

REPORT

Selwyn District Council

**Desk-based Ground Contamination
Assessment
Plan Change 7 Area**

Report prepared for:

Selwyn District Council

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Distribution:

Selwyn District Council

2 copies

Tonkin & Taylor Ltd (FILE)

1 copy

January 2011

T&T Ref: 51778



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1 Introduction

Tonkin and Taylor Ltd (T&T) have been engaged by the Selwyn District Council (SDC) to undertake a desk-based ground contamination investigation within the Plan Change 7 area. The Plan Change 7 area is located around the townships of Rolleston and Lincoln, Canterbury, hereafter referred to as 'Site 1' and 'Site 2' respectively.

The aim of the investigation was to establish the potential for historical activities to have resulted in ground contamination within the land proposed for rezoning, and how this may affect the zone change.

This work has been undertaken in accordance with our proposal of 10 November 2010.

1.1 Objectives and scope of work

We understand that SDC proposes to rezone land around Lincoln and Rolleston that is currently zoned as 'Living Z' or 'Deferred Living Z'. This rezoning is proposed in order to allow these areas to be used for standard residential activities. The area proposed for rezoning comprises 58 current land parcels.

We also understand that as part of the plan change process, SDC are required to demonstrate that ground contamination matters will not preclude the proposed use. This study was undertaken at the request of SDC in order to assess the potential for historical activities on the sites to have resulted in ground contamination, with the following scope of works:

- Identification all of the properties within the PC7 area (information provided to us by SDC)
- An Environment Canterbury (ECan) Listed Landuse Register (LLUR) search
- Undertaking of a site walkover inspection
- Review of historical aerial photographs
- Review of the SDC property files
- Review of selected historic certificates of title where required
- Preparation of this report.

Findings are reported for 'Site 1' (Rolleston) and 'Site 2' (Lincoln) in sections 2 and 3 respectively.

2 Site 1 – Rolleston

2.1 Site Description

Site 1 comprises a total of 6 Outline Development Plan (ODP) areas around the township of Rolleston, as shown on Figures 1, 2a, and 2b. Site 1 includes 30 current land parcels (list of parcels as provided by SDC in Appendix A) covering a total of approximately 242 hectares.

2.1.1 Site location and current land use

ODP area 1 contains 18 of the existing parcels, and is located southwest of Rolleston, between Main Road South (State Highway 1), Dunns Crossing Road, Burnham School Road and Brookside Road. These land parcels cover an area of approximately 63 hectares and are predominantly agricultural land.

ODP area 2 is a small (4.8 hectares), triangular-shaped area of agricultural land consisting of one existing parcel of land on Norman Kirk Drive, bound by Dick Roberts Place and Rolleston Drive on its southwest and east sides respectively.

ODP areas 3 and 4 are areas of approximately 50 and 7 hectares respectively, to the east of Rolleston township. Both areas are predominantly agricultural land with some residential buildings and together comprise 5 existing land parcels.

ODP areas 5 and 6 together contain 6 existing parcels of land. These are agricultural areas with some residential buildings and are located south of Rolleston, along Goulds Road. They have a combined area of approximately 117 hectares.

2.1.2 Site geology and hydrogeology

The underlying geology is described by Forsyth et al.¹ as grey alluvium of variable thickness, beneath plains or low level terraces.

Based on information in ECan's database, soils beneath Site 1 are stony, shallow silt loam (ODP areas 1, 5 and 6), shallow, sandy loam (ODP area 2) and deep, fine sandy loam (ODP 3 and 4).

ECan's well database shows a total of 22 wells on Site 1. The depth of these wells varies from 16m to 84m, used for irrigation, stock supply and domestic supply. The wells are privately owned, except for M36/0028 in ODP area 1 which is used by Land and Survey for groundwater monitoring. Groundwater levels in this well range between 7.9 and 16.3m below ground level. Based on local topography and location of surface water features, general groundwater flow direction is expected to be towards the southeast.

2.2 Site History

2.2.1 Aerial Photographs

Six sets of aerial photographs from New Zealand Aerial Mapping (1942, 1961, 1973, 1984 and 1994) and Terraview (2010) were reviewed to gain historical information for Site 1. The results are summarised in Table 1. Key features are shown on Figures 2a and b.

¹ Forsyth, P.J., Barrell, D.J.A. and Jongens, R., 2008, Geology of the Christchurch Area, IGNS Map 16, 1:250,000

Table 1: Summary of historical aerial photographs

Year	Run, Scale	Description
1942	SN 224, 1:16,000	<p>ODP1: Agricultural land, including cropping. Stands of trees are present along part of south-western and north-eastern boundaries. There is a small area of disturbed ground near north-eastern boundary.</p> <p>ODP2: Cropping.</p> <p>ODP3: Agricultural land, including cropping. A small shed is present in the centre of the area, and a paddock, residential dwelling and associated garden are present on the southern boundary. A small area of disturbed ground is visible north of the dwelling.</p> <p>ODP4: Cropping.</p> <p>ODP5: Agricultural land, including cropping and rough, undeveloped ground. A dwelling and two outbuildings surrounded by trees are present towards the eastern corner.</p> <p>ODP6: Agricultural land, including cropping. A small paddock enclosed by trees is present on north-western boundary.</p>
1961	SN 1408, 1:17,000	<p>ODP1: There is a cluster of small buildings against southern boundary.</p> <p>ODP2: No significant change.</p> <p>ODP3: The small shed has been removed. The disturbed ground near the dwelling is no longer visible.</p> <p>ODP4: No significant change.</p> <p>ODP5: Rough ground is no longer present. A small fenced/hedge-lined yard is present north of the buildings and an area of disturbed ground extends approximately 200m to the northwest.</p> <p>ODP6: Rough ground is visible on the southern part of the area. A cluster of small buildings and a fenced paddock are present in the northern corner.</p>
1974	SN 2713, 1:25,000	<p>ODP1: A residential building is present in the eastern corner.</p> <p>ODP2: No significant change.</p> <p>ODP3: No significant change.</p> <p>ODP4: No significant change.</p> <p>ODP5: The area of disturbed ground extending northwest from the yard has been removed.</p> <p>ODP6: Rough ground is no longer present. A shed is visible at the southern corner of the tree-enclosed paddock.</p>
1984	SN 8389, 1:25,000	<p>ODP1: No significant change.</p> <p>ODP2: No significant change.</p> <p>ODP3: No significant change.</p> <p>ODP4: No significant change.</p> <p>ODP5: A track crosses the lot from the buildings to the northwest corner. A new building is present in centre of site.</p> <p>ODP6: A second shed is visible on the south-eastern edge of the tree-enclosed paddock.</p>
1994	SN 9381, 1:50,000	<p>ODP1: No significant change.</p> <p>ODP2: No significant change.</p> <p>ODP3: A shed is present to the east of the dwelling.</p> <p>ODP4: No significant change.</p>

Year	Run, Scale	Description
		ODP5: Two sheds are present close to the building. The area containing the building and sheds is now surrounded by trees. ODP6: No significant change.
2010	Terraviva image	ODP1: No significant change. ODP2: No significant change. ODP3: A new dwelling and two outbuildings are present on the southern boundary adjacent to the existing dwelling. Three sheds are present to the east of the dwellings. ODP4: No significant change. ODP5: The sheds in centre of the area have been removed and a large dwelling and garden area are now present. ODP6: One of the sheds on the edge of the paddock has been removed. There is a small area of disturbed ground in centre of site. Grazing stock are visible.

2.2.2 Certificates of Title

To ascertain how long the identified sheep dip (see Section 2.2.6) within ODP area 6 may have been operating, a search of the available historical certificates of title (CTs) was undertaken for this parcel. Appendix B contains the certificates of title.

This revealed that RS 12514, RS 15710 and RS9522 (which form part of ODP areas 5 and 6) are in one title, and the original titles were created in 1917. The original and subsequent titles suggest that farming of some sort has been undertaken on this site since this date. As a consequence, the sheep dip may have been operating since at least 1870 and as such, a variety of agrochemicals may have been used in the dip and elsewhere on the property.

Certificates of title for the other parcels were not searched as the other information sources provided sufficient information.

2.2.3 Previous investigations

In April 2010 Tonkin & Taylor Ltd carried out a desk study and limited soil investigation of ODP area 5². Soil samples were collected to assess if any contaminants existed in the site's soils. The conclusions of this study were:

- A dwelling existed on the site since at least 1942. A vegetable garden and underground storage tank (UST) were associated with the dwelling.
- The UST was removed in 2005 and is reportedly being used as an AST on the property to the south of Dynes Road (within ODP area 6 – formerly same owner). No soil sampling was undertaken following removal of the tank, but the former occupant stated that there was no evidence that the tank leaked.
- The property was used for cropping and sheep grazing, but no sheep dip existed on site. Sheep were either dipped on a mobile dip (onsite), or the dip on the property to the south of Dynes Road was used.

² 54 Dynes Road, Rolleston. Desk based ground contamination investigation with limited confirmatory sampling. April 2010. Ref 51664.

2.2.4 SDC property files

Property files relating to Site 1 held by SDC were reviewed on 26 November 2010. Relevant information is summarised in Table 2.

Table 2: Summary of SDC property files

ODP Area	Summary of file information
1	No relevant information.
2	No property file located.
3	1990: Relocation of dwelling (Lot 2 DP 65668). 1994: Construction of hay barn (Lot 1 DP 65668). 1995: Construction of hay barn (Lot 1 DP 68746). 1996: Construction of dwelling and implement shed (Lot 1 DP 68746). 1997: Construction of farm building (Lot 1 DP 65668). 1998: Construction of dwelling with septic tank (Lot 1 DP 65668).
4	No relevant information.
5	1980: Construction of farmhouse (RS 9522, 19792, 23251). 1998: Construction of farm storage shed (RS 9522, 19792, 23251). 2000: Alterations to dwelling including septic tank (RS 9522, 19792, 23251).
6	No relevant information.

2.2.5 ECan listing

A search of ECan's Listed Land Use Register (LLUR) was requested. The register contains information about contaminated and potentially contaminated sites. A contaminated sites team member confirmed in a letter dated 7 December 2010 that RS 9522, in ODP area 5, appears on the LLUR as an "Unverified HAIL" site.

ECan records summarise the T&T 2010 report, noting that an underground fuel storage tank was removed in 2005, and was continued to be used as an aboveground fuel tank on a neighbouring property. Sampling of soil around the fill point of the former underground tank site in 2010 showed acceptable total petroleum hydrocarbons (TPH) and BTEX concentrations. A copy of the LLUR listing for Site 1 is attached as Appendix C.

2.2.6 Site inspection

A site visit was made by a Tonkin & Taylor Environmental Engineer on 16 December 2010. Given the size of the subject area, it was not possible to undertake a detailed walkover the land parcels, however all were viewed from the road to confirm the findings of the historical review.

For Site 1, the following were the significant findings of the site inspection:

- Farm sheds, above ground storage tanks (ASTs), sheep yards and possibly a sheep dip were observed on the northern edge of RS12514 and Lot 1 DP 8833, adjacent to Dynes Road (within ODP area 6).
- An AST was observed adjacent to the farmhouse located within ODP area 6 adjacent to East Maddisons Road (Lot 1 DP 327430).
- Remnants of the foundations of a domestic dwelling were present on Lot 1 DP11863 on the corner of Burnham School Road and Brookside Road.

- Cropping and grain storage was being undertaken within ODP area 3.
- The remainder of the sites appeared to be utilised for dry stock grazing.
- A number of farm buildings and implement sheds were observed throughout the ODP areas.

2.3 Summary of site history and potential for ground contamination

The walkover inspection as well as the historical titles, aerial photographs and SDC file showed that the majority of Site 1 was used for dry stock grazing and cropping since at least the earliest available records (late 1800s). These activities may have included application of agrochemicals to control insects, weeds and fungal diseases, as well as the storage and mixing of these chemicals and fuels. A sheep dip may have operated on at least one property.

Activities associated with these land uses do have potential to cause contamination of the ground, albeit at relatively low levels across the broad acre areas of the sites. Higher levels of contaminants may be found in localised areas around farm buildings, sheep dips, waste holes and wherever agrochemicals may have been stored or mixed.

A summary of potential land uses at Site 1 which may have resulted in ground contamination are summarised in Table 3.

Table 3: Summary of potential sources of contamination for site 1

Activity	Potential contaminants	Likely extent and level
Cropping and dry stock grazing (broad acre areas)	Metals and organochlorine pesticides (OCP), including DDT (to control grass grub and other insects)	Low level over pasture cropping areas, predominantly within surface soils
Farm sheds, chemical storage sheds	Metals, OCP, petroleum hydrocarbons	Level depend on handling practices, typically localised around sheds and mixing/filling points, mostly constrained to surface soils
Sheep dips	Metals (copper, arsenic, chromium, zinc) and OCP	Limited to land surrounding dip, holding pens and location of chemical disposal if undertaken on site. Concentrations can be elevated.
AST or USTs	Petroleum hydrocarbons	Soils around the tanks, likely limited to surface soil in vicinity of AST, deeper soils may be affected near UST. Potentially elevated concentrations if tanks have leaked or if poor filling practices used.
Residential dwellings and other painted structures	Metals (principally lead, arsenic) and OCP if a vegetable garden present	Limited to surface soils adjacent to current or former structures, or within former vegetable gardens.
Waste disposal areas (possibly indicated by disturbed ground in the aerial photos)	Metals, OCP, petroleum hydrocarbons	Potentially elevated concentrations in waste and soil underlying waste.

3 Site 2 – Lincoln

3.1 Site Description

Site 2 includes 6 Outline Development Plan (ODP) areas around the township of Lincoln as shown on Figures 3, 4a, and 4b. The site includes 28 existing land parcels (list of parcels as provided by SDC in Appendix A), covering a total of 352 hectares.

3.1.1 Site location and land use

Outline Development Plan (ODP) area 1 lies to the south of Lincoln, between Springs Road and LI Creek. This parcel covers an area of approximately 58 hectares (over 6 lots) and is predominantly agricultural (cropping and grazing) land. A reservoir is present towards the eastern end of ODP area 1. While this was not listed as a parcel involved in this study by SDC it has been included in this report because it is within the zone change boundary.

ODP area 2 contains 7 existing land parcels with a combined area of approximately 60 hectares of agricultural land (cropping and grazing) adjacent to Edward Street, Elsmere Road and LI Creek to the southeast of Lincoln township. The LI River runs through this area.

Six parcels are in ODP area 3 is to the east of Lincoln, between Birchs Road, Ellesmere Road and Edwards Road and cover approximately 159 hectares. It is agricultural land with some residential buildings.

ODP area 4 is north of the township and covers 10 existing parcels of land with an area of approximately 55 hectares adjacent to Birchs Road and Tancreds Road. Land use is agricultural with a few residential buildings.

Five parcels are in ODP area 5 to the southwest of Lincoln township, adjacent to Springs Road. These cover an area of approximately 12 hectares and are agricultural and residential land.

ODP area 6 is a single parcel covering an area of approximately 3.5 hectares of former horticultural land (crop and food research farm) on the northern edge of Lincoln township. There are also residential buildings in this area.

3.1.2 Site geology and hydrogeology

The underlying geology is described by Forsyth et al. as grey alluvium of variable thickness, beneath plains or low level terraces.

Based on information in ECan's database, soils beneath Site 2 are deep silt loam and deep silt loam on clay loam (ODP areas 1, 2 and 5) and moderate to deep silt loam on sandy loam (ODP areas 2, 3, 4 and 6).

ECan's well data shows over 50 wells within Site 2. The depth of these wells varies from 6m to 42m. The wells are used for irrigation, stock supply and domestic supply. The majority of the wells are privately owned. Groundwater level monitoring data from two investigation wells (M36/0512 in ODP and M36/0515 in ODP area 1) show groundwater depth ranges between 0.5m and 4.5m below ground level. Based on local topography and location of surface water features, general groundwater flow direction is expected to be towards the south.

3.2 Site History

3.2.1 Aerial Photographs

Six sets of aerial photographs, from New Zealand Aerial Mapping (1942, 1962/3, 1973, 1984 and 1994) and Terraview (2010), were reviewed to gain historical information for Site 2. The results are summarised in Table 4. Key features are shown on Figures 4a and 4b.

Table 4: Summary of historical aerial photographs

Year	Run, Scale	Description
1942	SN 224, 1:16,000	<p>ODP1: Agricultural land, including cropping. Two tracks cross the western part of the area running approximately northeast-southwest. A railway runs northwest-southeast, crossing the eastern area. A stream marks the eastern boundary.</p> <p>ODP2: Agricultural land, including cropping. A large dwelling and numerous small outbuildings are present towards the northern side of the area. A stream crosses the site north-south and a second stream forms the western boundary. Two small buildings are present on the eastern boundary.</p> <p>ODP3: Agricultural land, including cropping. A dwelling with a garden, two large barns and an orchard are present in the south-central area. A circular structure, possibly a water tank, is present immediately to the southwest of the buildings. A second dwelling with many small outbuildings is present in the northwest corner. A track runs southeast for approximately 700m from these buildings to a small shed. A third dwelling and a shed are present on the eastern boundary. Two small sheds are present in the centre of fields towards the southeast side of the area.</p> <p>ODP4: Agricultural land, including cropping. Two dwellings with gardens, an outbuilding and a small orchard are present on the eastern side. A barn is present in the centre of the area, close to an area of disturbed land, possibly with another building. A second dwelling with gardens and a shed is present on the northern boundary.</p> <p>ODP5: Agricultural land, including cropping. A dwelling, garden and two small sheds are present on the eastern boundary.</p> <p>ODP6: Agricultural land, likely cropping. Two small sheds are present to the northern end. A further small shed is present on the eastern boundary.</p>
1962/3	SN 1408, 1:17,000	<p>ODP1: A small shed is present on the western boundary.</p> <p>ODP2: A dwelling with two outbuildings is present on the northern boundary.</p> <p>ODP3: The small outbuildings around the dwelling in the south-central area have been replaced with three larger barns. The orchard, circular structure and two sheds in the central fields have been removed.</p> <p>ODP4: Numerous more small buildings are present around the two dwellings on the eastern side, and the orchard has been removed. Three further dwellings with small gardens are present along the eastern boundary.</p> <p>ODP5: No significant change.</p> <p>ODP6: Only one small shed remains at the northern end, around a small, square, fenced area. Four buildings are present in the south.</p>
1973	SN 2634, 1:25,000	<p>ODP1: The railway appears vegetated and no longer used. A second shed is present on the western boundary. A large cluster of farm buildings is present in the centre of the area.</p> <p>ODP2: A further dwelling is present on the northern boundary with small garden, garage and shed. A shed is present towards the southern corner.</p> <p>ODP3: Further sheds are present around the buildings in the northwest corner.</p>

Year	Run, Scale	Description
		<p>ODP4: Wooden structures, possibly related to a sheep-dip, are present immediately west of the cluster of buildings located on the eastern boundary. Grazing stock are visible in the western corner. A small shed is present to the south of the main cluster of buildings. Three circular structures, possibly tanks, are located around the dwelling on the northern boundary.</p> <p>ODP5: Three dwellings are now present along the eastern boundary.</p> <p>ODP6: The square, fenced area at the north appears to be a small pond/reservoir. Two large sheds are present immediately south of the reservoir. A further small shed is present in the cluster of buildings at the south.</p>
1984	SN 8389, 1:25,000	<p>ODP1: Two additional small sheds are present on the western boundary.</p> <p>ODP2: Three sheds are present immediately west of the existing buildings towards the north of the area. A dwelling and two sheds are present in the western corner.</p> <p>ODP3: A shed is present towards the eastern boundary, and another shed has been added to the cluster of buildings in the south-central area.</p> <p>ODP4: No significant change.</p> <p>ODP5: No significant change.</p> <p>ODP6: No significant change.</p>
1994	SN 9381, 1:50,000	<p>ODP1: A large reservoir is present towards the western end of the area.</p> <p>ODP2: No significant change.</p> <p>ODP3: No significant change.</p> <p>ODP4: Two further dwellings with gardens are present along the eastern boundary.</p> <p>ODP5: A fourth dwelling with garden is present along the eastern boundary.</p> <p>ODP6: The pond/reservoir at northern end has been removed or filled.</p>
2010	Terraviva image	<p>ODP1: No significant change.</p> <p>ODP2: The shed towards the south has been removed. Silage storage on northern boundary.</p> <p>ODP3: Grazing stock are visible on central areas.</p> <p>ODP4: No significant change.</p> <p>ODP5: No significant change.</p> <p>ODP6: No significant change.</p>

3.2.2 Certificates of Title

A search of the available historical certificates of title (CTs) for Lot 1 DP 388824 within Site 2 was undertaken to ascertain the period orchards were likely on site. Appendix D contains the certificates of title.

The historic titles showed that this parcel was sold to Lincoln Grange Ltd (later renamed Lincoln Grange Orchards Ltd) in 1984. This correlates with the aerial photographs which show shelter belts being established in the 1984 photograph. As a result, it is possible that organochlorine pesticides as well as metal based chemicals were used to control pests during the orchard operation on this land parcel.

No other titles were searched as sufficient information was available from other sources.

3.2.3 Previous investigations

In 2006, Tonkin & Taylor Ltd undertook a ground contamination assessment of the former Crop and Food Research Farm, located on North Belt, Lincoln³. The ODP area 6 includes part of the Research Farm. Results from soil samples collected within the portion covered by ODP area 6 showed some elevated levels of metals (primarily lead related to a former dwelling). A remedial action plan was developed and is being implemented as part of the community centre construction. Following this remedial work, all known areas of contamination will have been removed from the Research Farm, and the remaining soils will be below residential guidelines.

3.2.4 SDC property files

Property files relating to Site 2 held by SDC were reviewed on 26 November 2010. Relevant information is summarised in Table 5.

Table 5: Summary of SDC property files

ODP Area	Summary of file information
1	No property file located.
2	1950s: Construction of dwelling (Lot 2 DP 372809). House existing since prior to 1965 (Lot 1 DP 16901). 1975: Construction of dwelling (Lot 96 DP 354488). 1993: Construction of dwelling, sleep-out and septic tank (Lot 1 DP 63828). 2010: Dwelling and pool removed (Lot 96 DP 354488).
3	1979: Construction of implement storage shed (Lot 2 DP 33700). 2001: Construction of implement storage shed (Lot 2 DP 33959). 2002: Construction of house and farm building (Lot 2 DP 33959). 2003: Granting of domestic dwelling consents (Lot 2 DP 65371).
4	1950s: Construction of dwelling (Lot 2 DP 56631). 1990: Construction of dwelling and commercial greenhouse (Lot 1 DP 16901). 2001: Construction of pool (Lot 2 DP 56631). 2002: Extension to commercial greenhouse (Lot 1 DP 16901). 2006/7: Construction of dwelling (Lot 4 DP 374083). 2009: Construction of farm building (Lot 4 DP 374083).
5	1986: Replacement of garden shed (Lot 2 DP 22861). 1989: Construction of dwelling (Lot 1 DP 54824). 1994: Construction of garage and septic tank (Lot 1 DP 26815). 1994: Installation of septic tank (unknown date of construction of dwelling) (Lot 2 DP 22861).
6	2009: Construction of Lincoln Playcentre (Lot 1 DP 301682).

³ Tonkin & Taylor Ltd. Ground Contamination Investigation Crop & Food Research Farm - North Belt. 2006. Prepared for SDC. Ref 51201.

3.2.5 ECan listing

A search of ECan's Listed Land Use Register (LLUR) was requested. A copy of the LLUR listing for Site 2 is attached as Appendix E. The register contains information about contaminated and potentially contaminated sites. A contaminated sites team member confirmed in a letter dated 8 December 2010 that two areas in Site 2 appear on the LLUR:

- Lot 1 DP 301682 (in ODP Area 6) is categorised as "verified HAIL".

ECan indicate that a 5000L underground diesel tank was installed at this lot in the 1960s and used until approximately 1993. It was removed in 1999 at which time two soil samples were taken from the tank pit. TPH was below the most conservative MfE soil acceptance criteria for industrial/commercial use.

In addition, this lot is listed by ECan as being used for market gardens, orchards or glasshouses between the 1950s and 2000. This listing is based on one sample showing elevated levels of cadmium, and another showing elevated levels of lead and zinc. However, ECan reports that soil testing in 2006 (by T&T, see section 3.2.3) adequately characterised the northernmost 80% of the site and that this area is suitable for future residential use. In addition, the south-western corner (approximately 5% of the total area) was shown to be suitable for the childcare centre proposed to be built at that time. The remainder of the site required minor remedial works and these are discussed in Section 3.2.3.
- Pt Lot 1 DP 9172, Lot 1 DP 16901, Lot 1 DP 63828, Lot 96 DP 354488 and Lot 1 DP 388824 (all adjoining lots in ODP area 2) are identified as having former HAIL activity.

ECan indicate that these lots were used as market gardens, orchards or glasshouses between the 1990s and 2006. ECan report that three rounds of soil sampling in 2007 demonstrated that hazardous substances were present at the site, but were below guidelines for residential site use. The investigation data were not available for review.

The ECan letter also summarises soil and groundwater investigations carried out on Lot 6 DP 374333 (ODP area 1) in 2008. According to ECan, some cropping had previously occurred on the site and a former railway passed through it, but results of testing showed heavy metals, total DDT, polycyclic aromatic hydrocarbons (PAH) and TPH were all below residential land use criteria. The data and criteria were not provided.

Finally, ECan note in their letter that the proposed Lincoln University Landfill is located within 75m of ODP area 5. However, necessary consents to start operation of the landfill are still on hold and no landfilling activity has yet occurred at this location.

3.2.6 Site walkover inspection

A site visit was made by a Tonkin & Taylor Environmental Engineer on 16 December 2010. Given the size of the subject area, it was not possible to undertake a detailed walkover the land parcels, however, all were viewed from the road to confirm the findings of the historical review.

For Site 2, the significant findings of the site inspection were:

- ODP area 1 forms part of the Lincoln University Dairy Farm.
- ODP area 2 still had some shelter belts present, but no orchard activities were occurring. The land appeared to be used for cropping and grazing.
- Cropping and grazing was the predominant use for ODP area 3, with a cluster of buildings present in the central southern portion of the area. These consisted of a dwelling, farm sheds and sheep yards. It is possible that a sheep dip may be present in this location.

- Cropping and horticultural activities were being undertaken within ODP area 4 and storage silos were noted as well as horse stables.
- Cropping and horticultural activities were also noted on ODP area 5.

3.3 Summary of historical information and potential for ground contamination

The walkover inspection and file review showed that the majority of Site 2 was used for dry stock grazing and cropping as well as small portions of horticulture and dairying.

Records reveal that these activities have likely been undertaken in the area since the mid to late 1800's, most likely commencing with stock grazing and then progressing to more diversified uses such as cropping, dairying and orchards. Overall the ODP areas in Site 2 are representative of pastoral farming and cropping land uses on the lower Canterbury plains.

Activities associated with these land uses do have potential to cause contamination of the ground, albeit at relatively low levels across the broad acre areas of the sites. Higher levels of contaminants may be found in localised areas around farm buildings, sheep dips, waste disposal pits and wherever agrochemicals/fuels may have been stored or mixed.

A summary of potential land uses at Site 2 which may have resulted in ground contamination, and the likely nature and extent, is summarised in Table 3.

Table 3 Summary of potential ground contamination within Site 2

Activity	Potential contaminants	Likely extent and level
Cropping and dry stock grazing (broad acre areas)	Metals and organochlorine pesticides (OCP), including DDT (to control grass grub and other insects)	Low level over pasture cropping areas, predominantly within surface soils.
Orchard areas	Metals and OCP (insect and fungal control)	Low levels of orchard areas, localised hotspots at ends of rows and mixing/disposal areas.
Farm sheds, chemical storage sheds	Metals, OCP petroleum hydrocarbons	Level depends on handling practices, typically localised around sheds and mixing/filling points, mostly constrained to surface soils.
Sheep dips	Metals (copper, arsenic, zinc) and OCP	Limited to land surrounding dip, holding pens and location of chemical disposal if undertaken on site. Concentrations can be elevated.
AST or USTs associated with farm buildings	Hydrocarbons	Soils around the tanks, likely limited to surface soil in vicinity of ASTs, deeper soils may be affected near USTs. Potentially elevated concentrations if tanks have leaked or if poor filling practices used.
Railway line	Hydrocarbons, metals and PAHs	Along and under lines where oil or fuel may have been dumped or leaked.
Residential dwellings and other painted structures	Metals (principally lead and arsenic) and OCP if a vegetable garden present	Limited to surface soils adjacent to current or former structures, or within former vegetable gardens.

4 Conclusions

The land around Rolleston and Lincoln that is proposed for rezoning to residential land is currently used, and has been since the 1800s, for agricultural activities. These activities include cropping, stock grazing, orchards and dairy farming. Associated with these activities are farm buildings, implement sheds, sheep dips, chemical and fuel storage sheds and residential dwellings. All of these structures and features are typical of this type of land use, and occur across much of the Canterbury Region.

As a result of this long history of agricultural land use, some level of contaminants should be expected in the soils of the zone change areas. General application of agrochemicals (such as DDT) to control insect, weed and fungal growth is likely to have caused low and relatively consistent levels of agrochemicals across the farmed areas. Higher and more variable levels of contamination may be present in surface soil around the farm buildings, from the storage, spillage, mixing and handling of these chemicals. Elevated concentrations of contaminants are also likely present in surface and deeper soil around areas used for sheep dipping (permanent sheep dip structures and locations of mobile dipping).

In addition to the presence of agrochemicals, most farms have on site fuel storage, whether in an above, or below ground storage tank (AST or UST). These may have leaked, or spills may have occurred during the filling or transfer of fuel. As a result, the soils under or around the tanks or filling points may be contaminated with petroleum hydrocarbons.

Many farms may have had, or still have, small waste pits for disposing of animal waste and on farm refuse. Localised contamination of the surrounding soils, and potentially groundwater may be caused by these pits.

Given the age of many of the farm buildings and dwellings in the zone change area(s), it is likely that many of these are, or were, painted with a lead based paint. Therefore lead contamination of surface soils adjacent to these buildings should also be expected.

Whilst the various activities and structures on the proposed zone change land may have caused contamination of the ground, the levels and type of contamination is expected to be typical of this type of land use. This type of land is commonly developed for residential use within Canterbury and in other regions around New Zealand, and it would be unusual for ground contamination to preclude the development of this type of land.

No information was found that indicated the proposed zone change area had special characteristics that would result in ground contamination at higher levels, or greater extents than typical agricultural land use. Consequently, there are proven methods from remediating or managing the type and levels of contaminants that are commonly found in the soils with this sort of land use history.

As all sites within the PC7 area (Sites 1 and 2) have potential for some level of ground contamination, we would recommend that soil sampling should be undertaken to confirm the levels and nature of contaminants present in the soils. The sampling should aim to characterise the broad acre contamination as well as that in the vicinity of farm buildings, dwellings, waste pits or other discrete features. This could be undertaken at the subdivision consent stage. All investigations should be undertaken in accordance with the Ministry for the Environment's various Contaminated Land Management Guidelines. This approach is consistent with the proposed National Environmental Standards for Soil Contamination (currently in draft).

5 Applicability

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

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

A handwritten signature in blue ink, appearing to read 'Jared Pettersson', written over a dotted line.

Jared Pettersson

Environmental Engineer

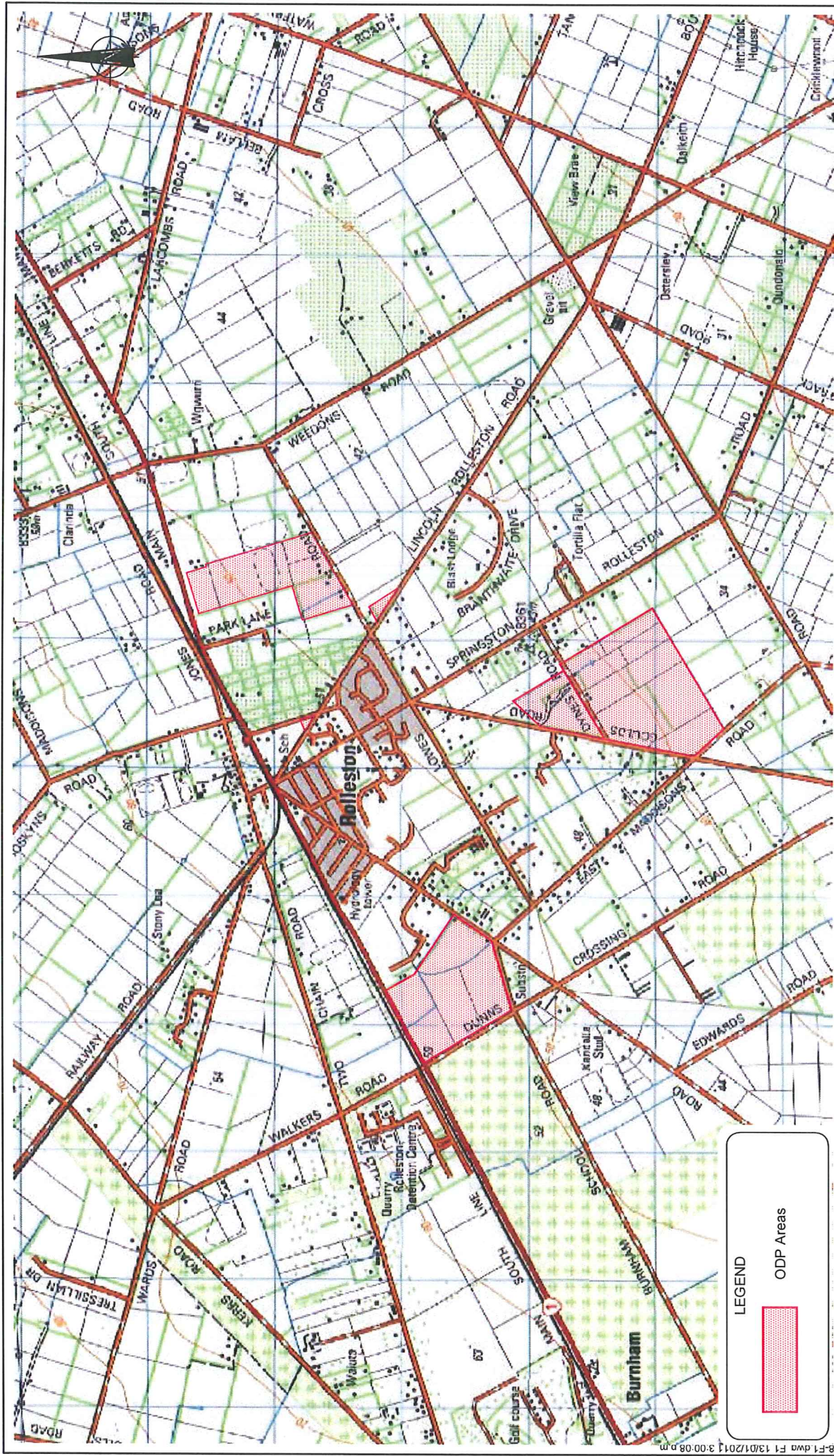
Authorised for Tonkin & Taylor Ltd by:

A handwritten signature in blue ink, appearing to read 'Grant A Lovell', written over a dotted line.

Grant A Lovell

Christchurch Group Manager

rpt_SDC Plan ChangeDec10_draft_pek.docx



LEGEND

 ODP Areas

SCALE 1: 40,000

0 400 800 1200 1600 2000(m)

Topomap sourced from Land Information New Zealand data
(Crown Copyright Reserved).



Tonkin & Taylor
Environmental and Engineering Consultants
Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	Jan.11
DRAFTING CHECKED	CA/lu	
APPROVED	CA/lu	
CADFILE : 51778-F1.dwg		
SCALES (AT A4 SIZE) 1: 40,000		
PROJECT No. 51778		

SELWYN DISTRICT COUNCIL
DESK STUDY GROUND CONTAMINATION ASSESSMENT
PLAN CHANGE 7 – ROLLESTON TOWNSHIP
Site 1 Location Map



SCALE 1: 12,500
0 100 200 300 400 500 600 700 800 (m)

Aerial photo sourced from Terralink International
(Copyright 2002–2005 Terralink International Limited and its licensors).
Property boundaries sourced from Land Information New Zealand data
as at 8–Nov–2010 (Crown Copyright Reserved).



Tonkin & Taylor
Environmental and Engineering Consultants
Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	Jan.11
DRAFTING CHECKED		
APPROVED		
CADFILE :	51778-F2a-2b.dwg	
SCALES (AT A4 SIZE)	1:12,500	
PROJECT No.	51778	

SELWYN DISTRICT COUNCIL		
DESK STUDY GROUND CONTAMINATION ASSESSMENT		
PLAN CHANGE 7 – ROLLESTON TOWNSHIP		
Site 1 Features – ODP Areas 2, 3 & 4		
FIG. No.	Figure 2a	REV. 0



SCALE 1: 20,000

Aerial photo sourced from Terralink International
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Property boundaries sourced from Land Information New Zealand data
as at 8-Nov-2010 (Crown Copyright Reserved).

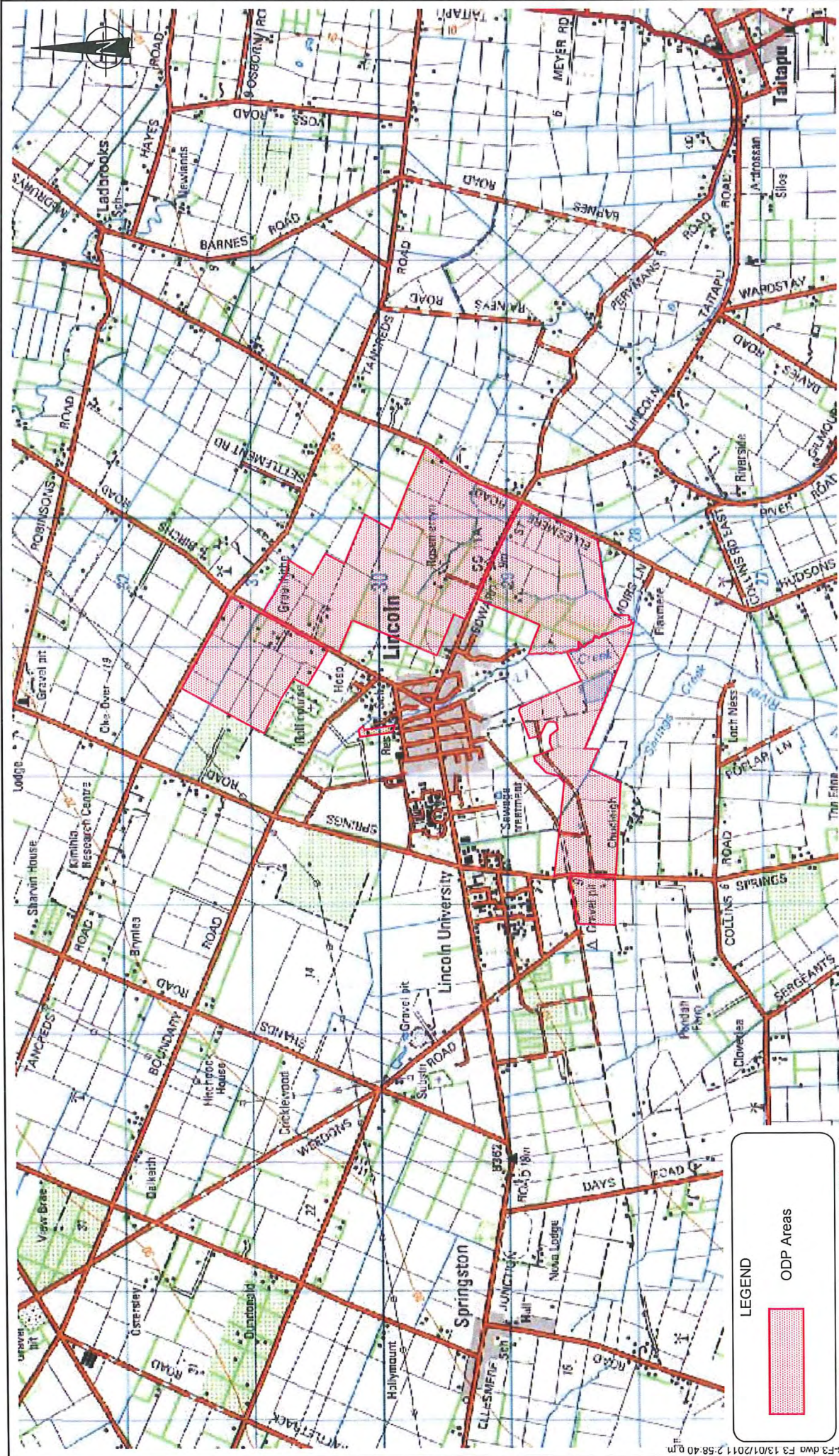


Tonkin & Taylor

Environmental and Engineering Consultants
Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	Jan.11
DRAFTING CHECKED	CA-III	
APPROVED	CA-VII	
CADFILE :	51778-F2a-2b.dwg	
SCALES (AT A4 SIZE)	1: 20,000	
PROJECT No.	51778	

SELWYN DISTRICT COUNCIL		
DESK STUDY GROUND CONTAMINATION ASSESSMENT		
PLAN CHANGE 7 – ROLLESTON TOWNSHIP		
Site 1 Features – ODP Areas 1, 5 & 6		
FIG. No.	Figure 2b	REV. 0



Tonkin & Taylor

Environmental and Engineering Consultants
Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	Jan.11
DRAFTING CHECKED	CP	11/11
APPROVED	CP	11/11
CADFILE :	51778-F3.dwg	
SCALES (AT A4 SIZE)	1:40,000	
PROJECT No.	51778	

SELWYN DISTRICT COUNCIL
DESK STUDY GROUND CONTAMINATION ASSESSMENT
PLAN CHANGE 7 – LINCOLN TOWNSHIP
Site 2 Location Map

FIG. No. **Figure 3** REV. **0**

Topomap sourced from Land Information New Zealand data
(Crown Copyright Reserved).



SCALE 1: 12,500

0 100 200 300 400 500 600 700 800 (m)

Aerial photo sourced from Terralink International
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Property boundaries sourced from Land Information New Zealand data
as at 8-Nov-2010 (Crown Copyright Reserved).

SELWYN DISTRICT COUNCIL

DESK STUDY GROUND CONTAMINATION ASSESSMENT

PLAN CHANGE 7 – LINCOLN TOWNSHIP

Site 2 Features – ODP Areas 1, 2 & 5

FIG. No. 51778

REV. 0

Tonkin & Taylor

Environmental and Engineering Consultants

Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	JUN.11	
DRAFTING	CHECKED		
APPROVED			
CADFILE : 51778-F4a-4b.dwg			
SCALES (AT A4 SIZE)			
1:12,500			
PROJECT No. 51778			



Aerial photo sourced from Terralink International
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Property boundaries sourced from Land Information New Zealand data
as at 8-Nov-2010 (Crown Copyright Reserved).



Tonkin & Taylor
Environmental and Engineering Consultants
Level 6, 151 Kilmore St, Christchurch

DRAWN	RBS	Jan, 11
DRAFTING CHECKED	CA/MLH	
APPROVED	CA/MLH	
CADFILE :	51778-F4a-4b.dwg	
SCALES (AT A4 SIZE)	1:20,000	
PROJECT No.	51778	

SELWYN DISTRICT COUNCIL
DESK STUDY GROUND CONTAMINATION ASSESSMENT
PLAN CHANGE 7 – LINCOLN TOWNSHIP
Site 2 Features – ODP Areas 3, 4 & 6
FIG. No. 4b
REV. 0

Appendix A: List of land parcels in PC7

Selwyn District Council - Land Parcels in Rolleston

Address	Legal Description	Area (ha)
LOT 407 DP 341095	2 Norman Kirk Drive, Rolleston	4.8
LOT 3 DP 74253 BLK III LEESTON SD	Main South Road, Rolleston	20.0
LOT 2 DP 65668 BLK III LEESTON SD	Levi Road, Rolleston	4.0
LOT 1 DP 65668 BLK III LEESTON SD	126 Levi Road, Rolleston	6.6
LOT 1 DP 68746 BLK III LEESTON SD	116 Levi Road, Rolleston	19.5
RS 7556 BLK III LEESTON SD	157 Levi Road, Rolleston	7.2
RURAL SECS 9522 19792 23251 BLK III LEES	1092 Goulds Road, Rolleston	33.7
LOT 1 DP 8833 RURAL SECS 12514 15710 BL	Dynes Road, Rolleston	58.8
LOT 1 DP 372247	East Maddisons Road, Rolleston	4.0
LOT 2 DP 372247 BLK III LEESTON SD	East Maddisons Road, Rolleston	4.0
LOT 3 DP 372247 BLK III LEESTON SD	Goulds Road, Rolleston	4.0
LOT 4 DP 372247 BLK III LEESTON SD	Goulds Road, Rolleston	12.0
LOT 500 DP 425548 PT LOT 1 DP 75811 PT S	Main South Road, Rolleston	44.0
LOT 10 DP 71316 BLK III LEESTON SD	Dunns Crossing Road, Rolleston	4.0
LOT 9 DP 71316 BLK III LEESTON SD	Dunns Crossing Road, Rolleston	4.0
LOT 8 DP 71316 BLK III LEESTON SD	Dunns Crossing Road, Rolleston	4.0
LOT 1 DP 361539	7 Newman Road, Rolleston	0.5
LOT 2 DP 361539	9 Newman Road, Rolleston	0.6
LOT 3 DP 361539	25 Newman Road, Rolleston	0.6
LOT 4 DP 361539	27 Newman Road, Rolleston	0.5
LOT 5 DP 361539	31 Newman Road, Rolleston	0.5
LOT 6 DP 361539	19 Newman Road, Rolleston	0.5
LOT 7 DP 361539	13 Newman Road, Rolleston	0.5
LOT 8 DP 361539	1 Newman Road, Rolleston	0.6
LOT 9 DP 361539	2 Newman Road, Rolleston	0.5
LOT 10 DP 361539	14 Newman Road, Rolleston	0.5
LOT 11 DP 361539	30 Newman Road, Rolleston	0.5
LOT 12 DP 361539	24 Newman Road, Rolleston	0.5
LOT 13 DP 361539	22 Newman Road, Rolleston	0.5
LOT 14 DP 361539		0.5
Total area:		242.0

Selwyn District Council - Land Parcels in Lincoln

Legal Description	Address	Area (ha)
PT LOT 1 DP 9172	Edward Street, Lincoln	26.5
LOT 2 DP 33700	581 Birchs Road, Lincoln	46.6
LOT 2 DP 54824	Springs Road, Lincoln	10.6
LOT 1 DP 56631	530 Birchs Road, Lincoln	2.0
LOT 6 DP 374083		4.1
LOT 1 DP 16901	96 Edward Street, Lincoln	0.2
LOT 1 DP 372809	560 Birchs Road, Lincoln	4.0
LOT 1 DP 54824	1472 Springs Road, Lincoln	0.8
LOT 1 DP 26815	1482 Springs Road, Lincoln	0.1
LOT 1 DP 63828	90 Edward Street, Lincoln	0.7
LOT 8 DP 374083	Birchs Road, Lincoln	9.0
LOT 5 DP 26021		12.1
LOT 2 DP 33959	555 Birchs Road, Lincoln	8.6
LOT 1 DP 364266	Edward Street, Lincoln	6.5
LOT 2 DP 22861	1480 Springs Road, Lincoln	0.1
LOT 2 DP 26815	1484 Springs Road, Lincoln	0.1
LOT 96 DP 354488		5.4
LOT 2 DP 56631	550 Birchs Road, Lincoln	2.2
LOT 4 DP 374083	564 Birchs Road, Lincoln	4.0
LOT 1 DP 301682	North Belt, Lincoln	3.4
LOT 2 DP 372809	Birchs Road, Lincoln	4.0
LOT 5 DP 374083		4.0
LOT 1 DP 388824	Edward Street, Lincoln	28.0
RS 1904	520 Birchs Road, Lincoln	20.4
LOT 2 DP 364266	Edward Street, Lincoln	76.4
LOT 6 DP 374333	Springs Road, Lincoln	58.3
LOT 2 DP 65371	Edward Street, Lincoln	8.7
LOT 7 DP 374083	Birchs Road, Lincoln	5.6
	Total area:	352.4

Appendix B: Selected certificates of title: Site 1



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952

Historical Search Copy



Identifier CB10K/1098
Land Registration District Canterbury
Date Issued 30 July 1971

Cancelled

Prior References
CB308/256

Estate	Fee Simple
Area	42.7373 hectares more or less
Legal Description	Rural Section 9522, Rural Section 12514, Rural Section 15710 and Rural Section 19792

Original Proprietors

David John Foster as to a 1/2 share
Annette Pamela Foster as to a 1/2 share

Interests

919515.1 Mortgage to Bank of New Zealand - 7.2.1991 at 1.55 pm
7797575.1 Variation of Mortgage 919515.1 - 29.4.2008 at 9:00 am
8289164.1 Transfer to Foster Holdings Limited - 19.3.2010 at 12:07 pm
8602534.2 Discharge of Mortgage 919515.1 - 1.10.2010 at 11:24 am
8602534.3 Transfer of part Section 1 SO 433412 to Selwyn District Council pursuant to Section 17 Public works Act 1981 - 1.10.2010 at 11:24 am
CT 535726 issued for balance after excluding part Section 1 SO 433412 - see Transfer 8602534.3 - 1.10.2010 at 11:24 am
8602534.4 CTs issued - 1.10.2010 at 11:24 am

Legal Description	Title
part Section 1 Survey Office Plan 433412	533853
CANCELLED	

References
Prior C/T. 308/256

Transfer No. ---
N/C. Order No. 838679

Land and Deeds 69



REGISTER

No. 10K/1098

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 30th day of July one thousand nine hundred and seventy one under the seal of the District Land Registrar of the Land Registration District of Canterbury.

WITNESSETH that DORIS NGAIRE FOSTER of Rolleston, Widow as Administratrix —

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 105 acres

2 roads 17 perches or thereabouts situated in Block III of the Leeston Survey District being Rural Sections 9522, 12514, 15710 and 19792 —



Assistant Land Registrar

Subject to:-

- (i) Mortgage 741454 to Amy Edith Lowe and Ngaire Doris Foster on shares - 15/7/1968 at 2.30 p.m.
- (ii) Mortgage 838017 to Pyne Gould Guinness Limited - 13/12/1974 at 2.30 p.m.
- (iii) No. 838018 Memorandum of Priority making Mortgage 838017 first Mortgage and Mortgage 741454 second Mortgage - 23/7/1971 at 2.30 p.m.

[Signature] A.L.R.

Transfer 19919/3 to David John Foster of Rolleston, Farmer - 13.12.1974 at 1.52 p.m.

A.L.R.

Mortgage 19919/4 to Pyne Gould Guinness Limited - 13.12.1974 at 1.52 p.m.

A.L.R.

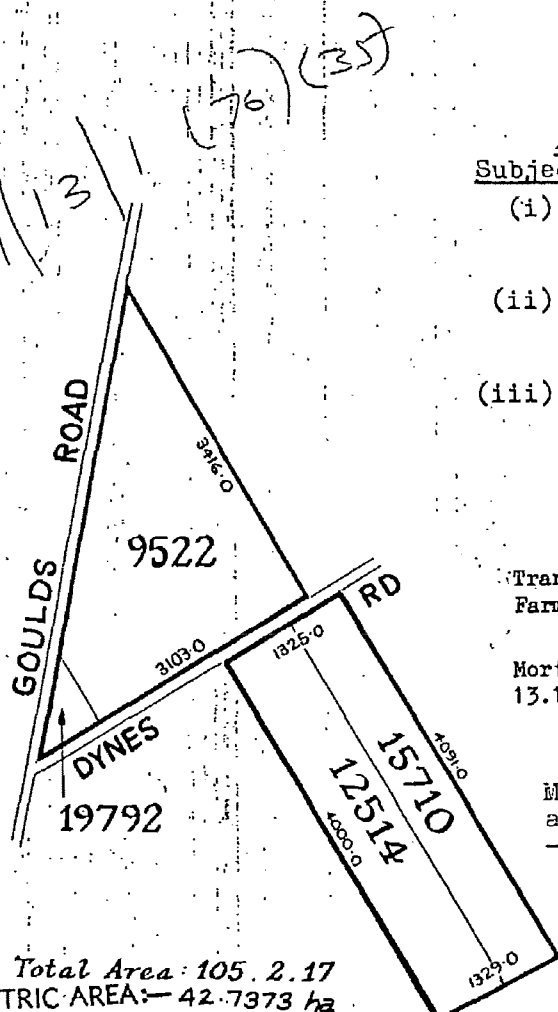
Mortgage 50152/1 to The Rural Banking and Finance Corporation of New Zealand - 10.9.1975 at 9.37 a.m.

A.L.R. *[Signature]*

Variation of Mortgage - 20.10.1977 at 11.48 am.

[Signature] A.L.R.

- OVER -



Total Area: 105.2.17
METRIC AREA: 42.7373 ha

Scale: 1 inch = 15 chains

No. 10K/1098

Variation of Mortgage 50152/1 - 23.1.1979 at 12.22 pm.

[Signature]
for A.L.R.

Variation of Mortgage 50152/4 - 21-9-1979 at 11.51a.m.

DISCHARGED

[Signature]
for A.L.R.

Variation of Mortgage 50152/1 - 24.2.1981 at 9.31 am.

for A.L.R.

Variation of Mortgage 50152/1 - 18-11-1981 at 11.38a.m.

[Signature]

for A.L.R.

Variation of Mortgage 50152/1 - 7-7-1982 at 11.13a.m.

[Signature]

Mortgage 401969/2 - 11.42a.m. 1982 at 11.42a.m.

DISCHARGED

[Signature]
for A.L.R.

No. 401969/3 Memorandum of Priority making Mortgages 401969/2 and 50152/1 first and second Mortgages respectively - 21-9-1982 at 11.42a.m.

[Signature]
for A.L.R.

No. 426868/1 Change of ~~NAME~~ of the mortgagee under mortgage 401969/2 to Nicoll Cooney Argyle & Co. Solicitors Nominee Company Limited - 25.3.1983 at 11.16 a.m.

Mortgage 481665/1 to Bank of New Zealand - 28.3.1984 at 11.59a.m.

DISCHARGED

[Signature]
for A.L.R.

501231/1 Change of Name of the Mortgagee under Mortgage 401969/2 to Nicoll Cooney Solicitors Nominee Company Limited - 6.8.1984 at 12.12p.m.

[Signature]

of a one-half share ~~of A.L.R.~~ Transfer 533430/2/ to Annette Pamela Foster of Rolleston, Married Woman - 1.3.1985 at 11.03a.m.

[Signature]
for A.L.R.

Mortgage 533430/3 to Nicoll Cooney Solicitors Nominee Company Limited - 1.3.1985 at 11.03a.m.

DISCHARGED

[Signature]
for A.L.R.

Mortgage 533430/4 to The Rural Banking and Finance Corporation - 1.3.1985 at 11.03a.m.

DISCHARGED

[Signature]
for A.L.R.

No. 533430/6 Memorandum of Priority making Mortgages 533430/3, 533430/4 and 481665/1 first, second and third Mortgages respectively - 1.3.1985 at 11.03a.m.

for A.L.R.

The discharge memorial has not been endorsed on the outstanding duplicate of Mortgage 481665/1 production of the same having been dispensed with in terms of Section 111 Land Transfer Act 1952.

for A.L.R.

Mortgage 825587/2 to The Rural Banking and Finance Corporation of New Zealand - 5.9.1989 at 1.55pm

DISCHARGED

[Signature]
for A.L.R.

Mortgage 919515/1 to Bank of New Zealand - 7.2.1991 at 1.55pm

for A.L.R.



Register-book,
Vol. 308, folio 256

4-----113,257
8-----175
Vol. 82, Folio 153
Substituted
Transfer No.
Reference: Application No.
Order for NIC No.



This Certificate, dated the 12th day of September one thousand nine hundred and seventeen under the hand and seal of the District Land Registrar of the Land Registration District of Gloucestershire Witnesseth that Richard Albert Pearce of Johnchurch Retired
Gloucester

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial under written or endorsed hereon, subject also to any existing right of the Crown to take and lay off roads under the provisions of any Act of the General Assembly of New Zealand) in the land hereinafter described, as the same is delineated by the plan hereon bordered green be the several dimensions a little more or less, that is to say: All that parcel of land containing ^{there} together One hundred and five Acres two roods and seventeen perches or thereabouts situated in Block III of the Section Survey District comprising Rural sections 9522, 12514, 15410 and 14492

No 828015 Memorandum of Priority making
Mortgage 828017 first Mortgage, Mortgage
74454 second Mortgage. 23.7.1976
at 2.30p

NCO. 838679 } ~~Cancelled~~ ^{AKR} and new
 30.7.1971 } C.T. 10K/1098 issued

Cancelled.
Duplicate destroyed

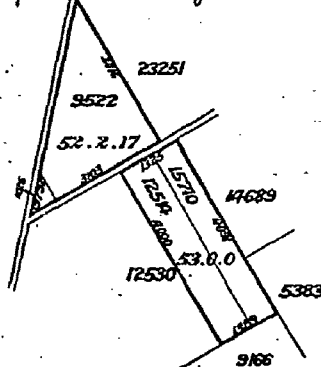


Image Quality due
to Condition
of Original

Scale: 20 Chains to an Inch



cc. copy to
District Land Registrar.

Admission #94106 produced 8 April
1915 at Fort Belvoir Albert Pearce
DISCHARGED
Kaweah Indian Reservation
2-2-1920 for credit W.D.W.

Transfer 115248, issued 6 September 1914 at 240px Richard Albert Beane to Agnes Bailey wife of Arthur Bailey of Johnstonsburg, Kansas.

Montague 1042-25th
1914 1042-25th
Sawney 20-100 11th

Transfer 104410 produced 2 September
1920 at 2.26 pm. Stones Bailey to
James Habcroft of Colleston
farmer. *W. H. H. H. H.*

Mortgage 116999 produced 2 September
1930 at 2.45pm James Hobcroft to
Marian Meers Dearby ^{Witch} ^{Witch}
TRANSFER No. 162376 ^{Witch} ^{Witch}

Mortgage \$1000. produced 2 September
1920 at 2:26 pm. James Hobcroft to
Herbert Henry Crook
Cath. H. H. Crook

Over

308/256

308/256
Mortgage 124529 produced 6.10.1929
at 2.45 pm James Holcroft to Cyril
Alexander Stanger
J. Dampy
adk

Transfer 162376 produced 17 December
1924 at 2.15 pm The Registrar of the
Supreme Court (16116999) to Mary
Augusta Swanson wife of William
Swanson of Hororata farmer
J. Dampy
adk

Mortgage 141130 produced 17 December
1924 at 1.15 pm Mary Augusta Swanson
to Edward J. Dampy
J. Dampy
adk

Transfer 192340 produced 11 December
1929 at 10.55 am Mary Augusta
Swanson to William Dyer of
Rolliston Farmer
J. Dampy
adk

Extension of the term of Mortgage 141130
produced 11 December 1929 at 3 pm
J. Dampy
adk

Transfer 201978 produced 13.11.1932
at 11 am McManus Charles Dearnley under
Power of Sale in Mortgage 141130 to
Ernest Ackerman Smith of Lincoln
farmer
J. Dampy
adk

Mortgage 182639 produced 13.11.1932
at 11 am Ernest Ackerman Smith to
McManus Charles Dearnley and Joyce
Blunden wife of Charles Dearnley
J. Dampy
adk

Mortgage 185191 produced 3 October
1933 at 11.30 am Ernest Ackerman
Smith to Harold Dearnley, remwood
and Joyce Blunden
J. Dampy
adk

Charge No 1602 under Section 11 of the Land and
Income Tax Amendment Act 1924 entered 22.11.1933
19.11.1933
Charge No 1716 under Section 11 of the Land and
Income Tax Amendment Act 1924 entered 21.11.1933
19.11.1933
J. Dampy
adk

K.13.1933 Evidence of the death of the deceased
at 1.15 pm at 1.15 pm at 1.15 pm
J. Dampy
adk

at 3.40. Evidence of the marriage of Joyce
Mary Blunden to Charles Dearnley as above described as
Joyce Blunden of the mortgages under
Mortgage 182639 with John Warren Drury Fisher
Entered 26 August 1940 at 12.40 pm
J. Dampy
adk

Transmission 23700 of the interest of
Marion Mary Dearnley deceased
in Mortgage 182639 to Alfred Batten
Entered 18 November 1941 at 11.14 am
J. Dampy
adk

Transmission 31384 to the Perpetual Trustees
Estate and Agency Company of New Zealand
Limited Entered 13 June 1941 at 3 pm
J. Dampy
adk

Transfer 456480 produced 26 June 1941
at 11.45 am The Perpetual Trustees
Estate and Agency Company of New Zealand
Limited to Katie
Smith of Lincolnton spinster
J. Dampy
adk

Transmission 11322 to Allan Leslie of
Etham Veterinary Surgeon and Unwin
Renny Harman of Christchurch Solicitor
as Executors Entered 28 May 1942 at 11.25 am
J. Dampy
adk

374930 Transfer Allan Leslie and Unwin R.
Renny Harman to John Foster of Rolliston Farmer
produced 23 March 1943 at 12.30 pm
J. Dampy
adk

374931 Mortgage John Foster to Mary and Amy
Edith Lowe in shares 23.11.1943 at 12.22 pm
J. Dampy
adk

Variation of the terms of Mortgage 374931
entered 14/4/1945 at 2.15 pm
J. Dampy
adk

Transmission 679141 of the share of Levi Lowe in
Mortgage 374931 to The Public Trustee - Entered 19.4.1966
at 2.30 pm
J. Dampy
adk

Discharge of Mortgage 374931
as to the share of The Public
Trustee 15-7-1968 at 10.30 am
J. Dampy
adk

Mortgage 741454 to Amy Edith
Lowe and Ngare Denis Foster
in shares 5-7-1968 at 10.30 am
J. Dampy
adk

Transmission 772219 to Denis Ngare Foster
as Administrator of the Estate of
John Warren Drury Fisher
Entered 4.8.1969 at 11.15 am
J. Dampy
adk

Mortgage 772220 to Denis Ngare Foster
as Administrator of the Estate of
John Warren Drury Fisher
Entered 4.8.1969 at 11.15 am
J. Dampy
adk

Memorandum of Priority making Mortgage 772220
first mortgage and Mortgage no 741454 second
mortgage 4.8.1969 at 11.30 am
J. Dampy
adk

See front page

Appendix C:

ECan LLUR listing Site 1

Attn: Jared Pettersson
Tonkin and Taylor
PO Box 13055
Christchurch

58 Kilmore Street
PO Box 345
Christchurch 8140
P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz
Customer Services
P. 03 353 9007 or 0800 324 636
www.ecan.govt.nz

Dear Jared

Thank you for submitting your property enquiry for land within the Rolleston area. I have searched our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

There is one LLUR site located on the land parcels you enquired about. The enclosed LLUR statements indicate the location of the site relative to this land, and detail the information we currently hold for the site on the register. This information is to be used by Tonkin and Taylor in accordance with the enclosed Memorandum of Understanding.

The LLUR does not contain all the information held by Environment Canterbury about a property, and other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please be aware that many current and past activities undertaken on farms (such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks) have the potential to cause contamination and these may not be listed on the LLUR.

Please contact me if you wish to discuss the contents of this letter, or if you require additional information.

Yours faithfully



Nick Griffiths
Contaminated Sites Officer

Encl:

Statements from Environment Canterbury's Listed Land Use Register

Statement from the Listed Land Use Register

58 Kilmore Street, PO Box 345, Christchurch

General enquiries: 03 365 3828

Fax: 03 365 3194

Email: ecinfo@ecan.govt.nz

Customer services: 03 353 9007

or: 0800 EC INFO (0800 324 636)

Website: www.ecan.govt.nz

Date:

7 December 2010

Land Parcels:

• Lot 1 DP 68746	Valuation No(s): 2405505100
• Lot 3 DP 74253	Valuation No(s): 2405500701
• Lot 2 DP 65668	Valuation No(s): 2405504700
• RS 7556	Valuation No(s): 2405510000
• Lot 1 DP 65668	Valuation No(s): 2405504900
• Lot 407 DP 341095	Valuation No(s): 2405350100



Summary of sites:

There are no sites associated with the area of enquiry.

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6537.

Disclaimer:

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987 and Environment Canterbury's Contaminated Land Information Management Strategy (ECan 2009).

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Customer services: 03 353 9007

or: 0800 EC INFO (0800 324 636)

Website: www.ecan.govt.nz

Date:

7 December 2010

Land Parcels:

• Lot 10 DP 71316	Valuation No(s): 2405539307
• Pt Lot 1 DP 75811	Valuation No(s): 2405539099
• Lot 9 DP 71316	Valuation No(s): 2405539311
• Lot 8 DP 71316	Valuation No(s): 2405539315
• Lot 1 DP 361539	Valuation No(s): 2405539331
• Lot 2 DP 361539	Valuation No(s): 2405539332
• Lot 3 DP 361539	Valuation No(s): 2405539333
• Lot 4 DP 361539	Valuation No(s): 2405539334
• Lot 5 DP 361539	Valuation No(s): 2405539335
• Lot 6 DP 361539	Valuation No(s): 2405539336
• Lot 7 DP 361539	Valuation No(s): 2405539337
• Lot 8 DP 361539	Valuation No(s): 2405539338
• Lot 9 DP 361539	Valuation No(s): 2405539339
• Lot 10 DP 361539	Valuation No(s): 2405539340
• Lot 11 DP 361539	Valuation No(s): 2405539341
• Lot 12 DP 361539	Valuation No(s): 2405539342
• Lot 13 DP 361539	Valuation No(s): 2405539343
• Lot 14 DP 361539	Valuation No(s): 2405539344
• Lot 500 DP 425548	Valuation No(s): 2405539099



Summary of sites:

There are no sites associated with the area of enquiry.

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6538.

Disclaimer:

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Statement from the Listed Land Use Register

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Customer services: 03 353 9007

or: 0800 EC INFO (0800 324 636)

Website: www.ecan.govt.nz

Date:

7 December 2010

Land Parcels:

• RS 9522	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• RS 15710	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• RS 12514	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• Lot 1 DP 8833	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• RS 19792	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• RS 23251	Valuation No(s): 2405526000,2405526000A,2405526000B, 2405526000C
• Lot 1 DP 372247	Valuation No(s): 2405526001
• Lot 2 DP 372247	Valuation No(s): 2405526002
• Lot 3 DP 372247	Valuation No(s): 2405526003
• Lot 4 DP 372247	Valuation No(s): 2405526004



Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
5516	54 Dynes Road, Rolleston	54 Dynes Road, Rolleston	Storage tanks and drum storage for fuel, chemicals and liquid waste	Unverified HAIL

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

Information held about the sites on the Listed Land Use Register

Site 5516: 54 Dynes Road, Rolleston (Intersects referenced land.)

Site Address:	54 Dynes Road, Rolleston
Legal Description:	RS 9522

Site Category:	Unverified HAIL
Definition:	The relevant land-use / HAIL history has not been confirmed.

Period From	Period To	HAIL land use
?	2005	Storage tanks and drum storage for fuel, chemicals and liquid waste

Notes

18 Oct 2010

An underground fuel storage tank. Removed from the site in circa 2005, the tank continued to be used as an above ground storage tank at a neighbouring property. A soil sample collected from the fill point of the former underground storage tank location by Tonkin & Taylor in 2010 yielded acceptable concentrations of total petroleum hydrocarbons and BTEX compounds.

Investigations

1 Apr 2010 INV 5125: 54 Dynes Road, Rolleston - Desk-based Ground Contamination Investigation with Limited Confirmatory Sampling
Tonkin and Taylor Ltd

Summary of investigation(s)

Tonkin & Taylor were engaged by Selwyn District Council to undertake a preliminary site investigation and a limited intrusive soil sampling investigation at a 33.3 ha block of land at 54 Dynes Road, Rolleston, presently described as RS 23251, RS 9522 and RS 19792. According to the report, Selwyn District Council was considering purchase of the properties comprising the study area for the purpose of constructing a recreational facility (including sporting fields).

The study area was in use for rural residential and general agricultural purposes at the time of the investigation. Research undertaken as part of the preliminary site investigation included a review of historical certificates of title (1883-2007), historical aerial photographs (1942-2010) and regional and district council files, an interview with the property's owner for the last 35 years, and a site inspection.

The desktop review reported that the study area was historically used for sheep farming and cropping purposes. There were no sheep dips within the study area. The potential for significant residual contamination associated with the past agricultural use was therefore assessed as low. However, the historical use of persistent pesticides may have resulted in surface soil impact, particularly within plots previously used for vegetable gardening. A gravel extraction pit (600 square metres, 4 m deep) was observed on the eastern corner of the study area. A 100 cubic metre soil stockpile – reportedly sourced from a residential subdivision in Rolleston – was observed adjacent to the gravel pit. Two residential dwellings were identified at the site.

An underground fuel storage tank formerly existed within the study area. The tank was removed roughly 5 years prior to the investigation (i.e. 2005) and was still in use as an above ground storage tank at the neighbouring property. A Tonkin & Taylor report identifies the tank location, but the tank's capacity is unknown. Validation samples had not been collected at the time of the removal. Because storage of hazardous chemicals in tanks is a HAIL activity, the former tank location has been entered on the Listed Land Use Register (LLUR) as **Site 5516**.

In April 2010 a limited intrusive soil investigation was conducted to confirm that the historical use of the site for agricultural purposes has not resulted in significant soil contamination. The sampling pattern was designed to assess the presence of residual soil contamination from the general agricultural use, historical gardening, and the imported soil stockpile. While a single surface sample was collected at the fill point of the former underground storage tank, samples were not collected to characterise sub-surface soil at the former underground petroleum storage tank location. Furthermore, sampling was not undertaken in the vicinity of dwellings to determine presence, or otherwise, of lead impact.

Surficial (0.0-0.1 m) and deeper (0.2-0.5 m) soil were collected from 16 locations. A single discrete sample was collected from the imported soil stockpile, located adjacent to the gravel extraction pit. Only the surface samples were submitted for analysis. Based on the sampling location, the analysis was scheduled for heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc), organochlorine pesticide, total petroleum hydrocarbons, BTEX compounds, and polycyclic aromatic hydrocarbons.

All sample results were compliant with the guideline criteria protective of residential, recreational and industrial/commercial land use. Soil cadmium, lead and zinc concentrations at a number of sampling locations were above the likely background levels (ECan, 2006). Petroleum hydrocarbons in the C15-C36 carbon band were detected marginally above the laboratory limits in the sample collected near the old underground storage tank location, recording a concentration of 32 mg/kg. Polycyclic aromatic hydrocarbon compounds were not recorded above the laboratory limits of detection in the sample collected from stockpiled soils.

Based on the information provided in the report, it is proposed to register LLUR Site 5516 as 'Partially Investigated'. Based on the observations (i.e. continuing use of the former underground storage tank as an above ground storage tank at an adjacent property), and the analytical results of a single sample collected at the former tank fill point, the likelihood of significant soil contamination at the former tank location is low.

No analytical analysis was undertaken to confirm the presence, or otherwise, of lead-based paint on the old dwelling located within the study area.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6539.

Disclaimer:

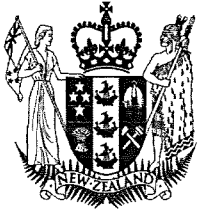
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Appendix D:

Selected certificates of title: Site 2



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952



Historical Search Copy


R. W. Muir
Registrar-General
of Land

Identifier 355094
Land Registration District Canterbury
Date Issued 25 February 2008

Prior References

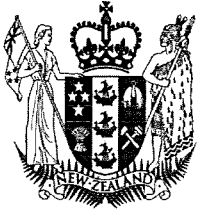
CB38B/344

Estate	Fee Simple
Area	28.0803 hectares more or less
Legal Description	Lot 1 Deposited Plan 388824

Original Proprietors
Broadfield Estates Limited

Interests

6201940.2 Mortgage to Mascot Finance Limited - 3.11.2004 at 9:00 am
6201940.3 Mortgage to Lincoln Grange Orchards Limited - 3.11.2004 at 9:00 am
6232622.1 Mortgage Priority Instrument making Mortgages 6201940.3 and 6201940.2 first and second mortgages respectively - 30.11.2004 at 9:00 am
6760438.1 Mortgage to Adrienne Marina Shadbolt, Trevor Edward Luke, Broadfield Estates Limited and David Bruce Shadbolt - 21.2.2006 at 9:00 am
7814209.1 Discharge of Mortgage 6201940.2 - 15.5.2008 at 9:23 am
7814209.2 Mortgage to Canterbury Finance Limited - 15.5.2008 at 9:23 am
7818497.1 Mortgage Priority Instrument making Mortgages 6201940.3, 7814209.2 and 6760438.1 first, second and third mortgages respectively - 16.5.2008 at 9:00 am



COMPUTER FREEHOLD REGISTER UNDER LAND TRANSFER ACT 1952




R.W. Muir
Registrar-General
of Land

Historical Search Copy

Identifier CB38B/344
Land Registration District Canterbury
Date Issued 17 February 1994

Cancelled

Prior References

CB28B/1254

Estate	Fee Simple
Area	27.0127 hectares more or less
Legal Description	Part Lot 2 Deposited Plan 1401
Original Proprietors	
Lincoln Grange Limited	

Interests

5018683.1 Transfer to Lincoln Grange Orchards Limited - 15.1.2001 at 11:36 am
6201940.1 Transfer to Broadfield Estates Limited - 3.11.2004 at 9:00 am
6201940.2 Mortgage to Mascot Finance Limited - 3.11.2004 at 9:00 am
6201940.3 Mortgage to Lincoln Grange Orchards Limited - 3.11.2004 at 9:00 am
6232622.1 Mortgage Priority Instrument making Mortgages 6201940.3 and 6201940.2 first and second mortgages respectively - 30.11.2004 at 9:00 am
6760438.1 Mortgage to Adrienne Marina Shadbolt, Trevor Edward Luke, Broadfield Estates Limited and David Bruce Shadbolt - 21.2.2006 at 9:00 am
7390584.1 Application under section 19 Land Transfer Act 1952 dry creek bed and dry lagoon bed - produced 28.5.2007 at 9:00 am and entered 25.2.2008 at 9:00 am
7390584.1 CT 355094 issued for Lot 1 DP 388824 - produced 28.5.2007 at 9:00 am and entered 25.2.2008 at 9:00 am
CANCELLED

References

Prior C/T 28B/1254

Transfer No.

N/C. Order No. DL A92041/1 - 20.1.1994



Land and Deeds 69

REGISTER

No. 38B/344

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 17th day of February one thousand nine hundred and ninety four under the seal of the District Land Registrar of the Land Registration District of CANTERBURY

WITNESSETH that LINCOLN GRANGE LIMITED at Christchurch ---

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 27.0127 hectares or thereabouts being part Lot 2 Deposited Plan 1401 ---

Ellesmere County

ASSISTANT LAND REGISTRAR

Subject to:

Mortgage 501051/1 to The Rural Banking and Finance Corporation - 9.8.1984 at 11.53am

Mortgage 668852/1 to The Rural Banking and Finance Corporation of New Zealand - 9.3.1987 at 11.13am

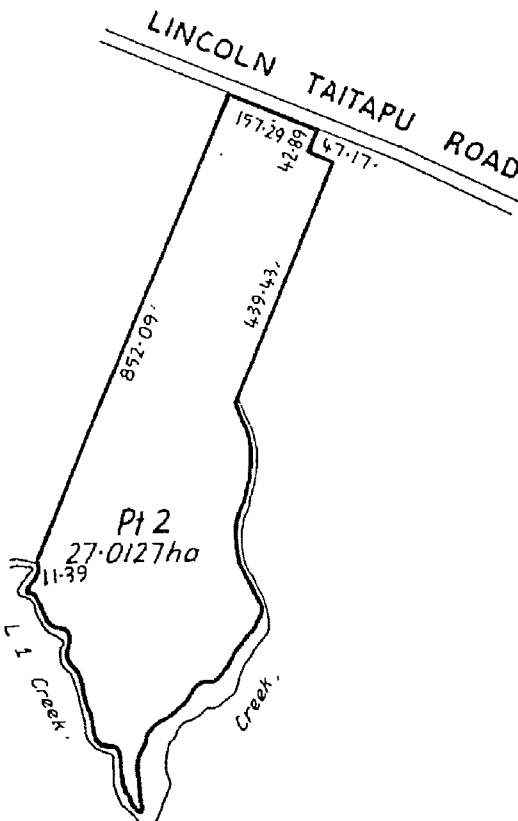
Mortgage 672188/1 to The Rural Banking Corporation - 26.3.1987 at 11.07am

A.L.R.

The discharge memorial has not been endorsed on the outstanding duplicate of Mortgage 501051/1 production of the same having been dispensed with in terms of Section 111 Land Transfer Act 1952 * and 668852/1

Mortgage A99149/4 to The Bank of New Zealand Limited - 1.3.1994 at 11.28am

for A.L.R.



Measurements are Metric

No. 38B/344



References

Prior C/T 3A/296

Transfer No.

N/C. Order No. 594270/1

CANCELLED

CANCELLED

Land and Deeds 69



REGISTER

No. 28B/1254

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

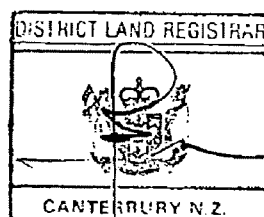
This Certificate dated the 24th day of March one thousand nine hundred and eighty six under the seal of the District Land Registrar of the Land Registration District of CANTERBURY

WITNESSETH that LINCOLN GRANGE LIMITED at Christchurch ---

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 27.0127

hectares or thereabouts being part Lot 2 Deposited Plan 1401 ---

Ellesmere County.



Assistant Land Registrar

Subject to:

Mortgage 501051/1 to The Rural Banking and Finance Corporation - 3.8.1984 at 11.53a.m.

A.L.R.

Mortgage 668852/1 to The Rural Banking and Finance Corporation of New Zealand - 9.3.1987 at 11.12a.m.

for A.L.R.

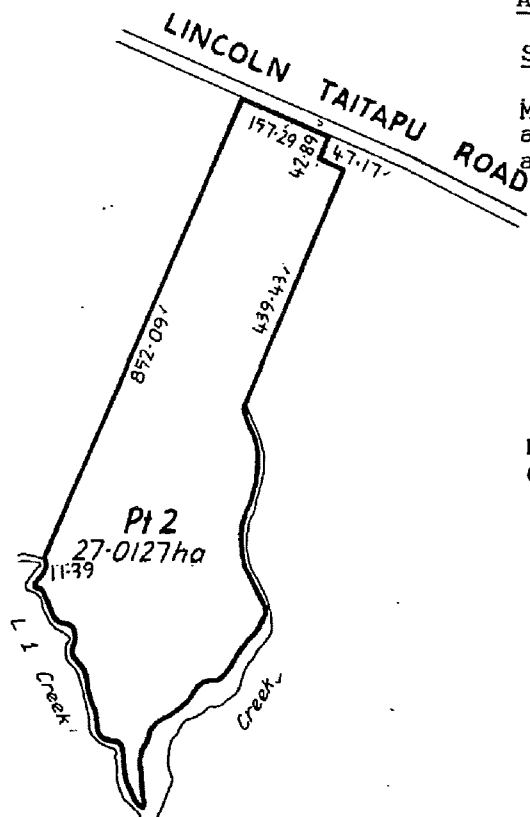
Mortgage 672188/1 to Westpac Banking Corporation - 26.3.1987 at 11.37a.m.

for A.L.R.

No. A92041/1 the outstanding duplicate hereof having been declared lost this Certificate of Title is hereby cancelled and a new Certificate of Title 388/344 issued herefor Produced 20.1.1994 and entered 17.2.1994 at 9.00am

A.L.R.

CANCELLED



Measurements are Metric

No. 28B/1254

Reference:
Prior C/T. 180/79

Transfer No.
N/C. Order No. 601001



CANCELLED

Land and Deeds 69

REGISTER

No.

3A/296

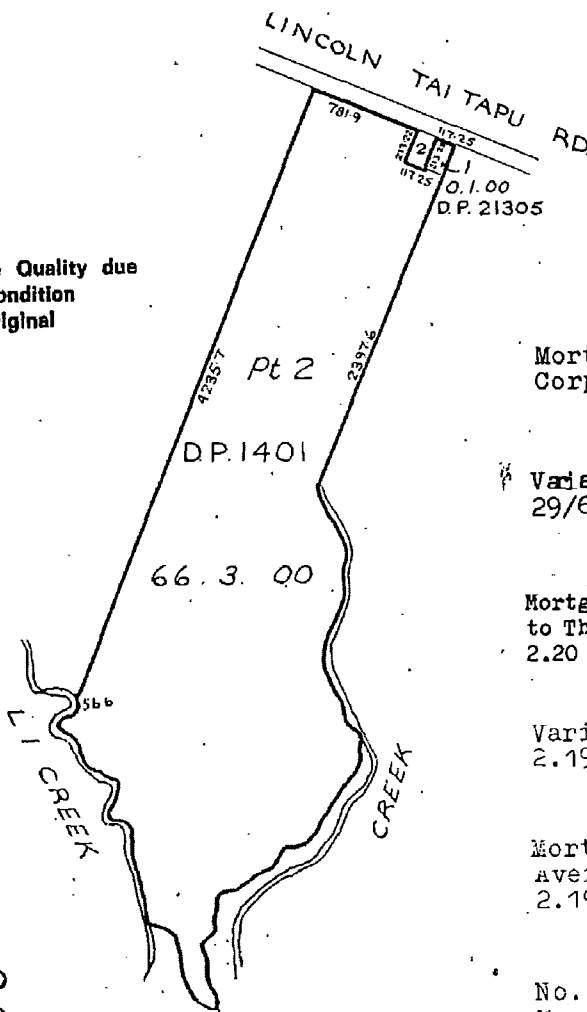
CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 23rd day of May one thousand nine hundred and sixty-three under the seal of the District Land Registrar of the Land Registration District of Canterbury

WITNESSETH that CHARLES EVELYN WATKINS of Lincoln Farmer

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 67 acres or thereabouts situated in Block V of the Halswell Survey District being Lot 1 on Deposited Plan No.21305 and part Lot 2 on Deposited Plan No.1401 Rural Section 2774 and part Rural Sections 1548 and 1880

Image Quality due
to Condition
of Original



METRIC AREA:-27.1139ha

7.0.0

10 chains.



Assistant Land Registrar

Mortgage 489964 to State Advances
Weston - 28.10.1958 at 12 noon

A.L.R.

Mortgage 823739 to State Advances
Corporation - 29/6/1972 at 11.45 a.m.

A.L.R.

Variation of Mortgage 489964
29/6/1972 at 11 a.m.

A.L.R.

Mortgage 927335 variation of the terms of Mortgage 823739
to The State Advances Corporation - 11.9.1973 at
2.20 p.m.

A.L.R.

Variation of Mortgage 927335 - 15.10.1976 at
2.19 p.m.

A.L.R.

Mortgage 102114/4 to Donaldson, Wylie and
Averill Nominees - 15.10.1976 at
2.19 p.m.

A.L.R.

No. 102114/5 Memorandum of Priority making
Mortgage 102114/4 first mortgage, Mortgage
823739 second mortgage and Mortgage 927335
third mortgage - 15.10.1976 at 2.19 p.m.

- OVER -

Register copy for L. & D. 69/71, 72
30/10/12/61-4818 W

No. 3A/296

Transmission 260315/1 to Phillip Robert Thorpe Taylor of Christchurch, Solicitor and Kenneth James Jensen of Christchurch, Chartered Accountant as Executors - 29.1.1980 at 10.48 am.

for A.L.R.

Transfer 260315/3 to Ian Charles Watkins and John Oswald Watkins both of Lincoln, Farmers as tenants in common in equal shares - 29.1.1980 at 10.48 am.

for A.L.R.

Variation of Mortgage 927335 - 29.1.1980 at 10.49 am.

for A.L.R.

Mortgage 260315/5 to ~~Wyllie and Averill Nominees Limited~~ *Wyllie and Averill* 29.1.1980 at 10.49 am.

for A.L.R.

Variation of Mortgage 102114/4 - 29.1.1980 at 10.49 am.

for A.L.R.

No. 290642/1 Change of Name of the Mortgages under Mortgage 102114/4 to Ronaldson Averill Solicitors Nominee Company Limited 5/9/1980 at 9.21 a.m.

D.L.R.

Variation of Mortgage 927335 - 29.9.1981 at 1.48 p.m.

Mortgage 347395/2 to ~~Wyllie and Averill~~ *Wyllie and Averill* New Zealand - 29.9.1981 at 1.48 p.m.

for A.L.R.

Transfer 456569/1 of Mortgage 102114/4 to Lane Neave Ronaldson Solicitors Nominee Company Limited - 7.10.1983 at 10.51 a.m.

A.L.R.

Certificate No. 472856/2 that the within Mortgage No. 623139, 927355 is vested in the Rural Banking and Finance Corporation of New Zealand 3/2/1984 at 9.39.

A.L.R.

Transfer 487784/1 of Mortgage 260315/5 to Lane Neave Ronaldson Solicitors Nominee Company Limited - 14.5.1984 at 11.20 a.m.

for A.L.R.

Transfer 491165/1 to Lincoln Grange Limited at Christchurch - 1.6.1984 at 11.15 am.

for A.L.R.

Mortgage 501051/1 to The Rural Banking and Finance Corporation - 3.8.1984 at 11.53 a.m.

for A.L.R.

OCT594270/1 - Cancelled and Cst. 24.3.1986 28B/1253,1254 issued for Lot 1 DP 21305 and part Lot 2 DP 1401

A.L.R.

CANCELLED DUPLICATE DESTROYED

Appendix E:

ECan LLUR listing Site 2

Attn: Jared Pettersson
Tonkin and Taylor
PO Box 13055
Christchurch

58 Kilmore Street
PO Box 345
Christchurch 8140
P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz
Customer Services
P. 03 353 9007 or 0800 324 636
www.ecan.govt.nz

Dear Jared

Thank you for submitting your property enquiry for land within the Lincoln area. I have searched our Listed Land Use Register (LLUR) which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

There are two LLUR sites located on the land parcels you enquired about, and there is one site located within 100 m that may be of interest to you. Environmental investigations have also been conducted on some of this land and reports have been supplied to Environment Canterbury. Staff at Environment Canterbury have reviewed the reports and determined that the land has not been used for any activities listed on the Hazardous Activities and Industries List and therefore the land has not been listed as a site on the LLUR.


The enclosed LLUR statements indicate the location of the sites and investigations relative to the land you enquired about, and detail the information we currently hold on the register. This information is to be used by Tonkin and Taylor in accordance with the enclosed Memorandum of Understanding.

The LLUR does not contain all the information held by Environment Canterbury about a property, and other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please be aware that many current and past activities undertaken on farms (such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks) have the potential to cause contamination and these may not be listed on the LLUR.

Please contact me if you wish to discuss the contents of this letter, or if you require additional information.

Yours faithfully



Nick Griffiths
Contaminated Sites Officer

Encl:

Statements from Environment Canterbury's Listed Land Use Register

Statement from the Listed Land Use Register

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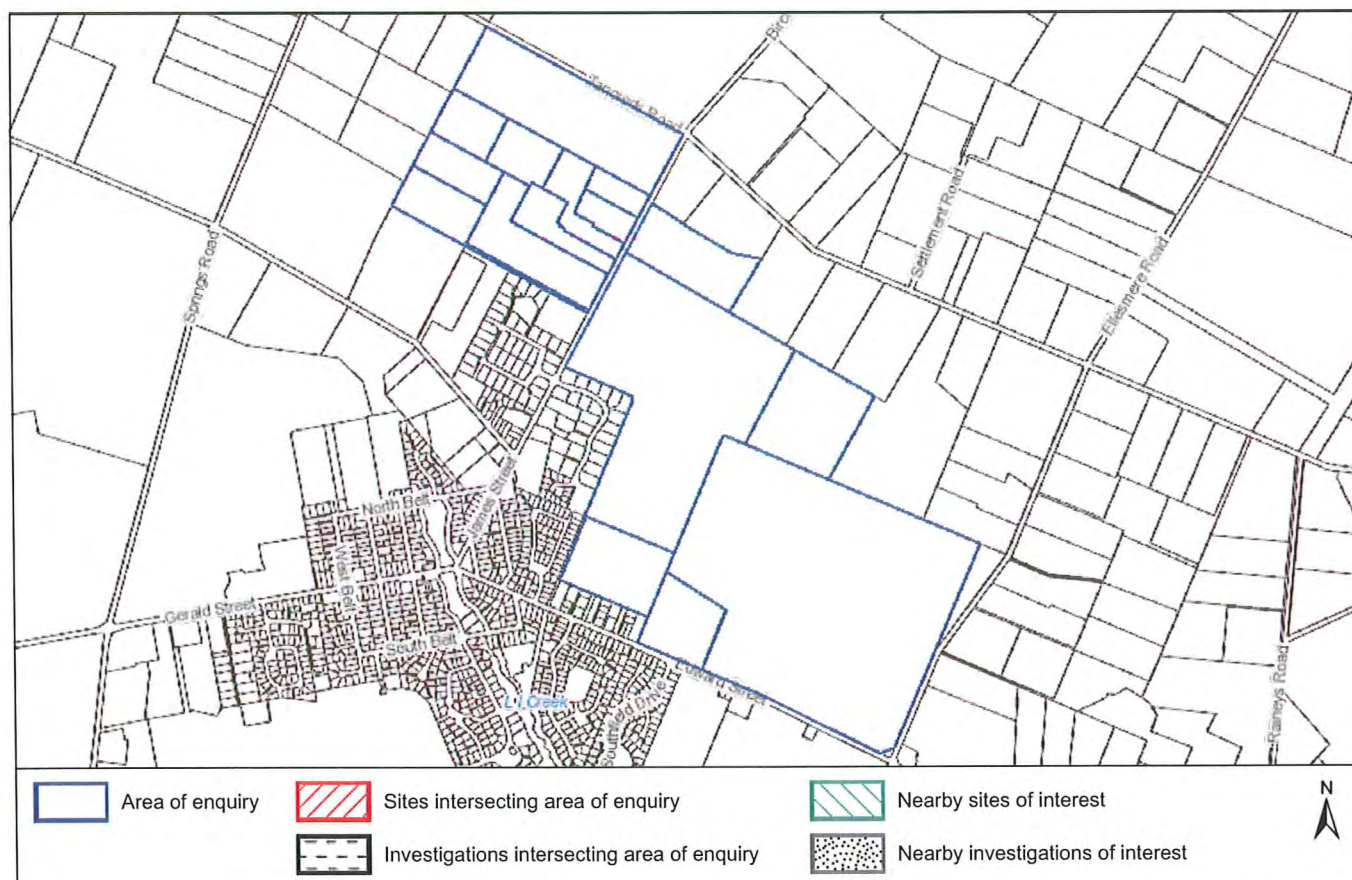
Website: www.ecan.govt.nz

Date:

8 December 2010

Land Parcels:

• Lot 2 DP 56631	Valuation No(s): 2356118800
• Lot 2 DP 33959	Valuation No(s): 2356120700
• RS 1904	Valuation No(s): 2356118701
• Lot 2 DP 33700	Valuation No(s): 2356119800
• Lot 1 DP 56631	Valuation No(s): 2356118801
• Lot 5 DP 26021	Valuation No(s): 2356119800
• Lot 2 DP 65371	Valuation No(s): 2356119900
• Lot 1 DP 364266	Valuation No(s): 2356120001
• Lot 2 DP 364266	Valuation No(s): 2356120000
• Lot 1 DP 372809	Valuation No(s): 2356118600
• Lot 2 DP 372809	Valuation No(s): 2356118602
• Lot 4 DP 374083	Valuation No(s): 2356118604
• Lot 5 DP 374083	Valuation No(s): 2356118605
• Lot 6 DP 374083	Valuation No(s): 2356118606
• Lot 7 DP 374083	Valuation No(s): 2356118607
• Lot 8 DP 374083	Valuation No(s): 2356118608



Summary of sites:

There are no sites associated with the area of enquiry.

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6547.

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Statement from the Listed Land Use Register



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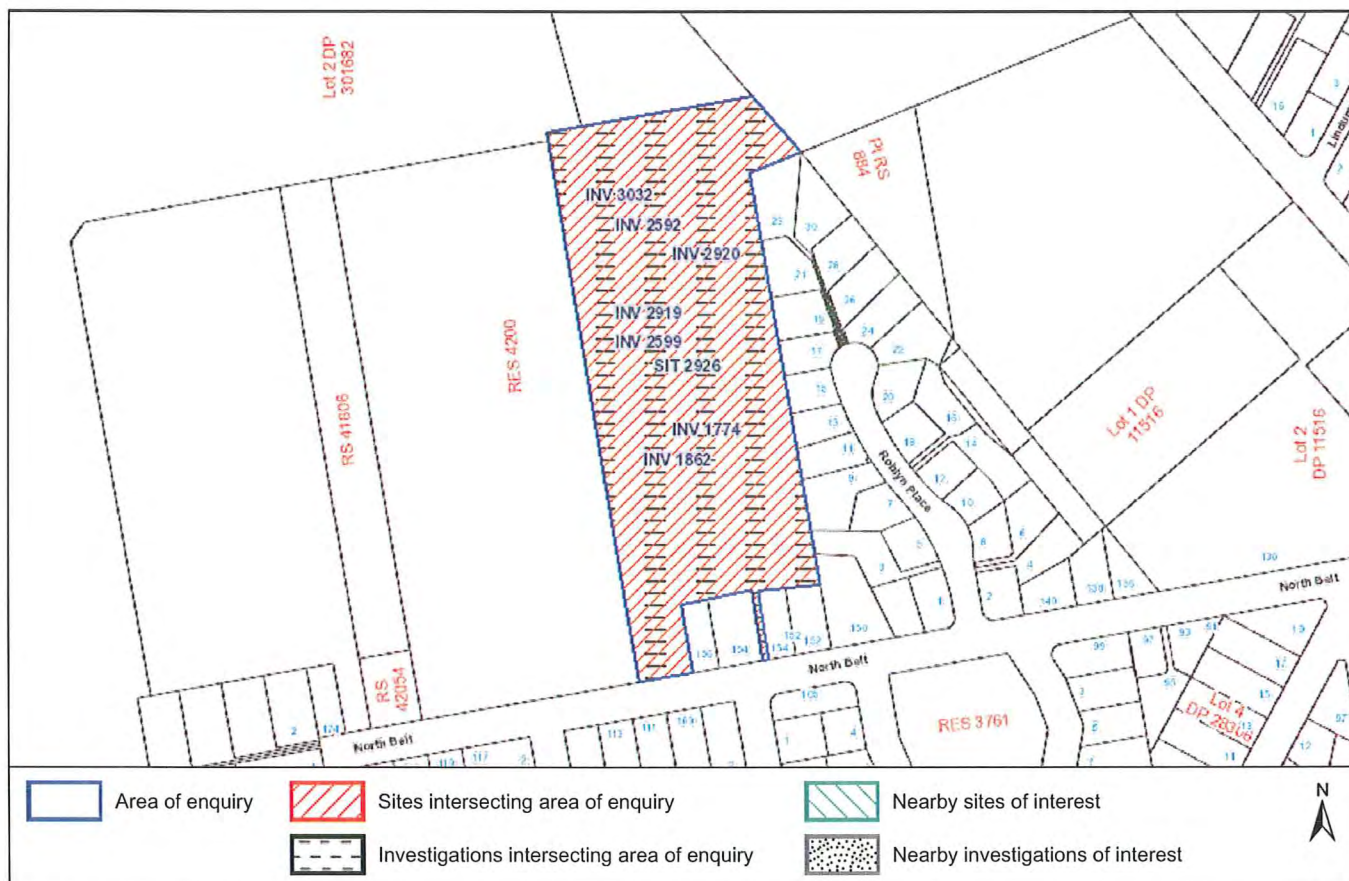
Date:

8 December 2010

Land Parcels:

• Lot 1 DP 301682

Valuation No(s): 2404000701



Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
2926	Former Crop and Food Research Institute Ltd	0 North Belt, Lincoln	Storage tanks and drum storage for fuel, chemicals and liquid waste; Market gardens, orchards, glass houses	Verified HAIL

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

Information held about the sites on the Listed Land Use Register

Site 2926: Former Crop and Food Research Institute Ltd (Intersects referenced land.)

Site Address:

0 North Belt, Lincoln

Legal Description:

Lot 1 DP 301682

Site Category:

Verified HAIL

Definition:

The land-use / HAIL history has been confirmed.

Land uses (from HAIL):

Period From	Period To	HAIL land use
1950s	1999	Storage tanks and drum storage for fuel, chemicals and liquid waste
1950s	2000	Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred

Notes

22 Sep 2005 A 5000 litre tank was present at the site. This tank was installed in the 1960s, and it was not used since approximately 1993. It was removed in 1999, with two soil samples taken from the tank pit. Samples were analysed for unbanded Total Petroleum Hydrocarbons (TPH). Sampling was carried out prior to release of the MfE (1999) Guideline for Assessing and Managing Petroleum Hydrocarbon Sites in New Zealand, and was not in accordance with the guideline.

However, sample concentrations of total TPHs were below the most conservative TPH band Tier 1 MfE(1999) soil acceptance value for Industrial/Commercial Use.

11 Feb 2009 All of the current site investigation reports held on file for this property have been assessed and the category of 'Contaminated for Residential use' recommended for the site, due to one sample having a cadmium concentration exceeding guideline values, and another having arsenic and lead concentrations exceeding guideline values. These areas of the site (associated with the former glass house and the residence) require further investigation to determine the nature and extent of contamination.

The 2006 Tonkin and Taylor investigation included soil sampling in the paddock area of the site which has previously been used for horticultural activities. This area comprises approximately the northern 80% of the total site. It is considered that this portion of the site has been adequately characterised and has shown to be suitable for future residential use.

The south-western corner of the site was also adequately characterised by sampling conducted during the 2008 Tonkin and Taylor investigation, and this part of the site (approximately 5% of the total site area) is considered to be suitable for the proposed childcare centre/plunket rooms.

The paddock area of the site meets the criteria of 'At or below background concentrations' as all of the sample results were consistent with expected naturally occurring background levels.

The south-western corner of the site meets the criteria of 'Below guideline values residential land use' as this area was adequately characterised with regard to all known HAIL activities, and all sample results were within the relevant residential guideline values but with some above natural background levels.

These two areas are marked on the LLUR layer on the ECan GIS. Although the site has the overall classification of 'Contaminated for Residential use' it is considered that these two areas require no further investigation and have been adequately demonstrated to be suitable for their proposed uses.

18 Sep 2009 A consent application has been lodged for discharge of stormwater from a proposed community centre and residential development (CRC100553). The area around the former boiler which was assessed as being contaminated for residential land use will now be located beneath a sealed car park for the community centre. Due to the change of land use to commercial/industrial, an assessment of the soil contaminant concentrations shows the land to be suitable for this proposed new land use. A small area of contaminated soil above residential guidelines remains around the dwelling on the south-east corner of the site. Remediation has been proposed for this part of the site and detailed in a Remediation Action Plan, which is held on the file. A Site Management Plan and a Construction Management Plan for the entire site is being prepared and will be submitted in response to a Section 92 request as part of the consent application.

Investigations

28 Feb 2001 INV 1774: Tank Removal of only one diesel tank
Petroleum Engineering Services Ltd

2 Jun 2005 INV 1862: Assessment of Soil Contamination at Crop and Food Proving Ground, North Belt, Lincoln
Golder Associates

1 Oct 2006 INV 2599: Ground Contamination Investigation - Crop & Food Research Farms - North Belt
Tonkin and Taylor Ltd

Exceedences of environmental guideline values				
Document	Contaminant	Pathway	Media	Land Use
UK DEFRA	Cadmium	All pathways	Soil	Residential
Contaminated sites NEPM	Lead		Soil	Residential
NZ TTG	Arsenic	Adopted value, combined pathways	Soil	Residential

1 Sep 2008 INV 2592: Ground Contamination Investigation - North Belt, Lincoln
Tonkin and Taylor Ltd

Summary of investigation(s)

At the time of investigation by Golders Associates (May 2005), the 3.6 hectare site was unoccupied. Buildings and equipment associated with the former use as an agricultural research facility were still present. The site history indicates that the site was farmed and grazed until acquired by the Crown in 1948. The site was used as a research facility from the 1950s until about 2000. The site comprised: a dwelling and garage; a field laboratory; a glasshouse with associated boiler and 5,000L diesel UST (removed); a soil shed (possibly previously housing a boiler); and a number of distinct paddocks for crop testing. Key potential contaminating activities identified were application of pesticides and storage of fuel, lubricants

and other chemicals associated with site operation.

2001 - Petroleum Engineering Services Ltd.

The former diesel storage tank was removed in 1999 and two soil samples taken from the walls of the tank pit. No significant hydrocarbons were detected. No further information was available for the tank removal. Two soil samples does not meet the recommended minimum sampling requirement (MfE 1999), however no further work is considered necessary with regard to the former tank.

2005 - Golder Associates.

A total of seven composite samples were analysed (made up of between 4 and 8 sub-samples). Five of the samples were taken from the paddock areas, one sample from a soil dump and one sample from adjacent to a chemical store in the south of the site. Five samples were analysed for organochlorine pesticides (OCPs), five for heavy metals and one for organo-nitrogen and organo-phosphorous pesticides. All the results were below relevant residential guidelines.

The Golders report concluded that the site is suitable for the proposed residential site use in its current state. The investigation results do provide a good initial indication that only limited contamination is present on site from the historical activities. However, given the size of the site and the sensitive proposed end use, the scope of the investigation is not considered adequate and additional sampling is required to confirm conditions. No hydrocarbon sampling has been undertaken to confirm that no significant contamination remains from the former UST, associated pipework, the boiler(s) or the evident hydrocarbon usage at the soil shed in the north.

An asbestos survey of the site structures should be undertaken and any identified materials handled appropriately during demolition (the Golders report refers to asbestos cement sheeting on some buildings).

2006 - Tonkin and Taylor.

26 samples collected from the site. 22 samples analysed for metals and 12 for OCPs and ONOPs. A grid sampling pattern was used for the paddock area which was appropriate as any contamination was expected to be homogeneous (based on site history).

All of the samples collected from the paddock area of the site were found to have concentrations of OCPs and ONOPs that were within the relevant guideline values, and also below the level of laboratory detection for some compounds. Metals concentrations in the paddock samples were generally at or around background levels and all within guideline values. The relatively low and regular concentrations of contaminants detected in the samples from the paddock area of the site are consistent with its documented historic use, and the sampling is considered sufficient to demonstrate that this area is acceptable for the proposed residential land use.

Targeted sampling was used to assess for potential contamination hotspots associated with the buildings, glasshouse and residential dwelling area of the site. Exceedances of guideline values were recorded for Cadmium in one sample and Arsenic and Lead in another.

2008 - Tonkin and Taylor.

Further sampling conducted with the aim of further characterising the ground contamination and potential health effects in the location of the proposed childcare centre/plunket rooms (south-west corner of the site) and at the former residence (south east corner).

The sampling and analysis conducted in the south-west corner of the site was adequate to characterise this area. All sample results were within the relevant guideline values (but with some above background), and there had been no exceedances from samples collected in the previous investigations. It is considered that this portion of the site has been demonstrated to be appropriate for the proposed development.

20 samples were collected and analysed for metals and OCPs and all results found to be within the relevant guideline values. Further work is required at these areas of the site to delineate the extent of contamination identified in the initial T&T investigation.

13 May 2009 INV 2920: Former Crop and Food site, Northbelt, Lincoln - additional sampling
Tonkin and Taylor Ltd

13 May 2009 INV 3032: Additional Data Letter Report
Tonkin and Taylor Ltd

1 Aug 2009 INV 2919: Remediation Action Plan - Former Crop and Food Site
Tonkin and Taylor Ltd

Summary of investigation(s)

Report(s) have not yet been audited.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6548.

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Statement from the Listed Land Use Register

58 Kilmore Street, PO Box 345, Christchurch

General enquiries: 03 365 3828

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Customer services: 03 353 9007

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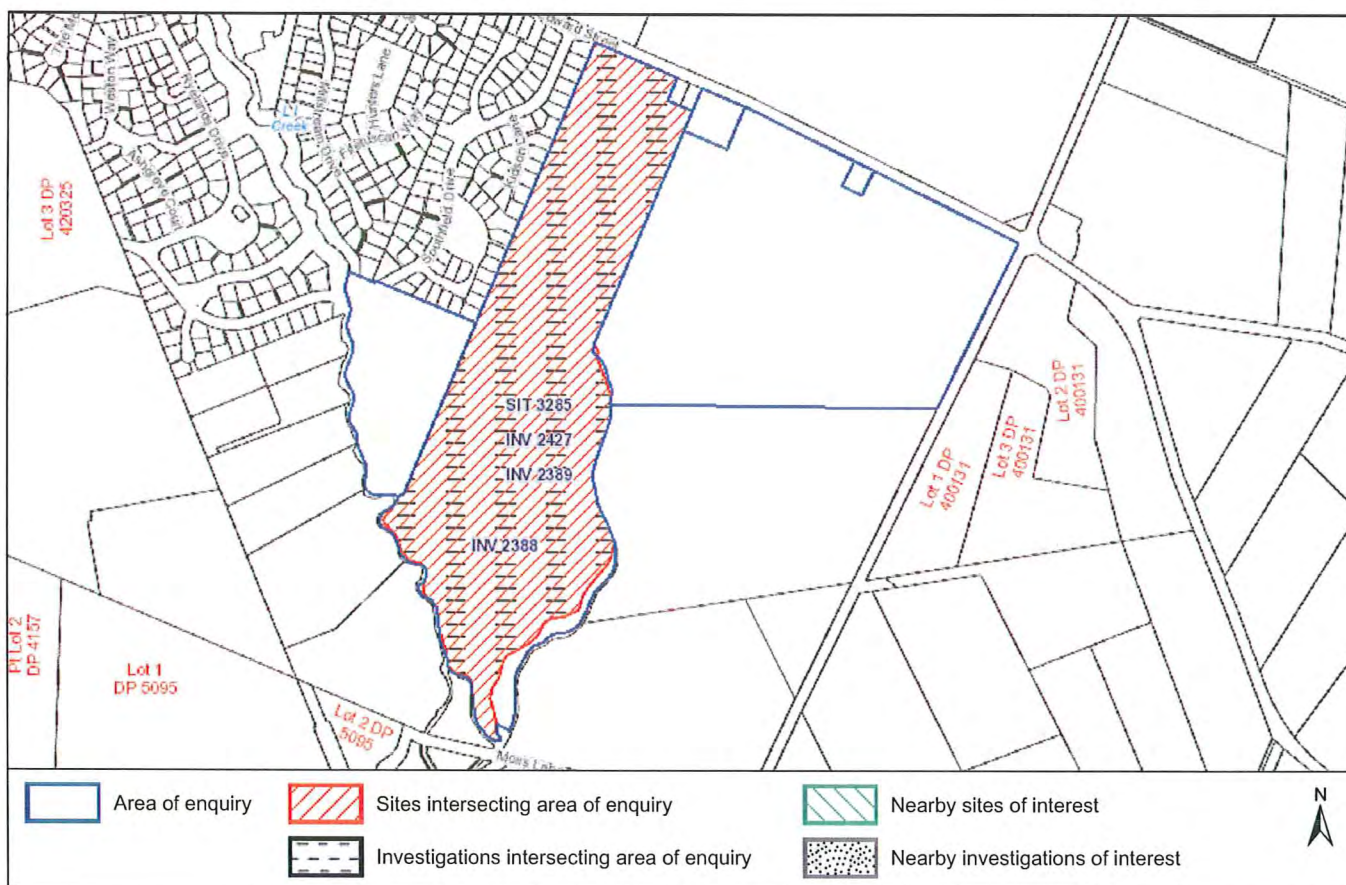
Website: www.ecan.govt.nz

Date:

8 December 2010

Land Parcels:

• Pt Lot 1 DP 9172	Valuation No(s): 2404002800
• Lot 1 DP 16901	Valuation No(s): 2404002701
• Lot 1 DP 63828	Valuation No(s): 2404002603
• Lot 96 DP 354488	Valuation No(s): 2404002500
• Lot 1 DP 388824	Valuation No(s): 2404002602



Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
3285	Former Lincoln Grange Orchards	Edward Street, Lincoln	Market gardens, orchards, glass houses	Below environmental guidelines (residential)

Please note that the above table represents a summary of sites intersecting the area of enquiry only.

Information held about the sites on the Listed Land Use Register

Site 3285: Former Lincoln Grange Orchards (Intersects referenced land.)

Site Address:

Edward Street, Lincoln

Legal Description:

Lot 1 DP 388824

Site Category:

Below environmental guidelines (residential)

Definition:

Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Residential

Land uses (from HAIL):

Period From	Period To	HAIL land use
?	2004	Market gardens, orchards, glass houses or other areas where the use of persistent agricultural chemicals occurred

Notes**31 Jul 2008 Site History**

The site is known to have operated as a commercial orchard between the 1990s and 2006. It is thought that the site was used for agriculture/horticulture prior to the 1990s. Information obtained from Selwyn District Council indicates activity since at least the 1960s with consents for drainage/plumbing, erection of implement/packing sheds, a residential dwelling and a garage.

Investigation Work

Three phases of work have been undertaken. The first comprised a preliminary investigation of soils in June 2007. As a result of the elevated metal concentrations found in the first investigation, further assessment was required. A second investigation in areas of concern was therefore undertaken in September 2007. This revealed one further area of concern and a third phase of investigation was undertaken in December 2007, targeting a specific area of lead contamination.

Sampling Methodology

A mixture of composite and discrete sampling was undertaken during the first investigation. The methodology was used correctly, although for the composite samples, the use of five sub-samples meant that the adjusted guideline values were overly conservative. Several samples exceeded the adjusted guideline values. Discrete samples were used in the subsequent investigations. No duplicate or QA/QC samples were taken during any of the three investigations.

Laboratory Analysis

During the first investigation, samples were tested for a suite of metals, hydrocarbons and pesticides. This suite of analytes appropriately addressed all potential contaminants associated with the identified on-site HAIL activities. The analyte list was then reduced to arsenic, copper and lead during the second investigation, with the third investigation solely focusing on lead.

Evaluation of Results

The initial investigation report identified a number of samples with elevated metal concentrations which required further assessment. However 9 of the 11 samples detailed as impacted were associated with levels of copper in soil in excess of the MfE "protection of plant life" guidance value found in the MfE Treated Timber guidance document (1997), and therefore had no bearing on protection of human health. The second investigation concentrated on the broad areas of lead, arsenic and copper (over protectively in terms of human health) contamination associated with composite sampling conducted in the first investigation. Results of analysis for arsenic in this investigation indicated that the composite samples collected during the first investigation reflected average concentration for the site, and were well below applicable human health risk-based guidelines. Further investigation of the "elevated" copper from discrete sampling in the area of a chemical mixing facility was not undertaken. The second report concluded that reworking and homogenising the affected area with clean soil would dilute the concentrations and that they would then fall below guideline values. Since the results for these samples were very close to the "protection of plant life" guidance value this is likely. However reworking of the area is not necessary since all copper values were below the applicable human health risk-based guidance values for residential land use. The second report indicated the presence of a single lead hot spot which required delineation. The third report found no evidence of elevated lead concentrations. The initial elevated lead in soil concentration is considered to be an anomalous isolated hot spot.

Further Work

No further work is required.

Investigations**1 Jun 2007 INV 2388: Preliminary Contamination Assessment, 86A Edwards Street, Lincoln, Canterbury**
Golder Associates

Exceedences of environmental guideline values				
Document	Contaminant	Pathway	Media	Land Use
Contaminated sites NEPM	Lead		Soil	Parkland/Recreational

20 Sep 2007 INV 2389: 86A Edward Street, Lincoln: Additional Contamination Assessment
Golder Associates

Exceedences of environmental guideline values				
Document	Contaminant	Pathway	Media	Land Use
Contaminated sites NEPM	Lead		Soil	Residential

1 Dec 2007 INV 2427: 86A Edward Street, Lincoln: Lead Delineation Investigation
Golder Associates**Summary of investigation(s)**

The site is known to have operated as a commercial orchard between the 1990s and 2006. It is thought that the site was used for agriculture/horticulture prior to the 1990s. Information obtained from Selwyn District Council indicates activity since at least the 1960s with consents for drainage/plumbing, erection of implement/packing sheds, a residential dwelling and a garage.

Three phases of work have been undertaken. The first comprised a preliminary investigation of soils in June 2007. As a result of the elevated metal concentrations found in the first investigation, further assessment was required. A second investigation in areas of concern was therefore undertaken in September 2007. This revealed one further area of concern and a third phase of investigation was undertaken in December 2007, targeting a specific area of lead contamination.

A mixture of composite and discrete sampling was undertaken during the first investigation. The methodology was used correctly, although for the composite samples, the use of five sub-samples meant that the adjusted guideline values were overly conservative. Several samples exceeded the adjusted guideline values. Discrete samples were used in the subsequent investigations. No duplicate or QA/QC samples were taken during any of the three investigations.

During the first investigation, samples were tested for a suite of metals, hydrocarbons and pesticides. This suite of analytes appropriately addressed all potential contaminants associated with the identified on-site HAIL activities. The analyte list was then reduced to arsenic, copper and lead during the second investigation, with the third investigation solely focusing on lead.

The initial investigation report identified a number of samples with elevated metal concentrations which required further assessment. However 9 of the 11 samples detailed as impacted were associated with levels of copper in soil in excess of the MfE "protection of plant life" guidance value found in the MfE Treated Timber guidance document (1997), and therefore had no bearing on protection of human health. The second investigation concentrated on the broad areas of lead, arsenic and copper (over protectively in terms of human health) contamination associated with composite sampling conducted in the first investigation. Results of analysis for arsenic in this investigation indicated that the composite samples collected during the first investigation reflected average concentration for the site, and were well below applicable human health risk-based guidelines. Further investigation of the "elevated" copper from discrete sampling in the area of a chemical mixing facility was not undertaken. The second report concluded that reworking and homogenising the affected area with clean soil would dilute the concentrations and that they would then fall below guideline values. Since the results for these samples were very close to the "protection of plant life" guidance value this is likely. However reworking of the area is not necessary since all copper values were below the applicable human health risk-based guidance values for residential land use. The second report indicated the presence of a single lead hot spot which required delineation. The third report found no evidence of elevated lead concentrations. The initial elevated lead in soil concentration is considered to be an anomalous isolated hot spot.

No further work is required.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6553.

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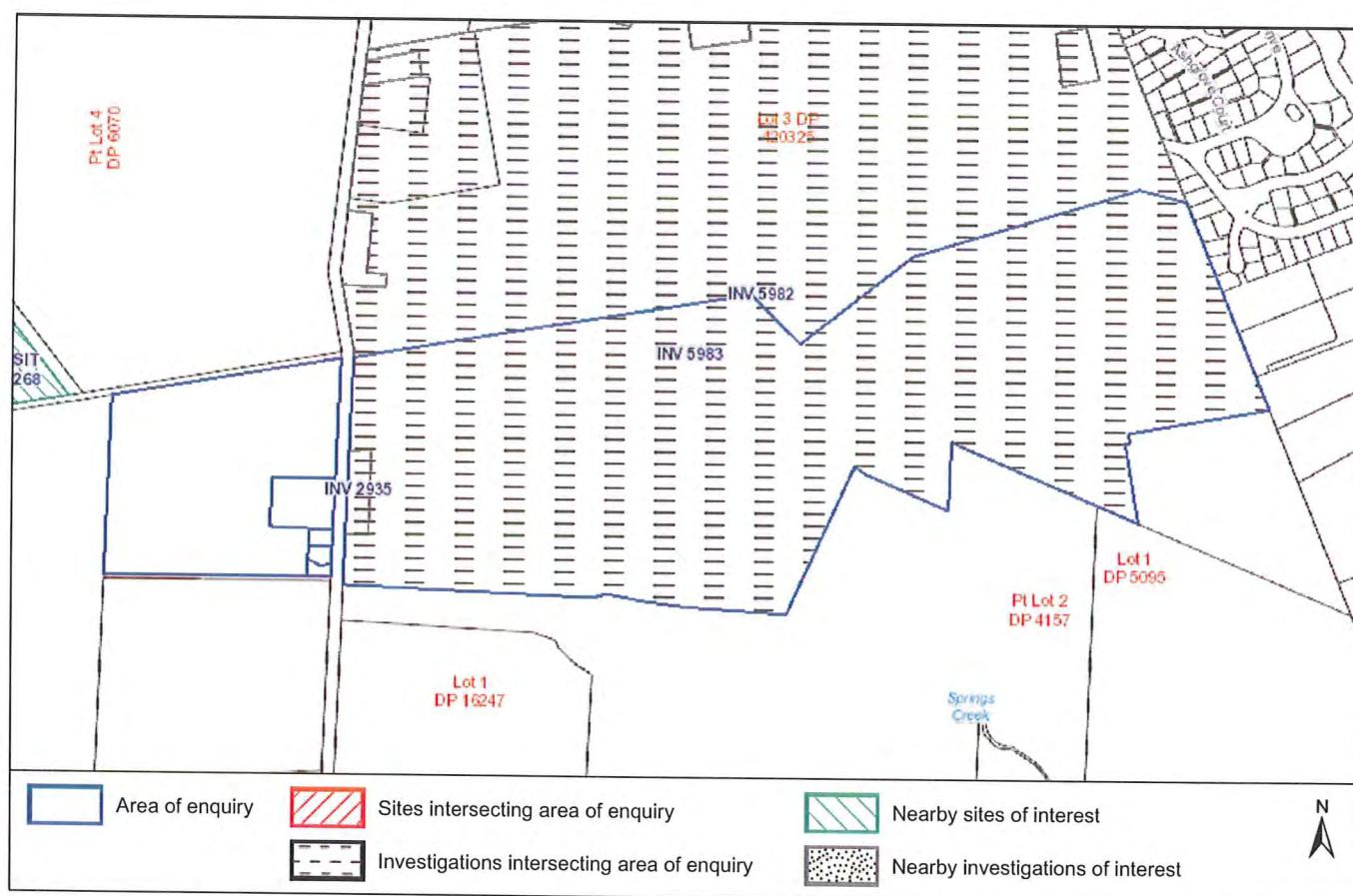
Website: www.ecan.govt.nz

Date:

8 December 2010

Land Parcels:

• Lot 1 DP 54824	Valuation No(s): 2405243800,2405243801
• Lot 1 DP 26815	Valuation No(s): 2405244100
• Lot 2 DP 22861	Valuation No(s): 2405244200
• Lot 2 DP 26815	Valuation No(s): 2405244000
• Lot 2 DP 54824	Valuation No(s): 2405243800
• Lot 6 DP 374333	Valuation No(s): 2404000107



Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
268	Lincoln University Landfill	Sth end of Weedons Ross Road, Lincoln	Landfill sites	Unverified HAIL

Information held about the sites on the Listed Land Use Register

Site 268: Lincoln University Landfill (Within 100m of referenced land.)

Site Address:	Sth end of Weedons Ross Road, Lincoln
Legal Description:	RS 4947

Site Category:	Unverified HAIL
Definition:	The relevant land-use / HAIL history has not been confirmed.

Land uses (from HAIL):	Period From	Period To	HAIL land use
	?	?	Landfill sites

Notes

- 19 Mar 2007** Lincoln University operated landfill located at the south end of Weddons Road. Approx. 200 squared metres in area. Domestic and university waste disposed at the fill. Information supplied by Selwyn District Council.
- 1 Oct 2009** A passive discharge consent (CRC090606) has been applied for and is on hold awaiting further information. The site will be registered under an appropriate category once the consenting process has been completed.
- 8 Dec 2010**
The consent for discharge of leachate from this site is still on hold awaiting further information. An investigation was conducted by CPG in April 2010 which involved the excavation and logging of 21 test pits. PID readings were taken in all pits with results reportedly indicating no significant volatile compounds were present. Fill material encountered at the site included hardfill, greenwaste and general domestic rubbish. The maximum depth of excavation was 7 m below ground level, and no groundwater was encountered in any of the pits.

Investigations

- 24 Jul 2008** INV 6551: Resource Consent Application and Assessment of Environmental Effects
Duffill Watts
- 25 Jun 2010** INV 6552: Response to Request for Further Information - CRC090606
CPG

Summary of investigation(s)

Report(s) have not yet been audited.

Information held about other investigations on the Listed Land Use Register

- 13 Feb 2009** INV 5982: Stage 2 - Environmental Assessment Report for Lots 5, 6, 8, and 9 DP 374333, Lincoln
Connell Wagner Limited
- 13 Feb 2009** INV 5983: Stage 1 - Environmental Assessment Report for Lots 5, 6, 8, and 9 DP 374333, Lincoln
Connell Wagner Limited

Summary of above Investigations

Connell Wagner was engaged to evaluate the potential for ground contamination at a former agricultural site in Lincoln. The assessment was conducted in support of the intention to develop the 118 ha site for primarily residential use. The reports refer to the site as "Lincoln Land Development" site. The investigative work was conducted in 2008. The investigations were undertaken and reported in accordance with Ministry for Environment contaminated land management guidelines.

The review of land use history, conducted as part of the preliminary site investigation, indicated that the study area had been primarily used for grazing, but with small areas of cropping also evident. The site is bisected by an old railway line, which was decommissioned in mid to late 1960s. Two areas of historical or current sewage treatment ponds were identified adjacent to the study area. The potential contaminants of concern associated with the historical activities were identified as: heavy metals, hydrocarbons, pesticides and/or pathogens. The likelihood of significant

ground contamination arising from the historical land use was considered to be low by the preliminary desktop study. With exception of the former sewage treatment plant, which was located outside of the study area's boundary, none of the identified potential contamination sources are explicitly included on Ministry for Environment's Hazardous Industries and Activities List. However, a detailed site investigation was recommended to confidently quantify the degree of contamination associated with the identified historical activities.

A detailed site investigation was conducted between April and November 2008 and comprised an assessment of soil and groundwater quality. Environment Canterbury staff were consulted in deriving the sampling and analysis programmes. A targeted sampling approach was adopted for the soil investigation. The analyses scheduled for soil samples included: total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, total heavy metals, pesticides (organochlorines and organophosphates), herbicides, and *E. Coli*. Groundwater samples were analysed for routine water quality parameters and *E. Coli*. The detailed site investigation confirmed that the historical and adjacent activities had a minor impact on the contaminant status of the site's soils.

All soil samples complied with the applicable residential land use criteria. Concentrations of heavy metals, sum DDT, polycyclic aromatic hydrocarbons, and total petroleum hydrocarbons were marginally above the anticipated ambient concentrations in a number of samples. Groundwater analysis detected total iron, total manganese, nitrate and *E. coli* levels above the New Zealand Drinking Water Standards. Iron and manganese concentrations were attributed to natural processes, while nutrient and bacterial groundwater loadings were ascribed to the agricultural impacts. The detailed investigation confirmed that historical activities associated with the old railway line, the use of land for grazing, cropping, and horticulture, and the adjacent sewage treatment ponds did not result in significant ground contamination in the study area.

13 Feb 2009 INV 2935: Lead in Soil Investigation - Lincoln Land Development Site, Lincoln. Ngai Tahu and Lincoln University Property Joint Ventures Limited
Connell Wagner Limited

Exceedences of environmental guideline values				
Document	Contaminant	Pathway	Media	Land Use
Contaminated sites NEPM	Lead		Soil	Residential

Summary of above Investigations

Connell Wagner Limited (presently Aurecon) was engaged to undertake a limited soil investigation to determine the presence of lead-based paint impact in soil surrounding painted buildings within the 118 ha 'Lincoln Land Development' site. Structures were present in three areas of the site, referred to by Connell Wagner as Areas D, H, and J by adopting the nomenclature used in the previous investigations. Area D contained a residential dwelling, two garages, and two shed/storage buildings. Because Area D was slated for immediate development, the scope of the investigation was extended to delineate the extent and magnitude of soil lead impact with respect to future residential land use. The development status of areas H and J was not finalised at the time of the investigation and the areas were unlikely to be developed for several years. Residential dwellings in Area H and J are used as rental housing by Lincoln University. The NEPC(1999) health investigation level of 300 mg/kg was selected as the action level for remediation.

The limited study showed that lead concentrations in soil immediately adjacent to all investigated structures were elevated with respect to the expected background soil levels with samples from Area D and Area H exceeding the selected action level. While partially investigated, the limited investigation of Area J indicated that soil lead impact surrounding the existing structures was lower than at other two areas. The detailed survey of lead in soil surrounding structures within Area D confirmed that lead paint was the most likely source of the impact. Lead concentrations above the NEPC (1999) health investigation level were generally confined to shallow soils immediately surrounding the buildings. Subsequent sampling of Area H detected a deeper migration of lead impact, which was attributed to acid washing of exterior walls. Based on the results of the limited soil investigation, remediation of areas D and H was recommended.

While the remedial strategy at both areas was based on excavation of impacted soil and replacement with clean soil, the methodology and the goals of remediation at Area D and Area H differed according to the planned land use. Validation sampling was conducted to verify the remedial goals and to confirm the state of imported material. Remediation was carried out in March 2009.

At Area D, which was slated for immediate residential development, the objective of remediation was to reduce the soil lead concentrations to below the NEPC (1999) health investigation level for residential land use (300 mg/kg). An additional stage of remedial excavation and validation at Area D was conducted in July 2010, after the structures were removed from the site. According to Aurecon, an area which included all the former structures within Area D was cut by stripping topsoil (approximately 400 mm) and the underlying silt horizon (minimum of 100 mm). The described cut and fill work is likely to have adequately removed the lead-impacted soil. Validation sampling at Area D has shown that lead concentrations in soil surrounding the former dwelling, an adjacent shed, and a north-most garage have been successfully reduced below 300 mg/kg, as intended. The area is considered suitable for residential development.

Remediation goals for Area H were devised in accordance with the 2007 Ministry of Health guidance for lead-exposure. Soil lead concentrations between 400 and 1,000 mg/kg were selected as remedial goals for soft-cover management (e.g. clean soil and grass/mulch). Because soil lead

concentrations above 1,000 mg/kg were recorded in validation samples collected from an initial excavation surrounding one of the houses in Area H, and due to the logistical difficulties in extending the depth of excavation, a geotextile fabric was incorporated in remediation strategy at two of the houses in Area H, placed between the exposed surface and imported soil. Tenant notices and a hazard register have been prepared to ensure the integrity of exposure barriers is maintained and to provide advice on minimising contaminated soil exposure and migration.

For further information from Environment Canterbury, contact the Contaminated Sites Officer and refer to enquiry number 6554.

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