resources. The subdivision is therefore considered to be in accordance with Part 2 of the RMA.

To determine whether the subdivision is also in accordance with Section 104 of the RMA an assessment of environmental effects must be undertaken and an assessment of the subdivision against the relevant objectives and policies of the District Plan.

Actual and potential effects on the environment are assessed in Section 4 of this report.

4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

As part of this report, an Assessment of Environmental Effects (AEE) of the proposed activity has been undertaken in accordance with Section 88 and the Fourth Schedule of the Resource Management Act 1991, and provides further information for this resource consent application.

STDP policy 2.03.2 a) (i), reads:

Provide for flexibility in the use, development and subdivision of land while maintaining amenity values; and ensuring that any adverse effects on the surrounding environment are avoided, remedied or mitigated.

4.1 Amenity values

The proposed boundary adjustment would create one new residential lot in accordance with controlled activity performance standards for lot sizes and the provision of onsite services in the Residential Zone, and therefore any effects on residential amenity would be no more than minor.

All services can be provided from urban services at the road frontage of both sites (or in the case of sewer, at the western boundary) with no cross boundary effects. Lot 1 will continue to function as a bowling club, while Lot 2 will be restored for residential use. Redevelopment of Lot 2 will have an uplifting effect on the amenity values of the neighbourhood.

4.2 Traffic Effects

Lot 1's street boundary on Meredith St extends 2.6m beyond the boundary wall into the street. It is thought that this might have historically covered the provision of parking for the club. Meredith Street is a no exit street with local traffic only. The boundary adjustment will have no effect on the traffic generation from Lot 1. Traffic generation from Lot 2 will be purely residential in nature as anticipated within the residential zone.

Both lots have existing vehicle crossings, which meet sight visibility standards, no new vehicle crossings will be required. Any effects from either vehicle crossing would be no more than minor in the context of the existing local environment, and have no adverse implications for traffic safety or the functioning of the road network.

4.3 Heritage Items

There are no Significant Natural Areas, Scheduled Rivers, Streams or Waahi Tapu sites within the boundaries of the proposed subdivision (as shown on the STDP Map No. 43). Likewise, no Heritage Item, Notable Tree or other Archaeological Site is affected.

4.4 Consultation

No consultation has been undertaken as adverse effects are considered to be no more than minor and within acceptable levels for the Residential Area. It is therefore considered appropriate that the application be processed on a non-notified basis.

5 CONCLUSION

The applicants, Rebecca White and Rob Groat, wish to undertake a two-lot subdivision (boundary adjustment) of their property at 16 Richmond Street Patea, currently held in three titles, legally described as Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456

The application is classified as a controlled activity under 8.01.2 (c) of the South Taranaki District Plan (STDP) as it fully complies with all performance standards for subdivision in the Residential Zone under the STDP. Both proposed lots can be fully serviced to urban standards, and would pose no undue pressure on service provision

The assessment of environmental effects concludes that the subdivision will have only minor adverse effects on the environment and that these will be within acceptable levels for the Residential Zone. The subdivision is considered to uphold the principles of sustainable management of natural and physical resources in accordance with RMA Part 2 s5

APPEND X A APPLICATION FORM

Application for Resource Consent

Form 9 of the Resource Management Act 1991

South Taranaki District Council
Private Bag 902, Hawera 4640
Telephone: 06 278 0555 or 0800 111 323
Web: www.southtaranaki.com



1. Applicant Details			
Name:	REBECCA WHITE & ROB GROAT		
Contact Person:	SUE ROBB, BTW COMPANY LTD		
Postal Address:	PO BOX 551, NEW PLYMOUTH		
Street Address / Registered Office:		Contact Numbers:	Phone 06 759 5040
			Mobile
			Fax 06 759 5049
Address for Invoices:			
Email Address:	susan@btwcompany.co.nz		
2. Property Details			
Site Address:	16 RICHMOND ST PATEA		
Legal Description:	LOT 3 DP 6868, LOT 9-11 DEEDS PLAN 53, LOT 1 DP 6456		
Valuation Number:			
Property Owner:	PATEA BOWLING CLUB		
3. Project Description			
TWO LOT RESIDENTIAL SUBDIVISION			
4. The following additional resource consents are required for this project			
5. The following additional information is attached			
An Assessment of Environmental Effects:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Other information:	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
If Yes, please list:	SEE ATTACHED		

Privacy Statement

Information on these forms must be provided under legislation administered by the Council and is required to process your application. This information must be made available to members of the public (including businesses). In appropriate circumstances, it may be made available to other units of the Council, Contractors and other government agencies. Under the Privacy Act 1993, you may access the personal information held about you by the Council and you may request that the Council correct any personal information it holds about you.

	3/10/12
Signature of owner/ agent on behalf of and with the authority of the owner	Date
SUE ROBB	
Name (print clearly)	

Note to applicant: You have the option of applying for consent directly to Environmental Protection Authority. Please contact us if you would like to do this.

APPENDIX B CERTIFICATES OF TITLE



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

Search Copy



R. W. Muir
Registrar-General
of Land

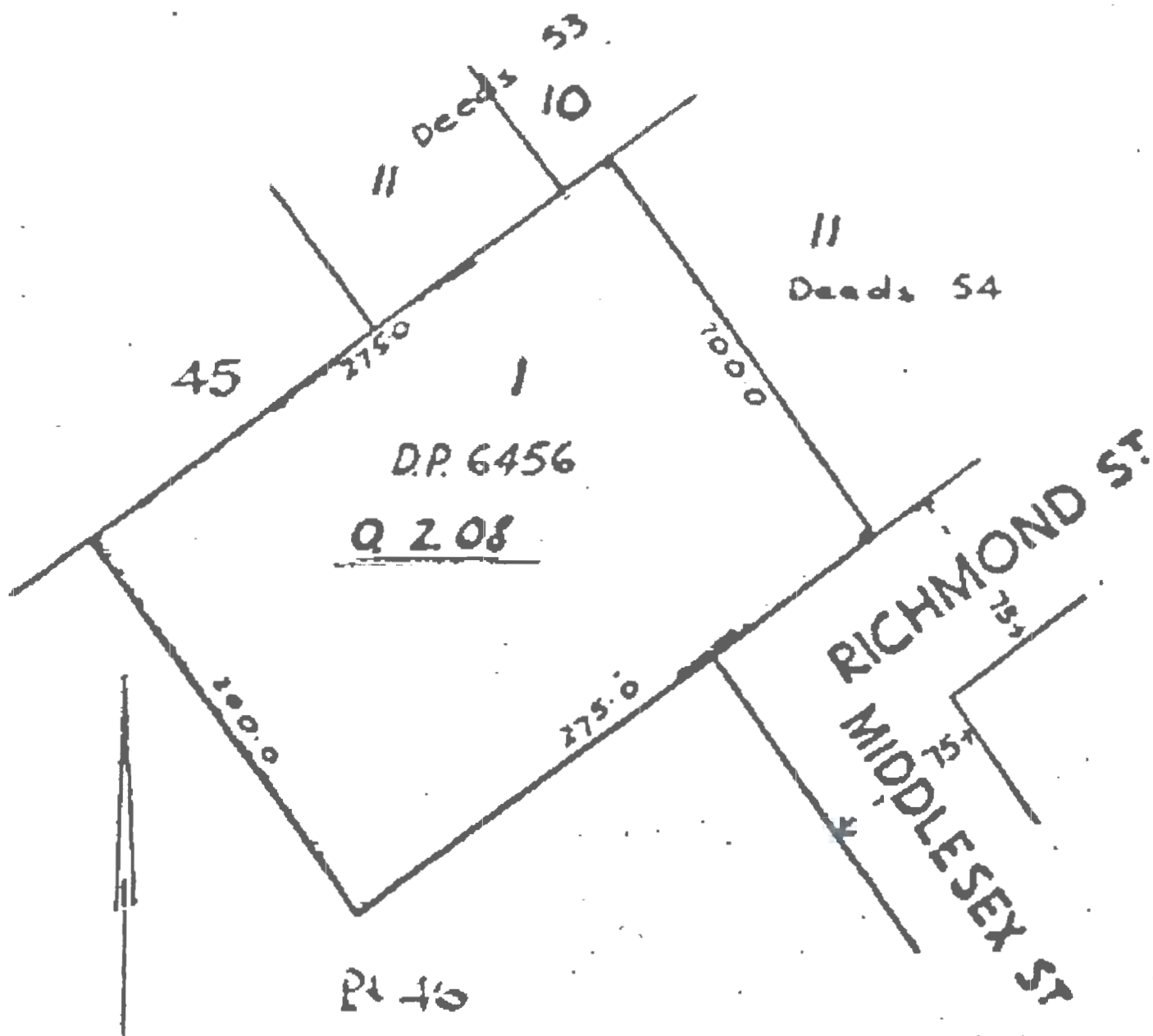
Identifier TN164/94
Land Registration District Taranaki
Date Issued 10 April 1951

Prior References
TN134/37

Estate Fee Simple
Area 2226 square metres more or less
Legal Description Lot 1 Deposited Plan 6456

Proprietors
The Patea Bowling Club (Incorporated)

Interests
W6369 Memorandum of Acceptance imposing Building Line Restriction - 9.5.1950 at 10.00 am





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

Search Copy



R. W. Muir
Registrar-General
of Land

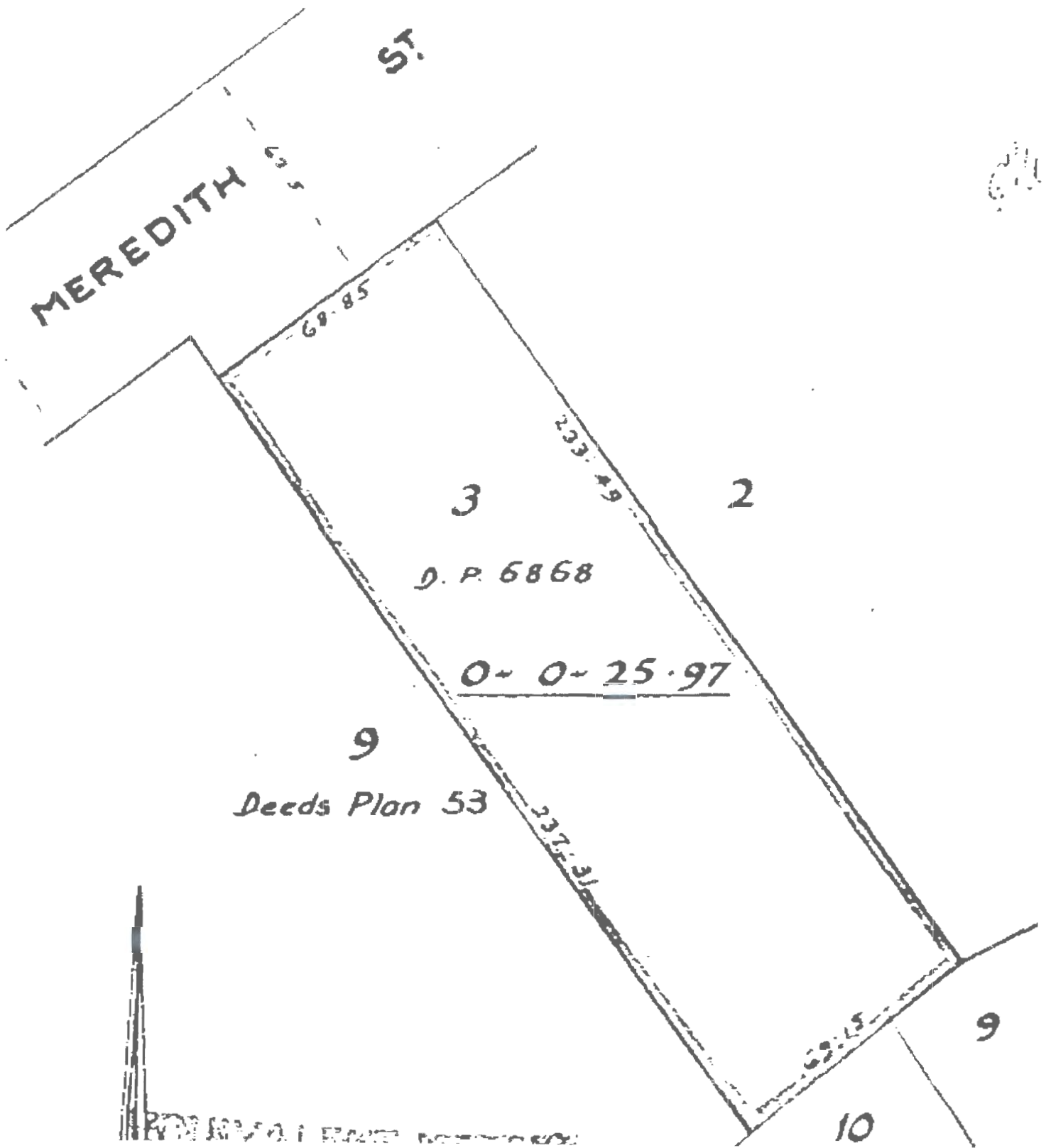
Identifier TN193/52
Land Registration District Taranaki
Date Issued 05 July 1954

Prior References
TN130/191

State Fee Simple
Area 657 square metres more or less
Legal Description Lot 3 Deposited Plan 6868

Proprietors
Patea Bowling Club (Incorporated)

Interests
2041 Order in Council exempting the abovedescribed land from the provisions of Section 128 Public Works Act 1928





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

Limited as to Parcels

Search Copy



R. W. Muir
Registrar-General
of Land

Identifier TN130/193
Land Registration District Taranaki
Date Issued 17 June 1930

Prior References

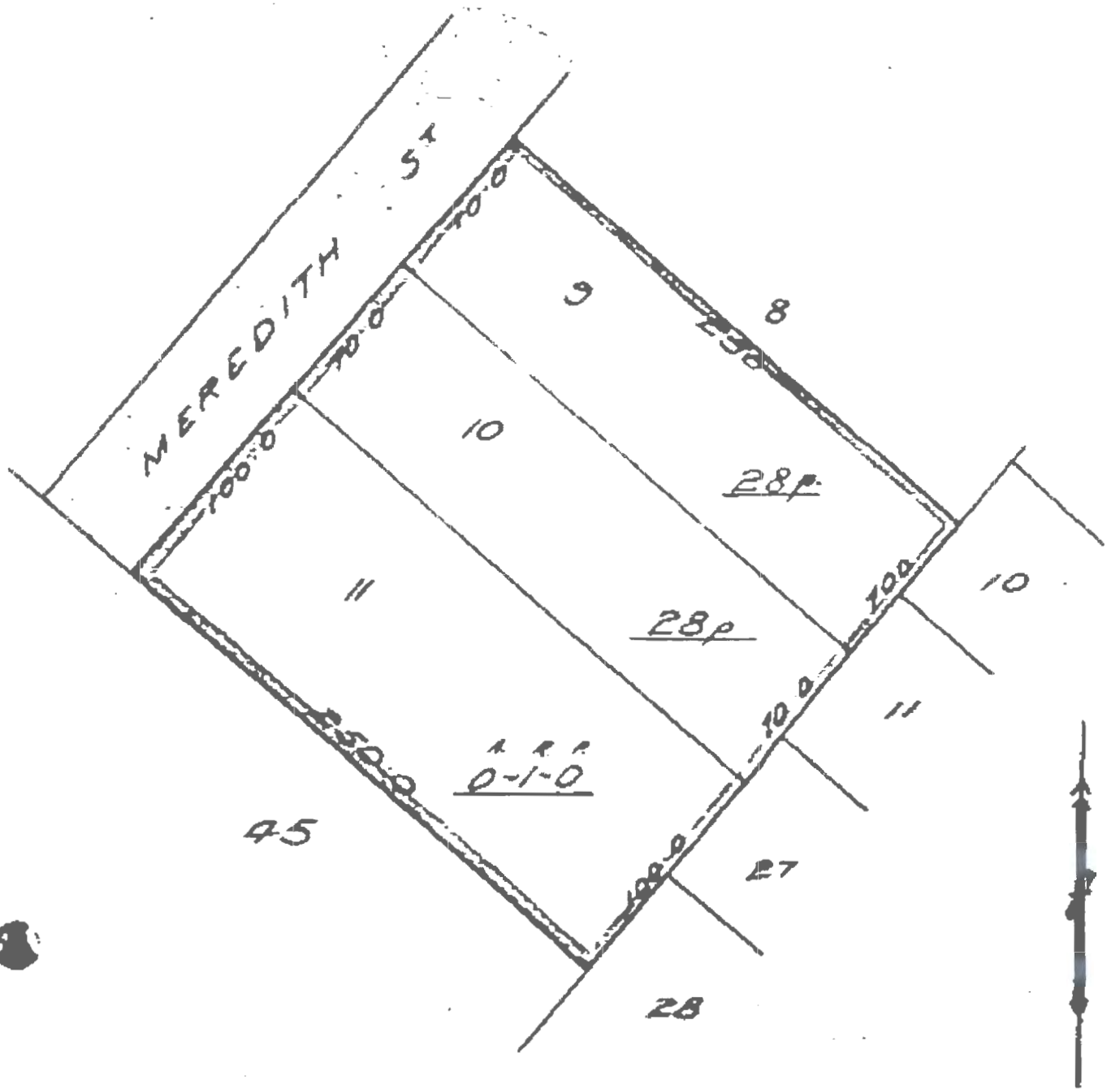
DI 8/831 DI 8/832 DI 8/833

State Fee Simple
Area 2428 square metres more or less
Legal Description Lot 9-11 Deeds Plan 53

Proprietors

The Patea Bowling Club Registered

Interests



APPENDIX C SCHEME PLAN



Disclaimer: This plan is produced for the sole purpose of obtaining a subdivision consent under the Resource Management Act 1991. Dimensions and areas are approximate and are subject to final survey. The use of this drawing for any other purpose is at the owners risk.



LOCAL BODY: South Taranaki District Council
 APPLICANT: R. White & R Groat
 COMPRISED IN: CT TN130/93, TN164/94, TN193/52
 SCALE: 1:600

**Lots 1 & 2 being a Proposed Subdivision of
 Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456**

Prepared by: I.M. Dickey
 Drawn by: R.J.G.
 Checked by: IMD
 Date: 08/08/12
 Date: 14/08/12
 Licensed Cadastral Surveyor
 Date: August 2012 Job No. 12217 Drawing No. 12217-01-Rev02

APPENDIX 3: DETAILED SITE INVESTIGATION

Detailed Site Investigation Report

In accordance with National
Environmental Standard for Assessing
and Managing Contaminants in Soil to
Protect Human Health 2011

Revision to address s92 information request from STDC – July
2013 & to include additional sampling information



by *BTW Company*

for R White & R Groat

btw company
surveyors . planners . engineers . land & g-i-s services



for R White & R Groat

	Reviewed	
Report Author		08/10/2013
	_____ Sue Robb	_____ Date
Reviewed by		08/10/2013
	_____ Kathryn Hooper	_____ Date

08 October 2013

EXECUTIVE SUMMARY

BTW Company has been commissioned by Rebecca White and Rob Groat ('the applicants') to prepare a Detailed Site Investigation (DSI) report for Lot 1 DP 6456 at 16 Richmond Street Patea, previously the Patea Women's Bowling Club. This is a follow-up report to the Preliminary Site Investigation submitted to the South Taranaki District Council (STDC) in January 2013 in which the site was identified as potentially containing soils hazardous to human health, as a result of historic pesticide use on the bowling green.

Under the Resource Management National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011(NES Soils), an application for subdivision of potentially contaminated land is required to verify that the land in question will not endanger human health should the proposed subdivision and subsequent development proceed.

Extensive soil testing on site found elevated levels of arsenic on the bowling green, above acceptable standards for residential use. This triggers a restricted discretionary status under the NES Soils for the proposed subdivision. Measures to render the contaminated turf fit for residential use are proposed.

No other heavy metals or persistent pesticide traces on the bowling green exceed soil standards for residential use. No soil contamination was found on the remainder of the site, which is suitable for its intended residential use.

This report has been revised (July 2013 & October 2013) to include additional information requested by the STDC under section 92 of the Resource Management Act 1991, and results from additional soil sampling which was undertaken in August 2013.

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1 INTRODUCTION

1.1 Background

BTW Company was commissioned by Rebecca White and Rob Groat ('the applicants') to subdivide the land at 16 Richmond Street Patea, legally described as Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456 into two lots. Lot 1 DP 6456, being proposed Lot 2 of the subdivision (refer scheme plan Appendix A), is the subject of this report.

The site is currently occupied by the Patea Bowling Club (disused) and the applicant wishes to convert proposed Lot 2 to residential use. Proposed Lot 1 will remain as a bowling green. The site is zoned residential under the South Taranaki District Council (STDC) District Plan. Given the past use of the site as a bowling club, and hazardous substances traditionally associated with that activity, the suitability of, in particular proposed Lot 2 of the site for residential land use, needs to be assessed and land use consent granted for the changing use, prior to council granting consent to subdivide. (Note: the applications for land-use, subdivision and soil disturbance are made concurrently).

1.2 Requirements under the NES (soils)

Subdivision of potentially contaminated sites triggers the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES Soils). These regulations apply to any piece of land on which an activity or industry described in the current edition of the Ministry for the Environment's (MfEs) Hazardous Activities and Industries List (HAIL) is being or has been undertaken.

Sports grounds and bowling greens are included in the MfE's Hazardous Activities and Industries List (HAIL) as follows:

Table 1.1: HAIL register

Activity or industry on the HAIL	Hazardous substances likely to be associated with that activity or industry
Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds	Arsenic, lead, copper, mercury; wide range of organic compounds including acidic herbicides, organophosphates, and organochlorines (eg, endosulfan on golf and bowling greens)

The inclusion of an activity on the MfE's HAIL register does not mean that hazardous substances were necessarily used or stored on the land in question or that hazardous substances have contaminated the soil. The list merely highlights the activities or industries more likely to store or use hazardous substances, with a correspondingly greater probability of site contamination.

The intent of the NES (Soils) is to protect human health from the actual or potential adverse effects of contaminants in soil from five activities, being subdivision, change in land-use, soil disturbance, soil sampling and removing fuel storage containers. The proposed subdivision triggers further investigation under the NES (Soils).



1.3 Objectives of the Report

This report has been prepared in accordance with the Ministry for the Environment's (MfE's) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (Revised 2011)*.

The report aims to:

- Establish the history of activities with contamination potential at the site;
- Determine through soil sampling whether any contaminants in the soil are present at levels which constitute a threat to human health;
- Assess suitability of the site (both Lots 1 and 2) for their intended use post-subdivision;
- Ascertain what remedial action if any should be considered (and likely required as condition of land use consent) prior to council granting consent for subdivision.

1.4 Scope of Work

Scope of work undertaken includes:

- Site visits;
- Review of aerial photographs;
- Review of historical ownership records
- Background information from current Club president and turf manager
- Review of STDC property file
- Review of TRC records
- Soil test on green and surrounds
- Analysis of results
- Comparative studies

2 PRELIMINARY SITE INVESTIGATION

2.1 Introduction

The proposed subdivision of any land where an activity or industry described in the HAIL "is being...has been...(or)...more likely than not has been undertaken", can be considered as a permitted activity under the NES s8(4) provided that a preliminary site investigation (PSI) clears the site for that use.

A PSI report was prepared and submitted to the South Taranaki District Council in January 2013. The findings are summarised below.

2.2 Site Visits

A site visit was conducted by BTW Company on 23 August 2012. On 17 December 2012 soil sampling was undertaken at the site, and further sampling was undertaken on 30 August 2013.

2.3 Site Description

2.3.1 General

The subject land contains the Patea Bowling Club, comprising the Patea Men's Bowling Club fronting Meredith Street, and the Patea Women's Bowling Club fronting Richmond Street, as shown in Appendix A: Scheme Plan BTW Dwg No12217-01 Rev2.

Proposed Lot 1, at 2850m² (Lots 9-11 Deeds Plan 53 & Lot 3 DP 6868) comprises the Men's Bowling Club which contains a clubhouse and several sheds surrounding a bowling green. Proposed Lot 2, at 2375m² (Lot 1 DP 6456) comprises the Women's Bowling Club clubhouse and green. The proposed subdivision would entail the construction of a firewall on the boundary between the proposed lots as the clubhouses are currently interconnected.

The focus of this report is on the history and use of proposed Lot 2. The site is flat and fully fenced on the perimeter. Structures include the clubhouse building on the northern boundary, storage sheds on the southern boundary and the disused bowling green on the western half of the site, which has been grazed by hoggets since 2004. Vehicle access is from Meredith Street. Zoning is residential. Residential subdivisions flank the eastern boundary of the site.

2.3.2 Groundwater and soil types

Soils in Patea generally comprise a 150-300mm topsoil layer overlaying sandy soils. The soils in Patea are largely formed by historic windblown sand dunes and in areas near the coast, unstable moving dunes are still present. The soils are therefore free draining.

A borehole on the corner of Bedford and Egmont Street (GND0072, Taranaki Regional Council) has a depth of 182m, and no groundwater was encountered. GND0075, located 1.2km to the north, was drilled to 139.9m in 1989, has a low static water level of 31.1m and a high static water level of 31.2m. (Source: Taranaki Regional Explorer).

2.4 Site History

2.4.1 Previous Site Ownership and Use

Prior to 1930, it is likely that the site was in agricultural use. Both bowling greens were established by 1949. Separate title for the Men's Bowling Club was issued in 1930, though the title for the Women's Bowling Club (Lot 1 DP 6456) was only created later, in 1948.

Following the declining roll at the Patea Bowling Club, the Men's and Women's clubs were amalgamated in 1999/2000 to rationalise use and maintenance of the site. The Women's green has been disused since 2000, with the green becoming a pasture for sheep over the past eight years.

2.4.2 Review of historical aerial photographs

The earliest aerial photograph found is from 1949, sourced from NZ Aerial Mapping Ltd. The Men's clubhouse and a few sheds are visible as are the two separate bowling greens. This information ties up with the establishment of the Women's Bowling club in 1948.

2.5 Council Records

2.5.1 South Taranaki District Council (STDC) Records

Clubhouse buildings are shown on the title for the Patea Men's Bowling Club (Lot 9 Deeds Plan 53 DP 6868) dated January 1951, and it is understood that both club buildings pre-date this time.

2.5.2 Taranaki Regional Council (TRC) Records

The TRC maintains a Register of Selected Land Uses (RSLU), a database of potentially contaminated land. The nearest recorded sites are a fertiliser store at 89 Egmont Street and a garage at 153 Egmont Street.

Neither of the Patea bowling club premises were recorded in the RSLU, but subsequent to my enquiry on 12 December 2012, have now both been entered. However, it should be noted that the TRC holds no contamination records for either site. Results of soil tests undertaken in January 2013 have been forwarded to the TRC for their records.

2.6 Site Specific Information

Grant Hassall of Bowls Taranaki Inc, who is compiling a centenary history of bowling in Taranaki, confirms that no turf maintenance of the Women's Club has occurred since 2000. The disused green reverted to pasture at that time and has been grazed by hogget since.

Information obtained from George Fenton, Patea Bowling Club president (phonecall 13/11/2012), indicates that previous site maintenance was limited to fertilisers and topdressing of the greens. He understood there to be no herbicide use. Top dressing soil was screened and stored in the sheds fronting Richmond Street. These sheds are now disused, but would be unlikely to be a point of contamination.

Greenkeeper Bruce Phillips, who has maintained the greens for more than 16 years, has confirmed that no sprays have been applied to the women's green within the last twelve years. He is

unaware of any historic DDT or Dieldrin use, but over his tenure turf maintenance included the application of the pesticide Thiodan (Endosulfan) to control worms. Endosulfan is classed as a persistent pesticide (US EPA website). Thiodan use was discontinued on site prior to it being officially banned in 2008, following recommendations from TurfNZ. No herbicides were employed during his tenure as the green was established in *Cotula* sp., a small native mat-forming herb favoured on bowling greens for its tolerance to low mowing. It has been common on bowling greens for the past 40 years.

There is no visible evidence from the site visit or review of aerial photos to suggest ground contamination from chemical spills or bulk storage of chemicals or fuels. Bruce Phillips confirmed that chemical storage and mixing occurred solely within the sheds on the Men's Bowling Club (proposed Lot 1).

According to Bruce Phillips few records were kept by the previous greenkeeper, now deceased, therefore information of earlier spraying regimes is subsequently unavailable.

2.7 Possible Contaminants Associated with Past Land Use

2.7.1 Priority Contaminants

The NES (Soils) identifies twelve priority contaminants including heavy metals, organic compounds and dioxin.

Several priority contaminants are associated with persistent pesticide use on bowling greens in the HAIL register, and include the following:

- Heavy metals (arsenic, lead, copper, mercury)
- Organic compounds (including acidic herbicides)
- Organophosphates
- Organochlorines (eg, endosulfan/thiodan).

2.7.2 Persistent Pesticides

'Persistent pesticide bulk storage and use' referred to in the HAIL register refers to pesticides that 'persist' in the environment long after they were used, or persistent organic pollutants (POPs), which have the potential to bio-accumulate. Amongst these, lead arsenate ($PbAsO_4$) was widely used for insect control on turfgrass in the 1930's and '40's, but gradually replaced by other commonly used pesticides such as DDT and Dieldrin, subsequently banned in 1970. Endosulfan (or Thiodan), introduced in the 1950's but banned for use in December 2008, is one particular persistent pesticide (commonly used on sports turfs for earthworm control) known to have been used on site.

2.8 PSI Summary and Conclusions

2.8.1 Summary

Soil contamination is anticipated to be limited, due to the following factors:

- Pesticide use and all other sprays were discontinued in 2000, with circumspect use of chemicals during the 1980's and 1990's; contamination levels therefore relate to historic chemical application.
- Soils are sandy and free-draining.
- There was no bulk storage of chemicals on-site at any time. Chemicals, small quantities of mower fuel and lubricants were stored and mixed in sheds on the Men's club site.
- The sheds fronting Richmond St were used to house topsoil for topdressing the greens. They are unlikely to be a point of contamination.
- No discolouration of land or evidence of spillage was found away from the green during a site visit or on aerial photographs, nor was this evidenced in site history.
- No contamination records are held by the TRC for either of Patea's bowling clubs.

2.8.2 Conclusions

- The site history revealed the (possibly limited) use of persistent pesticides and inconclusive evidence of other pesticides employed, with potential risks to human health.
- Under NES (Soils) s(8)(4)(b), the proposed subdivision is not a permitted activity as the PSI could not categorically state that there was no risk to human health – land use consent is therefore required.
- A detailed site investigation is required to quantify the potential health risk of subdividing the land and the suitability of the land for the subsequent use.

3 DETAILED SITE INVESTIGATION

3.1 Soil Sampling

The first round of soil testing was undertaken on 17 December 2012 under dry climatic conditions. The second round of sampling was undertaken on 30 August 2013, during dry weather, though it was noted the proceeding day had been very wet.

3.1.1 Sampling objectives

The sampling objectives were:

- To establish the nature and extent of contamination on proposed Lot 2;
- To compare the background level of contamination within the site;
- To establish the degree and extent of contamination.
- To interpret results and recommend remedial action if required.

3.1.2 Pre-sampling procedure

- Requirements for testing were discussed with Hill Laboratories, Hamilton, a professional testing laboratory with IANZ accreditation to ISO Standard 17025. Hills recommended a suite of tests to cover the priority contaminants in soil as required under the NES together with organochlorine pesticide traces and polycyclic aromatic hydrocarbons (PAH). An additional test for Endosulfan was included as it was known to have been used on site.
- Clean, sterilised sampling containers were provided for each sampling viti by Hill Laboratories. Each container had a sample identification label to be completed at time of sampling.
- Soil sampling and testing equipment (spade and soil bore) was inspected and decontaminated before field work commenced.
- BTW Soil Sampling Procedure (PL02 dated June 2010) was followed.

3.1.3 Sampling pattern and strategy

First sampling round (17 December 2012)

- A systematic grid sample pattern across the green was selected as being likely to be most representative. A composite control sample was taken off the green for background contamination comparison.
- Primary sample area was the historic women's bowling green, because this is the area which will be used for residential purposes post-subdivision. Samples were taken in a 6-point grid pattern at two depths, 0-100mm and 100-300mm (see Sampling Plan, Appendix B).
- Two samples were taken at each of the six points, one at each depth. Each sample was placed in a separate labelled sampling container. The first depth (0-100mm) represents the direct human exposure pathway, and the composite depth (0-300mm) represents the home produce exposure pathway as it covers the significant root zone.

- Samples were labelled 1-6 with 'A' designating 0-100mm depth, and 'B' designating 100-300mm depth (12 samples).
- Secondary sample area was between the clubhouse and sheds. Two samples were taken at 0-100mm depth and labelled 7 and 8 (2 samples).
- Total of 14 separate samples were composited at the laboratory to form 3 composite samples 'A'(0-100mm depth), 'B' (100-300mm depth) and 'C' (control).

Second sampling round (30 August 2013)

- Further samples were taken at 0-100mm depth at the 6 points shown on the grid (as per Appendix B), and analysed individually to get more detailed information as to the extent of arsenic contamination.
- An additional soil sample was taken from 0-100mm depth at a representative site on the men's bowling green on 30 August 2013 for completeness. This part of the site however will not be used for residential purposes and remains suitable for the current site use (recreational outdoor bowls).

3.1.4 Sample records and delivery to Laboratory

For both sampling rounds, individual sample containers were clearly marked with the date, time of sampling and bore reference before placing them in a chillybin for storage. Samples were then delivered to the laboratory in a tightly sealed container, on an overnight courier as per BTW testing procedure.

Chain of Custody form [PF01] and laboratory-provided Analysis Request Form were completed for all samples.

3.2 NES(Soils) guidelines

3.2.1 Interpretation of data

New Zealand and Australian soil standards have been used to interpret the laboratory results and conduct a risk assessment. Where soil contamination standards are not available, industry-based guidelines published by the Ministry for the Environment may be applied or overseas guidelines employed (Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guideline Values (revised 2011) (Ministry for the Environment, 2003).

- New Zealand SCSs for assessment of priority contaminants (*Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health*, Ministry for the Environment, Wellington 2011; *Toxicological Intake Values for Priority Contaminants in Soil*, Ministry for the Environment, Wellington 2011).
- National Environment Protection Council (NEPC) Australia for assessment of endosulfan, endrin, and heptachlor epoxide; comparison values with New Zealand SCSs for arsenic. (NEPC, Schedule B(1) *Guideline on Investigation Levels for Soil and Groundwater 1999 revised draft 2011*). (Refer Appendix E).

3.2.2 Exposure scenarios

Five exposure scenarios have been devised under the NES (Soils), with the relevant ones shown in Table 3.1 below. The current site is zoned residential, with the assumption of 10% home-grown produce consumption, but as the lot size would enable it to be used as a lifestyle block with the higher 25% produce consumption, both scenarios are considered.

Table 3.1: Land-use scenarios

Land-use scenario	Description
Rural / lifestyle block (25% produce consumption)	Rural residential land use, including home-grown produce consumption. Applicable to the residential vicinity of farm houses for protection of farming families, but not the productive parts of agricultural land. Note: Consumption of eggs, milk and meat from animals raised on site is excluded. Produce consumption is limited to home-grown vegetables. Sites for which consumption of home-grown eggs, milk or meat is important will need to be evaluated on a site-specific basis.
Residential (10% produce consumption)	Residential Standard residential lot, for single dwelling sites with gardens, including homegrown produce.

3.3 Results

3.3.1 Laboratory results

Samples were analysed for constituents most likely to persist in the environment, namely heavy metals, organochlorine pesticide traces and polycyclic aromatic hydrocarbons. Sample A is a composite of the six samples on the green at 0-100mm depth, Sample B a composite of the six green samples at 100-300mm depth, and Sample C a composite of two samples at 0-100mm depth at a distance of 10m from the green as a background reading.

Results for heavy metals, organochlorine pesticide traces and polycyclic aromatic hydrocarbons are given in tables 3.2 to 3.4 below. Full sampling results for both sampling rounds are shown in the Hill Laboratories analysis reports in Appendix D. Guideline values are adjusted in the table below to reflect the number of composite samples taken.

Heavy Metals

Table 3.2: Sampling Results - Heavy Metals – Composite (December 2012)

Heavy Metals	Sampling Results (mg/kg)			Soil Contaminant Standards for health (SCS) ¹ mg/kg		NEPC Guidelines ² mg/kg	
	Sample A 0-100mm (6 X composite)	Sample B 100- 300mm (6 X composite)	Sample C 0-100mm (2 X composite)	Residential 10% Produce Single sample 6X composite 2X composite	Rural Residential 25% Produce Single sample 6X composite 2X composite	HIL A ³ Residential 10%	EIL ⁴
Total Recoverable Arsenic	51	38	6	20 3.33 10	17 2.83 8.5	100	20
Total Recoverable Boron	<20	<20	<20	>10,000 1666.66 5000	>10,000 1666.66 5000	5,000	
Total Recoverable Cadmium	0.34	0.25	0.31	3 0.5 1.5	0.8 0.13 0.4	20	3
Trivalent Chromium	18	20	20	>10,000 1666.66 5000	>10,000 1666.66 5000	-	
Hexavalent Chromium	<0.4	<0.4	<0.4	460 76.66 230	290 48.33 145	100	
Total Recoverable Copper	40	41	48	>10,000 1666.66 5000	>10,000 1666.66 5000	7,000	
Total Recoverable Lead	118	91	47	210 35 105	160 26.66 80	300	600
Total Recoverable Mercury	0.32	0.25	<0.10	310 51.66 155	200 33.33 100	600	1

Notes:

¹ Soil Contaminant Standards for Health (SCS) New Zealand standards 2011.

² Australian NEPC Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater 1999, revised draft for review 2011.

³ HIL A (Health Investigation Level) for standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), includes children's day care centres, preschools and primary schools.(NEPC Australia 2011)

⁴ EIL (Ecological Investigation Level) also termed provisional phytotoxicity-based investigation level for sandy loams. (NEPC Australia 2011)

Table 3.3: Sampling Results - Heavy Metals – Individual Samples (August 2013)

Heavy Metals	Sampling Results (mg/kg)							Soil Contaminant Standards for health (SCS) ¹ mg/kg		NEPC Guidelines ² mg/kg	
	PBC1	PBC2	PBC3	PBC4	PBC5	PBC6	PBC7	Residential 10% Produce Single sample	Rural Residential 25% Produce Single sample	HIL A ³ Residential 10%	EIL ⁴
Total Recoverable Arsenic	25	42	59	57	39	63	25	20	17	100	20
Total Recoverable Boron	<20	<20	<20	<20	<20	<20	<20	>10,000	>10,000	5,000	
Total Recoverable Cadmium	0.26	0.35	0.35	0.41	0.34	0.33	0.26	3	0.8	20	3
Trivalent Chromium	20	22	21	21	21	18	21	>10,000	>10,000	-	
Hexavalent Chromium	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	460	290	100	
Total Recoverable Copper	38	40	39	43	42	37	37	>10,000	>10,000	7,000	
Total Recoverable Lead	54	120	130	115	81	135	71	210	160	300	600
Total Recoverable Mercury	0.30	0.27	0.32	0.14	0.29	0.27	0.35	310	200	600	1

Notes:

¹ Soil Contaminant Standards for Health (SCS) New Zealand standards 2011.

² Australian NEPC Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater 1999, revised draft for review 2011.

³ HIL A (Health Investigation Level) for standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), includes children's day care centres, preschools and primary schools.(NEPC Australia 2011)

⁴ EIL (Ecological Investigation Level) also termed provisional phytotoxicity-based investigation level for sandy loams. (NEPC Australia 2011)

Organochlorine Pesticide Traces (OCPs)

The organochlorine suite of tests includes commonly used pesticides such as DDT and its polymers, dieldrin, chlordane and lindane. An additional test was included to detect the presence of endosulfan due to this compound having been identified in the site history.

Table 3.4: Sampling Results – Composite samples for Organochlorine Pesticide traces (December 2012)

Organochlorine Pesticide	Sampling Results			Soil Contaminant Standards for health (SCS) ¹ mg/kg		NEPC Guidelines ² mg/kg	
	Sample A 0-100mm (6 X composite)	Sample B 100-300mm (6 X composite)	Sample C 0-100mm (2 X composite)	Residential 10% Produce Single sample 6X composite 2X composite	Rural Residential 25% Produce Single sample 6X composite 2X composite	HIL A ³ Residential 10%	EIL ⁴
DDT ⁵	3.877	4.224	0.062	70 11.66 35	45 7.5 35	260	1
Chlordane ⁶	<0.002	<0.002	<0.002	-	-	50	0.5
Dieldrin ⁷	1.5537	0.9223	0.0029	2.6 0.43 1.3	1.1 0.18 0.55	7	0.2
Endosulfan ⁸	0.048	0.0237	0.0015	-	-	300 50	
Endrin	0.0035	0.0021	<0.0010	-	-	10 1.66	
Heptachlor epoxide	0.0158	0.0137	<0.0010	-	-	7 1.16	0.5

Notes

Concentrations refer to dry weight (ie, mg/kg dry weight or µg/kg dry weight).

¹ Soil Contaminant Standards for Health (SCS) New Zealand standards 2011.

² Australian NEPC Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater 1999, revised draft for review 2011.

³ HIL A (Health Investigation Level) for standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), includes children's day care centres, preschools and primary schools. (NEPC Australia 2011)

⁴ EIL (Ecological Investigation Level) also termed 'provisional phytotoxicity-based investigation level'. (NEPC Australia 2011)

⁵ DDT value is sum of four DDD, DDE and DDT compounds.

⁶ Chlordane is total recoverable (cis- and trans-).

⁷ SCS is applicable to both Aldrin and Dieldrin as both are present.

⁸ Endosulfan value is sum of endosulfan sulphate and parent isomer levels detected.

Table 3.5: Sampling Results – Individual samples for Organochlorine Pesticide traces (August 2013)

Organochlorine Pesticide	Sampling Results							Soil Contaminant Standards for health (SCS) ¹ mg/kg		NEPC Guidelines ² mg/kg	
	PBC1	PBC2	PBC3	PBC4	PBC5	PBC6	PBC7	Residential 10% Produce Single sample	Rural Residential 25% Produce Single sample	HIL A ³ Residential 10%	EIL ⁴
DDT ⁵	2.672	1.136	4.144	3.608	2.079	1.78	2.542	70	45	260	1
Chlordane ⁶	<0.04	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	-	-	50	0.5
Dieldrin ⁷	1.14	0.87	1.71	1.16	0.76	1.08	0.091	2.6	1.1	7	0.2
Endosulfan ⁸	<0.010	0.036	0.063	0.062	0.049	0.054	0.282	-	-	300	
Endrin	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	-	-	10	
Heptachlor epoxide	0.016	<0.010	0.107	0.023	0.018	0.013	<0.010	-	-	7	0.5

Notes

Concentrations refer to dry weight (ie, mg/kg dry weight or µg/kg dry weight).

¹ Soil Contaminant Standards for Health (SCS) New Zealand standards 2011.

² Australian NEPC Schedule B(1) Guideline on the Investigation Levels for Soil and Groundwater 1999, revised draft for review 2011.

³ HIL A (Health Investigation Level) for standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), includes children's day care centres, preschools and primary schools. (NEPC Australia 2011)

⁴ EIL (Ecological Investigation Level) also termed 'provisional phytotoxicity-based investigation level'. (NEPC Australia 2011)

⁵ DDT value is sum of four DDD, DDE and DDT compounds.

⁶ Chlordane is total recoverable (cis- and trans-).

⁷ SCS is applicable to both Aldrin and Dieldrin as both are present.

⁸ Endosulfan value is sum of endosulfan sulphate and parent isomer levels detected.

Polycyclic Aromatic Hydrocarbons (PAHs)

Table 3.6: Sampling Results – Composite Polycyclic Aromatic Hydrocarbons (December 2012)

Polycyclic Aromatic Hydrocarbons (PAHs)	Sampling Results			Route-specific Soil Acceptance Criteria (Residential) ¹ mg/kg		NEPC Guidelines ² mg/kg	
	Sample A 0-100mm	Sample B 100-300mm	Sample C 0-100mm	Soil ingestion	Produce ingestion (10%)	HIL A ³ Residential 10%	EIL ⁴
Total PAHs	< 0.04	< 0.04	< 0.04	-	-	20	20
BaP ⁵ (TEQ) ⁶	<0.12	<0.12	<0.12	10	6	3	1
Anthracene	< 0.04	< 0.04	< 0.04	-	-	21900	10
Benzo[a]pyrene	< 0.04	< 0.04	< 0.04	2.1	0.27	1	1
Fluoranthene	< 0.04	< 0.04	< 0.04	-	-	2290	10
Naphthalene	< 0.16	< 0.17	< 0.17	630	72	60	5
Phenanthrene	< 0.04	< 0.04	< 0.04	-	-	-	10
Pyrene	< 0.04	< 0.04	< 0.04	4,700	1,600	2310	10

Notes

¹ MfE, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand Module 4 Tier 1 Soil Acceptance Criteria August 1999

² DoE Assessment Levels for Soil, Sediment and Water, Draft 2003, DoE Perth.

³ HIL A (Health Investigation Level) for standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), includes children's day care centres, preschools and primary schools. (NEPC Australia 2011)

⁴ EIL (Ecological Investigation Level) also termed 'provisional phytotoxicity-based investigation level'. (NEPC Australia 2011)

⁵ BaP is the BaP equivalence concentration used to represent the carcinogenic PAHs and is the sum of the relevant PAHs multiplied by the potency equivalent factor (PEF) below:

- Benz(a)anthracene 0.1
- Benzo(b)fluoranthene 0.1
- Benzo(j)fluoranthene 0.1
- Benzo(k)fluoranthene 0.1
- Benzo(a)pyrene 1.0
- Chrysene 0.01
- Dibenz(a,h)anthracene 1.0
- Fluoranthene 0.01
- Indeno(1,2,3-c,d)pyrene 0.1

⁶ TEQ = Toxic equivalency, an indication of the toxicity of a mixture of compounds.

As the results for all PAH's were below detection limits in the composite samples, it was not deemed necessary to take further samples of PAH's from individual sample locations during the August 2013 sampling.

3.4 Summary of Results

3.4.1 Heavy Metals

- Arsenic levels in excess of both the SCS residential 10% (20mg/kg) and the rural-residential 25% home produce consumption (17mg/kg) were found in samples A and B and confirmed in the further sampling of 7 individual locations. No elevated levels were detected in sample C.
- Arsenic levels are within the HIL A residential 10% (NEPC Australian) guideline of 100mg/kg.
- All other heavy metals tested meet SCSs for both landuse scenarios considered.

3.4.2 Organochlorine pesticides

- HIL guidelines are adopted in the absence of relevant New Zealand standards for organochlorine pesticides and polycyclic aromatic hydrocarbons. (See Appendix E).
- Dieldrin levels in sample A (composite of 6 surface soil samples) exceed the rural-residential 25% SCS, but are within acceptable limits for residential 10%.
- Further sampling confirmed that dieldrin is present over the entire historic bowling green (i.e. is not concentrated in 'hotspots', and has shown that in samples PBC1, PBC3, and PBC4, dieldrin levels exceed the rural-residential 25% SCS, but all samples are within acceptable limits for residential 10%.
- In sample PBC7, taken from the operating green on proposed lot 1, dieldrin levels were below the rural-residential 25% SCS and the residential 10% SCS.
- No elevated levels of other organochlorine pesticides of concern to human health were detected in any of the samples in December 2012, deeming further sampling for PAH's unnecessary in August 2013.

3.4.3 Polycyclic aromatic hydrocarbons

- No elevated levels of polycyclic aromatic hydrocarbons of concern to human health were detected in any of the samples.

3.5 Activity status under the NES (Soils)

The proposed subdivision is classified as a **permitted activity** if a preliminary site investigation states that it is 'highly unlikely that there will be a risk to human health if the activity (subdivision) is done to the piece of land'. (NES (8)(4)(b)).

As the detailed site investigation has found the soil contamination for arsenic exceeds the applicable standard, the subdivision therefore becomes a **restricted discretionary activity** (NES (10)(2)(b)).

4 HUMAN HEALTH RISK ASSESSMENT

4.1 Sources of arsenic in the environment

Arsenic occurs naturally in rocks, soils, water, air, plants and animals. Natural activities such as volcanic action, erosion and forest fires can release arsenic into the environment. Anthropogenic activities such as mining, industrial processes and burning of fossil fuels all release arsenic into the environment (Robinson 2004).

Natural background levels of soil arsenic vary by region, soil composition and underlying geology, including proximity to areas of geothermal activity. A Taupo volcanic zone sampling study of water and soil (2003) showed average arsenic concentrations in the water samples over twice the New Zealand Drinking Water Standard of 0.01mg/l, and a mean for soil samples of 50mg/kg (Robinson 2004). Natural mean background concentrations in New Zealand topsoil vary from 3.7 – 5.9mg/kg (MfE Methodology 2011). Control sample C had an arsenic level of 6mg/kg, considered to be within the range of typical for a background concentration.

4.2 Health effects of arsenic

Arsenic is classed as a non-threshold substance which poses an inherent health risk at any level of exposure. It is a known carcinogen, and can lead to internal cancers such as liver and bladder cancer and is implicated in skin and lung cancer. The U.S. EPA gives a value of 0.43ppm total soil arsenic (equivalent to 43mg/kg) for a cancer risk of 1 in 10⁶ for exposure by soil ingestion (Duxbury 2004).

SCS's "represent a human health risk threshold above which the effects on human health may be unacceptable over time" (MfE 2011). Arsenic exposure is averaged over a lifetime, i.e. the health risk level is based on exposure to the contamination for 350 days for 30 years (Blanco 2007).

4.3 Biodegradation

Arsenic remains largely immobile in soil, though it breaks down over time through oxidation into arsenic compounds which adsorb onto soil particles and remain indefinitely in the topsoil layers (Robinson 2004). This is borne out in the site sampling with 51mg/kg in the topsoil layer (0-100mm) and 38mg/kg (25% less) at the lower depth (100-300mm).

4.4 Bioavailability

The Soil Contamination Standards assume that arsenic in soil is 100% bioavailable, i.e. that *all* arsenic in a soil can be absorbed into the body when soil is ingested (Golder Associates 2012). Golder's study on soils in the Moanataiari subdivision on old mine tailings in Thames showed that although elevated arsenic levels were found, arsenic bioavailability was very low, generally less than 10%, indicating that the arsenic levels presented a reduced health risk. Golder suggested that the 20mg/kg SCS for residential soil may be too conservative and a site-specific soil guideline value may be more appropriate.

The propensity of arsenic to form compounds that bind to soil particles reduces its biological availability (NEPC 2011, CDFA 2004). The level of arsenic in edible plants is generally reported to be low (TEA 2002). Edible portions of plants grown on contaminated soils seldom accumulate

dangerous levels of arsenic due to the toxic effects on plants themselves. A Western Australian study on heavy metal accumulation in vegetables grown in soils with 2.5 – 65.0mg/kg arsenic found that plant arsenic levels were below detection levels (Kachenko 2005).

Studies have shown that the addition of phosphate fertilisers, iron oxides and organic matter further inhibits the amount of arsenic available for absorption by plant roots (Peryea 1991, Health Canada website). The absence of any visible plant stress and the ability of the turf to have sustained animal grazing over the past ten years would indicate that the arsenic risk on site to plant growth is low.

4.5 Potential for exposure

Risk to human health or the environment is only present if there is an exposure pathway between a hazard (e.g. contaminated soil) and a receptor (people or the environment).

Again, the focus is on proposed Lot 2 of the subdivision because this is the part of the site where the land use will change. Proposed Lot 1 will remain as a bowling green however it was possible to obtain one sample from this green for the purposes of this report.

The MfE's *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (2011)* considers exposure to contaminants by the following pathways:

- (a) Soil ingestion;
- (b) Produce consumption;
- (c) Dermal exposure;
- (d) Inhalation of particulates;
- (e) Inhalation of volatiles.

While the potential for exposure on proposed Lot 1 remains unchanged, the sample taken indicates that levels of contamination on proposed Lot 1 are similar to proposed Lot 2, though do not exceed any of the SCS levels. The risk of exposure via the pathways identified above are significantly reduced on proposed Lot 1 given the limited amount of time people spend on the green (i.e. they do not reside there permanently), the activities they undertake there (recreational bowls, there is no harvesting of fruits or vegetables) and direct contact with contaminated soils is very unlikely.

It is noted however that regardless of the application at hand, any bulk movement of soil/soil disturbance on the green (e.g. if re-turfing was proposed) in the future may trigger the NES soil disturbance limits, and consideration will need to be given to this at the time.

On proposed Lot 2, pathway d) is of minor importance and pathway e) can be excluded, as the levels of volatile compounds found are negligible. Pathways a) and b) constitute the major pathways in this case as the controlling pathway for arsenic is soil ingestion, primarily through direct contact with contaminated soils while digging etc, and from ingestion of soil clinging to home-grown produce. (Email from PHU at TDHB to TRC dated 10/12/10).

It is noted that hoggets were kept on site to maintain the disused green. This practice has now been abandoned, and the owner of the stock alerted to the health risks. As grazing animals are known to ingest soils while grazing (Thornton & Abrahams 1983), it is recommended that those animals be identified and not used for human consumption.

4.6 Risks to likely future onsite receptors

In its present undisturbed state, (as will be the case for the entire area encompassed within proposed Lot 1 of the site post-subdivision) human health risks from the arsenic on the bowling green area are negligible. If the green was not developed, i.e. the grass was retained forming a barrier to the contamination known to exist, the potential exposure pathway would be eliminated. No sources of contamination were found on the remainder of the site, which is considered suitable for the proposed residential use including gardening and vegetable growing.

Future occupants would only come into contact with bare contaminated soil if the turf were removed from the bowling green. The proposed subdivision in itself is not reasonably likely to harm human health. However the subdivision introduces the potential scenario of future development and site excavation and vegetable growing.

Common sense precautions such as washing hands after contact with soil, washing garden produce thoroughly and removing shoes before entering the house to reduce the tracking of contaminated dust indoors, are considered good practice near any sources of contamination. (Blanco 2007, MoH 2012) and would help to minimise any on-site risks to human health.

4.7 Controls on future development

It is recommended that consent conditions be put in place to restrict soil disturbance of the contaminated piece of land, and to control removal, transport and disposal of soil to an approved facility. Such controls will minimise risk to human health in the possible event of excavation for building foundations should future residential development of the site occur.

Summary:

- Soil contamination of proposed Lot 2 is limited to the area encompassing the bowling green (1296m²), i.e. 53% of the site. This soil should not be disturbed except under a remediation or management plan. An indicative sample has shown that soil contamination of proposed Lot 1 is likely to be similar to that found on proposed lot 2.
- There is no evidence of contamination elsewhere on proposed lot 2 (i.e. other than the historic green area). Control sample C shows readings for all contaminants tested to be undetected or within acceptable limits. This area is suited to the proposed residential use and any vegetable gardens should be established within this area. It is not recommended that poultry be reared on site.
- There are no off-site effects occurring from either of the proposed lots while the contaminated soil remains covered by the turf.

5 ONGOING SITE MANAGEMENT

5.1 Requirements of the NES

Under Regulation 10 of the NES, the applicant is required to make the land safe for the intended land use, which can be done in either of the two following ways. Resource consent is required for both of these options.

1. Remediate the land to reduce the concentration of the contaminants to an acceptable level;
2. Manage the land to prevent exposure of people to the contaminant(s).

5.2 Remediation & Control options

Remediation and control options are considered only for Lot 2 as Lot 1 will remain as a bowling green for the foreseeable future. In order to secure the safety of proposed lot 2 for the intended residential use, consideration has been given to the following remediation options:

1. **Removal of the upper 300mm of contaminated soil and replace with cleanfill.** This option may be impractical given the quantity of material involved (approximately 300mm x 1296m² = 388m³), the potential to contaminate the remainder of the site through soil removal, and cost of safe removal to a recognised disposal facility. In this situation, further land use consent would be required for the soil removal as identified in the NES as more than 24.2m³ of soil would be removed (based on the area of proposed Lot 2 as subdivided). This option will not be proceeded with by the applicant.
2. **Removal at selected locations of upper 300mm of turf and topsoil on the green where cultivation is desired.** Construct raised vegetable beds to a depth of a minimum of 500mm and fill with cleanfill. This is considered a more feasible alternative to full-scale soil removal. Turf remaining in situ would act as containment over remaining undisturbed area. Whether this option triggered the need for a land use consent under the NES would depend on the volume of soil removed. Based on the current site area (again, assuming the land is subdivided), 484m³ of soil could be disturbed on proposed Lot 2 and 24.2m³ could be removed. This option will not be proceeded with by the applicant.
3. **INTERIM MEASURE - Leave turf undisturbed.** Grazing by hoggets could continue, as long as animals were not a potential future food source. Fence area from remainder of site to contain animals and keep small children out. If the green was not developed, i.e. the turf left intact forming a barrier to the contamination known to exist, the site would comply as the contamination pathway would be eliminated. Vegetables could still be grown away from the green without endangering human health. This is considered an interim measure until residential land use is established on proposed Lot 2.
4. **PREFERRED OPTION - Capping of contaminated land.** Cover the bowling green area with a minimum of 300mm cleanfill. This would fill in the depression of the green and isolate the contaminated ground. Shrubs and trees could then be planted into the topsoil layer. Contaminated soil excavated from deeper holes for tree planting or foundations would require safe removal to a recognised disposal facility, however it is proposed that excavations below 300m cap be restricted and controlled by way of consent notice. Capping is the applicant's preferred option for remediation and use of the site. This option will appropriately address the human health concerns associated with the contaminated soil, is practical, affordable and achievable, and no land use consent would be required for the soil disturbance activities.

5. **CONTINUED MONITORING** – it is anticipated that the levels of arsenic will decrease, albeit very slowly, over time. In the future, the applicant may choose to undertake monitoring of the soil layer below any capping to detect when the levels are appropriately reduced, and advise the STDC accordingly. Given the capping proposed (and the subsequent minimisation of the risk), ongoing monitoring is not considered a mandatory requirement.

5.3 Consent Status

Land use consent is required (and subsequently sought) from the STDC for the following activities:

- Subdivision of the subject land (being a subdivision of Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 and Lot 1 DP 6456, as shown on the scheme plan in Appendix B).
- Land Use Consent to change proposed Lot 2 of the subdivision from a bowling green to residential use, and to enable proposed Lot 1 to remain under its current use as a bowling green.

This report confirms that the subdivision is a **Restricted Discretionary Activity**.

To assist the Council in considering the application, an assessment of Section 10 (3) of NES is required. This section lists matters over which discretion is restricted, and the activity is discussed against each of these matters below.

Table 5.1: Assessment against s10(3) NES

NES S10(3)	Assessment
1. The adequacy of the detailed site investigation, including a) Site sampling b) Laboratory analysis c) Risk assessment	Site sampling was undertaken under advice from Hills Laboratories, and the analysis was undertaken by them. The Risk Assessment has been made by Suitably Qualified and Experienced Person(s).
2. The suitability of the piece of land for the proposed activity, given the amount and kind of soil contamination	Given the amount and kind of soil contamination, and the remediation & controls proposed above (item 3 – interim site use and item 4 residential use), the risk to human health posed by the contaminant (Arsenic) of concern is addressed and the suitability of proposed Lot 2 for the proposed residential use is confirmed. This use of proposed Lot 1 as a bowling green remains suitable.
3. The approach to the remediation or ongoing management of the piece of land, including a) The remediation or management methods to address the risk posed by the contaminants to human health b) The timing of the remediation c) The standard of the remediation on completion d) The mitigation methods to address the risk posed by the contaminants to human health e) The mitigation measures for the piece of land, including the frequency and location of monitoring of specified contaminants	Given the scale of contamination and the contaminant of concern, the approach detailed in section 5.2 above is considered practical, affordable and achievable. Human health risks associated with Arsenic will be managed initially by the interim measure detailed in 5.2 (3), then once the land use is changed to residential, via the capping detailed in 5.2(4). The interim measure is immediate, the timeframe for the capping measure will be tied to the land use consent.

NES S10(3)	Assessment
4. The adequacy of the site management plan or the site validation report or both, as applicable	With the capping and instructions which will be documented permanently in the consent notices proposed, a site management plan is not considered necessary at this stage. It may however be required depending on the works proposed, as part of compliance with the NES.
5. The transport, disposal and tracking of soil and other materials taken away in the course of the activity.	It is not currently planned to take any materials away. However, if this occurs, the requirements of the NES will continue to apply.

6 CONCLUSIONS & RECOMMENDATIONS

It is concluded that:

- Land use consent is required for the subdivision and associated land use change, and these are to be sought concurrently.
- Land use consent for soil removal/disturbance is NOT required, and on the basis of the proposal put forward by the applicant, this activity is permitted.

It is recommended that:

- a consent notice be issued alerting future owners to the potential risk from arsenic contamination of the soil in the contaminated portion of proposed Lot 2 of the site. This notice should include that:
 - **Prior to capping:** vegetable gardens are only allowed in this area if they are in raised beds (minimum 600mm above the existing ground level), fruit trees are not to be established in this area, any excavations in this area require soil excavated from the contaminated zone to be isolated and managed to avoid impacts on human health.
 - **After capping with 300mm clean soil:** vegetable gardens are only allowed in this area if they are in raised beds (minimum 300mm above the capped ground level, (600mm above existing), any excavations below 300mm (i.e. below the clean capping soil) in this area require soil excavated from the contaminated zone to be isolated and managed to avoid impacts on human health.
- a consent notice be issued for any site works and excavation that would disturb the contaminated portion of proposed Lot 2 of the site, notably in the event that the site is on-sold for future residential development alerting them to the requirements of the NES around soil disturbance and removal.
- results of any soil tests and any remedial action undertaken to be made available to the TRC for inclusion in the RSLU.
- an advisory note regarding animals known to have grazed on-site be placed on the consent: that these animals be identified as not suitable for human consumption.

7 LIMITATIONS

This report has been prepared on behalf of Rebecca White and Rob Groat for the purposes of gaining subdivision and land use consent. The report was based on a preliminary site investigation, site visits and soil sampling, and information from the client and other parties. Samples were analysed by an accredited laboratory for heavy metals, organochlorine pesticides and polycyclic aromatic hydrocarbons.

Assessment and conclusions are based on information currently available.

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APPENDIX A SCHEME PLAN

(BTW Dwg No12217-01 Rev2)

btw company

- . surveyors
- . planners
- . engineers
- . land & g-i-s services



Disclaimer: This plan is produced for the sole purpose of obtaining a subdivision consent under the Resource Management Act 1991. Dimensions and areas are approximate and are subject to final survey. The use of this drawing for any other purpose is at the owners risk.



File Name: L:\017\12217\12217.dwg Plot Date: 11/10/2012 Plot Time: 09:25

LOCAL BODY: South Taranaki District Council
 APPLICANT: R. White & R Groat
 COMPRISED IN: CT TN130/93, TN164/94, TN193/52
 SCALE: 1:600


**Lots 1 & 2 being a Proposed Subdivision of
 Lots 9-11 Deeds Plan 53, Lot 3 DP 6868 & Lot 1 DP 6456**

Prepared by: I.M. Dickey
 Drawn by: RJG
 Checked by: IMD
 Date: 08/08/12
 Date: 14/08/12
 Licensed Cadastral Surveyor
 Date: August 2012 Job No. 12217 Drawing No. 12217-01-Rev02

APPENDIX B SAMPLING PLAN



File Name: L:\DATA\12217\DWG\12217-02.dwg Plot Date: 15/04/2013 Plot Time: 15:26

 <p>btw company Cnr. Courtenay & Eliot Sts. P.O Box 551, NEW PLYMOUTH 4340 Ph (06) 759 5040 Ph 0800 289787 Fax (06) 759 5049 E-mail survey@btwcompany.co.nz Web www.btwcompany.co.nz</p>	LOCATION:	PATEA	SURVEYED	N/A	-	TITLE	R WHITE & R GROAT PROPOSED SUBDIVISION SAMPLING PLAN				
	PROJECT No:	12217	DRAWN	KCB	15/04/13	DRAWING No:	12217-02	SHEET	1	REVISION	0
	SCALE:	1:400	APPROVED			ORIGINAL SIZE:	A4				

APPENDIX C BTW SOIL SAMPLING PROCEDURE

PL02 PLANNING PROCEDURES

02.3.2 SOIL SAMPLING

PRE- SAMPLING

1. Clean and sterilised sampling containers (14 x 300ml glass soil jars) have been provided by Hill Laboratories. These have sample identification labels adhered to them.
2. Clean and decontaminate soil sampling and testing equipment (spade and soil bore).

SITE SPECIFIC SAMPLING TECHNIQUE

3. Sterile gloves shall be worn.
4. Primary sample area is the bowling green. Samples should be taken in a 6-point grid pattern at two depths (see diagram).
5. Two samples to be taken at each of the six points, one at 0-100mm depth and one at 100-300mm depth, with each sample to be placed in a separate labelled sampling jar.
6. Samples to be labelled 1-6 with A designating 0-100mm depth, and 1-6 with B designating 100-300mm depth (12 samples).
7. Secondary sample area is between clubhouse and sheds (see diagram). Two samples to be taken at 0-100mm depth and labelled 7 and 8. Total of 14 separate samples.

SAMPLE RECORDS & DELIVERY TO LABORATORY

Samples shall be delivered to the laboratory in tightly sealed containers, on an overnight courier. The samples shall be protected from light and heat, by placement in a sealed chillybin with cooling pads. If this is not carried out, sample quality can change rapidly. Sample containers shall be clearly marked with the date, time of sampling, bore reference and samplers name before placing them in a chillybin for storage. Chain of Custody forms [PF01] and laboratory provided Analysis Request Forms shall be completed for all samples.

Making it happen.

NEW PLYMOUTH - HEAD OFFICE

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APPENDIX D HILL LABORATORY ANALYSIS REPORTS



Hill Laboratories
BETTER TESTING BETTER RESULTS

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Hamilton 3240, New Zealand

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Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Page 1 of 3

Client:	BTW Company Ltd	Lab No:	1082870	SPV1
Contact:	Sue Robb C/- BTW Company Ltd PO Box 551 NEW PLYMOUTH 4340	Date Registered:	18-Dec-2012	
		Date Reported:	10-Jan-2013	
		Quote No:	52631	
		Order No:		
		Client Reference:	Bowling Club	
		Submitted By:	Sue Robb	

Sample Type:	Soil					
Sample Name:	Composite of 1A + 2A + 3A + 4A + 5A + 6A	Composite of 1B + 2B + 3B + 4B + 5B + 6B	Composite of 7 + 8			
Lab Number:	1082870.15	1082870.16	1082870.17			
Individual Tests						
Dry Matter	g/100g as rcvd	71	74	70	-	-
Total Recoverable Chromium	mg/kg dry wt	18	20	20	-	-
National Environmental Standards Metals						
Total Recoverable Arsenic	mg/kg dry wt	51	38	6	-	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.34	0.25	0.31	-	-
Trivalent Chromium*	mg/kg dry wt	18	20	20	-	-
Chromium (hexavalent)*	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
Total Recoverable Copper	mg/kg dry wt	40	41	48	-	-
Total Recoverable Lead	mg/kg dry wt	118	91	47	-	-
Total Recoverable Mercury	mg/kg dry wt	0.32	0.25	< 0.10	-	-
Organochlorine Pesticides Trace in Soil						
Aldrin	mg/kg dry wt	0.0037	0.0023	< 0.0010	-	-
alpha-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
beta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
delta-BHC	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
cis-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
trans-Chlordane	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
2,4'-DDD	mg/kg dry wt	0.0171	0.0099	< 0.0010	-	-
4,4'-DDD	mg/kg dry wt	0.047	0.054	0.0011	-	-
2,4'-DDE	mg/kg dry wt	0.0142	0.0098	< 0.0010	-	-
4,4'-DDE	mg/kg dry wt	1.83	1.01	0.036	-	-
2,4'-DDT	mg/kg dry wt	0.21	0.160	0.0039	-	-
4,4'-DDT	mg/kg dry wt	1.79	3.0	0.021	-	-
Dieldrin	mg/kg dry wt	1.55	0.92	0.0029	-	-
Endosulfan I	mg/kg dry wt	0.0040	0.0015	< 0.0010	-	-
Endosulfan II	mg/kg dry wt	0.0100	0.0064	< 0.0010	-	-
Endosulfan sulphate	mg/kg dry wt	0.034	0.0158	0.0015	-	-
Endrin	mg/kg dry wt	0.0035	0.0021	< 0.0010	-	-
Endrin Aldehyde	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
Endrin ketone	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
Heptachlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
Heptachlor epoxide	mg/kg dry wt	0.0158	0.0137	< 0.0010	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-
Methoxychlor	mg/kg dry wt	< 0.0010	< 0.0010	< 0.0010	-	-



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 Name:		Composite of 1A + 2A + 3A + 4A + 5A + 6A	Composite of 1B + 2B + 3B + 4B + 5B + 6B	Composite of 7 + 8	
Lab Number:		1082870.15	1082870.16	1082870.17	
Organochlorine Pesticides Trace in Soil					
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.002	< 0.002	< 0.002	-
Polycyclic Aromatic Hydrocarbons Screening in Soil					
Acenaphthene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Acenaphthylene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Anthracene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Benzo[a]anthracene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Chrysene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Fluoranthene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Fluorene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Naphthalene	mg/kg dry wt	< 0.16	< 0.17	< 0.17	-
Phenanthrene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-
Pyrene	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-

Analyst's Comments

Samples 15-17 Comment:

It should be noted that the results reported for lead and mercury are total recoverable, not inorganic as specified by the NES standards. This should be kept in mind when interpreting these results.

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	Samples
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
National Environmental Standards Metals*		-	15-17
Organochlorine Pesticides Trace in Soil	Sonication extraction, SPE cleanup, GPC cleanup (if required), dual column GC-ECD analysis. Tested on dried sample	-	15-17
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	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	15-17
Extraction of Hexavalent Chromium in Environmental Solids*	0.01M KH ₂ PO ₄ Extraction.	-	15-17
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	15-17
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	1-14
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	15-17
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	15-17
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	15-17
Trivalent Chromium*	Calculation Total Chromium - Hexavalent Chromium.	0 mg/kg dry wt	15-17

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Samples
Hexavalent Chromium in Environmental Solids*	Phosphate buffer extraction, colorimetry.	0.4 mg/kg dry wt	15-17
Total Recoverable Chromium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	15-17
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	15-17
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	15-17
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	15-17

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.

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



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ANALYSIS REPORT

Page 1 of 3

Client:	BTW Company Ltd	Lab No:	1174059	SPv1
Contact:	K Hooper C/- BTW Company Ltd PO Box 551 NEW PLYMOUTH 4340	Date Registered:	31-Aug-2013	
		Date Reported:	10-Sep-2013	
		Quote No:	56819	
		Order No:		
		Client Reference:	Bowling Club	
		Submitted By:	K Hooper	

Sample Type: Soil						
Sample Name:		PBC 1	PBC 2	PBC 3	PBC 4	PBC 5
Lab Number:		30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013
		1174059.1	1174059.2	1174059.3	1174059.4	1174059.5
Individual Tests						
Dry Matter	g/100g as rcvd	69	72	68	64	69
Total Recoverable Chromium	mg/kg dry wt	20	22	21	21	21
National Environmental Standards Metals						
Total Recoverable Arsenic	mg/kg dry wt	25	42	59	57	39
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Cadmium	mg/kg dry wt	0.26	0.35	0.35	0.41	0.34
Trivalent Chromium*	mg/kg dry wt	20	22	21	21	21
Chromium (hexavalent)*	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total Recoverable Copper	mg/kg dry wt	38	40	39	43	42
Total Recoverable Lead	mg/kg dry wt	54	120	130	115	81
Total Recoverable Mercury	mg/kg dry wt	0.30	0.27	0.32	0.14	0.29
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	0.020	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	0.020	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	0.09	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	0.014	< 0.010	0.020	0.011	< 0.010
4,4'-DDD	mg/kg dry wt	0.026	< 0.010	0.053	0.047	0.021
2,4'-DDE	mg/kg dry wt	0.016	< 0.010	0.021	0.010	0.010
4,4'-DDE	mg/kg dry wt	1.30	0.65	1.44	1.63	1.07
2,4'-DDT	mg/kg dry wt	0.196	0.076	0.41	0.23	0.148
4,4'-DDT	mg/kg dry wt	1.12	0.38	2.2	1.68	0.82
Dieldrin	mg/kg dry wt	1.14	0.87	1.71	1.16	0.76
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	0.016	0.043	0.042	0.029
Endrin	mg/kg dry wt	< 0.010	< 0.010	0.013	< 0.010	< 0.010
Endrin Aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	0.016	< 0.010	0.107	0.023	0.018
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010



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 Name:	PBC 1	PBC 2	PBC 3	PBC 4	PBC 5
	30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013
Lab Number:	1174059.1	1174059.2	1174059.3	1174059.4	1174059.5
Sample Name:	PBC 6	PBC 7			
	30-Aug-2013	30-Aug-2013			
Lab Number:	1174059.6	1174059.7			
Individual Tests					
Dry Matter	g/100g as rcvd	69	70	-	-
Total Recoverable Chromium	mg/kg dry wt	18	21	-	-
National Environmental Standards Metals					
Total Recoverable Arsenic	mg/kg dry wt	63	25	-	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.33	0.26	-	-
Trivalent Chromium*	mg/kg dry wt	18	21	-	-
Chromium (hexavalent)*	mg/kg dry wt	< 0.4	< 0.4	-	-
Total Recoverable Copper	mg/kg dry wt	37	37	-	-
Total Recoverable Lead	mg/kg dry wt	135	71	-	-
Total Recoverable Mercury	mg/kg dry wt	0.27	0.35	-	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010	< 0.010	-	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	0.014	-	-
4,4'-DDD	mg/kg dry wt	0.019	0.025	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	0.013	-	-
4,4'-DDE	mg/kg dry wt	0.86	0.94	-	-
2,4'-DDT	mg/kg dry wt	0.101	0.29	-	-
4,4'-DDT	mg/kg dry wt	0.78	1.26	-	-
Dieldrin	mg/kg dry wt	1.08	0.091	-	-
Endosulfan I	mg/kg dry wt	< 0.010	0.013	-	-
Endosulfan II	mg/kg dry wt	< 0.010	0.029	-	-
Endosulfan sulphate	mg/kg dry wt	0.034	0.24	-	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	-	-
Endrin Aldehyde	mg/kg dry wt	< 0.010	< 0.010	-	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	-	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	-	-
Heptachlor epoxide	mg/kg dry wt	0.013	< 0.010	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	-	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	-	-

Analyst's Comments

Samples 1-7 Comment:

It should be noted that the results reported for lead and mercury are total recoverable, not inorganic as specified by the NES standards. This should be kept in mind when interpreting these results.

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	Samples
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%.	-	1-7
National Environmental Standards Metals*		-	1-7

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Samples
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on dried sample	-	1-7
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	1-7
Extraction of Hexavalent Chromium in Environmental Solids*	0.01M KH ₂ PO ₄ Extraction.	-	1-7
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-7
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	1-7
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1-7
Trivalent Chromium*	Calculation Total Chromium - Hexavalent Chromium.	0 mg/kg dry wt	1-7
Hexavalent Chromium in Environmental Solids*	Phosphate buffer extraction, colorimetry.	0.4 mg/kg dry wt	1-7
Total Recoverable Chromium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-7
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1-7

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.

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



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ANALYSIS REPORT

Page 1 of 3

Client: BTW Company Ltd	Lab No: 1174059	SPV1
Contact: K Hooper	Date Registered: 31-Aug-2013	
C/- BTW Company Ltd	Date Reported: 10-Sep-2013	
PO Box 551	Quote No: 56819	
NEW PLYMOUTH 4340	Order No:	
	Client Reference: Bowling Club	
	Submitted By: K Hooper	

Sample Type: Soil	Sample Name:	PBC 1	PBC 2	PBC 3	PBC 4	PBC 5
		30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013	30-Aug-2013
	Lab Number:	1174059.1	1174059.2	1174059.3	1174059.4	1174059.5

Individual Tests

Dry Matter	g/100g as rcvd	69	72	68	64	69
Total Recoverable Chromium	mg/kg dry wt	20	22	21	21	21

National Environmental Standards Metals

Total Recoverable Arsenic	mg/kg dry wt	25	42	59	57	39
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	< 20	< 20	< 20
Total Recoverable Cadmium	mg/kg dry wt	0.26	0.35	0.35	0.41	0.34
Trivalent Chromium*	mg/kg dry wt	20	22	21	21	21
Chromium (hexavalent)*	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total Recoverable Copper	mg/kg dry wt	38	40	39	43	42
Total Recoverable Lead	mg/kg dry wt	54	120	130	115	81
Total Recoverable Mercury	mg/kg dry wt	0.30	0.27	0.32	0.14	0.29

Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	0.020	< 0.010	< 0.010
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	0.020	< 0.010	< 0.010
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	0.09	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	0.014	< 0.010	0.020	0.011	< 0.010
4,4'-DDD	mg/kg dry wt	0.026	< 0.010	0.053	0.047	0.021
2,4'-DDE	mg/kg dry wt	0.016	< 0.010	0.021	0.010	0.010
4,4'-DDE	mg/kg dry wt	1.30	0.65	1.44	1.63	1.07
2,4'-DDT	mg/kg dry wt	0.196	0.076	0.41	0.23	0.148
4,4'-DDT	mg/kg dry wt	1.12	0.38	2.2	1.68	0.82
Dieldrin	mg/kg dry wt	1.14	0.87	1.71	1.16	0.76
Endosulfan I	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan II	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endosulfan sulphate	mg/kg dry wt	< 0.010	0.016	0.043	0.042	0.029
Endrin	mg/kg dry wt	< 0.010	< 0.010	0.013	< 0.010	< 0.010
Endrin Aldehyde	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Heptachlor epoxide	mg/kg dry wt	0.016	< 0.010	0.107	0.023	0.018
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010



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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 Name:	PBC 1	PBC 2	PBC 3	PBC 4	PBC 5
Lab Number:	30-Aug-2013 1174059.1	30-Aug-2013 1174059.2	30-Aug-2013 1174059.3	30-Aug-2013 1174059.4	30-Aug-2013 1174059.5
Sample Name:	PBC 6	PBC 7			
Lab Number:	30-Aug-2013 1174059.6	30-Aug-2013 1174059.7			
Individual Tests					
Dry Matter	g/100g as rcvd	69	70	-	-
Total Recoverable Chromium	mg/kg dry wt	18	21	-	-
National Environmental Standards Metals					
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-
Total Recoverable Boron	mg/kg dry wt	< 20	< 20	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.33	0.26	-	-
Trivalent Chromium*	mg/kg dry wt	18	21	-	-
Chromium (hexavalent)*	mg/kg dry wt	< 0.4	< 0.4	-	-
Total Recoverable Copper	mg/kg dry wt	37	37	-	-
Total Recoverable Lead	mg/kg dry wt	135	71	-	-
Total Recoverable Mercury	mg/kg dry wt	0.27	0.35	-	-
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.010	< 0.010	-	-
alpha-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
beta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
delta-BHC	mg/kg dry wt	< 0.010	< 0.010	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010	< 0.010	-	-
cis-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-
trans-Chlordane	mg/kg dry wt	< 0.010	< 0.010	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	-	-
2,4'-DDD	mg/kg dry wt	< 0.010	0.014	-	-
4,4'-DDD	mg/kg dry wt	0.019	0.025	-	-
2,4'-DDE	mg/kg dry wt	< 0.010	0.013	-	-
4,4'-DDE	mg/kg dry wt	0.86	0.94	-	-
2,4'-DDT	mg/kg dry wt	0.101	0.29	-	-
4,4'-DDT	mg/kg dry wt	0.78	1.26	-	-
Dieldrin	mg/kg dry wt	1.08	0.091	-	-
Endosulfan I	mg/kg dry wt	< 0.010	0.013	-	-
Endosulfan II	mg/kg dry wt	< 0.010	0.029	-	-
Endosulfan sulphate	mg/kg dry wt	0.034	0.24	-	-
Endrin	mg/kg dry wt	< 0.010	< 0.010	-	-
Endrin Aldehyde	mg/kg dry wt	< 0.010	< 0.010	-	-
Endrin ketone	mg/kg dry wt	< 0.010	< 0.010	-	-
Heptachlor	mg/kg dry wt	< 0.010	< 0.010	-	-
Heptachlor epoxide	mg/kg dry wt	0.013	< 0.010	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.010	< 0.010	-	-
Methoxychlor	mg/kg dry wt	< 0.010	< 0.010	-	-

Analyst's Comments

Samples 1-7 Comment:

It should be noted that the results reported for lead and mercury are total recoverable, not inorganic as specified by the NES standards. This should be kept in mind when interpreting these results.

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	Samples
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%.	-	1-7
National Environmental Standards Metals*		-	1-7

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Samples
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082).. Tested on dried sample	-	1-7
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	1-7
Extraction of Hexavalent Chromium in Environmental Solids*	0.01M KH ₂ PO ₄ Extraction.	-	1-7
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-7
Total Recoverable Arsenic	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Boron	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level US EPA 200.2.	20 mg/kg dry wt	1-7
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1-7
Trivalent Chromium*	Calculation Total Chromium - Hexavalent Chromium.	0 mg/kg dry wt	1-7
Hexavalent Chromium in Environmental Solids*	Phosphate buffer extraction, colorimetry.	0.4 mg/kg dry wt	1-7
Total Recoverable Chromium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Copper	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	2 mg/kg dry wt	1-7
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	1-7
Total Recoverable Mercury	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1-7

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.

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

APPENDIX E NEPC HEALTH INVESTIGATION LEVELS (HIL) (AUSTRALIA)

Table 1A(1) Health investigation levels for soil contaminants

Chemical	Health-based investigation levels (mg/kg)			
	Residential A	Residential B	Recreational C	Commercial/Industrial D
Metals and Inorganics				
arsenic ⁽¹⁾	30	50	30	300
beryllium	70	100	300	500
boron	800	4000	20000	90000
Cadmium	20	50	30	100
chromium (VI)	30	50	300	3000
Cobalt	300	600	300	4000
Copper	300	3000	30000	250000
lead	300	1200	600	1500
manganese	3000	3000	9000	40000
methyl mercury ⁽²⁾	2	30	10	20
mercury (inorganic)	200	600	400	4000
Nickel	400	900	300	4000
Selenium	300	1000	500	10000
Zinc	6000	6000	30000	400000
cyanide (free)	250	400	100	2000
Polynuclear Aromatic Hydrocarbons (PAHs)				
benz[a]pyrene (B[a]P)	3	4	4	40
Fluorene	30	40	40	400
Phenols				
Phenol	300	5000	40000	250000
pentachlorophenol	60	550	140	300
Chloro	400	500	4700	27000
Organochlorine Pesticides				
DDT + DDE + DDD	20	70	400	400
aldrin and dieldrin	5	30	8	30
chlordane	30	300	80	500
malathion	300	400	400	2000
lindrin	30	20	20	100
heptachlor	5	10	8	30
HCH	30	20	15	80
methoxychlor	40	500	500	2700
Mirex	30	20	20	100
toxaphene	20	30	30	170
Phenylacetic Acid Herbicides				
2,4-D	700	1000	900	9000
2,4-DE	1000	2000	1400	19000
MCPA	300	1000	350	3000
MCPB	300	1000	400	5000
mecoprop	700	1000	350	3000
Picloram	300	1000	400	27000
Other Pesticides				
Atrazine	300	500	300	3000
chlorpyrifos	170	400	100	500
Disodiam	400	600	700	4000
Other Organics				
PCBs	1	2	2	8
FR-1 Flame Retardant (Br-1-Br-2)	1	2	2	10

Notes:

- (1) HIL A Standard residential with garden/vegetable and home grown produce <10% fruit and vegetable intake (no poultry), include children's day care centres, day health and primary schools.
- HIL B Residential with minimal opportunities for soil access, includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats.
- HIL C Includes developed open space such as parks, playgrounds, playing fields (e.g. oval), secondary schools and footpaths. This does not include undeveloped public open space which should be subject to a site-specific assessment, where appropriate.
- HIL D Commercial/Industrial or public purposes such as shops, offices, factories and industrial sites.
- (2) HIL for arsenic assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate.

APPENDIX 4: PEER REVIEW OF THE DETAILED SITE INVESTIGATION

South Taranaki District Council
Private Bag 902
Hawera 4640

Attn. Maria Cashmore
Sent via email

20 October 2013

Dear Maria

Peer Review of Detailed Site Investigation (DSI) dated 08 October 2013, Former Patea Womens Bowling Club

Further to our discussions, Geohazard Environmental is pleased to prepare this review of the above report for you. The scope of works for this review consists of the following:

- Assess the ability of the DSI report to meet the MfE reporting requirements with respect to both lots.
 - Including any gaps where further information is required.
- Determine the suitability of proposed remediation and its ability to be effectively monitored.
- Comment on the suitability of timing of remediation.
- Provide discussion on compliance with NES legislation.

Background

It is proposed to subdivide the site into two Proposed Lots, 1 & 2. The site is currently a bowling club and green (Lot 1) and former bowling club and green (Lot 2). A Preliminary Investigation identified the potential for persistent pesticides to be present in site soils. Soil samples were collected from Proposed Lot 2, in two separate sampling rounds. A confirmatory soil sample was also collected on Proposed Lot 1.

Proposed Lot 1: To remain as a bowling club.

Proposed Lot 2: To change to residential land use.

Ministry for the Environment Reporting Requirements

The site was identified as potentially being subject to persistent pesticide use. As this is a HAIL category, a Detailed Site Investigation was undertaken by BTW (July 2013). A DSI requires soil sampling, and if required groundwater sampling and analysis.

Soil samples were collected by BTW in a grid pattern on the bowling green, with two additional samples collected between buildings on the site. This sampling density is suitable given the sites size.

The original soil samples were composited by the laboratory from 6 soil sample locations, and were analysed for metals and persistent pesticides. Per Ministry for the Environment guidelines:

When comparing composite results against guideline values, the guideline value must be adjusted by dividing the value by the number of sub-samples in the composite.

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- Given the relatively low guideline for arsenic (20 mg/kg), an adjusted value based on even 4 composite soil samples would be at background levels. It is also not appropriate to composite as many as 6 soil samples; MfE guidelines recommend a maximum of 4 samples per composite. Therefore, composite samples are not considered appropriate for this site.

Subsequent samples (August 2013) were collected and analysed individually by the laboratory. This method is appropriate and meets MfE requirements.

- The sampling analytes of metals and organochlorine pesticides are suitable given the sites historic use. The report does note that organophosphorus pesticides are associated with bowling greens, however these have not been tested for. Given the low persistence of such compounds, they are unlikely to be present at significant levels.
- It is not clear why polycyclic aromatic hydrocarbons were also chosen for laboratory analysis, however as results are below guidelines this becomes a moot point.
- Guideline values selected are taken from the NES and from appropriate sources such as the NEPC where New Zealand Guidelines are not available. Guidelines / SCS chosen are appropriate for this site.

Suitability of Proposed Remediation

The controlling pathway for arsenic is soil ingestion. Produce consumption has a significant influence for residential scenarios at high home grown produce proportions but only a moderate influence at the standard residential proportion of 10 per cent.

Proposed remedial methods are presented below, with comments from Geohazard Environmental Ltd. in the following bullet points.

- Removal of 300mm of soil from across the site (not selected by applicant).
 - This method eliminates the majority of the source of contamination. It is envisioned that clean topsoil would be required to be imported, creating a barrier layer to any remaining contamination in soil.
 - This remedial method is considered appropriate for the site, and would not require on-going site management.
- Selected removal of soil where cultivation is required, and construct raised vegetable gardens (not selected by applicant).

- This remedial method does not anticipate changing needs of future site users, including the location of future dwellings and preferences for garden locations.
- Ongoing monitoring for compliance would not be practicable, and this method should be discouraged.

- Undisturbed -Fence the site to restrict access.
 - This method does not address the source of soil contamination, but does remove the pathway, and hence minimise the risk to human health.
 - This method is suitable whilst there is no land use change.
 - The site would not be suitable for residential use without further remedial work.

- Cap site with at least 300mm of clean fill (preferred method).
 - Given the significant exposure route for arsenic uptake is through ingestion of soil, capping the site is a valid remediation method. The proposed minimum cap thickness (300mm) is appropriate, given the moderate influence of vegetable consumption at a standard residential site.

 - It is noted that a proposed consent condition also includes that vegetables are only to be grown in raised gardens at least 300mm high. This condition attempts to satisfy concerns regarding the cap thickness for deep rooted vegetables, but is thought to be unnecessary and impractical to monitor. A notice should however still advise future owners that contaminants are present in soils at depths greater than 300mm.

 - Minor excavations for fence posts and planting of shrubs are unlikely to present a significant risk to human health, therefore a consent notice warning against this activity is considered unnecessary. Again, a notice on the property file should advise future owners that contaminants are present in soils at depths greater than 300mm.

- Ongoing monitoring (not selected by applicant).
 - The levels of arsenic are not expected to degrade within a reasonable period of time, and therefore ongoing monitoring is considered to be an irrelevant remedial method. This method is not suitable for this site.

Timing of Remediation

The original proposal was to undertake the preferred remediation option of capping the site after subdivision consent has been granted. The NES offers council Restricted Discretionary powers when issuing the consent including Section 3(c)(ii) regarding “the timing of the remediation”.

Approach by other Councils

The Tauranga City Council and Rotorua District Council both take the approach that remedial works are required prior to obtaining subdivision consent. The rationale is that the site is to be considered “suitable for use” for the end user of the site, who may not make their own due diligence research, nor be aware of potential costs of remediation.

Geohazard Environmental Recommendation

Given the approach by other District Councils, it is considered appropriate to maintain consistency and that remedial works be completed prior to final issue of consent. The decision however remains at the discretion of the South Taranaki District Council.

Compliance

National Environmental Standards for Assessing and Managing Contaminants in Soils to Protect Human Health (NES) requires a Detailed Site investigation if a site is to be subdivided. The NES describes a “*piece of land*” on which an “*activity*” occurs. The “*piece of land*” is described as land that has had a HAIL use. An “*activity*” includes subdividing a site.

It is our interpretation that the NES requires an investigation of all land parcels within the subdivision, unless it is production land. The “Users Guide” states the following in support of a requirement to investigate each proposed lot:

*Either a preliminary site investigation report (in support of a permitted activity under regulation 8(4)) or a detailed site investigation report (in support of a resource consent application) will need to be prepared and submitted for **each** of the resulting land parcels that contain a “piece of land”. The NES applies to the piece of land on which hazardous activities are being, have been, or are more likely than not to have been undertaken, so in some cases, all of the land parcels that result from a subdivision may be subject to the NES, even if there is no change in land use.*

The Detailed Site Investigation addresses each of the proposed land parcels, specifically noting that levels of contaminants are expected to be similar across both sites. A confirmatory soil sample has been collected on Lot 2. The DSI is considered compatible with the National Environmental Standards.

Additional Geohazard Environmental Comments

A guideline value has not been introduced for Proposed Lot 1, however the “recreational” guideline could be considered as a very conservative screening value. Levels of arsenic at the site are inferred to be within the guidelines for recreational use. Should land use change, the risk will need to be re-assessed.

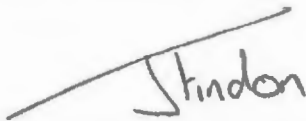
Summary

Overall the DSI dated 08 October 2013 meets the reporting requirements of the National Environmental Standards.

The report concludes that arsenic is present at unacceptable levels at the site (residential land use), and dieldrin is also at unacceptable levels (rural –residential use). Geohazard Environmental undertook further statistical analysis of the laboratory results, to determine the 95%UCL. This analysis confirms that any samples collected at the site would statistically be likely to exceed the guideline values. Remediation is therefore required at the site prior to use for residential purposes.

The existing bowling club remains suitable for recreational land use. Please contact me directly if you have any further questions on this review.

Yours sincerely,



Jonathan Findon
Director, Geohazard Environmental

References

Ministry for the Environment. 2012. *Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*.

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

Maria Cashmore

Subject: FW: RMS12035: Proposed Two Lot Residential Subdivision at 16 Richmond Street, Patea

Subject: RE: RMS12035: Proposed Two Lot Residential Subdivision at 16 Richmond Street, Patea

Hi Maria,

As discussed, the activity has become "Restricted Discretionary" (or Discretionary) as the DSI confirmed soils are above applicable guidelines.

A Remediation Action Plan is a document that outlines what methodology will be undertaken at a site. It is reviewed and approved by council. Section 10(3)(c) of the NES provides council with the tools to approve a remediation plan. It also allows the Council to approve the timing of remediation.

In the case of Patea, the RAP is expected to be a short report or letter, with the following:

- An outline of the site (location, summary of sampling results).
- Objectives of the remediation (e.g. cap contaminants or remove all contaminants, or a combination).
- A plan showing areas to be remediated, and approximate volumes of soil to be removed/imported.
- Confirmation any consents have been gained if required (earthworks consent?).
- An outline of how soils will be handled (i.e by hand or by machine).
- Site environmental management (silt fences if required?).
- Where will soils be disposed if any is to be removed? How will it be transported?
- Where will clean soil come from?
- How the site will be validated as suitable for use when remediation is complete? (usually further soil sampling, or if soil is imported, proof that the soil is clean).
- Health and safety
 - Protection for workers against dust (usually overalls, dust masks, gloves to be available. Dust to be suppressed with water if required, or no excavation in windy conditions).

Given the RAP is relatively simple, it shouldn't need peer review if you are confident it covers these items. Peer review could be undertaken at the applicants cost. Alternatively give me a call when the RAP is submitted and we can go over any questions you have informally.

ct 1 should have a notice put on the consent, so that any future land use change is able to be managed. If it isn't put on now, it may be difficult in future to control. The notice should advise that "contaminants are recorded above levels for the protection of human health, and remediation or further investigation is required prior to use other than for recreational purposes" (or something similar).

Hopefully this helps...

Jonathan Findon

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