Request for a Change to the

Selwyn District Plan

Hughes Development Limited

163 Halkett Road and 1066 West Coast Road • West Melton

November 2020

HUGHES DEVELOPMENTS

Request To Change the Selwyn District Plan under Clause 21 of the First Schedule of the Resource Management Act 1991

TO: The Selwyn District Council achieving

Hughes Developments Limited request changes the Selwyn District Plan as detailed below.

1. **The locations** to which this request relates are:

Address:	163 Halkett Road and 1066 West Coast Road
Legal Descriptions:	Lots 1 and 2 DP 34902
Total Area:	20.687ha

2. **The Proposed Plan Change** undertakes the following:

   a. Amend Selwyn District Plan Planning Maps rezoning the following parcels of land from Inner Plains to Living West Melton;

   b. Insert new Outline Development Plan, West Melton East in Appendix 20 of Volume 1 Townships as illustrated in Attachment 1;

   c. Amend Part C Living Zone Rules – Subdivision, Table C12.1 Allotment Sizes;

   d. Any other consequential amendments including but not limited to renumbering of clauses and District Plan maps as appropriate

DATED: 20 November 2020 .....

(Signature of applicant or person authorised to sign on behalf)

Title and address for service:	Address for the applicant and all Council fees:
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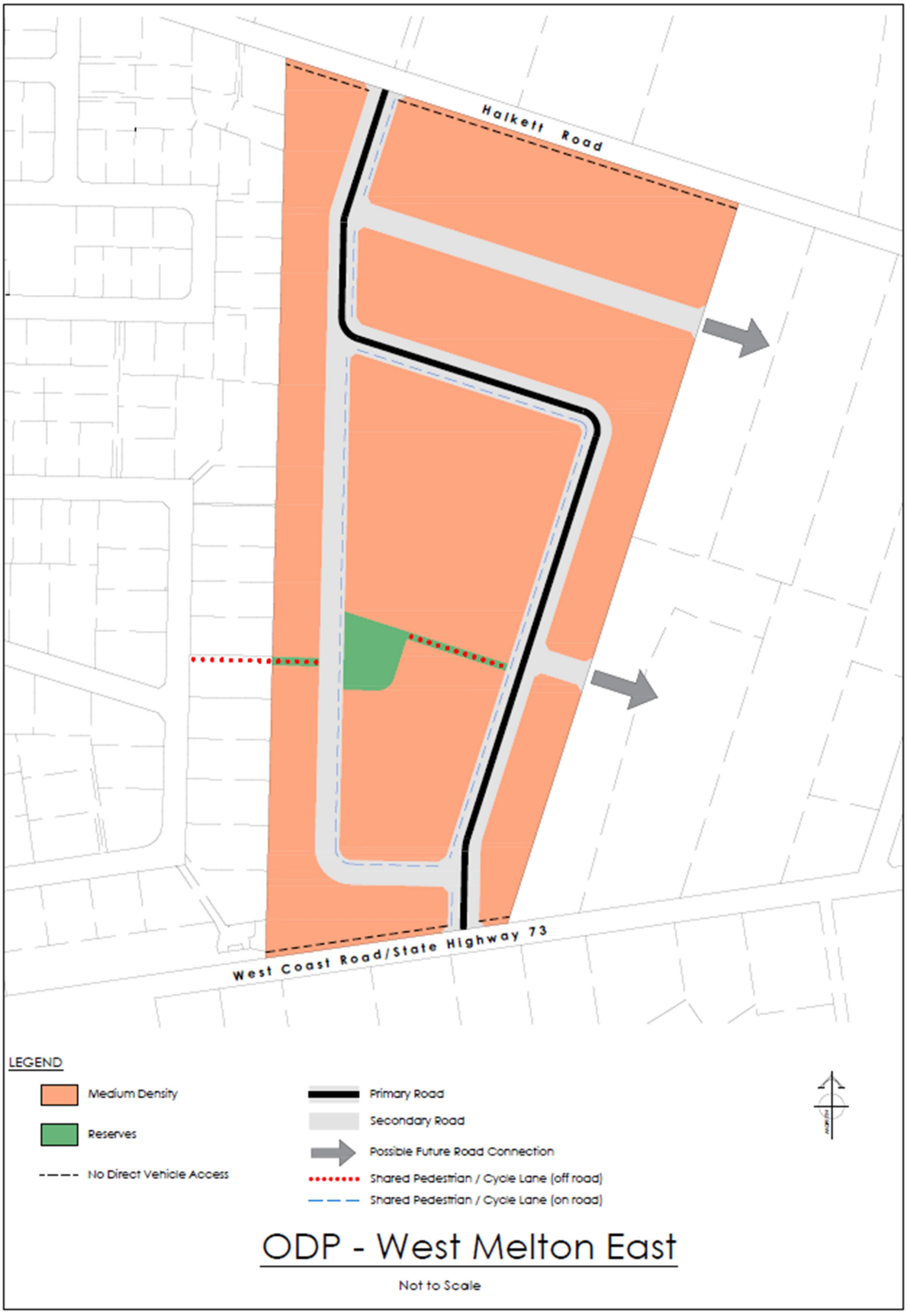
Attachment 1 – Proposed Outline Development Plan



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1 Introduction

Hughes Developments Ltd request a change to the Selwyn District Plan by rezoning 163 Halkett Road and 1066 West Coast Road with a total area of 20.687 hectares from Rural Inner Plains to Living West Melton.

This document forms the Section 32 evaluation of the plan change, consisting of an evaluation of the contents of the Proposed Plan Change, and incorporates material from the following documents:

- Davie Lovell-Smith Infrastructure Report (Appendix A)
- ENGEO Geotechnical Assessments (Appendix B)
- ENGEO Preliminary and Detailed Site Investigations (Appendix C)
- NOVO Group Traffic Assessment (Appendix D)
- Urban Design Statement (Appendix E)

2 The Environment

2.1 The Plan Change Site

The land proposed to be rezoned is owned by Hughes Developments Ltd, the applicant for this plan change. The site is located at 163 Halkett Road and 1066 West Coast Road, legally described as Lots 1 and 2 DP 34902. The land is located to the east of the existing West Melton residential area and is bound between Halkett Road and West Coast Road (State Highway 73) as shown on Figure 1 below.

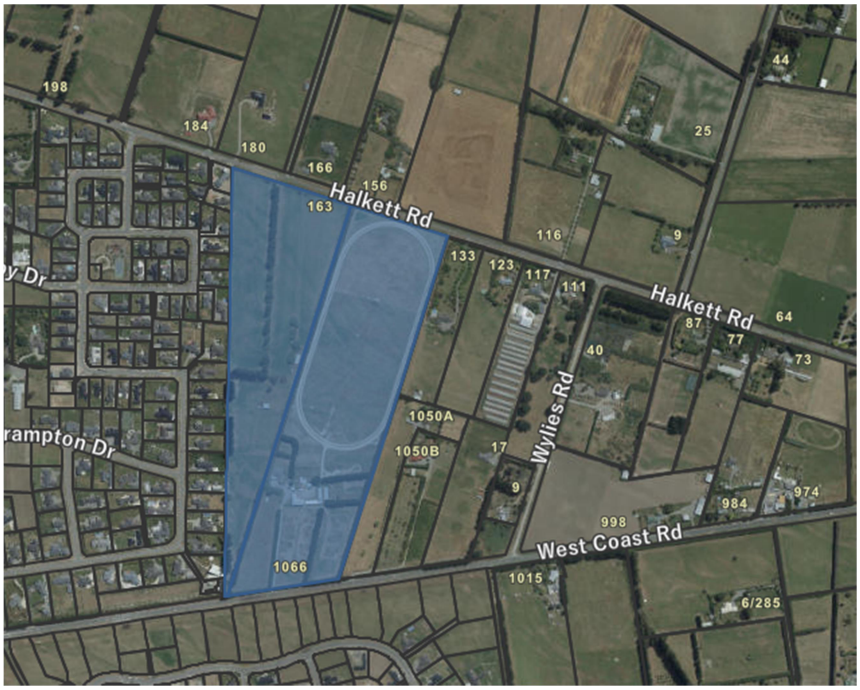


Figure 1: Site identified in blue (Source: Canterbury Maps)

The land is generally flat ground with some gentle undulations and depressions. The depressions are generally in a northwest/southeast direction and have resulted from remnant river channels. Existing shelterbelts can be found along many of the internal boundaries of the site and along the road boundary with West Coast Road. The topography of the site is flat. The properties are currently divided into numerous rectangular and triangular paddocks of different sizes. There is an existing dwelling on 1066 West Coast Road and both parcels of land have farm buildings.

2.2 The Surrounding Environment

To the north and east of the sites is rural land used for grazing and other agricultural activities. The southern boundary is boarded by West Coast Road with Wilfield residential subdivision to the south of this road. The western boundary of the site is the Gainsborough subdivision which is part of the West Melton residential area with a small shopping area, school and pre-school.

3 The Plan Change

3.1 Description of the Proposal

It is proposed to rezone 20.687 hectares of Inner Plains to Living West Melton. This provides the opportunity to develop approximately 130 residential allotments which will have a similar density to what is provided in West Melton. The allotments are to be developed in accordance with the Living West Melton – Medium Density standards.

The Outline Development Plan (ODP) has been prepared for inclusion in the District Plan. The ODP provides for:

- A mixture of low density and medium density development with lower density generally on the boundaries which face existing rural areas and the medium density more centralised within the blocks and near the reserve area
- Two road connections from the north and south as well as smaller roads within the development to enable easy movement to, through and from these blocks
- Pedestrian / cycle link from the west to provide connection to the Gainsborough subdivision

- A local recreation reserve which will act as a focal point for the neighbourhood and local communities, whilst also providing spatial relief for surrounding medium density development.

3.2 Servicing

Servicing of the development will be by reticulated Council services. Details of the infrastructure requirements for the development are contained in the Infrastructure Report in Appendix A and are summarised as follows:

- Primary stormwater from the site will be discharged to ground. The soakholes on the individual sites will be constructed as part of the Building consent process but the drainage and soakholes associated with the roads will be constructed as part of any future subdivision and will be vested in SDC. The development will be designed to ensure that secondary flow will safely drain through the site via the road networks.
- Wastewater will be catered for primarily through gravity connections to existing infrastructure. Initial estimates are that approximately 50% of the proposed development site will be able to drain into the existing network located to the west of the site. The remainder of the development will be serviced one of two ways: low pressure sewer systems or a small sewerage pumping station which will be installed in the road reserve and vested in Selwyn District Council. These options will be further considered at detailed design.
- Water supply will be provided via reticulated supply located within the road reserves. Additional water supply will need to be provided to cater for this development which will be provided through increasing the capacity of the reservoir (located to the south west of the plan change area) through the current work undertaken by Council which is connecting the Wets Melton and Edendale supply.
- Gas, power and telecommunications will be provided to all sites to utility company and industry standards. All cables will be placed underground and all kiosks will be constructed on separate individual lots.

3.3 Proposed Amendments to the District Plan

This Plan Change is simply rezoning and therefore the objectives, policy and rule provisions of the Selwyn District Plan will remain the same. The only changes required are:

- Amending Selwyn District Plan Planning Maps by rezoning the West Melton – East parcels of land from Inner Plains to Living West Melton
- Inserting a new Outline Development Plan, West Melton East in Appendix 20 of Volume 1 Townships as illustrated in Attachment 1
- Amend Part C Living Zone Rules – Subdivision, Table C12.1 Allotment Sizes

West Melton	Living 1	1,000m^2
	Living 1B	2,800m^2
	Living 2	5,000m^2
	Living 2A	Maximum number of allotments is 10, and a minimum allotment size of 1 ha.
	Living WM Medium Density	Minimum lot area of 500m^2 and maximum lot area of 3000m^2 (Appendix 20A)
	Living WM Low Density	Minimum lot area of 3000m^2 and maximum lot area of 5000m^2 (Appendix 20A)
	So that a total of 292 allotments must be achieved across the whole Living WM North Zone	

Please note that the Living WM North Zone applies to the area in blue in the below figure.

Figure 2: Location of West Melton North in reference to the proposed changes to Table C12.1. Source Canterbury Maps

4 Consultation

Hughes Developments Ltd and their consultants have undertaken consultation with Selwyn District Council staff in relation to this proposal to ensure that the area to be rezoned is appropriately located and can be adequately serviced. More specifically, the consultation can be summarised as follows:

Planning

Hughes Developments Ltd has commenced this plan change process following a period of engagement with Planning staff in respect of the potential for residential growth within West Melton.

Infrastructure

Hughes Developments Ltd have consulted with Council's Asset Department in respect of wastewater, water supply and stormwater infrastructure capacity.

Traffic

Informal discussion has been had between New Zealand Transport Agency and Novo Group. These discussions have informed the ODP layout including the access onto State Highway 73.

Tangata Whenua

Mahaanui Kurataiao Ltd has been asked to comment on the proposed plan change. Due to large workloads, this process is ongoing and will be provided to Council once received. It is noted that Te Whakatau Kaupapa and Canterbury Maps indicate that there are no silent files in the West Melton area. In addition there are no waterbodies or remnant vegetation expected to be of significance to Tangata whenua. With regard to vegetation the soft landscaping associated with reserves, street

berms and stormwater swales will in almost all situations be dominated by indigenous species from the local area. This approach has the dual advantage of achieving plantings in sympathy with the area as well as increasing the likelihood that the plants will survive and flourish in West Melton's the dry and windy environment.

5 Assessment of Environmental Effects of the Proposed Change

The following assessment considers both the environmental effects and character of the proposed residential development area as well as environmental effects beyond these sites. The matters assessed are:

- Township growth
- Rural – urban interface
- Natural hazards and geotechnical matters
- Soil contamination
- Water quality
- Neighbouring activities and potential reverse sensitivity issues
- Natural features
- Versatile soils
- Transportation
- Quality urban environment
- Beneficial effects

5.1 Township Growth

Selwyn District Plan – Township Volume policies on township growth provide guidance on the outcomes sought by the Council and the community with regard to the expansion of townships and which are normally examined when considering rezoning through the plan change process. An assessment of this proposal in terms of those policies is contained in Section 6.3.

5.2 Rural Urban Interface

The proposed outline development plan addresses the urban-rural interface primarily through the location of lower density allotments around the periphery of the site. This is consistent with the surrounding residential developments in West Melton. This approach is also consistent with developments in Rolleston. The plan change area will be separated from adjacent rural properties to the north by West Melton East Road. The eastern boundary of the site is at this stage, retaining its rural zoning. Design controls derived from the District Plan will control the boundary treatment along this boundary, particularly in respect of fencing. The applicant is prepared to accept the standard condition indemnifying the adjoining land owners to the east from contributing to the costs of (non-rural) fencing along this shared boundary. Such interface treatments have been made on the proviso that at the time of development, the adjacent land retains its Inner Plains zoning status. In anticipation of future residential re-zoning, provisions have been made within the ODP to ensure that connectivity, reserve networks and density distribution are provided for at the boundary with these adjoining properties.

The Applicant notes that they have undertaken numerous large and small scale residential developments within Selwyn which have been within a rural setting. They have found that no major problems have arisen with regard to incompatibility with the surrounding rural land uses and residents. The combination of the factors referred to above ensures that the urban-rural interface within this application is appropriately managed to mitigate any potential effects that might arise.

Further detail around the rural-urban interface is contained within the Urban Design Statement contained in Appendix E.

5.3 Natural Hazards and Geotechnical

Geotechnical Investigations have been prepared by ENGEO Ltd for the properties (Appendix B). These reports advise that there are no mapped faults in the immediate area but that this area could be subject to ground shaking from movement of faults elsewhere. The area is located to the north of the Greendale Fault and the Port Hills Fault, that latter which has not been mapped because it did not result in any surface rupture. With regard to the liquefaction potential for the site, the ENGEO reports conclude that damaging liquefaction is unlikely consistent with a TC1 zoning.

There are no other known potential natural hazards that could affect the Plan Change sites. In particular the site is not likely to be subject to material damage from erosion, falling debris, subsidence, slippage of inundation from any source.

5.4 Soil Contamination

Preliminary and Detailed Site Investigations into the potential for soil contamination have been undertaken for the two properties proposed to be rezoned in terms of the Ministry for the Environment's Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand, 2011. These investigations by ENGEO Ltd are contained in Appendix C to this Plan Change request, and considered the following information:

- Reviews of Selwyn District Council property information provided in LIMs
- Obtaining ECan data from the Listed Land Use Register (LLUR)
- Review of ECan GIS data
- Review of historic aerial photos
- Review of historical ownership history
- Review of local knowledge of site history
- Site visits

The investigations involving site histories and walkovers generally found that activities on site have given rise to no soil contamination. The most common potential for soil contamination arises from the trotting track (1066 West Coast Road), localised burn pits (163 Halkett Road) and the potential for asbestos associated with cladding of existing and former buildings. The reports recommend that these matters be dealt with by:

- The areas of potential concern are managed appropriately during development earthworks. This would include excavation and off-site disposal of the burn pit to a licensed disposal location and observation of the soils in the area of ground disturbance.
- Should the buildings located at 1066 West Coast Road be refurbished or demolished a full asbestos survey must be undertaken by a competent person.

The localised nature of findings are able to be dealt with at future subdivision stage and are not of any significance such as to warrant further investigation in support of the Plan Change.

5.5 Water Quality

Groundwater quality can be adversely affected by residential development from two main sources, namely on-site effluent treatment and disposal or stormwater generated by increases in impervious surface coverage. In terms of effluent treatment and disposal, no adverse effect will be generated by this proposal as the development will be connected into the Council's reticulated system within West Melton. The appropriate infrastructure to connect to the Council's reticulated system will be installed within the subdivision.

As there will be an increase in impervious surfaces as a result of this development, it is proposed to collect all stormwater generated on site and discharge this to ground in accordance with Council's requirements of residential stormwater. This will ensure that groundwater quality is not adversely impacted by this proposal. Consent will be obtained from Environment Canterbury for this discharge, and will ultimately be transferred to the Council.

With the reticulation of sewage and the stormwater treatment and disposal system proposed, it is anticipated that there will be minimal adverse effects on groundwater quality from the development of this land for residential purposes.

5.6 Neighbouring Activities and Potential Reverse Sensitivity Issues

Activities on neighbouring properties are both rural/rural lifestyle and residential. To the north, east and south east of the site are predominantly rural activities. To the west and south is residential. There is no intensive animal or crop production in the vicinity of the Plan Change area.

There will always be the potential for people living on the edge of townships to be impacted by noise, odour, and traffic impacts of rural activities. In most cases residents living opposite rural areas have chosen to live on these sites presumably with an expectation that the rural uses will be carrying on.

5.7 Natural Features

There are no natural features within the proposed Plan Change areas which are generally flat with planted or fenced boundaries and some dwellings and farm buildings.

5.8 Versatile Soils

The sites contain Eyre stony loam soils. These soils have limited ability to retain moisture and are considered to have severe limitation for food production even with irrigation.

A commonly used land use/soil classification system used in planning, particularly plans under the Town and Country Planning Acts, is the Land Use Classification. Information obtained from Landcare Research's New Zealand Land Resource Inventory identifies that this site as LUC3. This class is not considered to comprise versatile soils.

5.9 Transportation

Novo Group has prepared an Integrated Transport Assessment (Appendix D).

Road network capacity:
Novo Group has modelled the proposed volumes and intersection performance from the site on to State Highway 73. This modelling concludes that the traffic remains modest and the intersection has a good level of service in relation to delays with an A and B Levels for traffic travelling into the site from the State Highway and traffic travelling out of the site and turning left onto the State Highway.

Access:
There are two accesses into the site: one from State Highway 73 and the other from Halkett Road. These intersections will be designed as T-intersections. It is considered that the intersection at Halkett Road will mirror the design at Rossington Drive.

The state highway intersection is to include a right turn lane (a conceptual design is illustrated in the traffic report). This intersection can be accommodated for a posted speed limit of 100km/hour.

Should the traffic speed be reduced in the immediate area of the site and intersection design can be accommodated within the existing road reserve. This intersection will accommodate the predicted traffic volumes and will be designed to comply with the relevant design standards, including sight lines.

Wider accessibility effects:
The proposed ODP includes pedestrian and cycle links within the development and has accommodate future linkages to the east. A key pedestrian / cycle link is proposed from the Gainsborough subdivision to the west which will provide a connection to the Primary School, and retail shops. There are no footpaths along Halkett Road and State Highway 73.

5.10 Quality Urban Environment

Urban Acumen has provided an urban design statement to accompany the plan change request (Appendix E). From an urban design perspective, the ODP includes an appropriate level of detail to ensure a connected, efficient and attractive residential neighbourhood can be delivered while retaining sufficient flexibility for detailed subdivision design and staging. It provides the opportunity for growth to be accommodated in West Melton in a way that supports the town centre and provides choice for potential residents. It promotes active transport and social interaction along with a sense of identity.

The urban design statement concludes:
The proposed ODP directs the development of a new residential community which:

- has a legible spatial layout
- utilises a hierarchy of movement spaces to aid efficiency and legibility
- has a strong identity associated with a local public recreation space and gateways
- maximises opportunity for connection to the existing residential environment to the west
- provides for future linkages to the east if/when such land is rezoned and developed for residential use
- is easily accessible and permeable by active travel modes
- responds appropriately to its interfaces, particularly Halkett Road and SH73

5.11 Beneficial Effects

The Plan Change will provide for the growth of West Melton within the master planned ODP area. Hughes Developments Limited has purchased the two sites totally 20ha which will enable a master planned approach to be employed to cater for future residential development. The benefits derived from this approach will facilitate in creating communities with a focal point such as the recreation reserve and the strategic allocation of medium density areas.

The area subject to this plan change will provide for a different housing choice to what is currently offered in Rolleston and within Christchurch City. In particular the larger lot areas are one of the reasons people are attracted to West Melton. The demand for larger lots has risen following the COVID 19 nationwide lockdown. This is also coupled with the proximity West Melton has to employment in Darfield, Hornby, IZONE and the airport as well as Rolleston and Christchurch City.

From a wider local perspective, the provision of land for residential growth will continue to support the Council's investment in community infrastructure by virtue of maintaining and perpetuating growth rates, increasing the rating base and attracting development contributions.

6 Policy and Plan Framework

The policy and planning framework relevant to the residential development is extensive including policy statements, plans and legislation at national, regional and district level. The following provides an assessment of the proposed plan change for rezoning in relation to these various documents.

6.1 National Policy Framework

- Part 2 RMA
- NPS Urban Development Capacity
- NPS Urban Development
- Draft NPS Highly Productive Land

Part 2 of the Resource Management Act

Part 2 of the Resource Management Act defines the purposes and principles of the Act, which are the overarching matters that should be taken into account in preparing policy statements and plans and when considering a resource consent application. In terms of this request for a plan change it is considered that the most relevant sections of Part 2 are Sections 5 and 7. There are no relevant matters of national importance that are relevant to this proposal, and as such no assessment against this section has been made.

The West Melton East proposal provides for the efficient and sustainable use of land resource, in that it is an expansion of the residential development in West Melton. This increase in housing supply within West Melton will enable the social and economic wellbeing of the community to be maintained and enhanced. However, the site is not in a location which is identified in higher order planning policy documents for residential development.

The amenity of the neighbours and futures residents has been taken into account throughout the development of Outline Development Plan. This includes providing for lower density allotments in areas opposite rural zoned land. With regard to ensuring integration with adjoining existing residential areas and future growth areas this will be achieved by development being in accordance with the Outline Development Plan.

Achieving the balance required under Part 2, has been achieved through a comprehensive approach to the design of the West Melton East development and as such is considered to achieve the overall purpose of the Act as set out in Part 2.

National Policy Statement on Urban Development Capacity

The National Policy Statement on Urban Development Capacity (NPS-UDC) came into effect in December 2016, providing direction to decision-makers under the Resource Management Act 1991 in respect of planning for urban environments. The purpose of the Policy Statement is to recognise the national significance of:

- Urban environments and the need to enable these to develop and change and
- Provide sufficient development capacity to meet the needs of people and communities and future generations in urban environments

To achieve these purposes all councils that have part, or all, of a medium or high growth urban area within their district or region are required to produce a future development strategy which demonstrates that sufficient, feasible development capacity is available to support future housing

and business growth. This includes over the medium (next 10 years) and long term (10 to 30 years) periods.

The Christchurch urban area was defined by Statistics NZ in 2016 as a high growth urban area. Given the strategic planning arrangements that already exist between the councils in the Greater Christchurch Partnership, it was agreed that a review of Greater Christchurch's settlement pattern should be done collaboratively, and in doing so, meet the statutory requirements of the NPS-UDC. Accordingly, the Partnership has determined that the Greater Christchurch area should be the geographic area of focus for the Update of the existing Urban Development Strategy (UDS) for the purposes of the NPS-UDC requirements.

National Policy Statement on Urban Development 2020

The National Policy Statement on Urban Development (NPS-UD) was gazetted on 20 July 2020 and comes into effect on 20 August 2020. Its purpose is to ensure regional policy statements and regional and district plans provide adequate opportunity for land development for housing and business to meet community needs. This is to occur through improving the responsiveness and competitiveness of land and development markets to support productive and well-functioning cities. This National Policy Statement replaces the National Policy Statement on Urban Development Capacity 2016 by incorporating many of its elements.

The NPS-UD recognises at a national level the significance of well-functioning urban environments. In particular the Objectives of the NPS-UD seek the following:

- Urban environments that provide for the social, economic and cultural well-being and for their safety and safety now and in the future
- Planning decisions that improve housing affordability by supporting competitive land and development markets
- Regional policy statements and district plans enabling more people to live in areas of urban environments near centres or areas with employment opportunities, areas well serviced by public transport or a high demand for housing in the area
- Urban environments develop and change over time in response to diverse and changing need of people, communities and future generations
- Local authority decisions on urban development are integrates with infrastructure planning and strategic over the medium term and long

The provision of additional land for housing through rezoning of West Melton East achieves the following relevant policies of the NPS-UD:

Policy 1 – Planning decisions

The requested rezoning with an accompanying outline development plan provides the Selwyn District Council with a mechanism to make a planning decision that provides for a variety homes with larger lots adjoining Halkett Road and the State Highway. In particular the larger lot areas are one of the reasons people are attracted to West Melton. The demand for larger lots has risen following the COVID 19 nationwide lockdown. This is also coupled with the proximity West Melton has to employment in Darfield, Hornby, IZONE and the airport as well as Rolleston and Christchurch City.

West Melton has a number of community services such as West Melton Primary School, the newly constructed community centre, pre-schools, supermarket, petrol station and food and beverage outlets which will be able to support the proposed rezoned land.

With regard to resilience to likely current and future effects of climate change the primary manner in which this can be achieved within new urban development is through encouraging reduced greenhouse gas emissions. The plan change request supports reduced greenhouse gas emissions by promoting a consolidated urban form, cycle and pedestrian connectivity to community infrastructure and reduced reliance on vehicle travel as detailed below.

Consolidated Urban Form
The proposed plan change site directly adjoins the existing West Melton township. The site is not lineal nor will it give rise to any ribbon-like development pattern. The site represents a compact area which has the ability to physically connect to the existing urban area in a coherent manner from both a pedestrian and infrastructure perspective.

Proximity to Community Infrastructure
The proposed development areas are located in close proximity to key community infrastructure. This includes:

- West Melton School
- West Melton Commercial Area
- West Melton Community Centre
- Neighbourhood parks located in surrounding residential developments
- Preschools

Reduce Reliance on Vehicle Travel
The layout of the proposed development is conducive to supporting future Public Transport. The pedestrian/cycle link connection provides a route for children to walk to the nearby school and for residents to access the commercial area to the west. West Melton currently has both private and public bus services with multiple bus stops located throughout West Melton. These bus services provide a connection to Darfield and into Christchurch CBD. The private bus services are used by school children to enable them to get to school via a shared vehicle system rather than reliant on parents taking children individually into Christchurch. The widths of the primary and secondary roads provide an opportunity for a bus stop should Environment Canterbury increase the number of stops within West Melton.

West Melton is located in close proximity to a number of major employment hubs. Whether it is the Christchurch International Airport, Izone and Iport, Hornby Quadrant, Waterloo Industrial Park or Darfield, West Melton is handily placed to such areas, thereby reducing travelling time to these areas compared to other Selwyn townships.

Conclusion
The aforementioned factors which are inherent to the West Melton East area provide opportunities to reduce vehicle use and therefore greenhouse gas emissions. The factors mentioned are relevant on a predominantly local scale.

Policy 2 – Sufficient development capacity
This policy requires local authorities to provide sufficient development capacity to meet expected demand for housing over short, medium and long term. The proposed rezoning is expected to provide for somewhere in the order 130-150 lots over the next 2-3 years. Initially the timeframe to realise the total yield from West Melton East was longer (say 5 years), however since HDL acquired this land strong interest in future potential lots has been recorded.

Policy 8 – Responsiveness to plan changes
This policy requires local authority decisions to be responsive to plan changes that add significantly to development capacity and contribute to well-functioning urban environments even if the development capacity is not anticipated by current RMA documents or is out-of-sequence for planned land release.

This area is not anticipated for residential development by the both the Regional Policy Statement and the Selwyn District Plan. Map A of the Regional Policy Statement does not provide for any further residential growth in West Melton and has the infrastructure boundary around the existing West Melton township. The Selwyn District Plan zones the sites as Inner Plains which limits subdivision to a minimum of 4 hectares.

Whilst West Melton is included as part of the Greater Christchurch area it was not included as an area identified for future growth, and therefore was not part of the Our Space work for the purposes of the NPS-UDC requirements.

Policy 8 requires Selwyn District Council to be responsive to plan changes which add significant development capacity and contribute to well-functioning urban environments in situations where the development capacity is not anticipated by the current RMA documents. As mentioned above, the RPS and District Plan does not anticipate development on this site. The proposed plan change will result in the establishment of approximately 130 lots. A development of this size is considered to be significant when West Melton, based on the 2018 census data, has a population of 1,968 and 627 dwellings[1]. Based on these figures the proposed rezoning will increase the residential capacity by 20.7%. Further to the proportional significance of the plan change, the plan change represents a significant contributor to the capacity of lower density lots within the Selwyn District. West Melton has a defined residential character that is precluded from being replicated elsewhere due to the existing zoning and planning framework.

The sites subject to the rezoning adjoin existing residential areas. The ODP provides for a pedestrian and cycle link connection to the Gainsborough subdivision to the west. This connection directs users into the proposed recreation reserve which is considered to be a focal point of the development.

Draft National Policy Statement for Highly Productive Land

A discussion document on a proposed National Policy Statement on Highly Productive Land was released in August 2019. Its purpose is to:

- Recognise the full range and values and benefits associated with the use of highly productive land for primary production
- Maintain it availability for primary production for future generations and
- Protect highly productive land from inappropriate subdivision, use and development

The NPS is primarily directed at regional policy statements and district plans.

Proposed Policy 1 of the NPS requires regional councils within 3 years of the NPS coming into effect to identify areas of highly productive land based on specific criteria based primarily on:

- capability and versatility based on the Land Use Capability classification system
- suitability of the climate for primary production
- the size and cohesiveness of the area of land to support primary production.

At its most basic level it appears that Land Use Capability Classes 1, 2 and 3 will be included.

[1] Note: These figures are based on the Meshblock data which may include land outside the township of West Melton.

The policy lists problems that need to be solved including urban expansion onto highly productive land. In relation to this issue the document contains proposed Objective 3 which states:

> ***Objective 3: Protecting from inappropriate subdivision, use and development***
> *To protect highly productive land from inappropriate subdivision, use and development, including by:*
> - *avoiding subdivision and land fragmentation that compromises the use of highly productive land for primary production;*
> - *avoiding uncoordinated urban expansion on highly productive land that has not been subject to a strategic planning process; and*
> - *avoiding and mitigating reverse sensitivity effects from sensitive and incompatible activities within and adjacent to highly productive land.*

As assessed in relation to the effects of development on versatile soils the West Melton East site contains Eyre stony loam soils. These soils have limited ability to retain moisture and are considered to have severe limitation for food production even with irrigation.

With regard to the proposed Objective 3, the soil on the site would not be regarded as highly productive land, both because the soils have poor water retention and so would not support viable intensive production.

Importantly Objective 3 specifically refers to highly productive soils being protected by avoiding "uncoordinated urban expansion on highly productive land that has not been subject to a strategic planning process". The Land use Classification for the sites subject to rezoning is LUC3. This class is not considered to comprise versatile soils.

6.2 Regional Policy and Plans

- Canterbury Regional Policy Statement
- Iwi Management Plan

Canterbury Regional Policy Statement 2013

Chapter 5 – CRPS

The Selwyn District Plan is required under Section 73(4) of the Resource Management Act to give effect to the Canterbury Regional Policy Statement 2013 (CRPS). Any proposed change to the District Plan must also give effect to the CRPS. Section 74(2) of the Act also requires territorial authorities to have regard to any proposed regional policy statement when preparing or changing a district plan.

The CRPS provides guidance on matters relevant to the growth of settlements within the region. Chapter 5 of the CRPS addresses concerns resulting from land use and infrastructure on a region wide basis, and the objectives and policies of this chapter seek to ensure that development and growth does not have an adverse effect on the environment.

The objectives and policies in Chapter 5 of the CRPS 2013 seek to promote urban and rural-residential developments that have regard to the efficient use and development of resources while ensuring that any adverse effects on the environment are avoided, remedied or mitigated. Consolidation and integration with existing infrastructure is promoted, whilst ensuring that regionally significant infrastructure and the strategic transport network are not adversely impacted by any new development. The relevant objectives and assessment of the proposal in relation to these are set out below:

CHAPTER 5- LAND-USE AND INFRASTRUCTURE

5.2 OBJECTIVES

5.2.1 Location, design and function of development (Entire Region)

Development is located and designed so that it functions in a way that:

1. *achieves consolidated, well designed and sustainable growth in and around existing urban areas as the primary focus for accommodating the region's growth; and*
2. *enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety; and which:*
   - a. *maintains, and where appropriate, enhances the overall quality of the natural environment of the Canterbury region, including its coastal environment, outstanding natural features and landscapes, and natural values;*
   - b. *provides sufficient housing choice to meet the region's housing needs;*
   - c. *encourages sustainable economic development by enabling business activities in appropriate locations;*
   - d. *minimises energy use and/or improves energy efficiency;*
   - e. *enables rural activities that support the rural environment including primary production;*
   - f. *is compatible with, and will result in the continued safe, efficient and effective use of regionally significant infrastructure;*
   - g. *avoids adverse effects on significant natural and physical resources including regionally significant infrastructure, and where avoidance is impracticable, remedies or mitigates those effects on those resources and infrastructure;*
   - h. *facilitates the establishment of papakāinga and marae; and*
   - i. *avoids conflicts between incompatible activities.*

Objective 5.3.7 Strategic land transport network and arterial roads (Entire Region)

In relation to strategic land transport network and arterial roads, the avoidance of development which:

1. *adversely affects the safe efficient and effective functioning of this network and these roads, including the ability of this infrastructure to support freight and passenger transport services; and*
2. *in relation to the strategic land transport network and arterial roads, to avoid development which forecloses the opportunity for the development of this network and these roads to meet future strategic transport requirements.*

Assessment:

The proposed plan change area provides for a particular housing choice that is not readily available within Selwyn, particularly in respect to vacant land and new builds. The area maintains a coherent pattern of development and retains a consolidated urban form around the West Melton township.

The plan change area provides for a housing type and density that is consistent with the current township and provides living options that are well-located to major employment hubs. The area lies outside of CIAL air noise contours, yet provides a desirable housing alternative for employees at the airport and other major employers within close proximity.

Chapter 6 CRPS

Chapter 6 was included in the Regional Policy Statement in2013 having been incorporated from the Land Use Recovery Plan developed in response to the Canterbury earthquakes. Specifically it "*provides a resource management framework for the recovery of Greater Christchurch to enable and support earthquake recovery and rebuilding including restoration and enhancement through to 2028"*. A key focus of Chapter 6 was to respond to the anticipated demand for business and residential activities which needed to be replaced or relocated as a result of the earthquakes. To a large extent this recovery has occurred in relation to provision and uptake of identified (and now zoned) land for business and residential activities impacted by the earthquakes. Accordingly, it is considered that the objectives and policies in Chapter 6 need to be applied and evaluated recognizing that Greater Christchurch has moved on from only responding to the direct impacts of

the earthquakes. In particular there is ongoing demand for residential land for housing due to population growth. Whilst a lot of the demand is from first home buyers, some of this demand is from existing homeowners who want larger sections to what is currently offered in the market.

With reference to urban areas generally, the Canterbury Regional Policy Statement generally seeks to ensure that urban growth occurs in such a manner as to achieve consolidation and avoid unnecessary sprawl. The Plan Change area sits outside the urban limits of Greater Christchurch, as indicated in the Regional Policy Statement. Furthermore the proposed development is not located within the existing township of West Melton. It is not contained within an area identified as Residential Greenfield Priority in Chapter 6 of the RPS. The RPS specifically references West Melton in Objective 6.2.2 Urban Form and Settlement, stating that the objective seeks to encourage sustainable and self-sufficient growth and consolidation of the existing settlement of West Melton. While the plan change area is not located within the existing settlement of West Melton the area is adjoining the existing township and based on the Infrastructure report can be adequately serviced.

Policy 6.3.1 Development within the Greater Christchurch area

In relation to recovery and rebuilding for Greater Christchurch:

1. *give effect to the urban form identified in Map A, which identifies the location and extent of urban development that will support recovery, rebuilding and planning for future growth and infrastructure delivery;*
2. *give effect to the urban form identified in Map A (page 6-27) by identifying the location and extent of the indicated Key Activity Centres;*
3. *enable development of existing urban areas and greenfield priority areas, including intensification in appropriate locations, where it supports the recovery of Greater Christchurch;*
4. *ensure new urban activities only occur within existing urban areas or identified greenfield priority areas as shown on Map A, unless they are otherwise expressly provided for in the CRPS;*
5. *provide for educational facilities in rural areas in limited circumstances where no other practicable options exist within an urban area;*
6. *provide for a metropolitan recreation facility at 466-482 Yaldhurst Road; and*
7. *avoid development that adversely affects the function and viability of, or public investment in, the Central City and Key Activity Centres.*

Assessment Policy 6.3.1:

The Plan Change area is not located within an area identified in Map A and therefore does not comply with the above policy.

Objective 6.2.3 Sustainability

Recovery and rebuilding is undertaken in Greater Christchurch that:

1. *provides for quality living environments incorporating good urban design;*
2. *retains identified areas of special amenity and historic heritage value;*
3. *retains values of importance to Tāngata Whenua;*
4. *provides a range of densities and uses; and*
5. *is healthy, environmentally sustainable, functionally efficient, and prosperous*

Assessment Objective 6.2.3:

The Assessment of Environmental Effects in the Plan Change Request document addresses the matters of good urban design, densities and uses and the adoption of sustainable infrastructure services. It is assessed that implementation of the requested Plan Change will give effect to this Objective.

Policy 6.2.4 Integration of transport infrastructure and land use

Prioritise the planning of transport infrastructure so that it maximises integration with the priority areas and new settlement patterns and facilitates the movement of people and goods and provision of services in Greater Christchurch, while:

1. *managing network congestion;*
2. *reducing dependency on private motor vehicles;*
3. *reducing emission of contaminants to air and energy use;*
4. *promoting the use of active and public transport modes;*
5. *optimising use of existing capacity within the network; and*
6. *enhancing transport safety.*

Assessment Policy 6.2.4:

This policy is not directly relevant to the Plan Change request. The Transport report discusses the roading network of the plan change area. A pedestrian/cycle connection has been included in the ODP to connect to the residential subdivision to the west providing integration where possible.

Policy 6.3.2 Development form and urban design

Business development, residential development (including rural residential development) and the establishment of public space is to give effect to the principles of good urban design below, and those of the NZ Urban Design Protocol 2005, to the extent appropriate to the context:

1. *Tūrangawaewae – the sense of place and belonging – recognition and incorporation of the identity of the place, the context and the core elements that comprise the Through context and site analysis, the following elements should be used to reflect the appropriateness of the development to its location: landmarks and features, historic heritage, the character and quality of the existing built and natural environment, historic and cultural markers and local stories.*
2. *Integration – recognition of the need for well-integrated places, infrastructure, movement routes and networks, spaces, land uses and the natural and built environment. These elements should be overlaid to provide an appropriate form and pattern of use and development.*
3. *Connectivity – the provision of efficient and safe high quality, barrier free, multimodal connections within a development, to surrounding areas, and to local facilities and services, with emphasis at a local level placed on walking, cycling and public transport as more sustainable forms of*
4. *Safety – recognition and incorporation of Crime Prevention Through Environmental Design (CPTED) principles in the layout and design of developments, networks and spaces to ensure safe, comfortable and attractive places.*
5. *Choice and diversity – ensuring developments provide choice and diversity in their layout, built form, land use housing type and density, to adapt to the changing needs and circumstances of the population.*
6. *Environmentally sustainable design – ensuring that the process of design and development minimises water and resource use, restores ecosystems, safeguards mauri and maximises passive solar gain.*
7. *Creativity and innovation – supporting opportunities for exemplar approaches to infrastructure and urban form to lift the benchmark in the development of new urban areas in the Christchurch region.*

Policy 6.3.3 Development in accordance with outline development plans

Development in greenfield priority areas and rural residential development is to occur in accordance with the provisions set out in an outline development plan or other rules for the area. Subdivision must not proceed ahead of the incorporation of an outline development plan in a district plan. Outline development plans and associated rules will:

1. *Be prepared as:*
    a. *a single plan for the whole of the priority area; or*
    b. *where an integrated plan adopted by the territorial authority exists for the whole of the priority area and the outline development plan is consistent with the integrated plan, part of that integrated plan; or*
    c. *a single plan for the whole of a rural residential area; and*

2. *Be prepared in accordance with the matters set out in Policy 6.3.2;*
3. *To the extent relevant show proposed land uses including:*
    a. *Principal through roads, connections with surrounding road networks, relevant infrastructure services and areas for possible future development;*
    b. *Land required for community facilities or schools;*
    c. *Parks and other land for recreation;*
    d. *Land to be used for business activities;*
    e. *The distribution of different residential densities, in accordance with Policy 6.3.7;*
    f. *Land required for stormwater treatment, retention and drainage paths;*
    g. *Land reserved or otherwise set aside from development for environmental, historic heritage, or landscape protection or enhancement;*
    h. *Land reserved or otherwise set aside from development for any other reason, and the reasons for its protection from development;*
    i. *Pedestrian walkways, cycleways and public transport routes both within and adjoining the area to be developed;*
4. *Demonstrate how Policy 6.3.7 will be achieved for residential areas within the area that is the subject of the outline development plan, including any staging;*
5. *Identify significant cultural, natural or historic heritage features and values, and show how they are to be protected and/or enhanced;*
6. *Document the infrastructure required, when it will be required and how it will be funded;*
7. *Set out the staging and co-ordination of subdivision and development between landowners;*
8. *Demonstrate how effective provision is made for a range of transport options including public transport options and integration between transport modes, including pedestrian, cycling, public transport, freight, and private motor vehicles;*
9. *Show how other potential adverse effects on and/or from nearby existing or designated strategic infrastructure (including requirements for designations, or planned infrastructure) will be avoided, remedied or appropriately mitigated;*
10. *Show how other potential adverse effects on the environment, including the protection and enhancement of surface and groundwater quality, are to be avoided, remedied or mitigated;*
11. *Show how the adverse effects associated with natural hazards are to be avoided, remedied or mitigated as appropriate and in accordance with Chapter 11 and any relevant guidelines; and*
12. *Include any other information that is relevant to an understanding of the development and its proposed zoning.*

Assessment Policy 6.3.2 and 6.3.3

The urban design approach and elements detailed in the Outline Development Plan have been assessed in Section 5.10 and Appendix E of the AEE accompanying this Plan Change request. This assessment concludes that areas to be rezoned will achieve a high level of amenity and efficiency for residents and for the neighbourhood and accordingly it is considered that the Plan Change will give effect to Policies 6.3.2 and 6.3.3.

Policy 6.3.5 Integration of land use and infrastructure

Recovery of Greater Christchurch is to be assisted by the integration of land use development with infrastructure by:

1. *Identifying priority areas for development to enable reliable forward planning for infrastructure development and delivery;*
2. *Ensuring that the nature, timing and sequencing of new development are co-ordinated with the development, funding, implementation and operation of transport and other infrastructure in order to:*
    a. *optimise the efficient and affordable provision of both the development and the infrastructure;*
    b. *maintain or enhance the operational effectiveness, viability and safety of existing and planned infrastructure;*
    c. *protect investment in existing and planned infrastructure; and*
    d. *ensure new development does not occur until provision for appropriate infrastructure is in place;*

3. *Providing that the efficient and effective functioning of infrastructure, including transport corridors, is maintained, and the ability to maintain and upgrade that infrastructure is retained;*
4. *Only providing for new development that does not affect the efficient operation, use, development, appropriate upgrading and safety of existing strategic infrastructure, including by avoiding noise sensitive activities within the 50dBA Ldn airport noise contour for Christchurch International Airport, unless the activity is within an existing residentially zoned urban area, residential greenfield area identified for Kaiapoi, or residential greenfield priority area identified in Map A (page 6-28); and*
5. *Managing the effects of land use activities on infrastructure, including avoiding activities that have the potential to limit the efficient and effective, provision, operation, maintenance or upgrade of strategic infrastructure and freight hubs.*

Assessment of Policy 6.3.5

The proposed plan change area is located outside of the air noise contours and will have no impact on the efficient and effective functioning of infrastructure. No major infrastructure upgrades are required to accommodate the plan change area, with existing infrastructure and modern design initiatives able to be utilised to service the proposed new area.

The area will benefit from planned upgrades to the local traffic network and speed limit changes, and it is likely the area can be factored into upgrades to achieve improved outcomes above those already anticipated.

Policy 6.3.7 Residential location, yield and intensification

1. *In relation to residential development opportunities in Greater Christchurch:*
2. *Subject to Policy 5.3.4, residential greenfield priority area development shall occur in accordance with Map A. These areas are sufficient for both growth and residential relocation through to 2028.*
3. *Intensification in urban areas of Greater Christchurch is to be focused around the Central City, Key Activity Centres and neighbourhood centres commensurate with their scale and function, core public transport routes, mixed-use areas, and on suitable brownfield land.*
4. *Intensification developments and development in greenfield priority areas shall achieve at least the following residential net densities averaged over the whole of an ODP area (except where subject to an existing operative ODP with specific density provisions):*
5. *10 household units per hectare in greenfield areas in Selwyn and Waimakariri District;*
6. *15 household units per hectare in greenfield areas in Christchurch City;*
7. *Intensification development within Christchurch City to achieve an average of:*
8. *50 household units per hectare for intensification development within the Central City;*
9. *30 household units per hectare for intensification development elsewhere.*
10. *Provision will be made in district plans for comprehensive development across multiple or amalgamated sites.*
11. *Housing affordability is to be addressed by providing sufficient intensification and greenfield priority area land to meet housing demand during the recovery period, enabling brownfield development and providing for a range of lot sizes, densities and appropriate development controls that support more intensive developments such as mixed use developments, apartments, townhouses and terraced housing.*

Assessment of Policy 6.3.7

The Plan Change area is not located within an area identified in Map A and therefore does not comply with the above policy.

Conclusion:

Section 61(1) of the RMA specifically requires regional policy statements to be prepared and changed "in accordance a national policy statement." The National Policy Statement – Urban Development specifically acknowledges that there will inevitably be delays in RMA planning

documents recognizing and providing for sufficient development capacity as required by the NPS. It then provides a means to overcome temporary inconsistences between regional policy statements (and other planning documents) and plan changes providing for significant development capacity and contributing to well-functioning urban environments. This means is Policy 8 of the NPS-UD. Effectively Policy 8 softens the requirement in Section 75 of the RMA requiring district plans to give effect to all aspects the regional policy statements and other planning document which do not reflect the NPS-UD. This approach reinforces the RMA requirement that national policy statements are the highest level planning documents and that where there is inconsistently between planning documents national policy statements are predominant. Accordingly the Council is required to be responsive to this proposed plan change which is consistent with the requirements of the NPS-UD despite it being inconsistent with the CRPS in relation to the location of new greenfield areas.

Mahaanui - Iwi Management Plan, 2013

The Mahaanui Iwi Management Plan (IMP) sets out Ngāi Tahu's objectives, issues and policies for natural resource and environmental management within the area bounded by the Hurunui River in the north and the Ashburton River in the south. Under Section 74(2A) of the Resource Management Act, a territorial authority must take into account any such plan to the extent that it has a bearing on the resource management issues of the district. The IMP is primarily a tool for the Rūnanga in the area it covers; the plan also provides guidance to territorial authorities and others. The IMP sets out the broad issues as well as the specifics for particular areas. These matters are considered below, as they are relevant to this proposed Plan Change. It is noted that the IMP does not identify any specific cultural values associated with this land that might be adversely impacted by its development.

Ranginui

The relevant matters identified in IMP are discharges to air and the protection of night time darkness. The proposed Plan Change does not contain controls on these matters. The main discharge to air that could occur through this proposal is the establishment of log burners or similar within individual houses. Such discharges are controlled by Environment Canterbury through the Regional Air Plan. West Melton currently has regulatory requirements to reduce the impact on the night sky. The proposed Plan Change will not alter this and it is considered these rules will apply to the plan change site.

Wai Māori

Freshwater is of considerable cultural significance to Rūnanga. The main matters of concern relate to water quality and quantity and mixing waters from different waterbodies. The land to be rezoned does not contain any waterways. With the reticulation of effluent disposal from the proposed new dwellings the potential from adverse impacts on groundwater quality are limited. The site will also be connect to a Council water supply, which is more efficient way to service the development than through a separate well or wells. Stormwater generated by the new road will be treated and disposed of through swales or alternative treatment methods, ensuring that no untreated stormwater will reach the water race or groundwater which is at least 21m-24m below ground level. Roof stormwater will be disposed of straight to ground as is commonplace in West Melton. All of these aspects of the development combine to ensure that there will be minimum adverse impact on the freshwater quality or quantity within this locality.

Papatūānuku

The use of land and how it is developed is of importance to Rūnanga. This section identifies matters such as the urban planning, the subdivision and development of land, stormwater, waste management, and discharges to land. The potential effects of the proposal on the environment have been discussed in Section 5 of this proposed Plan Change. That assessment concludes that there will minimal adverse impacts on the quality of the natural environment as no waste or

contamination will be discharged in a manner that will compromise the mauri of surface or groundwater.

Tāne Mahuta

This section addresses the significance of indigenous biodiversity and mahinga kai to Rūnanga. The application site is not located in a known mahinga kai area. The subject land has been used for farming purposes since 1900s, and contains substantial plantings in and around the site, the majority of which are exotic in nature. The majority of these plantings are expected to be removed, however the street and reserve plantings will be dominated by native species which are well suited to the area. From experience with other residential developments, property owners will take a lead from this approach and use native plants from local nurseries as a major component of their landscaping.

Ngā Tūtohu Whenua

There are no known wāhi tapu, wāhi taonga or mahinga kai sites within the application site or close by.

Te Waihora

The application site sits with the catchment of Te Waihora. The main matters of concern within this area relate to the management of water and waterways within the Te Waihora catchment, and the subsequent impact that can have on the water quality of Te Waihora and its environment. The proposal does not involve an activity that could adversely impact on the lake and its environmental and cultural values.

Summary

It is considered that overall the proposal will not have an adverse impact on the cultural values of iwi as set out within IMP.

6.3 District Policy and Plans

- Selwyn District Plan
- District Development Strategy 2031

Assessment of Selwyn District Plan Township Section Objectives and Polices

Township Section Part B1 Natural Resources

Objective B1.1.1 and Policy 1.1.3 seek to limit the effects on people from contaminated soils, primarily through avoiding the exposure of people to contaminated soils. Site Investigations have been undertaken, and minor contamination identified which will be remediated at the time of subdivision.

Objective B1.1.2 seeks to ensure that new activities undertaken within the rural area do not create shortages of land or soil resources for other activities. This is implemented through Policy B1.1.8 which directs avoiding the zoning of land which contains versatile soils for other activities, such as new residential development. In considering this objective and policy, it is noted that versatile soils are defined not in the District Plan, however they are defined in the Canterbury Regional Policy Statement 2013 as being soils with a Land Use Capability (LUC) class of 1 or 2. Information obtained from Landcare Research's New Zealand Land Resource Inventory identifies that this site as LUC3. This class is not considered to comprise versatile soils. Given this, it is considered that the residential use of this land is appropriate and in keeping with the above objective and policy.

Objective B1.2.1 seeks to ensure that the expansion of townships either maintains or enhances the quality of ground or surface water resources within the District, while Objective 1.2.2 is directed

towards ensuring activities do not adversely impact on water resources. The policies that implement these objectives provide direction on the provision of water supplies at both an individual lot and township level. They also require the provision of effluent and stormwater disposal systems that avoid adverse effects on the quality of ground water. The details of the infrastructure to be provided is set out in Section 3.2 of this report and discussed in more detail in the attached Infrastructure Report (Appendix A). This infrastructure will ensure that the development of West Melton East occurs in a manner sought by these objectives.

The objectives and policies within parts B1.3 Ecosystems and B1.4 Outstanding Natural and Landscapes are not considered to be relevant to the consideration of this proposal.

Township Section Part B2 Physical Resources

The objectives and policies within Part B2.1 Transport Networks address the issues of the integration of land use and transport, ensuring a safe and efficient transport network, the provision for the future transport network and managing the effects of activities on the transport network and vice versa. The ODP provides a comprehensive road network scheme that will ensure they are integrated with the surrounding environment, as best as possible due to the layout of the subdivision to the east. This will be achieved by providing for future connections to existing residential land that is either adjoining or is opposite one of the boundary roads. The overall layout will ensure the safety, permeability and accessibility for vehicles, pedestrians and cyclists. These aspects of the proposal are consistent with the outcomes sought by the objectives and policies within Part B2.1 Transport Networks.

The West Melton East site will be supplied with a reticulated water and effluent disposal as well connections to the power and telecommunications networks in West Melton. The provision of this infrastructure to the development is consistent with the outcomes sought by the objectives and policies in Part B2.2 Utilities.

Objectives B2.3.1 and B2.3.2 and their associated policies address the provision of community facilities and reserves within townships. The community facility provided for within this plan change area is the reserve and the pedestrian / cycle connection into the residential subdivision to the east. These networks are being provided in accordance with the ODP prepared for this development. This aspect of proposal is in keeping with the Objective B2.3.1 and B2.3.2 and their associated policies.

Part B2.4 Waste Disposal addresses the matters of solid waste and reducing waste within the townships of the Selwyn District. For residential development such as this, is achieved primarily through the provision of a solid waste collection and disposal service. It is anticipated that as this area is developed, that the Council's collection system will be expanded. With the provision of this service and access to the Pines Resource Recovery Park, the matters address within Part B2.4 are provided for.

Township Section Part B3 People's Health, Safety and Values

Part B3.1 Natural Hazards address the issues associated with various natural hazards that can occur within the District, including earthquake and flooding. West Melton East is not located within an area prone to flooding, and is also not located close to any known fault. This matter has been assessed in Section 3.2, which concluded the development is unlikely to result in an increase in natural hazard risk for future residents or for residents of surrounding land. Given this it is considered that the outcomes sought by the objectives and policies within Part B3.1 Natural Hazards are achieved for this development.

Parts B3.2 Hazardous Substances and B3.3 Culture and Historic Heritage objectives and policies are not considered to be relevant to this proposal.

The objectives B3.4.1 to B3.4.3 of B3.4 Quality of the Environment address the issues associated with ensuring that the townships are pleasant places to work and live and provide for a range of activities to occur. The objectives seek to ensure that the character and amenity of zones is maintained and that reverse sensitivity effects between activities are avoided. West Melton East has been designed comprehensively to ensure that a pleasant living environment is provided for future residents. The allotments that will be created will be of a size anticipated for the Living West Melton Medium Density zone.

Objectives B3.4.4 addresses the growth of townships and seeks to achieve a compact form that provides for a range of living environments and housing choices. The ODP identifies areas suitable for low density and medium density development. The Living West Melton framework within the District Plan ensures a variety of lot sizes, areas and shapes can be provided within low and medium density areas. The density requirements along with the rules framework allow a range of living environments and housing choice to be achieved. In this regard the development will be consistent with and implements this objective.

Objective B3.4.5 requires that the growth of townships provides a high level of connectivity both within the new developments and with adjoining areas, and enables access to a variety of forms of transport. The ODP provides for two road connection points to the north and south of the site and a pedestrian / cycle link to the Gainsborough subdivision to the west of the plan change site. There is no ability for a road connection from the west due to the layout of the Gainsborough subdivision. The ODP has provided for future road connections to adjoining land to the east, enabling a variety of transport forms to be used by future residents. Future subdivision designs will implement these ODPs thus satisfying this objective.

The policies of relevance that implement the objectives within B3.4 Quality of Environment are B3.4.1 and B3.4.3. The implementation method sought by these policies to achieve the objectives is through zoning. This is what this requested Plan Change is seeking with its proposed rezoning of the land to Living West Melton, including the provision of medium density housing.

Township Section Part B4 Growth of Townships

Objectives B4.1.1 and B4.1.2 seek a range of living environments, including the provision of medium density areas, that provide a high quality of living and that the new areas are pleasant places to live. The proposal will ensure that West Melton continues to provide for a range of living environments. The plan change area will continue to be a pleasant place to live and will contribute to the character and amenity of West Melton and will be in keeping with the existing nature and form of the residential development within West Melton.

The most relevant policy is Policy B4.1.1 which provides for a range of allotments sizes within living zones. The proposal will ensure that West Melton continues to provide for a range of living environments.

The objectives and policies within B4.2 Subdivision of Land address the issues relating to subdivision and ensuring the resulting development is fit for purpose. At this stage only rezoning is being sought by this Plan Change, however the ODP has been carefully designed with the ultimate subdivision in mind and have focussed on creating a high level of amenity to support the density of development being supplied. It is anticipated that on the basis of the ODP that there will be very limited rear allotments developed. This stage is part of an overall master planned development which achieves the outcomes prescribed within this policy. The location of reserves, roading layout

and facilities such as cycle paths proposed will all be in accordance with the ODP discussed with the Selwyn District Council for this area. By virtue of the inclusion of medium density lots into this area of the ODP, the proposed development is implements and is consistent with the objectives and policy with part B4.2 Subdivision of Land.

Part B4.3 Residential and Business Development contains the primary objectives and policies that enable the growth of townships within the District. Objective B4.3.1 outlines that the type of effects that should be avoided when the expansion of townships occurs. The impact of this proposal on natural and physical resources and the amenity values of the township has been discussed in relation to the objectives and policies within Parts B1 Natural Resources, B2 Physical Resources and B3 Quality of the Environment. The conclusion of that assessment is that the development of West Melton East is generally consistent with those objectives and policies, and as such is consistent with Objective B4.3.1.

Objective B4.3.3 requires new residential development within townships in the Greater Christchurch area to be provided within existing zoned land or priority areas identified in the Regional Policy Statement (RPS). Any such development is to be general accordance with an operative ODP. The West Melton East area is not located within an existing zoned area or one that is identified as a priority area in the current CRPS. As such the proposed plan change is inconsistent with this objective. Notwithstanding this, the NPS-UD is a higher order document and therefore where there is inconsistency between planning documents, national policy statements are must be given more weight.

Objective B4.3.4 directs that new areas of residential development should support the timely, efficient and integrated provision of infrastructure. The plan change area can be appropriately serviced with reticulation as discussed in Section 3.2.

Objective B4.3.5 directs that sufficient land is available to accommodate that anticipated household growth within the District between 2013 and 2028 through both Greenfield growth areas and consolidation within existing townships.

Policies B4.3.1, B4.3.3, and B4.3.4 manage residential growth through zoning and the use of ODPs to ensure a compact shape in a manner that avoids surrounding rural zoned land with urban development, and encourages the use of existing zoned land.

Policy B4.3.8 sets out the requirements that must be contained within any Outline Development Plan included in the District Plan. These matters include but are not limited to the identification of roads and connections to surrounding lands, land for schools, parks and similar facilities, the distribution of different residential densities across the ODP area. The ODP proposed as part of the Plan Change has been prepared to comply with the requirements of this policy.

Overall, in considering the objectives and policies of the Township Section of the District Plan, it is considered that the requested rezoning meets the outcomes sought for new residential areas.

Assessment of Selwyn District Plan Rural Section Objectives and Polices

Given the current Rural zoning of the site, it is considered appropriate that an assessment is made of the relevant rural objectives and policies.

Rural Section Part B1 Natural Resource, B2 Physical Resources and B3 People's Health, Safety and Values

The objectives and policies of these two sections of the District Plan similar matters to those contained within the Township section. The conclusions reached in the assessment of the Township

objectives and policies that the development of this land is appropriate and is generally consistent with the outcomes sought also applies here. As such it is not considered necessary to repeat that assessment.

The only matter of relevance not considered within Section 4.3.2 above relates to the matter of reverse sensitivity effects, addressed by Objective B3.4.2 and Policies B3.4.20 to B3.4.22. This objective and its policies seek to ensure that new activities do not give rise to any reverse sensitivity effects. For reverse sensitivity effects to arise, there must be an effect from a permitted activity that would give cause for complaints to occur that could impact on the ability for that permitted activity to operate. Typically, within rural areas this arises from horticultural and viticultural activities, intensive farming (such as poultry and pig farms) and quarrying. Aerial photography and site visits to the surrounding land indicate that the primary use of this area is for the rural living and arable use, primarily the grazing of animals. Arable farming is typically not an activity associated with reverse sensitivity effects. Given this environment it is considered unlikely that any reverse sensitivity effects will arise from the granting of this development.

Rural Section Part B4 Growth of Rural Area

The objectives and the policies that implement Rural Section Part B4 seek to ensure that the rural area maintains an overall low residential density that is consistent with the character of the area and avoids adverse effects on the environment including reverse sensitivity. Residential development at the density sought by the requested rezoning to Living West Melton clearly conflicts with the low residential densities typically found within the Rural Inner Plains Zone but is principally a distinction bought about by the fact that rezoning follows the change to the CRPS Greater Christchurch settlement pattern. Although the rezoning is inconsistent with this aspect of these objectives and policies, it is consistent with the overriding national and regional policy statements relating to providing for future growth of urban areas.

The conclusions reached within the above assessment are that the proposed plan change is generally consistent with the outcomes sought by the relevant objectives and policies relating to natural and physical resources. Similarly, the proposal is unlikely to result any reserve sensitivity effects. As such the development while not consistent with the low density sought for the rural area does support the other outcomes sought by these objectives and policies.

District Development Strategy 2031

This Strategy was finalised in 2014 and was working with the population estimates and capacity assessments available at this time. This indicated that there was a trend leading to an 80/20 split of total population growth, where 80% of growth throughout the district will occur within identified urban boundaries. Further there was also an 80/20 split of urban population growth, where 80% will occur within the metropolitan Greater Christchurch area, comprising Rolleston, Lincoln, Prebbleton and West Melton township. From this data analysis Selwyn 2031 puts forward three key growth concepts being:

- establishment of a township network, which provides a support framework for managing the scale, character and intensity of urban growth across the whole district;
- establishment of an activity centre network, which provides a support framework for managing the scale and intensity of business areas throughout the district townships;
- encouraging self-sufficiency at a district-wide level.

With regard to urban expansion the Strategy seeks provision of sufficient zoned land to accommodate projected household and business growth to assist earthquake recovery within the Greater Christchurch area.

7 Statutory Requirements of Section 32 of the Act

Before a proposed Plan Change is publicly notified an evaluation must be carried out by the person making the request. The evaluation, carried out under Section 32 of the Resource Management Act, must examine:

(a) the extent to which each objective is the most appropriate way to achieve the purpose of the Act; and

(b) whether, having regard to their efficiency and effectiveness, the policies, rules, or other methods are the most appropriate for achieving the objectives.

The evaluation is required to take into account:

- The benefits and costs of policies, rules, or other methods; and
- The risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the policies, rules, or other methods.

Specifically Section 32(2) requires identification and assessment of benefits and costs of the environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions including opportunities for:

- Economic growth that are anticipated to be provided or reduced; and
- Employment that are anticipated to be provided or reduced

The Guidance Note on Section 32 analysis on the Quality Planning website makes the following statement:

> ***Appropriateness*** *- means the suitability of any particular option in achieving the purpose of the RMA. To assist in determining whether the option (whether a policy, rule or other method) is appropriate the* ***effectiveness*** *and* ***efficiency*** *of the option should be considered:*
>
> - ***Effectiveness*** *- means how successful a particular option is in addressing the issues in terms of achieving the desired environmental outcome.*
> - ***Efficiency*** *- means the measuring by comparison of the benefits to costs (environmental benefits minus environmental costs compared to social and economic costs minus their benefits).*

In this case it is the appropriateness of rezoning rural land for residential use that needs to be examined.

7.1 Objectives and Policies of the Selwyn District Plan

As the Proposed Plan Change does not seek to alter any objectives or policies of the Selwyn District Plan, the examination under Section 32(3)(a) of whether the objectives of the District Plan are the most appropriate way of achieving the purpose of the Resource Management Act is not required. This is because as the District Plan is operative it is assumed that the objectives are the most appropriate way to achieve the purpose of the Act. Similarly, it is assumed that as no policies are proposed to be altered, that they are the most appropriate means of achieving the objectives of the District Plan.

Although an assessment of the appropriateness of the objectives and policies of the Plan is not required, it is worthwhile to consider the proposed Plan Change against the proposed objectives and policies contained within the Selwyn District Plan relating to providing for urban growth. A detailed assessment of these objectives and policies has been undertaken in Section 6.3 of this assessment and it concludes that requested rezoning meets the outcomes sought for urban growth and new residential areas.

Overall it is considered that the Proposed Plan Change is consistent with the strategic outcomes sought for residential development by Selwyn District Council. Additionally the resulting amenity is considered to be consistent with the outcomes required under the District Plan.

Given the conclusions within Section 6.3 on the effects of the proposal on the environment and the above assessment, the proposed rezoning is considered to be an appropriate means of achieving the outcomes sought by the objectives and policies of the District Plan.

7.2 Assessment of the Benefits and Costs of the Proposed Change

In order to determine the effectiveness and efficiency of the proposed rezoning, an assessment of the benefits and costs of the proposed Plan Change, together with an examination of the risks of acting or not acting based on the information provided is required. In order to determine the relative benefits and costs of the proposed change, options other than the proposal should also be examined. In terms of this proposal the options considered are:

- Option 1 – Leave the area zoned Rural
- Option 2 – Rezone the land as Living West Melton by private plan change
- Option 3 – Wait for Council to rezone land as Living West Melton
- Option 4 – Apply for resource consent for proposed subdivision and development

The following is an assessment of these options.

Benefits and Costs of Option 1 – Leave the area zoned Rural

Benefits/Advantages	Costs/Disadvantages
• Maintains the existing character of the area. •	• Does not fulfil the District Plan's objective of an equitable process to rezoning land. • Reduces the level of choice for potential purchasers of residential allotments. • Does not contribute to the cost of existing reticulation of services.

Benefits and Costs of Option 2 - Rezoning land as Living West Melton by private plan change

Benefits/Advantages	Costs/Disadvantages
• Implements Policy 8 of the National Policy Statement for Urban Development • The area is not dependent on the development of other land to provide access or infrastructure, such as stormwater disposal. • Provides an alternative for prospective purchasers of residential allotments within Selwyn District and elsewhere. • Economic benefit to Council from larger rating base through additional properties	• Loss of rural land for productive purposes. • Change in character of the area from rural to residential. • Increase in traffic generated within and around Rolleston. • Does not take into account other land that may be suitable to provide for growth • The plan change is not anticipated by the RPS or the District Plan and therefore is out of sequence for planned land release.

Benefits/Advantages	Costs/Disadvantages
being added upon subdivision, and the payment of development contributions for new infrastructure • Provides long-term certainty for the developer, potential purchasers and surrounding land owners as to the use of the land. • Supports existing Council reticulated services, e.g. sewer system and water supply. • Costs of assessments and development of ODP falls on the developer, not the Council.	

Benefits and Costs of Option 3 – Wait for Council to rezone land as Living West Melton

Benefits/Advantages	Costs/Disadvantages
• The area is not dependent on the development of other land to provide access or infrastructure, such as stormwater disposal. • Provides an alternative for prospective purchasers of a specific type of residential allotment within Selwyn District and elsewhere. • Economic benefit to Council from larger rating base through additional properties being added upon subdivision, and the payment of development contributions for new infrastructure. • Provides long-term certainty for the developer, potential purchasers and surrounding land owners as to the use of the land. • Supports existing Council reticulated services, e.g. sewer system and water supply.	• Could result in uncertainty and delay regarding rezoning for urban growth as Council has indicated it does not want to be directly involved in rezoning land. • Council would have to determine which land is to be rezoned and so undertake detailed comparative analysis. • Council would have to undertake detailed assessments (e.g. geotech, soil contamination, traffic) which are a cost to the ratepayer. • Council would have to develop an ODP for the rezoned areas which is not something it normally undertakes and which would be at a cost for ratepayers. • Loss of rural land for productive purposes. • Change in character of the area from rural to residential. • Increase in traffic generated within and around West Melton.

Benefits and Costs of Option 4 – Develop the land by Resource Consent

Benefits/Advantages	Costs/Disadvantages
• Council has the ability to place stricter controls on the development through consent conditions than may be possible through a plan change. • Potential for greater environmental benefit through Council having greater control over development, and being able to require some land for environmental compensation for the use proposed.	• Potential social cost arising from lack of long-term certainty for future purchasers and adjoining neighbours as to the use of the land, as additional consents to alter conditions can be sought. • Potential and future purchasers would need to obtain consent if they were to alter uses, for example home occupation rules from the rural zone would still apply. • Restricted timeframe in which land has to be developed and houses built, leading to potential economic costs for landowner/developer. • Less flexibility in being able to develop the land. • Possibly higher costs to develop land through the placing of tighter controls on the development by way of strict conditions on a consent. • Unwanted precedent in terms of allowing large scale residential activity in the rural zone through consent only.

The above assessment highlights that the advantages and benefits of rezoning this area of land for residential use (Option 2) by way of private plan change outweigh the potential costs and disadvantages. The costs or disadvantages of the other options clearly indicate that they are not the most appropriate method.

7.3 Effectiveness

The proposed Selwyn District Plan has been notified and has not rezoned land in West Melton. The applicant could achieve rezoning by submission to the District Plan. If this option was taken up, it would likely result in a delay of 2 or more years before the zoning was finalised. Such a delay would adversely affect the delivery of lots to meet the assessed and known demand. This not only creates frustration for buyers and sellers but also has the potential to result in an escalation of costs making house ownership more difficult.

The proposed Plan Change is the only method that can ensure all of the following:

- Residential development of an appropriate density
- Development in accordance with an outline development plan
- Integration of development with existing infrastructure
- Specific amenity standards to be achieved in final development
- Enables the site to be planned, designs and physically constructed in a timely manner to meet the anticipated demand for new residential sections in West Melton.

7.4 Efficiency

In determining efficiency, it is necessary to compare the costs and benefits of the four options listed in the tables above. These costs and benefits relate to a variety of matters including environmental, process and land use compatibility. In relation to all these matters Option 2 has a

greater number of benefits/advantages as compared to Options 1, 3 and 4 while Option 2 has the same or lesser costs/disadvantages.

Assessment Regarding Information Provided

There is a large amount of information available about the site and the effects of the proposed rezoning; as such it is considered that there are no risks in acting.

7.5 Overall Assessment

Based on the assessment above, the overall conclusion is that the Proposed Plan Change is a more appropriate method for achieving the objectives and policies of the District Plan than the existing plan provisions or the alternatives canvassed above. It is also concluded that the environmental, social and economic benefits of the Proposed Plan Change outweigh any of the costs. On this basis, the proposed rezoning is considered to be an appropriate, efficient and effective means of achieving the purpose of the Resource Management Act.

Private Plan Change Request – Hughes Developments Limited
Appendix A – Infrastructure Report

Preliminary Infrastructure Report

Hughes Developments Ltd

Halkett Road • West Melton

H19404

November 2020

DAVIE LOVELL·SMITH

PLANNING SURVEYING ENGINEERING

Shaping the future since 1880

Contents:

Revision History

Rev Number:	Prepared By:	Description:	Date:
Revision 0	Jamie Verstappen	For plan change submission	6/11/2020

Document Control

Action:	Name:	Signed:	Date:
Prepared By	Jamie Verstappen		6/11/2020
Reviewed By	Andy Hall		6/11/2020
Approved By	Andy Hall		6/11/2020

1. GENERAL

1.1. Introduction

This preliminary infrastructure report addresses the infrastructure upgrades required to service the proposed development of approximately 20 Ha of land located at West Melton, Canterbury. The land is located on the eastern side of the West Melton Township.

The proposed zoning for the site is Living West Melton – Medium Density. It is proposed to subdivide the site at a density of approximately 10 Lots/Ha, therefore infrastructure loadings will be based on a total of 200 new residential sites. The property is not currently connected to Selwyn District Council (SDC) drainage and water supply infrastructure.

The site is bounded by Halkett Road to the North, Gainsborough development on the west, West Coast Road (SH73) to the south and lifestyle blocks to the east. A site plan is attached as Appendix A.

Consultation has been undertaken with SDC staff in regard to the infrastructure requirements for the site. Consultation with service designers and service authorities has been undertaken to determine services requirements for the proposed development.

The proposed subdivision infrastructure construction will comply with the requirements of SDC's Code of Practice and all future consents relating to the site to ensure vesting in SDC upon completion.

The purpose of this report is to provide an assessment of the servicing of the proposed residential development with respect to road access, wastewater, water supply, stormwater, electricity and telecommunications infrastructure and to identify any issues that may prevent or substantially delay the efficient provision of this infrastructure.

1.2. Legal Description

The legal description for the site is Lot 1 DP34902 at 163 Halkett Road and Lot 2 DP 34902 at 1066 West Coast Road.

1.3. Topography

The topography of the site is relatively flat and level, with a slight fall towards the eastern side of the site. The maximum variation in ground level across the site is approximately 2.4m. There is an existing equestrian track located within the site and various rural access tracks across the land.

The existing site area is predominantly in pasture and is currently in use for rural purposes. Large mature hedges are located along the eastern and southern boundaries of the land. There is also a large amount of hedge line within the land, including along the internal boundary of the site.

Please refer to the enclosed Site Contour Plan in Appendix B of this report for existing contour levels

across the site.

1.4. Soils

Environment Canterbury data for the site and surrounding areas has been reviewed to determine the soil and groundwater conditions below the site. The data from 3 bores was reviewed, one from within the site and two from neighbouring land. The bore data was gathered between September 2003 and September 2007.

The data indicates that the site is underlain by sandy and claybound gravels to at least 78m. Ground water was encountered at between 22m and 24m below ground level. Please refer to Appendix C for bore log summaries and location plan.

It is recommended a comprehensive geotechnical investigation be undertaken at the site to confirm soil and groundwater conditions at consenting stage.

1.5. Site Contamination

Preliminary and detailed site investigations into potential contamination within the site have been undertaken by ENGEO for both the 1066 West Coast Road property and the 163 Halkett Road property. Contamination has not been found within the 1066 West Coast Road property however if the buildings within the site are to be demolished as part of any development work further testing will be required to determine the presence and management of asbestos. Potential contamination has been identified at four localised areas within the 163 Halkett Road property where burn pits have been located. The removal of the soil in these areas would be considered a permitted activity and would be undertaken prior to any development works within the site.

These investigation reports are attached to the main plan change application. Validation reports will be supplied following the removal of any contaminated material from within the site.

2. EARTHWORKS

2.1. Consent Requirements

Consent will be sought from SDC to undertake earthworks at the site for the purpose of residential development. Consent will also be sought from Environment Canterbury to enable discharge to ground of stormwater during the construction period.

2.2 Soil Conditions

Two geotechnical investigations have been undertaken for the proposed development area. These investigations were undertaken by ENGEO between July 2017 and July 2018 on each of the two existing properties. The investigations included a desktop study of existing data and site investigations consisting of boreholes, penetrometer testing and machine test pits to determine the soil profile and give an indication of the bearing capacity of soils beneath the site. Both reports indicate a consistent soil profile of up to 0.5m topsoil overlying silts and sands of between 0.1m and

1.8m thickness overlying interbedded sandy gravel and clay-bound gravel to at least 78m depth.

The ground water level in ECan boreholes in the vicinity of the site is between 21m and 24m below ground level. “Good ground” as described in NZS:3604 is typically encountered below 0.6m below ground level.

Due to the subsurface materials and depth to groundwater the potential for liquefaction and lateral spreading within the site is very low. The site is therefore considered equivalent TC1, where future land damage from liquefaction is unlikely and ground settlements are expected to be within normally accepted tolerances.

2.3 Construction

From the review of the completed geotechnical investigations we expect that all soil encountered within the site will be suitable for filling to residential development standards. It is also expected that the construction of the subdivision works will be possible in any season, however excavation over summer months in this area along with these soil conditions wind erosion may be an issue. Mitigation measures such as an onsite water cart will need to be employed to control dust.

It should also be noted that during the construction process the containment and disposal of potentially sediment laden stormwater flows would need to be carried out. To ensure this is managed appropriately an erosion and sediment control management plan must be implemented. This plan will also need to be submitted and approved by both SDC and Environment Canterbury.

It is anticipated that around 50,000 m^3 of soil will need to be cut and filled to establish building lots and roading within the site for the proposed development density. This will ensure building platforms are protected from surface water and flooding and allow adequate drainage of the development area.

All earthworks are required to be carried out in accordance with NZS4431:1989 and will involve the stripping of topsoil to stockpile, the bulk cut to fill earthworks and finally reinstatement of the topsoil and grass. We would expect that the earthworks will be a balanced cut and fill and no material will be removed from site unless it is of an unsuitable nature.

3. ROADING AND ACCESS

3.1 Road Network

The ODP for the site shows the roading links proposed, this is included in figure 1 below. A primary link will connect SH 73 to Halkett Road through the site. Several seconday roads within the site will provide access to the majority of new lots. Right-of-Ways will be used to service rear lots where road frontage is not available for access.

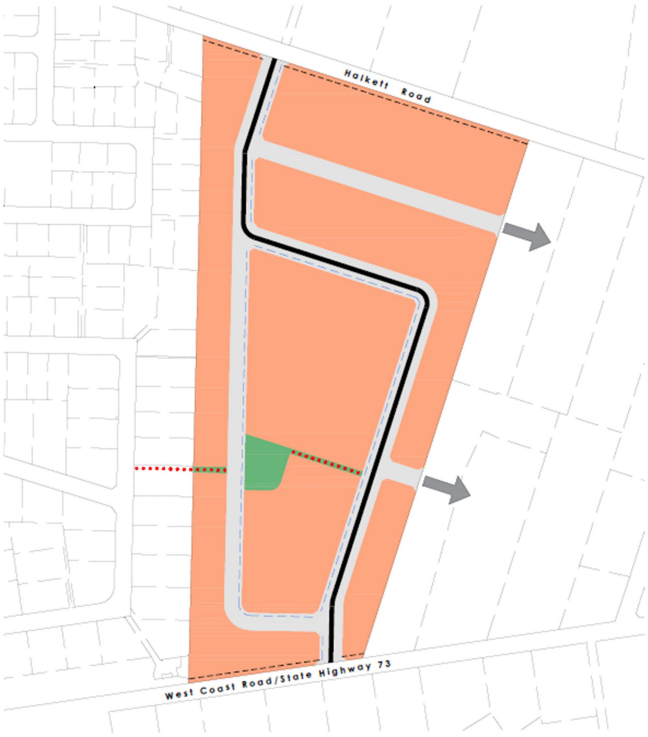


Figure 1 – Roading ODP for West Melton East

A traffic report has been undertaken by Novo Group to identify the effects on the surrounding road network as a result of the proposed development. Consultation has been undertaken with NZTA regarding the proposed road connection to SH 73. This report provides an assessment of the rezoning proposal and provides recommendations regarding roading and pedestrian linkages to be provided through future subdivision works. The key findings of the report can be summarised as follows:

- No crashes have been reported on roads fronting the site in the past 5 years.
- Pedestrian access across SH73 is provided approximately 300m west of the site. Pedestrian linkage to the town centre and this crossing point has been provided through existing development areas to the west. It is not preferable to provide any pedestrian linkage along SH73 from the site.
- A bus stop is located on Halkett Road approximately 260m west of the proposed road link.
- A direct road connection to SH73 is possible. A right turn bay at this intersection will provide adequate safety for the expected traffic loading. It is expected the current 60 km/h speed limit on SH73 will be extended beyond this intersection.
- A detailed intersection design for the Halkett Road link is not deemed necessary.
- Re-zoning of the land is supported from a transport perspective.

The current speed limit along the Halkett Road frontage is 80km/h. This speed limit is reduced to 60 km/h at the western side of the site. It is expected this speed restricted zone would be extended beyond any future development frontage, ensuring that direct access is a possibility for lots fronting Halkett Road.

A roading link to the site from SH 73 will also be sought to ensure adequate traffic permeability through the development. It is proposed to locate this road connection at one of the existing driveways to the site. Consultation with both SDC and NZTA will be undertaken in regards to this proposed access to determine design details and road upgrade requirements; these will likely include lane widening and a reduction in speed limit. The Novo Group traffic report includes a concept intersection layout which will form the basis of any future detailed design. No direct lot access will be provided from SH 73.

A development of this size will increase the traffic loading on Halkett Road and the surrounding road network. The intersection of Halkett Road and SH 73 has been identified as a high risk intersection and as such may require some upgrade work. As a minimum this work would likely include local carriageway widening to allow space for a right turn bay off SH 73 into Halkett Road. A merging lane for vehicles entering SH 73 from Halkett Road along with a speed restriction through the intersection may also be recommended. The scope and funding of any upgrade work will be agreed between NZTA, SDC and the developer.

3.2 Road Design

New roads constructed as part of the development works will be in accordance with the SDC District Plan (Township), in particular Table E13.8. The bearing capacity of foundation soils beneath the proposed roading are expected to be appropriate for road construction. Pavement depths within the development will be determined according to the tested bearing capacity as outlined in the SDC Engineering Code of Practice. All new roads will be sealed with asphalt. Some roading features such as thresholds, intersections and cul-de-sac heads may be surfaced with cobblestones or other suitable materials at the discretion of SDC. Footpaths will be provided on at least one side for all vested roads and a cycleway will be installed along the route identified in the ODP.

3.3 Gradients

Due to the flat site topography, road gradients will be minimal. To ensure the roads drain adequately, kerb and channel gradients will be no shallower than 1:500. The road levels will be set to ensure all flood flows are managed and directed away from building platforms within the road corridor. Secondary flow in the event of flooding is able to be directed off site.

4. STORMWATER

4.2 General

It is expected soil conditions on site will be suitable for stormwater disposal to ground. Stormwater emanating from roofs and hardstand areas on private lots will be directed to ground within the lot in accordance with the New Zealand Building Code.

All other stormwater from site will be directed to roadside kerb and channel by ground contour and collected in channel sumps. Stormwater can then be discharged to ground via soakage facilities. In some locations pre-treatment of stormwater may be required, this is likely to be through the use of a

swale, retention basin or infiltration basin. All flow over and above the 50 year ARI will need to be directed away from the development area by secondary flow channels.

All stormwater infrastructure is to be constructed in accordance with the SDC Code Of Practice to enable It to be vested upon completion of the construction defects period.

4.3 Environment Canterbury Requirements

Selwyn District council have indicated that once vested, the development area could be included in their global stormwater discharge consent for West Melton. This consent is labelled CRC167467 and is attached as Appendix D.

This consent allows for potentially contaminated stormwater to be discharged to ground in accordance with consent conditions. A consent with ECAN with the same conditions will be sought by the developer in order to discharge stormwater during the construction defects period, generally 2 years from completion. Due to the local ground conditions and depth to the ground water table we do not anticipate any problems obtaining a consent as detailed above.

It is noted that there are several domestic supply wells located in the rural land to the east of the site in the direction of groundwater flow. Well depths range from 36m to 78m within 300m of the site.

4.4 Flood Flows

Selwyn District Council has with the help of Environment Canterbury identified land across the Selwyn District which may be susceptible to flooding. The proposed development site has been shown to be affected by flooding in both the 1 in 200 year and 1 in 500 year storm events.

An assessment of the existing flood flow channels within and surrounding the site has been undertaken by Davie Lovell-Smith Ltd to determine any works to mitigate these potential flood flows. Three flow channels were identified within the site and all are able to be fully mitigated by filling of lots and providing for secondary flow channels through road corridors and reserves. Secondary flow channels through the road and reserve network for flow over and above the 1 in 50 year event will be considered during detailed design. It is expected the roading links on the eastern and southern boundary will be used to convey flood flow away from the site.

5. WASTEWATER

5.1. Existing Wastewater System

An existing sewer pumping station is located at the south western corner of the site on Rossington Drive. This pumping station serves all existing residential areas in West Melton township. Initial consultation with SDC has indicated there is additional capacity available in the local sewerage system and rising main; however some changes may be required to ensure adequate downstream system capacity is available.

The current rising main conveying flow from the pump station is sized 225mm and has a pressure

rating of PN10. SDC has indicated that the pressure rating of the pipe is the limiting factor for sewer flow from the pump station. Upgrading the capacity of the wastewater pumps to a maximum of 70m pressure may be considered to ensure additional future flows can be accommodated. The rising main links the West Melton pump station to the Rolleston gravity wastewater network approximately 9km away.

We have been informed that the flow rate available through the rising main at maximum operating pressure is 44l/s. This equates to a catchment loading of 1276 households using the SDC Code of Practice flow calculation method.

There is currently 829 consented connections within this pump station catchment, therefore an additional 447 connections can be accommodated by the current pumping arrangement. The maximum sewerage flow for a development size of 200 lots is expected to be 6.875 l/s, or approximately 15.7% of the total available pump station flow.

SDC has also indicated that additional emergency wastewater storage may be required within the Rossington Drive pump station catchment as a result of further development. The volume of additional storage required will be determined at detailed design stage. It is likely the combination of pipework, structures, lift station and/or residential pump reservoirs installed in the new development will account for a large proportion of the storage.

A 225mm uPVC gravity sewer connection has been provided to the site area approximately mid-way along the western boundary for future connection. This pipe is located in an easement through Lot 109 DP 402313. It is anticipated a proportion of the wastewater from the development site will discharge into this pipe system.

5.2. Wastewater Design

Due to the flat contour of the site only a proportion of the development area will be able to drain via gravity to the existing network. Initial estimates are that approximately 50% of the proposed development site will be able to drain into the existing network via gravity; this area is located along the western boundary of the site. This will mean some form of wastewater pumping arrangement will need to be installed to enable the remainder of the development site to be serviced. The two options we will consider during detailed design are a low pressure sewer system and a small sewage pumping station which can be installed in the road reserve and vested in SDC.

Initial indications from Council are that the use of a low pressure sewer network to service the balance of lots that cannot use a gravity pipe system will be allowable. This low pressure sewer system would rely on small pump units at each property boundary that would pump to a common PE rising main located in the road berm that discharges to the gravity system at a point where an allowable pipe gradient can be achieved. The cost of operation and maintenance of the pump units would be the responsibility of the home owner. The cost of operation and maintenance of the pressure pipe located in the road reserve would be the responsibility of council. The majority of the construction cost in this solution is in the installation of boundary pumping kits.

Alternatively a small sewer pumping station could be utilised within the site to convey wastewater to

the existing pumping facility at the south western corner of the site. This will allow the eastern side of the site to be serviced via gravity sewer mains located in the road carriageways and laterals to within the property boundaries. It is expected the largest sewer main pipe required will be 150mm uPVC and all laterals to residential lots will be 100mm uPVC. This pumping station and gravity sewer network will be required to be built to SDC standards in order to be vested in Council upon completion.

5.3. Wastewater Rising Main Outfall

SDC has indicated that the existing gravity system which the West Melton rising main discharges to is nearing capacity. This outfall is located at Walkers Road on the north western side of Rolleston. Currently all sewerage pumped into this gravity pipeline flows to a pump station at Burnham School Road. Upgrade works of this gravity pipeline or an alternative point of discharge will need to be considered some time in future if flows into the system are increased. It is noted that proposed further development of Rolleston Prison will also increase flow through this system. Two alternative discharge options are currently being considered by SDC.

An alternative outfall into the gravity sewer system located at Hoskyns Road is being considered by SDC. This outfall location would be near the Maddisons Road intersection. SDC has indicated the gravity sewer system from here has adequate capacity to accommodate additional flow produced by future West Melton development; however this discharges to a pump station located at Jones road which is nearing capacity. This option would require the installation of approximately 1850m of new 225mm diameter sewer rising main along Hoskyns Road to connect with the existing rising main at West Melton Road.

SDC have indicated an extension to the existing sewer rising main which will convey sewage directly to the Pines treatment plan is also an option. This will require an additional 5750m of 225mm sewer rising main to be installed south along Walkers Road and beneath the railway and SH1. This option is favourable as it conserves capacity within the Jones Road pump station.

Each of the above options will likely require pump upgrades within the Rossington Drive pump station due to the increase in rising main length. SDC have indicated a portion of the costs associated with the above upgrade work will be recovered by development contributions split between all new lots within the West Melton sewer catchment. These costs will be determined when the district plan is reviewed.

6. WATER SUPPLY

6.1. Existing Water Supply Network

SDC has existing water supply reticulation in the area, supplied by several groundwater extraction wells. The Council well nearest to the site is located in the Gainsborough reserve located on Rossington Drive. This well is currently connected to a reservoir consisting of 10 above ground water tanks located at the south western boundary of the site on land currently owned by Hughes

Developments Ltd. The current flow reliably available from the Rossington Drive well is 9 l/s. SDC has indicated that the current local water pressures are at, or above the council suggested pressure range.

Council water supply is not currently provided to either of the lots within the proposed development area. One well is currently active within the site for domestic and stock water supply, this well is labelled M35/1013 and details have been provided in Appendix C. It is expected this well will be abandoned during development works.

6.2. Proposed Water Supply Network

The estimated water supply loading of the proposed development is 800 m^3/ day, this is based on a conservative average household usage of 4000 l/ day. This daily flow volume equates to 9.3 l/s, however during peak times this flow rate will be significantly higher.

It is understood that the proposed development will require more water than is currently available within the existing community water supply scheme. This can be managed by increasing the capacity of the reservoir. SDC has indicated they would like to remove the current multiple tank storage arrangement and replace this with a single steel tank reservoir with at least 400 m^3 of storage. Additional land for this new reservoir would be required and SDC has indicated there would be funding available for the purchase of land for this purpose. The most logical position for this reservoir facility would be adjacent to the current location of the tanks, within the proposed development area. If this option is pursued a utility reserve would be included in the survey plan for the site and vested in SDC. The dimensions and layout of this land parcel would be confirmed with SDC during the subdivision consent process.

In addition, SDC has recently been undertaking work to connect the Edendale and West Melton water networks. The Edendale well is capable of supplying approximately 35 l/s, with a local loading of approximately 10 l/s. This surplus capacity can then be transferred to the West Melton water network through a recently installed pipe connection between Edendale and West Melton. It is expected the cost for this pipe installation will be recovered through development contributions of the new connections which would benefit.

Water within the development will be supplied by a reticulated pipe system located within the road berms. This would be linked at all available locations into the existing system surrounding the proposed development area. Metered water connections will be required to each property boundary as per council standards. It is expected all water infrastructure will be vested in SDC upon completion of construction.

The water supply system will also be required to be sized to meet the flow and pressure required by the New Zealand Fire Service Code of Practice. Hydrants will also be placed in accordance with this standard.

7. ELECTRICITY AND STREETLIGHTING

The site is currently serviced by an overhead power connection to a pole located in the 163 Halkett Road property. This line will be removed during the development works.

Preliminary consultation with Design Net (power design engineer) has indicated all proposed sites can be serviced for power to the industry standards. The infrastructure will be laid underground in the roading reserve. It is estimated 4 or 5 new kiosks will be required for the proposed development density. Connection to the HV network is available at Halkett Road. All lots within the development will require a power supply connection at the lot boundary.

All power reticulation installed within the site will be taken over by Orion upon completion. A rebate will be given to the developer upon completion to cover a proportion of the installation costs. This value is to be determined through an agreement prior to installation.

Streetlighting will need to be installed to SDC standards as part of the proposed development works. Streetlighting would be serviced by the local LV power supply installed by the developer and be vested in council upon commencement of construction. All streetlighting will be located in the vested road reserve.

Correspondence with Design Net and existing power supply plans can be found in Appendix E.

8. TELECOMMUNICATIONS

The site is currently serviced by Chorus via their standard rural supply.

Enquiries have been made to Chorus in regards to the proposed development. Chorus have confirmed they are able to supply fibre reticulation to the development from Halkett Road. Connection is also available from the southern side of the site over SH 73, however Chorus has indicated this will be at some additional cost due to the road crossing.

Jamie Verstappen
Chartered Professional Engineer
Davie Lovell-Smith Ltd

APPENDIX A - Site Location Plan

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

SEE O:\STD_DWG\Eng Notes\Standard Notes.dwg - Shortcut FOR RELEVANT NOTES.

NOTES :

1) ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.
2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION
3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.
4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.
5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.
6) CONTROL OF SW, SEDIMENT AND DUST ON SITE IS THE RESPONSIBILITY OF THE CONTRACTOR
7) ALL ROW AND DRIVEWAYS ARE TO HAVE 50mm DUCTS INSTALLED FOR COMMUNICATIONS AND POWER SUPPLY.

AMENDMENTS:

AMENDMENT	DATE	DESCRIPTION

	NAME	SIGNED	DATE
DESIGNED BY			
CHECKED BY			

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Hughes Developments Ltd

SHEET TITLE:

Site Plan

DRAWING STATUS

For Information

SCALE : 1:2000@A1 1:4000@A3

DATE : July 2018

CAD FILE : J:\19404\Preliminary investigation\SitePlan.dwg

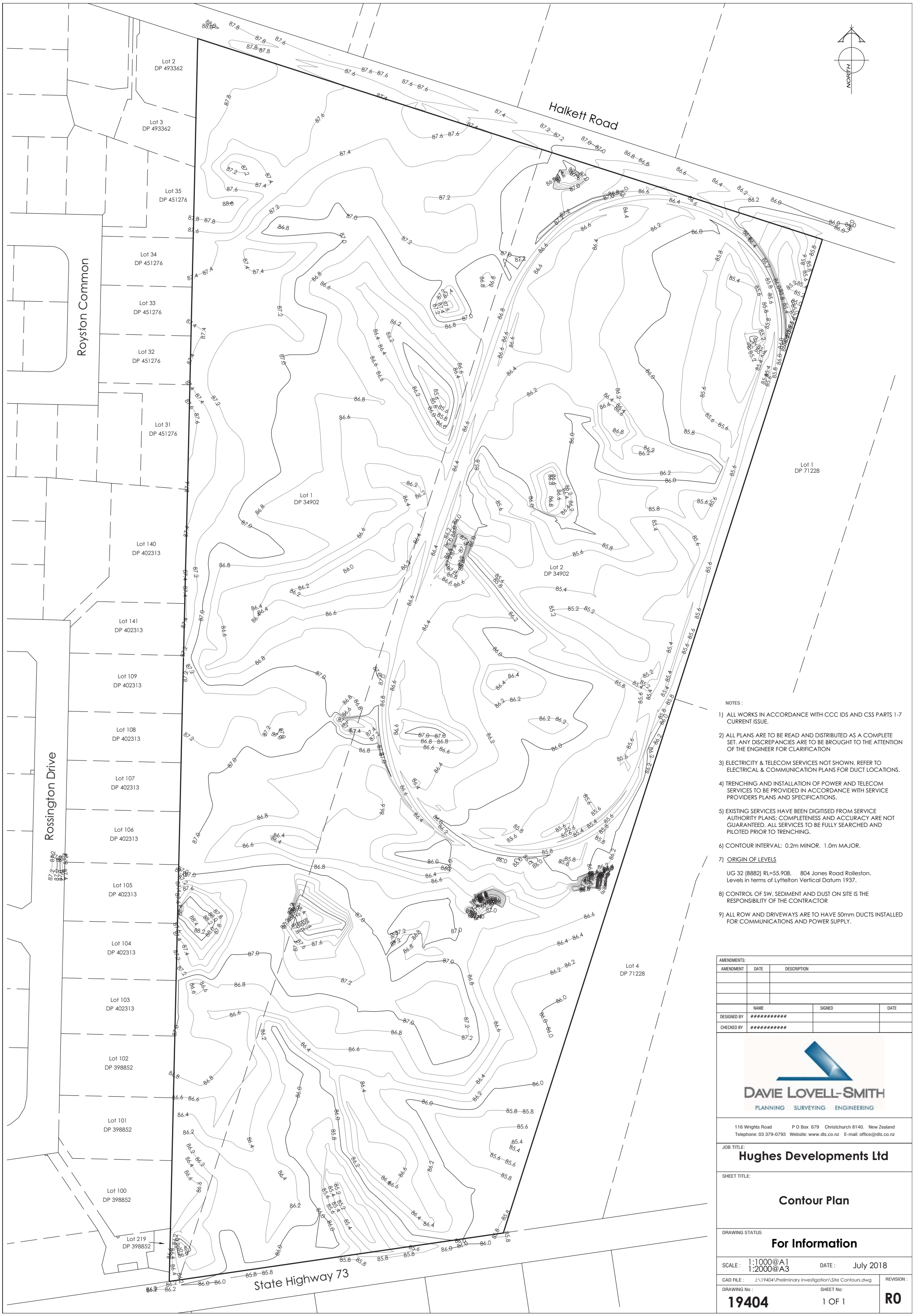
DRAWN : GAC

DRAWING No : **19404**

SHEET No:

REVISION : **R0**

APPENDIX B - Site Contours



NOTES :

1) ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.

2) ALL PLANS ARE TO BE READ AND DISTRIBUTED AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

3) ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS.

4) TRENCHING AND INSTALLATION OF POWER AND TELECOM SERVICES TO BE PROVIDED IN ACCORDANCE WITH SERVICE PROVIDERS PLANS AND SPECIFICATIONS.

5) EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED AND PILOTED PRIOR TO TRENCHING.

6) CONTOUR INTERVAL: 0.2m MINOR. 1.0m MAJOR.

7) ORIGIN OF LEVELS

UG 32 (B882) RL=55.908, 804 Jones Road Rolleston.
Levels in terms of Lyttelton Vertical Datum 1937.

8) CONTROL OF SW, SEDIMENT AND DUST ON SITE IS THE RESPONSIBILITY OF THE CONTRACTOR

9) ALL ROW AND DRIVEWAYS ARE TO HAVE 50mm DUCTS INSTALLED FOR COMMUNICATIONS AND POWER SUPPLY.

AMENDMENTS:		
AMENDMENT	DATE	DESCRIPTION

	NAME	SIGNED	DATE
DESIGNED BY	###########		
CHECKED BY	###########		

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:
Hughes Developments Ltd

SHEET TITLE:
Contour Plan

DRAWING STATUS
For Information

SCALE : 1:1000@A1 1:2000@A3 DATE : July 2018

CAD FILE : J:\19404\Preliminary investigation\Site Contours.dwg

REVISION : **R0**

DRAWING No : **19404**

SHEET No: 1 OF 1

APPENDIX C - ECAN Bore Data

Canterbury Maps

Information has been derived from various organisations, including Environment Canterbury and the Canterbury Maps partners. Boundary information is derived under licence from LINZ Digital Cadastral Database (Crown Copyright Reserved). Environment Canterbury and the Canterbury Maps partners do not give and expressly disclaim any warranty as to the accuracy or completeness of the information or its fitness for any purpose.

Information from this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it.

N

0 0.045 0.09 0.135 0.18 Kilometres

Scale: 1:3,000 @A3

Map Created by Environment Canterbury on 7/5/2018 at 10:05:58 AM

Bore or Well No	M35/10751
Well Name	Weedons Ross Road
Owner	Selwyn District Council

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Well Number	M35/10751	**File Number**	CO6C/23232
Owner	Selwyn District Council	**Well Status**	Active (exist, present)
Street/Road	Weedons Ross Road	**NZTM Grid Reference**	BX23:49567-81486
Locality	West Melton	**NZTM X and Y**	1549567 - 5181486
Location Description		**Location Accuracy**	< 50m
CWMS Zone	Selwyn - Waihora	**Use**	Public Water Supply,
Groundwater Allocation Zone	Selwyn-Waimakariri	**Water Level Monitoring**	--
Depth	78.00m	**Water Level Count**	1
Diameter	300mm	**Initial Water Level**	24.00m below MP
Measuring Point Description		**Highest Water Level**	24.00m below MP
Measuring Point Elevation	89.17m above MSL (Lyttelton 1937)	**Lowest Water Level**	24.00m below MP
Elevation Accuracy	< 5 m	**First reading**	07 Sep 2007
Ground Level	0.00m above MP	**Last reading**	07 Sep 2007
Strata Layers	7	**Calc Min 95%**	
Aquifer Name		**Aquifer Tests**	0
Aquifer Type		**Yield Drawdown Tests**	3
Drill Date	07 Sep 2007	**Max Tested Yield**	22 l/s
Driller	East Coast Drilling	**Drawdown at Max Tested Yield**	27 m
Drilling Method	Rotary Rig	**Specific Capacity**	1.10 l/s/m
Casing Material	STEEL	**Last Updated**	02 Apr 2015
Pump Type		**Last Field Check**	07 Sep 2007
Water Use Data	No		

Screens

Screen No.	Screen Type	Top (m)	Bottom (m)	Slot Size (mm)	Slot Length (mm)	Diameter (mm)	Leader Length (mm)
1	Stainless steel	74	77				

Step Tests

Step Test Date	Step	Yield	Yield GPM	DrawDown	Step Duration
07 Sep 2007	1	12	158.3782	10.9	0.05
07 Sep 2007	2	18	237.5673	25	0.05
07 Sep 2007	3	21.5	283.760956	26.6	0.166666672

Comments

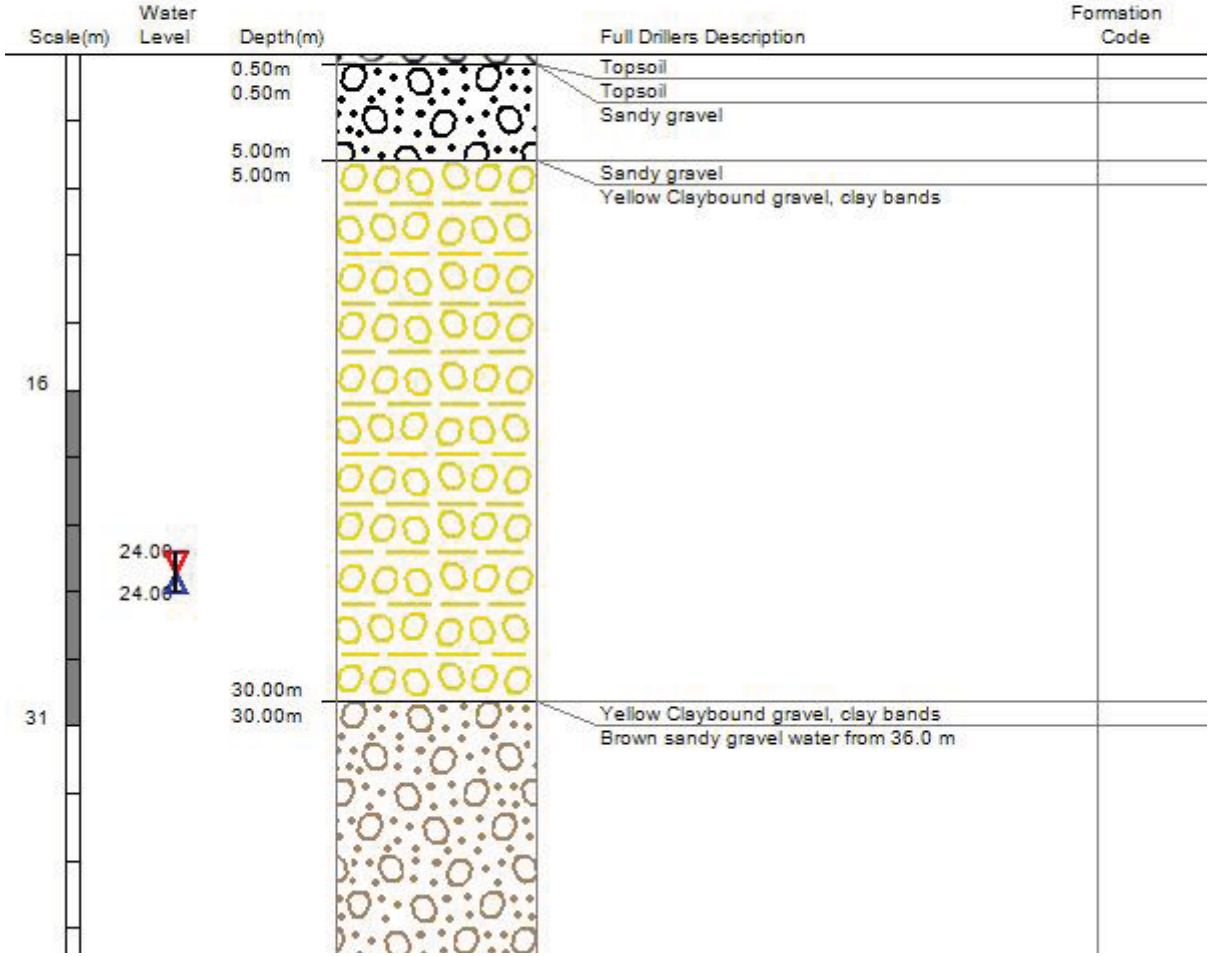
Comment Date	Comment
27 Apr 2010	Set status to active, this is a community supply for SDC. Added well name, added to community water supply database

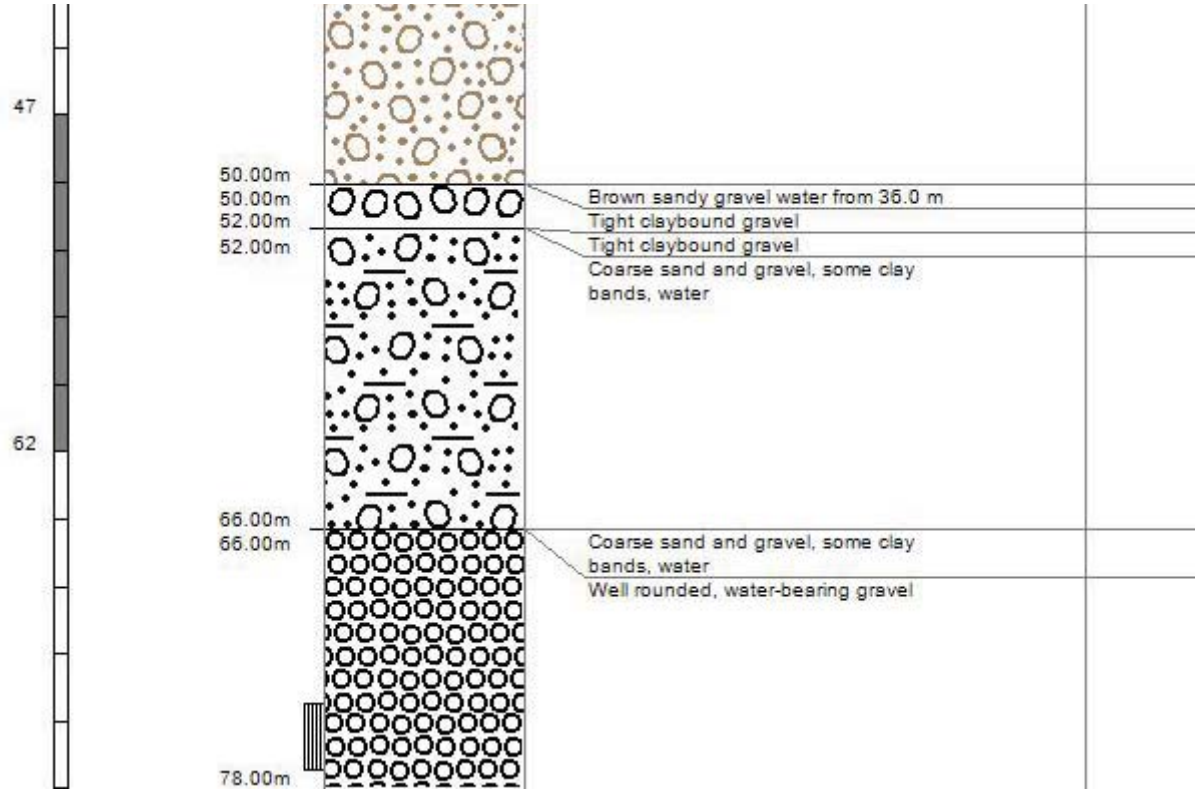
Bore Log

Borelog for well M35/10751

Grid Reference (NZTM): 1549567 mE, 5181487 mN
Location Accuracy: < 50m
Ground Level Altitude: 89.2 m +MSD Accuracy: < 0.5 m
Driller: East Coast Drilling
Drill Method: Rotary Rig
Borelog Depth: 78.0 m Drill Date: 07-Sep-2007

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha




47
62
50.00m
50.00m
52.00m
52.00m
66.00m
66.00m
78.00m
Brown sandy gravel water from 36.0 m
Tight claybound gravel
Tight claybound gravel
Coarse sand and gravel, some clay bands, water
Coarse sand and gravel, some clay bands, water
Well rounded, water-bearing gravel

APPENDIX D - Flood Assessment

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

Davie, Lovell-Smith Ltd
116 Wrights Road, Addington
PO Box 679, Christchurch 8140
New Zealand
Telephone (03) 379-0793,
E-mail: office@dls.co.nz

2nd May 2020

Selwyn District Council
Benjamin.Rhodes@selwyn.govt.nz

Attn: Mr Ben Rhodes

RE: Future Development Area, Halkett Road, West Melton – Flood Assessment

Dear Ben

As part of the identification of future development areas in West Melton, Council require us to assess the effects of flooding on potential sites and how it may be mitigated. In this case we are investigating a site owned by Hughes Developments on the existing Urban Edge between Halkett Road and State Highway 73.

Selwyn District Council has with the help of Environment Canterbury (ECan) identified land across the Selwyn District which may be susceptible to flooding. Please refer to the two attached plans of the proposed development area. These two plans depict the modelled flood effects on the development site. Please note that all flows up to a 1 in 50 year event will be disposed of on site by infiltration to ground.

Plan A describes the channelization and water depth for a 1 in 200 year critical storm event.
Plan B describes the channelization and water depth for a 1 in 500 year critical storm event.

These clearly show channelized flow through and around the site. To better locate these channels, please refer to the attached plan of the site with overlaid LIDAR contours. The key flow channels have been superimposed over the LIDAR and they fall into distinct contour channels.

From this investigation there appear to be four main flow routes and these are described on the plan as Flows A – D. What is also apparent is that the site is quite flat but generally slopes towards the southeast at a gradient of

Flow A crosses Halkett Road and just touches the north-eastern corner of the site. This corner will be filled to ensure that flood flows remain in the roadway and continue past the site to the adjacent rural land.

Flow B enters the site in the north-eastern corner and flows south to a point half way along the eastern boundary. It is proposed that a road entry will be located at the point on Halkett Road where the flow enters the property and a road connection will also be located at the point where it exists. The flows derived from the channels within the site will be relocated to the proposed road network with gradients towards the outlet point.

Flow C is derived from drainage from within the site and discharges onto State Highway 73. The flows within the site will once again be contained within a future road network and will be directed to this existing discharge point via either a reserve link or a Road Link. Please note that there is an existing entry into the site at or close to this location.

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Flow D is the overflow from the basin associated with the Gainsborough subdivision. It enters onto State Highway 73 at the southwestern corner of the site. As with Flow A, the new sites will be filled to ensure that flood flows do not enter into the site.

By adhering to this ass3ssment, the effects of significant flood events will be fully mitigated. The actual final floor levels in relation to these events will be determined as part of the Detailed Design and subdivision process.

Should you have any queries, please do not hesitate to call.

Kind Regards

Andy Hall
Director
CPEng

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

1. Areas and dimensions are approximate only and are subject to final survey and deposit of plans.
2. Service easements to be created as required.
3. This plan has been prepared for subdivision concept & discussion purposes only. No liability is accepted if the plan is used for any other purposes.
4. Contours shown are from Christchurch City Council Lidar Data at 0.25m Contour Intervals and interms of LINZ Vertical Datum 2016.

Halkett Road

RL87.50

RL85.00

RL85.75

RL86.50

State Highway 73

Rossington Drive

FLOW A

FLOW B

FLOW C

FLOW D

Lot 1 DP 34902 8.3170

Lot 2 DP 34902 12.3700

NORTH

Total Area :

Comprised in:

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

West Melton

SHEET TITLE:

Existing Secondary Flowpaths over Lots 1 & 2 DP 34902

DRAWING STATUS

For Discussion Purposes

SCALE : 1:1250@A1 1:2500@A3

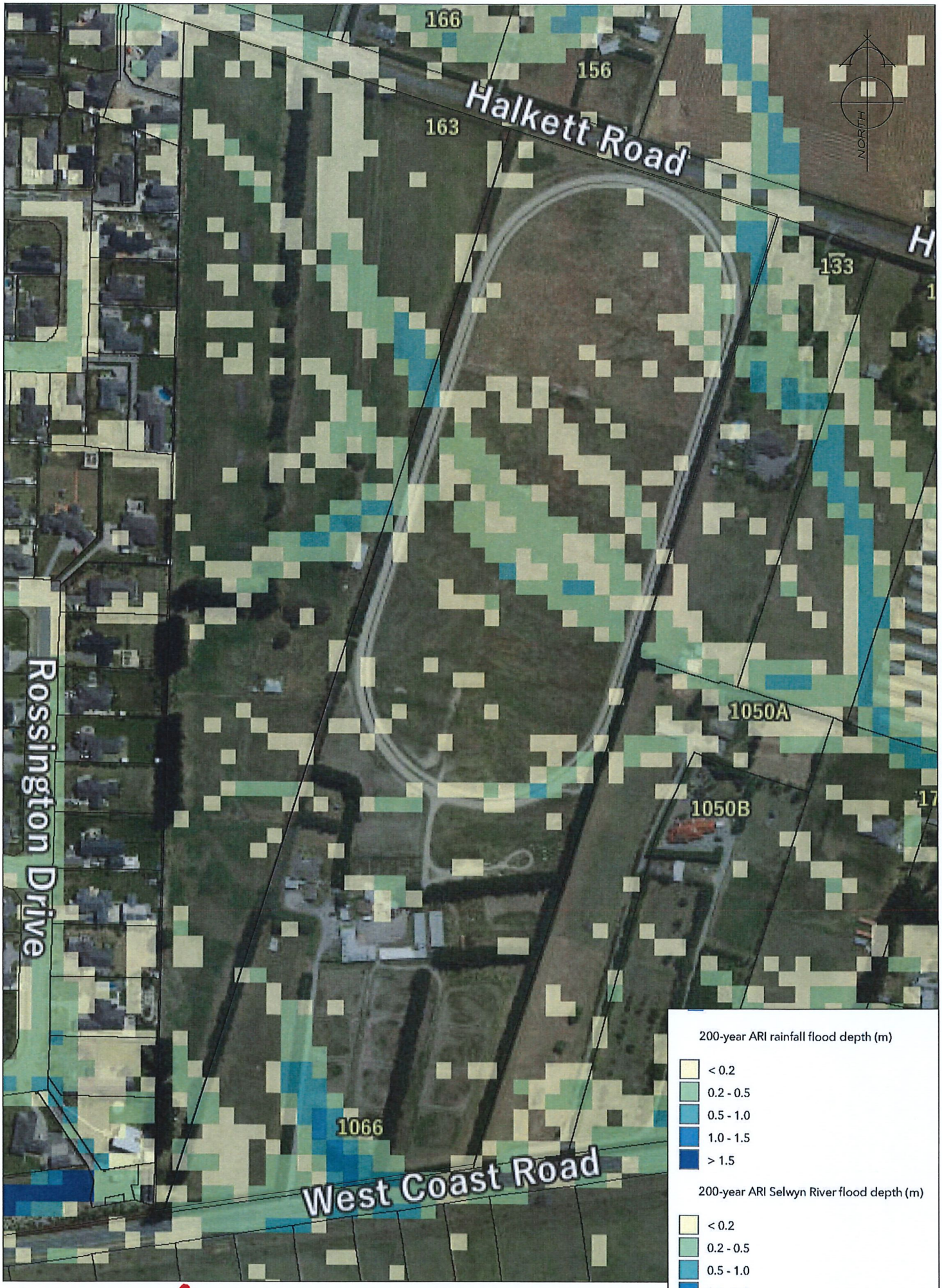
DATE : May 2020

CAD FILE : J:\19404\Flooding\E19404 West Melton Lidar.dwg

REVISION : **R0**

DRAWING No : **E19404**

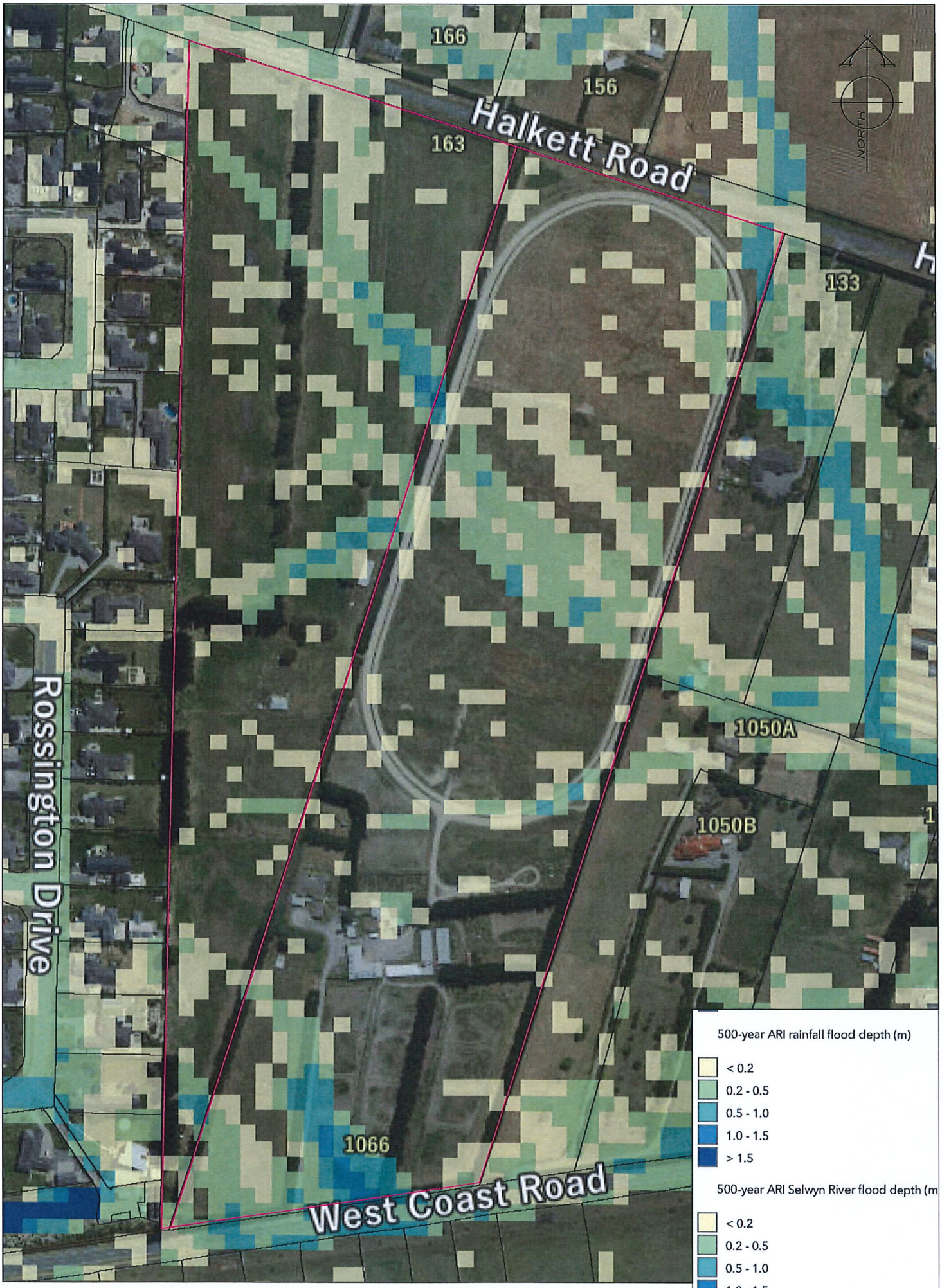
SHEET No: 1 OF 1



Plan A

1 in 200 year Flood Event
Scale 1:3000@A4

J:\18727\West Melton\H18727 West Melton Lidar.dwg



Plan B

1 in 500 year Flood Event
Scale 1:3000@A4

J:\18727\West Melton\H18727 West Melton Lidar.dwg

APPENDIX E- ECAN Consent CRC167467

12 April 2017

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Selwyn District Council
Attn: Joanne Golden
PO Box 90
Rolleston 7643

Dear Sir/Madam

Notice of Resource Consent Decision

Record Number(s): CRC167467
Applicant Name: Selwyn District Council
Activity Description: to discharge contaminants into and onto land
Decision: Granted

Decision

The decision of Environment Canterbury is to grant your application on the terms and conditions specified in the attached resource consent document. The reasons for the decision are:

1. The activity will achieve the purpose of the Act.
2. The activity is consistent with the policies of the regional plan or national policy statement.

Commencement of consent

Your resource consent commences from the date of this letter advising you of the decision.
If you object to or appeal this decision, the commencement date will then be the date on which the decision on the appeal is determined.

Lapsing of consent

This resource consent will lapse if the activity is not established or used before the lapse date specified on your consent document. Application may be made under Section 125 of the Resource Management Act 1991 to extend this period.

Your rights of objection and appeal

- **Objection to Decision**
  If you do not agree with the decision of the consent authority, you may object to the whole or any part in accordance with Section 357A(1)(g) of the Resource Management Act 1991 (RMA). Notice of any objection must be in writing and lodged with Environment Canterbury **within 15 working days** of receipt of this decision in accordance with Section 357C(1) of the RMA.

- **Right to Appeal**
  You may appeal the decision of the consent authority to the Environment Court in accordance with section 12 of the RMA. , The notice of appeal must be lodged with the Court within 15 working days of receipt of this decision, at PO Box 2069, Christchurch. A copy of the appeal should also be forwarded to Environment Canterbury within the same timeframe.

If you are in any doubt about the correct procedures, you should seek legal advice.

- **Objection to Costs**
  Section 357B of the RMA allows you to object to costs. Your objection must be received **within 15 working days** of the date on which you receive your invoice. Your objection must be in writing and should clearly explain the reasons for your objection as detailed in section 357C of the RMA.

Monitoring of conditions

It is important that all conditions of consent are complied with, and that the consent holder continues to comply with all conditions, to ensure that the activity remains lawfully established.
You can find online Information regarding the monitoring of your consent at www.ecan.govt.nz/monitoringconsent.pdf.

Charges, set in accordance with section 36 of the Resource Management Act 1991, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of resource consents and for the carrying out of its functions under section 35 of the Act.

Further information about your consent

For some activities a report is prepared, with officer recommendations, to provide information to the decision makers. If you require a copy of the report please contact our Customer Services section. You can find online information about your consent document at www.ecan.govt.nz/yourconsent.pdf.

Queries

For all queries please contact Customer Services Section quoting your CRC number noted above.

Thank you for helping us make Canterbury a great place to live

Yours sincerely

Consents Planning Section

cc:

RESOURCE CONSENT CRC167467

Pursuant to Section 104 of the Resource Management Act 1991

The Canterbury Regional Council (known as Environment Canterbury)

GRANTS TO:	Selwyn District Council
A DISCHARGE PERMIT (S15):	to discharge contaminants into and onto land
COMMENCEMENT DATE:	12 Apr 2017
EXPIRY DATE:	12 Apr 2052
LOCATION:	West Melton, Selwyn

SUBJECT TO THE FOLLOWING CONDITIONS:

0 **Definitions**

For the purpose of this consent the following definitions and abbreviations shall apply to all conditions and attached Schedules:

'Annual Exceedance Probability (AEP)' is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 40 cubic metres per second has an AEP of 2%, it means there is a 2% chance (i.e. one-in-fifty) of a peak flood discharge of 40 cubic metres a second or larger occurring in any one year. AEP is the inverse of return period expressed as a percentage.

'Best practicable option' means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to:
(a) the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
(b) the financial implications, and the effects on the environment, of that option when compared with other options; and
(c) the current state of technical knowledge and the likelihood that the option can be successfully applied.

'Commercial Development' means a business providing personal, property, financial, household, private or business services to the general public as a commercial activity.

'Community Drinking Water Supply Protection Zone' means the protection zone for a drinking-water supply that is recorded in the drinking-water register maintained by the Chief Executive of the Ministry of Health (the Director-General) under section 69J of the Health Act 1956 that provides no fewer than 25 people with drinking-water for not less than 60 days each calendar year.

'Construction' means all earthworks associated with the maintenance of the SDC

stormwater network.

'Critical duration' means the time taken during a storm event for peak water levels to be reached in the receiving waters as determined by the most up-to-date information and modelling.

'Design storm' means the theoretical rainfall event that the analysis is based on for a particular probability. The design storm is based on certain assumptions, including rainfall distribution and intensity, and the storm rainfall profile shape for the critical duration.

'**Earthworks'** means the disturbance of land surfaces by blading, contouring, ripping, moving, removing, placing or replacing soil and earth, or by excavation, or by cutting or filling operations.

'Existing site' means any site that discharges its stormwater into the SDC stormwater network at the date of commencement of this resource consent.

'Key sump' means any sump which directly discharges to the final stormwater management device i.e. where the discharge has no other form of primary treatment.

'Recognised Design Guidelines' refers to the Auckland Regional Council, Stormwater Management Devices: Design Guidelines Manual, May 2003, Technical Publication No.10; and/or Christchurch City Council, Waterways, Wetlands and Drainage Guide, Part B: Design, February 2003; and/or the On-Site Stormwater Management Guideline, October 2004, New Zealand Water Environment Research Foundation, or any updates to these documents.

'Re-development' means a change to a developed site or a site activity that results in a stormwater discharge that is not the same in scale, intensity or character to the discharge that existed prior to the commencement of this consent.

'SDC' means Selwyn District Council.

'Stabilised' means an area inherently resistant to erosion such as rock (excluding sedimentary rocks), or rendered resistant to erosion by the application of aggregate, geotextile, vegetation or mulch. Where vegetation is to be used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once 80 percent vegetation cover has been established.

'Stormwater' means runoff water and entrained contaminants arising from precipitation on the external surface of any structure or any land modified by human action, and that has been collected, channelled, diverted, intensified or accelerated by human intervention. This definition excludes discharges of spilled or deliberately released hazardous substances and/or washdown activities.

Advice Note: With respect to sites or collection areas where stormwater is sourced from land not in the ownership of the Consent Holder (being the SDC), the point of discharge is where the contaminant or water leaves the effective control of the discharger, which includes but is not limited to the point of entry into the SDC stormwater network. It is therefore the responsibility of individual owners and/or occupiers of land, for example

private industrial sites, to ensure that their discharge of stormwater into the SDC stormwater network complies with the above definition of stormwater.

'Stormwater network' 'means the reticulated piped and open network, including kerb and channel, sumps, pipes, swales and manholes; and any stormwater conveyance and mitigation system for which SDC are responsible for operation, maintenance, and upgrade.

'Stormwater treatment system' means a constructed or proprietary device which by function attenuates, detains or treats stormwater.

'Surface water' means water above the ground surface and within a lake, river, artificial watercourse or wetland, but does not include water in the sea, snow or rain or water vapour in the air.

'Tangata Whenua' means representatives of Te Ngai Tuahuriri Runanga, Te Taumutu Runanga and Te Runanga o Ngai Tahu.

Limits

1 The discharge shall be only:

a. Stormwater generated from roofs, roads and hardstand areas (impervious areas) and pervious areas associated with:

i. development that existed prior to the commencement of this consent ('existing sites');

ii. re-development of 'existing sites';

iii. new residential development; and

iv. new commercial development; and

b. Sediment laden discharges generated during maintenance of any Selwyn District Council stormwater infrastructure;

located within the West Melton Stormwater Management Area, as shown on Plan CRC167467 and Schedule CRC167467A, attached to and forming part of this consent.

Advice Note: Selwyn District Council approval is required prior to any activity operating under this consent. Approval is subject to evidence being provided to satisfy Selwyn District Council that the activity will meet the conditions of this consent.

2 Stormwater shall be discharged onto or into land within the Stormwater Management Area shown in Schedule CRC167467A.

Exclusions

3 Notwithstanding Condition (1), discharges from sites in one or more of the following categories are excluded from this consent:

a. Industrial or trade premises as defined in Section (2)(1) of the Resource Management Act 1991;

b. Sites on which activities or industries listed, and which are not excluded by the criteria set out in Schedule CRC167467D, attached to and forming part of this consent;

c. Sites on which the quantity of hazardous substances listed below are stored or handled in a quantity of substance that exceed the following volumes:

   i. Diesel, Petrol, Kerosene 5,000 litres; and

   ii. All other specified hazardous substances 1,000 litres;

d. Sites that have been registered by the Canterbury Regional Council on its Listed Land Use Register (LLUR) as 'not investigated', 'below guideline values for', 'managed for', 'partially investigated', 'significant adverse environmental effects' or 'contaminated for';

e. Sites which hold an existing stormwater discharge consent with current non-compliances;

f. Sites that are located on, or adjacent to, land that has been historically used as a landfill; and

g. Sites for which another stormwater consent is currently held, including the State Highway network.

Advice notes:
(1) Although discharges from the sites listed above may not discharge under this consent, discharges from sites listed above may discharge via the system authorised under this consent provided that a separate resource consent for the site is obtained and the SDC has authorised the discharge into the system.
(2) For the avoidance of doubt, 'industrial and trade premises' excludes those activities defined as a 'commercial service' in the Selwyn District Plan.

Stormwater Management Area

4 If the Consent Holder accepts consented operational stormwater discharges from stormwater networks located outside of the Stormwater Management Area, the Consent Holder shall update Schedule CRC167467A and provide a revised version to the Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance within 20 working days of acceptance of the discharge.

5 The Consent Holder shall review the Stormwater Management Area shown in Schedule CRC167467A at least every five years from commencement of the consent to ensure that it accurately shows:

a. The Stormwater Management Area boundary;

b. The stormwater treatment and disposal systems that discharge operational stormwater under this consent; and

c. All Community Drinking Water Supply Protection Zones within the Stormwater Management Area boundary.

6 If an update to Schedule CRC167467A is required to meet Condition (5), the Consent Holder shall revise and provide the updated Schedule CRC167467A to Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance within 20 working days of the review.

Advice note: An operational stormwater network may be accepted by the Consent Holder after a maintenance period. The Consent Holder holds the right not to accept the stormwater network based on historical compliance, design or at its own discretion, so is not automatically transferred without the written approval of Selwyn District Council.

Stormwater System Design

7 The stormwater network constructed before the commencement of this consent shall be maintained to ensure that stormwater generated under the authority of this consent from all rainfall events up to and including a 24 hour duration 2 percent exceedance probability rainfall event does not enter a habitable building.

8 Stormwater systems designed and constructed after the commencement of this consent shall:

a. Have the capacity to convey and discharge stormwater to land from the contributing catchment for all rainfall events up to and including a critical duration 10 percent annual exceedance probability (AEP) event;

b. Be designed to ensure that stormwater for all rainfall events up to and including a 24 hour duration two percent AEP event does not enter a habitable building as a result of stormwater generated under the authority of this consent; and

c. Not exacerbate flooding on existing sites.

9 Stormwater systems designed and constructed after the commencement of this consent that receive runoff from roads, hardstand areas and/or commercial sites, and that have a stormwater infiltration/discharge system located within any Community Drinking Water Supply Protection Zone or within 50 metres of any well used for domestic supply purposes shall:

a. Include at least one of the following stormwater treatment devices which shall be designed in accordance with recognised New Zealand design guidelines and with Schedule CRC167467B, which forms part of this consent:

i. Treatment swale;

ii. Infiltration basin; and

iii. Detention basin; and

b. Not discharge stormwater to land within 50 metres of any well used for community drinking water supply, and within 20 metres of any other bore used for water abstraction.

Advice notes:
(1) For the purposes of this condition, runoff from commercial sites includes stormwater generated from all areas including pervious areas and roof runoff.
(2) For the purposes of this condition, a stormwater infiltration/discharge system includes but is not limited to treatment swales, infiltration basins, detention basin and soakage pits.
(3) This condition does not apply to residential roof runoff that discharges directly to a soakpit via a sealed system that excludes all other stormwater.

10 At least one month prior to commencement of construction of a stormwater system under this consent within any Community Drinking Water Supply Protection Zone, excluding those located on private property, the Consent Holder shall submit to the Canterbury Regional Council Attention: Regional Leader – Monitoring and Compliance, design plans of the stormwater system to be installed. The design of the stormwater system shall demonstrate compliance with conditions the relevant treatment requirements of Schedule CRC167467B of this consent.

Stormwater Management Plan

11 The Consent Holder shall prepare a Stormwater Management Plan for the West Melton Stormwater Management Area, as shown in Schedule CRC167467A, to demonstrate how the catchments, watercourses, and stormwater infrastructure within the Stormwater Management Area will be managed to avoid, remedy or mitigate adverse effects on the environment, and to ensure the continued and efficient operation of the stormwater network. The Stormwater Management Plan shall include, but not be limited to:

a. Stormwater management objectives;

b. A description of the Stormwater Management Area, including catchment details, watercourses, Community Drinking Water Supply Protection Zones and existing and future land use;

c. Consideration of cultural values;

d. Information on quantity and quality of existing and future stormwater discharges to land and water;

e. A description of the existing stormwater system, including waterways, drainage systems and network infrastructure;

f. A stormwater management strategy, that includes but is not limited to:

    i. Level of Service requirements and design standards for new development;

    ii. Treatment method preferences;

    iii. Mitigation measures;

    iv. Consideration of construction discharges; and

    v. Contingency measures;

g. Plans or processes for implementation of the Stormwater Management Plan;

h. Operations and Maintenance Schedules;

i. Design requirements for new and replacement stormwater systems;

j. Details of the monitoring programmes required by Condition (17); and

k. Reporting requirements and review procedures.

12 The Stormwater Management Plan shall be submitted to Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance, for certification that it complies with Condition (11) within six months of the commencement of this consent.

13 The Consent Holder shall review the Stormwater Management Plan at least every five years from the date of initial certification under Condition (12), and at any other time deemed necessary as a result of changes to legislation or regional rules that may affect the management of stormwater.

14 Any amendments to the Stormwater Management Plan shall not replace the certified version until the amended Stormwater Management Plan has been submitted to Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance, for certification that it complies with Condition (11).

Engagement with Tangata Whenua

15 The Consent Holder shall provide Tangata Whenua an opportunity to contribute to the development and review of the Stormwater Management Plan undertaken in accordance with Condition (13). The Consent Holder shall:

a. Allow at least 30 working days for Tangata Whenua to provide feedback, and shall communicate this timeframe to Tangata Whenua at the start of the process; and

b. Provide Tangata Whenua and Canterbury Regional Council a written response to all Tangata Whenua feedback within 20 working days.

Advice note: 'Tangata Whenua' means the representative(s) of Te Ngai Tuahuriri Runanga, Te Taumutu Runanga and Te Runanga o Ngai Tahu.

Maintenance

16 Stormwater systems within the Stormwater Management Area, excluding those located on private property, shall be maintained in accordance with the SDC Stormwater Maintenance Schedule, Schedule CRC167467C, which forms part of this consent. All swales shall be maintained at the minimum frequency specified for 'urban' swales in the Stormwater Maintenance Schedule. In addition to the maintenance undertaken in accordance with Schedule CRC167467C the following maintenance shall occur:

a. Swales, infiltration basins, and detention basins shall be:

   i. Maintained so that vegetation and/or grass is in a healthy and uniform state, with the exception of seasonal browning off;

   ii. Replanted where erosion or die-off has resulted in bare or patchy soil cover; and

   iii. Where grassed, mown to ensure grass is generally at a length between 40 and 150 millimetres.

b. Hydrodynamic separators shall be inspected at least once annually, and:

   i. Cleaned at least annually or when filled to a depth of at least 200 millimetres with sediment and/or floating hydrocarbons, whichever is the most frequent;

   ii. Cleaned out following any spills; and

   iii. Maintained in accordance with the manufacturers' instructions.

c. Oil interceptors shall be:

   i. Cleaned at least annually;

   ii. Cleaned out following any spills; and

   iii. Maintained in accordance with the manufacturers' instructions.

Monitoring and Performance Standards

17 Where a Community Drinking Water Supply Protection Zone exists within the Stormwater Management Area, the Consent Holder shall prepare a soil and stormwater monitoring programme in accordance with the requirements of Conditions (20) to (26), to investigate the effects of stormwater discharges on groundwater quality and soil quality. The monitoring programme shall assess for and discuss any trends in soil and stormwater quality.

18 The monitoring programme shall be submitted to Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance for certification that it complies with Condition (17) of this consent within six months of the commencement of this consent.

19 The monitoring programme may be amended at any time. Any amendments to the monitoring programme may not replace the certified version until the amended programme has been certified by Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance as complying with the requirements of Condition (17).

20 Soil samples shall be taken from representative infiltration basins, detention basins and swales within each Community Drinking Water Supply Protection Zone, as shown on Schedule CRC167467A:

a. At least once every five years;

b. From a depth of between zero and 50 millimetres below the ground surface at the point of lowest elevation;

c. By a person who has at least a tertiary science or engineering qualification that required the equivalent of at least one year of full-time study and has at least two years environmental investigation professional work experience post-qualification; and

d. In general accordance with Ministry for the Environment (2004) 'Contaminated Land Management Guidelines - Site Investigation and Analysis of Soils'.

21 Soil samples shall be analysed by a laboratory accredited for that method by International Accreditation New Zealand or an equivalent accreditation body:

a. For the following contaminants in milligrams per litre (mg/L) using the United States Environmental Protection Agency method 1312, Synthetic Precipitation Leaching Procedure (SPLP), using reagent water:

i. Copper;

ii. Lead; and

iii. Zinc; and

b. For the following contaminants in in milligrams per kilogram (mg/kg) using total matrix method:

i. Benzo(a)pyrene;

ii. Naphthalene; and

iii. Pyrene.

22 The analyses undertaken in accordance with Condition (21) shall be carried out with detection limits of a maximum of 10 percent of the trigger levels set out in Condition (23).

23 The results of analyses undertaken in accordance with Condition (21) shall be compared against the following trigger concentrations:

Contaminant	Leachate Trigger Concentration (milligrams per litre)	Trigger Concentration (milligrams per kilogram)
Copper	40[1]	
Lead	0.2[1]	
Zinc	30[2]	
Naphthalene		>10,000[3]
Pyrene		>10,000[3]
Benzo(a)pyrene		>10,000[3, 4]

Table references:

(1) 20 x MAV (Maximum Acceptable Value) for determinand of health significance

(2) 20 x GV (Guideline Value) for aesthetic determinand

(3) Guideline value from MfE Oil Industry Guidelines 1999 (Table 4.20)

(4) Benzo[a]pyrene refers to Benzo[a]pyrene only (not Benzo[a]pyrene equivalent concentration).

24 If any of the trigger concentrations listed in Condition (23) are exceeded, the soils shall be considered to be contaminated. Within 60 working days of the Consent Holder receiving the results of analyses showing contaminated soils:

a. Additional sampling shall be carried out to determine the lateral and vertical extent of contamination, with respect only to the contaminant(s) that exceeded a trigger concentration;

b. Additional sampling of two other devices within the same Community Drinking Water Supply Protection Zone shall be carried out in accordance with Conditions (20) to (23), with respect only to the contaminant(s) that exceeded a trigger concentration;

c. All soils identified as contaminated shall be removed; and

d. The affected infiltration basin(s) and/or retention basin(s) and/or attenuation swale(s) shall be reconstructed.

25 Stormwater samples shall be taken from a representative urban road, within the Stormwater Management Area, every five years and test for the following contaminants:

a. Total Suspended Solids;

b. Total Copper;

c. Total Lead;

d. Total Zinc;

e. Total Nitrogen; and

f. Total Petroleum Hydrocarbons

26 The results of analyses undertaken in accordance with Condition (25) shall be compared against previous sampling and any trends discussed in the Annual Report in accordance with Condition (29).

Construction Phase Stormwater Discharges

27 Discharges of sediment laden water during earthworks shall be via best practicable erosion and sediment control measures undertaken to minimise the discharge of sediment-laden stormwater into surface water and private property; and

a. All erosion and sediment control measures shall be constructed and maintained in accordance with Environment Canterbury's Erosion and Sediment Control Guidelines or an equivalent New Zealand industry guideline; and

b. All exposed surfaces shall be stabilised once earthworks are complete or if earthworks of exposed areas is not to be undertaken for a period of 14 days or more.

Disposal of Material

28 Any contaminated material removed, including sediment and hydrocarbons, in the exercising of this consent shall be disposed of at a facility authorised to receive such material.

Recording and Reporting

29 The Consent Holder shall provide an Annual Report to Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance, and to representatives of Te Ngai Tuahuriri Runanga and Te Taumutu Runanga. The report shall detail the following from monitoring undertaken within the prior 12 month period, and shall include:

a. Maintenance works undertaken in accordance with Condition (16);

b. Updates to the monitoring programme developed in accordance with Condition (17);

c. Results of monitoring carried out each year, including;

   i. The name of the person(s) who collected the samples, the date and time the samples were collected;

   ii. The rainfall data associated with stormwater sampling events, including, but not limited to, date, time, duration and rainfall depth of the storm event;

   iii. The laboratory analysis results;

   iv. An interpretation of trends including comparisons to previous years' monitoring; and

   v. Documentation of trigger value exceedances and further action taken in response to exceedances;

d. A summary of any remedial or improvement works carried out to improve the quality of stormwater discharges from each year;

e. A description of any future stormwater system proposals, including retrofitting of existing stormwater systems, to improve the management of stormwater within the Stormwater Management Area as shown on Schedule CRC167467A;

f. Any updated information as a result of further site investigations, including but not limited to the extent of the Stormwater Management Area boundaries, groundwater levels, and a discussion of the implications of the updated information.

Administration

30 The Canterbury Regional Council may, on any of the last five days of September each year, serve notice of its intention to review the conditions of the consent for the purposes of:

a. Dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage;

b. Requiring the Consent Holder to adopt the best practicable option to remove or reduce any adverse effect on the environment; or

c. Requiring the Consent Holder to carry out monitoring and reporting instead of, or in addition to that required by the consent.

Issued at Christchurch on 12 April 2017

Canterbury Regional Council

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Plan CRC167467

N

0 1 2 3 4 Kilometres

Scale: 1:100,000 @A4

Map Created by Environment Canterbury on

Schedule CRC167467A –Stormwater Management Area for West Melton

Schedule CRC167467B – Design of Stormwater Systems

Stormwater Design Parameters

DEVICE	REQUIREMENTS FOR DESIGN AND CONSTRUCTION
Key sump	Shall be fitted with submerged or trapped outlet capable of trapping hydrocarbons
Treatment swale	Shall have a hydraulic residence time of at least nine minutes during design rainfall intensity of 10 millimetres per hour
Infiltration basin	Shall contain and treat all stormwater generated from the first 20 millimetres of rain on in the contributing catchment.
	Shall detain and dispose of all stormwater generated from a 2 percent annual exceedance probability rain event of any duration
	Shall have an infiltration rate not exceeding 112 millimetres per hour and not less than 18 millimetres per hour as determined using a double ring infiltrometer test, or not exceeding 75 millimetres and not less than 12 millimetres per hour as determined using a flooded basin test
	Shall be designed to minimise groundwater mounding where necessary, by oversizing the basin, or constructing multiple basins or other methods
	Shall not have stormwater ponding within it for longer than 72 hours following the cessation of a rainfall event.
Detention basin (including an attenuation swale)	Shall contain and treat all stormwater generated from the first 20 millimetres of rain on the contributing catchment.
	Shall, either alone or in combination with other devices, attenuate flows so that the post development flows do not exceed pre-development flows for events up to a 2 percent annual exceedance probability rain event of any duration.
	Shall be designed to minimise groundwater mounding where necessary, by oversizing the basin, or constructing multiple basins
	Shall not have stormwater ponding within it for longer than 72 hours following the cessation of a rainfall event.
Treatment wetland	Shall attenuate flows, either alone or in combination with other devices, so that the post-

	development peak discharge rate does not exceed the pre-development discharge rate for the 50 percent, 10 percent and 2 percent annual exceedance probability design storm events for durations up to and including 12 hours.
	Shall contain and treat all stormwater generated from the first 20 millimetres of rain on hardstand and roading in the contributing catchment.
	Shall provide an average hydraulic residence time of at least 24 hours
Hydrodynamic separator	Shall be capable of treating at least the flows generated by rainfall of 10 millimetres per hour on the contributing catchment before bypassing
Oil interceptor	Shall be an API or Coalescing Plate type Interceptor, or similar device capable of removing the same or greater amounts of hydrocarbons from stormwater
	Shall be capable of treating at least the flows generated by rainfall of 10 millimetres per hour on the contributing catchment before bypassing
	Shall reduce the concentration of total petroleum hydrocarbons in the discharge to below 15 milligrams per litre averaged over a rainfall event
Outlet structure	Shall minimise scour and erosion
Soakpit	Shall have the base sunk into free draining substrate
	Roof soakpits shall have the capacity as a minimum to dispose of stormwater generated on the contributing catchment by the ten percent annual exceedance probability one hour duration storm.
	Roof soakpits shall have the base no deeper than the highest groundwater level reasonably expected at the site.

Selwyn District Council STANDARD STORMWATER MAINTENANCE SCHEDULE

Task	Minimum frequency of maintenance visit					
	Sumps			Swales		Infiltration and dry basins
	Key sumps	Non-key sumps	To soakage chambers	Urban	Rural-residential	
Removal of debris, and litter likely to adversely affect the operation of the system, within 10 working days of the maintenance visit	Yearly	Two Yearly	Yearly	6 monthly	Yearly	6 monthly
Removal of sediment likely to adversely affect the operation of the system, within 10 working days of the maintenance visit	Yearly	Two Yearly	Yearly	N/A	N/A	N/A
Removal of hydrocarbons that are visible over a total area of greater than 0.5 square metres (swales and basins) or a layer greater than 5 millimetres thick (sumps), within 10 working days of the maintenance visit	N/A	N/A	6 monthly	6 monthly	Yearly	6 monthly
Repair or stabilisation of erosion and scour, within 20 working days of the maintenance visit	N/A	N/A	N/A	6 monthly	Yearly	6 monthly
Replanting, where bare or patchy soil cover or sediment build up is greater than 10 square metres, or a total of five percent of the area of the device, whichever is the lesser, within 10 working days of the maintenance visit	N/A	N/A	N/A	6 monthly	Yearly	6 monthly
Weed control	N/A	N/A	N/A	6 monthly	Yearly	6 monthly

Schedule 3 Hazardous Industries and Activities

A. Chemical manufacture, application and bulk storage

1. Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application
2. Chemical manufacture, formulation or bulk storage
2. Commercial analytical laboratory sites
3. Corrosives including formulation or bulk storage
4. Dry-cleaning plants including dry-cleaning premises or the bulk storage of dry-cleaning solvents
5. Fertiliser manufacture or bulk storage
6. Gasworks including the manufacture of gas from coal or oil feedstocks
7. Livestock dip or spray race operations
8. Paint manufacture or formulation (excluding retail paint stores)
9. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds
10. Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application
11. Pesticide manufacture (including animal poisons, insecticides, fungicides or herbicides) including the commercial manufacturing, blending, mixing or formulating of pesticides
12. Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground
13. Pharmaceutical manufacture including the commercial manufacture, blending, mixing or formulation of pharmaceuticals, including animal remedies or the manufacturing of illicit drugs with the potential for environmental discharges
14. Printing including commercial printing using metal type, inks, dyes, or solvents (excluding photocopy shops)
15. Skin or wool processing including a tannery or fellmongery, or any other commercial facility for hide curing, drying, scouring or finishing or storing wool or leather products
16. Storage tanks or drums for fuel, chemicals or liquid waste
17. Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside

B. Electrical and electronic works, power generation and transmission

1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)
2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment
3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices

4. Power stations, substations or switchyards

C. Explosives and ordinances production, storage and use

1. Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging
2. Gun clubs or rifle ranges, including clay targets clubs that use lead munitions outdoors
3. Training areas set aside exclusively or primarily for the detonation of explosive ammunition

D. Metal extraction, refining and reprocessing, storage and use

1. Abrasive blasting including abrasive blast cleaning (excluding cleaning carried out in fully enclosed booths) or the disposal of abrasive blasting material
2. Foundry operations including the commercial production of metal products by injecting or pouring molten metal into moulds
3. Metal treatment or coating including polishing, anodising, galvanising, pickling, electroplating, or heat treatment or finishing using cyanide compounds
4. Metalliferous ore processing including the chemical or physical extraction of metals, including smelting, refining, fusing or refining metals
5. Engineering workshops with metal fabrication

E. Mineral extraction, refining and reprocessing, storage and use

1. Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
2. Asphalt or bitumen manufacture or bulk storage (excluding single-use sites used by a mobile asphalt plant)
3. Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process
4. Commercial concrete manufacture or commercial cement storage
5. Coal or coke yards
6. Hydrocarbon exploration or production including well sites or flare pits
7. Mining industries (excluding gravel extraction) including exposure of faces or release of groundwater containing hazardous contaminants, or the storage of hazardous wastes including waste dumps or dam tailings

F. Vehicle refuelling, service and repair

1. Airports including fuel storage, workshops, washdown areas, or fire practice areas
2. Brake lining manufacturers, repairers or recyclers
3. Engine reconditioning workshops
4. Motor vehicle workshops
5. Port activities including dry docks or marine vessel maintenance facilities
6. Railway yards including goods-handling yards, workshops, refuelling facilities or maintenance areas
7. Service stations including retail or commercial refuelling facilities
8. Transport depots or yards including areas used for refuelling or the bulk storage of hazardous substances

G. Cemeteries and waste recycling, treatment and disposal

1. Cemeteries
2. Drum or tank reconditioning or recycling
3. Landfill sites
4. Scrap yards including automotive dismantling, wrecking or scrap metal yards
5. Waste disposal to land (excluding where biosolids have been used as soil conditioners)
6. Waste recycling or waste or wastewater treatment

H. Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment.

I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

Exercising of resource consent CRC167467

It is important that you notify Environment Canterbury when you first start using your consent.

GRANTED TO: Selwyn District Council
A DISCHARGE PERMIT (S15): to discharge contaminants into and onto land
LOCATION: West Melton, Selwyn

Even if the consent is replacing a previous consent for the same activity, you need to complete and return this page.

Providing this information will:

- Validate your consent through to its expiry date
- Minimise compliance monitoring charges
- Help provide an accurate picture of the state of the environment.

If consent CRC167467 is not used before 30 Jun 2022 this consent will lapse and no longer be valid.

Declaration:

I have started using this resource consent.

Action taken: (e.g. pasture irrigated, discharge from septic tank/boiler/spray booth etc).

_____

Approximate start date (***Note: this may be different to the date the consent was granted)***: _____

Signed: _____ **Date:** _____

Full name of person signing (please print**):** _____

Please return to:

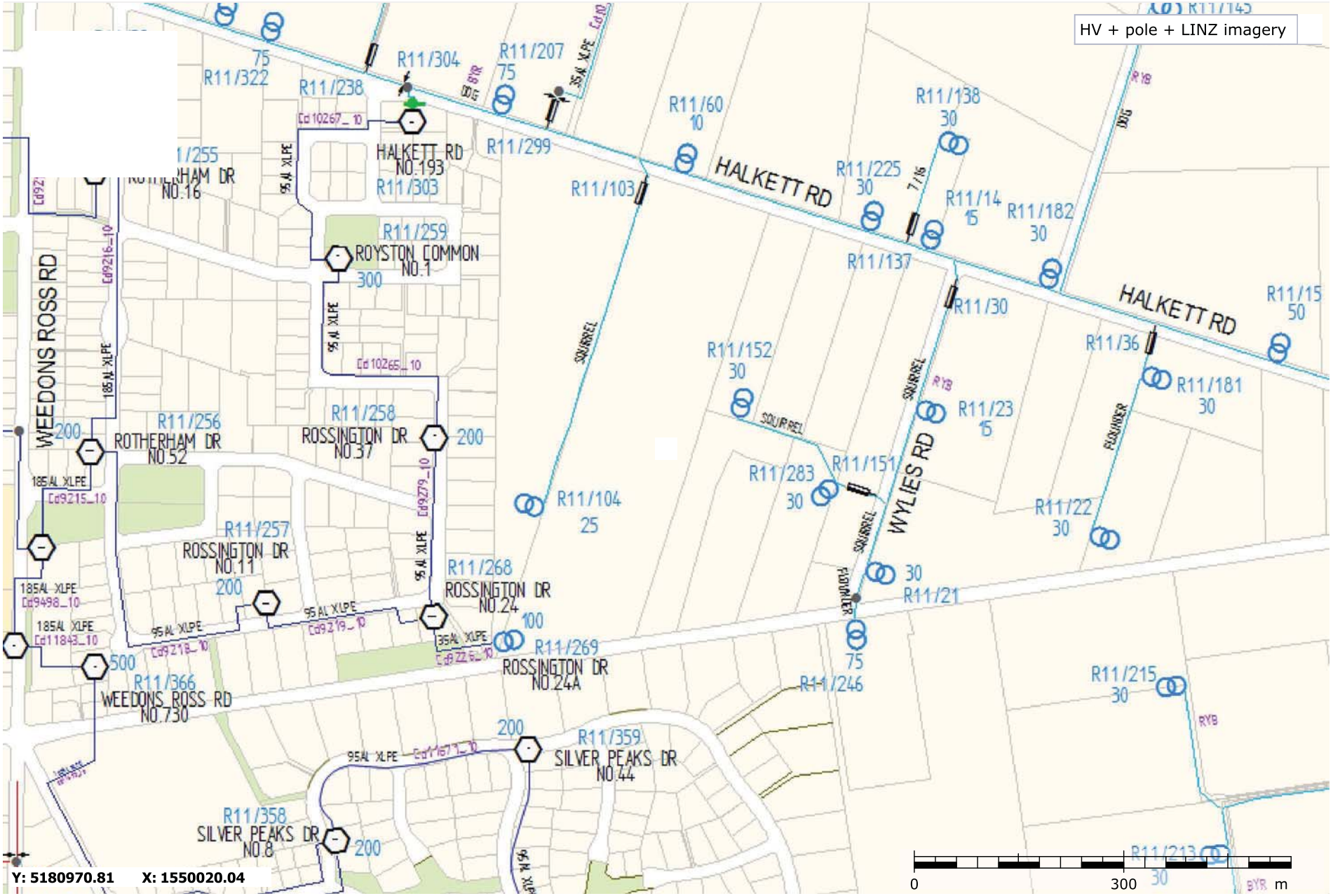
Environmental Protection - Administration
Environment Canterbury
PO Box 345
Christchurch 8140

File: CRC167466

APPENDIX F -Power Supply Plan and Correspondence

1: 7200

1066 West Coast Road West Melton



Jamie Verstappen

From: David Wear <davidwear@xtra.co.nz>
Sent: Monday, 25 June 2018 3:53 p.m.
To: Jamie Verstappen
Subject: Fw: 1066 West Coast Road Inquiry
Attachments: West Coast Rd 1066 ex HV supply.pdf

Hi Jamie
Should not be a problem.
200 lots=1MVA of load 4-5 kiosks on new roads (standard res. size lots similar to adj Rossington Dr Rotheram Dr they did).

The HV conductors(DOG large CSA) are on the north side of Halkett Rd so HV cable network, in & out would be required from these to kiosks.

If you need formal confirmation (later on), Orion will provide this.

The Farm presently has an OH HV line to a 25kVA pole sub (to be removed).

Regards Dave Wear
Design-Net Ltd
Ph3799937

From: Jamie Verstappen
Sent: Monday, June 25, 2018 3:23 PM
To: davidwear@xtra.co.nz
Subject: FW: 1066 West Coast Road Inquiry

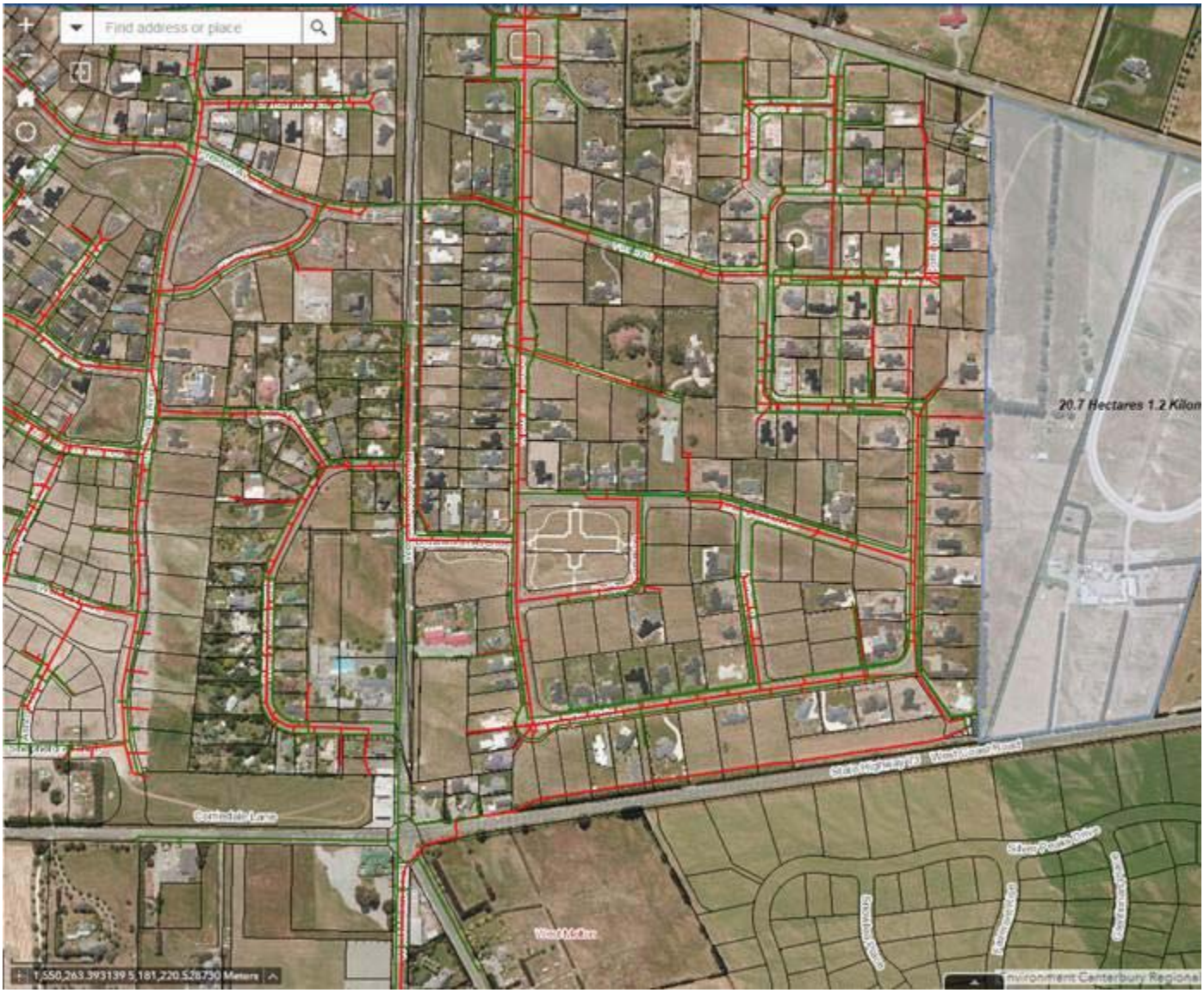
Hi Dave

Hughes are looking at the block of land below for development.

Can you have a quick look into the local power supply and provide comment on the installation/upgrade work required for a development density of 10 lots/ha (200 Lots total).

No layout available yet.

Regards
Jamie



Jamie Verstappen | Civil Engineer

Davie Lovell-Smith Ltd
Planning Surveying Engineering
PO Box 679 | Christchurch | Phone (03) 379 0793 | www.dls.co.nz

Private Plan Change Request – Hughes Developments Limited
Appendix B – Geotechnical Investigations

ENGEO

Expect Excellence

Geotechnical Investigation

163 Halkett Road

West Melton

Submitted to:

Hughes Developments Ltd

Canterbury

ENGEO Limited
124 Montreal Street, Sydenham, Christchurch 8023
PO Box 373, Christchurch 8140, New Zealand
Tel +64 3 328 9012 Fax +64 3 328 9013
www.engeo.co.nz

03.07.2017
14088.000.000_02

ACENZ

Contents

Tables

Figures

Appendices (at the rear of this report)

ENGEO Document Control:

Report Title	Geotechnical Investigation - 163 Halkett Road, West Melton			
Project No.	14088.000.000	Doc ID	02	
Client	Hughes Developments Ltd	Client Contact	Kelvin Back	
Distribution (PDF)	Kelvin Back – kelvin@hughesdevelopments.co.nz			
Date	Revision Details/Status	WP	Author	Reviewer
03/07/17	Final	BK	LF	GM

1 Introduction

ENGEO Ltd was requested by Hughes Developments Ltd to undertake a geotechnical investigation for the proposed subdivision at 163 Halkett Road, as outlined in our proposal (ref. P2016.000.248, dated 15 June 2017).

The purpose of this investigation was to determine a geological model of the site; assess the likely future land performance; comment on the suitability of the site for residential subdivision; address the requirements of Section 106 of the Resource Management Act (RMA); and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases.
- Undertake a geotechnical site walkover.
- Undertake 11 hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics.
- Organise and technically supervise the excavation of 12 test pits, including geotechnical logging of the exposed soils.
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision. This will include geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and address likely geohazards as required by Section 106 of the RMA.

2 Site Description

The site covers an area of 8.317 ha and has a legal description of Lot 1 DP 34902 BLK XI Rolleston SD (Selwyn District Council). It is located to the north-eastern of West Melton with residential properties immediately to the west and rural lots to the east. The property spans between Halkett Road to the north and West Coast Road to the south (Figure 1).

Figure 1: Site Location Plan

Image sourced from Google Maps (July 2017), not to scale.

The site is currently used predominantly as pasture, with three utility sheds located near the central portion of the site. It is predominantly flat, with undulations representing old stream channels. Near the northern side of the site the broad undulations measure up to 2 m high, while near the southern side of the site these are typically 0.5 to 1 m high.

The Canterbury Earthquake Recovery Authority (CERA, now disestablished) has categorised the site as 'N/A Rural & Unmapped', meaning future development can proceed following normal consenting processes.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by beach sand or river sand dunes.

3.2 ECan Boreholes

A review of three deep ECan borehole logs located to the north (M35/10753), west (M35/10751) and east (M35/9443 and M35/5159) of the site was conducted. The locations of these boreholes are presented in Figure 2. While borehole M35/1013 is located on site, there is no data for this borehole.

Figure 2: Nearby ECan Borehole Locations

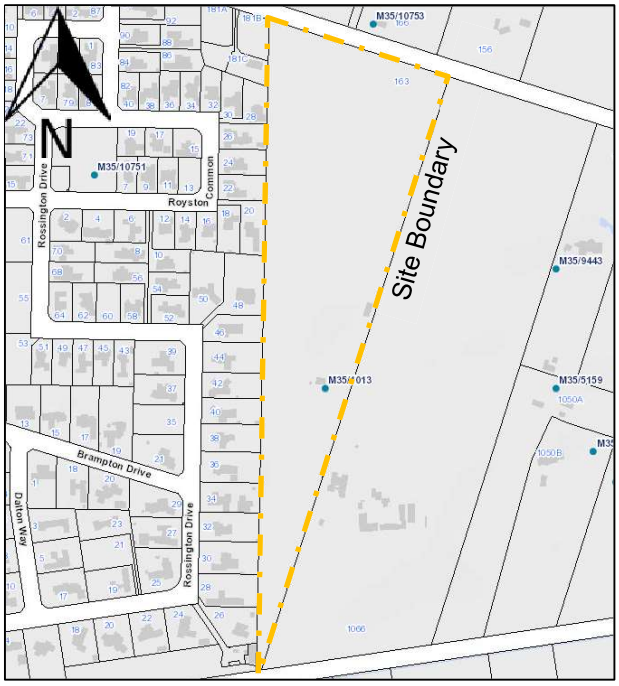


Image sourced from Canterbury Maps (retrieved June 2017).

The borehole logs indicate interbedded sandy gravel and claybound gravel from the surface through to the maximum depth of 78 m.

3.3 Groundwater

Groundwater is recorded within the ECan boreholes discussed above, at depths between 21 m and 24 m below ground level.

3.4 Geomorphology

As evident on aerial imagery (Canterbury Maps, 2016) and observed during our site walkover conducted on 28 June 2017, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast trend. Based on observations, silt and sand deposits with variable thickness (up to 0.8 m) are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

3.5 Geohazards

3.5.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located north of two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 6 km south of the site and trends roughly east-west with a surface rupture of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have occurred at a depth of 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass-Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250-300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.5.2 Liquefaction and Lateral Spreading

The site is located within an area mapped as 'damaging liquefaction unlikely' (NZGD Map CGD5140, 2012).

4 Site Investigation

4.1 Subsurface Investigations

ENGEO undertook site investigations to assess the shallow subsurface material types and strength characteristics on 28 June 2017. The investigations comprised 11 hand auger boreholes with associated Scala Penetrometer tests, and 12 test pit excavations.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1.

Table 1: Generalised Summary of Subsurface Conditions

Soil Type	Depth to Top of Layer (m)	Layer Thickness (m)	Consistency / Density	Comment
Silt [Topsoil]	0	0.2 to 0.5	Soft to Firm	-
Silt and Sand	0.2 to 0.5	0.1 to 0.5	Soft to Very Stiff / Loose to Medium Dense	No present in all layers
Gravel	0.2 to 0.8	>1.8	Medium Dense to Dense	-

"Good ground" (as defined in NZS 3604:2010) under static conditions was typically encountered below 0.6 m depth.

Test locations are shown on the site plan presented in Appendix 1. Hand auger borehole and test pit logs are presented in Appendices 2 and 3.

4.2 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a 'deep soft soil site'.

5 Liquefaction Assessment

Based on our site investigation and observations, and owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider the site of the proposed subdivision to have Technical Category 1 (TC1) future land performance whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

6 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if the land is likely to be subject to the following:

- Erosion, including surface and subsurface erosion, associated with water and wind.
- Falling debris, including rockfall that could impact the site from upslope sources.
- Subsidence, which involves the removal of underlying support by natural or artificial means.
- Slippage, which is defined as the downslope transfer of materials by sliding and / or flowage.
- Inundation, which may be sourced from streams, coastal processes or excess precipitation.

Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to any of the above hazards and, as such, the site is considered suitable for subdivision from a geotechnical perspective.

7 Geotechnical Recommendations

7.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earthfilling for Residential Development. In particular, any areas to receive fill should be stripped of any vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean natural sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2:1 and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination of 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and an inspection / testing regime agreed, along with a robust erosion and sediment control plan.

7.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the natural ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas.

7.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

7.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise pad, strip or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 200 kPa may be assumed for foundations bearing on natural soils or engineered fill, below any topsoil. We anticipate this to be typically below 0.2 m depth based on our subsurface investigations. Greater capacity may be available across many Lots and will be confirmed during building consent testing. Alternatively, a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for bearing on the underlying gravels, typically encountered below 0.6 m depth.

8 References

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9 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Lauren Foote

Engineering Geologist

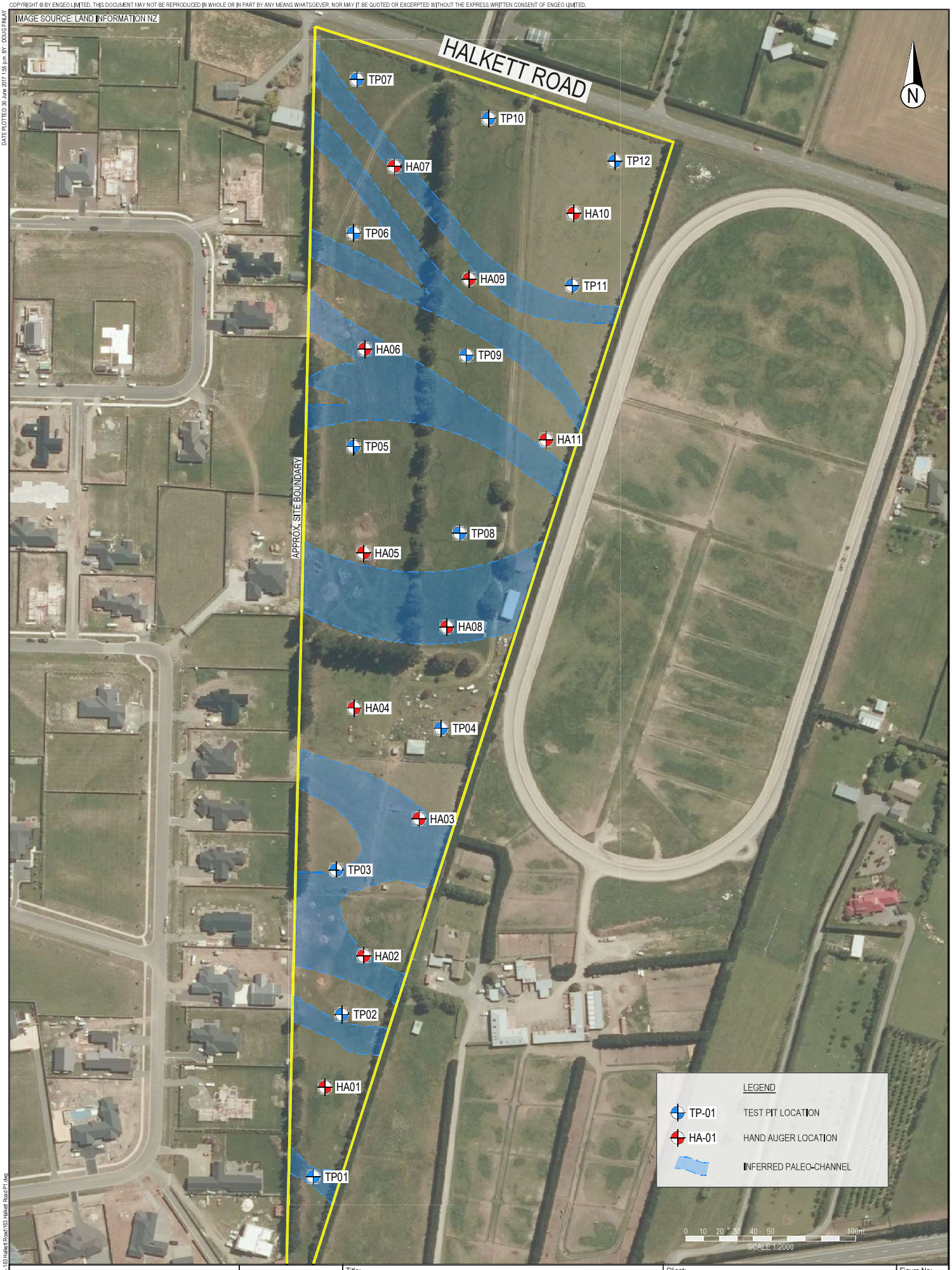
Report reviewed by

Greg Martin, PEngGeol

Principal Engineering Geologist

APPENDIX 1:

Site Location Plan



ENGEO
Expect Excellence

Christchurch Office
124 Montreal Street
Sydenham, Christchurch 8023
Tel: 03 328 9012
www.engeo.co.nz

Title: TEST LOCATION PLAN

Client: HUGHES DEVELOPMENTS			Figure No: 1
Project: 163 Halkett Road, West Melton, Selwyn District	Designed: LF		
	Drawn: ADF		
	Checked: -		
	Date: 15.06.17		Size: A3
Proj No: 14088.000.000	Scale: 1:2000		Rev: 0

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

Hand Auger Borehole Logs

LOG OF AUGER HA01

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : EG/RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			W	S		
	A	ML	SILT with trace sand; greyish brown. Low plasticity.				F		
			End of Hole Depth: 0.4 m Termination Condition: Practical refusal						

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12; >> at 0.4 m

Depth (m): 0.5, 1.0, 1.5, 2.0

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered
A = ALLUVIUM

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA02

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : EG/RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			W	S	
	A	SP	Fine to medium SAND; grey. Poorly graded.				MD	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal					

Scala Penetrometer
Blows per 100mm
2 4 6 8 10 12
>>

0.5
1.0
1.5
2.0

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.3 m depth.
Standing groundwater was not encountered
A = ALLUVIUM

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA03

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : EG/RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			W	S	
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

2.0

Hand auger met practical refusal at 0.2 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA04

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F	
	A	ML	SILT with trace sand and gravel; greyish brown. Low plasticity.				F-St	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								
1.5								
2.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered
A = ALLUVIUM

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA05

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal						
0.5									
1.0									
1.5									
2.0									

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12; >>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA06

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : EG/RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with trace sand and rootlets; brown. [TOPSOIL].			W	S	
	A	ML	SILT with trace sand; brownish grey. Low plasticity.				S	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

0.5

1.0

1.5

2.0

Hand auger met practical refusal at 0.3 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

TS = TOPSOIL
A = ALLUVIUM

LOG OF AUGER HA07

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. [TOPSOIL].				S-F	
	ALLUVIUM	ML	SILT with trace sand; brownish grey. Low plasticity.			M	S-St	
0.5		SP	Fine to medium SAND with trace gravel; brownish grey. Poorly graded.			W	L-MD	
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

1.0

1.5

2.0

Hand auger met practical refusal at 0.6 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA08

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.4 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. [TOPSOIL].				S-F	
	ALLUVIUM	ML	SILT with trace sand; brownish grey. Low plasticity.			M	S-F	
0.5			End of Hole Depth: 0.4 m Termination Condition: Practical refusal					
1.0								
1.5								
2.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.4 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

LOG OF AUGER HA09

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown [TOPSOIL].				S-F	
	ALLUVIUM	ML	SILT with trace sand; brownish grey. Low plasticity.			M	S-St	
		SP	Fine to medium SAND with trace gravel; brownish grey. Poorly graded.				L-MD	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.9 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA10

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : RP/EG
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TS	ML	SILT with trace rootlets; brown. Low plasticity [TOPSOIL].				S	
	ALLUVIUM	ML	SILT with minor sand; brownish grey. Low plasticity. Sand, fine, poorly graded.			W	S	UTP
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								
1.5								
2.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

LOG OF AUGER HA11

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Client Ref. :
Date : 28/06/17
Hole Depth : 0.7 m
Hole Diameter : 50 mm

Shear Vane No :
Logged By : EG/RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].				S	
0.5	ALLUVIUM	SP	Fine to medium SAND with trace silt; brownish grey with orange mottles. Poorly graded. Sand becomes minor at 0.5 m depth.			W	L-MD	
			End of Hole Depth: 0.7 m Termination Condition: Practical refusal					

Scala Penetrometer
Blows per 100mm
2 4 6 8 10 12
>>

Hand auger met practical refusal at 0.7 m depth on inferred gravel.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGERS.GPJ NZ DATA TEMPLATE 2.GDT 29/6/17

APPENDIX 3:

Test Pit Excavation Logs

LOG OF TEST PIT TP01

ENGEO Expect Excellence

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 1.2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some cobbles and sand; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			W	MD-D		
1.0				Depth of Excavation: 1.2 m Termination Condition: Practical refusal						
1.5										
2.0										

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met practical refusal due to cobbles.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP02

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd **Shear Vane No** :
Date : 28/06/17 **Logged By** : RP
Max Test Pit Depth : 2 m **Reviewed By** : LF
Digger Type/Size : Bucket Excavator **Latitude** :
Bucket Type/Size : **Longitude** :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with minor sand, trace gravel and rootlets; brown. Low plasticity. Sand, fine to medium, poorly graded [TOPSOIL].			M	S-F		2 4 6 8 10 12
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			W	MD-D		
1.0										
1.5				Some cobbles encountered from 1.8 m depth.						
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

LOG OF TEST PIT TP03

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].				S-F		
0.5	ALLUVIUM		SP	Fine to medium SAND with trace silt and gravel; greyish brown. Poorly graded.				MD-D		
1.0			GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			M	MD-D		
1.5				Some cobbles encountered from 1.4 m depth.						
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

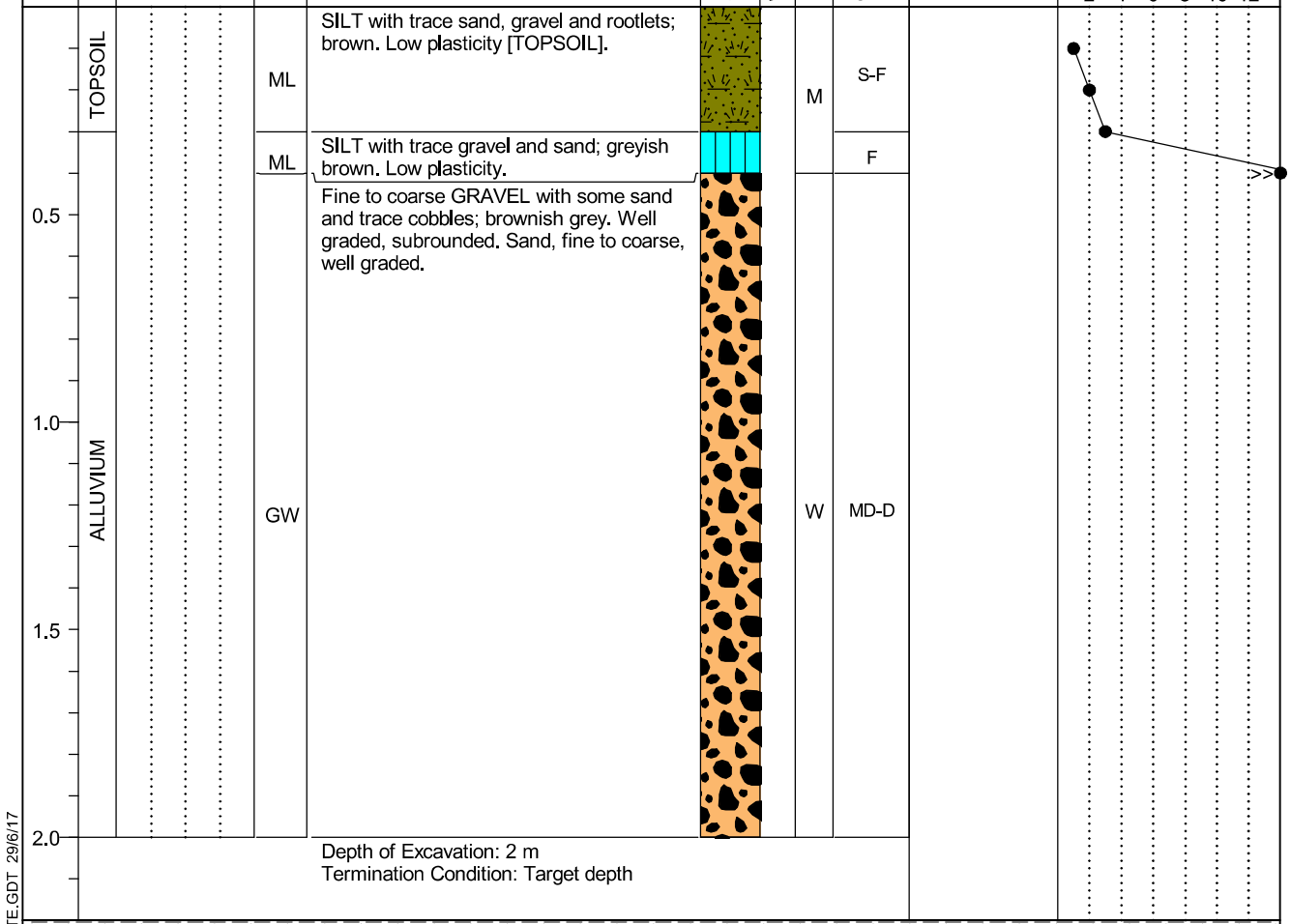
Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP04

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd **Shear Vane No** :
Date : 28/06/17 **Logged By** : RP
Max Test Pit Depth : 2 m **Reviewed By** : LF
Digger Type/Size : Bucket Excavator **Latitude** :
Bucket Type/Size : **Longitude** :



Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

LOG OF TEST PIT TP05

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL		ML	SILT with trace sand, gravel and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		
0.3	ALLUVIUM		ML	SILT with trace gravel and sand; greyish brown. Low plasticity.				F		
0.5			GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			W	MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP06

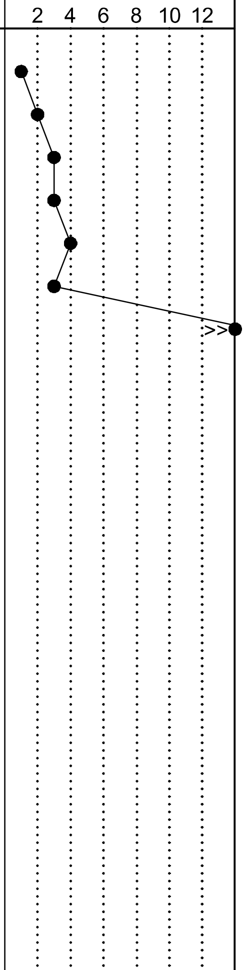
ENGEO — Expect Excellence

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :
Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)
0.0–0.3	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].		M	S-F	
0.3–0.8	ALLUVIUM		SM	Silty fine to medium SAND; greyish brown. Poorly graded.		M	MD	
0.8–2.0	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand, trace cobbles and silt; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded. Some cobbles encountered from 1.5 m depth.		W	MD-D	
2.0				Depth of Excavation: 2 m Termination Condition: Target depth				

Scala Penetrometer — Blows per 100mm



Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

LOG OF TEST PIT TP07

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 1.5 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].						
0.5	ALLUVIUM		ML	SILT with trace gravel and sand; greyish brown. Low plasticity.			M			
1.0			GW	Fine to coarse GRAVEL with some sand, cobbles and trace silt; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			W			
1.5				Depth of Excavation: 1.5 m Termination Condition: Practical refusal						
2.0										

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met practical refusal at 1.5 m depth due to cobbles.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP08

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd **Shear Vane No** :
Date : 28/06/17 **Logged By** : RP
Max Test Pit Depth : 2 m **Reviewed By** : LF
Digger Type/Size : Bucket Excavator **Latitude** :
Bucket Type/Size : **Longitude** :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		
0.3	ALLUVIUM		ML	SILT with trace sand; greyish brown. Low plasticity.				S-F		
0.5			GW	Fine to coarse GRAVEL with some sand and minor cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			W	MD-D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP09

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd **Shear Vane No** :
Date : 28/06/17 **Logged By** : RP
Max Test Pit Depth : 2 m **Reviewed By** : LF
Digger Type/Size : Bucket Excavator **Latitude** :
Bucket Type/Size : **Longitude** :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].				S-F		
			GW	Fine to coarse GRAVEL with some sand, minor cobbles, trace silt and organics; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.				MD		
0.5	ALLUVIUM			Fine to coarse GRAVEL with some sand and minor cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.						
1.0							W			
			GW					MD-D		
1.5				Some cobbles encountered from 1.3 m depth.						
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP10

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 2 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].				S-F		
0.5	ALLUVIUM		ML	SILT with minor sand; greyish brown. Low plasticity. Sand, fine to medium, poorly graded.				F-VSt		
1.0			GW	Fine to coarse GRAVEL with some sand and trace cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse, well graded.			M	MD-D		
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met target depth at 2.0 m depth.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP11

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd **Shear Vane No** :
Date : 28/06/17 **Logged By** : RP
Max Test Pit Depth : 1.6 m **Reviewed By** : LF
Digger Type/Size : Bucket Excavator **Latitude** :
Bucket Type/Size : **Longitude** :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		2 4 6 8 10 12
			ML	SILT with trace gravel and sand; greyish brown. Low plasticity.				S-F		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand and cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse.			W	MD-D		
1.0										
1.5				Depth of Excavation: 1.6 m Termination Condition: Practical refusal						
2.0										

Excavator met practical refusal at 1.6 m depth due to cobbles.
Scala Penetrometer met practical refusal

GEOSCIENCE TEST PIT LOG TEST PITS.GPJ NZ MASTER DATA TEMPLATE.GDT 29/6/17

LOG OF TEST PIT TP12

Geotechnical Investigation
163 Halkett Road
West Melton
14088

Client : Hughes Developments Ltd
Date : 28/06/17
Max Test Pit Depth : 1.4 m
Digger Type/Size : Bucket Excavator
Bucket Type/Size :

Shear Vane No :
Logged By : RP
Reviewed By : LF
Latitude :
Longitude :

Depth (m)	Material	Excavatability (Relative Scale) Easier–Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace sand and rootlets; brown. Low plasticity [TOPSOIL].			M	S-F		
			ML	SILT with trace gravel and sand; greyish brown. Low plasticity.				S-F		
0.5	ALLUVIUM		GW	Fine to coarse GRAVEL with some sand and cobbles; brownish grey. Well graded, subrounded. Sand, fine to coarse.			W	MD-D		
1.0										
1.5				Depth of Excavation: 1.4 m Termination Condition: Practical refusal						
2.0										

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met practical refusal at 1.4 m depth due to cobbles.
Scala Penetrometer met practical refusal

Private Plan Change Request – Hughes Developments Limited
Appendix B – Geotechnical Investigations

ENGEO

Expect Excellence

Geotechnical Investigation

1066 West Coast Road

West Melton

Canterbury

Submitted to:

Hughes Development Ltd

ENGEO Limited
124 Montreal Street, Sydenham, Christchurch 8023
PO Box 373, Christchurch 8140, New Zealand
Tel +64 3 328 9012 Fax +64 3 328 9013
www.engeo.co.nz

20.07.2018
15184.000.000_01

ACENZ

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Tables

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Appendices

ENGEO Document Control:

Report Title	Geotechnical Investigation - 1066 West Coast Road, West Melton			
Project No.	15184.000.000	Doc ID	01	
Client	Hughes Development Ltd	Client Contact	Kelvin Back	
Distribution (PDF)	Kelvin Back – kelvin@hughesdevelopments.co.nz			
Date	Revision Details/Status	WP	Author	Reviewer
20/07/2018	Final	BK	HB	DB

1 Introduction

ENGEO Ltd was requested by Hughes Development Ltd to undertake a geotechnical investigation for the proposed subdivision at 1066 West Coast Road in West Melton, as outlined in our variation proposal (ref. P2018.001.093, dated 28 June 2018).

The purpose of this investigation was to determine a geological model of the site; assess the likely future land performance; comment on the suitability of the site for residential subdivision; address the requirements of Section 106 of the Resource Management Act (RMA); and provide recommendations for subdivision works and foundations for typical timber framed residential dwellings.

Our scope of works included the following:

- Complete a desktop study of relevant available geotechnical and geological publications, including the NZ Geotechnical and Environment Canterbury Databases.
- Undertake a geotechnical site walkover.
- Undertake 17 hand auger boreholes with associated Scala penetrometer tests to assess the near surface material types and strength characteristics.
- Organise and technically supervise the excavation of 15 test pits, including geotechnical logging of the exposed soils.
- Preparation of this report outlining our findings on the ground conditions and the suitability of the site for residential subdivision. This includes the provision of geotechnical advice on the likely foundation Technical Category, conceptual foundation recommendations for typical timber framed residential dwellings, and assess likely geohazards as required by Section 106 of the RMA.

2 Site Description

The site covers a total area of 12.36 ha, and has the legal description of Lot 1 DP 34902 (Selwyn District Council). It is understood that the site is proposed to be subdivided into residential lots.

The site is located approximately 800 m east of West Melton town centre, and is bound to the south by West Coast Road (State Highway 73), to the north by Halkett Road and by rural properties on all remaining sides (Figure 1).

Figure 1: Site Location Plan

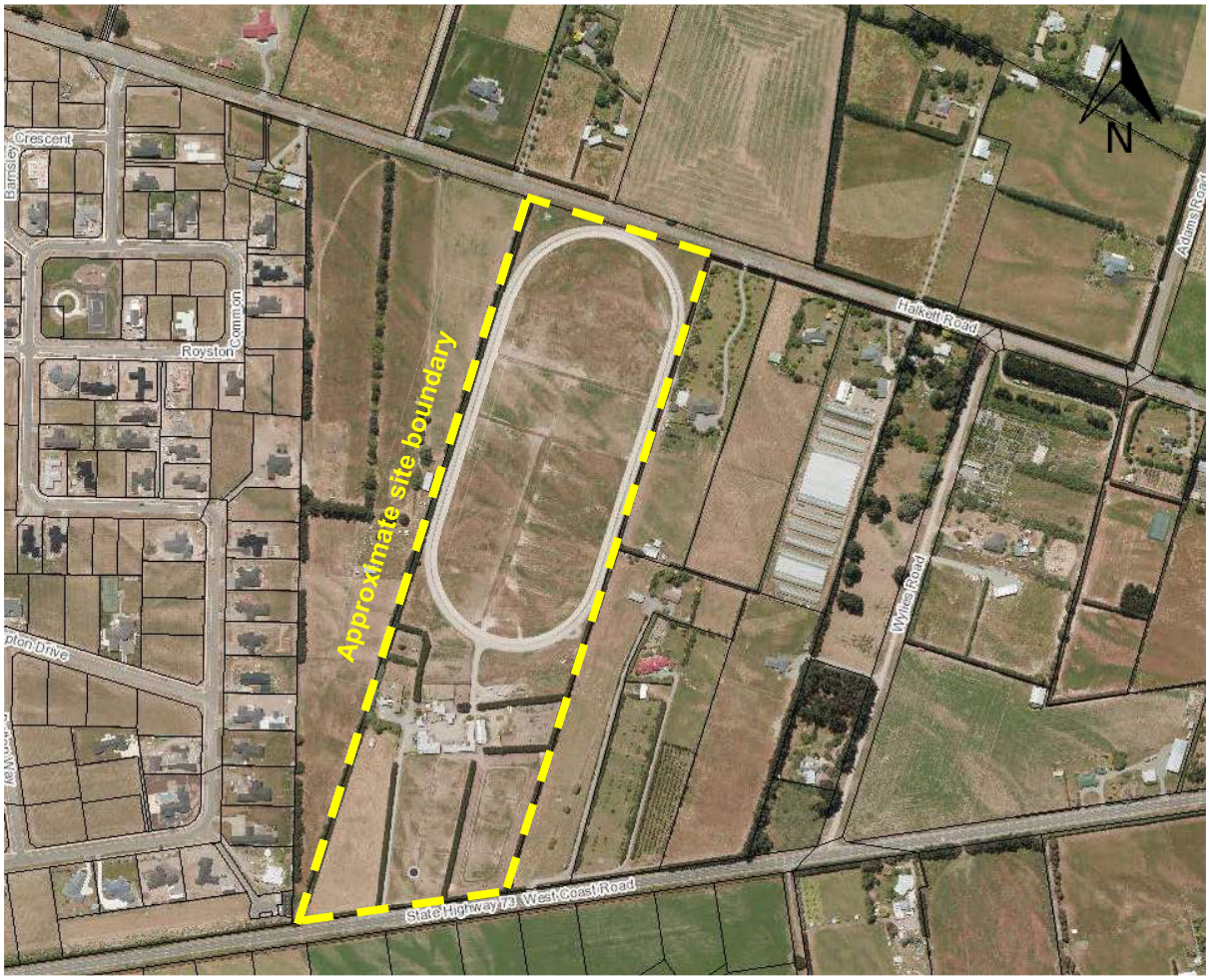

Image sourced from Canterbury Maps, not to scale.

The site is currently used for raising and training horses, with a race track covering the northern two thirds of the property. The southern third of the site has stables and pasture, with a two storey dwelling located toward the centre of the site. It is predominantly flat, with undulations representing old stream channels.

The Canterbury Earthquake Recovery Authority (CERA, now disestablished) has categorised the site as 'N/A Rural & Unmapped', meaning future development can proceed following normal consenting processes.

3 Geological Model

3.1 Regional Geology

The site has been regionally mapped by GNS (Forsyth et al., 2008) as being underlain by beach sand or river sand dunes.

3.2 ECan Boreholes

A review of four deep ECan borehole logs located to the east (M35/9443 and M35/5159), west (M35/10751) and northwest (M35/10753) of the site was conducted. The locations of these boreholes are presented in Figure 2.

Figure 2: Nearby ECan Borehole Locations

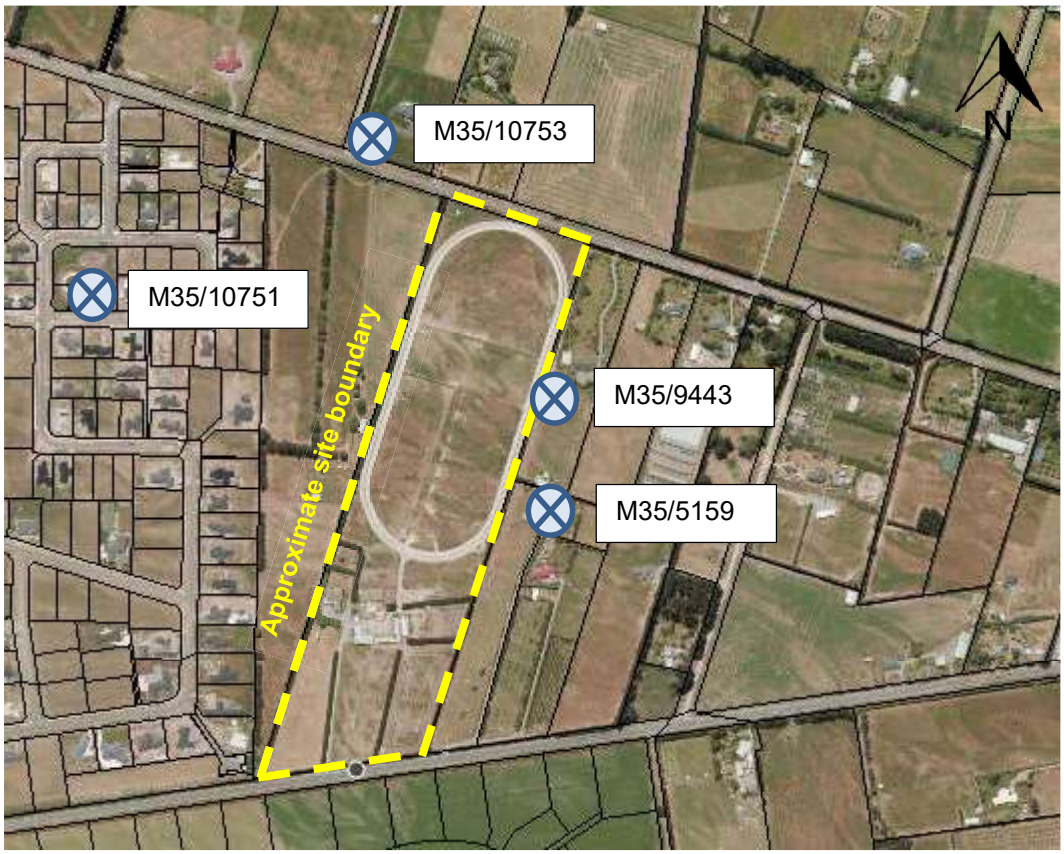

Image sourced from Canterbury Maps, not to scale.

The borehole logs indicate interbedded sandy gravel and clay-bound gravel from the surface through to the maximum depth of 78 m.

3.3 Groundwater

Groundwater is recorded within the ECan boreholes discussed above, at depths between 21 m and 24 m below ground level

3.4 Geomorphology

As evident on aerial imagery (Canterbury Maps) and observed during our site walkover conducted on 10 July 2018, undulating and depressed ground can be attributed to paleo-channels, which traverse the site in a general northwest to southeast trend. Based on observations, silt and sand deposits with variable thickness (up to 1.8 m) are expected to have in-filled the paleo-channels where they have not remained as channel features. Inferred paleo-channels have been mapped to give an indication of areas with potential channel in-fill (Appendix 1).

3.5 Geohazards

3.5.1 Seismicity

There are no known or mapped faults in the immediate area of the site, however the site may be at risk of ground shaking induced by movement of proximal or distal faults.

The site is located north of two recently discovered fault systems, the Greendale Fault and the Port Hills Fault, the ruptures of which initiated the ongoing Canterbury Earthquake Sequence (CES). The Greendale Fault has been mapped approximately 6 km south of the site and trends roughly east-west with a surface rupture of approximately 28 km (GNS, 2015), while the Port Hills Fault remains unmapped as the fault did not rupture at the surface. Movement on the Port Hills Fault is believed to have occurred at a depth of 1 km to 2 km below ground surface.

Large regional areas of faulting (GNS, 2015) namely the Ashley Fault, Porters Pass-Amberley Fault Zone, and the Hope and Alpine Faults, are further afield but present a high seismic hazard to the Christchurch area due to the anticipated size of earthquakes generated. The largest of these faults is the Alpine Fault, which has a return period of 250-300 years and is expected to produce a M8 earthquake. The last rupture on the Alpine Fault is believed to have occurred in 1717 (Pettinga et al., 2001).

3.5.2 Liquefaction and Lateral Spreading

The site is located within an area mapped as 'damaging liquefaction unlikely' (NZGD Map CGD5140, 2012).

4 Site Investigation

4.1 Subsurface Investigations

ENGEO undertook site investigations to assess the shallow subsurface material types and strength characteristics on 10 June and 11 June 2018. The investigations comprised 17 hand auger boreholes with associated Scala Penetrometer tests, and 15 test pit excavations.

The investigations revealed subsurface conditions across the site are consistent with the published geological mapping, as summarised in Table 1.

Table 1: Generalised Summary of Subsurface Conditions

Soil Type	Depth to Top of Layer (m)	Layer Thickness (m)	Consistency / Density	Comment
Silt and Sand [Topsoil]	0	0.1 to 0.4	Soft to Firm	-
Silt and Sand	0.1 to 0.4	0.1 to 1.8	Soft to Very Stiff / Loose to Medium Dense	Not present in all test locations
Gravel	0.2 to 1.8	>1.8	Medium Dense to Dense	-

Review of the ECan well borehole logs indicated that the gravel continues to at least 78 m below ground level.

“Good ground” (as defined in NZS 3604:2010) under static conditions was typically encountered below 0.6 m depth.

Test locations are shown on the site plan presented in Appendix 1. Hand auger borehole and test pit logs are presented in Appendices 2 and 3.

4.2 Site Seismic Class

In accordance with NZS 1170.5:2004, Class D applies to this particular site, defining it as a ‘deep soft soil site’.

4.3 Additional Observations

During our site walk over on 10 July, ENGEO observed an excavation roughly 4 m wide by 4 m long by 3 m deep on the eastern side of the property, in the pasture area within the race track. Through conversation with the property owner, we understand that this was excavated as a drainage pit approximately 30 years ago (Figure 3). From the fence line surrounding the excavation, we observed collapsed topsoil and vegetation in the base of the excavation. The extent of this pit should be further investigated during construction and be appropriately remediated.

An area of saturated soil was observed to the southwest of the drainage excavation, near the southern most end of the horse track. Running water could be clearly heard beneath the surface in this location, though no source was visible. Through discussion with the home owner, we understand that an irrigation pipe had broken in this area. We performed a hand auger borehole (HA07) in this location, and inferred that sandy gravels could be found approximately 0.3 m below ground level. We advise this area be investigated during the construction phase and appropriately remediated.

Approximate locations of both the drainage excavation and the area of saturated ground are outlined in Figure 4.

Figure 3: Drainage Excavation

Figure 4: Saturated Ground and Drainage Excavation

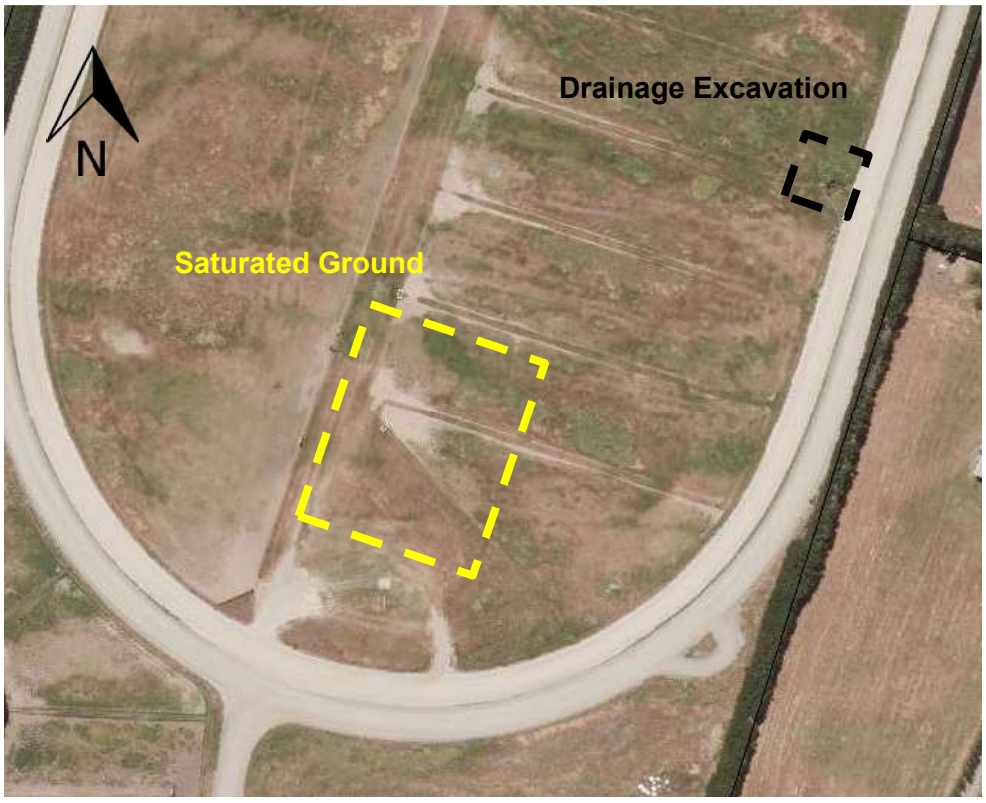

Image sourced from Canterbury Maps, not to scale.

5 Liquefaction Assessment

Based on our site investigation, subsurface conditions encountered in our explorations and documented in the ECan logs, and owing to the nature of the subsurface materials and depth to groundwater at the site, we consider the potential for liquefaction and lateral spreading on the site to be very low.

We therefore consider the site of the proposed subdivision to have Technical Category 1 (TC1) future land performance whereby future land damage from liquefaction is unlikely, and ground settlements are expected to be within normally accepted tolerances.

6 RMA Section 106 Requirements and Suitability to Subdivide

Section 106 of the Resource Management Act 1991 states a consent authority may refuse to grant a subdivision consent, or may grant a consent subject to specific consent conditions if the land is likely to be subject to the following:

- Erosion, including surface and subsurface erosion, associated with water and wind.
- Falling debris, including rockfall that could impact the site from upslope sources.
- Subsidence, which involves the removal of underlying support by natural or artificial means.
- Slippage, which is defined as the downslope transfer of materials by sliding and / or flowage.
- Inundation, which may be sourced from streams, coastal processes or excess precipitation.

Based on our observations and the nature of the site, its performance during the CES, and the site's distance from the nearest significant watercourse, we consider it is unlikely for the site to be subject to any of the above hazards and, as such, the site is considered suitable for subdivision from a geotechnical perspective, subject to the following geotechnical recommendations.

7 Geotechnical Recommendations

7.1 Earthworks

Earthworks carried out for the subdivision shall be in accordance with NZS 4404:2010, Land Development and Subdivision Infrastructure and NZS 4431:1989, Code of Practice for Earthfilling for Residential Development. In particular, any areas to receive fill should be stripped of any vegetation, topsoil, non-engineered fill, soft or organic soils prior to fill placement.

Fill may comprise clean native sandy gravel or silty soils, or clean imported soils and / or granular fill, compacted to achieve no less than 95% of maximum dry density. Fill faces steeper than 2:1(H:V) and higher than 600 mm should be retained and referred back to ENGEO. Although unlikely, where any springs or groundwater seeps are encountered they should be intercepted with suitable drainage and discharged to a Council approved outlet.

All unretained batters of pond and stormwater drains constructed with the native sandy gravel material should be at an inclination of 1V:3H, with protection schemes in place to control erosion of the formed batters within the waterways.

A comprehensive earthworks specification should be provided to the earthworks contractor prior to starting excavations and a geotechnical observation / testing regime agreed, along with a robust erosion and sediment control plan.

7.2 Subdivision Roading

Vegetation, any organic or deleterious material, topsoil and non-engineered fill should be removed from the site under pavement areas prior to aggregate placement. Based on our observations during testing, we consider the native ground below the topsoil at the site should provide an adequate subgrade for the proposed pavement areas. Prior to placement of any fill to achieve finished roadway grades, the exposed native subgrade should be proof-rolled with heavy equipment and any soft, yielding areas compacted or over-excavated and replaced with compacted engineered fill to provide a smooth non-yielding surface for the roadway subgrade.

7.3 Stormwater Control

Concentrated stormwater flows from all impermeable areas must be collected and carried in sealed pipes to the Council system or an alternative disposal point subject to approval from Council. Uncontrolled stormwater must not be allowed to saturate the ground as this will potentially affect future foundation performance both statically and during future seismic activity.

7.4 Foundations

Foundations for future proposed residential dwellings within the subdivision may comprise pad, strip or slab foundations designed in accordance with the provisions of NZS 3604 Timber Framed Buildings.

Site specific testing will be required for Building Consent, to confirm the bearing materials and capacity. For preliminary design, we anticipate that a geotechnical Ultimate Bearing Capacity of 200 kPa may be assumed for foundations bearing on native soils or engineered fill, below any topsoil. We anticipate this to be typically below 0.3 m depth based on our subsurface investigations. Greater capacity may be available across many Lots and will be confirmed during building consent testing. Alternatively, a geotechnical Ultimate Bearing Capacity of 300 kPa may be assumed for bearing on the underlying medium dense sand and gravels, or stiff silt typically encountered below 0.6 m depth.

8 Additional Works

Future geotechnical work at the site will include a detailed subsurface exploration to support design of all earthwork and development concepts, including specific foundation recommendations appropriate for the proposed structures. Subject to the proposed development concept and timeline, this exploration can be tailored to inform the earthworks design, and to support building consent applications to the Selwyn District Council.

9 References

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The Ministry of Business, Innovation, and Employment (2016). New Zealand Geotechnical Database. Retrieved June 2017, from https://www.nzgd.org.nz

10 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Development Ltd, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineers NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by

Hugh Brenstrum

Engineering Geologist

Report reviewed by

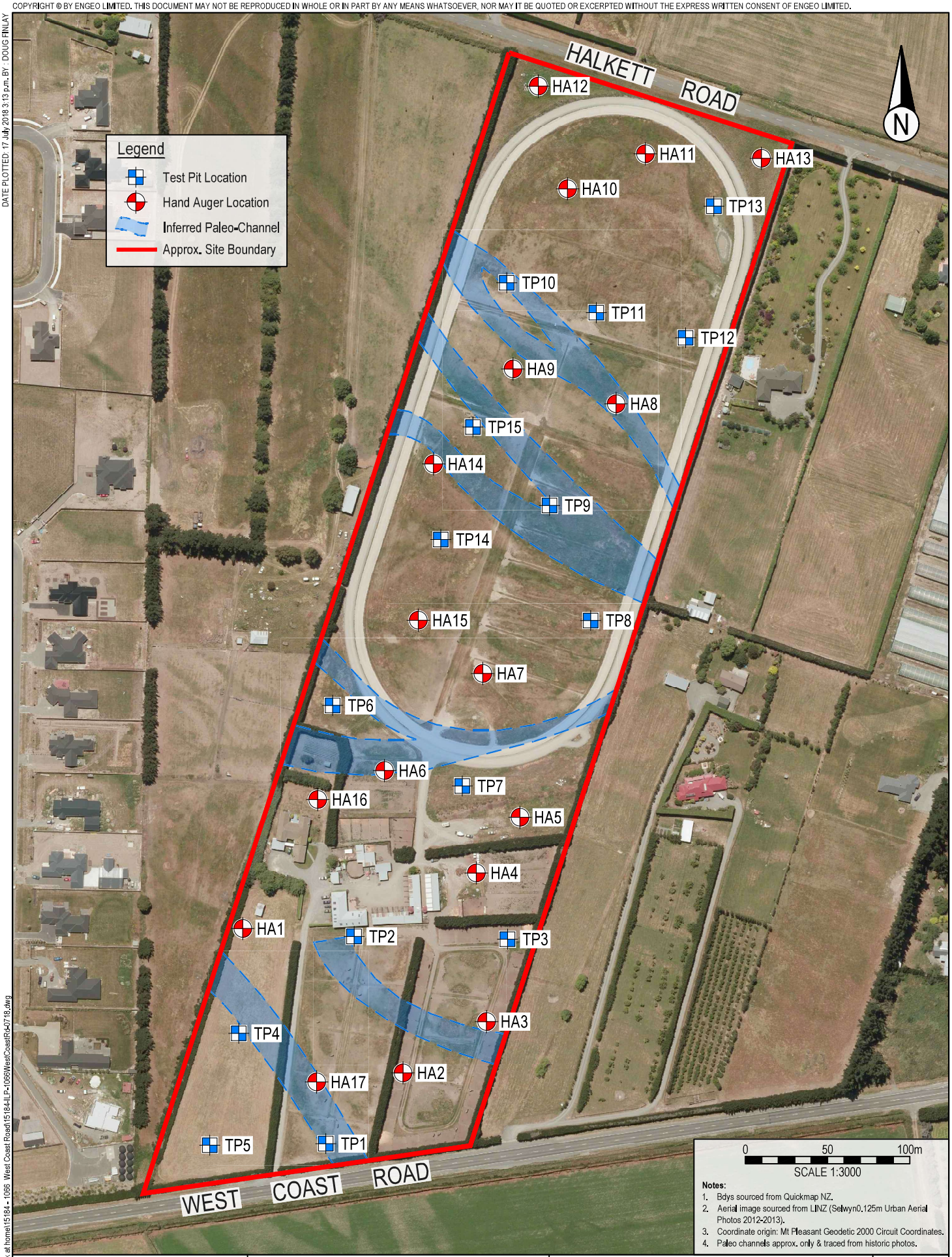
Don Bruggers, CMEngNZ (CPEng)

Principal Engineer

APPENDIX 1:

Site Location Plan and Paleo Channels

DATE PLOTTED: 17 July 2018 3:13 p.m. BY: DOUG FINLAY



Notes:
1. Bdys sourced from Quickmap NZ.
2. Aerial image sourced from LINZ (Selwyn0.125m Urban Aerial Photos 2012-2013).
3. Coordinate origin: Mt Pleasant Geodetic 2000 Circuit Coordinates.
4. Paleo channels approx. only & traced from historic photos.

ENGEO
Expect Excellence
Christchurch Office
124 Montreal Street, Sydenham, Christchurch 8023
Tel: 03 328 9012, www.engeo.co.nz

Title: PALEO CHANNELS & TEST LOCATIONS

Client: HUGHES DEVELOPMENTS			Appendix No: 1
Project: 1066 WEST COAST ROAD WEST MELTON SELWYN DISTRICT	Designed: HB		
	Drawn: DF		
	Checked: -		
	Date: 17.7.18		Size: A4
Proj No: 15184.000.000	Scale: 1:3000		Revision: -

XREFs: selwyn-0125m-urban-aerial-photos-2012-13
CAD File: C:\ENGEO CAD\Engeo work at home\15184 - 1066 West Coast Road\15184-LLP-1066WestCoastRd-0718.dwg

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

Hand Auger Logs

LOG OF AUGER HA01

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.8 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.521674
Longitude : 172.379102

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	SM	Silty fine to medium SAND with trace rootlets; brown. Poorly graded [TOPSOIL].				L	
0.5	ALLUVIUM	ML	Sandy SILT; grey brown. Low plasticity. Sand, fine to medium.			M	St	
		SP	Fine to medium SAND with minor silt; grey brown. Poorly graded.				MD	
1.0			End of Hole Depth: 0.8 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met practical refusal at 0.8 m depth on inferred gravel.

Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGER LOGS - 1066 WEST COAST.GPJ NZ DATA TEMPLATE 2.GDT 20/7/18

LOG OF AUGER HA02

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.522504
Longitude : 172.38031

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine to medium [TOPSOIL].				F	
	ALLUVIUM	SP	Fine to medium SAND with trace silt; grey brown. Poorly graded.			M	MD	
0.5			End of Hole Depth: 0.6 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.6 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA03

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.522215
Longitude : 172.380943

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine to medium [TOPSOIL].				F	
	ALLUVIUM	ML	Sandy SILT; grey brown. Low plasticity. Sand, fine to medium.			M	St - VSt	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA04

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 1 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.521416
Longitude : 172.380798

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	SM	Silty fine to medium SAND with trace rootlets; brown. Poorly graded [TOPSOIL].				L	
	ALLUVIUM	SP	Fine to medium SAND; grey brown. Poorly graded.			M	MD	
1.0			End of Hole Depth: 1 m Termination Condition: Target depth					
2.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met target depth at 1 m.

Standing groundwater was not encountered
TS = TOPSOIL

LOG OF AUGER HA05

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

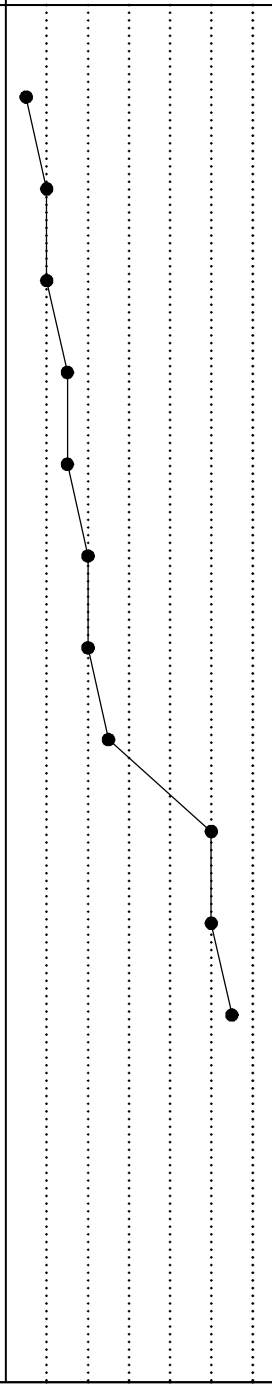
Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 1 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.521049
Longitude : 172.381268

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity [TOPSOIL].				F	
0.5	ALLUVIUM	SM	Silty fine to medium SAND; grey brown. Poorly graded.			M	MD	
		SP	Fine to medium SAND with trace silt; grey brown. Poorly graded.				MD - D	
1.0			End of Hole Depth: 1 m Termination Condition: Target depth					
1.5								

Scala Penetrometer

Blows per 100mm



Hand auger met target depth at 1 m.
Scala Penetrometer met practical refusal at 1.1 m depth.

Standing groundwater was not encountered

LOG OF AUGER HA06

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.520748
Longitude : 172.380166

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity [TOPSOIL].			M	F		
	ALLUVIUM	SM	Sandy SILT; grey brown. Low plasticity. Sand, fine to medium.				MD		
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal						
1.0									

Scala Penetrometer: Blows per 100mm — 2, 4, 6, 8, 10, 12; >>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA07

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.520302
Longitude : 172.381069

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine to medium [TOPSOIL]		▼	S	S	
0.3			End of Hole Depth: 0.3 m Termination Condition: Practical refusal					
0.5								
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.

Dip test showed standing water at 0.1 m depth.
Broken pipe saturating surrounding soil

LOG OF AUGER HA08

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.518795
Longitude : 172.381937

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	Sandy SILT with trace rootlets; brown. Low plasticity. Sand, fine to medium [TOPSOIL].			M	S	
	ALLUVIUM	ML	SILT with some fine sand; grey brown.				S	
0.5			End of Hole Depth: 0.3 m Termination Condition: Practical refusal					

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA09

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.9 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.518559
Longitude : 172.381015

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0	TOPSOIL	SP	Silty fine to medium SAND with trace rootlets; brown. Poorly graded [TOPSOIL].				S		
0.5	ALLUVIUM	SP	Fine to medium SAND; greyish brown. Poorly graded.			M	MD		
1.0			End of Hole Depth: 0.9 m Termination Condition: Practical refusal						

Hand auger met practical refusal at 0.9 m depth on inferred gravel.

Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGER LOGS - 1066 WEST COAST.GPJ NZ DATA TEMPLATE 2.GDT 20/7/18

LOG OF AUGER HA10

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.517812
Longitude : 172.381431

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	SP	Sandy SILT with trace rootlets; brown. Low plasticity [TOPSOIL].				F	
	ALLUVIUM	ML	SILT with some SAND; greyish brown. Low plasticity. Sand, fine to medium.			M	F - St	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA11

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.517393
Longitude : 172.382153

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0.0	TOPSOIL	ML	SILT with some SAND; brown. Low plasticity. Sand, fine to medium [TOPSOIL].			M	F		2 4 6 8 10 12 >>
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						
0.5									
1.0									

Hand auger met practical refusal at 0.2 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA12

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.6 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.517157
Longitude : 172.381358

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	ML	SILT with some SAND; brown. Low plasticity. Sand, fine to medium [TOPSOIL].				S	
	ALLUVIUM	ML	Sandy SILT; greyish brown. Low plasticity. Sand, fine to medium.			M	F	
0.5		SP	Fine to medium SAND with minor silt; grey brown. Poorly graded.				MD	
			End of Hole Depth: 0.6 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.6 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA13

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.2 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.517445
Longitude : 172.382894

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0	TOPSOIL	ML	SILT with some SAND; brown. Low plasticity. Sand, fine to medium [TOPSOIL].			M	S		2 4 6 8 10 12
			End of Hole Depth: 0.2 m Termination Condition: Practical refusal						>>
0.5									
1.0									

Hand auger met practical refusal at 0.2 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA14

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.519018
Longitude : 172.380563

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with minor fine sand; brown. Low plasticity [TOPSOIL].			M	F	
	ALLUVIUM	ML	SILT with some fine sand and trace gravel, grey brown. Low plasticity.				F	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA15

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.520197
Longitude : 172.380455

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
	TOPSOIL	ML	SILT with trace fine sand; brown. Low plasticity [TOPSOIL].				S	
	ALLUVIUM	ML	SILT with some fine sand; grey brown. Low plasticity.			M	F	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGER LOGS - 1066 WEST COAST.GPJ NZ DATA TEMPLATE 2.GDT 20/7/18

LOG OF AUGER HA16

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.3 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.520997
Longitude : 172.37966

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	SM	Silty fine to medium SAND with trace rootlets; brown. Poorly graded [TOPSOIL].			M	S	
	ALLUVIUM	SM	Silty fine to medium SAND; greyish brown. Poorly graded.				L - MD	
			End of Hole Depth: 0.3 m Termination Condition: Practical refusal					
0.5								
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.3 m depth on inferred gravel.

Standing groundwater was not encountered

LOG OF AUGER HA17

Geotechnical Investigation
1066 West Coast Road
West Melton, Canterbury
15184.000.000

Client : Hughes Developments
Client Ref. : 1066 West Coast Road
Date : 10/07/2018
Hole Depth : 0.5 m
Hole Diameter : 50 mm

Shear Vane No : NA
Logged By : HB
Reviewed By :
Latitude : -43.522504
Longitude : 172.379696

Depth (m)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TOPSOIL	SM	Silty fine to medium SAND with trace rootlets; brown. Poorly graded [TOPSOIL].				S	
	ALLUVIUM	SM	Silty fine to medium SAND; greyish brown. Poorly graded.			M	L - MD	
0.5			End of Hole Depth: 0.5 m Termination Condition: Practical refusal					
1.0								

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 0.5 m depth on inferred gravel.

Standing groundwater was not encountered

GEOSCIENCE HAND AUGER HAND AUGER LOGS - 1066 WEST COAST.GPJ NZ DATA TEMPLATE 2.GDT 20/7/18

APPENDIX 3:

Test Pit Logs

LOG OF TEST PIT TP01

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.522792
Bucket Type/Size	: 500 mm	**Longitude**	: 172.379732

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TOPSOIL		ML	SILT with minor fine sand, trace gravel and rootlets; brown. Low plasticity [TOPSOIL].				St		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL some cobbles and trace boulders; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M	MD - D		>>
1.0										
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP02

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.521704
Bucket Type/Size	: 500 mm	**Longitude**	: 172.379949

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	Silty fine to medium SAND; brown. Poorly graded [TOPSOIL].				St		
0.5	ALLUVIUM		SP	Fine to medium SAND; greyish brown. Poorly graded.				MD		
1.0			GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M	D		
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 >>

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.8 m depth.
Standing groundwater was not encountered

LOG OF TEST PIT TP03

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.521757
Bucket Type/Size	: 500 mm	**Longitude**	: 172.381124

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		SM	Silty fine to medium SAND; brown. Poorly graded [TOPSOIL].				St		
0.5	ALLUVIUM		SM	Silty fine to medium SAND; greyish brown. Poorly graded.				MD		
1.0			GW	Sandy fine to coarse GRAVEL some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M	D - VD		
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.9 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

LOG OF TEST PIT TP04

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.522058
Bucket Type/Size	: 500 mm	**Longitude**	: 172.379121

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				S		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.			M	D		
1.0				Encountered minor boulders from 1.1 m depth.						
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.6 m depth.
Standing groundwater was not encountered

T=TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP05

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.522817
Bucket Type/Size	: 500 mm	**Longitude**	: 172.378891

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				VS		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL with minor cobbles and trace boulders; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.				D		
1.0			SP	Fine to medium SAND; greyish brown. Poorly graded.			M	D		
1.5			GW	Sandy fine to coarse GRAVEL with minor cobbles and trace boulders; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.				D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

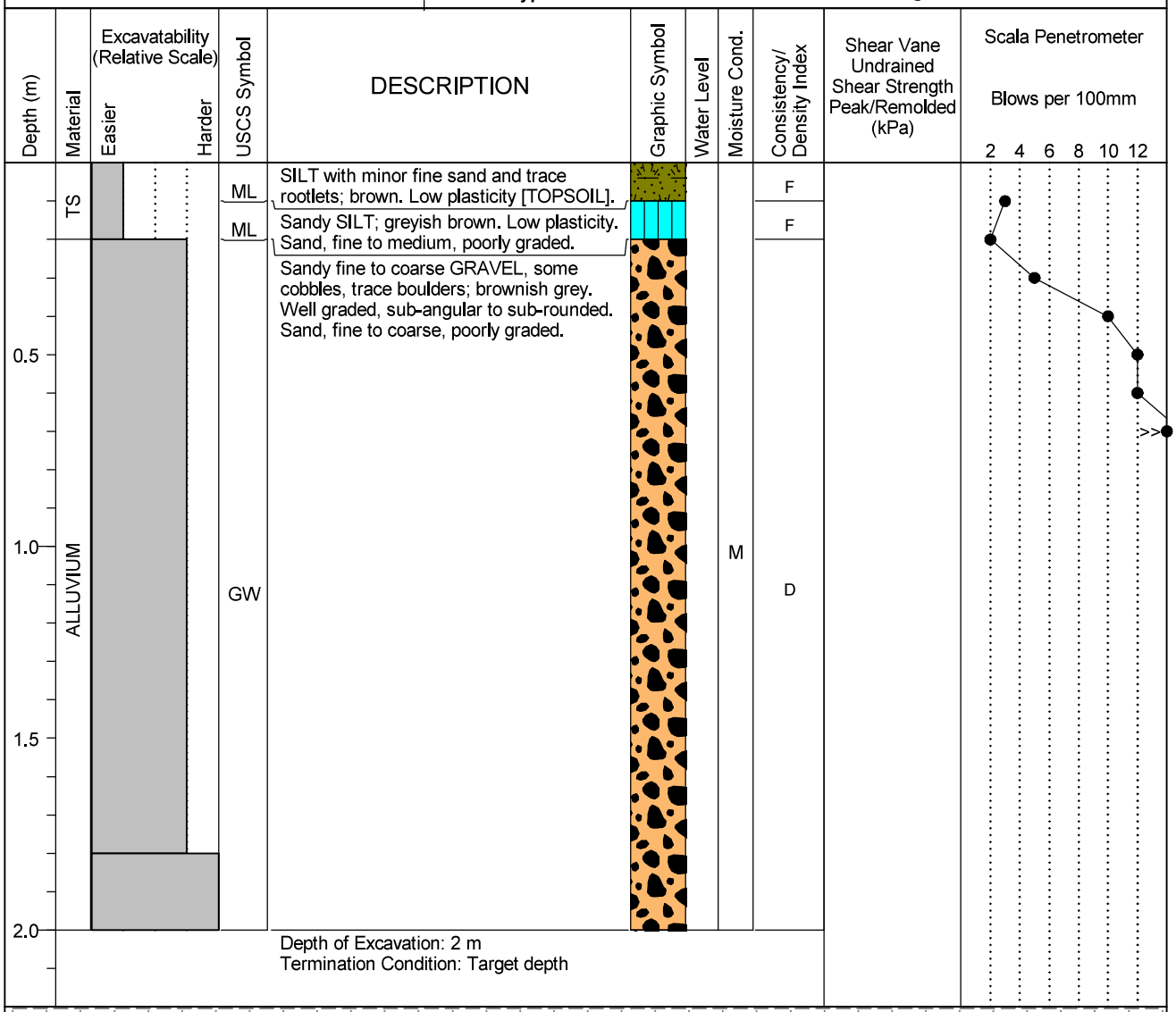
GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP06

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.520483
Bucket Type/Size	: 500 mm	**Longitude**	: 172.379771



Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

LOG OF TEST PIT TP07

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.9 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.520882
Bucket Type/Size	: 500 mm	**Longitude**	: 172.380726

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		SM	Silty fine to medium SAND; brown. Poorly graded [TOPSOIL].				S		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M	MD - D		
1.0										
1.5										
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12

Excavator met taget depth. at 1.9 m.
Scala Penetrometer met practical refusal at 0.8 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP08

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.520093
Bucket Type/Size	: 500 mm	**Longitude**	: 172.381704

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	T		SM	Silty fine to medium SAND; brown. Poorly graded [TOPSOIL].				F		
	ALLUVIUM			Sandy fine to coarse GRAVEL some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.						
0.5				Encountered fine to medium gravel lens from 0.6 m to 0.7 m depth.						
1.0			GW				M	D		
1.5										
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 0.5 m depth.
Standing groundwater was not encountered

T = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP09

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.9 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.519197
Bucket Type/Size	: 500 mm	**Longitude**	: 172.381435

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				F		
	ALLUVIUM		ML	SILT with minor fine sand, greyish brown. Low plasticity.				St		
0.5				Sandy fine to coarse GRAVEL; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.						
1.0			GW	Encountered trace boulders from 1.0 m depth.			M	MD - D		
1.5										
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth						

Excavator met taget depth. at 1.9 m.
Scala Penetrometer met practical refusal at 0.8 m depth.
Standing groundwater was not encountered

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP10

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.9 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.518183
Bucket Type/Size	: 500 mm	**Longitude**	: 172.380984

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0.0	T		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				F		
0.5	ALLUVIUM		GW	Sandy fine to coarse GRAVEL minor cobbles; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.			M	D		
1.0				Encountered minor boulders from 1.2 m depth.						
1.5										
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth						

Excavator met taget depth. at 1.9 m.
Scala Penetrometer met practical refusal at 0.4 m depth.
Standing groundwater was not encountered

T=TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP11

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.518294
Bucket Type/Size	: 500 mm	**Longitude**	: 172.381683

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TS		SP	Silty fine to medium SAND; brown. Poorly graded [TOPSOIL].				F		
0.5	ALLUVIUM		SP	Fine to medium SAND; greyish brown. Poorly graded.				L - MD		
1.0				Sandy fine to coarse GRAVEL some cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M			
1.5			GW	Encountered trace boulders from 1.5 m depth.				D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 1.3 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP12

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 2 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.518441
Bucket Type/Size	: 500 mm	**Longitude**	: 172.382411

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		SP	Fine to medium SAND with some silt; brown. Poorly graded [TOPSOIL].				L		
0.5	ALLUVIUM		SP	Fine to medium SAND; greyish brown. Poorly graded.				L - MD		
1.0				Sandy fine to coarse GRAVEL minor cobbles; brownish grey. Well graded, sub-rounded to rounded. Sand, fine to coarse.			M			
1.5			GW	Encountered trace boulders from 1.3 m depth.				D		
2.0				Depth of Excavation: 2 m Termination Condition: Target depth						

Excavator met taget depth. at 2 m.
Scala Penetrometer met practical refusal at 1.2 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP13

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.9 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.517745
Bucket Type/Size	: 500 mm	**Longitude**	: 172.382679

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm
0	TOPSOIL		ML	SILT with trace fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				S		
0.5	ALLUVIUM		ML	SILT with minor fine sand; grey brown. Low plasticity.				St		
1.0			GW	Sandy fine to coarse GRAVEL with minor cobbles and trace boulders; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.			M	D		
1.5										
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth						

Scala Penetrometer: Blows per 100mm — 2 4 6 8 10 12 (>>)

Excavator met taget depth. at 1.9 m.
Scala Penetrometer met practical refusal at 0.9 m depth.
Standing groundwater was not encountered

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP14

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.8 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.519745
Bucket Type/Size	: 500 mm	**Longitude**	: 172.380612

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0.0	TS		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				S		
	ALLUVIUM		ML	SILT with some fine sand; grey brown. Low plasticity.				F		
0.5			GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.			M	D - VD		>>
1.0										
1.5										
2.0				Depth of Excavation: 1.8 m Termination Condition: Target depth						

Excavator met taget depth. at 1.8 m.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

LOG OF TEST PIT TP15

Geotechnical Investigation

1066 West Coast Road
West Melton
15184.000.000

Client	: Hughes Developements Ltd.	**Shear Vane No**	: NA
Date	: 20/4/18	**Logged By**	: HB
Max Test Pit Depth	: 1.9 m	**Reviewed By**	:
Digger Type/Size	: Bucket Excavator	**Latitude**	: -43.518982
Bucket Type/Size	: 500 mm	**Longitude**	: 172.380712

Depth (m)	Material	Excavatability (Relative Scale) Easier – Harder	USCS Symbol	DESCRIPTION	Graphic Symbol	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength Peak/Remolded (kPa)	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
0	TS		ML	SILT with minor fine sand and trace rootlets; brown. Low plasticity [TOPSOIL].				S		
	ALLUVIUM		ML	SILT with some fine sand; grey brown. Low plasticity.				F		
0.5			GW	Sandy fine to coarse GRAVEL with minor cobbles; brownish grey. Well graded, sub-angular to sub-rounded. Sand, fine to coarse, poorly graded.			M	D		>>
1.0										
1.5										
2.0				Depth of Excavation: 1.9 m Termination Condition: Target depth						

Excavator met taget depth. at 1.9 m.
Scala Penetrometer met practical refusal at 0.7 m depth.
Standing groundwater was not encountered

TS = TOPSOIL

GEOSCIENCE TEST PIT LOG - PHOTOS TEST PIT LOGS - 1066 WEST COAST.GPJ NZ MASTER DATA TEMPLATE.GDT 18/7/18

Private Plan Change Request – Hughes Developments Limited
Appendix C – Preliminary and Detailed Site Investigations

ENGEO

Expect Excellence

Combined Preliminary and Detailed Site Investigation

1066 West Coast Road

West Melton

Submitted to:

Hughes Developments Limited
PO Box 848
Christchurch 8140

ENGEO Limited
124 Montreal Street, Sydenham, Christchurch 8023
PO Box 373, Christchurch 8140, New Zealand
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20.07.2018
15184.000.000_02

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ENGEO Document Control:

Report Title	Combined Preliminary and Detailed Site Investigation - 1066 West Coast Road, West Melton			
Project No.	15184.000.000	Doc ID	02	
Client	Hughes Developments Limited	Client Contact	Kelvin Back	
Distribution (PDF)	Hughes Developments Limited			
Date	Revision Details/Status	WP	Author	Reviewer
20/07/2018	Final	DF	NF	DR

1 Introduction

ENGEO Ltd was requested by Hughes Developments Limited to undertake a combined Preliminary and Detailed Site Investigation (PSI / DSI) of 1066 West Coast Road, West Melton (herein referred to as 'the site') situated on a 12.36 hectare property. The purpose of the assessment was to assess the property's suitability for a change of land use consent and subdivision under the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011* (NES) to satisfy the requirements of Selwyn District Council (SDC).

Figure 1 attached in Appendix 1 indicates the location of the property. This PSI / DSI was undertaken in accordance with the Ministry for the Environment (MfE) 2001, *Guidelines for Reporting on Contaminated Sites*.

1.1 Objectives of the Assessment

The objectives of this assessment were to:

- Evaluate and identify conditions indicative of releases and threatened releases of hazardous substances on, at, in or to the subject property;
- Evaluate the presence of and extent of identified contaminants of concern (COCs) at the site; and
- Assess whether the COCs pose an unacceptable risk to human health or the environment during and post site redevelopment.

1.2 Approach

To satisfy the objectives, ENGEO sought to gather information regarding the following:

- Current and past property uses and occupancies;
- Current and past uses of hazardous substances;
- Waste management and disposal activities that could have caused a release or threatened release of hazardous substances;
- Current and past corrective actions and response activities to address past and on-going releases of hazardous substances at the subject property; and
- Properties adjoining or located near the subject property that have environmental conditions that could have resulted in conditions indicative of releases or threatened releases of hazardous substances to the subject property.

1.2.1 Review of Site Information

During this assessment, a number of sources of information were contacted for information relating to the site regarding its past and present uses. This included contacting Canterbury Regional Council (CRC) to determine if there were records on the Listed Land Use Register (LLUR) and reviewing records held by Selwyn District Council (SDC) including the property file and dangerous goods file (if available). A review of a number of historical and current aerial photographs was also undertaken using images from Canterbury Maps and Google Earth.

1.2.2 Site Inspection

A site walkover was undertaken on 9 July 2018 by Natalie Flatman of ENGEO.

2 Site Description and Setting

Site information is summarised in Table 1.

Table 1: Site Information

Item	Description
Location	1066 West Coast Road, West Melton
Legal Description	Lot 2 DP 34902
Property Owner	Property is under contract to Hughes Developments Limited
Current Land Use	Residential and Agricultural
Proposed Land Use	Residential
Site Area	12.36 ha
Building Construction	Main dwelling – concrete foundation, brick and timber cladding, metal roof. Various stables – concrete and open earth floors, breeze block, timber and metal walls, metal roofs.
Territorial Authority	Selwyn District Council

Table 2: Site Setting

Item	Description
Topography	The site is predominantly flat with slight undulations across the paddocks within the trotting track to the north of the site.
Local Setting	The surrounding area is a mix of agricultural, horticultural and residential.
Nearest Surface Water & Use	No surface water features were noted on-site or within 50 m of the site.
Geology	Late Quaternary unconsolidated to poorly consolidated mud, sand, gravel and peat of alluvial and colluvial origin.
Hydrogeology	The site is located over an unconfined / semiconfined gravel aquifer.
Groundwater Abstractions	There are no groundwater abstractions located on the site and seven within 100 m of the site: M35/1013: AR & JR Dunn, active well west of the site (28 m bgl) for domestic and stockwater. M35/9443: P & J Rowlands, active well east of the site (36 m bgl) for domestic and stockwater. M35/7353: PA & JM Lenton, active well east of the site (39 m bgl) for irrigation and domestic supply. M35/10753: Apex Industries (Christchurch) Limited, active well northwest of the site (42 m bgl) for domestic supply.
Discharge Consents	There are no active discharge consents located on the site and one active consent within 250 m of the site: CRC090354: DA Miller, active, discharge domestic sewage to ground.

3 Site History

A number of sources were used to investigate the past uses of the site. The findings of these information searches have been summarised in this section.

3.1 Discussions with Site Owner

After the site walkover, discussions were had with the site occupier in regards to past and present uses of the site. It was confirmed that the 100 L blue containers near the pump shed were used for storage of stock water and that the large piles and bags of plastic along the tree line to the east of the stables were silage wraps and would be removed from site.

3.2 Selwyn District Council Property File

The property file for the site held by Selwyn District Council was reviewed on 10 July 2018 as part of the PSI. The below was identified in the property file search:

- 11 May 1978 Building Permit for residential dwelling;
- 29 July 1976 Building Permit for farm buildings;
- 23 December 1976 Building Permit for loose boxing buildings (stables);
- 28 July 1978 Building Permit for loose boxing buildings (stables);
- 21 May 1988 Building Permit for stable (south of dwelling); and
- 12 February 2014 Consent for two Solid Fuel Heaters (domestic dwelling).

3.3 Certificate of Title

A review of the certificate of title was completed with no information related to potential contaminating activities identified. The certificate of title is attached in Appendix 2.

3.4 Listed Land Use Register (LLUR)

Potentially hazardous activities are defined on the Hazardous Activities and Industries List (HAIL). Canterbury Regional Council (CRC) maintains a Listed Land Use Register (LLUR) of past and current land uses within the Canterbury region which have potentially had an activity included on the HAIL undertaken on them. The listing of the property on the LLUR triggers the requirement for a contaminated land assessment prior to development.

The CRC LLUR property statement was requested by ENGEO 1 May 2018 for the site and is presented in Appendix 3. No areas of concern were identified on the CRC LLUR for the site.

3.5 Historical Aerial Photograph Review

Aerial photographs dating from 1940 to 2016 have been reviewed. The relevant visible features are summarised in Table 3.

Table 3: Aerial Photographs

Date	Source	Description
1940-1944	Canterbury Maps	The site appears to be used for agricultural grazing. There is a visible cluster of three buildings to the south of the site. The buildings appear to be farm buildings/garage. There are two rows of trees running east-west around the eastern most building. The surrounding area of the site is used for agricultural grazing. Halkett Road bounds the site to the north and West Coast Road bounds the site to the south.
1960-1964	Canterbury Maps	The site appears mainly unchanged. A small shed has been constructed near the other three buildings to the south of the site. There are some visible tracks through the paddocks, it is unclear what would have created these tracks but is presumed to be from machinery or animals. There is a large trotting track present on the site to the west, the remaining surrounding area remains unchanged.

Date	Source	Description
1965-1969	Canterbury Maps	The northern most building in the south of the site has been removed from site. The site appears to still be used for agricultural grazing – sheep are visible in most paddocks. The northern-most section of the site is missing from the photograph. The remainder of the surrounding area is unchanged.
1975-1979	Canterbury Maps	No changes from the previous aerial photograph.
1980-1984	Canterbury Maps	A trotting tack has been developed in the north section of the site. The farm buildings from the previous aerial photographs have been removed from the site along with the two tree lines running east-west near the buildings. A dwelling has been constructed near the west boundary line with stables or other farm buildings present southeast of the dwelling (in the same area as the previous buildings). One smaller building is present south of the dwelling. The surrounding area remains unchanged.
1990-1994	Canterbury Maps	The site remains mainly unchanged. The dwelling and stables from the previous aerial photographs are still present on-site. The south of the site is still used for agricultural grazing. The trotting track on the north of the site appears to be double tracked, two tracks running adjacent to another. A small shed appears to be present north of the dwelling. A residential dwelling has been constructed to the east of the site and one building has been constructed to the west. No other major changes are visible to the surrounding area.
2004-2010	Canterbury Maps	The site appears mainly unchanged. Glasshouses have been constructed to the east of the site (117 Halkett Road). Residential dwellings have also been constructed at 123 and 133 Halkett Road to the east. The site to the west remains mainly undeveloped.
2017	Canterbury Maps	The site remains mainly unchanged. The small shed to the north of the dwelling has either been removed or moved slightly to the east of its position from the 1990-1994 aerial photograph. The site to the west of 163 Halkett Road has been developed into a residential subdivision with numerous dwellings present.

4 Current Site Conditions

A site walkover investigation was undertaken on 9 July 2018 by Natalie Flatman of ENGEO. The information gathered is summarised in Table 4. Photographs taken during the site investigation are included in Appendix 4.

Table 4: Current Site Conditions

Site Condition	Comments
Visible signs of contamination	No visible signs of contamination were noted on site.
Surface water appearance	No surface water was observed on-site.
Local sensitive environments	No local sensitive environments were observed on site or within 50 m of the site boundary.
Visible signs of plant stress	No visible signs of plant stress were noted on-site.
Potential for on or off-site migration of contaminants	The potential for on or off-site migration is considered low.
Additional observations (if any)	Several 100 L blue drums were stored next to the pump shed – east of the dwelling. It was confirmed with the site occupier that these were used for water storage for stock on site. Three small 10 L containers for fertilizer were also noted behind the pump shed. They appeared to be old containers of Reaction liquid fertiliser – a nitrogen based fertiliser. Due to the small amount of containers stored, it is presumed that the fertiliser was used in a small scale. Paint storage was present in one of the storage sheds near the stables. The paint cans appeared to be sealed and no staining on the surrounding soils was noted. Large bags of plastic waste were noted in the tree line east of the stables. It was confirmed with the site occupier that these are left over from silage and would be removed from site. A large sump pit was noted in the middle of the trotting track along the eastern stretch. It was confirmed with the site occupiers that it was dug approximately 30 years ago as a drainage pit to try and dewater the north paddocks. It has not been used as a waste pit and was visually clear of contaminants. The areas where the former farm buildings were located are now encapsulated by gravel driveway areas and building footprints. No PACM was visually identified on the surface in these areas. Please refer to Figure 2 for the footprints of former buildings.

5 Potential HAIL Activities

Activities included on the HAIL trigger the requirement for a contaminated land investigation prior to development. While no activities have been identified on the LLUR for the site, the following observations noted during the site walkover included:

- E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition; house was built prior to 2000 and may contain asbestos.
- I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

Further information regarding the areas of potential concern have been summarised in Table 5 below:

Table 5: Potential HAIL Activities

Potential Source of Contamination	Contaminants of Concern	Possible extent of contamination	HAIL activity as defined by the NES (soil)
Main dwelling, stables, sheds and footprints of previous garages / farm buildings	Asbestos	Around main residential dwelling, stables, sheds and south of dwelling in gravel driveway area	E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition
Trotting Track	Heavy metals PAH's Asbestos	Trotting track and soils directly adjacent to the track	I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

There was no evidence on the remainder of the site of activities included on the HAIL having been undertaken.

6 Intrusive Investigation

Based on the review of the historical site uses, the potential COC's identified as a part of this investigation were heavy metals, polycyclic aromatic hydrocarbons and asbestos related with the trotting track and asbestos from previous and present buildings on site.

A total of four intrusive investigation samples were completed across the trotting track area. Soil samples were collected from each location to assess the potential risks to human health posed by the historical contamination sources, disposal options for soils removed during the redevelopment works and the suitability of the site for the intended long-term site usage (residential subdivision).

Please note that a visual inspection was made of the soils surrounding the dwelling to the north and south and to the north of the current stables, which are the areas of the former farm buildings. No potentially asbestos containing material (PACM) was observed on the surface soils, therefore no samples were taken from these areas. As a large portion of the former building footprints are currently encapsulated by current building footprints and gravel driveways, it is recommended that if these buildings are to be removed that after the demolition an asbestos soil investigation is undertaken in these three areas.

6.1 Fieldwork Methodology

The following fieldwork methodology was undertaken:

- Completion of four sample locations across the trotting track area with soil samples taken from between 0.0 and 0.25 m bgl, depending on location. The depths were considered suitable to provide an indication of potential impacts from the former uses of the site and to assess potential impacts to future land users and disposal locations.
- All soil samples collected were placed in jars supplied by RJ Hill Laboratories (Hills), which were then capped, labelled with a unique identifier and placed in chilled containers (chilly bins) prior to transportation to the laboratory. Samples were transported to Hills under standard ENGEO chain of custody documentation provided in Appendix 5. Asbestos samples were placed in zip lock bags, double bagged and transported to Environmental and Industrial Analysis Group (EIAG) for semi-quantitative analysis for asbestos in soil.
- To reduce the potential for cross-contamination, each sample was collected using disposable nitrile gloves that were discarded following the collection of each sample.
- After the collection of each sample, the sampling equipment was decontaminated by washing with a solution of Decon90 and rinsing with tap water followed by deionised water.
- The intrusive samples were completed in accordance with ENGEO standard operating procedures with geological logging completed in general accordance with the New Zealand Geotechnical Society Inc. ‘Guidelines for the Field Classification of Soil and Rock for Engineering Purposes’ December 2005.
- All fieldwork and sampling was completed in general accordance with the procedures for the appropriate handling of potentially contaminated soils as described in the MfE *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*.
- Samples were collected from a hand trowel at each location and inspected for visual and olfactory indicators of contamination.

6.2 Quality Assurance and Quality Control

The quality assurance / quality control (QA / QC) procedures employed during the works included:

- Standard sample registers and chain of custody records have been kept for all samples.
- The use of Hills and EIAG who have certification through the International Accreditation New Zealand (IANZ). To maintain their IANZ accreditation, Hills and EIAG undertakes rigorous cross checking and routine duplicate sample testing to ensure the accuracy of their results.
- During the site investigation, every attempt was made to ensure that cross contamination did not occur through the use of procedures outlined within this document.

- Following receipt of the samples by Hills and EIAG, the soil samples were scheduled for analysis of the identified contaminants of concern.

7 Regulatory Framework and Assessment Criteria

7.1 NES

The NES came into effect on 1 January 2012 (MfE, 2011).

The NES introduced soil contaminant standards (SCSs) for 12 priority contaminants for the protection of human health under a variety of land use scenarios.

The NES requires the *Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guideline Values* be used where a NES SCS is not available. The NES does not consider environmental receptors; accordingly, the application of guidelines relevant to environmental receptors shall be implemented according to the MfE CLMG No.2 and any relevant rules in the Regional Plan.

7.2 Disposal Criteria

An assessment of potential off-site disposal options for any excess soil generated during site development works has been conducted. Dependent on the contamination conditions of the spoil, off-site disposal options range from disposal to “cleanfill” sites to managed fill sites to licensed Class A and B Landfills. As outlined in the publication “A Guide to the Management of Clean Fills” (MfE, 2002), cleanfill is defined as:

“Material that when buried will have no adverse effect on people or the environment. Cleanfill material includes virgin natural materials such as clay, soil and rock, and other inert materials such as concrete or brick that are free of:

- Combustible, putrescible, degradable or leachable components;
- Hazardous substances;
- Products or materials derived from hazardous waste treatment, hazardous waste stabilisation or hazardous waste disposal practices;
- Material that may present a risk to human health such as medical and veterinary waste, asbestos or radioactive substances; and
- Liquid waste.”

7.3 Assessment Criteria

Contaminant concentrations in soil were compared to human health criteria based on one land use:

- Residential land use (for proposed future land use).
- Commercial / Industrial land use (based on an outdoor worker scenario) (for redevelopment workers and proposed end use).

The land use scenarios are relevant to the likely future use of the site and are being used as a surrogate to assess short term risks to redevelopment earth workers on-site during the development activities.

The NES methodology document notes that the exposure parameters assumed for the maintenance / excavation scenario in other New Zealand guidelines are unrealistic (perhaps by a factor of 10 or more). The technical committee preparing the NES decided that a maintenance / excavation worker scenario should not be included in the NES as sites would not be cleaned up to this standard; it was considered more appropriate that exposures to these workers be limited through the use of site-specific controls that are required under health and safety legislation. However, this report uses commercial / industrial outdoor worker criteria to get a general sense of potential risks to excavation workers during the redevelopment. Note that commercial / industrial outdoor worker criteria are based on personnel carrying out maintenance activities involving soil exposure to surface soil during landscaping activities, and occasional shallow excavation for routine underground service maintenance. Exposure to soil is less intensive than would occur during construction works but occurs over a longer period. For a construction worker developing the site, the soil exposure is limited when compared to a large earthworks project (e.g. for a residential subdivision or industrial development). As such, the commercial / industrial outdoor worker criteria are considered suitable for obtaining a high-level understanding of potential risks to excavation workers during site redevelopment and confirming the need for site controls.

Where appropriate, the standard NES criteria, and other applicable guideline criteria, were adjusted according to the requirements for composite samples specified in the MfE (2011) *Contaminated Land Management Guidelines No.5 – Site Investigation and Analysis of Soils*.

The soil analysis results have been compared to Regional Background levels for heavy metals and PAHs. These provide information into the possible disposal options at a cleanfill facility.

The asbestos assessment criteria have been outlined in Section 7.4 below.

7.4 Asbestos in Soil

The field work and reporting for this site have been done in accordance with the New Zealand Guidelines for Assessing and Managing Asbestos in Soil released on 6 November 2017. The BRANZ Asbestos (2017) Guidelines have been developed based on the WA DOH Guidelines but with the New Zealand regulatory environment in mind.

The BRANZ guideline criteria have been adopted as investigation criteria for this assessment and are presented in Table 2.

Table 6: Adopted Asbestos Investigation Criteria

Form of asbestos	Soil guideline values for asbestos (w/w)			
	Residential[1]	High-density residential[2]	Recreational[3]	Commercial and Industrial[4]
ACM (bonded)	0.01%	0.04%	0.02%	0.05%
FA and/or AF[5]	0.001%			
All forms of asbestos – surface	No visible asbestos on surface soil[6]			
Capping requirements for residual contamination above selected soil guideline value				

Form of asbestos		Soil guideline values for asbestos (w/w)			
		Residential[1]	High-density residential[2]	Recreational[3]	Commercial and Industrial[4]
Depth[7]	Hard cap	No depth limitation, no controls – except for long-term management			
	Soft cap	≥0.5 m			≥0.2 m

Notes:

ACM: Asbestos-containing material i.e. asbestos bound in a matrix; material that cannot pass through a 7 mm x 7 mm sieve.

FA: Fibrous asbestos. Encompasses friable asbestos material, such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products. Friable asbestos is defined here as asbestos material that is in a degraded condition, such that it can be broken or crumbled by hand pressure.

AF: Asbestos fines. It includes free fibres of asbestos, small fibre bundles and also ACM fragments that pass through a 7 mm x 7 mm sieve.

Residential: Single dwelling site with garden and / or accessible soil. Also includes daycare centres, preschools, primary and secondary schools and rural residential.

High-density residential: Urban residential site with limited exposed soil / soil contact, including small gardens. Applicable to urban townhouses, flats and ground-floor apartments with small ornamental gardens but not high-rise apartments (with very low opportunity for soil contact).

Recreational: Public and private green areas and sports and recreation reserves. Includes playing fields, suburban reserves where children play frequently and school playing fields.

Commercial and industrial: Includes accessible soils within retail, office, factory and industrial sites. Many commercial and industrial properties are well paved with concrete pavement and buildings that will adequately cover / cap any contaminated soils.

FA and / or AF: Where free fibre is present at concentrations at or below 0.001% w/w, a proportion of these samples should be analysed using the laboratory analysis method described in section 5.4.4 of the BRANZ Guideline (≥10% of samples). This is due to limitations in the AS 4964-2004 and WA Guidelines 500 ml sample method for free fibre (see section 5.4 of the BRANZ guideline for more information).

Surface: Effective options include raking/tilling the top 100 mm of asbestos-contaminated soil (or to clean soil / fill if shallower to avoid contaminating clean material at depth) and hand picking to remove visible asbestos and ACM fragments or covering with a soft cap of virgin natural material (VNM) 100 mm thick delineated by a permeable geotextile marker layer or hard cap. Near-surface fragments of ACM can become exposed in soft soils such as sandy pumiceous soils after periods of rain.

Depth: Capping is used where contamination levels exceed soil guideline values. Considerations of depth need to incorporate the type and likelihood of future disturbance activities at the site and site capping requirements (see section 6.1 of the BRANZ guideline). Ideally, any capping layer should be delineated by a permeable geotextile marker layer between the cap and underlying asbestos/contaminated material. Institutional controls must be used to manage long-term risks, particularly where the cap may be disturbed (see section 7 of the BRANZ guideline). Two forms of capping are typically used:

a. Hard cap comprises surfaces that are difficult to penetrate and isolate the asbestos contamination, such as tar seal or concrete driveway cover. This would typically not include pavers or decking due to maintenance and coverage factors. b. Soft cap consists of a layer(s) of material which either comprise virgin natural material or soils that meet the asbestos residential soil guideline value from an on-site source. Use of on-site soils may require resource consent.

8 Results

8.1 Field Observations

A summary of the field observations is presented in Table 6.

Table 7: Summary of Ground Conditions

Location	Depth	Description
TTSS1, TTSS2, TTSS3, TTSS4	0.0-0.25	SILT with minor gravel and trace shell; brown
	0.25-0.4	SILT with trace sand; brown.

Soil analytical results and the adopted soil assessment criteria are presented in Table 7 and asbestos soil results are presented in Table 8. Certified laboratory reports are included in Appendix 5.

The analytical results can be summarised as follows:

- No exceedances of the Residential Land Use Guideline criteria were observed in the soil samples analysed.
- No exceedances of the Regional Background levels for the site were observed in the soil samples analysed.
- All polycyclic aromatic hydrocarbon samples returned below the laboratory detection limit.
- No asbestos fibres were identified in the samples submitted for semi-quantitative analysis.

Table 8: Laboratory Sample Analysis Results

Sample Name	TT SS1	TT SS2	TT SS3	TT SS4	Human Health Criteria – Residential Land Use ALL PATHWAYS[a]	Human Health Criteria – Commercial / Industrial Outdoor Worker (unpaved)[a]	Regional Background Criteria – Trace Elements (Level 2)[b]	
Soil Type	SILT	SILT	SILT	SILT				
Sample Depth, m	0.0-0.2	0.0 - 0.2	0.0 - 0.2	0.0-0.2				
Heavy Metals in soil, mg/kg								
Arsenic	3	3	3	2	20	70	12.58	6.35
Cadmium[c]	<0.10	<0.10	<0.10	<0.10	3	1,300	0.19	0.14
Chromium[d]	10	10	11	9	460	6,300	22.7	19.89
Copper	6	6	6	8	>10,000	>10,000	20.3	11.68
Lead	8.3	9.6	9.0	7.2	210	3,300	40.96	19.75
Nickel	8	9	10	8	400	6,000[c]	20.7	13.91
Zinc	29	33	33	26	7,400	400,000[c]	93.94	69.58

[a] Human health criteria from the NES except where noted.

Bold text indicates that the concentration exceeds the Residential land use criterion

Italics indicates that the concentration exceeds the Commercial/industrial land user criterion

[b] ECan (2007) Background Concentrations of Selected Trace Elements in Canterbury Soils. Exceedances are underlined.

[c] Assumes soil pH of 5.

[d] Criteria for Chromium VI were conservatively selected.

Table 9: Asbestos Semi-quantitative Results

Sample Name	Depth (m)	Description of Asbestos Form	Asbestos as FA/AF (% w/w)
TTSS1	0.0-0.2	No asbestos detected	-
TTSS2	0.0-0.25	No asbestos detected	-
TTSS3	0.0-0.2	No asbestos detected	-
TTSS4	0.0-0.2	No asbestos detected	-

9 Conceptual Site Model

A conceptual site model consists of four primary components. For contaminants to present a risk to human health or an environmental receptor, all four components are required to be present and connected. The four components of a conceptual site model are:

- Source of contamination.
- Pathway(s) in which contamination could potentially mobilise along (e.g. vapour or groundwater migration).
- Sensitive receptor(s), which may be exposed to the contaminants.
- An exposure route, where the sensitive receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).

The potential source, pathway, receptor linkages at this subject site are provided in Table 10

Table 10: Conceptual Site Model Summary

Potential Sources	Contaminants of Concern	Exposure Route and Pathways	Receptors	Acceptable Risk? Do samples meet acceptance criteria?
Trotting track	Heavy metals PAHs Asbestos	Dermal contact with impacted soil, inhalation of dust / fibre and incidental ingestion during earthworks and long term use of the site.	Onsite redevelopment workers. Future subsurface maintenance workers. Future residential land users.	**Yes**. No exceedances of the guideline criteria observed in the soils sampled.
Former farm buildings	Asbestos	Dermal contact with impacted soil, inhalation of dust / fibre and incidental ingestion during earthworks and long term use of the site.	Onsite redevelopment workers. Future subsurface maintenance workers. Future residential land users.	**Yes.** Visual evidence suggests no ACM is present on site but large portions of previous building footprints are encapsulated. Investigation of these areas should be undertaken if they are to be disturbed.

10 Conclusions and Recommendations

ENGEO Ltd was engaged by Hughes Developments Ltd to undertake a Preliminary and Detailed Site Investigation at a 12.36 ha site, situated at 1066 West Coast Road, West Melton, for a change in land use, subdivision and soil disturbance consent. Information was gathered and reviewed regarding the current and past uses of the site that could have resulted in releases or potential releases of hazardous substances to the subject property.

The review of information identified that the site has been used for agricultural grazing from circa 1940, and residential land use with a trotting track and various stables since 1980's.

During the review of the SDC property file the main dwelling was constructed in 1978, with several stables and farm buildings being constructed between 1976-1988. The Health and Safety at Work (Asbestos) Regulations 2016 states if a building constructed or installed prior to 1 January 2000 requires demolition or refurbishment, a full asbestos survey must be undertaken by a competent person. ENGEO understands that the residential buildings are to remain on-site, however confirmation should be sought during redevelopment.

No activities were identified on Canterbury Regional Council's Listed Land Use Register (CRC LLUR). The property file for the site was viewed at Selwyn District Council, and contained no information related to potential hazardous activities having occurred at the site.

During the site walkover and the trotting track was sampled for impacted imported fill material. It was noted that the imported fill consisted of gravel and shells. The laboratory analysis of four samples from around the trotting track area were submitted for analysis for heavy metals, PAHs and asbestos semi-quantitative analysis. All four samples returned concentrations below the site specific regional background criteria and the applicable NES human health criteria. No asbestos fibres were detected in any of the four samples.

Based on the information gathered, we consider that it is highly unlikely for the soils to have been impacted from past and current uses of the site. As per regulation 7 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, it is highly unlikely that an activity included on the HAIL has or is being carried out on the site therefore this piece of land is not covered by this piece of legislation.

During the site walkover visual inspections were also made around the footprint areas of the former farm buildings. No visual PACM was noted during the visual inspection but as a large portion of the former footprints are currently encapsulated by the dwelling, gravel driveway and stables it is recommended that an asbestos soil investigation is undertaken after the demolition or removal of these buildings to ensure that no asbestos containing material is present within these areas.
At present these areas are highly unlikely to present a health issue to the site users as potential asbestos containing material is likely to be encapsulated under hard standing.

If the buildings on-site are to be refurbished or demolished, the presence of asbestos in these buildings should be identified by undertaking full asbestos demolition surveys. If identified on the outside of the buildings in a deteriorated state, the soils surrounding the buildings should also be tested.

11 References

ECan (2007a). *Background Concentrations of Selected Trace Elements in Canterbury Soils. Addendum 1: Additional Samples and Timaru Specific Background Levels.* Report prepared for Environment Canterbury by Tonkin & Taylor Limited, Christchurch, New Zealand. Report Number R07/1/2. Tonkin & Taylor Reference: 50875.003.

Forsyth, P.J.; Barrell, D.J.A; Jongens, R. 2008: *Sheet 16 - Geology of the Christchurch Area 1:250,000.* Institute of Geological and Nuclear Sciences, Lower Hutt.

MfE (2002). *A Guide to the Management of Cleanfills*.

MfE (2011a). *Ministry for the Environment Hazardous Activities and Industries List.*

MfE (2011b). *Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites*.

MfE (2011c). *Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of Environmental Guideline Values.*

MfE (2011d). *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils*.

MfE (2011f). *Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.*

MfE (2012). *Users' guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.*

12 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Developments Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

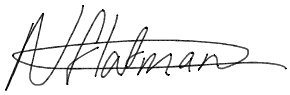
iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineers NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

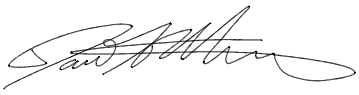
Report prepared by



Natalie Flatman

Environmental Scientist

Report reviewed by



Dave Robotham CEnvP, SC

Principal Environmental Consultant

APPENDIX 1:

Figures

ENGEO
Expect Excellence

Christchurch Office
124 Montreal Street
Sydenham, Christchurch 8023
Tel: 03 328 9012
www.engeo.co.nz

Title: Location of Former Building Footprints

Client: Hughes Developments Limited

Project: 1066 West Coast Road
West Melton
Canterbury

Proj No: 15184.000.000

Designed:	NF
Drawn:	NF
Checked:	DR
Date:	Jul 18
Scale:	1:1,000

Figure No: 2

Size: A3

Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

ENGEO
Expect Excellence

Christchurch Office
124 Montreal Street
Sydenham, Christchurch 8023
Tel: 03 328 9012
www.engeo.co.nz

Title: Site Location and Sampling Locations

Client: Hughes Developments Limited

Project: 1066 West Coast Road
West Melton
Canterbury

Proj No: 15184.000.000

Designed: NF
Drawn: NF
Checked: DR
Date: Jul 18
Scale: 1:2,000

Figure No: 1
Size: A3
Revision: A

ORIGINAL FIGURE PRINTED IN COLOUR

APPENDIX 2:

Certificate of Title

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**CB14A/1422**
Land Registration District	**Canterbury**
Date Issued	08 October 1974

Prior References
CB6D/871

Estate	Fee Simple
Area	12.3700 hectares more or less
Legal Description	Lot 2 Deposited Plan 34902

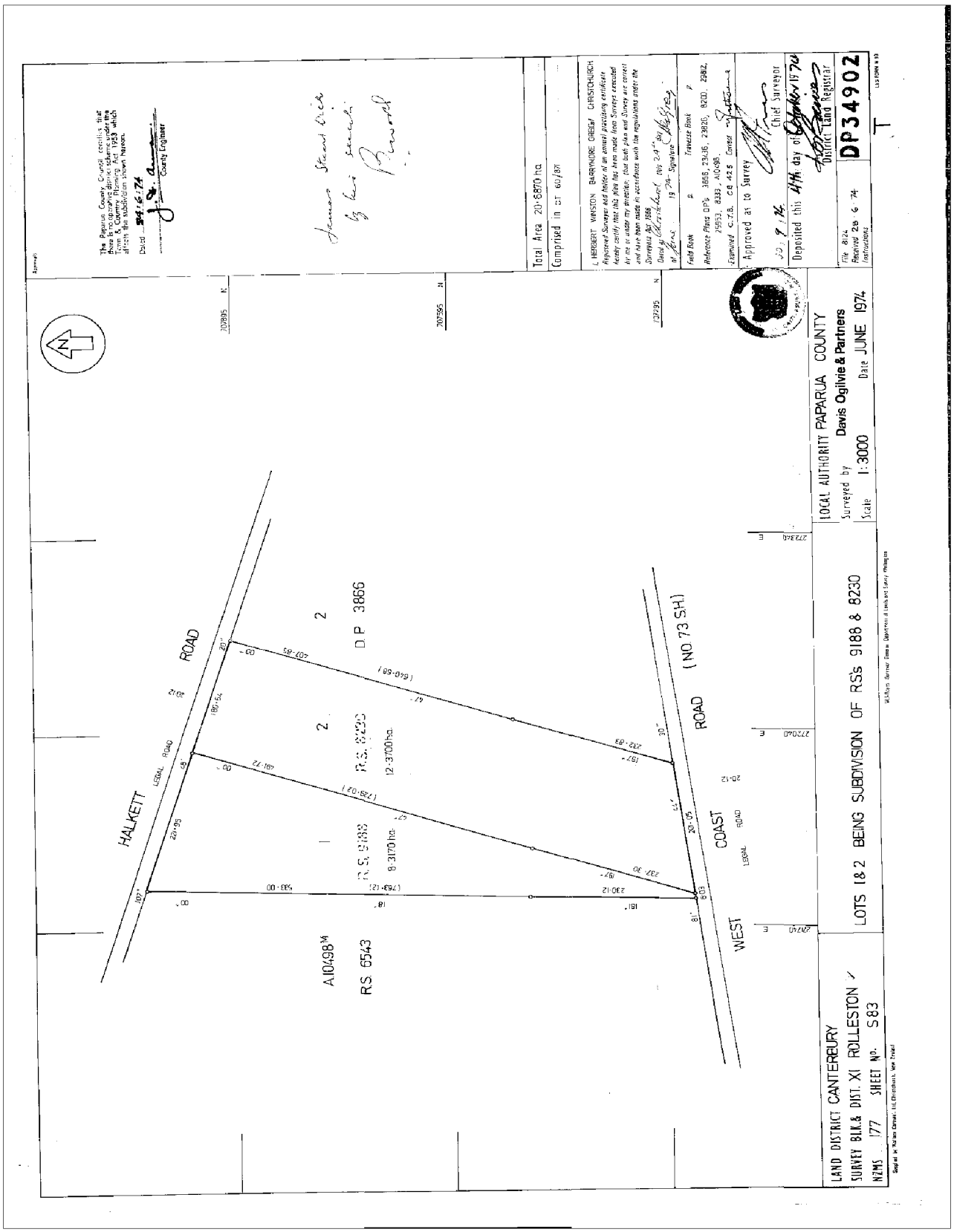
Proprietors
Margaret Patricia Dunn

Interests

723687 Notice declaring the State Highway adjoining the above land to be a limited access road - 30.10.1967 at 9.01 am

10007681.2 Mortgage to Westpac New Zealand Limited - 18.12.2015 at 12:38 pm

Identifier **CB14A/1422**



APPENDIX 3:

CRC LLUR Statement

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to 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.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; 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 note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities 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.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information.
For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

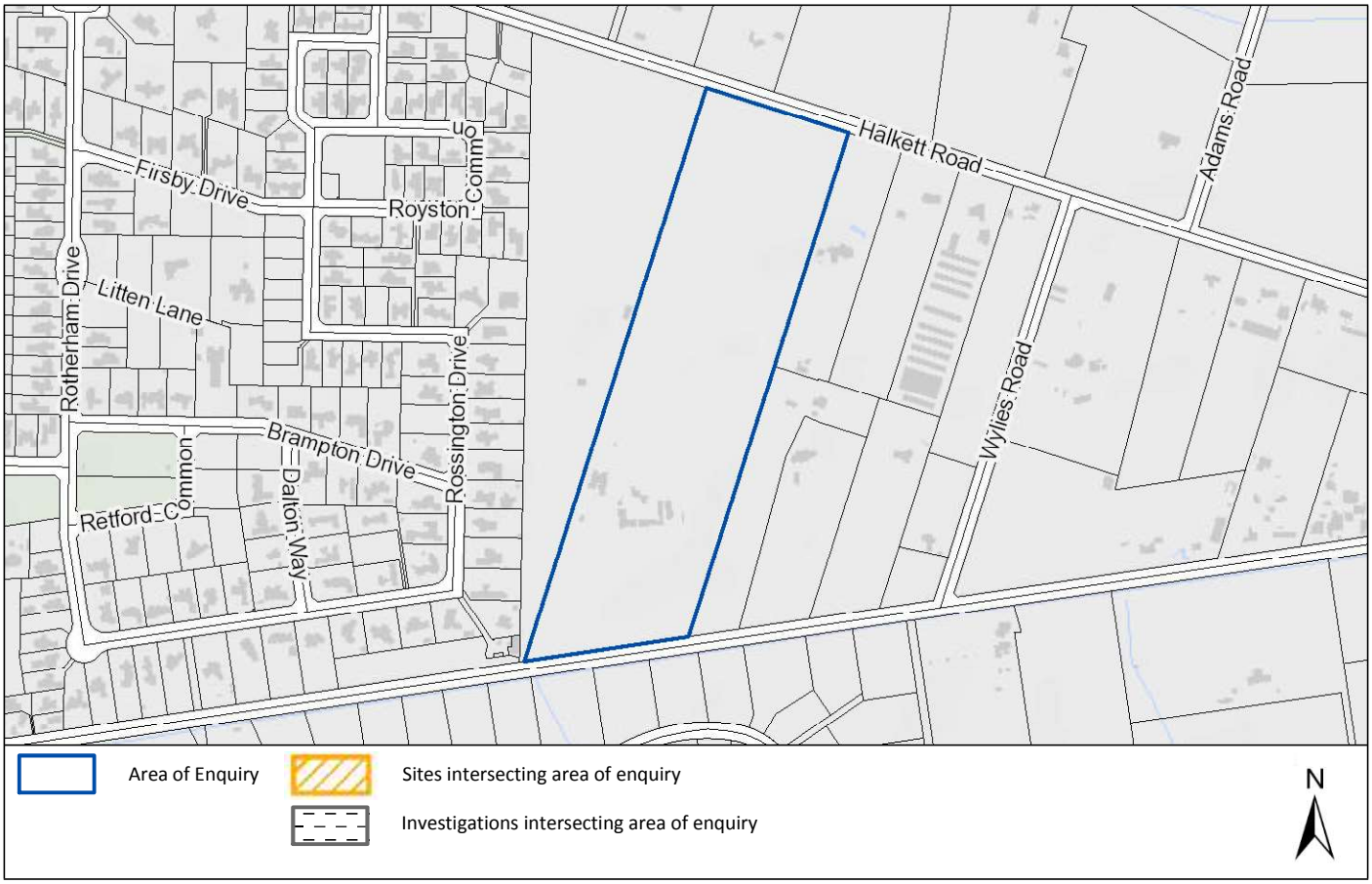
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	28 June 2018	
Land Parcels:	Lot 2 DP 34902	Valuation No(s): 2354113000



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

There are no sites associated with the area of enquiry.

Information held about the sites on the Listed Land Use Register

There are no sites associated with the area of enquiry.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ207234.

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).

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Listed Land Use Register

What you need to know

Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)[1]. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

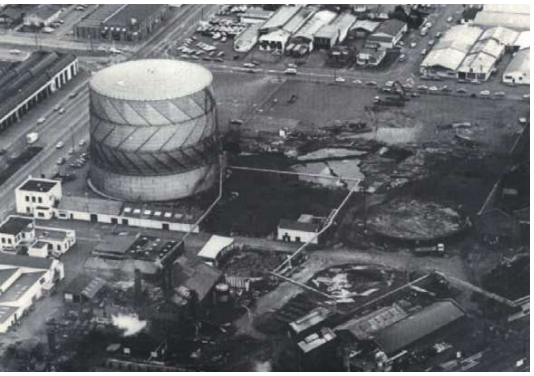
Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.

Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:
Calling from Christchurch: (03) 353 9007
Calling from any other area: 0800 EC INFO (32 4636)

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Everything is connected

Promoting quality of life through balanced resource management.

www.ecan.govt.nz E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

E13/102

APPENDIX 4:

Site Photographs

Photo 1: Dwelling

Photo 2: Eastern stables

Photo 3: Southern stables

Photo 4: Inside of stables

Photo 5: Plastic storage in stables

Photo 6: Paint storage in stables

ENGEO
Expect Excellence

Date taken	July 2018	**Client**	**Hughes Developments Ltd**
Taken by	NF	**Project**	**1066 West Coast Road, West Melton**
Approved by	DR	**Description**	**Site Photographs**
Photo No.	1 to 6	**ENGEO Ref.**	**15184.000.000**

Photo 7: Waste Area east of stables

Photo 8: Waste on trailer - east of stables

Photo 9: Plastic storage in treeline east of stables

Photo 10: Silage south of trotting track

Photo 11: 100L water storage containers near pump shed

Photo 12: Fertiliser containers north of pump shed

ENGEO
Expect Excellence

Date taken	July 2018	**Client**	**Hughes Developments Ltd**
Taken by	NF	**Project**	**1066 West Coast Road, West Melton**
Approved by	DR	**Description**	**Site Photographs**
Photo No.	7 to 12	**ENGEO Ref.**	**15184.000.000**

Photo 13: Paddocks towards the south of the site

Photo 14: West of trotting track looking north

Photo 15: Paddocks in the middle of trotting track

Photo 16: Paddocks in middle of trotting tack, looking north

Photo 17: Typical soil profile below trotting track

Photo 18: Drainage sump on east stretch of trotting track

ENGEO
Expect Excellence

Date taken	July 2018	**Client**	**Hughes Developments Ltd**
Taken by	NF	**Project**	**1066 West Coast Road, West Melton**
Approved by	DR	**Description**	**Site Photographs**
Photo No.	13 to 18	**ENGEO Ref.**	**15184.000.000**

APPENDIX 5:

Laboratory Certificates

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Engeo Limited	**Lab No:**	2012758	SPv1
Contact:	Natalie Flatman	**Date Received:**	10-Jul-2018	
	C/- Engeo Limited	**Date Reported:**	13-Jul-2018	
	PO Box 373	**Quote No:**	82742	
	Christchurch 8140	**Order No:**		
		Client Reference:	15148.000.000	
		Submitted By:	Natalie Flatman	

Sample Type: Soil

Sample Name:		TT SS1 @ 0.0-0.2 09-Jul-2018 12:00 pm	TT SS2 @ 0.0-0.25 09-Jul-2018	TT SS3 @ 0.0-0.2 09-Jul-2018	TT SS4 @ 0.0-0.2 09-Jul-2018	
Lab Number:		2012758.1	2012758.2	2012758.3	2012758.4	
Individual Tests						
Dry Matter	g/100g as rcvd	94	93	90	93	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	3	2	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	10	10	11	9	-
Total Recoverable Copper	mg/kg dry wt	6	6	6	8	-
Total Recoverable Lead	mg/kg dry wt	8.3	9.6	9.0	7.2	-
Total Recoverable Nickel	mg/kg dry wt	8	9	10	8	-
Total Recoverable Zinc	mg/kg dry wt	29	33	33	26	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	-
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[a]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[e]pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Chrysene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Fluorene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	-
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-
Pyrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	-

Analyst's Comments

Appendix No.1 - Chain of Custody

Summary of Methods

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

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-4
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.002 - 0.05 mg/kg dry wt	1-4
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-4
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-4
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-4

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

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

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Job No: **201 2758** Date Recv: 10-Jul-18 06:34

Received by: Kayley Steel

3120127582

ENVIRONMENTAL Analysis Request Form

Hill Laboratories

R J Hill Laboratories Limited — accredited by International Accreditation NZ

1 Clyde Street, Telephone: +64 (7) 858-2000
Private Bag 3205, Facsimile: +64 (7) 858-2001

CLIENT

Name: ENGEO Ltd. [160117]
PO Box 373
Christchurch 8140

Phone: 03 328 9012 Fax:

Client Reference: 15148.000.000 (Project Code)

Quote Number: Order No: (Cost Centre)

Hill Laboratories office use only:
Date In Job # No. of Samples

Submitted By: Natalie Hatman

Charge To: ENGEO. [160117]

RESULTS TO

☐ Mail Client ☐ Mail Submitter
☐ Fax Results
X Email Results: nHatman@engeo.co.nz

✠ C.O.C & coversheet to be scanned and emailed back

Additional Information

May Contain Asbestos

Chain of Custody Record

Delivered to Hill Laboratories (Depatched by)	Date & Time: N Hatman 9/7/2018	Signature:
Received at Hill Laboratories	Date & Time:	Name: Signature:
Condition ☐ Ambient Temp ☑ Chilled 6.9 °C		

PRIORITY ☐ **Normal** (up to 10 days) ✠ **High** (approx 5 days) ☐ **Urgent** (MUST be pre-arranged)
Results required by: .....

Sample types

GW	Bore/well	**TW**	Trade waste	**S**	Saline water	**ES**	Soil/Solid	**Pl**	Plant
SW	Surface water	**E**	Effluent	**O**	Oil	**Sed**	Sediment	**BM**	Fish/shellfish/Biota
P	Potable/DI	**L**	Leachate	**Sl**	Sludge	**BS**	Biosolid	**M**	Misc (Specify)

Site ID	Sample type	Tests required	Comments
TT SS1 @ 0.0-0.2	ES	Heavy metals & PAHs	
TT SS2 @ 0.0-0.25	ES	" "	
TT SS3 @ 0.0-0.2	ES	" "	
TT SS4 @ 0.0-0.2	ES	" "	

Date: Wednesday 11th July 2018

Client Reference: 15148.000.000

ENGEO
124 Montreal Street
Sydenham
Christchurch, 8023

EIAG Reference No: F10033

For the Attention of: Natalie Flatman

Dear Natalie,

Re: 15148.000.000

Test Method – EIAG001: Polarised light microscopy including dispersion staining in accordance with the Australian Standard AS4964-2004 "Method for the qualitative identification of asbestos in bulk samples".

Where material weights passed through a 2mm sieve and are greater than 100g, representative sub samples of 50g were taken by cone and quartering using EIAG's in house method in accordance with the Australian Standard AS4964-2004.

Asbestos is reported as weight (g) found in each sample/sub sample. Where asbestos has been identified it has been broken down into three categories.

Identified asbestos is reported as either
ACM- Asbestos Containing Material
FA- Fibrous Asbestos
AF- Asbestos Fines

The samples in this report are reported 'As Received'. The Environmental and Industrial Analysis Group does not take responsibility for the sampling procedure or accuracy of sample location description as these have been provided by the client.

Four samples were received on Tuesday 10th July 2018. The samples were taken from 15148.000.000

The fibre identification analysis results are presented in the appended table.

Should you require further information please contact Belinda Hughes.

Yours sincerely

BHughes

…….
Belinda Hughes
Key Technical Person
ENVIRONMENTAL AND INDUSTRIAL ANALYSIS GROUP

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1115

EIAG ENVIRONMENTAL & INDUSTRIAL ANALYSIS GROUP

ASBESTOS ANALYSIS REPORT

Wednesday 11th July 2018 **Reference No: F10033**

Laboratory Reference No.	Client Sample No.	Sampling Address/Sampling Location/Description/Dimensions	Fibre Identification Analysis Results
F10033.1	SS1	15148.000.000 TTSS1 @0.0-0.2, Soil	
		>10 mm Sample weight: N/A	
		10-2 mm Sample weight: 250.75 g	Organic Fibres No Asbestos Detected
		<2mm (Sample weight: 541.88 g) Sub sample weight: 51.41 g	Organic Fibres No Asbestos Detected
		Total sample weight: 792.63 g	
F10033.2	SS2	15148.000.000 TTSS2 @0.0-0.25, Soil	
		>10 mm Sample weight: N/A	
		10-2 mm Sample weight: 215.93 g	Organic Fibres No Asbestos Detected
		<2mm (Sample weight: 400.47 g) Sub sample weight: 51.17 g	Organic Fibres No Asbestos Detected
		Total sample weight: 616.40 g	
F10033.3	SS3	15148.000.000 TTSS3 @0.0-0.2, Soil	
		>10 mm Sample weight: N/A	
		10-2 mm Sample weight: 241.04 g	Organic Fibres No Asbestos Detected
		<2mm (Sample weight: 496.13 g) Sub sample weight: 52.09 g	Organic Fibres No Asbestos Detected
		Total sample weight: 737.17 g	

IANZ ACCREDITED LABORATORY ACCREDITATION Nº: 1115

EIAG ENVIRONMENTAL & INDUSTRIAL ANALYSIS GROUP

ASBESTOS ANALYSIS REPORT

Wednesday 11th July 2018 **Reference No: F10033**

Laboratory Reference No.	Client Sample No.	Sampling Address/Sampling Location/Description/Dimensions	Fibre Identification Analysis Results
F10033.4	SS4	15148.000.000 TTSS4 @0.0-0.2, Soil	
		>10 mm Sample weight: N/A	
		10-2 mm Sample weight: 305.17 g	Organic Fibres No Asbestos Detected
		<2mm (Sample weight: 600.50 g) Sub sample weight: 52.64 g	Organic Fibres No Asbestos Detected
		Total sample weight: 905.67 g	

Note: **The results contained in this report relate specifically to the samples submitted.**

Reporting limit is 0.1g/kg as per the AS4964-2004.

Reporting raw asbestos weights within soil samples is outside of EIAG's IANZ accreditation.

This document may not be reproduced except in full.

Identified By:

……

Holly Eeg BA (ERSc & Anth)
Laboratory Technician

Reviewed By:

……

Jessica Campbell BSc (Geol & Geog)
Laboratory/ Quality Manager

Form No: QLA001 – A	CONTROLLED DOCUMENT
CHAIN OF CUSTODY FORM – ENGEO	Version Number: 1 Issue Date: August 2016 Authorised By: Jessica Campbell *Document is Uncontrolled When Printed*
EIAG Contact Name:	**Receiving Laboratory:** Please complete sample receipt details below and email copy of COC to EIAG contact
EIAG Contact Email:	
Client Business Name: ENGEO	
Contact Name:	**Received By:**
Company Address: 124 Montreal Street	**Date & Time:**
Contact No: Natalie Flatman	**Signature:**
Report Email: nflatman@engeo.co.nz	**ENGEO Ref. #:** 151.48,000.000
Account Email:	**Client Ref. #:**
Sample Details: VFC – Vinyl Floor Covering IB – Insulation Board S/C – Skim Coat T/C – Textured Coating VFT – Vinyl Floor Tile w PB – With Paper Backing	**COC emailed to EIAG: Yes / No** *(Circle)* **Turn Around time Requested** *(Circle)* 3 - 5 Business days (48 Hour) ~~24 Hour~~
Site Reference: 151148.000.000	**Analysis Required**
Accessibility:	**Sampled By:** NF
Time & Date: 9/7/18	**AS RECEIVED**

Lab. Sample Number	Client Sample Number	Product	Sample Location: *(Provide the information you require on the analysis report)*	Bulk ID	Fibre. C	SG Bulk	Bulk	Tape	Dust	Soil/Ore
	SS1	Soil	TP SS1 @ 0.0-0.2			✓				
	SS2	Soil	TP SS2 @ 0.0-0.25			✓				
	SS3	Soil	TP SS3 @ 0.0-0.2			✓				
	SS4	Soil	TP SS4 @ 0.0-0.2			✓				

Number of Samples Received: 4	Date required: 12.07.18
Date/Time Received: 10.07.18 9:13 am	Results to be sent to client by:
Name: Jane Pankhurst	Email ☑ Post ☐
Signature:	
Job Number: FW 033	
WFM UPDATED WITH SAMPLE AMOUNT AND COSTS: YES / NO	

This form has been altered to suit the client (ENGEO) and has been approved by EIAG's Quality Manager

Private Plan Change Request – Hughes Developments Limited
Appendix C – Preliminary and Detailed Site Investigations

ENGEO

Expect Excellence

Preliminary Environmental Site Investigation

163 Halkett Road

West Melton

Canterbury

Submitted to:

Hughes Development Limited

Canterbury

ENGEO Limited

124 Montreal Street, Sydenham, Christchurch 8023

PO Box 373, Christchurch 8140, New Zealand

Tel +64 3 328 9012 Fax +64 3 328 9013

www.engeo.co.nz

30.06.2017

14088.000.000_01

ACENZ

Contents

Tables

Figures

Appendices (at the rear of this report)

ENGEO Document Control:

Report Title	Preliminary Environmental Site Investigation - 163 Halkett Road, West Melton			
Project No.	14088.000.000	Doc ID	01	
Client	Hughes Development Limited	Client Contact	Kelvin	
Distribution (PDF)	Hughes Development Limited			
Date	Revision Details/Status	WP	Author	Reviewer
30/06/17	Final	JB	HA/NF	DR

1 Introduction

ENEGO Ltd was requested by Hughes Development Limited to undertake a Preliminary Environmental Site Investigation (PSI) of the property (herein referred to as 'the site') at 163 Halkett Road in West Melton, Canterbury. The purpose of this investigation was to assess the property's suitability for consent for a change of land use and subdivision consent under the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (NES) to satisfy the requirements of Selwyn District Council (SDC). The site currently has an agricultural land use and it is proposed to be redevelopment for residential land use.

Figure 1 indicates the location of the property. This PSI was undertaken in general accordance with the Ministry for the Environment (MfE) 2001, *Guidelines for Reporting on Contaminated Sites*.

1.1 Objectives of the Assessment

The objective of this PSI was to evaluate and identify conditions indicative of releases and threatened releases of hazardous substances on, at, in or to the subject property and report on the potential risk posed to future site users.

1.2 Approach

To satisfy the objectives, ENGEO sought to gather information regarding the following:

- Current and past property uses and occupancies;
- Current and past uses of hazardous substance;
- Waste management and disposal activities that could have caused a release or threatened release of hazardous substances;
- Current and past corrective actions and response activities to address past and on-going releases of hazardous substances at the subject property; and
- Properties adjoining or located near the subject property that have environmental conditions that could have resulted in conditions indicative of releases or threatened releases of hazardous substances to the subject property.

1.2.1 Review of Site Information

During this assessment, a number of sources of information were contacted for information relating to the site regarding its past and present uses. This included contacting Canterbury Regional Council (CRC) to determine if there were any records on the Listed Land Use Register (LLUR) and reviewing records held by Selwyn District Council (SDC) including the property file and dangerous goods file (if available). A review of a number of historical and current aerial photographs was also undertaken using images from Canterbury Maps and Google Earth.

1.2.2 Site Inspection

A site walkover was undertaken on 28 June 2017 by Jenna Lohmann of ENGEO. Objective evidence was collected through discussions with the current site owner.

2 Site Description

Site information is summarised in Table 1.

Table 1: Site Information

Item	Description
Location	163 Halkett Road, West Melton, Canterbury
Legal Description	Lot 1 DP 34902
Property Owner	Heather Ringland
Current Land Use	Agricultural
Proposed Land Use	Residential subdivision
Site Area	8.3170 ha
Building Construction	Two farm sheds and one storage shed: timber frame with metal cladding and roofing
Territorial Authority	Selwyn District Council

The site setting is summarised in Table 2.

Table 2: Site Setting

Item	Description
Topography	Generally flat with gentle swales.
Local Setting	Land to the west of the site is residential with land to the north, east and south is predominantly agricultural with some associated residential land use.
Nearest Surface Water & Use	An un-named water race is present approximately 15 m to the south of the site.
Geology	Late quaternary dunes, sand in mobile and fixed dunes of the coast and river.
Hydrogeology	The site is overlying an unconfined / semiconfined gravel aquifer, with groundwater depth estimated to be between 70 and 65 m bgl and estimated to be flowing in an easterly direction.
Groundwater Abstractions	There is one groundwater abstraction located on the site: M35/1013: A & J Dunn; domestic and stockwater supply. There are eight active groundwater abstractions within 250 m of the site: M35/7353: P & J Lenton; irrigation supply.

Item	Description
	M35/9443: P & J Rowlands; domestic and stockwater supply. M35/5159: J Grant; irrigation, domestic and stockwater supply. M35/10751: Selwyn District Council; public water supply. M35/18776: R & L Smith; domestic and stockwater supply. M35/10753: Apex Industries; domestic supply. BX23/0505: J & K Brosnahan; domestic and stockwater supply.
Discharge Consents	There are no discharge consents located on the site. There are two active discharge consents located within 250 m of the site: CRC172915: Fergusson & Wang; discharge contaminants, being treated domestic sewage effluent, to land. CRC061616: Fenton; discharge domestic sewage tank effluent to ground.

3 Site History

A number of sources were used to investigate the past uses of the site. The findings of these information searches have been summarised in this section.

3.1 Interview with Site Occupants

During the site walkover on 28 June 2017, the site owner, Heather Ringland, was interviewed by Jenna Lohmann of ENGEO. Heather indicated that she has owned the site since 1972 and has used it solely to raise and train horses. No dwelling has been present on the site, and no structures have been demolished, while she has owned the property. Additionally, no other agricultural activities have taken place on the site. Ms. Ringland indicated that the only known area of buried materials is a pit of buried shingles and boards near the power pole, east of the southernmost farm shed.

3.2 SDC Property File Review

The property file for the site held by Selwyn District Council was reviewed on 28 June 2017 as part of the PSI. The following documents were provided for review.

Table 3: Property File Review

Document	Date	Description
Building Consent Application #21510	29/1/1977	Application with the Selwyn District Council for a new hay shed.
Building Consent Application #33207	13/11/1986	Application with the Paparua County Council for a new hay shed.

3.3 Listed Land Use Register

Potentially hazardous activities are defined on the Hazardous Activities and Industries List (HAIL). Canterbury Regional Council (CRC) maintains a Listed Land Use Register (LLUR) of past and current land uses within the Canterbury region which have potentially had an activity included on the HAIL undertaken on them. The listing of the property on the LLUR triggers the requirement for a contaminated land assessment prior to development.

The CRC LLUR property statement was requested by ENGEO on 23 June 2017 for the site and is presented in Appendix 1, no areas of concern were identified on the CRC LLUR for the site.

3.4 Historical Aerial Photograph Review

Aerial photographs dating from 1940 to 2016 have been reviewed on Canterbury Maps. The relevant visible features are summarised in Table 4.

Table 4: Aerial Photographs

Date	Description
1941	The site is being used for agricultural grazing purposes with the site appearing to be split into three fields. No buildings are present on the site. The surrounding area is agricultural with farm buildings located to the southeast of the site.
1960-1964	The site remains the same. The surrounding area remains predominantly agricultural with a trotting track now present to the west of the site.
1975-1979, 1980-1984, 1985-1989	The site remains the same, with some small buildings present in the centre of the site. It is presumed their use is for agricultural purposes. The surrounding area remains the same with a trotting track present to the east of the site as well as the west.
1994	The site remains the same with an additional building present along the eastern boundary of the site. It is unclear as to what the building is used for. The surrounding area remains the same.
2004	The site remains the same. There appears to be some disposal to land/storage or materials present in the centre of the site. There are also a number of cars located on the property in the same area. The surrounding area remains the same.
2016	The site remains the same as the previous photo with material still present in the centre of the site. Piles of timber also appear to be present. Land to the west of the site has been developed for residential purposes with the remaining surrounding area the same.

4 Current Site Conditions

A site walkover investigation was undertaken on 28 June 2017 by Jenna Lohmann of ENGEO. The information gathered is summarised in Table 5. Photographs taken during the site investigation are included in Appendix 2.

Table 5: Current Site Conditions

Site Condition	Comments
Visible signs of contamination	Four small burn pits with materials consisting of green waste, cans, building materials, and household items were observed in the vicinity of the farm sheds.
Surface water appearance	No surface water was present.
Local sensitive environments	None identified.
Visible signs of plant stress	Aside from the burn pits, no plant stress was apparent.
Potential for on or off site migration of contaminants	None identified.
Additional observations (if any)	A fuse board that may contain asbestos was identified in the southernmost farm shed. Although materials in the materials storage shed were covered, there may be impacts to the underlying soil as the shed was built straight onto earthen ground. There is a water race to south of West Coast Road.

5 Potential HAIL Activities

Activities included on the HAIL trigger the requirement for a contaminated land investigation prior to development. While no activities have been identified on the LLUR for the site, the following observations noted during the site walkover have been included:

- G5: Waste disposal to land

Further information regarding the areas of potential concern have been summarised in Table 6.

Table 6: Potential Contamination at the Site

Potential source of contamination	Contaminants of concern	Possible extent of contamination	HAIL activity as defined by the NES (soil)
Burn off Areas	Heavy metals PAH's	Eastern paddock and south-western paddock only	G5: Waste disposal to land

6 Conceptual Site Model

A conceptual site model consists of four primary components. For a contaminant to present a risk to human health or an environmental receptor, all four components are required to be present and connected. The four components of a conceptual site model are:

- Source of contamination;
- Pathway(s) in which contamination could potentially mobilise along (e.g. vapour or groundwater migration);
- Sensitive receptor(s) which may be exposed to the contaminants; and
- An exposure route, where the sensitive receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).

The potential source, pathway, receptor, exposure linkages at this subject site are provided in Table 7.

Table 7: Conceptual Site Model

Potential Sources	Contaminants of Concern	Exposure Route and Pathways	Receptors	Acceptable risk?
Burn pits	Heavy metals PAH's	Dermal contact with impacted soil, incidental ingestion and inhalation of dust during earthworks	On-site redevelopment workers. Future subsurface maintenance workers.	Unknown, further investigation or removal of site soils required.
		Dermal contact with impacted soil, incidental ingestion and inhalation of wind-blown dust.	Future residential land users.	Unknown, further investigation or removal of site soils required.

7 Conclusions and Recommendations

ENGEO Ltd was requested by Hughes Developments Limited to undertake an environmental assessment of an 8.3 ha site, situated at 163 Halkett Road, West Melton, for a change of land use (agricultural to residential), subdivision and soil disturbance consent. Information was gathered and reviewed regarding the current and past uses of the site that could have resulted in releases or potential releases of hazardous substances to the subject property.

The review of information identified that the site has been used for agricultural grazing since before 1940. No evidence of wider land use before this date was available.

The review of property files at the Selwyn District Council indicated that the farm buildings were constructed in 1977 and 1986. The Health and Safety at Work (Asbestos) Regulations 2016, states if a building is constructed or installed prior to 2000 requires demolition or refurbishment, a full asbestos survey must be undertaken by a competent person. ENGEO recommends that asbestos surveys are completed prior to the demolition of any buildings present on site if no previous information related to a building survey is present.

No activities were identified on the Canterbury Regional Council's Listed Land Use Register (CRC LLUR). The property file for the site was viewed at Selwyn District Council, and contained no information related to potential hazardous substances having occurred at the site.

During the site walkover, four small burn pits located in the middle of the property were noted. It is considered that the burn pits would be listed on the HAIL for G5: Waste disposal to land.

Based on the information gathered, we consider that there is a potential that soils in four localised areas may have been impacted by the past and current uses of the site. There is a potential risk to human health at the site to future redevelopment works or site users from these sources.

As the redevelopment of the site involves a change of land use, subdivision and soil disturbance, it is possible that soils being disturbed have been impacted by the identified potential sources of contamination. The burn pits observed during the site walkover and the impacted soil should be removed and properly disposed of prior to site redevelopment. The removal of these areas would be considered a permitted activity under Regulation 8(3) of the Resource Management (National Environmental Standard for Assess and Managing Contaminants in Soils to Protect Human Health) Regulation 2011 due to the small volume to be removed. However a site management plan would be required detailing controls to be put in place to protect the site workers and surrounding during the works. It is likely that soil validation samples in the burn pit areas would also be required.

It is considered that the remainder of the site is highly unlikely to have been impacted by it past uses and therefore the change of land use and sub-division should be considered a permitted activity under Regulation 8(4) of the Resource Management (National Environmental Standard for Assess and Managing Contaminants in Soils to Protect Human Health) Regulation 2011.

8 References

Forsyth, P.J.; Barrell, D.J.A; Jongens, R. 2008: Sheet 16 - Geology of the Christchurch Area 1:250,000. Institute of Geological and Nuclear Sciences, Lower Hutt.

Ministry of Business, Innovation, and Employment. 2016: Health and Safety at Work (Asbestos) Regulations 2016.

MfE Oct 2011: Ministry for the Environment Hazardous Activities and Industries List.

MfE 2012: Users' guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

9 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Hughes Development Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

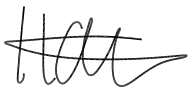
iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

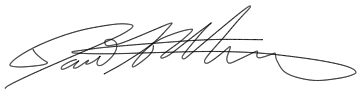
Report prepared by



Hazel Atkins

Senior Engineering/Environmental Geologist

Report reviewed by



Dave Robotham, CEnvP CL Specialist

Principal Environmental Consultant

FIGURES

ENGEO
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Date	June 2017	**Client**	**Hughes Developments Limited**		
Drawn by	NF	**Project**	**163 Halkett Road, West Melton**		
Approved by	DR	**Description**	**Site Plan**		
Scale	NTS	**Figure Number**	1	**Project Number**	14088.000.000

APPENDIX 1:

Listed Land Use Register

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry in regards to 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.

The LLUR statement provided indicates the location of the land parcel(s) you enquired about and provides information regarding any LLUR sites within a radius specified in the statement of this land.

Please note that if a property is not currently entered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; 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 note that many current and past activities undertaken on farms may not be listed on the LLUR. Activities 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.

Please contact and Environment Canterbury Contaminated Sites Officer if you wish to discuss the contents of the LLUR statement, or if you require additional information.
For any other information regarding this land please contact Environment Canterbury Customer Services.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Environment Canterbury
Regional Council
Kaunihera Taiao ki Waitaha

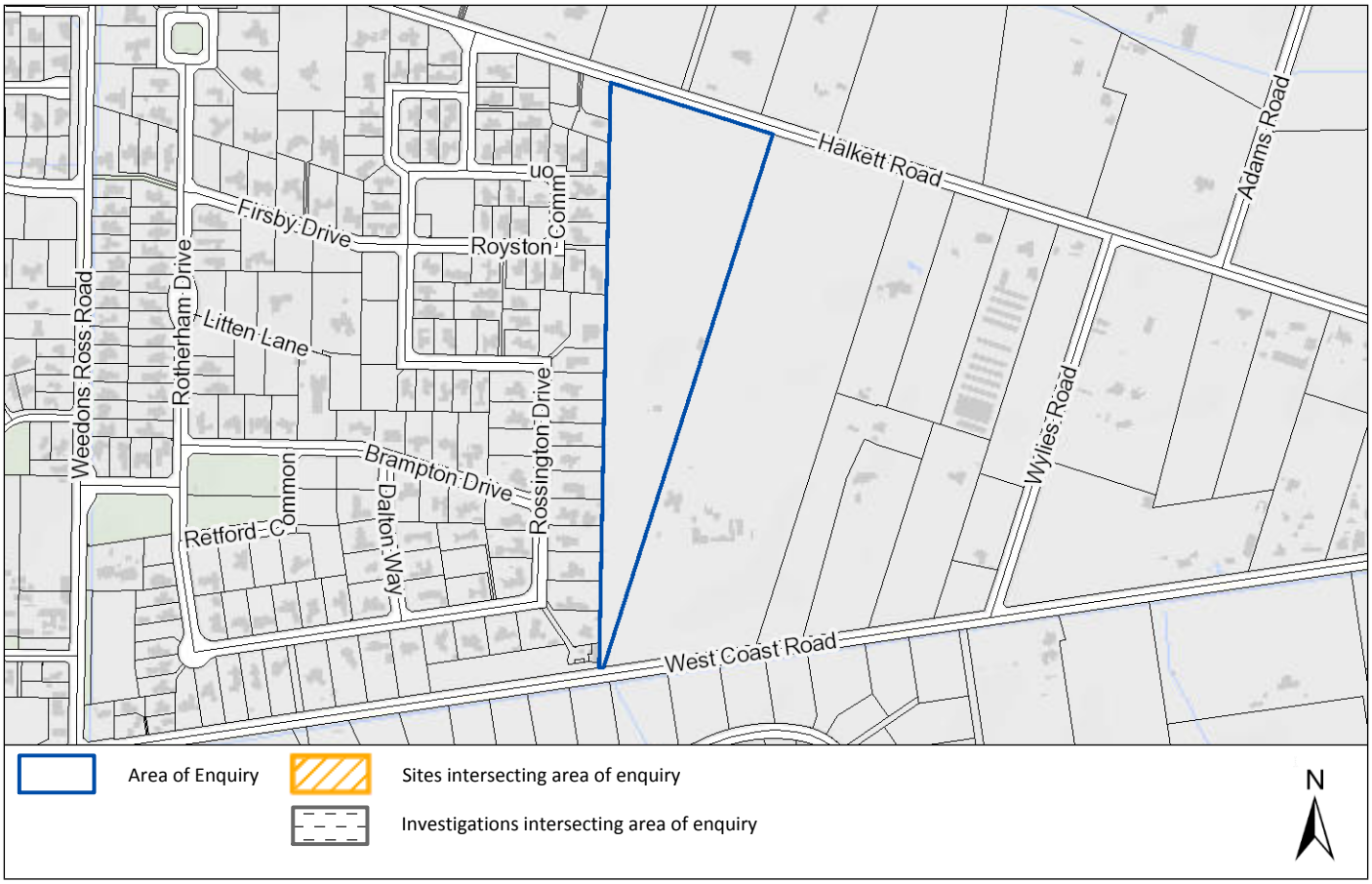
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	23 June 2017	
Land Parcels:	Lot 1 DP 34902	Valuation No(s): 2354113100



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Summary of sites:

There are no sites associated with the area of enquiry.

Information held about the sites on the Listed Land Use Register

There are no sites associated with the area of enquiry.

Information held about other investigations on the Listed Land Use Register

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ168019.

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).

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Listed Land Use Register

What you need to know

Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)[1]. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

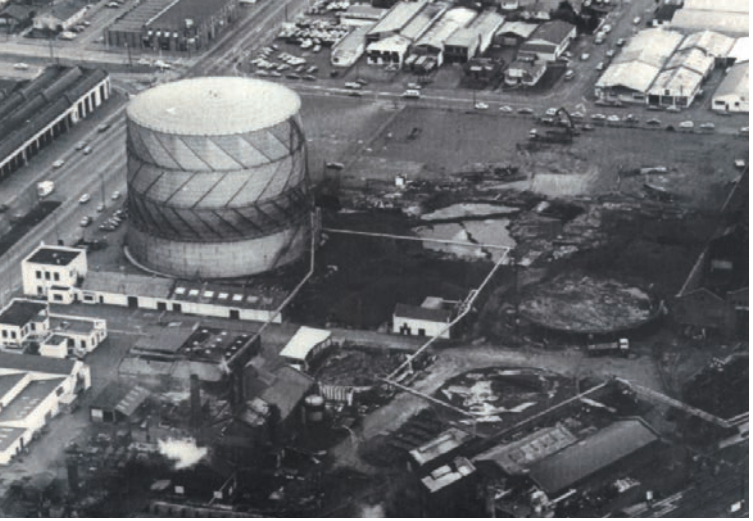
Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

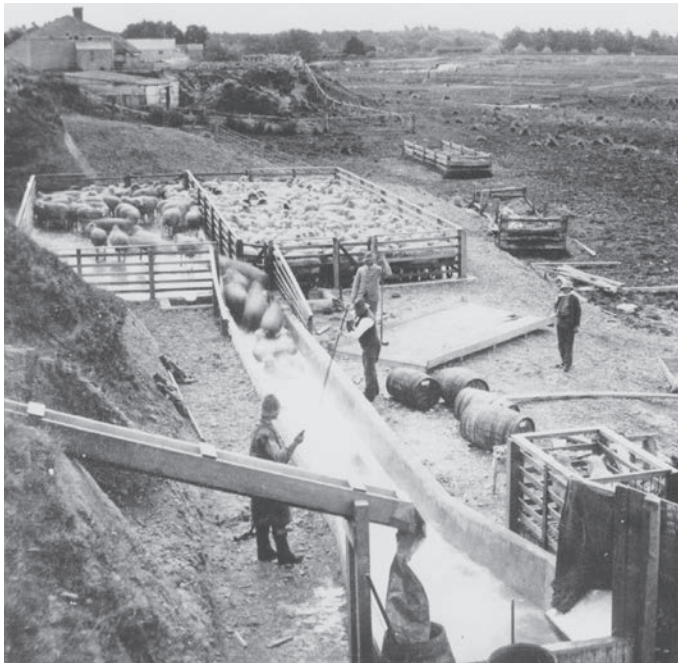
We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:
Calling from Christchurch: (03) 353 9007
Calling from any other area: 0800 EC INFO (32 4636)

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

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Promoting quality of life through balanced resource management.

www.ecan.govt.nz E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

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Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

E13/102

APPENDIX 2:

Site Photographs

Photo 1: Looking north across southern paddock

Photo 2: Looking south across southern paddock

Photo 3: Looking south across western site boundary

Photo 4: Looking south along eastern site boundary

Photo 5: Looking towards north east site corner

Photo 6: Looking west across central portion of site

ENGEO
Expect Excellence

Date taken	June 2017	**Client**	**Hughes Developments Limited**		
Taken by	JL	**Project**	**163 Halkett Road, West Melton**		
Approved by	DR	**Description**	**Site Photographs**		
Photo No.	1 to 6	**ENGEO Ref.**	14088.000.000	**Appendix**	2

Photo 7: Burn Pit in northern paddock

Photo 8: Burn pit next to trotting track

Photo 9: Household rubbish, burn pit, and materials storage shed

Photo 10: Materials storage shed

Photo 11: Northernmost farm shed

Photo 12: Southernmost farm shed

ENGEO
Expect Excellence

Date taken	June 2017	**Client**	**Hughes Development Limited**		
Taken by	JL	**Project**	**163 Halkett Road**		
Approved by	DR	**Description**	**Site Photographs**		
Photo No.	7 to 12	**ENGEO Ref.**	14088.000.000	**Appendix**	2

Private Plan Change Request – Hughes Developments Limited
Appendix D – Traffic Assessment

novo group

Planning. Traffic. Development.

Integrated Transport Assessment

Prepared for

HUGHES DEVELOPMENTS LIMITED

163 Halkett Road Plan Change
West Melton

November 2020

Integrated Transport Assessment
Prepared for

Hughes Developments Limited

163 Halkett Road Plan Change
West Melton

Novo Group Ltd
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Document Date:	**11/11/2020**
Document Version/Status:	Rev 1 | FINAL
Project Reference:	033020
Project Manager:	Rhys Chesterman, Director and Traffic Engineer/Planner
Prepared by:	Simon de Verteuil, Senior Transport Engineer
Reviewed by	Rhys Chesterman, Director and Traffic Engineer/Planner

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List of Figures and Tables

Appendices

Introduction

1. Hughes Developments Limited has commissioned Novo Group to prepare an Integrated Transport Assessment (ITA) for a Plan Change at 163 Halkett Road in West Melton. This includes land bounded by State Highway 73 (to the south), Halkett Road (to the north) and the existing Gainsborough and Halkett Grove subdivisions (to the west).

2. This report provides an assessment of the transport aspects of the proposed development. It describes the transport environment in the vicinity of the site, the transport related components of the proposal and identifies any transportation issues associated with the proposed development. This includes any likely changes in travel patterns. The assessment also examines any potential adverse effects and whether these can be mitigated.

3. The report has been prepared broadly in accordance with the Integrated Transportation Assessment Guidelines specified in New Zealand Transport Agency Research report 422, November 2010 and other relevant best practice guides.

4. The site location is illustrated in Error! Reference source not found.. The proposed ODP for the site is contained in Error! Reference source not found..

Figure 1: Site Location (Source: Canterbury Maps)

Transport Environment

Road Network

5. The site is located immediately to the east of the existing West Melton urban area and bounded by West Coast Road (State Highway 73) to the south and Halkett Road to the north. These roads are shown below in **Figure 2**.

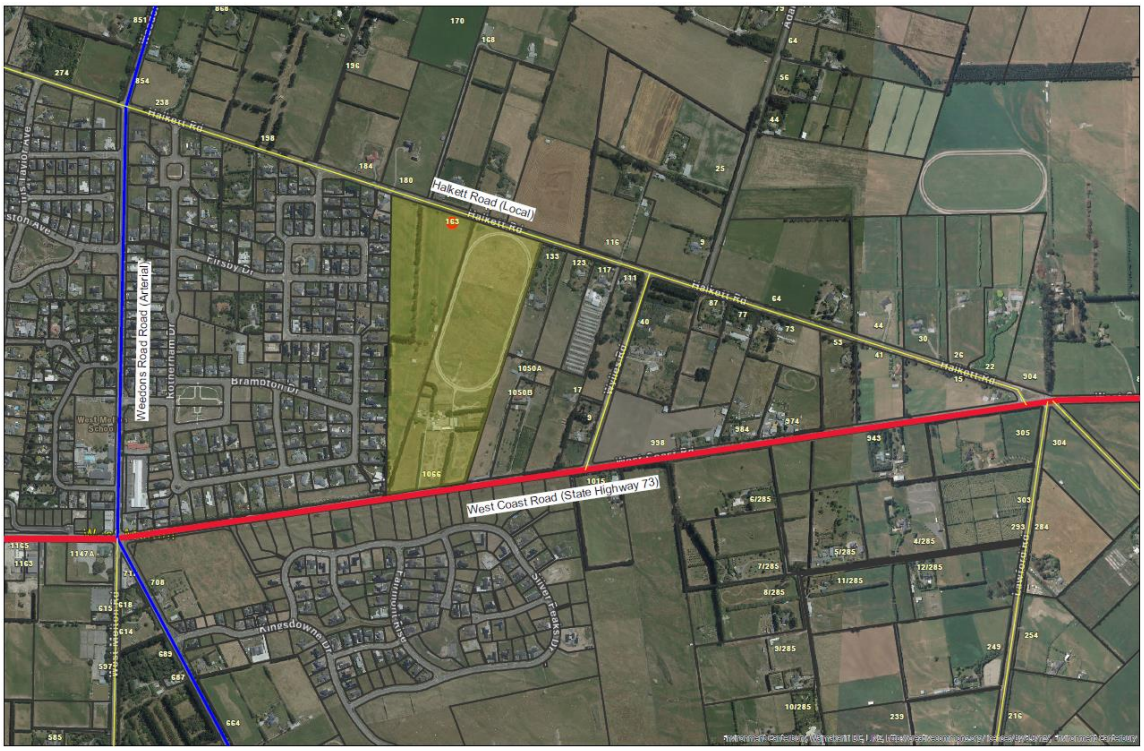


Figure 2: Road Network (Source: Canterbury Maps)

6. The key characteristics of adjacent roads are summarised below.

Table 1: Road characteristics – West Coast Road and Halkett Road

Key Feature or Characteristic	West Coast Road (SH73)	Halkett Road
Road Classification	State Highway	Local
Cross section Description	20 m road reserve Grass verge 8.0m (approx.) sealed carriageway, 3.5m lane in each direction separated by a painted centreline. Edge line markings with 0.5m shoulder approximately either side See **Photograph 1**.	20 m road reserve Grass verge 6.0m (approx.) sealed carriageway, 3.0m lane in each direction separated by a painted centreline. No edge line markings. See **Photograph 2**.
Road features	Straight alignment with grass verges either side (range from 4-5 m). A water race also runs along the south side of	Straight alignment with grass verges either side (approximately 6m wide). A speed threshold treatment (lane narrowing using markings) is located

	SH73 approximately 4.0m from the edge of the sealed road. On the southern/opposite side of the water race there is a fence and a sloped bund.	immediately west of where the access is proposed.
Traffic Volumes	Annual Average Daily Traffic = 13,250 including 5.2% heavy traffic (2019) [NZTA State Highway Traffic Monitoring site. West Melton – East of Dawsons Road (ID 07300013)].	1,097 vehicles per day (vpd) (June, 2020). [Data from RAMM – provided by SDC (Selwyn District Council)]
Posted Speed Limit	100km/h along the frontage. A new permanent speed limit of 60km/h is proposed approximately 200m west of the site[1].	There is a posted speed limit change along the site frontage. The existing speed limit is 80km/h outside the site; however, this reduces to 60km/h approximately 30m to the west of the proposed access.
Cycling Infrastructure	None	None
Pedestrian Infrastructure	There is no pedestrian infrastructure along SH73. There is a pedestrian refuge and pedestrian crossing point approximately 400m west of the site that links the northern and southern subdivisions.	There is no pedestrian infrastructure along Halkett Road
Public Transport	There are currently no public transport routes passing the site.	Bus service 86. Express service operating between Darfield, Kirwee and West Melton. Only one pick up and drop off time – 7.30am and 5.30pm.

7. All other roads in the local area are local roads. This includes West Melton Road, Wylies Road, Lawford Road, Curraghs Road, Adams Road and those located within the Gainsborough and Halkett Grove subdivisions.

Photographs 1 and 2 below illustrate the sight distance and cross section elements of SH73 and Halkett Road.

Photograph 1: SH73 Looking West (Left) & East (Right)

[1] https://www.nzta.govt.nz/projects/sh73-west-melton/

Photograph 2: Halkett Road Looking East (Left) & West (Right)

Crash History

8. The NZ Transport Agency Crash Analysis System (CAS) has been reviewed to identify crashes that have been reported within 50m of the site frontage in the five-year period ending 9 November 2020. This is illustrated in **Figure 3**. No crashes were reported.

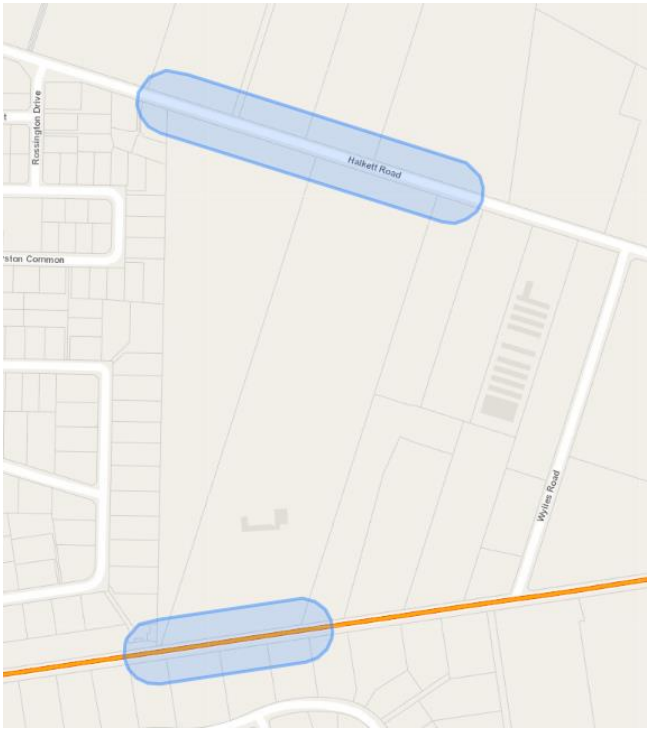


Figure 3: CAS Database Study Area and Crash History

Non-Car Modes of Transport

9. The site is currently located in a rural area on a greenfield site. There is minimal infrastructure in the area to support non-car modes. There are existing residential subdivisions to the west - Halkett Grove and Gainsborough. Both have internal footpaths but neither have footpaths along the frontages with Halkett Road or SH73. Cyclists are required to share the roads with motorised traffic.

10. There is a pedestrian refuge island and crossing point on SH73, approximately 300m east of Weedons Ross Road (see **Photograph 3)**. This was implemented to provide a direct route for pedestrians from the Wilfield residential subdivision to access services on the north side of SH73.

Photograph 3: Pedestrian Refuge Across SH73

11. A permanent speed limit change was implemented on 12 October 2020 along SH73 in vicinity of the site as shown in **Figure 4**. The safety of pedestrians crossing SH73 was identified as a key reason to implement this speed reduction.

Figure 4: Speed Limit Changes as of 12 October 20220

12. The No. 86 bus service is primarily for residents that commute to the city from Darfield, Kirwee and West Melton. It operates as an express service so only stops at selected locations as shown in **Figure 5**. This illustrates a bus-stop location on Halkett Road within 260m of the proposed site access.

Figure 5: Bus Service 86 (West Melton) (Source: Metro Christchurch)

Future Changes to Land Use and Infrastructure

13. The Weedons Ross Road/SH73 priority-controlled intersection is programmed to be upgraded to traffic signals. This is due for completion in 2022/2023. The key purpose for this improvement is *to allow safer access for pedestrians and cyclists, particularly vulnerable school children*[2].

Current and Future Transportation Patterns

14. NZTA have a traffic monitoring site (count station) along SH73, east of Dawsons Road. This is approximately 4 km east of the application site. The Average Annual Daily Traffic (AADT) recorded between 2014-2019[3] is illustrated in **Table 2**.

Table 2: Average Daily Traffic for SH73 (East of Dawsons Road)

Year	AADT
2014	9,910
2015	10,340
2016	11,027
2017	11,236
2018	9,424
2019	13,250

[2] https://www.nzta.govt.nz/planning-and-investment/nz-upgrade/canterbury-package/
[3] https://www.nzta.govt.nz/resources/state-highway-traffic-volumes/

15. **Table 2** reveals that the background traffic growth has increased by a rate of around 3.6% (compound) per year along SH73 (if using all values between 2014 & 2019).

16. Commuter traffic patterns from the latest Census data[4] (2013) has been analysed to determine likely traffic distributions for the site. Results for the West Melton zone (587904) are shown in **Table 3** and clearly indicate that a significant proportion of trips (74% and 90%) travel to and from Christchurch City (to and from the east). It also assumes that vehicles would predominantly use SH73 at some point to access their destinations.

Table 3: Predicted Traffic Distributions from the Site

Distribution	In	Out
Christchurch	711 (74%)	1926 (90%)
Other/West	255 (26%)	219 (10%)

The Proposal

17. The proposed Plan Change would enable up to 130 residential lots to be established at the application site. A proposed ODP is illustrated in **Appendix 1**.

18. Unless otherwise stated, it is proposed to adopt the transport provisions of the Operative District Plan or Proposed District Plan, whichever is relevant at the time.

19. The following sets out the transport details of the proposed Plan Change.

Site Layout

Access Intersections

20. The proposed ODP provides a north-south primary road through the site forming T-intersections at Halkett Road (to the north) and SH73 (to the south).

21. The intersection design at Halkett Road is envisaged to mirror the design associated with Rossington Drive (Halkett Grove). This includes lighting and kerb and channel at the point of access with the potential to include future footpaths.

22. The intersection design at SH73 is envisaged to include a right turn lane as conceptually illustrated in **Figure 6**. This can be accommodated for a posted speed limit of 100km/h with the widening shared across the centreline. It is anticipated that the stock-water race on the south side of the road may need to be filled in to accommodate such an access. A less onerous design could be provided if the existing 60km/h speed limit was extended further to the east to incorporate the proposed site access. Either way, an access intersection can be designed to fit within the existing road reserve.

[4] http://infoshare.stats.govt.nz/datavisualisation/commuterview/index.html#

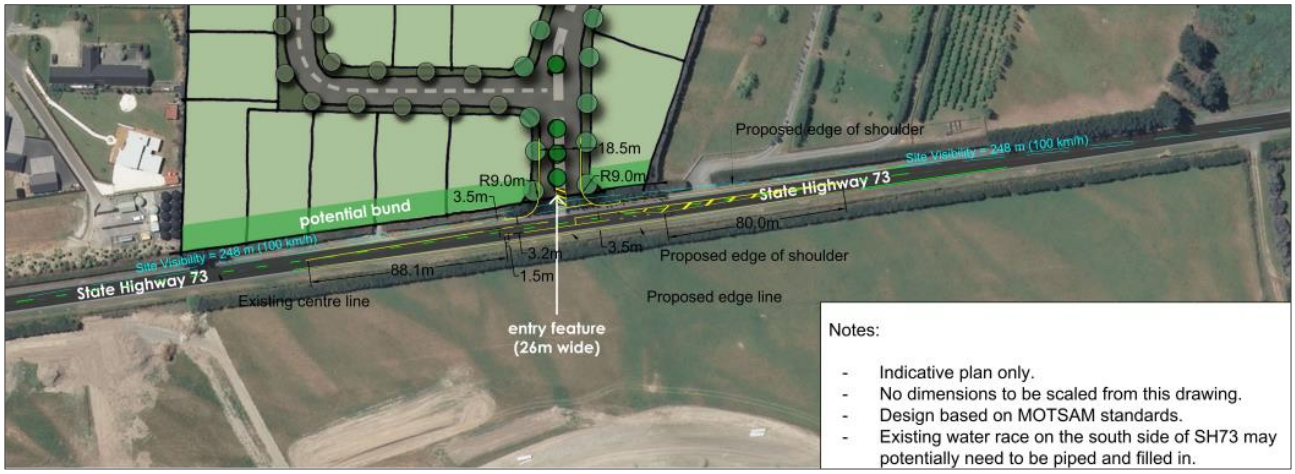


Figure 6: Indicative Intersection Plan With a Right-Turn Lane – SH73

Internal Roads

23. Internal roads within the site include:

- A primary north-south road;
- A secondary loop road connected to the primary road; and

Two secondary roads connecting with land further to the east.

24. The road cross-sections and intersection spacings within the Plan Change area are proposed to comply with the requirements of the District Plan. It is proposed that the roads identified on the ODP would most likely be constructed as either Local Major or Local Intermediate roads.

Potential Access Links

25. Vehicular access to the adjacent subdivision to the west (Halkett Grove) is not able to be provided, however provision has been made for future links to east with two connecting roads.

Pedestrian & Cycle Links

26. A link through Lot 105 within the Halkett Grove subdivision is proposed that can accommodate a shared footpath/cycleway. This is illustrated in **Figure 7**. This also identifies the existing pedestrian refuge across SH73 that links through to Rossington Drive from the residential subdivision to the south. Pedestrians/cyclists from the application site can use the shared footpath/cycleway to access the subdivision to the west, then either walk west along Brampton Drive (to access the various facilities within the activity centre of West Melton) via Brinsworth Avenue and Weedons Ross Road or they can walk south along Rossington Drive to use the pedestrian/cycle path to cross SH73 at the refuge.

27. The ‘activity centre’ is generally at the centre of West Melton and includes a Primary School, various shops including a supermarket, a kindergarten and nursery, ATM facilities, a church and a post office. All these facilities will be within approximately 1km walking distance of the application site.

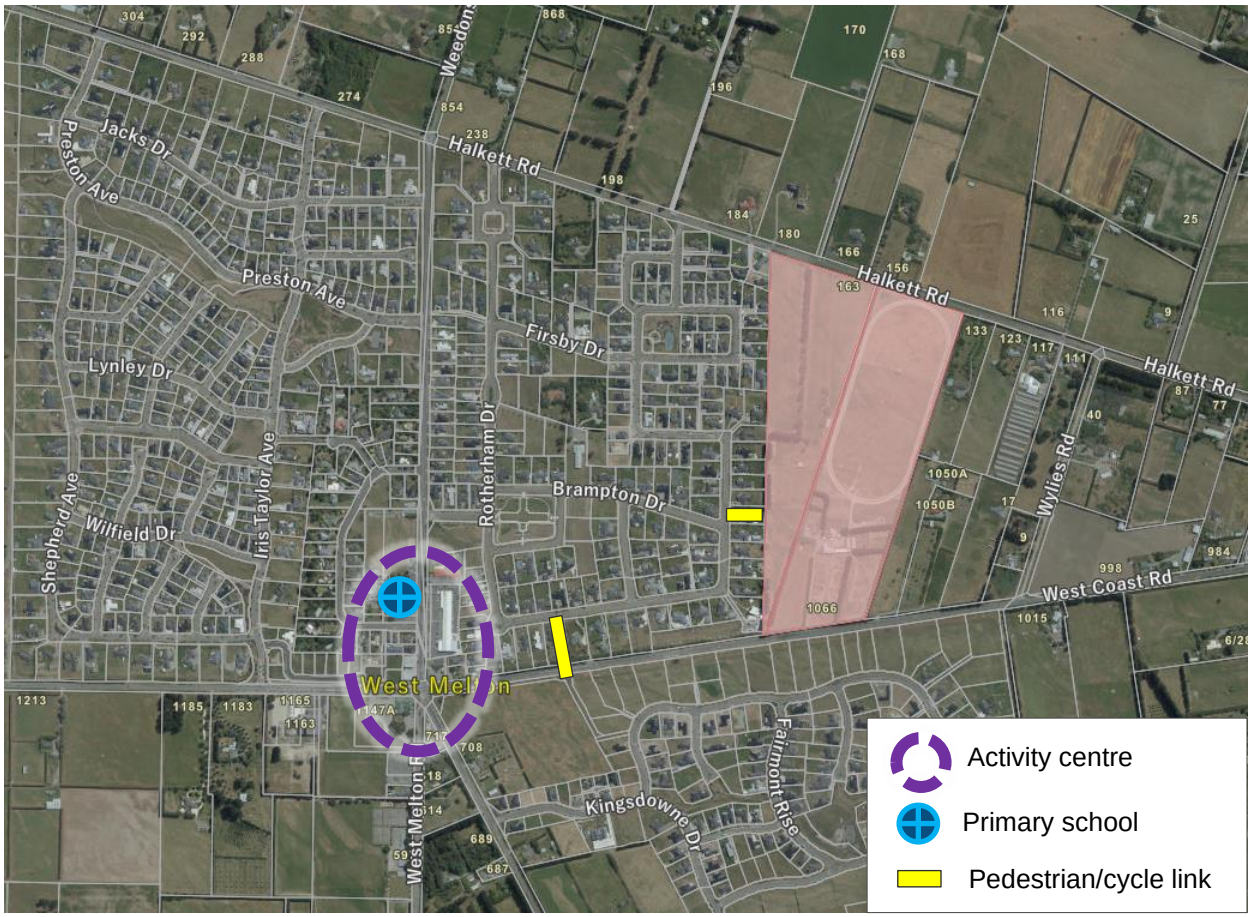


Figure 7: Pedestrian and Cycle Links near to the Site (source: Canterbury Maps)

28. The future provision for a footpath along SH73 could be considered that extends along the frontage of the site towards the existing pedestrian crossing (and beyond). This could improve connectivity to and from any further development to the east of the site, although for safety purposes the preference is to retain and promote internal pedestrian linkages.

Traffic Generation & Distribution

Traffic Generation

29. The traffic generation of residential activities is typically based on an 85th percentile rate of 0.9 vehicles per 'outer suburban' dwelling in the peak hours and 8.2 vehicles per dwelling per day[5]. However, it is considered that the location of the Plan Change site may lead to spreading of traffic generation, with some vehicles leaving early to commute to Rolleston and Christchurch, whilst others leaving later having dropped children at school in West Melton.

30. Applying those rates to the proposed 130 lots planned on the ODP will lead to a traffic generation of 117 vehicle movements per hour at peak times and 1,066 vehicle movements per day.

[5] Based on Outer Suburban dwellings in the NZTA Research Report 453 – *Trips and Parking Related to Land Use*.

31. In the morning peak, 80% of trips will be departing the development, with 65% arriving in the evening peak hour. These are typical splits for residential housing in the peak hours. The anticipated traffic generation associated with the Plan Change site is shown in **Table 4**.

Table 4: Traffic Generation (130 Lots)

Scenario	In	Out	Total
Morning Peak Hour	23	94	117
Evening Peak Hour	76	41	117
Daily	533	533	1,066

Distribution

32. Using the distribution of traffic derived from the 2013 Census data for Journey to Work (for people living in West Melton) and assuming that the split is 30:70% for residents using Halkett Road and SH73, respectively, the distribution of development is shown in **Table 5**.

Table 5: Distribution of Site Development Traffic

Distribution	Arrival		Departures	
	AM	PM	AM	PM
SH73				
East	12	39	59	26
West	4	14	7	3
Halkett Road				
East	5	17	25	11
West	2	6	3	1

33. These volumes have been used to inform and determine the intersection operation with the proposed Plan Change. The forecasted development and total traffic volumes at the two intersections are illustrated in **Figure 8** and **Figure 9** below. These are based on the following assumptions:

- An opening year of 2023 for the site;
- A compound growth of 3.64% along SH73 (and Halkett Road); and
- The peak hour is 10% of AADT and that this volume is shared evenly in both directions.

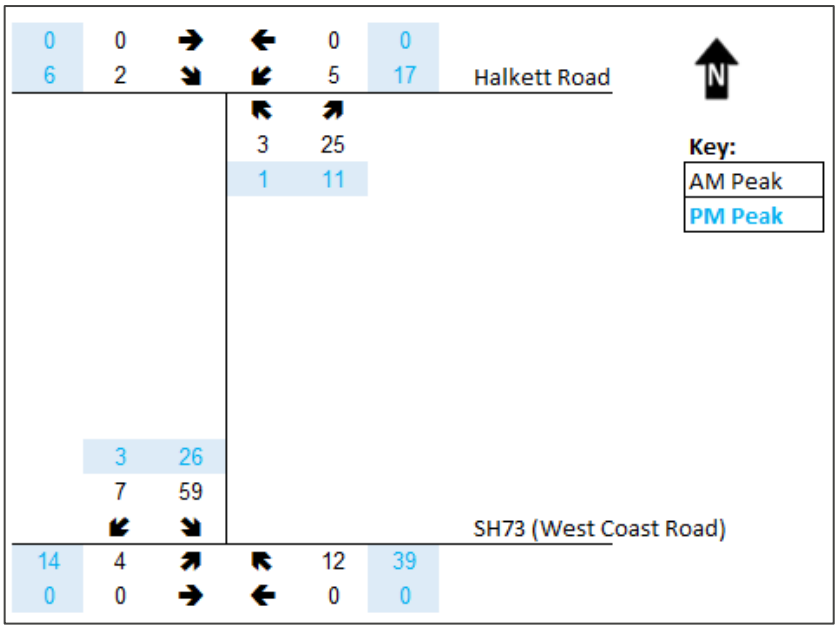


Figure 8: Development Volumes Modelled for the Site

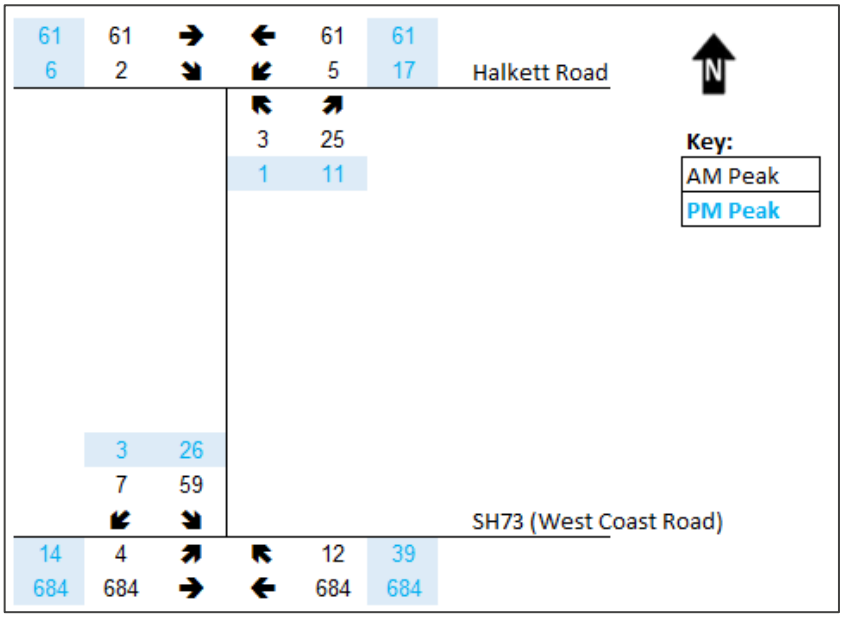


Figure 9: 2023 Total Traffic Volumes Modelled for the Site (Base + Development)

Assessment of Effects

34. Key matters for the assessment of transport effects associated with the proposed Plan Change are considered to be:

- **Roading Network Capacity**: Whether the main site access along SH73 can support development from the application site;

- **Parking & Loading**: Whether the District Plan rules adequately provide for the layout and provision of car parking and loading at the application site;

- **Access Arrangements**: Where the accesses are anticipated to operate safely and efficiently and whether the District Plan rules adequately provide for access. Also, the internal roading pattern proposed in the ODP and the associated rules and formation standards; and

- **Wider Network Effects**: Whether the effects of the proposed activity can be satisfactorily accommodated by the surrounding road network. Whether the proposed Plan Change will be accessible by a range of transport modes.

The above matters are assessed in turn in the following sections.

Roading Network Capacity

35. The traffic effects of the proposed ODP have been modelled using SIDRA 9.0 – an industry standard computer-based analysis tool for assessing the performance characteristics of an intersection.

36. The results presented in this report include the Level of Service ('LOS') provided by the intersection. LOS is a generalised function of delay where LOS A and B are very good and indicative of free-flow conditions; C is good; D is acceptable; and E and F are typically indicative of congestion and unstable conditions, although the former is sometimes accepted in the peak hour.

37. Only the site access onto SH73 has been modelled as the low volumes along Halkett Road do not merit analysis.

38. The SIDRA results are summarised below in **Table 6**.

Table 6: SIDRA Results at SH73/Site Access T-intersection – Opening 2023 (Base + Development)

Road and Movement	Turn	AM			PM		
		Average Delay (s)	95 %tile Queue (vehicle)	Level of Service	Average Delay (s)	95 %tile Queue (vehicle)	Level of Service
SH73 East	R	11.2	1	B	11.4	1	B
Site Access	L	12.6	1	B	12.3	1	B
	R	47.6	1	E	49.3	1	E
SH73 West	L	7.9	0	A	7.9	0	A

39. Results indicate that the intersection of SH73 (with a right turn lane) can support the level of development traffic proposed. Although a LOS E is indicated in the AM and PM peaks, this is for a very small number of drivers. In addition, when the traffic signals are implemented at the intersection of SH73/Weedons Ross Road (2022/2023), drivers wanting to head west from the site, will be able to exit onto Halkett Road instead, and drive south down Weedons Ross Road to use the traffic signals. It follows that the effect on drivers wanting to turn right will be mitigated.

40. Note that the layout does require two lanes for the egress onto SH73. The length of the right turn needs to accommodate the length of the largest vehicle expected to use the site. The layout is shown below in **Figure 10**.

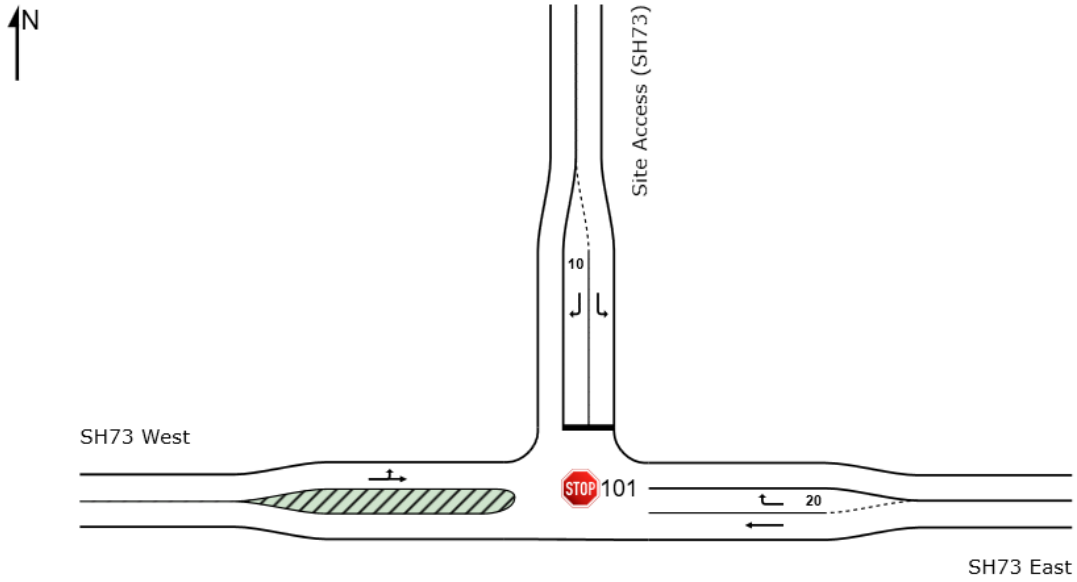


Figure 10: Site Access (SH73) Layout Modelled

41. All SIDRA modelling is included in **Appendix 2**.

Parking & Loading

42. The District Plan rules regarding parking and loading will be adopted for this Plan Change. This is considered to be sufficient to confirm that parking and loading will be satisfactorily provided for in a functional and practical manner.

Access Arrangements

Site Accesses

43. The engineering details of the proposed access arrangements are yet to be determined, although it is considered there will be sufficient space to accommodate satisfactory intersections at both the SH73 and at Halkett Road.

44. The intersections will be designed to comply with relevant design standards, including sight line requirements. These will also be subject to road safety audit requirements to confirm they can operate safely.

45. The proposed access intersection on SH73 will accommodate the predicted traffic volumes. An indicative intersection design has been provided in **Figure 6** that identifies spatial requirements for an intersection with a 100km/h speed limit and a right-turn bay.

46. The traffic volumes on Halkett Road are sufficiently low that detailed intersection design consideration is not required. There is sufficient space to accommodate an intersection in this location that is fit for purpose. This is envisaged to mirror the existing design at the neighbouring Halkett Grove subdivision.

47. Overall, it is considered that satisfactory intersections to accommodate access can be designed and constructed.

Internal Access Roads

48. The internal access roads and intersections are proposed to comply with the District Plan requirements and will again be subject to road safety audits. This is considered to be sufficient to confirm the internal network will operate safely and efficiently.

49. Access to individual properties is also proposed to comply with the District Plan requirements. Any non-compliances will either be sought at subdivision stage or addressed on an individual basis and the effects of this on safety and efficiency considered at that stage.

50. The above is considered to be sufficient to confirm that the internal transport network will be safe and efficient.

Wider Effects

Accessibility

51. The proposed site will include pedestrian and cycle links within the Plan Change area and potential linkages to adjoining land to the west and east. Most importantly this includes a key link via Lot 105 to and from The Halkett Grove subdivision. This in turn provides links and connections with the 'activity centre' and various facilities including the West Melton Primary School, and the subdivision on the south side of SH73 (via the pedestrian crossing). The approximate distance of 1km between the application site and the activity centre is considered to be an acceptable distance to walk/cycle – noting that a 1km walk would take approximately 11 minutes.

52. Two road links with associated footpaths are proposed to the east. These could include on-road cycleways if required.

53. There are no footpaths proposed along Halkett Road. The bus stop location is along Halkett Road to the west of the site's access. The road reserve is wide enough to provide one if ever required.

54. There are no footpaths on SH73. The future provision for a footpath along SH73 could be considered that extends along the frontage of the site towards the existing pedestrian crossing (and beyond). This could improve connectivity to and from any further development to the east of the site, although for safety purposes the preference is to retain and promote internal pedestrian linkages.

55. The above is considered to be sufficient to confirm that the site has access to adjoining communities and nearby amenities and facilities without the need to drive.

Summary & Conclusion

Summary

56. The Plan Change proposed would enable the development of up to 130 residential Lots to be established at the application site. These activities are predicted to generate in the order of 117 vehicle movements per hour in the peak hours and 1,066 vehicle movements per day.

57. An ODP has been prepared which provides a primary north-south road through the site connecting with SH73 and Halkett Road. A series of other local roads will provide connections to adjoining land to the east. A cycle and pedestrian link will be provided through Lot 105 which will provide a key link and

connection with communities and facilities to the west and on the opposite side of SH73. To the extent practicable, a high degree of accessibility is provided.

58. An intersection design incorporating a right-turn bay is envisaged on SH73. The traffic capacity of this intersection has been assessed. This intersection can operate satisfactorily with the proposed Plan Change traffic added to the network, operating at a LOS B on the main road (SH73) and LOS E for right turns during the peak hour period.

59. The transport provisions of the Operative District Plan (or Proposed District Plan) can be adopted at the subdivision and/or resource consent stages. No specific rules are required for any other transport purpose.

Conclusion

60. For the reasons discussed above, the proposed rezoning of this site for residential purposes can be supported from a transport perspective.

Appendix 1

Proposed ODP

Halkett Road

West Coast Road/State Highway 73

LEGEND

- Medium Density
- Reserves
- No Direct Vehicle Access
- Primary Road
- Secondary Road
- Possible Future Road Connection
- Shared Pedestrian / Cycle Lane (off road)
- Shared Pedestrian / Cycle Lane (on road)

NORTH

ODP - West Melton East

Not to Scale

Appendix 2

SIDRA Reports

MOVEMENT SUMMARY

Site: 101 [2023 AM - SH73 & Site Access (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH73 East														
5	T1	684	5.2	720	5.2	0.380	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	12	0.0	13	0.0	0.016	11.2	LOS B	0.1	0.4	0.59	0.74	0.59	55.0
Approach		696	5.1	733	5.1	0.380	0.2	NA	0.1	0.4	0.01	0.01	0.01	98.4
North: Site Access (SH73)														
7	L2	59	0.0	62	0.0	0.110	12.6	LOS B	0.4	2.7	0.64	1.00	0.64	52.0
9	R2	7	0.0	7	0.0	0.086	47.6	LOS E	0.2	1.7	0.93	1.00	0.93	34.1
Approach		66	0.0	69	0.0	0.110	16.3	LOS C	0.4	2.7	0.67	1.00	0.67	49.2
West: SH73 West														
10	L2	4	0.0	4	0.0	0.380	7.9	LOS A	0.0	0.0	0.00	0.00	0.00	87.9
11	T1	684	5.2	720	5.2	0.380	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.6
Approach		688	5.2	724	5.2	0.380	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.6
All Vehicles		1450	4.9	1526	4.9	0.380	0.9	NA	0.4	2.7	0.04	0.05	0.04	94.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2023 PM - SH73 & Site Access (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: SH73 East														
5	T1	684	5.2	720	5.2	0.381	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	39	0.0	41	0.0	0.054	11.4	LOS B	0.2	1.5	0.61	0.81	0.61	54.8
Approach		723	4.9	761	4.9	0.381	0.7	NA	0.2	1.5	0.03	0.04	0.03	95.7
North: Site Access (SH73)														
7	L2	26	0.0	27	0.0	0.049	12.3	LOS B	0.2	1.2	0.62	0.97	0.62	52.1
9	R2	3	0.0	3	0.0	0.039	49.3	LOS E	0.1	0.8	0.93	1.00	0.93	33.5
Approach		29	0.0	31	0.0	0.049	16.1	LOS C	0.2	1.2	0.65	0.97	0.65	49.3
West: SH73 West														
10	L2	14	0.0	15	0.0	0.386	7.9	LOS A	0.0	0.0	0.00	0.01	0.00	87.7
11	T1	684	5.2	720	5.2	0.386	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	99.3
Approach		698	5.1	735	5.1	0.386	0.2	NA	0.0	0.0	0.00	0.01	0.00	99.1
All Vehicles		1450	4.9	1526	4.9	0.386	0.7	NA	0.2	1.5	0.03	0.05	0.03	95.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Private Plan Change Request – Hughes Developments Limited
Appendix E – Urban Design Statement

WEST MELTON EAST

DESIGN STATEMENT

November, 2020

For: Hughes Developments Limited

Prepared by: Urban Acumen Ltd

urban acumen

CLIENT	Hughes Developments Limited
PROJECT	West Melton East
UA PROJECT NO.	20-016
DOCUMENT	Design Statement
DATE OF ISSUE	November 2020
STATUS	Final
AUTHOR	Lauren White
	Principal Urban Designer

TELEPHONE	027 6464156
E-MAIL	lauren@urbanacumen.co.nz

DOCUMENT CONTROL RECORD

This document is provided in support of both the private plan change application by Hughes Developments Ltd (HDL) to rezone the land from Inner Plains to Living West Melton as well as the adoption of an Outline Development Plan to guide future subdivision design.

The process followed prior to preparing this design statement included:

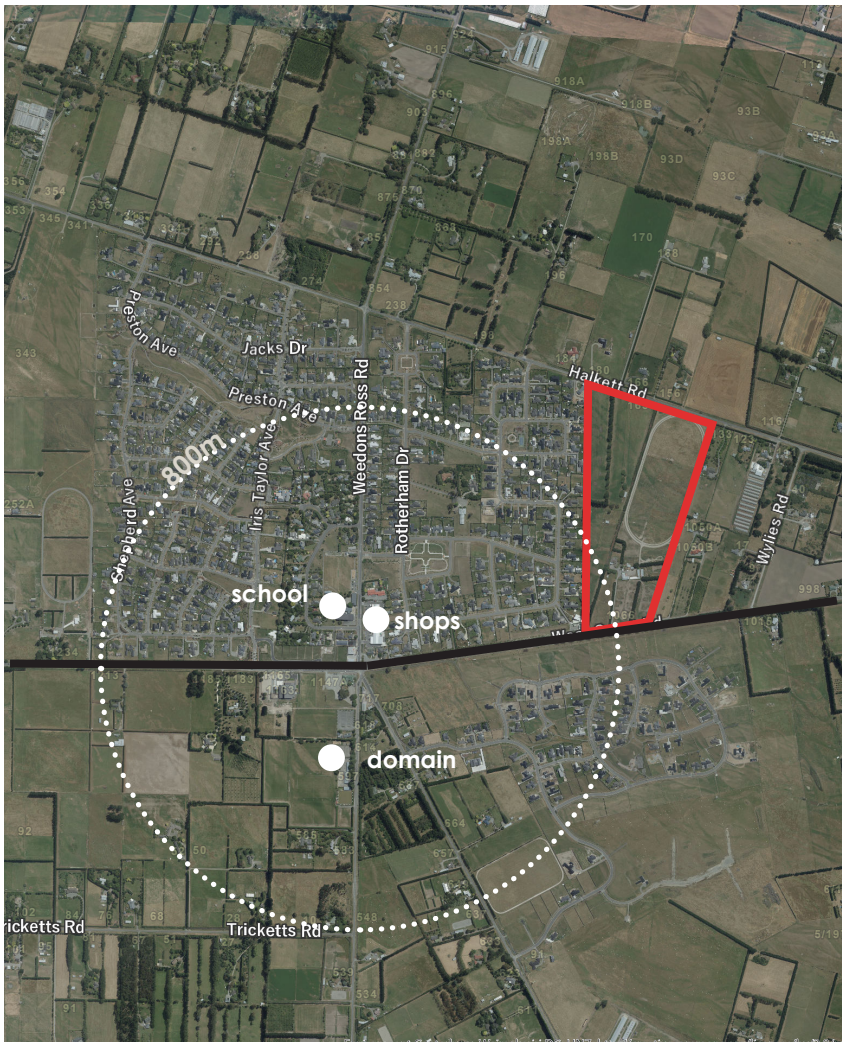
- receiving a briefing from the applicant
- understanding the relevant physical and statutory design drivers
- developing a conceptual subdivision masterplan
- capturing the key aspects in the Outline Development Plan

01

location

The site is located on the north east edge of West Melton, within walking distance (approximately 800m) of the local centre, primary school and domain.

It is bordered by Halkett Road on the north and West Coast Road/ SH73 on the south.



02

context

The site is located on the periphery of the urban area of West Melton and adjacent to Gainsborough, an existing suburban residential development (zoned Living 1). This area is characterised by relatively new single storey dwellings on lots typically between 1500 and 2500m^2. The subdivision is based on a grid pattern with generally straight roads, block depths are generous and there are a number of rear lots. This low density neighbourhood has a high level of amenity and public open space. To the south, across SH73, another residential subdivision (Wilfield) is being developed, with a more organic street pattern. Along the eastern boundary and north of Halkett Road is rural land (Inner Plains Zone).

03

description and analysis

The site comprises two separate titles and measures approximately 20.6ha. It has road frontage to Halkett Road and SH73

Typical of the West Melton area, the land is generally flat and dissected by shelterbelts. There are a number of existing buildings associated with its current use, none of which are intended to remain.

The site has a north-south orientation and a generally regular shape. The site is flat and free of topographical development constraints.

The site is small enough to enable future residents to access centrally located open space within an easy walking distance.

opportunities

- maximise potential integration with adjacent residential neighbourhood to the west (Gainsborough)
- maximise access to the town centre, community services and recreation
- provide for integration with future developments to the east (subject to future plan change)
- provide a mix of residential/lot typologies to promote a mixed community and a variety of pricepoints
- provide a central feature/open space which contributes to amenity and identity
- provide gateways to contribute to a sense of address/identity and wayfinding

constraints

- limited access/intersections with Halkett Road and SH73,
- no individual driveway access to Halkett Road or SH73 - alternative/internal vehicle access required
- visual and aural effects of traffic on SH73 on residential amenity
- limited opportunities for access to Gainsborough (other than along Halkett Road/SH73) or by creating pedestrian/ cycle links

04

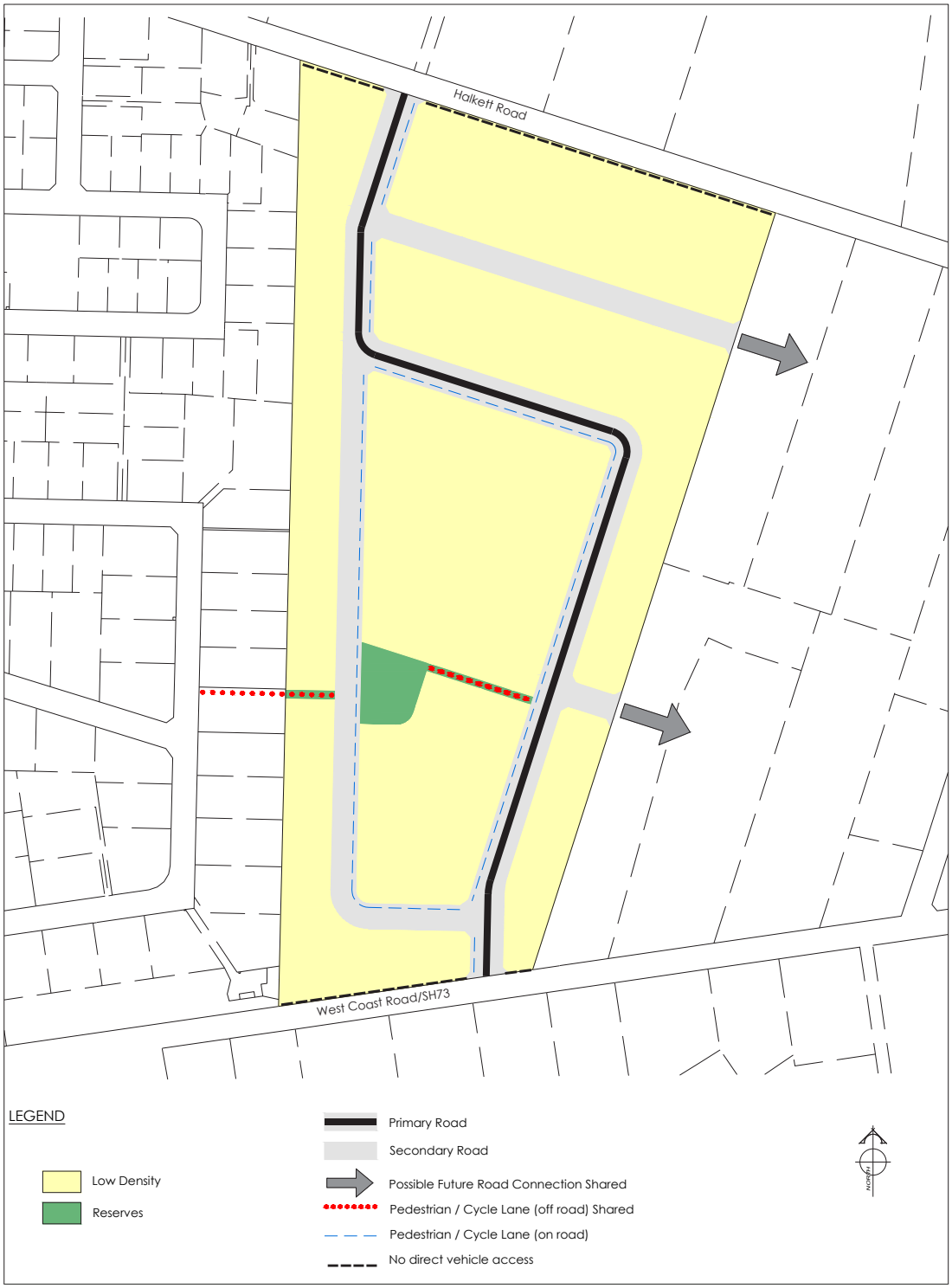
design drivers

The following best practice urban design principles have been considered in the development of the Outline Development Plan:

- promote a quality and compact urban form
- adopt blocks with a predominant north-south orientation in order to maximise solar gain for dwellings
- provide strong linkages and a well connected built form which accommodates all modes of transport
- future proof development to allow for linkages/expansion in the future
- provide a hierarchy of movement corridors to aid legibility
- provide gateway features on Halkett Road and SH23 to contribute to neighbourhood identity
- provide a variety of residential lifestyle options, which offer a range of housing typologies and price points, including more affordable options
- provide a local feature or open space which functions as the heart of the new community and provides residents with access to daily recreation and social interaction
- enable future residents access to local services, facilities and recreation within easy walking/cycling distance
- protect residential amenity along SH73

05

This section discusses the urban design outcomes of the proposed Outline Development Plan which is based on a conceptual subdivision masterplan. The ODP is not intended to be prescriptive but captures the key spatial elements of the underlying subdivision concept to ensure connection and integration while retaining a measure of flexibility for the future.



Overall Structure and Block Pattern

The proposed arrangement of movement corridors is defined by the ODP to ensure future development is connected with the surrounding context and provides for links to be made with adjacent development in the future.

The spatial structure connects the development north and south with a primary road, to Halkett Road and SH73 respectively. Only one connection is made to each route to limit the number of intersections with these roads. The internal route is intentionally "dog-legged" to discourage through traffic which would reduce the internal residential amenity of the development.

The secondary road network provides for connections to the rest of the site and sets ups blocks which have a predominantly north – south orientation. This will enable good solar gain for the majority of dwellings and minimise the number of north facing sections (where private outdoor space is shaded if located at the rear).

Two secondary roads meet the eastern boundary of the site to ensure neighbourhood level connections are made in the future, should the adjacent land be rezoned and developed. This futureproofs development and ensures a basic level of connectivity can be achieved over time.

Movement Hierarchy

To assist with legibility, the ODP includes both primary and secondary roads and has the opportunity to include a variety of local roads and accessways in detailed subdivision design. The primary road has a greater reserve width than other roads to allow for additional tree planting and a greater sense of spaciousness, both of which help to convey its primary collector function.

The primary roads are intended to accommodate entry features at the intersections with SH73 and Halkett Road which will assist with local identity and wayfinding.

Secondary routes are also indicated on the ODP and provide for internal circulation and additional neighbourhood-to-neighbourhood connections.

The ODP has appropriate flexibility with respect to additional local roads, including those around the proposed neighbourhood reserve. There is thus inherent opportunity to:

- locate local roads around the full perimeter of the reserve if desired;
- have lots which directly adjoin the reserve where practical, where the orientation favours vehicle access from the other side, and the interface with the reserve can be successfully managed; and/or
- utilise a shared or jointly owed access space which have the same qualities as a public street but a narrower width and additional opportunities for placemaking and landscaping.

Prioritising Active Transport Modes

By utilising a connected grid pattern and providing connections to adjacent neighbourhoods (through Gainsborough), the ODP promotes active transport modes of walking, cycling and scootering. Shared paths (pedestrians, scooters and cyclists) are provided on the berms of the primary road to provide easy access to the wider area. Shared paths are also provided along a secondary road to provide access to the centrally located public reserve.

A pedestrian/cycle link is proposed to the west, to connect this development to Gainsborough and provide an alternative route to SH73 toward the town centre and school.

A pedestrian/cycle link is also proposed to provide easy access between the park and the primary road network, and further on to future urban development to the west.

Neighbourhood Park

A neighbourhood is proposed and located centrally within the development to make it easily accessible and the social focus of the subdivision. Future residents will be able to access this space within a 400-500m/5 -10min walk. It is located along a secondary road which is likely to have low traffic volumes and slow speeds. It is also located to benefit from the pedestrian/ cycle access to the west, promoting the sharing of this space with adjacent residents, as well as a link to future development to the east.

The reserve is approximately 3000m in area which supports a ball kick-about area and seating, picnic tables etc.

Residential Density

The ODP proposes residential development in the Living West Melton Zone, and within the medium density band of 500m^2 to 3000m^2. This enables some variety of lot and house types to be delivered, at a range of pricepoints including more affordable options.

During the detail subdivision design stage, the size and distribution of lots of different sizes can respond to:

- the choice and opportunity in the wider/district housing market
- the need to address external interfaces, including lots which adjoin limited access roads
- the opportunity to locate smaller lots in close proximity of the neighbourhood park to promote its use/occupation and safety through passive surveillance
- the opportunity to vary lot sizes/dwelling typoplogies within streets to provide visual interest

Interfaces

SH73

In line with advice from NZTA, no direct vehicle access is permitted from SH73 to new residential sections which adjoin it. This is consistent with development to the west, where lots are either very deep (and dwellings adequately set back) or protected by a utility reserve and/or bund.

The ODP proposes residential development along this boundary within the Living West Melton (Medium Density) Zone. This enables lots of up to 3000m^2 to be delivered, large enough to enable measures to protect residential amenity to be incorporated at the detail subdivision design stage. Larger lots have greater ability to accommodate planting which can contribute to a high amenity interface along this route which does function as a entry to the town from Chistchurch

It is recommended that a consistent planting and fencing strategy be adopted for the full length of the southern boundary to ensure an attractive interface is delivered. Dwellings are likely to orientate primary habitable rooms and outdoor spaces towards the north/ internal local road indicated on the ODP. In response, it is also recommended that fencing along the internal secondary road be managed to balance on-lot privacy and surveillance of the street.

Halkett Road

Halkett Road is also a limited access route and individual vehicle access to private lots is not provided. Alternative access will be designed at detail subdivision stage and can include panhandles and jointly owned access lots serving a small number of units.

Lots along this boundary are likely to orientate their primary habitable rooms and outdoor spaces towards Halkett Road. It is recommended that careful consideration be given to planting and fencing along this interface to emsure consistency and balance on-lot privacy with surveillance and visual appeal.

Lot sizes in the larger range of the Living West Melton (Medium Density) Zone can effectively deal with the constraints of this interface.

Western Boundary

Future residential development in the ODP area will be relatively consistent with the existing residential environment to the west, which is characterised by lots between 1500 and 2500m^2.

Eastern Boundary

Although this boundary adjoins rural land (Inner Plains), it is considered likely that land to the west will be rezoned for residential use in the future and a specific interface condition is not considered necessary.

03

conclusion

In summary, the proposed ODP directs the development of a new residential community which:

- has a legible spatial layout
- utilises a hierarchy of movement spaces to aid efficiency and legibility
- has a strong identity associated with a local public recreation space and gateways
- maximises opportunity for connection to the existing residential environment to the west
- provides for future linkages to the east if/when such land is rezoned and developed for residential use
- is easily accessible and permeable by active travel modes
- responds appropriately to its interfaces, particularly Halkett Road and SH73

From an urban design perspective, the ODP includes an appropriate level of detail to ensure a connected, efficient and attractive residential neighbourhood can be delivered while retaining sufficient flexibility for detailed subdivision design and staging.

It provides the opportuity for growth to be accommodated in West Melton in a way that supports the town centre and provides choice for potential residents. It promotes active transport and social interaction along with a sense of identity.

Private Plan Change Request – Hughes Developments Limited
Appendix F – Record of Titles

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**CB14A/1422**
Land Registration District	**Canterbury**
Date Issued	08 October 1974

Prior References
CB6D/871

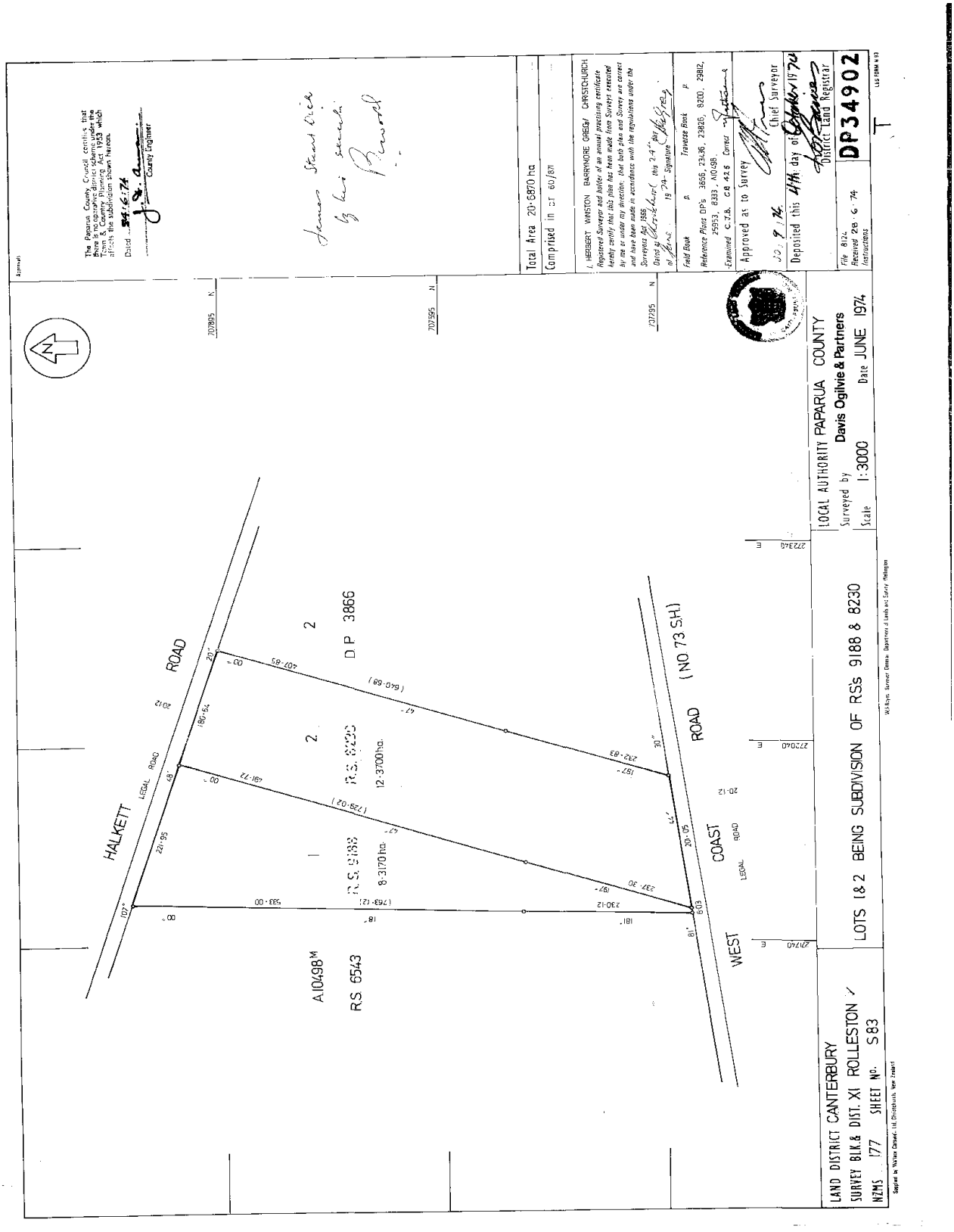
Estate	Fee Simple
Area	12.3700 hectares more or less
Legal Description	Lot 2 Deposited Plan 34902

Registered Owners
Hughes Developments Limited

Interests

723687 Notice declaring the State Highway adjoining the above land to be a limited access road - 30.10.1967 at 9.01 am

Identifier **CB14A/1422**



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**CB14A/1421**
Land Registration District	**Canterbury**
Date Issued	08 October 1974

Prior References
CB6D/871

Estate	Fee Simple
Area	8.3170 hectares more or less
Legal Description	Lot 1 Deposited Plan 34902

Registered Owners
Hughes Developments Limited

Interests

723687 Notice declaring the State Highway adjoining the above land to be a limited access road - 30.10.1967 at 9.01 am

Identifier **CB14A/1421**