Application for Subdivision and Landuse Consent

LMM Investments 2012 Limited
Whisper Creek

240 Spencerville Road • Christchurch

January 2018

DAVIE LOVELL-SMITH

PLANNING SURVEYING ENGINEERING

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Form 9 - Application for Resource Consent
Under Section 88, Resource Management Act 1991

TO: Christchurch City Council

1. **LMM Investments 2012 Limited** applies for the Subdivision and Land Use Consents described below.

   Consent to **subdivide** Pt Lot 2 DP 5889 into 70 residential allotments with associated reserves and roads to vest in Council

   And

   Land use consent for **residential activity** within the Golf Course and Open Space Activity Area

   And

   Land use consent for **earthworks** which exceed the permitted volumes and depths and construction of **under width local roads**

   And

   Consent is required under the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health for both the subdivision and soil disturbance

   Full details of the proposed activity are contained in the attached Assessment of Environmental Effects, including the servicing to be provided to this subdivision.

2. The **names and addresses of the owner and occupier** (other than the applicant) of land to which the application relates are as follows:

   Not applicable

3. The **site** at which the proposed activity is to occur is as follows:

Street Address:	240 Spencerville Road
Legal Description:	Pt Lot 2 DP 5889
Computer Freehold Register:	CB1B/387
Total Land Area:	63.79ha

4. There are no other activities that are part of the proposal to which this application relates.

5. No additional resource consents will be required in relation to this proposal.

6. Attached, is an assessment of the proposed activity's effect on the environment that –
   (a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and
   (b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and
   (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

7. Attached is an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

8. Attached is an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

9. Attached is information that adequately defines the following:
   (a) the position of all new boundaries; and
   (b) the areas of all new allotments; and
   (c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips; and
   (d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips; and
   (e) the locations and areas of land below mean high water springs of the sea, or of any part of the bed of a river or lake, to be vested in the Crown or local authority under section 237A of the Resource Management Act 1991; and
   (f) the locations and areas of land to be set aside as new roads.

DATED: 25 January 2018

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

Title and address for service:	Address for applicant **and for all Council fees**:
LMM Investments 2012 Limited C/- Davie, Lovell-Smith P O Box 679 CHRISTCHURCH 8140 Attention: Patricia Harte Phone (03) 379 0793 Email: patricia.harte@dls.co.nz	LMM Investments 2012 Limited 80 Jacksons Road, RD2, Kaiapoi 7692 Email: ross.moffatt@xtra.co.nz Mobile: 021 312244

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Appendices

LMM Investments 2012 Ltd: Assessment of Effects on the Environment

1. Introduction

Section 88(2)(b) of the Resource Management Act 1991 requires that any application for a resource consent should include an assessment of any actual or potential effects that the activity may have on the environment and the ways in which any adverse effects may be mitigated. Section 88(2)(b) requires that any assessment shall be in such detail as corresponds with the scale and significance of the actual or potential effects that the activity may have on the environment and shall be prepared in accordance with the Fourth Schedule to the Resource Management Act 1991. This assessment is made in accordance with those requirements.

2. Description of the Proposal

2.1 Background Information

The Specific Purpose (Golf Resort) Zone at Whisper Creek resulted from a requested private plan change which was processed over a number of years from 2009 through to the release of decision on the Replacement District Plan in 2017. The past owners of the land zoned have, after many years and investigations, accepted that it is not possible to establish an economically viable golf course on this land. They therefore put the land up for sale. The applicant has recently purchased this land and now wishes to develop it for residential purposes.

The site is used for grazing of cattle and there are three houses with access onto Spencerville Road and some farm buildings on the site.

2.2 Subdivision Consent

The applicant proposes subdivision of the site in general accordance with the Specific Purpose (Golf Resort) Zone – Whisper Creek, namely a subdivision at the scale and in the same general location as the northern Resort Community Area contained in the Whisper Creek Golf Resort Development Plan in Appendix 13.9.7.2. The subdivision also includes some land in the Golf/Open Space area shown on the Development Plan. The subdivision is to create a range of larger lots for residential use in keeping with the surrounding area and topography.

The proposed subdivision consists of:

- Seventy Lots ranging from 1411m^2 to 1.3ha. Proposed Lot 1 will contain the existing dwelling.
- Balance lot of 38.07ha.
- Access is from Spencerville Road and extends south to land which is also part of this zone.
- The subdivision design is based on using the higher land available, the idea of the curved road layout contained in the Development Plan and enabling development to achieve good solar gain.
- A significant reserve area containing a first flush basin and wetland in the lower parts of the site is proposed as a feature and to tie in with existing natural character of the site.

Subdivision is a Discretionary Activity as the subdivision is for residential purposes which are provided for the Resort Community Activity Areas but not in the Golf Course and Open Space Activity Area.

Activity Standard 8.6.1 Table 4 Minimum Net Site area for subdivision in this zone states:

- That there is no minimum net site area in this zone
- That prior to s224 being issued for the **71st residential allotment** in the Resort Community areas that a number of things must happen including the golf course and wetlands having been constructed.

This requirement indicates that up to 70 lots can be consented and titled without the need for the golf course and wetland to be developed. Given that construction and operation of a golf course appears not to be viable under almost any circumstances it seems logical and reasonable that this limited number of lots is provided for without the need to establish the golf course.

2.2.1 Infrastructure

Andy Hall of Davie Lovell-Smith has had a preliminary response to this proposal from Council Assets staff (Michele McDonald) which is based on using the surplus capacity in the sewage system created by the Red zoning of Brooklands.

It is intended that the proposed development will be connected to the existing 200mm watermain located at the intersection of Spencerville and Lower Styx Roads. The supply to the subdivision will be a restricted supply providing a supply of 6171 litres per day per lot which is considered suitable for rural residential lots. Firefighting storage will need to be provided on each lot and is expected to be achieved through the building consent process, and a condition and consent notice to this effect is volunteered.

It is proposed that the development will discharge into the existing 300m wastewater pipe located at the intersection of Spencerville and Lower Styx Road. The connection will be by way of a low-pressure sewer system. The rising sewer will be installed with the water connection along Spencerville Road including a steel section of pipe over the bridge. Each house site will require a low pressure pump unit which will be installed as part of the building consent process.

2.2.2 Roading

There are two road connections to the proposed subdivision from Spencerville Road. A major spine road is proposed running north-south as required by the Whisper Creek Development Plan along with a new additional road connection which is a cul-de-sac to the north-east that would only serve 10 properties. A further cul-de-sac and a loop road are proposed on the east of spine road as seen on the Subdivision Plan.

The second road connection is not consistent with the Whisper Creek Development Plan as it only anticipates one connection from Spencerville Road.

2.2.3 Geotechnical

A Geotechnical Investigation has been carried out by Tonkin and Taylor. The majority of the area being subdivided has low liquefactious potential due to the nature of the soils and the level of groundwater. Findings of the Tonkin and Taylor investigation are discussed in section 6 of the report with the full copy of the report attached under Appendix F.

2.2.4 Soil Contamination

A Preliminary Site Investigation has been undertaken by Tonkin and Taylor Ltd in relation to the underlying property in accordance with the National Environmental Standards for Assessing and Managing Contaminants in Soil to Protect Human Health (the NES). The PSI concludes that are areas that warrant further investigation. A copy of the Tonkin & Taylor report is contained in Appendix G. Given the conclusion of the PSI, the subdivision and associated earthworks are subject to consent under the NES. This matter is discussed in detail in Section 5 below.

2.3 Landuse Consent

The proposed subdivision creates 70 residential sites. While the layout of these sites is based on the Resort Community Activity Areas specified in the Development Plan, some of the lots fall fully or partly outside the Resort Community Activity Area and are within the Golf Course and Open Space Activity area. This is illustrated on the "Resort Community Area" plan in Appendix A. Land use consent is therefore sought for residential activity within the Golf Course and Open Space Activity Area as a **Discretionary Activity (D1)** under Rule 13.9.5.1.4.

Resort Activity Areas Rule 13.9.5.1.1, P10 provides for up to 150 residential units within the Resort Community Areas. No building is to be constructed until planting of the zone boundaries has occurred in accordance with a management plan required by rule 13.9.5.1 RD5 for the golf course. Although no golf course is now proposed a Management Plan that addresses planting, ecological restoration and management of stormwater and flooding has been prepared as required by this rule and is attached in Appendix D. It is considered that approval of this management plan satisfies the District Plans requirement in this regard. The Management Plan draws on the Landscape Concept prepared by Earthwork Landscape Architects (refer Appendix B), which in turn is based on restoration options recommended by Wildlands in their "A*ssessment of Ecological Values and Restoration Options for Whisper Creek"*, which is attached in Appendix C.

Landuse consent is also sought for earthworks for road construction, installation of services and minor shaping to ensure gradients are suitable for onsite drainage. These earthworks will exceed the specified volume in the general earthworks provisions and those relating to flood ponding and flood management areas Earthworks of approximately 60,000m^3 in total will be carried out on the site as part of this subdivision.

3. Description of the Environment

3.1 The Site

The site has a total area of 63.8ha and sits between Spencerville Road to the north and the Styx River to the south. The three existing residential units at the northern end of the site close to Spencerville Road are enclosed within dense vegetation. Two of these residential units are to be demolished to enable the proposed development. The rest of the site is used for grazing of cattle and some farm buildings on the site.

The higher elevation area of the site has been proposed for the subdivision adjoining Spencerville Road. The lower elevation area which extends down to the Styx River margins is to be retained as productive land for farming.

There are a number of drainage channels that traverse the lower parts of the property forming a network that channels water into the Styx River. It is understood that water only flows through these channels during winter.

3.2 Surrounding Environment

Aerial image showing the application site, source: Canterbury Maps, 2016

The surrounding area is shown in the above aerial photo. The lower area of the application site is to remain in rural use including cattle grazing. Land to the east of the site is currently grazed. The area to the south west is also in rural use including dairy grazing. To the immediate west are 4 lifestyle blocks with a single house on each of the site. The site adjoins the Styx River margins on its southern boundary which are dominated by a wide band of willows. Land on the north site of Spencerville Road is predominantly used for rural productive activities with some housing.

4. Christchurch District Plan

4.1 Zoning

The majority of the site is zoned Specific Purpose Golf Resort Zone with the south-eastern portion of the site zoned Open Space Water and Margins Zone. The site is subject to Flood Management Area, Flood Ponding Management Area and High Flood Hazard Management Area. The site is subject to the Whisper Creek Golf Resort Development Plan which specifies a number of activity areas which are the basis for the zone rules.

4.2 Rules

The following is a compliance assessment of the proposal with the relevant rules from Chapter 5 Natural Hazards, Chapter 8 Subdivision, Development and Earthworks, Chapter 13.9 Special Purpose (Golf Resort) and Chapter 18.8 Open Space Water and Margins Zone that are applicable to this application:

Chapter 5 Natural Hazards

Rule		Compliance Comments
5.4 Flood Hazard		
5.4.1.5 Restricted discretionary activities (Activities and earthworks in the Flood Management Area) *RD 2 - Filling or excavation which is not a permitted activity under P10, P11, P12, or P17 set out in Rule 5.4.1.1, or filling or excavation that exceeds the standards in P13 - P15 set out in Rule 5.4.1.1.*	×	The depth of filling above ground and excavation below ground level exceeds the permitted limits of 0.2m for filling and 0.6m for excavation set out in the standards in P15 under rule 5.4.1.1. The proposed volume of filling above ground level exceeds the permitted volume of fill of 100m^3 per site in the standards in P15 under rule 5.4.1.1.
5.4.5.3 Activities and earthworks in the Flood Ponding Management Area *Filling , excavation, and creation of vacant lots are listed as non-complying activities*	×	The earthworks have been designed so that filling in these areas will be kept to an absolute minimum and any filling will be compensated for with adding ponding volume elsewhere on the site. All sites have areas for building outside the ponding areas.
5.4.6.1 Activities in the High Flood Hazard Management Area *P2 Utilities*	✓	The subdivision has been designed such that only the local purpose reserve containing the stormwater conveyance, treatment and detention facilities is within the High Flood Hazard Area.
5.5 Liquefaction hazard		
5.5.2 Liquefaction Hazard *C1 Any subdivision which creates an additional vacant allotment or allotments in the Liquefaction Management Area.*	×	The proposed subdivision will create vacant allotments.

The proposed subdivision within the liquefaction management area is assessed as a **Controlled activity (C1)** under Rule 5.5.2.

The proposed earthworks and creation of vacant lots are a **Non-complying Activity** under Rule 5.4.5.3 in a Flood Ponding Management Area.

Chapter 8 Subdivision, Development and Earthworks

Rule	Compliance Comments	
8.6.1 Minimum net area and dimension **Table 4. Minimum net site area - specific purpose zones** ***e. Specific Purpose (Golf resort)***		
a. No minimum net site area in the Specific Purpose (Golf Resort) Zone at Clearwater and at the Whisper Creek Golf Resort.	✓	The proposed residential allotments range from 1271m^2 to 12929m^2.
b. Concept Plan *i. No subdivision shall take place within Academy Activity Areas A, A1 & A2 Whisper Creek Golf Resort shown on the development plan in Appendix 13.9.7.2 to Chapter 13.9, unless a concept plan has been lodged with and approved by the Council for that activity area in accordance with Rule 13.9.5.1.6 RD6 Concept plans.*	N/A	The Academy Activity Areas are not on the application site.
c. Sequencing standards – Whisper Creek Golf Resort *i. Prior to the Council signing a section 224 certificate under the Act, for the 71st residential allotment in the Resort Community Activity Areas, …* *ii. Prior to the Council signing a section 224 certificate under the Act, for the 120th residential allotment in the Resort Community Activity Areas, …*	N/A	Seventy residential allotments are proposed.
d. Any subdivision shall only be for the purpose of creating allotments to be used for any activity permitted in the zone or for which resource consent is held, or for conservation purposes, permitted utilities or boundary adjustments.	✓	This subdivision and associated land use is for the purpose of creating allotments to be used for residential purposes.
e. *Allotments for residential units, resort apartments or resort hotel bedrooms shall only be subdivided when a building or buildings are still allowable for that allotment within the maximum number limited specified for the zones.*	✓	The number of allotments proposed is 70.
8.6.2 Allotments with existing or proposed buildings *Where an* allotment *is to be created around an existing* building *(that has been constructed to the extent that its exterior is fully closed in), or a proposed* building *(where the* subdivision *consent is to be issued at the same time as, or after, the building consent for that* building *is issued):* *i. the provisions of Rule 8.6.1 do not apply to that* allotment*; and* *ii. the existing or proposed* building*(s) shall either*	N/A	The existing residential unit on proposed Lot 1 meets all the built form standards.

Rule	Compliance Comments	
meet all relevant standards for a permitted activity in relation to the proposed allotment boundaries*, or have been approved through a resource consent in relation to any standards that are not met, to the extent provided for in that resource consent, including any non-compliance with* site *coverage standards; and* *iii.* *no* allotment *shall be less than the minimum* net site area *specified in Table 6 to this rule.*		
8.6.3 Access *a. All sites shall have access which is able to allow vehicles to pass to and from a formed road, and such access shall be in accordance with Appendix 8.10.2 to this chapter and the standards set out in Chapter 7.*	✓	All the lots would have access to a formed road.
8.6.4 Roads *a. All roads shall be laid out, constructed and vested in accordance with the standards set out in Appendix 8.10.3, and in Chapter 7, except where alternative standards are set out in an outline development plan.* *Local Road Residential:* *Min legal width-16m## - Max legal width-20m*	X	The proposed major spine road complies with the requirements under the Rule. The proposed loop road is 15m wide.
8.6.6 Esplanade reserve, strip or additional land *a. Esplanade reserves and strips shall be provided in accordance with Appendix 8.10.1.*	✓	Site is more than 40m from the edge of the bed of the Styx River so esplanade reserve is not required.
8.6.7 Water supply *a. All allotments shall be provided with the ability to connect to a safe potable water supply* *b. Provision shall be made for sufficient water supply and access to water supplies for firefighting consistent with the New Zealand Fire Service Firefighting Water Supplies Code of Practice (SNZ PAS:4509:2008), except where the allotment is for a utility, road, reserve or access purposes.*	✓	Proposed residential lots would be provided with ability to connect to a safe potable water supply.
8.6.8 Wastewater disposal *a. All allotments shall be provided with the ability to connect to a wastewater system.* *b. A valid certificate, issued in accordance with Rule 8.4.1.3, is held which certifies that the wastewater system has adequate capacity for the respective potential land uses on all proposed allotments, except where a relevant outline development plan shows that adequate wastewater capacity is available.*	X	Proposed residential lots would be provided with new separate connections. A Wastewater capacity certificate has not been provided.
8.6.9 Stormwater disposal *All allotments shall be provided with a means for the management of collected surface water from all impervious surfaces. Where discharge is accepted in the Council's network, each new allotment shall be provided with a piped outfall laid at least 600mm into the net area of the allotment.*	✓	Stormwater is proposed to be discharged to the stormwater system proposed.

Pursuant to Rule 8.5.1.3 (RD2) consent is required for a **restricted discretionary activity** as the proposed subdivision does not meet the road formation requirements and wastewater capacity certificate is not provided.

Subdivision is a **Discretionary Activity (D2)** under Rule 8.5.1.4 as it does not fully comply with the layout in the Development Plan for Resort Community residential development.

8.9.2 Rules- Earthworks

Rule		Compliance Comments
8.9.2.1 Earthworks *i. Earthworks shall not exceed the volumes in Table 9 over any 12 month time period.* *ii. Earthworks in zones listed in Table 9 shall not exceed a maximum depth of 0.6m, other than in relation to farming activities, quarrying activities or permitted education activities.* *iii. Earthworks shall not occur on land which has a gradient that is steeper than 1 in 6.* *iv. Earthworks involving soil compaction methods which create vibration shall comply with DIN 4150 199902 and compliance shall be certified through a statement of professional opinion provided to the Council from a suitably qualified and experienced chartered or registered engineer.* *v. Earthworks involving mechanical or illuminating equipment shall not be undertaken outside the hours of 0700 – 1900 in a Residential Zone.* *vi. Earthworks involving mechanical equipment, other than in residential zones, shall not occur outside the hours of 0700 and 2200 except where compliant with NZS6803:1999.* *vii. Fill shall consist of clean fill.* viii. *The activity standards listed in Rule 8.5A.2.1 P3, P4 and P5.*	×	The proposed subdivision will require earthworks consisting of cut and fill in the order 60,000m^3 that will exceed the 20m^3 per site volume permitted in the Specific Purpose (Golf Resort) The maximum depth of filling/excavation may exceed the 0.6m depth. Construction activities will only occur during the hours of 0700 to 1900.

As the total volume of earthworks exceeds the permitted 20m^3 per site the proposal has been assessed as a **Restricted Discretionary Activity (RD 1)** under Rule 8.9.2.2.

Chapter 13 Special Purpose (Golf Resort) Zone – Whisper Creek Golf Resort

Rule		Compliance Comments
13.9.5.1.1 Permitted Activities		
P 1 – Any activity permitted in the Rural urban Fringe, provided it complies with the activity specific and built form standards in Chapter 17.5	✓	The continued use of the balance land for farming purposes is permitted.
P 10 Residential Activity *a. Up to 150 units in total within the Whisper Creek Golf Resort, with no more than one unit per site.* *b. No building shall be erected in the Resort Community Areas before boundary planting*	✓	70 residential lots are proposed A draft management plan is attached to the application.

along all zone boundaries (other than along the boundary between the Golf Resort Zone and the Open Space - Water and Margins Zone) is completed in accordance with the Management Plan required in Rule 13.9.5.1.3 RD5 for the golf course. *c. The activity shall be located within the relevant Activity Areas shown on the development plan for this resort at Appendix 13.9.7.2*		The majority of the residential sites are located in the Resort Community Activity Areas
13.9.5.1.4 Discretionary Activities		
D1 – Any activity listed in P1-P12 that is located outside of the relevant Activity Area	×	Some of the residential sites are located outside of the Resort Community Activity Areas
13.9.5.2 Built form Standards		
13.9.5.2.1 Site coverage and building sizes - *a. The maximum percentage of the total area of the Whisper Creek Golf Resort which may be covered by buildings shall be 5.5%.* *b. The maximum percentage of the total area of the Whisper Creek Golf Resort Academy Activity Area which may be covered by buildings shall be 30%.* *c. Within the Whisper Creek Golf Resort, no roof in the Academy, Resort Community or Driving Range Activity Areas shall have a reflectivity value greater than 35%.* *d. Within the Whisper Creek Golf Resort, the maximum building footprint of the buildings shall not exceed the figures in the table following.* *e. …* *(v) Each residential Unit* *– Maximum building footprint =400m^2*	✓	The new dwellings will be able to comply with this standard
13.9.5.2.2 Recession planes *a. No part of any building shall project beyond a building envelope contained by:* *Whisper Creek Golf Resort Community Activity Areas - Recession planes from points 2.3 metres above internal boundaries as shown in Diagram B of Appendix 14.16.2.*	✓	The new dwellings will be able to comply with this standard
13.9.5.2.3 Road boundary setback ***a.*** *The minimum building setback from road boundaries in the Academy Activity Areas and Resort Community Areas shall be 100 metres from Turners Road, Spencerville Road and from Teapes Road adjoining 138 Turners Road (Lot 1, DP23116).*	✓	The new dwellings will be able to comply with this standard
13.9.5.2.4 Zone boundary and other boundary setbacks *a. The minimum building setback from a zone or other boundary shall be:*	✓	The new dwellings will be able to comply with this standard

i. Setback from zone boundaries – 20m *ii. Setback from other boundaries – 15m*		
13.9.5.2.5 Building height *a. The maximum height of any building shall be:* *i. All Resort Community Activity Areas, except for accessory buildings; - 8 metres* ***ii.*** *Accessory buildings in all Resort Community Activity Areas. - 5 metres*	✓	The new dwellings will be able to comply with this standard
13.9.5.3 Area Specific Standards		
13.9.5.3.1 Access and roading improvements *a. Vehicle access to Whisper Creek Golf Resort shall be limited to the following:* *i. A single road from each of Lower Styx Road and Spencerville Road; and* *ii. A single road from Teapes Road, which shall be limited to use by service vehicles only.* *b. No activity shall be permitted in the Academy Activity Areas, except approved earthworks, landscaping and planting, and the construction and use of access roads, until the Lower Styx/Marshland Road intersection has been signalised.*	× N/A	Lots 16 and 17 are to have vehicle access onto Spencerville Road. All other sites property access will be via the new roads proposed. There will be two roads providing access to the subdivision from Spencerville Road.

Overall the proposal is a **Non-complying Activity** under **13.9.5.1.5 NC2** as more than one road access is provided onto Spencerville Road and/or two lots will obtain access of Spencerville Road.

Chapter 18 Open Space Water and Margins Zone

No change to land within the Open Space and Water Margins is proposed as part of the subdivision and landuse consents sought. It is noted that within this Zone on land adjoining the Styx River margin, some of which falls with the southern extent of the site, there are overlays relating to a Natural Landscape Significant Feature and a Site of Ecological Significance.

5. National Environmental Standard for Assessing and Managing Contamination in Soil to Protect Human Health

The NES controls soil disturbance on land where an activity on the Hazardous Activities and Industries List (HAIL) is being carried out, has been carried out, or is more likely than not to have been carried out. A Preliminary Site Investigation has been carried out by Tonkin and Taylor. The investigation noted that the site covers an area of land currently occupied by residential properties, disused farm buildings and open pasture. There is little information about past uses so possible contamination was inferred from observations made during a site walkover. These observations indicated that a number of possible HAIL activities relating to previous farming activities such as disused diesel fuel pumps and waste material storage. Further investigation of the areas of concern is needed to confirm the presence or absence of contamination.

A DSI is currently being undertaken and will be forwarded to Council upon its completion. As the DSI has yet to be completed, the proposed subdivision and earthworks works require consent as a Discretionary Activity under Clause 11 of the NES.

6. Assessment of Actual or Potential Effects on the Environment

The following assessment considers the effects of this development on the surrounding environment. The following matters are considered to relevant in assessment of this proposal:

- Zone Purpose and Development Plan
- Subdivision Design
- Boundary Treatment, Access Management Plan
- Effects of locating outside Resort Community Activity Area
- Natural Hazards
- Open Space, Reserves and Ecological Values
- Access Track
- Impacts of earthworks
- Traffic impacts

6.1 Compliance with Zone Purpose and Development Plan

The subdivision and landuse application being sought does not provide for construction of a golf course as specified on the Whisper Creek Outline Development Plan. The previous owner, who championed the zoning for a golf course and academy as well as residential development, has not been able over time to develop a viable proposal for development of the golf course. It is understood that this is a common problem with golf course development. With regard to Whisper Creek the physical challenges of the site are such that the costs of development would be considerable given the potentially conflicting goals of ecological enhancement, providing for flood ponding and golf course development and maintenance. It is for this reason that the owner has put the land (both titles) up for sale. The applicant has bought the eastern block with an understanding of the difficulties that the owner has faced in trying to achieve a golf course and so wishes to put part of the land to the residential use contemplated in the northern section of the Zone.

The effects of the golf course not being constructed on the application site (and presumably on the title to the west) are firstly that a golf course and golf academy will not be available for use by residents and visitors to Christchurch and Canterbury. Secondly, some of the public benefits associated with redevelopment such as public access through the site may not be achieved. This matter is assessed further in 6.3. A benefit, at least in the short term, is that the areas most sensitive to earthworks and development associated with development of the golf course will not be disturbed and so potential impacts on the river and its margins will not occur.

The amount of residential use proposed by this application (70 residential lots) is anticipated by the Zone rules to occur prior to the construction of the golf course. In that sense the proposal is in keeping with the Zoning. The non-compliances that need to be assessed are primarily associated with the extension of the residential subdivision into the Golf Course and Open Space Activity area. The effects of this extension are considered in 6.3 and 6.4.

6.2 Subdivision Design

The layout of the proposed subdivision is in general accordance with requirements specified in Development Requirements of the Whisper Creek Outline Development Plan and provides the main roading connection to the wider roading network required to the south-west. The main deviations from the Development Plan are that some of the residential allotments fall outside the Resort Community Activity Area and a second road connection to Spencerville Road to the north-east and that a bridleway is not provided for. These latter matters are assessed separately in sections 6.3.

This subdivision has been designed to ensure that as many allotments as possible are orientated on an east-west alignment providing the maximum opportunity for access to sunlight for the resulting dwellings. In addition the current topography of the site is being retained as far as possible to make best use of the lower lying areas for drainage as currently occurs. In particular stormwater swales will take stormwater from the roads and the lots adjoin the reserve and drain it into a newly created wetland and swamp forest area. These areas already receive stormwater and are part of an informal drainage system including constructed drainage channels which ultimately drain to the Styx River.

The topography of the site in general falls from north to south but there is a low lying area south of the exiting farm sheds as mentioned above. Apart from drains there are no other natural or cultural features associated with the site. The proposed subdivision layout and design acknowledges the context of this development tucked into the northeast corner of the Whisper Creek Development Plan. This location enables the provision of the two road connections to the wider network, whilst larger sites are provided along the majority of the external boundaries ensuring that the anticipated residential amenity of neighbouring properties will be maintained.

The proposed layout will enable a variety of housing to be provided should that be what the market desires; although it is expected that the majority will be standalone dwellings. The site layout will enable the establishment of dwellings on the allotments that have a visual interaction with street with only 15 rear allotments. Of these 15 rear allotments, six of these lots share an internal boundary with a reserve and four of these are over 1.2ha in area. Where necessary to ensure access, larger rights-of-way have been provided to enable a cohesive community to develop in these locations.

The proposed allotments are of appropriate size and dimensions suitable for Specific Purpose (Golf Resort) Zone- Whisper Creek Golf Resort and it is understood that these allotments will enable dwellings to be designed in accordance with the above requirements including setbacks from the zone boundary.

Second Road Connection

The Whisper Creek Development Plan only provides for a single road connection from Spencerville Road and another connection to the Lower Styx Road to the south-west on the wider area. There is also a rule limiting “vehicle access” to Spencerville Road. It is not clear whether the rule (13.9.5.3.1) is referring to vehicle access directly onto Spencerville Road or the roads connecting to Spencerville Road. With regard to the second road connection to the north-east off Spencerville Road this is proposed to enable road frontages and avoid rear lots the applicant has. This road is a cul-de-sac and would serve 10 properties including the existing residential unit to be retained within proposed Lot 1.

This second road connection does not compromise the ability to provide the boundary planting and has been chosen so as to avoid roading through the lower and wetter parts of the site. It is considered that although the second road connection is not anticipated by the Development Plan, the effects will be less than minor given the limited number of allotments that it would be serving.

6.3 Boundary Treatment, Access and Management Plan

A draft Whisper Creek Management Plan has been prepared to provide a means of achieving an appropriate form and level of planting throughout the development and to satisfy the requirements in Rule 13.9.5.1.3 RD5. The draft Whisper Creek Management Plan is contained in Appendix D. The planting regime set out in the Management Plan is contained the Landscape Concept prepared by Earthwork Landscape Architects – refer Appendix B, which in turn draws from the recommended ecological restoration options contained in the Wildlands ecological report (refer Appendix C).

Boundary planting specified on the Whisper Creek Development Plan for the majority of the western boundary is proposed by the applicant because this is the boundary which adjoins existing rural residential lots. The proposed planting will provide attractive screening between the development and these lots. It will also enhance the ecological biodiversity in the area as it comprises local indigenous species which are not well represented on the site. As the northern section of the western boundary is occupied by a pine plantation (which is to be retained) , no additional planting is proposed on the western boundary of lot 16.

No boundary planting is proposed on the eastern zone boundary as there is no apparent need or benefit for this given that the adjoining land is zoned Rural and it is unlikely that a number of houses would establish there. It is noted that that Development Plan requires a Bridleway route meandering along the eastern zone boundary with the boundary planting adjoining. The Bridleway is shown as extending through to the true left side of the Styx River. A bridleway is normally a track for people riding on horses although the same track can be used for walkers and bikers.

The matter of the bridleway was raised at the pre-application meeting and the applicant requested that Council provide feedback as to whether such a track in this location was wanted given it would not connect to the track on the true right of the Styx River. No response has been received from Council on the matter and so at this stage no route has been proposed. If such a route was desired considerable thought would need to be given as to how this could be achieved, what form of ownership would be involved and who would be response for matters of health and safety.

It is noted that a “pedestrian/cycle link/route” is also shown on the Development Plan. This route runs along the full length of the Zone adjoining the Styx River margins. The applicants are not proposing to construct this track for the same reasons as are discussed above in relation to the Bridleway. The development of such a track logically needs to be undertaken in consultation with all landowners along the route.

6.4 Residential Activity outside Resort Community Activity Area

The proposed subdivision includes areas within the Golf Course and Open Space Activity Area which were intended to be used as fairways for the golf course. As the golf course is not going to be developed on this land, or presumably on the neighbouring land to the south west, it is logical that it be put to some other use. The narrowness of the various areas of “fairway” land on the western, northern and central areas of the site means they are unsuitable for farming. In addition farming

use in these areas would be bound to create adverse amenity affects that have potential to annoy residents. For these reasons it was decided to include these areas of land within the subdivision.

With regard to effects on neighbouring properties it is considered that only the properties to be immediate west of Lots 12, 26, 31, 32, 48 and 49 have the potential to be effected by residential development on the application site. Two methods have been adopted to reduce, and possibly avoid, any such adverse effects. Firstly, these lots are large, ranging from 0.98ha to 1.2929ha. This area enables houses to be set well back from the western boundary. It is noted that Built form standard 13.9.5.2.4 requires a least a 20m setback as well. The second method is the extensive planting along the zone boundary. The extent of the boundary planting is illustrated in the crass section illustration "Western Site Boundary Planting" in the Landscape Development Information prepared by Earthwork – refer Appendix B. This level of planting with two layers will create attractive and substantial screening such that it is unlikely that the occupants of the neighbouring site will be aware of the residential of the land. It is further noted that the houses on the adjoining sties to the west are at least 200m from the zone boundary.

6.5 Natural Hazards

The site is within a Flood management Area, a fixed Minimum Floor Level Overlay as well as part of site being in a Flood Ponding Management Area. Further the lower area of the site is within a High Flood Management Hazard Area. To achieve conformity with the District Plan the subdivision has been designed so that a minimum floor level of 12.3 can be achieved for all sites. This is the highest level of those set out in the District Plan for Flood management areas.

With regard to the High Flood Hazard area, the subdivision has been designed such that all residential lots are outside this area and the area is used for establishment of the wetland and swamp forest. In relation to the Flood Ponding Management Area the earthworks have been designed so that filling in these areas will be kept to an absolute minimum and any filling will be compensated for with adding ponding volume elsewhere on the site. In addition any residential lots with this area have been designed such that lots are either outside this area or have flexibility for a house to be located outside this area.

6.6 Open Space, Reserves and Ecological Values

This proposed subdivision provides for open space including reserves. Although the reserves have the primary purpose of treatment and detention of stormwater, they will become attractive areas for residents and visitors to the new housing development.

Substantial indigenous planting is proposed throughout the development. The details of this planting is set out in the Earthwork Landscape Concept in Appendix B and also incorporated into the Draft Whisper Creek Management Plan in Appendix D. Five plant communities types are utilised in the Landscape Concept which have been taken from the Wildlands recommended ecological restoration options. These five communities only incorporate indigenous species and will contribute substantially to local indigenous biodiversity as the area currently almost totally dominated by exotic species. The five plant communities and their locations within the development are:

Dry shrubland:	Within reserve areas except the wetter areas
Dry Forest:	Along western zone/property boundary
Wetland Vegetation:	Wetland area below swales where existing drainage channels occur

Tall Wetland Forest:	Low lying area below wetland
Riparian Vegetation:	Along the edge of stormwater swales

The provision for planting within the residential subdivision in the northern area as detailed above has the purpose of increasing the indigenous biodiversity of the site. In addition it will create an attractive environment both for the residents of and visitors to the subdivision. It will also, over time, provide indigenous habitat and vegetation that will be appreciated beyond the site and add to the biodiversity values of the Lower Styx area.

The Styx River running along the southern boundary is classified as a Downstream River under the District Plan. The Styx River is identified as a Site of Ecological Significance listed in Schedule A of Appendix 9.1.6.1. A 20m wide Esplanade Reserve is required along the true left bank of the Styx in this area, however it is noted that as the title boundary is over 40m from the river bank no esplanade reserve is required. No works are proposed in proximity of the Styx River. As a result, the effects are assessed to be nil from the subdivision in terms of Natural and Cultural Values.

6.7 Geotechnical Assessment

A full geotechnical report including s106 assessment has been undertaken by Tonkin & Taylor, and is contained in Appendix F. In terms of Section 106, the report makes the following comments:

> *The site has performed well during the 2010/2011 Canterbury Earthquakes, with no liquefaction ejecta observe or recorded with the boundaries of the site.*
>
> *According to settlement criteria for assessing the Foundation Technical Category in the MBIE Guidelines and the variable nature evident across the site we consider the norther portion of the proposed subdivision to be "Low Liquefaction Vulnerability (TSC1 equivalent) . The remainder of the proposed subdivision is considered to the "Medium Liquefaction Vulnerability" (TC2 equivalent)*

Specific foundation designs are recommended. Please see Appendix F for a full copy of the report and statement of professional opinion for this subdivision.

6.8 Servicing, Infrastructure and Roading

The applicant has had discussions with Council staff regarding the most appropriate methods of servicing this site. The outcomes of those discussions are contained within the Infrastructure Report in Appendix E. In summary the proposed development will be connected to the existing 200mm watermain located at the intersection of Spencerville and Lower Styx Roads. The supply to the subdivision will be a restricted supply providing a supply of 6171 litres per day per lot which is considered suitable for rural residential lots. Firefighting storage will need to be provided on each lot and is expected to be achieved through the building consent process, and a condition and consent notice to this effect is volunteered.

It is proposed that the development will discharge into the existing 300m wastewater pipe located at the intersection of Spencerville and Lower Styx Road. The connection will be by way of a low-pressure sewer system. The rising sewer will be installed with the water connection along Spencerville Road including a steel section of pipe over the bridge. Each house site will require a low pressure pump unit which will installed as part of the building consent process.

6.9 Earthworks/Construction Activities

Earthworks of approximately 60,000m^3 will be carried out on the site to ensure that all future house sites will drain towards the street at a grade of 1/500. Subject to the design, the house sites will be elevated above the street by up to 0.6m.

All topsoil on site will be retained and replaced on the land immediately following bulk earthworks. All disturbed topsoil will be resown with Council specification grass seed mixes. A balance of cut and fill will be maintained as much as possible and removal of material from site will be kept to a minimum.

Sediment off the site will be controlled as per Council requirements. The basis of the sediment control will be the Environment Canterbury Guidelines and the discharge during construction will be appropriately addressed. This will either be discharged as permitted by rule 5.96A of ECan's Land and Water Regional Plan. A draft erosion and sediment control plan is contained in Appendix B.

All dust created on the site will be controlled by water cart, dust suppression fencing or other such Council approved methods, and in accordance with the permitted standards required by ECan's proposed Regional Air Plan.

All bulk filling will be compacted in accordance with NZS 4431:1989. All fill testing will be carried out by an independent laboratory. The primary area of fill will be that portion of Coxes Drain that passes through the site. This drain is being filled as the application site is the upper end of the catchment and once developed there will be no water flow from the site to this portion of the drain. Given this, it is considered unnecessary to naturalise this particular portion of the drain.

7. Policy Assessment

7.1 Christchurch District Plan

The following Objectives and Policies are considered relevant to the proposed development. An assessment of the development against these Objectives and Policies has been undertaken as follows:

Specific Purpose (Golf Resort) Zone

Objective 13.9.2.1- Golf Resort Development

For the Clearwater Resort and Whisper Creek Golf Resort, to provide golfing and associated facilities of international standard, bring economic and social benefits to the City and region, and to provide other recreational opportunities, and limited residential development, with extensive open space and lake or riparian settings, with no significant adverse effects on the natural or adjoining rural environments.

13.9.2.1.1 Policy - Benefits to the community

a. *Recognise the economic and social benefits that the Clearwater Golf Resort provides and Whisper Creek Golf Resort can provide to the City and region, and assist in enabling the potential benefits of these resorts for ecological restoration, public access to streams and rivers, and recreation for the wider community, including local community, to be realised.*

Comment: The proposed residential development within the northern section of the Whisper Creek Golf resort, while not providing for golfing facilities, is not contrary to this objective because it is

providing for "limited residential development". In fact this level of development is specifically provided for in the zone provisions which set a trigger point of 71 sections before the golf course needs to be constructed. Further the development will maintain extensive open space and riparian settings.

In addition, the development involves substantial indigenous planting in an area that currently is dominated by exotic species. The proposal will therefore result in a positive outcome for indigenous biodiversity in the area. This ecological restoration will definitely benefit the community, including the local community. At this stage no provision has been made for public access to the river and recreational opportunities such as a bridleway. However the applicant is open to consideration of these matters if the Council has specific projects in mind that involve the application site.

13.9.2.1.3 Policy - Visual integration and mitigation of effects

a. Ensure that built development is well integrated visually into the open rural environments within which each golf resort sits, and that there is adequate separation distance from activities in adjacent zones so as to mitigate potentially adverse effects of the resorts such as noise and traffic.

Comment: Boundary Planting in accordance with Development Plan has been incorporated into the proposal with input from the Ecological Assessment by Wildlands. This planting is specifically designed to provide screening and attractive edge to the development on its western boundary with the two existing lifestyle blocks. This planting and the 20m setback will ensure that there is sufficient separation to enable full enjoyment of sites on either side of the boundary. Because the development is for housing it is not expected that there will be any noise or traffic issues arising.

13.9.2.1.4 Policy - Careful siting

a. Ensure that earthworks and buildings in the two golf resorts are carefully designed, located and constructed, for the Whisper Creek Golf Resort so as to be resilient to potential liquefaction and to maintain flood storage capacity in the Lower Styx Ponding Area, and for both resorts, to reduce potential flood damage to buildings in a major flood event.

Comment: Tonkin and Taylor have undertaken a Geotechnical Assessment and concluded the northern half of the development area is equivalent to TC1 and so no liquefaction issue arises. The other parts of the site are equivalent to TC2 and with the recommended foundation designs houses will be resilient to potential liquefaction.

With regard to the site being within a flood management area and the Lower Styx Ponding area, the subdivision has been designed to limit the number of sites within the ponding area. For those in the ponding area sufficient land is available outside the ponding area for establishment of a house. In terms of flood storage capacity, very limited filling is proposed in this area and the volume lost through this filling will be fully compensated for by creation of additional area elsewhere. The development will therefore maintain the flood storage capacity of the Lower Styx Ponding Area.

Strategic Directions

Strategic Directions 3.3.1 Objective - Enabling recovery and facilitating the future enhancement of the district

The expedited recovery and future enhancement of Christchurch as a dynamic, prosperous and internationally competitive city, in a manner that:

a. *Meets the community's immediate and longer term needs for housing, economic development, community facilities, infrastructure, transport, and social and cultural wellbeing; and*
b. *Fosters investment certainty; and*
c. *Sustains the important qualities and values of the natural environment.*

Strategic Directions 3.3.4 Objective - Housing capacity and choice

a. For the period 2012 to 2028, an additional 23,700 dwellings are enabled through a combination of residential intensification, brownfield and greenfield development; and

b. There is a range of housing opportunities available to meet the diverse and changing population and housing needs of Christchurch residents, including:

i. *a choice in housing types, densities and locations; and*
ii. *affordable, community and social housing and papakāinga.*

Comment: The addition of 70 residential sites will assist in meeting the community's immediate and longer term needs for housing while sustaining and improving the important qualities and values of the natural environment. This will be achieved by substantial ecological restoration planting throughout the subdivision. The housing option provided by this development in a semi-rural area in the Styx River catchment is not available elsewhere and so directly satisfies Objective 3.3.4 .b

Strategic Directions 3.3.7 Objective - Urban growth, form and design

A well-integrated pattern of development and infrastructure, a consolidated urban form, and a high quality urban environment that:…..

c. Provides for urban activities only:

i. *within the existing urban areas; and*
ii. *on greenfield land on the periphery of Christchurch's urban area identified in accordance with the Greenfield Priority Areas in the Canterbury Regional Policy Statement Chapter 6, Map A; and*

d. Increases the housing development opportunities in the urban area to meet the intensification targets specified in the Canterbury Regional Policy Statement, Chapter 6, Objective 6.2.2 (1); particularly:

i. *in and around the Central City, Key Activity Centres (as identified in the Canterbury Regional Policy Statement), larger neighbourhood centres, and nodes of core public transport routes; and*
ii. *in those parts of Residential Greenfield Priority Areas identified in Map A, Chapter 6 of the Canterbury Regional Policy Statement; and*
iii. *in suitable brownfield areas; and…..*

Comment: If the development is considered an "urban activity" then it is not consistent with the objective as the site is not within any of the areas listed. However the development is more in the nature of rural-residential development with sections ranging from 1411m^2 to 1.3ha. As such this Objective is not directly relevant. It is also noted that the proposal falls with land zoned for the purpose.

Natural Hazards

5.2.2.1.1 Policy - Avoid new development where there is unacceptable risk

a. Avoid new subdivision, use and development, including new urban zonings, where the risk from a natural hazard is assessed as being unacceptable.

5.2.2.1.2 Policy - Manage activities to address natural hazard risks

a. Manage activities in all areas subject to natural hazards in a manner that is commensurate with the likelihood and consequences of a natural hazard event on life and property.

5.2.2.1.4 Policy -- No transferring of natural hazard risk

a. Ensure that subdivision, use and development (including proposals for hazard mitigation works or hazard removal) do not transfer or create unacceptable natural hazard risk to other people, property, infrastructure or the natural environment.

5.2.2.1.5 Policy -- Natural features providing hazard resilience

a. Protect natural features which assist in avoiding or reducing the risk of natural hazards, such as natural ponding areas, coastal dunes, wetlands, water body margins and riparian vegetation from inappropriate subdivision, use and development and where appropriate restore, maintain or enhance the functioning of these features.

5.2.2.2 Policy for managing risk from flooding

5.2.2.2.1 Policy – Flooding

……

b. Avoid subdivision, use or development in the high flood hazard management area where it will increase the potential risk to people's safety, well-being and property……..

d. Maintain the flood storage capacity and function of natural floodplains, wetlands and ponding areas, including the Hendersons Basin, Cashmere Stream Floodplain, Hoon Hay Valley, Cashmere--Worsleys Ponding Area, Cranford Basin and Lower Styx Ponding Area1.

e. Except for filling required to meet minimum floor levels, ensure that filling in urban areas at risk of flooding in a major flood event does not transfer flooding risk to other people, property, infrastructure or the natural environment.

Comment: Risk of flooding is being avoided by the subdivision design which will enable all houses to meet the fixed floor level. In addition the stormwater from the sites will be conveyed of the lots in a manner that will avoid on site flooding or localised flooding within or adjoining the development. In particular the wetland will enable flood water to be detained to avoid flooding downstream. There will be no transfer of flood waters onto adjoin sites because stormwater will be conveyed through swales into a wetland and then into existing drainage channels.

5.2.2.3 Policy for managing risk from liquefaction

5.2.2.3.1 Policy - Management of liquefaction risk

a. Map the Liquefaction Management Area based on a district-wide assessment of where damaging liquefaction is more likely to occur.

b. Provide for rezoning, subdivision, use and development on flat land where liquefaction risk has been appropriately identified and assessed, and can be adequately remedied or mitigated.

Comment: Tonkin and Taylor have undertaken a Geotechnical Assessment and concluded the northern half of the development area is equivalent to TC1 and so no liquefaction issue arises. The other parts of the site are equivalent to TC2 and with the recommended foundation designs houses will be resilient to potential liquefaction

Subdivision, Development and Earthworks

Subdivision, Development and Earthworks 8.1.2 Objective – Design and amenity

a. An integrated pattern of development and urban form through subdivision and comprehensive development that:
- *i. provides allotments for the anticipated or existing land uses for the zone;*
- *ii. consolidates development for urban activities;*
- *iii. improves people's connectivity and accessibility to employment, transport, services and community facilities;*
- *iv. improves energy efficiency and provides for renewable energy and use; and*
- *v. enables the recovery of the district.*

Comment: This objective and its supporting policies seek an integrated pattern of development that enables the recovery of the district and promotes the efficient provision and use of infrastructure. The proposed subdivision generally complies with the Zone provisions and provides for the density anticipated by the District Plan. The development provides for a range of allotment sizes and will provide for a range of living environments to meet the social and economic needs of various people. The proposed allotments will have appropriate wastewater and stormwater services, facilities and characteristics necessary for residential uses.

The proposal provides for a total of 70 residential allotments. Overall it is that this subdivision generally achieves the outcomes sought by Subdivision Objective 8.1.2 and its supporting policies.

7.2 Recovery Plans

The Land Use Recovery Plan another statutory document that must be applied when considering a resource consent. The development of this land is in keeping with the outcomes sought by the Land Use Recovery Plan in relation to the provision of additional housing in the Greater Christchurch area.

7.3 Iwi Management Plan

The Mahaanui Iwi Management Plan was lodged with the respective territorial authorities on 1 March 2013 and sets out Ngai Tahu's principles for land management. The relevant sections are

Mahaanui Iwi Management Plan 2013

P11.1 To assess proposals for earthworks with particular regard to:
- *a. Potential effects on wāhi tapu and wāhi taonga, known and unknown;*
- *b. Potential effects on waterways, wetlands and waipuna;*
- *c. Potential effects on indigenous biodiversity;*
- *d. Potential effects on natural landforms and features, including ridge lines;*
- *e. Proposed erosion and sediment control measures; and*
- *f. Rehabilitation and remediation plans following earthworks.*

P11.2 To require that tāngata whenua are able to identify particular areas whereby earthworks activities are classified a restricted discretionary activity, with Ngāi Tahu values as a matter of discretion.

P11.7 To require that indigenous vegetation that is removed or damaged as a result of earthworks activity is replaced.

P11.8 To require the planting of indigenous vegetation as an appropriate mitigation measure for adverse impacts that may be associated earthworks activity.

P11.9 To require stringent and enforceable controls on land use and earthworks activities as part of the resource consent process, to protect waterways and waterbodies from sedimentation, including but not limited to:

(a) The use of buffer zones;
(b) Minimising the extent of land cleared and left bare at any given time; and
(c) Capture of run-off, and sediment control.

CL3.8 To require, where a proposal is assessed by tāngata whenua as having the potential to affect wāhi tapu or wāhi taonga, one or more of the following:

(a) Low risk to sites:
(i) Accidental discovery protocol (ADP) - See Appendix 3.
(b) High risk to sites:
(i) Cultural Impact Assessment (CIA);
(ii) Site visit;
(iii) Archaeological assessment, by a person nominated by the Papatipu Rūnanga;
(iv) Cultural monitoring to oversee excavation activity, record sites or information that may be revealed, and direct tikanga for handling cultural materials;
(v) Inductions for contractors undertaking earthworks;
(vi) Accidental discovery protocol agreements (ADP); and/or
(vii) Archaeological Authority from the New Zealand Historic Places Trust.

The proposed residential lots including the earthworks are setback approximately a minimum of 550m from Styx River. The Landscape Plan by Earthwork incorporates indigenous vegetation planting along the drains and on the western boundary as required by the Whisper Creek Development Plan. It is considered that this would support the habitat. Erosion and sedimentation control plan in accordance with ECan guidelines will be followed during construction. Esplanade Reserves are proposed to be vested in Council along the Styx River boundary as shown on the Subdivision Plan.

Overall it is considered that this proposal will have no adverse effects on cultural values of iwi, and that outcomes sought in the Mahaanui Iwi Management Plan that are relevant to this proposal are achieved.

8. Assessment Against Part 2 of the RMA

The purpose of the Act (Part 2) is to promote the sustainable management of natural and physical resources. Section 5 imposes a duty on consent authorities to promote sustainable management while avoiding, remedying or mitigating adverse effects of activities on the environment. Section 6 addresses matters of national importance. It is considered that there no matters of national

importance (Section 6) or Treaty of Waitangi issues (Section 8) which need to be taken into account in this instance.

The proposed subdivision appropriately manages the risk associated with the natural hazards that been identified for this site.

The discharge of stormwater to water from the site will be undertaken in accordance with the global consent granted by Environment Canterbury to the Christchurch City Council. There is no disturbance of indigenous flora and fauna. There are no heritage structures, sites or protected trees or sites of cultural significance identified on the site.

Section 7 lists various matters to which regard shall be had in achieving the purpose of the Act. The matters of particular relevance to this application are 7(b), 7(c) and 7(f). In considering these sections it is considered that the proposal supports the purpose of the Act through residential subdivision and also providing various choices in terms of allotment sizes to meet their social, cultural and economic needs, does not impact on local amenity values or the quality of the environment in the general and wider locality.

It is therefore considered that the proposal supports the purpose of the Act as it represents an efficient use and development of the site without compromising amenity values or the quality of the environment.

9. Mitigation Measures and Proposed Conditions

We consider that there will be no significant adverse effects on the environment and therefore no mitigation measures are necessary or proposed, beyond those that are inherent to the proposal.

To this end, we anticipate that the Council's standard conditions relating to subdivision and landuse will be applied to this development.

10. Identification of Persons Potentially Affected and Consultation

The applicant has had a pre-application meeting with the Council with regards to the development.

11. Consideration of Alternatives

The above assessment indicates that the proposal will not have any significant adverse effects on the environment, therefore an assessment of alternatives is not required.

12. Monitoring

It is considered that there would be no significant adverse effects on the environment and therefore no on-going monitoring of the proposal is required or proposed.

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Whisper Creek Application
Appendix A: Subdivision Plan

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Whisper Creek Application
Appendix B: Landscape Plans

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Whisper Creek Application
Appendix C: Ecological Assessment

Whisper Creek Application
Appendix D: Draft Whisper Creek Management Plan

Whisper Creek Application
Appendix E: Infrastructure Report

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Whisper Creek Application
Appendix F: Geotechnical Investigation

Whisper Creek Application
Appendix G: Preliminary Site Investigation – NES

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Whisper Creek Application
Appendix H: Computer Freehold Register Information

Infrastructure Report

240 Spencerville Road, Brooklands

Whisper Creek - Proposed Subdivision

19432

July 2018

DAVIE LOVELL-SMITH

PLANNING SURVEYING ENGINEERING

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Revision History

Rev Number:	Prepared By:	Description:	Date:
Rev 1	AJEH	Reassessed Stormwater	2 July 2018

Document Control

Action:	Name:	Signed:	Date:
Prepared By	Andy Hall		
Reviewed By	Patricia Harte		
Approved By	Andy Hall		

CONTENTS:

1. GENERAL

1.1. INTRODUCTION

This infrastructure report addresses servicing of the proposed rural-residential development at 240 Spencerville Road, Brooklands.

The total area of the sub-division is 63.7935. It is proposed to subdivide the lot into 70 rural-residential lots associated roads, balance land and reserves.

This report addresses the servicing of the proposed sub-division including stormwater treatment, storage, disposal and reticulation, sewer reticulation, water supply, earthworks, groundwater, roading, pavements, power and telecom. In addition, the suitability of the soils over the site to accommodate residential development is addressed.

Consultation will be undertaken with Orion and Telecom to ensure the coordinated provision of these services.

A geotechnical investigation has shown that the soils are suitable for residential development. A copy of the geotechnical report is included with the sub-division consent application.

The design and construction of the proposed sub-division infrastructure will comply with the requirements of the Christchurch City Council standards.

1.2. SITE

The subject site is located at 240 Spencerville Road and is legally described as Pt Lot 2, DP 5889. It is currently a retired dairy farm. The site had initially been proposed as the Whisper Creek Golf Complex but that project has since failed to eventuate despite numerous attempts and interest.

The site is bounded by Spencerville Road to the north, lifestyle blocks to the west, the Styx River to the east and existing farm land to the south.

The site is approximately 1km from Spencerville. Spencerville can be accessed east along Spencerville Road. Travelling west along Spencerville Road leads to Kainga and Chaneys.

There are two houses and a number of farm buildings on the property. All of the farm buildings will be removed along with the western most house (pink cladding). The main house will be renovated along with the existing garden and will be sold as part of the proposed lot 1.

There is a stand of plantation trees in the north west corner of the development. These will be retained as part of Lot 16.

The large pine windbreak at the southern end of the development will be removed along with all internal fencing.

2. SITE CONDITIONS

2.1. SOILS

The Canterbury Plains consist of intermingled alluvial and glacial fans composed of clays, silts, sands and graded combinations of these soils. Site investigations show a thin layer of topsoil overlying a layer of sand and silt to a depth in excess of 20m.

The soils have the potential to create a very good subgrade to the roads. Scala penetrometer tests have indicated that the minimum bearing capacity of 300kPa is reached at a depth of 500-800mm. Basic site compaction following the topsoil strip will create the required bearing capacities at a shallower depth and meet the requirements of NZS 3604.

2.2. GROUNDWATER

The site is located over the unconfined aquifer system. The groundwater table was reached during the site investigations. Please refer to the Geotech report for interpolated and measured groundwater levels.

2.3. GEOTECHNICAL ASSESSMENT

A geotechnical investigation was undertaken by Tonkin an Taylor Ltd. Please refer to their report attached to the subdivision consent application.

The geotechnical investigations have concluded the following:

- There is a low liquefactious potential for a large portion of the site due to the nature of the soils and the level of the groundwater. (TC1)
- The remainder of the site is classified as Technical Category 2.
- There is no Technical Category 3 land within the project area
- Proximity to existing fault lines is not of concern to this development.

2.4. CONTAMINATION ASSESSMENT

A Preliminary Site Investigation in terms of the National Environmental Standards has been undertaken on the site and there are indications that there may be some contamination present. A Detailed Site Investigation is now proceeding. If there is any contaminated material found that exceeds the required thresholds, then that material will be removed from site to a safe landfill.

2.5. FLOODING

Consultation has been carried out with Christchurch City Council into the effects of various flood scenarios on the property. The area is within the Fixed Minimum Floor Level Overlay. This has a minimum required floor level of 12.3m. This level is an accepted standard but modelling undertaken by Council has set a more robust set of circumstances where the minimum floor level shall be the highest of:

- flooding predicted to occur in a 0.5% AEP (1 in 200¬-year) rainfall event concurrent with a 5% AEP (1 in 20¬-year) tidal event, including 1 metre sea level rise plus 400mm freeboard, as predicted by the relevant Council model and version identified in Table 5.4.1.1a; or

- flooding predicted to occur in a 0.5% AEP (1 in 200-year) tidal event concurrent with a 5% (1 in 20-year) rainfall event, including 1m sea level rise plus 400mm freeboard, as predicted by the relevant Council model and version identified in Table 5.4.1.1a; or

- 12.3 metres above Christchurch City Council Datum.

Of these scenarios, the 12.3m level is still the most rigorous and will be used on this development. Future home owners do have the ability to apply for a consent to reduce this level if they wish but that will be outside the scope of this application.

Please refer to the indicative earthworks plan in the appendices. This shows the proposed cut and fill on the development and also the 12.3m contour. As can be seen, there is a large portion of the site that requires some filling to lift the house sites above the flood plain. The plan also shows the extent of the Flood Management Ponding Area. It is intended that filling inside the ponding area will be kept to an absoluter minimum and that any filling within the area will be compensated with ponding volume elsewhere on the project.

3. EARTHWORKS

Earthworks will be carried out on the site to cut out the roads & basin and fill the low areas. The intention will be to replicate the existing land form as much as possible.

The site is affected by flooding and it is proposed that each site will have an area filled to at least 12.0m RL. This will provide a building platform for homes. It is not intended that the whole of each new lot be filled to this level. The minimum floor level is 12.30m.

The site is also affected by the Flood Ponding Area. No filling will occur in this area unless it is fulling compensated for elsewhere on the project.

It is expected that the majority of the project will drain from the site directly to the road network and on to the stormwater basins. However, the sites are large and it is not expected that all land will fall directly to the proposed roads. Any obvious potential flow channel features will be safely directed towards the roads, reserves or other safe secondary flow paths. Essentially, the built up building platforms will be protected from secondary flow.

All topsoil on site will be retained and replaced on the land immediately following bulk earthworks. All disturbed topsoil will be resown with Council specification grass seed mixes. A balance of cut and fill will be maintained on site and removal of material from site will be kept to a minimum.

Sediment off the site will be controlled as per Council requirements. The basis of the sediment control will be the Environment Canterbury Guidelines and the discharge during construction will be dealt with in association with the overall discharge consent.

All dust created on the site will be controlled by water cart or other such Council approved methods.

All bulk filling will be compacted in accordance with NZS 4431:1989. All fill testing will be carried out by an independent laboratory. The maximum depth of fill will be approximately 1.6m. The approximate volume of earthworks will be 60,000m³.

4. ROADING

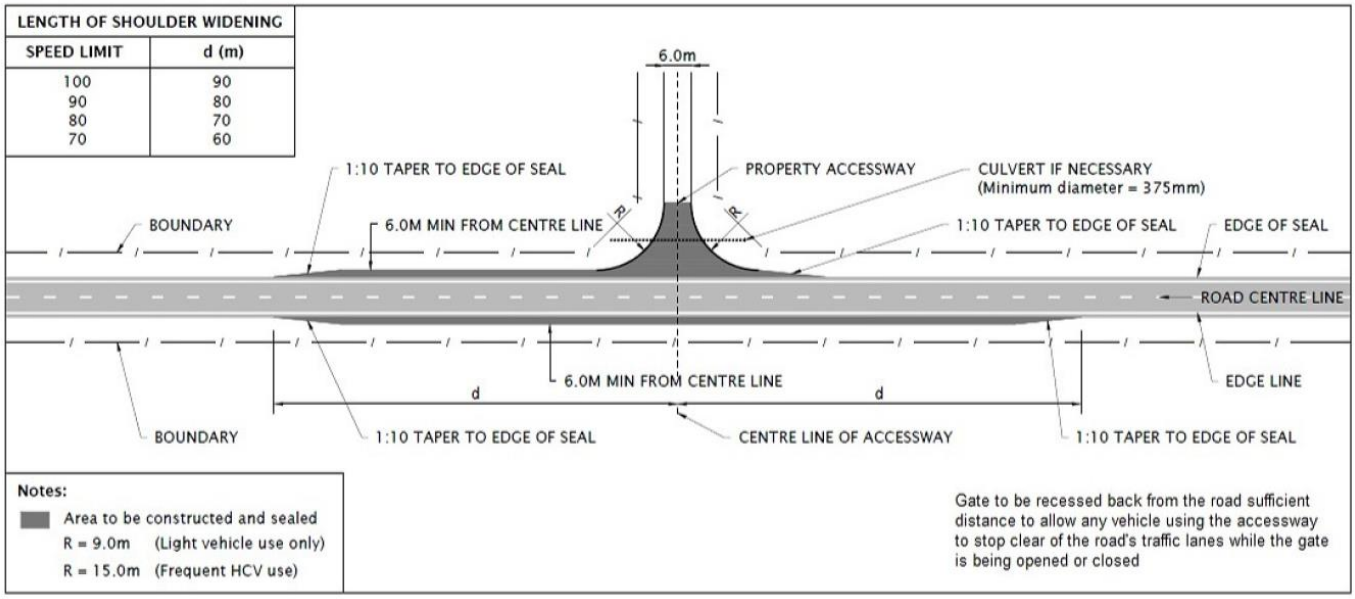
Access into the site will be off Spencerville Road. Spencerville Road is described in the District Plan as a Collector Route but is very much of a rural nature. The road reserve width is 20.12m but the seal formation is less than 6m. There is no kerb and channel or footpath.

It is proposed that there will be two intersections onto Spencerville Road approximately 135m apart. The intersections are on a relatively straight section of Spencerville Road with a minimum sight distance of 150m. The prescribed sight distance in the District Plan is 203m but in consideration of the rural nature of the road we suggest that this sight distance is sufficient.

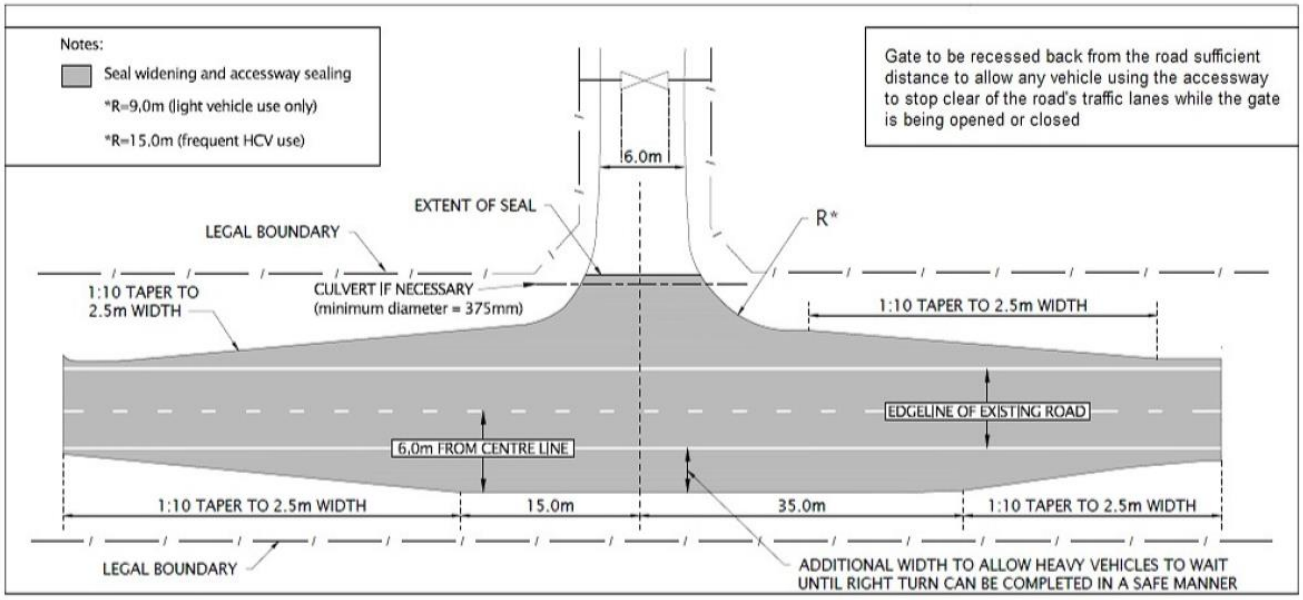
Spencerville Road at this location is in an 80km/hr speed zone. It is not expected that this will change. Travel speeds within the development will be restricted to 50kph.

Lots 16 and 17 will be accessed directly off Spencerville Road.

It is proposed that the intersection of Road 1 onto Spencerville Road will comply with Figure 14 in Appendix 7.5.10 of the Christchurch District Plan.



It is proposed that the intersection of Road 2 onto Spencerville Road will comply with Figure 13 in Appendix 7.5.10 of the Christchurch District Plan.



The roads within the proposed development will be of a semi-rural nature. They will have a 7m wide sealed carriageway draining to a shallow grassed swale either side. A sealed footpath will be located on one side of the carriageway with street trees lining both sides of the roads.

Please refer to the appendices for typical road cross sections.

Due to the rural nature of the roads it is requested that the lighting be reduced to bollard style lights at intersections, cul de sac heads, and along the pedestrian routes at 50m centres. The intersections onto Spencerville Road would be lit to Council Standards.

The entrance into Road 1 off Spencerville Road will pass between two large mature trees and will extend through the development to the southern boundary. The original golf development and associated ODP showed this connection that could eventually connect through to Turners Road.

The frontage along Spencerville Road will not be upgraded other than for the widening required for the intersections

Private access and rights of way will be constructed to Council standards.

Pedestrian access through the development will be provided by footpaths along the roads and through the connecting reserves.

All drainage off the roads up to a 1 in 50 year storm event will be treated and disposed of on site.

5. WATER SUPPLY

Consultation has been undertaken with Council Engineer – Michele McDonald. Her advice is as follows:

***Water**: in the absence of a hydraulic model for the area, the following can be concluded:*

- *Sufficient capacity for a restricted connection at 5 l/s (18 m³/hr)*
- *Should full pressure connection be required (i.e. extension of water main in Lower Styx Road), the Brooklands Pump Station which is now only operated intermittently, would have to be re-introduced into full time operation*
- *Please note District Plan requirements re firefighting Where a reticulated water supply compliant with SNZ PAS:4509:2008 is not available, or the only supply available is the controlled restricted rural type water supply which is not compliant with SNZ PAS:4509:2008, water supply and access to water supplies for firefighting shall be in accordance with the alternative firefighting water sources provisions of SNZ PAS 4509:2008.*

There is currently an existing 200mm ø uPVC watermain located at the Intersection of Spencerville Road and Lower Styx Road. It is intended that the proposed development will be connected to this supply. The size of this connection pipe will be a 100mm ø uPVC watermain. This watermain connection to the site will produce a headloss of around 5m, and a pipe velocity of approximately 0.6m/s.

The permitted supply of 5l/s is to be split between the 70 lots through a restrictor at each connection. This will limit the flow to each site to 0.0714l/s/site. Over a day, this flow could produce a volume of 6171 litres. This is considered to be a suitable amount for a rural residential site. If more water is required, the individual landowner may wish to consider harvesting rainwater.

Each site will provide its own water storage and pumping facility at the time of building consent. The provision of onsite storage will not be a subdivision matter.

The length of the watermain from the edge of the proposed development to Lower Styx Road and the connection into this existing main will be expected to be paid for by the developer. This includes for a lined steel pipe across the Spencerville Road Bridge.

All sites will either be serviced by the proposed mains or a 63mm ø submain, laid along the berms on the opposite side of the streets.

As advised by Council, each site will need to provide on-site storage for firefighting purposes. This facility will also be constructed as part of the building consent process and will not directly, be part of the subdivision process. The onsite fire storage will be required to be installed in compliance with District Council specifications and SNZ PAS 4509:2008, New Zealand Fire Service Fire Fighting Water Supplies Code of Practice. The firefighting water supply classification will be FW2.

It is expected that the restrictor and the onsite fire reserve will be covered by consent notice.

6. SEWER

Consultation has been undertaken with council engineer – Michele McDonald. Her advice is as follows:

Wastewater:

- *Although our hydraulic model indicates no spare capacity at PS0078 in Heyders Road – our reticulation and maintenance team advised that the large inflow previously experienced is in the process of being resolved due to sealing off of mains in the red zone area and raising of manholes on the 300mm gravity main in Lower Styx Road*
- *Wastewater conveyance from 160 low pressure sewer sites should therefore be achievable*
- *Please note that provision would have be to made for odour control / treatment and corrosion protection at the proposed discharge point Lower Styx Road*

It is proposed that the development will discharge into the existing 300mm ø wastewater pipe located at the intersection of Lower Styx Road and Spencerville Road (MH20228). The connection will be by way of a low pressure sewer system. The rising sewer will be installed with the water connection along Spencerville Road including a steel section of pipe over the bridge.

Subject to detailed design the rising sewer will be a 63mm(ID) PE pipe.

Each proposed new house site will require a low pressure pump unit. These will be installed at the time of building consent and will not be part of the subdivision process. A consent notice on the title is expected to detail this.

Each pump will connect to a common sewer in the road berm, and on to Spencerville Road.

There is some concern about ingress and infiltration in the existing system in Spencerville. Measures are being undertaken to reduce this flow and this may potentially lead to the pump stations requiring a one box controller to attenuate flows to time when there is capacity in the system. Further advice is being sought from Council into what success has been achieved in reducing the ingress.

The system will be constructed to Council standards and will be vested in Council.

Any public sewer pipes over private land will be covered by appropriate easements in favour of Council.

7. STORMWATER

It is proposed that all stormwater from the proposed roads and large portions of the proposed new lots will drain to a stormwater treatment and detention area as shown on the attached plans.

It is proposed that the discharge of stormwater to the Styx River, be allowed under the global consent CRC131249. However, several conditions are to be met to allow discharge under this consent. It is expected that the CCC will recommend a "partial detention" strategy, which has a primary focus on water quality. This strategy has been used for several catchments in the area and involves using a first flush basin and a wetland before discharging to local waterways.

The proposed development would look to discharge stormwater to existing drainage waterways that connect to the Styx River. The existing waterways are in the form of farm drains.

To provide a better understanding of the natural values of the area and to assist in design of the subdivision the applicant commissioned Wildlands to undertake an assessment of the ecological values and restoration options. This report (which is attached to the resource consent application) makes the following comments and assessment of the drains on the property:

Several drainage channels traverse lower elevations of the property, forming a network that channels into the Styx River. The drainage channels are not permanently wet, as is evidenced by the type of vegetation present and comments from the local farmer, and mainly carry water in the winter months. On the banks of the drainage channels there are only occasional, scattered rushes and some sedges and for some stretches of the drainage channels these species are absent. Some common exotic plants that are usually indicative of the site being permanently wet were either absent or present in low numbers.(s4.2.3)

The range of species that have been recorded in this lowland catchment highlight the values of the Styx River and its tributaries. Although the drainage channels within the project site are manmade and only contain water on a seasonal basis, they are connected to the Styx River and so freshwater fauna could be moving in and out of them and/or be temporarily residing in them, subject to water presence. These waterways could therefore provide seasonal habitat and feeding opportunities for freshwater fauna, and could also provide refuge during times when the Styx River is in flood.(s4.6)

To improve water quality in the drainage channels and also the Styx river and to protect the banks of the channels from erosion and stock damage the Report recommends that the main drainage channels be fenced and have riparian plantings. They recommend specific species for this planting to achieve shading, nutrient and sediment filtering and to enhance habitat and food sources. The subdivision design utilises the low lying areas adjoining the subdivision which contain drainage channels by incorporating these into the stormwater treatment and detention facilities. The design importantly creates additional wetland habitat for filtering of stormwater, using the wetland species recommend in the Wildland report.

The overall stormwater strategy is outlined below:

- The discharge will be to the existing drain shown on the plan just to the east of the development. The levels of the basin and wetland will be determined from this existing drain level and the Flood Ponding model.

Capture the 25 mm first flush (FF) volume in a dry sedimentation basin.

- Runoff Coefficient of 0.41 used for the development for First Flush
- Design the FF basin to discharge to wetland over 4 days
- Use the CCC Simplistic Method for Wetland Sizing with 250 mm average static water depth to determine the wetland area
- Protect the wetland from additional stormwater discharges (post first flush) up to 10-year ARI event. C = 0.42.
- After the 10-year event, start storing flood waters in an extended first flush basin depth and then overtopping to fill the wetland up to the 2% AEP 48hr Storm.
- Design the wetland to fill the 500 mm depth completely in a 50-year ARI, 48-hour event

These calculations are summarised below.

- Total catchment area 16.077ha being the majority of the development area.
- First flush basin volume of 1647 m^3 is required
- Using the CCC Simplistic Method for Wetland Sizing, the area of wetland required is 2197m^2
- Overall storage required = 5699m^3

A calculation was also undertaken to determine the critical duration event for the receiving Spencers Drain. The drain connects to the Styx River approximately 3km to the north of the site. The grade is very flat and has been estimated at only 0.5m fall. This gave a time of concentration of 172 minutes. At this duration the additional storage required in the development is 1462m^3. Well below the volume being provided and therefore of no effect on the Drain or Styx River.

All Roading Stormwater Infrastructure will be designed and built to meet Council Standards. Assets will be vested in CCC. As the stormwater is being dealt with on-site, no development contributions for this asset will be payable.

8. POWER/TELEPHONE/STREET LIGHTS

Power and Telephone 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. The kiosk sites will be forwarded to Council for approval following the power design.

Existing power connections to the site will be incorporated into the proposed power design.

Street lights will be provided to the roading and reserves to Council standards or as previously described in this report. The applicant will also provide a street light style to Council for approval.

APPENDICES

- Earthworks Plan
- Services Plan
- Water and Sewer Connection to Spencerville
- Typical Road Cross-Sections
- Stormwater Plan and Calculations

Aerial Photography Sourced from the LINZ Data Service and licensed by The Canterbury Aerial Imagery (CAI) consortium for re-use under the Creative Commons Attribution 3.0 New Zealand licence .

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

1. THIS PLAN HAS BEEN PREPARED TO SHOW PROPOSED EARTHWORKS FOR SUBDIVISION CONSENT PURPOSES AND ARE SUBJECT TO DETAILED DESIGN AND ENGINEERING APPROVAL. NO LIABILITY IS ACCEPTED IF THE PLAN IS USED FOR ANY OTHER PURPOSES.
2. ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.
3. ORIGIN OF LEVELS
   BM.3785
   (EHAY)
   RL=17.506m
   LOCATED ON THE INTERSECTION OF BELFAST ROAD AND MAIN NORTH ROAD.
4. LEVELS IN TERMS OF CHRISTCHURCH DRAINAGE DATUM JAN 2014 ISSUE.
5. METAL DEPTHS TO BE CONFIRMED OR INCREASED BY ENGINEER FOLLOWING CHECKING OF SUBGRADE CBR STRENGTH ONCE EXCAVATED.
6. ALL BERMS TO BE COVER WITH A MINIMUM OF 150mm SCREENED TOPSOIL GRASSED WITH CCC BERM MIX
7. EXISTING SERVICES HAVE BEEN DIGITISED FROM SERVICE AUTHORITY PLANS; COMPLETENESS AND ACCURACY ARE NOT GUARANTEED. ALL SERVICES TO BE FULLY SEARCHED & PILOTED PRIOR TO TRENCHING.
8. CLEARING TO INCLUDE REMOVAL OF ALL INTERNAL FENCING, ALL VEGETATION FROM LOTS, CLEARED AREA TO BE GRASSED AND FREE OF DEBRIS. ALL MATERIAL TO BE REMOVED FROM SITE.
9. CONTOUR INTERVAL: MAJOR 1m MINOR 0.2m
10. ALL EARTHFILL WORKS TO COMPLY WITH NZS 4431:1989 RELEVANT CERTIFICATION REQUIRED AS PROOF
11. IF PEAT OR OTHER UNSUITABLE MATERIAL IS LOCATED IN THE SUBGRADE THE ENGINEER IS TO BE CONTACTED FOR INSTRUCTION
12. ESCMP TO BE IN PLACE PRIOR TO ANY EARTHWORKS
13. CONTRACTOR MUST READ ALL DISCHARGE CONSENTS PRIOR TO ANY EARTHWORKS
14. DRAWINGS TO BE DISTRIBUTED AND READ AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

LEGEND :

ENGINEERING FILL
ENGINEERING CUT
FLOOD MANAGEMENT AND POND AREA
12.3m CONTOUR LINE
× 0.5 FILL DEPTHS

EXISTING SERVICES

PROPOSED SERVICES
SWALE

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JOB TITLE:
Whisper Creek Project

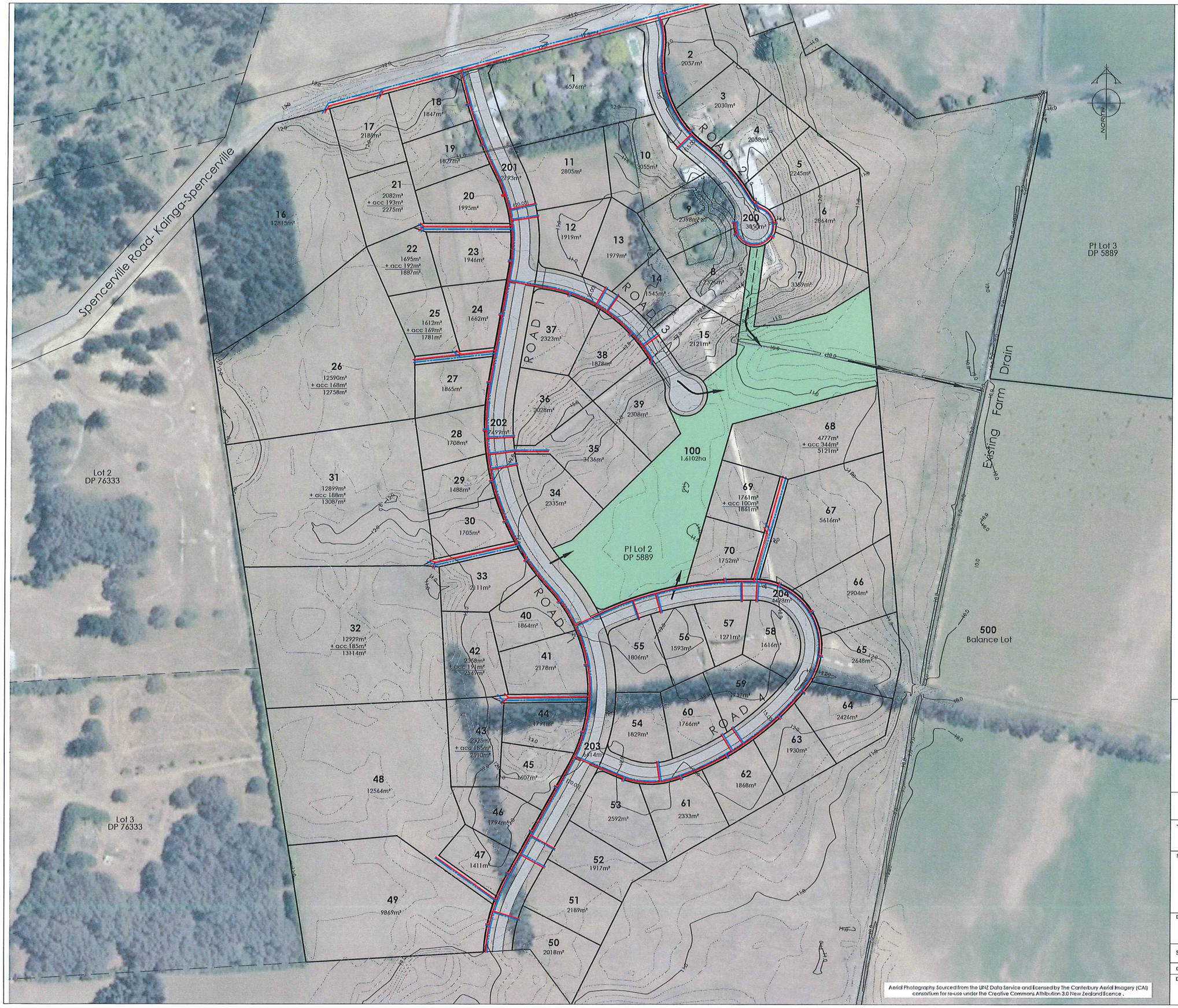
SHEET TITLE:
Earthworks Plan

DRAWING STATUS
For Consent Purposes

SCALE : 1:1250@A1 1:2500@A3
DATE : June 2018

CAD FILE : J:\19432\Eng\Drawings\E19432-E02.3_EARTHWORKS PLAN_R0.dwg
REVISION : R0

DRAWING No : E.19432
SHEET No: E02.3



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 to show Proposed Services for subdivision consent purposes only. No liability is accepted if the plan is used for any other purpose.
4. Contours have been produced from topographical data provided by others. No liability is accepted in relation to the accuracy of the topographical data.
5. Boundary information has been derived from Terraview.
6. This site is earthquake affected and there are likely to be changes in the final boundaries as a result . All boundaries are approximate only until the final land transfer survey is complete. No liability is accepted in relation to any changes to boundary dimensions and areas as a result of earthquake movement.
7. Levels are in terms of Christchurch Drainage Datum Jan 2014 Issue.
8. Contour Interval 0.20m
9. Origin of Levels
   BM 3785
   (EHAY)
   RL=17.506m
   Located on the intersection of Belfast Road and Main North Road.

Legend

- Overland Flow
- Swale
- Proposed Sewer
- Proposed Water

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JOB TITLE:
Whisper Creek Project

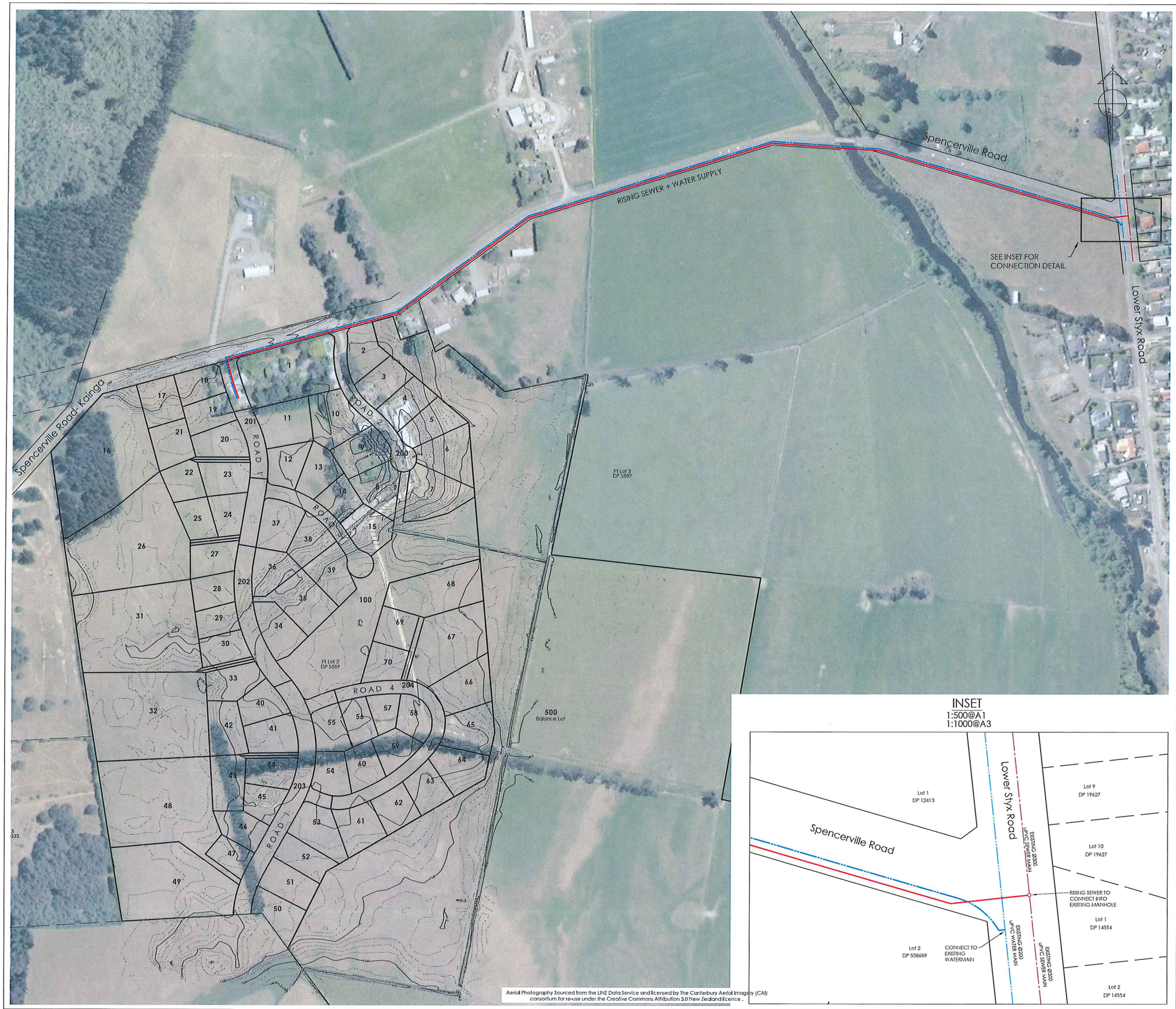
SHEET TITLE:
Services Concept

DRAWING STATUS
For Concent Purposes

SCALE : 1:1250@A1 1:2500@A3
DATE : January 2018

CAD FILE : J:\19432\E19432-Services concept.dwg

DRAWING No : **E.19432**
SHEET No: 1 OF 1
REVISION : **R0**



INSET
1:500@A1
1:1000@A3

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 to show the proposed connection to existing sewer & water for subdivision consent purposes only. No liability is accepted if the plan is used for any other purposes.
4. Contours have been produced from topographical data provided by others. No liability is accepted in relation to the accuracy of the topographical data.
5. Boundary information has been derived from Terraview.
6. Levels are in terms of Christchurch Drainage Datum Jan 2014 Issue.
7. Contour Interval 0.20m

Origin of Levels
BM 3785
(EHAY)
RL=17.506m
Located on the intersection of Belfast Road and Main North Road.

Legend

EXISTING SERVICES		PROPOSED SERVICES	
SANITARY SEWER	STD. MH	SANITARY SEWER	STD. MH
WATER		WATER	
		SWALE	

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JOB TITLE:
Whisper Creek Project

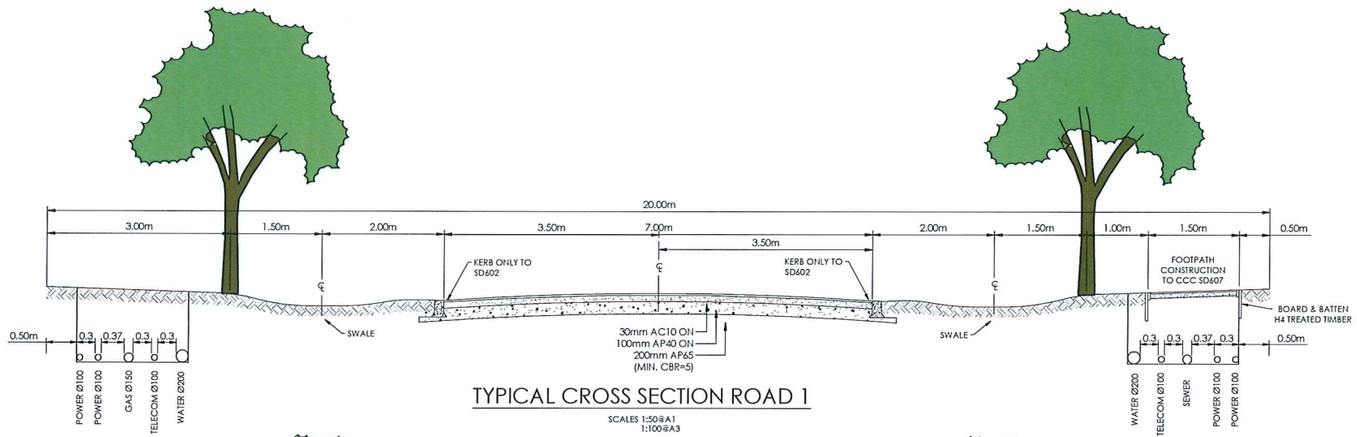
SHEET TITLE:
Proposed Sewer & Water

DRAWING STATUS
For Consent Purposes

SCALE : 1:2000@A1 1:4000@A3
DATE : January 2018

CAD FILE : J:\19432\E19432-Sewer+Water Concept.dwg
REVISION : R0

DRAWING No : E.19432
SHEET No: 1 OF 1



TYPICAL CROSS SECTION ROAD 1

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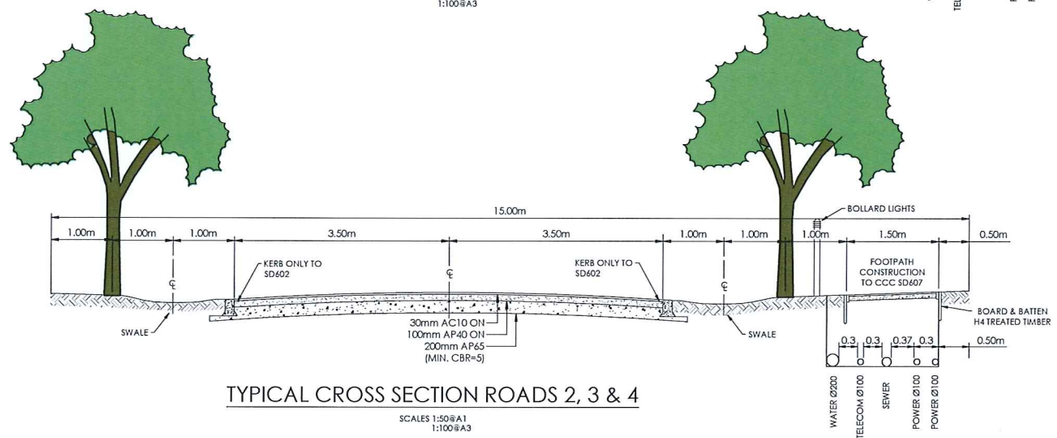

TYPICAL CROSS SECTION ROADS 2, 3 & 4

SCALES 1:50@A1
1:100@A3

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

1. THIS PLAN HAS BEEN PREPARED TO SHOW PROPOSED ROAD CROSS SECTIONS FOR SUBDIVISION CONSENT PURPOSES AND ARE SUBJECT TO DETAILED DESIGN AND ENGINEERING APPROVAL. NO LIABILITY IS ACCEPTED IF THE PLAN IS USED FOR ANY OTHER PURPOSES.
2. ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.
3. CARRIAGEWAY AND FOOTPATH ACCEPTANCE TESTING IN ACCORDANCE WITH CCC CSS PART 6 AND CCC IDS.
4. FOOTPATH BASECOURSE TESTING - MINIMUM CLEGG HAMMER VALUE OF 25 REQUIRED FOR FOOTPATHS & RESIDENTIAL CROSSINGS.
   - MINIMUM CLEGG HAMMER VALUE OF 35 REQUIRED FOR COMMERCIAL CROSSINGS.
5. KERB & CHANNEL BASECOURSE TESTING - MINIMUM DRY DENSITY OF 2100kg/m³ WITH 75% EQUAL OR EXCEEDING 2150kg/m³.
6. CUTDOWNS AT RESIDENTIAL PARKING AREAS TO HAVE 280mm OF CONCRETE AS PER SD611 AND CUT DOWN IN COMMERCIAL PARKING AREAS TO HAVE 280mm OF CONCRETE WITH REINFORCEMENT AS PER SD611.
7. ALL BERMS TO BE AND COVERED WITH A MINIMUM OF 150mm GRADE 1 TOPSOIL AND GRASSED WITH CCC BERM MIX
8. ELECTRICITY & TELECOM SERVICES NOT SHOWN. REFER TO ELECTRICAL & COMMUNICATION PLANS FOR DUCT LOCATIONS
9. ALL ROAD AND FOOTPATH AREAS TO BE SURFACED USING ASPHALTIC CONCRETE. FOOTPATHS TO BE CONSTRUCTED IN ACCORDANCE WITH CCC REQUIREMENTS WITH 20mm DEPTH AC, WHILE ROAD PAVEMENTS TO BE 30mm DEPTH.
10. METAL DEPTHS TO BE CONFIRMED OR INCREASED PRIOR TO COMMENCEMENT OF WORK FOLLOWING THE CHECKING OF SUBGRADE CBR ON SITE.
11. KERBS AT INTERSECTIONS HAVE A RADIUS OF 6.0m UNLESS SHOWN OTHERWISE.
12. ALL PAVEMENT CROSSFALLS ARE TO BE CONSTRUCTED IN ACCORDANCE SD639.
13. TACTILE PAVERS ARE TO BE INSTALLED AS PER SD623 AND RTS14 GUIDLINES FOR FACILITIES FOR THE BLIND AND VISION -IMPAIRED PEDESTRIANS.
14. ROAD BASECOURSE TESTING - MAXIMUM BENKELMAN BEAM DEFLECTION OF 2.00mm WITH 95% BELOW 1.6mm FOR _____ AND A MAXIMUM DEFLECTION OF 2.5mm WITH 95% BELOW 2.00mm FOR _____
15. ALL ROW AND DRIVEWAYS ARE TO HAVE 50mm DUCTS INSTALLED FOR COMMUNICATIONS AND POWER SUPPLY.

DAVIE LOVELL-SMITH
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JOB TITLE:

Whisper Creek Project

SHEET TITLE:

Roading Sections

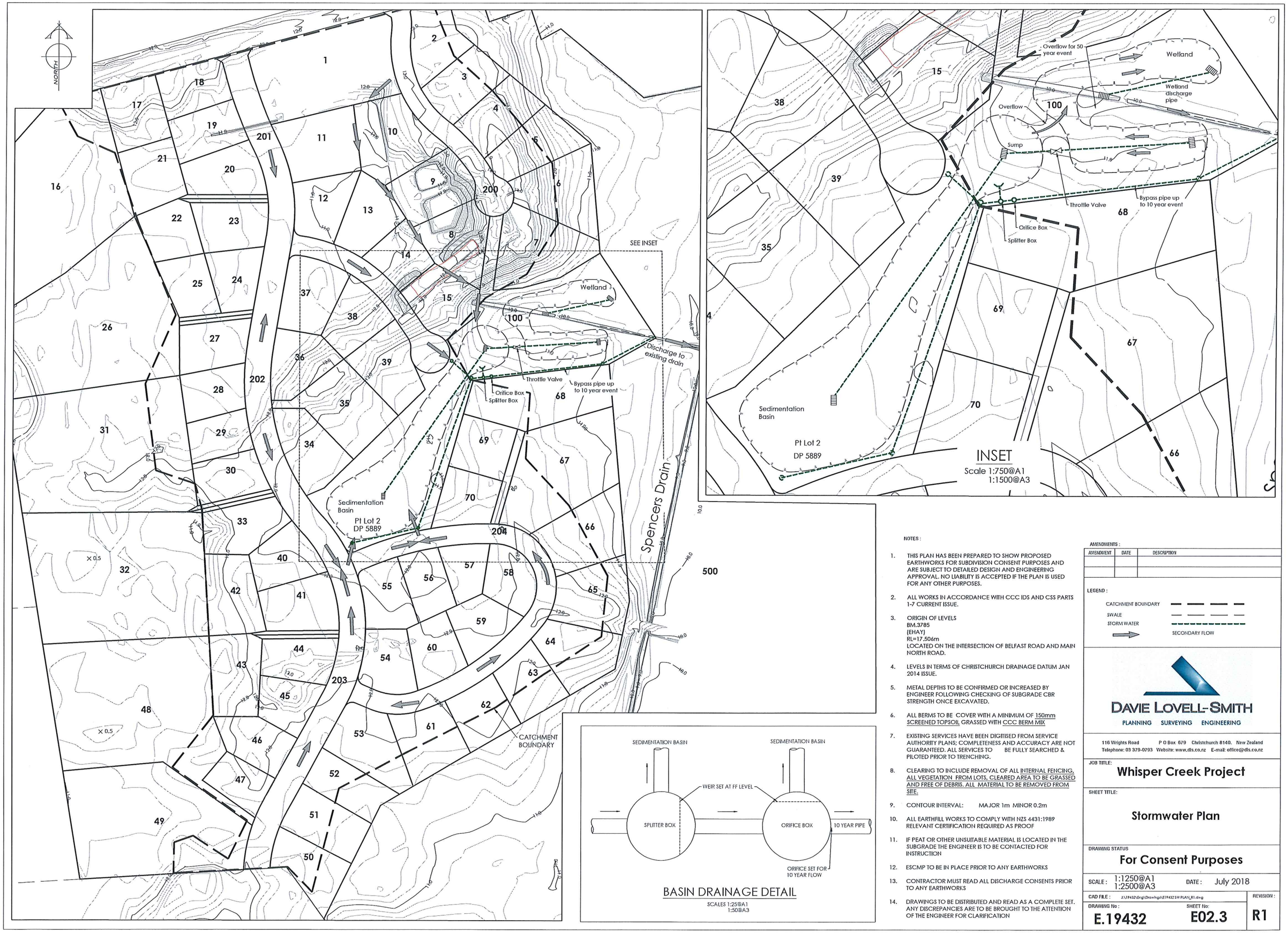
DRAWING STATUS

For Consent Purposes

SCALE : As Shown DATE : January 2018

CAD FILE : J:\19432\E19432_Cross Sections.dwg DRAWN : BW

DRAWING No : **E.19432** SHEET No: **E03.1** REVISION : **R0**



BASIN DRAINAGE DETAIL

SCALES 1:25@A1
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NOTES :

1. THIS PLAN HAS BEEN PREPARED TO SHOW PROPOSED EARTHWORKS FOR SUBDIVISION CONSENT PURPOSES AND ARE SUBJECT TO DETAILED DESIGN AND ENGINEERING APPROVAL. NO LIABILITY IS ACCEPTED IF THE PLAN IS USED FOR ANY OTHER PURPOSES.
2. ALL WORKS IN ACCORDANCE WITH CCC IDS AND CSS PARTS 1-7 CURRENT ISSUE.
3. ORIGIN OF LEVELS
   BM.3785
   (EHAY)
   RL=17.506m
   LOCATED ON THE INTERSECTION OF BELFAST ROAD AND MAIN NORTH ROAD.
4. LEVELS IN TERMS OF CHRISTCHURCH DRAINAGE DATUM JAN 2014 ISSUE.
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9. CONTOUR INTERVAL: MAJOR 1m MINOR 0.2m
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14. DRAWINGS TO BE DISTRIBUTED AND READ AS A COMPLETE SET. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

LEGEND :

- CATCHMENT BOUNDARY
- SWALE
- STORM WATER
- SECONDARY FLOW

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

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JOB TITLE:
Whisper Creek Project

SHEET TITLE:
Stormwater Plan

DRAWING STATUS
For Consent Purposes

SCALE : 1:1250@A1 1:2500@A3 DATE : July 2018

CAD FILE : J:\19432\Engn\Drawings\E19432SW PLAN_R1.dwg

REVISION : R1

DRAWING No : E.19432

SHEET No: E02.3

Whisper Creek Subdivision **19432**
Stormwater Calculations **AJEH**
21-Jun-18

First Flush Volume — Section 6.4.1 WWDG

Catchment Area	16.0772	ha	Refer to Catchment Plan
Cff	0.41		Table 6.10 WWDG
dff	25	mm	
Vff = 10 x Cff x dff x A			
Vff	**1647.913**	**m³**	

Mean Depth is to be 1m

Wetland Design — Section 6.7.2 WWDG

FF discharge flow over spread over 4 days	411.98	m³/day
t - hydraulic residence time	2	days
y - water depth	0.5	m
n - planting porosity	0.75	
Area of wetland As = Qt/yn	2197.22	m²
Initial discharge rate from FF to Wetland over four days	4.77	l/s

10% AEP 48hr flow

Any additional flows up to the 10% AEP are diverted around the system

By Rational method

C	0.42		Table 21.5 WWDG
i	2.5	mm/hr	
Q = CiA	46.89	l/s	
Less the wetland discharge	**42.12**	l/s	diverted flow

Storage Design

Storage up to the 2% AEP with a combined discharge from wetland and 10% storm

	Discharge Rate	46.89 l/s based on 10%AEP 48hr discharge		
C	Impervious Area	70 lots at 500m² each	35000	0.9
		Roading 1330m x 8.5m	11305	0.9
	Pervious area		114467	0.25
	Composite C		0.44	

This seems reasonable when the 2%AEP runoff C for L1 is 0.47

Storm Duration	*Intensity*	*Peak Flow*	*Storm Vol*	*Discharged Vol*	*Storage Reqd.*
D (min)	i (mm/hr)	Q (Tc) (l/s)	V (cu.m)	Ve (cu.m)	Vs (cu.m)
10	70.3	1372.63	823.58	28.14	795.44
15	57.4	1120.75	1008.68	42.20	966.48
20	49.6	968.46	1162.15	56.27	1105.88
30	40.5	790.78	1423.40	84.41	1338.99
45	33	644.34	1739.71	126.61	1613.10
60	28.6	558.42	2010.33	168.81	1841.52
90	23.3	454.94	2456.68	253.22	2203.46
120	20.2	394.41	2839.77	337.62	2502.15
240	14.2	277.26	3992.54	675.24	3317.30
360	11.6	226.49	4892.27	1012.86	3879.41
720	8.19	159.91	6908.22	2025.73	4882.50
1440	5.78	112.86	9750.80	4051.45	**5699.35**
4320	2.68	52.33	13563.40	12154.36	1409.04
5760	2.19	42.76	14778.03	16205.82	-1427.79

Volume to be stored	5699.35	m³
Storage in the FF	1647.91	m³
Storage in the wetland at 0.5m depth	1098.61	m³
Additional storage to be provided	2952.83	m³

This storage can be provided in the FF basin or an alternative basin.

Total Basin Storage	4600.74	m³

DAVIE LOVELL-SMITH

Calculation Sheet

Project No: 19432	Sheet No 1 of
Project Description: Whisper Creek	Computed: 26/6/18 by AJEH
Critical D for Drain	Checked: / / by

Whisper Creek Drain

SW Critical Flow

Ref Attached Plan of drain 3000m length

Ref Attached Open Channel Manning Calc

Grade = 1/6000

n = 0.03

v = 0.31 m/s

$T_C = T_f + T_E$

T_E = 10 min

T_f = 3000 / 0.31

= 9700 sec

= 2.69 hr

T_c = 2.86 hr = Critical D = 171.6 min

i = 16.9 mm/hr Ref WWDG for 170 min

Catchment Area = 16.07 ha

Predev C = 0.25

Postdev C = 0.44

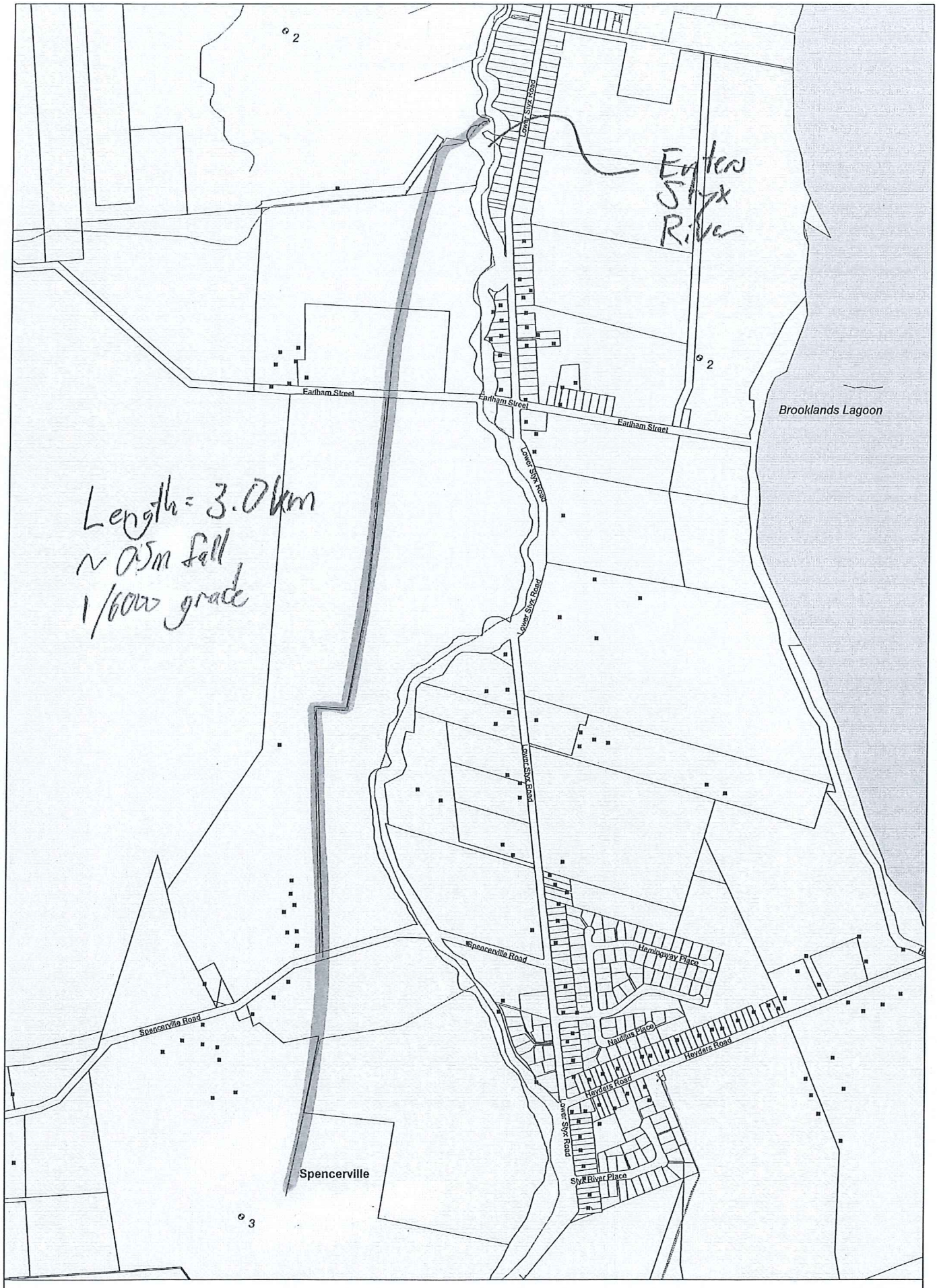
Diff C = 0.19

Q = CiA = 0.19 × 16.9/3600 × 160700

= 143 l/s added Flow

For 170 min = 1462 m^3 Storage

Easily within Proposed Storage



0 200 400 600 800 1000 1200 1400 1600m

QuickMap
Custom Software Ltd

Any person wishing to rely on the information shown on this map must independently verify the information

Scale 1:12500 Topographical and Cadastral map derived from LINZ data. Printed: 26/06/2018 08:04.

Open Channel Flow	
Trapezoid Channel	
Distance	0
Mannings n	0.03
Bottom width	2
Depth	1
Side Slope (1/?)	1
Channel slope	0.000167
Area	3.000
Wetted Perimeter	4.828
Hydraulic Radius	0.621
Flow (Mannings)	0.94
Velocity (mannings	0.31
vel grad	0.00001

Soil Contamination Risk
Stage 2 – Detailed Investigation Report &
Stage 3 - Remediation Action Plan

240 Spencerville Road,
Spencerville,
Christchurch

May 2018

Malloch Environmental Ltd

801 East Maddisons Road, Rolleston 7614

021 132 0321

www.mallochenviro.co.nz

Asbestos Surveys • Soil Contamination Investigations • Environmental Planning

CONTENTS

Appendices

1 Executive Summary

The subject site involves a part of a single lot on Spencerville Road in Christchurch. It is proposed to subdivide the site for residential use. This will change the use of the land and result in disturbance of soils. The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Health) Regulations 2011 (NESCS) require an assessment of the likelihood of soil contamination being present. It is noted also that Malloch Environmental Ltd is obligated to consider the requirements of Section 10 (4) of the Health and Safety at Work (Asbestos) Regulations 2016. This report details the work undertaken to assess the risks.

A Preliminary Site Investigation by Tonkin & Taylor Ltd in December 2017 found evidence of HAIL activities that may have occurred now or in the past. Animal pens that could indicate a sheep dip were noted on aerial photographs at a time the site was used for sheep farming. A site walkover identified two fuel dispensing pumps with potential associated supply tanks, and surficial piles of waste. Observed wastes included tyres, scrap metal, wood, soil/rubble, empty tins and drums, plastic sheeting and covers. No potential asbestos containing materials were identified. The report recommended that a detailed investigation be undertaken on the areas of concern to determine whether any soil contamination has occurred.

Additionally, Malloch Environmental Ltd identified two additional risks. These include existing buildings were noted on the 1940-44 aerial photograph posing a risk of soil contamination from the use of lead based paints, and a small area to the south of the houses in the 1955 aerial appeared to be a potential farm rubbish pit.

Malloch Environmental Ltd were engaged to carry out the Detailed Site Investigation of the site. The investigations have shown lead contamination exists around one of the dwellings on the site, with lead levels above 'residential 10% produce' guideline values. Two fuel tanks are present within the farm work yard and will need to be removed prior to develop of the site, with the proposed road passing through this area. The soils around one of these tanks has been shown to be contaminated with petroleum hydrocarbons and lead, and there is high potential for soil around and under the tanks to be contaminated. There is considered to be a moderate to high risk to human health if these areas were to be used for residential use, and during construction if not manged appropriately. The full extent of any petroleum contamination will not be known until the tanks are removed. It is proposed to remediate both the lead and petroleum contaminated areas by excavating and disposing of the affected soils to an appropriate facility. Full validation of the contaminated areas will need to be carried out and a validation report should be provided to the authorities.

In terms of planning status at the time of writing of this report, the NESCS does apply and a resource consent under the NESCS is required.

2 Objectives of the Investigation

This report has been prepared in accordance with the Ministry for the Environment's "Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand". This report includes all requirements for a Stage 2 Detailed Site Investigation Report and a Stage 3 Remediation Action Plan.

The objectives include determining whether there is any soil contamination present that would pose a risk to human health and providing solutions to ensure the ongoing protection of human health from the contaminants found.

3 Scope of Work Undertaken

The scope of the work undertaken has included:

- Summary of the Tonkin & Taylor Ltd PSI Report Dated December 2017
- On site soil sampling and lab testing
- Analysis of results in accordance with MfE Guidelines
- Recommendations for remediation
- Preparation of report in accordance with MfE guidelines

4 Site Identification

The site is located at 240 Spencerville Road, Christchurch as shown on the plan in **Figure 1** below. The site is part of the land parcel Part Lot 2 DP 5889 and has a total area of approximately 25ha.

Figure 1 – Location Plan

5 Site Description

The subject site is generally flat rural residential land on Spencerville Road. There are two dwellings and numerous farm buildings on the north of the subject site. The remainder of the site is open pasture. The subject site is partially defined by existing hedges and fences. It is bounded by Spencerville Road to the north and rural farming lots to the west, east and south. It is located approximately 12km north-east of Christchurch central business district.

6 Geology and Hydrology

The ECan GIS describes the soils as Waikuku deep sandy loam with a strip of Taitapu deep silty loam along the eastern boundary. Wells in the area indicate that topsoils are underlain by layers of sand, sand and clay, and sandy gravels and shells. Soil trace elements are 'Regional, Yellow Brown Sand' for most of the site with a strip of 'Regional, Gley' along the eastern boundary.

The site lies over the coastal confined gravel aquifer system. Ground water levels recorded on nearby bore logs are between 0.2 and 6.34m deep. The direction of ground water flow is generally in an easterly direction. The nearest down gradient well is approximately 250m to the south-east.

ECan GIS indicates there is an open drain running east to west across the middle of the subject site. The Styx River is approximately 370m south-east of the subject site.

7 Summary of Tonkin and Taylor PSI

A Preliminary Site Investigation (PSI) was produced for the site by Tonkin & Taylor Ltd in December 2017, and titled 'Preliminary Site Investigation (for subdivision), Proposed Whisper Creek Subdivision' Job number 1004525'. The PSI conclusion states the following:

"Available information indicates that the site was initially used for sheep farming, before converting to dairy in the 1970's. The site is to be subdivided for future low-density residential development. The proposed subdivision covers an area currently occupied by residential properties, disused farm buildings and open pasture.

There is little information available regarding the specific activities undertaken at the site, though the following potential contamination sources/HAIL activities have been inferred form observations made during a site walkover inspection and on a review of historical aerial photographs:

- *Two disused fuel pumps are located within the farm building complex. It is not known whether fuel was actually stored on the site, but farms commonly have a private fuel supply and so the potential cannot be discounted. In addition, drums of what is suspected to be used oil were located in numerous locations around the farm buildings, and which could be associated with localised soil contamination;*
- *It is possible that the use of inorganic/organic pesticides may have been used to treat sheep in the north eastern corner of the site; and*
- *Waste material (including machine parts, containers, wood, soil and rubble) have been disposed on the ground at the site. Localised soil contamination may be associated with leachate/spillage in these areas."*

The PSI recommended a Detailed Site Investigation of the areas of concern. For further detail it is recommended that the Tonkin and Taylor Report be read in its entirety in conjunction with this current report. Due to its size it has not been attached to this report, but a copy can be requested directly from Malloch Environmental Ltd or ECan.

8 Additional Risks Identified and Site Update

On being asked to carry out the Detailed Site Investigation, Malloch Environmental Ltd identified two additional risks. It was noted that there were existing buildings on the 1940-44 aerial photograph and these were considered to pose a high risk of soil contamination from the use of lead based paints. In the 1955 aerial there was a small area to the south of the houses which had the appearance of a potential farm rubbish pit.

On visiting the site, it was apparent that most of the waste materials mentioned in the T and T Report had been removed, along with a surficial site scrape in some areas. In these areas, very tall weed growth was present, and the soils had the appearance of having been scraped. Other than in the end of the sileage pit, there were no visible waste materials. The only evidence of potential waste remains was next to the farm track before the sileage pit, where some of the soil had a darker appearance with possibly some ash entrained in it.

9 Basis for Soil Guideline Values (SGV)

9.1 Activity Description

This report has been written for the following potential activities:

- Subdivision and development of the site for residential use,
- Soil disturbance activities associated with the above use and development of the site

9.2 Zoning

The subject site is currently zoned ‘Specific Purpose (Golf Resort)’.

9.3 Soil Guideline Values

Human health soil contaminant standards for a group of 12 priority contaminants were derived under a set of five land-use scenarios, and are legally binding under The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Health) Regulations 2011 (NES). These standards have been applied where applicable. For contaminants other than the 12 priority contaminants, the hierarchy as set out in the Ministry for the Environment Contaminated Land Management Guidelines No 2 has been followed. For soil, guideline values are predominantly risk based, in that they are typically derived using designated exposure scenarios that relate to different land uses. For each exposure scenario, selected pathways of exposure are used to derive guideline values. These pathways typically include soil ingestion, inhalation and dermal adsorption. The guideline values for the appropriate land use scenario relate to the most critical pathway.

With the special zoning for a golf resort use, the standard land use scenarios may not be directly applicable. A resort type use does not generally mean that high levels of produce consumption occur despite the subdivision being described as a low-density residential use. For this reason, it is considered the most suitable land-use scenarios applicable for this site would be ‘residential 10% produce’ and ‘commercial/industrial/outdoor maintenance workers’ as a proxy for construction workers disturbing soils.

10 Sampling and Analysis Plan and Sampling Methodology

A judgemental sampling methodology was used to identify any contamination within the identified risk areas as follows:

1. **Buildings seen in 1940/50's aerials**

   This included the existing weatherboard house and a former barn like structure near the north western corner, for which lead paint was considered to be risk. Four locations were XRF tested and sampled in the location of the large barn noted in the 1955-1959 aerial. Locations B1 and B2 were tested and sampled at the surface and at 200-250mm depth. Locations B3 and B4 were tested and sampled at 100mm depth. One sample was sent to Hill Laboratories for heavy metal analysis.

   Surface soils around the eastern weatherboard dwelling were XRF tested and sampled in five sample locations at 0-50mm depth. H1, H2, H4 and H5 were approximately 0.5m from the dwelling. H3 was 4m from the dwelling. The paint on the building is in a deteriorated, flaking state. Paint flakes were visually obvious in the soils close to the building. A disused, rusty aboveground diesel tank was located at H5. Three samples were sent to Hill Laboratories for heavy metal analysis. The sample from H5 was also analysed for PAHs.

   The garages between the dwelling and the farm yard area are constructed mainly with galvanised iron, plywood and concrete floors. A single small piece of cement board sheet was used as a patch on one wall, but was not in a deteriorated condition. An XRF test on the paint of this shed showed lead paint had not been used on these buildings. Further sampling around these buildings was deemed unnecessary.

2. **Potential Farm pit**

   Location P1 was placed within a possible farm pit that was seen on the 1955 aerial. The location was XRF tested and sampled at 50mm depth. Further digging to 900mm found only clean looking sand with no fill or rubbish found.

3. **Fuel pump/tanks and surrounding sheds**

   Sample locations Y1-5 were placed around and within a farm shed with a dirt floor, adjacent to the diesel pump. Y4 was placed next to a diesel fuel dispensing pump. The soil surface was difficult to access and see with hand tools due to timber and metal pieces on the surface with thick matted vegetation grown over. A vent behind the pump suggests there is also an underground storage tank (UST) at this location. Y1-5 were XRF tested and sampled at the surface.

   Y6 was placed within the nearby shed containing oil drums adjacent to the disused kerosene pump. Pipes within this shed indicate the UST feeding the pump is located under the shed. Y7 was placed next to the kerosene pump. Y6 and Y7 were sampled at the surface. Soils in the immediate area of the small shed and pump were visually oily and stained and had a strong petroleum odour. Approximately 1m beyond the shed and pump the soils did not have any visually affected or odorous impacted soils.

   Three samples were analysed for PAHs. Two samples (Y6.1 and Y7.1) were analysed for Total Petroleum Hydrocarbons (TPHs). A selection of samples were analysed for heavy metals based on XRF results.

4. **Potential sheep dip area**

   GPS co-ordinates of the former pen corners were used to locate the risk area on site. Sample locations Y8-Y10 were placed in the vicinity of the possible sheep dip. Sample Y12 is on the corner of a shed seen in the 1965 aerial. Y8-12 were XRF tested and sampled at 50-100mm depths. Y8-10 were also XRF tested at 250mm depth. A selection of samples were analysed for heavy metals based on XRF results. Two composite samples were analysed for OCP.

5. **Waste to Land**

   Samples S1-S5 were placed in locations where rubbish was thought to have existed based on the T and T Report and visual evidence. It is noted that the site has had a clean-up prior to Malloch Environmental Ltd being engaged. Samples were taken beside the farm track, around the silage storage area and beside the haybarn. The soil was XRF tested and sampled at 50mm depth. Three samples were sent to Hill Laboratories for heavy metal analysis including a duplicate. One sample, S1.1, was also analysed for PAHs.

   D1 and D2 were placed at the downstream end of the dairy buildings where the concrete floor wash down waste may have drained out to. Within the buildings, the floors were all concrete. The soils were XRF tested and sampled at 50mm depth. Both samples were sent to Hill Laboratories for heavy metal analysis. A composite sample was analysed for OCPs.

As it was proposed to use the XRF for the majority of heavy metal testing and the device reads 23 metals, the contaminants to focus on were narrowed down to those likely to be present based on the risk profile and the limitations of the XRF. It is noted that the XRF is not suitable for measuring cadmium with the limit of detection being higher than the residential SGV. As cadmium is primarily associated with fertiliser storage or industrial processes it was considered unlikely to be a significant contaminant of concern, however was included in the standard laboratory metal suite tested. The results from the XRF for arsenic, chromium, copper, lead, nickel and zinc were all analysed in detail, and only reported where above the limit of detection. For each sample location and depth, three XRF tests were performed over an approximate 100cm^2 area.

See **Appendix A** for the sample location plan.

11 Field Quality Assurance and Quality Control

The Contaminated Land Management Guidelines No 5, Ministry for the Environment was followed for all aspects of the investigation. Field quality control and decontamination procedures were followed. Samples were taken using a stainless steel trowel or fresh disposable nitrile gloves. All equipment was decontaminated between samples using Decon 90 and rinsed with tap water.

Samples were collected in laboratory supplied containers and immediately placed in chilled bins. Following sampling, the samples were delivered to Hill Laboratory under chain-of-custody documentation.

12 Laboratory Quality Assurance and Quality Control

All laboratory tested samples were submitted to Hill Laboratories in Christchurch for analysis. Hill Laboratories hold IANZ accreditation. As part of holding accreditation the laboratory follows appropriate testing and quality control procedures. No quality control issues were identified.

13 XRF Quality Assurance Measures

The XRF used was a Thermo Scientific Niton XL2 GOLDD. The manufacturer's instructions were followed in the use of the device. Calibration samples were tested prior to each day's testing and compared with the manufacturers specifications, and silicon blank readings were taken approximately every 20 samples to ensure there was no contamination of the XRF window.

The US EPA Method 6200 - Field Portable X-ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment (2007) was used as guidance for the use of the XRF and quality assurance measures. This method recommends that 5% of XRF tests should be verified through lab testing. Approximately 38% of the samples were laboratory tested for seven heavy metals.

It was not possible to perform a regression analysis on the arsenic XRF readings and laboratory results due to the high number of readings below the XRF limit of detection. Any locations with XRF readings above the residential SGV of 20 mg/kg have also been laboratory tested and no results exceeded the residential SGV.

A regression analysis was performed on the lead XRF readings and laboratory results to determine a statistical R^2 error result. However, the resulting R^2 value was below the minimum acceptable value of 0.70. This is likely due to the visible lead paint chips causing outlier results. All the locations with XRF readings above the residential SGV were also laboratory tested to confirm the level of exceedance. For those locations not laboratory tested, approximately 80% of the readings were below the XRF limit of detection. The highest XRF reading for lead which was not lab tested, was 51.4mg/kg, which is less than a quarter of the residential SGV. It is considered appropriate to accept that lead concentrations in the locations not laboratory tested but with low XRF readings do not exceed the residential SGV.

14 Results Analysis and Summary

14.1 Eastern Dwelling

The XRF and laboratory results showed lead contamination above the residential soil guideline value (SGV) around the eastern dwelling. The highest lead result was taken from H2.1 with a laboratory result of 7,300mg/kg. This extremely high result indicates the analysed sample likely contained a paint flake. The likely range of lead levels in the soil is approximately 250-2,000mg/kg, with the paint flakes contributing higher lead levels. The contamination is likely to extend to approximately 2-3m from the dwelling and to a depth of 200-300mm.

Zinc exceeded the ecological guideline value at H2, H4 and H5. The nearest ecological feature is the open drain approximately 200m south of the dwelling so this isn't considered to pose a risk. Levels of arsenic, cadmium, chromium and copper were above expected background levels around the dwelling.

The PAH analysis of sample H5.1 detected traces of all but one of the compounds included in the test suite but all were well below the residential SGV. The Benzo[a]pyrene equivalent (BaP) concentration was below the expected background level. This background level has been calculated for Christchurch Urban soils but is an indicator that this concentration is at a very low level.

14.2 Farm work yard area

The XRF and laboratory results showed lead contamination above the residential soil guideline value (SGV) at locations Y1 and Y6. The arsenic concentration at Y1 matched the residential soil guideline value and exceeds the ecological guideline value. Zinc concentrations exceed the ecological guideline value at five of the yard locations. Concentrations of arsenic, cadmium, chromium, copper and lead are above expected background levels across the yard area.

Only one of the composite samples analysed for OCPs returned any compounds above the limit of detection. Composite Y11.1 & Y12.1 contained a trace of 4,4'-DDE but the Total DDT Isomers result for the sample was well below the adjusted residential guideline value.

The four samples and one composite analysed for PAHs detected traces of some compounds but all well below residential guideline values. BaP was below the limit of detection for four of the samples and well below the indicative background level for the fifth. Samples Y6.1 and Y7.1 from close to the kerosene pump were analysed for TPH. The results did not exceed the residential guideline value but the high concentration of the heavier fractions indicates that there is a separate residual phase within the soil which should be remediated.

14.3 Rest of site

None of the samples taken from the rest of the site: the demolished barn area (B1-4), the possible farm pit (P1), the areas with stored rubbish (S1-5) or the dairy (D1-2) returned any XRF or laboratory results that exceeded the residential 10% soil guideline values.

Zinc exceeded the ecological guideline value at S3 but as there are no ecological features near this location this isn't considered to pose a risk. Heavy metal concentrations were above expected background levels at S1 and S3. Arsenic was above the expected background value at D1 and D2. Cadmium was above the expected background level at D1 and zinc at D2.

The PAH results from S1.1 and the OCP results from the composite sample of D1 and D2 showed no compounds above the laboratory limits of detection.

A table of XRF and laboratory results is shown in **Appendix B**. Copies of the Laboratory Reports are included in **Appendix C**.

15 Site Characterisation and Recommendations

Sampling has indicated no soil contamination above residential soil guideline values is present in the area of the demolished barn, the possible small farm pit, where rubbish had been stored or around the dairy buildings.

Sampling has shown lead contaminated soils are present around the eastern dwelling. The contamination is likely to extend to approximately 2-3m from the dwelling and to a depth of 200-300mm. The area of contaminated soil around the house is approximately 300-400m^2.

The fuel tanks supplying the two dispensing pumps in the yard area appear to still be present. There is evidence of lead contamination above the residential guideline value at two sample locations within the yard. The soil within the shed next to the kerosene pump is contaminated with petroleum hydrocarbons below the guideline value but is an obvious aesthetic contaminant. The full extent of the contaminated soils will not be known until the tanks are removed.

The following conceptual site model addresses the risks associated with the identified contaminants:

Conceptual Site Model				
Source	***Pathways***		***Receptor***	***Risk Assessment***
Approximately 300-400m^2 of lead contaminated soils around the dwelling. Lead levels range from 250-7,300 mg/kg.	**Human**	Dermal contact, ingestion and inhalation	Future site occupiers / land users	Moderate to high risk to human health in a residential use.
			Workers involved in soil disturbance at the site	Low to moderate risk to human health. The surficial paint flakes may pose a risk to any workers cleaning up the soils as the levels are above the commercial / outdoor worker SGV of 3300mg/kg for lead.
	Ecological	Infiltration through soils to groundwater	Groundwater is assumed to be 0.2-6.34m deep at the site	Low to moderate risk - heavy metals bind well to the soils and are likely to be limited to the top 300mm of original soil however this is within the range of groundwater depths indicated for the area.
		Surface runoff to waterways	Surface water ecology	Low risk as no adjacent surface waterways
Heavy fraction fuel contamination and minor lead contamination around fuel tanks	**Human**	Dermal contact, ingestion and inhalation	Future site occupiers / land users	Moderate to high risk to human health in a residential use with no remediation or management
			Workers involved in soil disturbance at the site	Low to moderate risk to human health. Although measured levels of contaminant are below the commercial / outdoor worker SGVs, removing the tanks may expose higher contaminant levels.
	Ecological	Infiltration through soils to groundwater	Groundwater is assumed to be 0.2-6.34m deep at the site	Moderate risk - there is the potential for any leaks from the fuel tanks to have infiltrated through the soils to groundwater.
		Surface runoff to waterways	Surface water ecology	Low risk as no adjacent surface waterways

It is recommended that the lead contaminated soils around the dwelling be remediated prior to development of the site. In the yard area, it is recommended that the fuel tanks be removed, followed by remediation of the soils under and around the tanks including the area around Y1.

As this general area is part of a proposed road, there is likely to be soil excavation required. With many contaminants above background concentrations, disposal to an approved waste facility of excess soils will be required.

1 Remedial Actions

1.1 Remedial Options and Discussion

Given the relatively small volumes of soil affected, the high lead levels around the house and the need to excavate areas by the fuel tanks for roading purposes, the recommended remediation option for the site is excavation and disposal to an approved off site facility of the contaminated soils. The removal of the fuel tanks would be required to be carried out before any other works in the area of the tanks.

1.2 Remediation Goals

- Remove the two fuel tanks from the site
- Ensure any petroleum hydrocarbon contaminated soils are removed from around and below the tanks
- Remove the lead affected soils from around the existing dwelling
- Ensure that the remaining soils within the remediated areas have lead levels below the residential SGV of 210 mg/kg.
- Ensure that any excess soils removed off-site are disposed of to an approved facility

1.3 Proposed Methodology

Prior to remediation of the soils around the dwelling, the flaking lead-based paint present on the building will need to be removed. This is to be carried out in an approved manner to ensure the health and safety of the workers and to prevent further soil contamination. The soil can be protected by the use of plastic drop sheets to catch paint. A guidance document by the Ministry of Health, “Guidance for the Management of Lead Based Paint’ can be found on the Worksafe website.

The area surrounding the dwelling should then be remediated by removing initially the top 200mm of soil up to 2-3m out from the building. A portable XRF should then be used to highlight any areas still over the residential SGV. Further layers will then be removed as required. The excavated soils will need to be XRF tested prior to disposal to determine an appropriate disposal facility. Following excavation and mixing it is considered likely that the soils will meet the acceptance criteria for Burwood landfill of 880mg/kg of lead.

The fuel tanks, which appear to be still existing, are to be removed and any contaminated soils around or below them, by following the procedure included in **section 1.4** below. Soil disposal options include the Texco petroleum remediation farm, Kate Valley Landfill, or potentially Burwood Landfill if suitably mixed.

The current development plan has a road through part of the area near the fuel tanks and farm shed. This includes near location Y1.1 with elevated lead. The road excavations will effectively remediate the exceedence of lead at and around Y1.1. It is noted that the soils in this general area have multiple heavy metals exceeding background concentrations, so any soils excavated from this area for road purposes will not qualify for disposal to clean fill. It is recommended that

any soils excavated from within the yellow outlined area on the attached plan should be disposed of at Burwood landfill.

1.4 Underground Storage Tank Removal

When the USTs and associated pipework are to be removed, the following is to occur:

- Prior to any removal work notify Christchurch City Council in accordance with the NESCS Regulation 8 (1) b and ECan in accordance with Land and Water Regional Plan Rule 5.183
- Fence off the tank area from other site works as required
- Engage an appropriately licensed specialist contractor to remove the fuel tanks
- Check whether the fuel has been drained and ensure complete removal of fuel if still present
- Remove tank in accordance with the EPA code of practice – "Below Ground Stationary Container Systems for Petroleum - Operation - HSNOCOP 45"
- Remove any obviously contaminated soils from under and around the tank with disposal location to be confirmed by a SQEP prior to any soils leaving the site
- Engage a SQEP to carry out validation sampling and testing of soils in accordance with Contaminated Land Management Guidelines.
- Fill in the excavation with appropriate material following successful validation

1.5 Regulatory Requirements

Resource consent is required in terms of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations. This consent is required to be in place prior to disturbing the soil.

1.6 Affected Volumes

The depth of contaminated soils under the fuel tanks will not be known until the tanks are removed, however are estimated to be in the order of 5-10 cubic metres per tank. The estimated volume of lead contaminated soils from around the dwelling is 100 to 150 cubic metres. The volume of soils to be excavated for road purposes that will not meet clean fill criteria is unknown.

1.7 Unexpected Contaminated Material

During the excavation works, if any other hazardous material is encountered in significant volumes that pose a threat to the health of workers on site, all works will cease until the hazardous material has been assessed in accordance with MfE guidelines by a Suitably Qualified and Experienced Person (SQEP).

Signs that would indicate further assessment is required include visually discoloured soils, olfactory evidence of hydrocarbons or other potential contaminants, potential asbestos containing materials, oily greasy soils, or significant rubbish items.

1.8 Contact Details During Remediation

Environmental Consultant (SQEP):
Nicola Peacock, Malloch Environmental Ltd, ph 021 132 0321

2 Site Remediation Management Plan

2.1 Site Setup

Prior to any works commencing the following should be in place on site:

- Contaminated areas should be clearly identified with site entry and exits planned before works commence.
- Appropriate washing facilities should be put in place to clean any equipment exposed to contaminated soils
- Hand washing facility must be available for all workers, in the immediate area of the work site
- Remediation should be planned in advance to ensure it occurs in a staged approach/ methodical manner to ensure that vehicles do no track contaminated soils onto clean areas
- A complete copy of this Detailed Site Investigation Report and Remediation Action Plan should be provided to the contractor prior to any works commencing

2.2 Stormwater and Soil Management

Remediation work will not take place during heavy rain or high wind. If rainfall occurs and tracking of wet contaminated soils to other parts of the site becomes a risk, work will cease.

Appropriate erosion and sediment control mitigation measures should be put in place to ensure no stormwater runoff of contaminated soils occurs beyond the work area.

2.3 Dust Control

Water will be available at the site and if required will be used to keep the dust emissions to an acceptable level to protect human health.

All vehicles transporting soils off-site are to use tarpaulins to prevent dust emissions if required.

2.4 Occupational Safety and Health Issues and Measures

The contractor shall prepare a site specific Health and Safety Plan covering all relevant matters and all workers will be inducted prior to site remediation works beginning. As a minimum the following matters will need to be included:

- Appropriate personal protection gear which should include as a minimum: head to toe clothing, the use of gloves for any worker handling soil, hard hats and hi-vis vests
- Appropriate hand washing measures to prevent ingestion of contaminated soil particles

3 Validation Sampling

For the dwelling area, the use of a portable XRF during the remediation will be used to delineate and validate that the remaining in-situ soils are below the residential SGV for lead. When the remediation is complete, laboratory sampling will be undertaken to confirm the XRF results.

At the fuel tank locations, soil samples will be taken in accordance with the MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.

For the area where the road excavation will occur, validation of the excavation with an XRF is considered to be sufficient due to the minimal contaminant concentrations and area then being capped with road surface.

Where validation sampling reveals remaining contaminated soils, further remediation works shall be carried out in a similar manner as detailed above. A Validation Report will be produced and provided to Christchurch City Council and ECan.

4 Conclusion

The investigations have shown lead contamination exists around one of the dwellings on the site, with lead levels above 'residential 10% produce' guideline values. Two fuel tanks are present within the farm work yard and will need to be removed prior to develop of the site, with the proposed road passing through this area. The soils around one of these tanks has been shown to be contaminated with petroleum hydrocarbons and lead, and there is high potential for soil around and under the tanks to be contaminated. There is considered to be a moderate to high risk to human health if these areas were to be used for residential use, and during construction if not manged appropriately. The full extent of any petroleum contamination will not be known until the tanks are removed.

It is proposed to remediate both the lead and petroleum contaminated areas by excavating and disposing of the affected soils to an appropriate facility. Full validation of the contaminated areas will need to be carried out and a validation report should be provided to the authorities.

5 Limitations

Malloch Environmental Limited has performed services for this project in accordance with current professional standards for environmental site assessments, and in terms of the client's financial and technical brief for the work. Any reliance on this report by other parties shall be at such party's own risk. It does not purport to completely describe all the site characteristics and properties. Where data is supplied by the client or any third party, it has been assumed that the information is correct, unless otherwise stated. Malloch Environmental Limited accepts no responsibility for errors or omissions in the information provided. Should further information become available regarding the conditions at the site, Malloch Environmental Limited reserves the right to review the report in the context of the additional information.

Opinions and judgments expressed in this report are based on an understanding and interpretation of regulatory standards at the time of writing and should not be construed as legal opinions. As regulatory standards are constantly changing, conclusions and recommendations considered to be acceptable at the time of writing, may in the future become subject to different regulatory standards which cause them to become unacceptable. This may require further assessment and/or remediation of the site to be suitable for the existing or proposed land use activities. There is no investigation that is thorough enough to preclude the presence of materials at the site that presently or in the future may be considered hazardous.

This report does not attempt to describe all risks or possible outcomes resulting from carrying out remediation works. Any party carrying out remediation works shall be responsible for all such works, including implementing all health and safety precautions as appropriate. Malloch Environmental Limited disclaims all liability whatsoever for any loss or damages, if any, suffered by any party as a result of any remediation works undertaken.

Report co-written by:

Frances Hobkirk
Environmental Scientist

Report co-written, reviewed and certified by a suitably qualified and experienced practitioner as prescribed under the NES (soil):

Nicola Peacock, CEnvP
Principal Environmental Engineer

Appendix A – Sample Location Plan

Kerosene Tank

Diesel Tank

H3 • H2 • H1 • H4 • H5

Y7 • Y6 • Y5 • Y1 • Y2 • Y3 • Y4

• Y10 • Y12 • Y9 • Y8 • Y11

• B2 • B4 • B3 • B1

• D2 • D1

• SS5 • SS4 • SS1 • SS2 • SS3

• P1

0 10 20 30 40 50m

N

LEGEND

- • SS1 — Soil sample location
- • SS1 — Soil sample location XRF and laboratory tested
- SS1 — Soil sample location that exceeds the residential SGV for lead
- Y6 — Soil sample location that exceeds the residential SGV for lead and TPH
- Approximate extent of area around dwelling requiring remediation
- Approximate area within proposed road alignment where soil is likely to not qualify for disposal to clean fill.

Notes:

1. This plan has been prepared for soil contamination risk assessment purposes only. No liability is accepted if the plan is used for any other purposes.
2. Any measurements taken from this plan which are not dimensioned on the electronic copy are at the risk of the user.
3. Soil sample locations are approximate only.

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Sample Location Plan

240 Spencerville Road, Spencerville, Christchurch

Scale: NTS

Date: 27 April 2018

Drawing No: 01299/1

Appendix B – Table of XRF and Laboratory Results

Table of Laboratory Results - 240 Spencerville Road

Date of testing: 26th March 2018

Analyte	Sample Name:	B3.1	H2.1	H4.1	H5.1	Y1.1	Y2.1	Y3.1	Y4.1	Soil Guideline Values					
Soil Results	Lab Number:	1952505.4	1952505.8	1952505.10	1952505.11	1952505.12	1952505.13	1952505.14	1952505.15	Residential 10% Produce	Commercial/ Outdoor	Reference	Ecological receptors	Reference	Background$_1$
	Depth:	100mm	0-50mm	50mm	50mm	0-50mm	0-50mm	0-50mm	0-50mm						
Heavy Metals															
Total Recoverable Arsenic	mg/kg dry wt	3	7	11	6	*20*	5	13	4	20	70	NES	17	CCME	3.5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.68	0.2	0.26	2.2	0.46	0.62	1.04	3	1,300	NES	10	CCME	0.08
Total Recoverable Chromium	mg/kg dry wt	10	24	14	16	52	18	64	19	460	6,300	NES	64	CCME	12.4
Total Recoverable Copper	mg/kg dry wt	5	24	14	22	*144*	18	46	19	>10,000	>10,000	NES	63	CCME	7.9
Total Recoverable Lead	mg/kg dry wt	22	**7,300**	**250**	**530**	**290**	32	54	62	210	3,300	NES	300	CCME	39.0
Total Recoverable Nickel	mg/kg dry wt	6	8	9	12	17	11	12	10	130	1,800	EAUK	50	CCME	9.6
Total Recoverable Zinc	mg/kg dry wt	34	*920*	*360*	*290*	*2,200*	191	*930*	*680*	7,400	400,000	NEPM	200	CCME	58.8

Analyte	Sample Name:	Y6.1	Y7.1	S1.1	S1.2	S3.1	D1.1	D2.1	RPD Value	Soil Guideline Values					
Soil Results	Lab Number:	1952505.17	1952505.32	1952505.23	1952505.24	1952505.26	1952505.29	1952505.30	(SS1.1 &SS1.2)	Residential 10% Produce	Commercial/ Outdoor	Reference	Ecological receptors	Reference	Background$_1$
	Depth:	0-50mm	0-50mm	0-50mm	0-50mm	0-50mm	50mm	50mm							
Heavy Metals															
Total Recoverable Arsenic	mg/kg dry wt	6	8	6	6	12	9	4	0%	20	70	NES	17	CCME	3.5
Total Recoverable Cadmium	mg/kg dry wt	0.89	1.38	0.18	0.14	0.28	0.39	< 0.10	25%	3	1,300	NES	10	CCME	0.08
Total Recoverable Chromium	mg/kg dry wt	63	16	9	13	16	6	10	36%	460	6,300	NES	64	CCME	12.4
Total Recoverable Copper	mg/kg dry wt	14	59	22	20	24	4	6	10%	>10,000	>10,000	NES	63	CCME	7.9
Total Recoverable Lead	mg/kg dry wt	**260**	139	47	34	44	4.2	7.7	32%	210	3,300	NES	300	CCME	39.0
Total Recoverable Nickel	mg/kg dry wt	8	9	3	5	9	8	6	50%	130	1,800	EAUK	50	CCME	9.6
Total Recoverable Zinc	mg/kg dry wt	*810*	*300*	79	60	*250*	27	67	27%	7,400	400,000	NEPM	200	CCME	58.8

Analyte	Sample Name:	Composite of Y8.1, Y9.1 & Y10.1	Composite of Y11.1 & Y12.1	Composite of D1.1 & D2.1	Soil Guideline Values					
Soil Results	Lab Number:	1952505.34	1952505.35	1952505.36	Adjusted Residential 10% produce (2 samples)	Adjusted Residential 10% produce (3 samples)	Adjusted Commercial/ Outdoor Worker (2 samples)	Adjusted Commercial/ Outdoor Worker (3 samples)	Reference	Background$_1$
	Depth:	0-50mm	100mm	50mm						
Organochlorine Pesticides Screening in Soil										
Aldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.013	1.3	0.87	80	53.33	NES	-
alpha-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Total Chlordane [(cis+trans)*100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.011	0.022	< 0.013	-	-	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.07	< 0.08	35	23.33	500	333	NES	0.43 $_2$
Dieldrin	mg/kg dry wt	< 0.011	< 0.012	< 0.013	1.3	0.87	80	53.33	NES	-
Endosulfan I	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Endrin	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.011	< 0.012	< 0.013	-	-	-	-	-	-

Indicates result exceeds residential guideline value
Indicates result exceeds ecological guideline value
Indicates result exceeds background value for soil type

Analyte	Sample Name:	H5.1	Y4.1	Y6.1	Y7.1	S1.1	Composite of Y2.1 & Y3.1	Soil Guideline Values					
Soil Results	Lab Number:	1952505.11	1952505.15	1952505.17	1952505.32	1952505.23	1952505.33	Residential 10% Produce	Adjusted Residential 10% Produce	Commercial/ Outdoor Worker	Adjusted Commercial/ Outdoor Worker	Reference	Background
	Depth:	50mm	0-50mm	0-50mm	0-50mm	0-50mm	0-50mm						
Polycyclic Aromatic Hydrocarbons Screening in Soil													
1-Methylnaphthalene	mg/kg dry wt	0.015	0.017	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	0.022	0.043	< 0.10	0.03	< 0.13	< 0.011	-	-	-	-	-	-
Perylene	mg/kg dry wt	0.066	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.52	< 0.03	< 0.3	0.07	< 0.3	< 0.03	10	5	35	17.5	NES	0.922 [3]
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.52	< 0.04	< 0.3	0.07	< 0.4	< 0.03	-		-	-	-	-
Acenaphthylene	mg/kg dry wt	0.04	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	500	250	>10,000	>5,000	GAS	-
Acenaphthene	mg/kg dry wt	0.013	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	800	400	>10,000	>5,000	GAS	-
Anthracene	mg/kg dry wt	0.053	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	9,000	4,500	>10,000	>5,000	GAS	-
Benzo[a]anthracene*	mg/kg dry wt	0.27	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
Benzo[a]pyrene (BAP)*	mg/kg dry wt	0.33	< 0.013	< 0.10	0.05	< 0.13	< 0.011	-	-	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene*	mg/kg dry wt	0.46	< 0.013	< 0.10	0.12	< 0.13	< 0.011	-	-	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.25	< 0.013	0.52	0.09	< 0.13	0.01	-	-	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.26	0.015	0.54	0.1	< 0.13	< 0.011	-	-	-	-	-	-
Benzo[k]fluoranthene*	mg/kg dry wt	0.22	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
Chrysene*	mg/kg dry wt	0.28	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
Dibenzo[a,h]anthracene*	mg/kg dry wt	0.06	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	-	-	-	-	-	-
Fluoranthene*	mg/kg dry wt	0.7	< 0.013	0.22	0.04	< 0.13	0.026	-	-	-	-	-	-
Fluorene	mg/kg dry wt	0.038	< 0.013	< 0.10	< 0.03	< 0.13	< 0.011	800	400	>10,000	>5,000	GAS	-
Indeno(1,2,3-c,d)pyrene*	mg/kg dry wt	0.25	< 0.013	< 0.10	0.08	< 0.13	< 0.011	-	-	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.5	< 0.15	< 0.7	< 0.06	-	-	-	-	-	-
Phenanthrene	mg/kg dry wt	0.35	< 0.013	< 0.10	< 0.03	< 0.13	0.017	900	450	>10,000	>5,000	GAS	-
Pyrene	mg/kg dry wt	0.63	< 0.013	2.1	0.04	< 0.13	0.014	1,500	750	>10,000	>5,000	GAS	-
Total Petroleum Hydrocarbons in Soil													
C7 - C9	mg/kg dry wt	-	-	85	< 18	-	-	120	-	120	-	PHCS	-
C10 - C14	mg/kg dry wt	-	-	440	66	-	-	470	-	1,500	-	PHCS	-
C15 - C36	mg/kg dry wt	-	-	113,000	1,530	-	-	NL	-	NL	-	PHCS	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	114,000	1,600	-	-	-	-	-	-	-	-

* Compounds included in Benzo[a]pyrene Potency Equivalency Factor calculation (NES)

Analyte	Sample Name:	RW1
Aqueous Results	Lab Number:	1952505.31
Heavy metals Potable (As,Cd,Cr,Cu,Ni,Pb,Zn)		
Total Arsenic	g/m3	< 0.0010
Total Cadmium	g/m3	< 0.00005
Total Chromium	g/m3	0.0007
Total Copper	g/m3	0.021
Total Lead	g/m3	0.0035
Total Nickel	g/m3	< 0.0005
Total Zinc	g/m3	0.022

NES - National Environmental Standard for Assessing and Managing Contaminants in Soils, MfE

NEPM - National Environmental Protection Measures 2013, Formerly NEPC, Australia

EAUK - Soil guideline values for nickel - Environment Agency UK 2009

CCME - Canadian Environmental Quality Guidelines, CCME (updated 2012)

GAS - Users' Guide to the Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand (MfE, 1997)

PHCS - Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE 1999)

[1] Concentrations for "Regional, Yellow Brown Sand" soil group from Background concentrations in Canterbury soils, Tonkin and Taylor, July 2007

[2] Ambient Concentrations of selected organochlorine in soils, Buckland, Ellis and Salter 1998

[3] Background concentrations of polycylic aromatic hydrocarbons in Christchurch urban soils, Tonkin and Taylor, 2007

Table of XRF Results - 240 Spencerville Rd, Christchurch

Date of testing: 26th March, 2018

Sample ID (Lab tested samples in BOLD)	Sample Depth	XRF Reading No	Date & Time	Test Duration (secs)	Total Recoverable Arsenic		Total Recoverable Chromium		Total Recoverable Copper		Total Recoverable Lead		Total Recoverable Nickel		Total Recoverable Zinc	
					Result	Error	Result	Error	Result	Error	Result	Error	Result	Error	Result	Error
B1.1	0 - 50mm	5	26/03/2018 11:02	60	<LOD	6.2	<LOD	74.73	<LOD	16.93	<LOD	8.3	<LOD	44.88	46	7.61
B1.1	0 - 50mm	6	26/03/2018 11:03	60	<LOD	6.02	<LOD	75.52	<LOD	16.18	<LOD	7.75	<LOD	44.4	42	7.23
B1.1	0 - 50mm	7	26/03/2018 11:04	60	<LOD	5.53	<LOD	67.27	<LOD	13.45	<LOD	7.09	<LOD	38.34	82	8.18
B1.2	250mm	11	26/03/2018 11:11	60	<LOD	7.06	<LOD	80.66	<LOD	18.56	<LOD	9.08	<LOD	50.03	30	7.52
B1.2	250mm	12	26/03/2018 11:12	60	<LOD	6.94	<LOD	81.15	<LOD	17.63	<LOD	8.95	<LOD	47.86	28	7.05
B1.2	250mm	13	26/03/2018 11:13	60	<LOD	6.55	<LOD	79.9	<LOD	18.02	<LOD	8.39	55.79	31.87	26	6.91
B2.1	0 - 50mm	8	26/03/2018 11:06	60	<LOD	6.63	<LOD	75.84	<LOD	16.37	<LOD	8.43	<LOD	44.36	46	7.57
B2.1	0 - 50mm	9	26/03/2018 11:08	60	<LOD	6.39	<LOD	72.12	<LOD	16.68	<LOD	8.61	<LOD	44.85	34	6.93
B2.1	0 - 50mm	10	26/03/2018 11:09	60	<LOD	7.56	<LOD	83.25	<LOD	20.72	<LOD	10.18	<LOD	52.8	33	8.27
B2.2	200mm	14	26/03/2018 11:15	60	<LOD	7.28	<LOD	89.61	<LOD	19.94	<LOD	9.21	<LOD	51.93	29	7.72
B2.2	200mm	15	26/03/2018 11:16	60	<LOD	7.77	<LOD	92.63	<LOD	21.65	<LOD	10.05	<LOD	57.05	39	8.93
B2.2	200mm	16	26/03/2018 11:17	60	<LOD	6.4	<LOD	75.51	<LOD	16.43	<LOD	8.1	<LOD	44.56	30	6.82
B3.1	100mm	17	26/03/2018 11:20	60	<LOD	6.75	<LOD	76.6	<LOD	17.67	<LOD	8.61	<LOD	45.85	31	7.02
B3.1	100mm	18	26/03/2018 11:21	60	<LOD	8.42	<LOD	99.37	<LOD	25.92	<LOD	10.77	<LOD	59.95	33	9.37
B3.1	100mm	19	26/03/2018 11:23	86	<LOD	6.01	<LOD	63.87	<LOD	14.85	10.6	5.18	<LOD	37.6	45	6.51
B4.1	100mm	20	26/03/2018 11:26	60	<LOD	9.03	<LOD	83.92	<LOD	21.28	25.2	7.72	<LOD	49.89	78	10.63
B4.1	100mm	21	26/03/2018 11:27	60	<LOD	10.47	<LOD	91.21	<LOD	24.83	22.8	8.6	<LOD	58.76	104	13.19
B4.1	100mm	22	26/03/2018 11:28	60	<LOD	7.27	<LOD	67.98	<LOD	15.52	25.2	6.23	<LOD	40.54	95	9.12
P1.1	0 - 50mm	24	26/03/2018 11:51	60	<LOD	5.81	<LOD	62.49	<LOD	14.78	<LOD	7.55	<LOD	39.04	46	7.05
P1.1	0 - 50mm	25	26/03/2018 11:53	60	<LOD	5.54	<LOD	62.39	<LOD	14.35	<LOD	7.23	<LOD	39.16	40	6.58
P1.1	0 - 50mm	26	26/03/2018 11:54	60	<LOD	6.34	<LOD	71.92	<LOD	16.49	<LOD	7.91	<LOD	45.64	40	7.4
H1.1	0 - 50mm	28	26/03/2018 12:13	60	8.0	4.92	<LOD	80	<LOD	16.8	14.7	6.11	68.92	30.63	104	9.84
H1.1	0 - 50mm	29	26/03/2018 12:14	60	<LOD	9.17	<LOD	89.6	<LOD	21.35	26.2	7.85	<LOD	52.47	132	12.99
H1.1	0 - 50mm	30	26/03/2018 12:15	60	8.7	5.74	<LOD	78.75	<LOD	18.3	27.8	7.12	<LOD	46.83	121	11.25
H2.1	0 - 50mm	31	26/03/2018 12:17	60	**69.6**	18.02	<LOD	59.37	15	9.61	**1226.4**	22.51	<LOD	34.3	660	19.29
H2.1	0 - 50mm	32	26/03/2018 12:19	60	<LOD	36.12	<LOD	64.88	22	11.31	**1910.6**	30.69	<LOD	38.64	749	22.57
H2.1	0 - 50mm	33	26/03/2018 12:20	57	<LOD	24.9	<LOD	55.9	<LOD	14.07	**1031.9**	21.06	<LOD	34.69	734	20.6
H3.1	0 - 50mm	34	26/03/2018 12:25	60	<LOD	7.79	<LOD	69.62	<LOD	15.72	32.9	6.57	<LOD	39.83	59	7.75
H3.1	0 - 50mm	35	26/03/2018 12:27	67	<LOD	7.77	<LOD	67.96	<LOD	15.58	35.0	6.5	<LOD	40.09	48	7.11
H3.1	0 - 50mm	36	26/03/2018 12:28	60	<LOD	8.3	<LOD	72.76	<LOD	16.88	29.9	6.87	<LOD	43.4	51	7.94
H4.1	0 - 50mm	37	26/03/2018 12:35	60	<LOD	11.43	<LOD	76.29	<LOD	16.87	120.2	9.76	<LOD	42.97	264	14.77
H4.1	0 - 50mm	38	26/03/2018 12:36	60	<LOD	8.17	<LOD	52.41	<LOD	12.83	70.5	6.84	<LOD	33.05	338	13.73
H4.1	0 - 50mm	39	26/03/2018 12:38	60	<LOD	11.07	<LOD	78.36	<LOD	17.25	104.7	9.35	74.68	31.41	227	13.87
H5.1	0 - 50mm	40	26/03/2018 12:47	60	<LOD	14.44	<LOD	92.73	<LOD	23.9	130.0	12.32	<LOD	58.93	141	14.08
H5.1	0 - 50mm	41	26/03/2018 12:48	60	13.2	8.44	<LOD	70.85	19	12.1	149.0	10.56	<LOD	42.72	218	13.66
H5.1	0 - 50mm	42	26/03/2018 12:50	60	<LOD	18.5	<LOD	75.62	<LOD	17.26	**423.2**	16.01	<LOD	44.83	181	12.5
Y1.1	0 - 50mm	44	26/03/2018 13:22	60	<LOD	23.98	<LOD	100.62	120	18.26	**576.4**	20.52	<LOD	53.3	2210	45
Y1.1	0 - 50mm	45	26/03/2018 13:23	60	**20.5**	8.12	100.68	63.23	79	15.52	109.7	9.92	87.5	34.08	1661	36.59
Y1.1	0 - 50mm	46	26/03/2018 13:25	60	16.2	10.3	<LOD	78.63	107	15.1	**270.2**	12.94	<LOD	44.07	2200	39.48
Y2.1	0 - 50mm	47	26/03/2018 13:31	60	18.6	8.2	<LOD	92.81	84	16.87	91.0	10.01	54.84	35.74	577	23.53
Y2.1	0 - 50mm	48	26/03/2018 13:32	60	<LOD	12.47	<LOD	93.42	57	16.03	100.3	10.36	<LOD	54.14	733	26.54
Y2.1	0 - 50mm	49	26/03/2018 13:33	60	**22.8**	7.86	<LOD	84.99	80	16.04	84.1	9.44	<LOD	50.52	631	23.82
Y3.1	0 - 50mm	50	26/03/2018 13:38	60	**21.1**	6.61	<LOD	83.47	47	13.41	56.4	7.88	<LOD	45.71	781	24.52
Y3.1	0 - 50mm	51	26/03/2018 13:39	60	15.9	6.08	<LOD	82.3	50	13.37	45.3	7.37	75.61	31.38	1057	27.86
Y3.1	0 - 50mm	52	26/03/2018 13:41	60	15.0	7.09	<LOD	83.96	44	14.12	69.6	8.69	<LOD	48.31	740	24.99
Y4.1	0 - 50mm	56	26/03/2018 13:50	60	<LOD	7.45	<LOD	58.76	17	9.73	43.9	6.3	<LOD	35.13	638	19.09
Y4.1	0 - 50mm	57	26/03/2018 13:51	61	<LOD	8.01	<LOD	62.7	<LOD	16.8	37.0	6.77	<LOD	40.58	645	21.34
Y4.1	0 - 50mm	58	26/03/2018 13:53	60	<LOD	8.52	<LOD	69.37	<LOD	20.67	29.2	7.55	<LOD	44.4	659	25.22
Y5.1	0 - 50mm	53	26/03/2018 13:44	60	<LOD	10.56	<LOD	94.19	25	15.46	51.4	9.01	<LOD	53.81	157	14.05
Y5.1	0 - 50mm	54	26/03/2018 13:45	60	<LOD	8.3	<LOD	74.73	22	12.19	33.0	6.95	<LOD	43.84	183	12.62
Y5.1	0 - 50mm	55	26/03/2018 13:47	60	<LOD	9.33	<LOD	88.53	<LOD	20.83	37.5	7.88	<LOD	50.93	141	12.5
Y8.1	0 - 50mm	59	26/03/2018 14:21	60	7.9	3.87	<LOD	65.92	<LOD	14.7	<LOD	7.13	<LOD	40.58	32	6.29
Y8.1	0 - 50mm	60	26/03/2018 14:22	60	<LOD	5.87	<LOD	67.73	<LOD	14.26	<LOD	7.44	43.51	27.05	37	6.41
Y8.1	0 - 50mm	61	26/03/2018 14:23	60	5.7	3.6	<LOD	63.11	<LOD	13.13	<LOD	6.76	<LOD	36.58	38	6.16
Y8.2	250mm	62	26/03/2018 14:29	60	<LOD	6.02	<LOD	69.09	<LOD	14.69	<LOD	7.59	<LOD	41.16	34	6.51
Y8.2	250mm	63	26/03/2018 14:30	60	<LOD	6.16	<LOD	69.81	<LOD	15.22	<LOD	7.75	<LOD	41.29	43	7.08
Y8.2	250mm	64	26/03/2018 14:31	60	8.2	3.97	<LOD	70.03	<LOD	14.61	<LOD	7.29	<LOD	40.63	43	6.9
Y9.1	100mm	65	26/03/2018 14:33	60	<LOD	6.05	<LOD	76.89	<LOD	15.28	<LOD	7.93	100.01	30.68	36	6.82
Y9.1	100mm	66	26/03/2018 14:34	60	<LOD	6.56	<LOD	77.76	<LOD	18.29	<LOD	8.59	<LOD	48.22	28	7.12
Y9.1	100mm	67	26/03/2018 14:35	60	<LOD	8.43	<LOD	91.33	<LOD	23.31	<LOD	11.13	<LOD	56.24	36	9.28
Y9.2	250mm	71	26/03/2018 14:42	60	<LOD	8.03	<LOD	96.48	<LOD	23.07	<LOD	10.4	<LOD	57.97	28	8.62
Y9.2	250mm	72	26/03/2018 14:44	60	<LOD	6.27	<LOD	81.83	<LOD	17.52	<LOD	8.09	57.34	32.22	26	6.93
Y9.2	250mm	73	26/03/2018 14:45	60	<LOD	6.34	<LOD	79.21	<LOD	16.92	<LOD	8.38	<LOD	44.23	35	7.11
Y10.1	100mm	74	26/03/2018 14:49	60	<LOD	5.87	<LOD	71.45	<LOD	15.89	<LOD	7.74	<LOD	43.55	32	6.69
Y10.1	100mm	75	26/03/2018 14:50	60	<LOD	5.55	<LOD	59.92	<LOD	14.66	<LOD	7.09	<LOD	36.78	27	6.1
Y10.1	100mm	76	26/03/2018 14:51	60	<LOD	5.6	<LOD	70.86	<LOD	14.63	<LOD	7.22	63.28	28.82	30	6.3
Y10.2	250mm	77	26/03/2018 14:55	60	<LOD	7.96	<LOD	91.03	<LOD	20.8	<LOD	10.11	<LOD	56.19	23	7.98
Y10.2	250mm	78	26/03/2018 14:56	60	<LOD	6.71	<LOD	82.63	<LOD	19.17	<LOD	8.51	<LOD	49.02	19	6.89
Y10.2	250mm	79	26/03/2018 14:57	60	<LOD	6.84	<LOD	79.27	<LOD	18.36	<LOD	8.84	<LOD	46.47	30	7.34
Y11.1	100mm	68	26/03/2018 14:38	60	<LOD	6.8	<LOD	81.42	<LOD	18.1	<LOD	8.73	<LOD	47.43	37	7.71
Y11.1	100mm	69	26/03/2018 14:39	60	<LOD	7.5	<LOD	92.91	<LOD	20.76	<LOD	9.85	<LOD	52.76	34	8.31
Y11.1	100mm	70	26/03/2018 14:40	60	<LOD	6.11	<LOD	75.7	<LOD	16.55	<LOD	7.85	<LOD	44.82	41	7.22
Y12.1	100mm	80	26/03/2018 14:59	60	<LOD	5.99	<LOD	71.43	<LOD	15.27	<LOD	7.67	65.2	29.63	29	6.48
Y12.1	100mm	81	26/03/2018 15:01	60	<LOD	6.17	<LOD	72.9	<LOD	15.56	<LOD	7.88	61.96	29.74	31	6.59
Y12.1	100mm	82	26/03/2018 15:02	60	<LOD	7.24	<LOD	86.05	<LOD	20.55	<LOD	9.11	<LOD	50.34	37	8.31
S1.1	0 - 50mm	84	26/03/2018 15:27	60	<LOD	6	<LOD	60.36	<LOD	13.79	11.3	5.14	<LOD	36.28	14	4.95
S1.1	0 - 50mm	85	26/03/2018 15:28	60	<LOD	7.74	<LOD	74.94	<LOD	17.57	20.3	6.44	<LOD	42.79	84	9.26
S1.1	0 - 50mm	86	26/03/2018 15:29	60	<LOD	8.37	<LOD	84.56	<LOD	20.2	18.7	7.2	<LOD	49.93	22	7.28
S2.1	100mm	90	26/03/2018 16:01	60	7.2	4.11	<LOD	75.54	<LOD	15.06	<LOD	7.6	66.43	29.96	39	7.03
S2.1	100mm	91	26/03/2018 16:02	61	<LOD	5.74	<LOD	71.56	<LOD	14.91	<LOD	7.34	51.23	28.48	37	6.69
S2.1	100mm	92	26/03/2018 16:04	60	<LOD	5.87	<LOD	71.79	<LOD	15.3	<LOD	7.52	73.75	29.2	34	6.57
S3.1	0 - 50mm	87	26/03/2018 15:42	60	12.7	5.91	<LOD	49.82	29	9.26	102.2	7.35	<LOD	31.72	366	13.66
S3.1	0 - 50mm	88	26/03/2018 15:43	60	13.4	4.09	<LOD	52.19	27	9.4	12.8	4.87	<LOD	32.73	310	12.89
S3.1	0 - 50mm	89	26/03/2018 15:44	60	11.8	3.96	<LOD	52.38	47	9.71	13.5	4.77	<LOD	30.23	494	15.63
S4.1	0 - 50mm	93	26/03/2018 16:06	60	6.8	4.04	<LOD	70.16	<LOD	17.21	<LOD	7.46	<LOD	43.03	40	7.21
S4.1	0 - 50mm	94	26/03/2018 16:08	92	6.5	3.07	<LOD	53.01	<LOD	11.7	<LOD	5.72	<LOD	31.55	107	7.45
S4.1	0 - 50mm	95	26/03/2018 16:09	60	7.3	3.91	<LOD	61.67	<LOD	14.79	<LOD	7.22	<LOD	36.76	57	7.27
S5.1	0 - 50mm	96	26/03/2018 16:12	60	<LOD	6.4	<LOD	66.31	<LOD	15.6	<LOD	8.03	<LOD	39.83	223	12.53
S5.1	0 - 50mm	97	26/03/2018 16:14	60	8.1	4.47	<LOD	67.89	<LOD	15.57	<LOD	8.28	<LOD	41.24	228	13.02
S5.1	0 - 50mm	98	26/03/2018 16:15	60	9.9	4.27	<LOD	66.67	<LOD	15.23	<LOD	7.78	<LOD	39.22	255	13.09
D1.1	0 - 50mm	100	26/03/2018 16:32	60	<LOD	8.88	<LOD	107.07	<LOD	27.17	<LOD	11.9	<LOD	65.26	48	11.07
D1.1	0 - 50mm	101	26/03/2018 16:33	60	10.5	5.44	<LOD	97.14	<LOD	26.56	<LOD	9.59	<LOD	63.37	57	10.86
D1.1	0 - 50mm	102	26/03/2018 16:34	60	9.0	4.7	97.55	62.34	<LOD	21.1	<LOD	8.44	108.93	37.8	48	9.02
D2.1	0 - 50mm	103	26/03/2018 16:36	60	<LOD	5.8	<LOD	70.08	<LOD	15.12	<LOD	7.36	107.05	29.4	34	6.45
D2.1	0 - 50mm	104	26/03/2018 16:37	60	<LOD	5.99	<LOD	71.21	<LOD	15.88	<LOD	7.73	62.7	29.3	35	6.75
D2.1	0 - 50mm	105	26/03/2018 16:38	60	<LOD	4.28	<LOD	47.04	<LOD	11.01	<LOD	5.64	<LOD	28.82	95	7.24
Soil Guideline Values mg/kg	Rural Residential 10% produce				17		460		>10,000		210		130		7,400	
	Outdoor Worker				70		6,300		>10,000		3,300		1,800		400,000	
	Reference				NES		NES		NES		NES		EAUK		NEPM	

Result exceeds residential SGV

Appendix C – Laboratory Reports

Hill Laboratories
TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Malloch Environmental Limited	**Lab No:**	1952505 SPv1
Contact:	Nicola Peacock	**Date Received:**	27-Mar-2018
	C/- Malloch Environmental Limited	**Date Reported:**	12-Apr-2018
	801 East Maddisons Road	**Quote No:**	72157
	Rolleston 7614	**Order No:**	
		Client Reference:	240 Spencerville
		Submitted By:	Nicola Peacock

Sample Type: Soil

Sample Name:		B3.1 26-Mar-2018 10:36 am	H2.1 26-Mar-2018 11:38 am	H4.1 26-Mar-2018 11:49 am	H5.1 26-Mar-2018 12:00 pm	Y1.1 26-Mar-2018 12:40 pm
Lab Number:		1952505.4	1952505.8	1952505.10	1952505.11	1952505.12
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	80	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	7	11	6	20
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.68	0.20	0.26	2.2
Total Recoverable Chromium	mg/kg dry wt	10	24	14	16	52
Total Recoverable Copper	mg/kg dry wt	5	24	14	22	144
Total Recoverable Lead	mg/kg dry wt	22	7,300	250	530	290
Total Recoverable Nickel	mg/kg dry wt	6	8	9	12	17
Total Recoverable Zinc	mg/kg dry wt	34	920	360	290	2,200
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	0.015	-
2-Methylnaphthalene	mg/kg dry wt	-	-	-	0.022	-
Perylene	mg/kg dry wt	-	-	-	0.066	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	0.52	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	0.52	-
Acenaphthylene	mg/kg dry wt	-	-	-	0.040	-
Acenaphthene	mg/kg dry wt	-	-	-	0.013	-
Anthracene	mg/kg dry wt	-	-	-	0.053	-
Benzo[a]anthracene	mg/kg dry wt	-	-	-	0.27	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	0.33	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	0.46	-
Benzo[e]pyrene	mg/kg dry wt	-	-	-	0.25	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	0.26	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	0.22	-
Chrysene	mg/kg dry wt	-	-	-	0.28	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	0.060	-
Fluoranthene	mg/kg dry wt	-	-	-	0.70	-
Fluorene	mg/kg dry wt	-	-	-	0.038	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	0.25	-
Naphthalene	mg/kg dry wt	-	-	-	< 0.07	-
Phenanthrene	mg/kg dry wt	-	-	-	0.35	-
Pyrene	mg/kg dry wt	-	-	-	0.63	-

Sample Type: Soil						
Sample Name:		Y2.1 26-Mar-2018 12:45 pm	Y3.1 26-Mar-2018 12:52 pm	Y4.1 26-Mar-2018 1:05 pm	Y6.1 26-Mar-2018 1:13 pm	S1.1 26-Mar-2018 2:42 pm
Lab Number:		1952505.13	1952505.14	1952505.15	1952505.17	1952505.23
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	80	97	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	13	4	6	6
Total Recoverable Cadmium	mg/kg dry wt	0.46	0.62	1.04	0.89	0.18
Total Recoverable Chromium	mg/kg dry wt	18	64	19	63	9
Total Recoverable Copper	mg/kg dry wt	18	46	19	14	22
Total Recoverable Lead	mg/kg dry wt	32	54	62	260	47
Total Recoverable Nickel	mg/kg dry wt	11	12	10	8	3
Total Recoverable Zinc	mg/kg dry wt	191	930	680	810	79
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	0.017	< 0.10	< 0.13
2-Methylnaphthalene	mg/kg dry wt	-	-	0.043	< 0.10	< 0.13
Perylene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	< 0.03	< 0.3	< 0.3
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	< 0.04	< 0.3	< 0.4
Acenaphthylene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Acenaphthene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Anthracene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.013	0.52	< 0.13
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	0.015	0.54	< 0.13
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Chrysene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Fluoranthene	mg/kg dry wt	-	-	< 0.013	0.22	< 0.13
Fluorene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Naphthalene	mg/kg dry wt	-	-	< 0.07	< 0.5	< 0.7
Phenanthrene	mg/kg dry wt	-	-	< 0.013	< 0.10	< 0.13
Pyrene	mg/kg dry wt	-	-	< 0.013	2.1	< 0.13
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	85	-
C10 - C14	mg/kg dry wt	-	-	-	440	-
C15 - C36	mg/kg dry wt	-	-	-	113,000	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	114,000	-

Sample Name:		S1.2 26-Mar-2018 2:43 pm	S3.1 26-Mar-2018 2:56 pm	D1.1 26-Mar-2018 3:47 pm	D2.1 26-Mar-2018 3:52 pm	SS7.1 [Y7.1] 26-Mar-2018 1:14 pm
Lab Number:		1952505.24	1952505.26	1952505.29	1952505.30	1952505.32
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	-	70
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	12	9	4	8
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.28	0.39	< 0.10	1.38
Total Recoverable Chromium	mg/kg dry wt	13	16	6	10	16
Total Recoverable Copper	mg/kg dry wt	20	24	4	6	59
Total Recoverable Lead	mg/kg dry wt	34	44	4.2	7.7	139
Total Recoverable Nickel	mg/kg dry wt	5	9	8	6	9
Total Recoverable Zinc	mg/kg dry wt	60	250	27	67	300

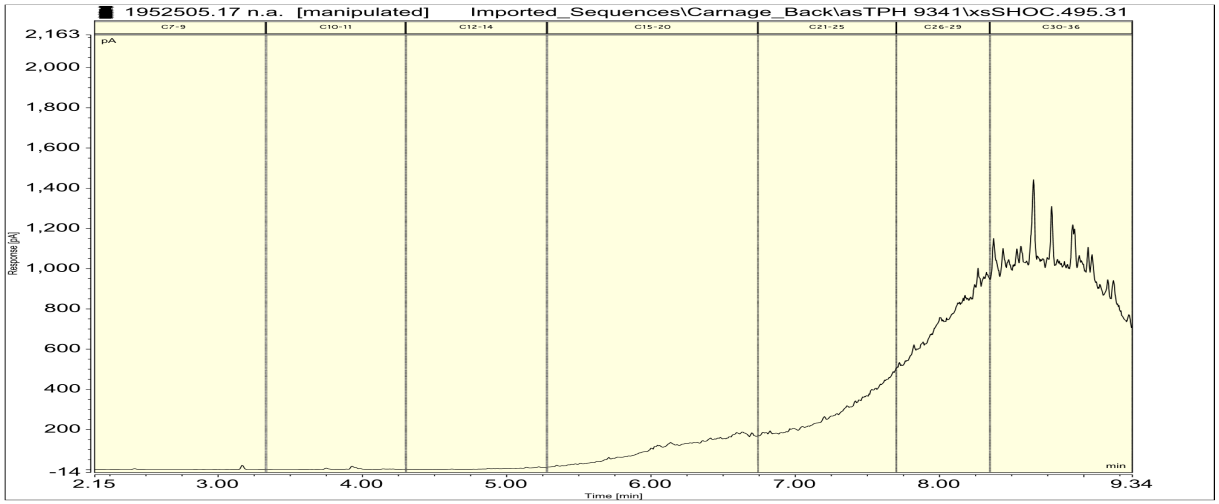
Sample Type: Soil						
Sample Name:		S1.2 26-Mar-2018 2:43 pm	S3.1 26-Mar-2018 2:56 pm	D1.1 26-Mar-2018 3:47 pm	D2.1 26-Mar-2018 3:52 pm	SS7.1 [Y7.1] 26-Mar-2018 1:14 pm
Lab Number:		1952505.24	1952505.26	1952505.29	1952505.30	1952505.32
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.03
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	0.03
Perylene	mg/kg dry wt	-	-	-	-	< 0.03
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	-	0.07
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	-	0.07
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.03
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.03
Anthracene	mg/kg dry wt	-	-	-	-	< 0.03
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	0.05
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	0.12
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	0.09
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	0.10
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.03
Chrysene	mg/kg dry wt	-	-	-	-	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.03
Fluoranthene	mg/kg dry wt	-	-	-	-	0.04
Fluorene	mg/kg dry wt	-	-	-	-	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	0.08
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.15
Phenanthrene	mg/kg dry wt	-	-	-	-	< 0.03
Pyrene	mg/kg dry wt	-	-	-	-	0.04
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	-	< 18
C10 - C14	mg/kg dry wt	-	-	-	-	66
C15 - C36	mg/kg dry wt	-	-	-	-	1,530
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	-	1,600

Sample Name:		Composite of Y2.1 & Y3.1	Composite of Y8.1, Y9.1 & Y10.1	Composite of Y11.1 & Y12.1	Composite of D1.1 & D2.1	
Lab Number:		1952505.33	1952505.34	1952505.35	1952505.36	
Individual Tests						
Dry Matter	g/100g as rcvd	97	93	87	81	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
alpha-BHC	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
beta-BHC	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
delta-BHC	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
gamma-BHC (Lindane)	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
cis-Chlordane	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
trans-Chlordane	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	-	< 0.04	< 0.04	< 0.04	-
2,4'-DDD	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
4,4'-DDD	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
2,4'-DDE	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
4,4'-DDE	mg/kg dry wt	-	< 0.011	0.022	< 0.013	-
2,4'-DDT	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
4,4'-DDT	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Total DDT Isomers	mg/kg dry wt	-	< 0.07	< 0.07	< 0.08	-
Dieldrin	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Endosulfan I	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-

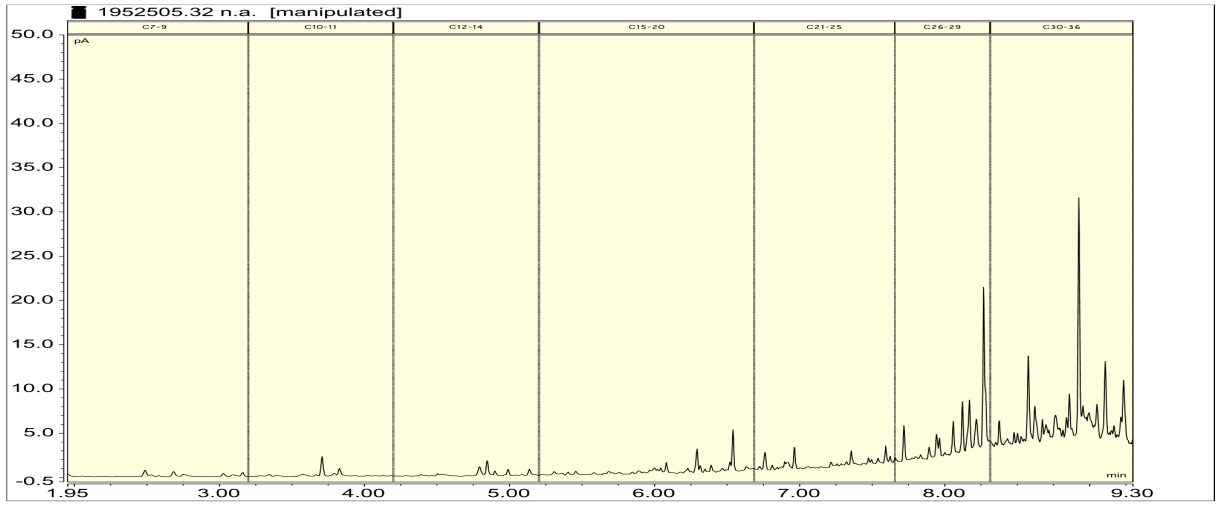
Sample Type: Soil						
Sample Name:		Composite of Y2.1 & Y3.1	Composite of Y8.1, Y9.1 & Y10.1	Composite of Y11.1 & Y12.1	Composite of D1.1 & D2.1	
Lab Number:		1952505.33	1952505.34	1952505.35	1952505.36	
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Endosulfan sulphate	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Endrin	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Endrin aldehyde	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Endrin ketone	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Heptachlor	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Heptachlor epoxide	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Hexachlorobenzene	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Methoxychlor	mg/kg dry wt	-	< 0.011	< 0.012	< 0.013	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.011	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.011	-	-	-	-
Perylene	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.03	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.03	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.011	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.011	-	-	-	-
Anthracene	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.010	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	-	-	-	-
Chrysene	mg/kg dry wt	< 0.011	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	-	-	-	-
Fluoranthene	mg/kg dry wt	0.026	-	-	-	-
Fluorene	mg/kg dry wt	< 0.011	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.06	-	-	-	-
Phenanthrene	mg/kg dry wt	0.017	-	-	-	-
Pyrene	mg/kg dry wt	0.014	-	-	-	-

Sample Type: Aqueous						
Sample Name:		RW1 26-Mar-2018 3:58 pm				
Lab Number:		1952505.31				
Heavy metals Potable (As,Cd,Cr,Cu,Ni,Pb,Zn)						
Arsenic	g/m³	< 0.0010	-	-	-	-
Cadmium	g/m³	< 0.00005	-	-	-	-
Chromium	g/m³	0.0007	-	-	-	-
Copper	g/m³	0.021	-	-	-	-
Lead	g/m³	0.0035	-	-	-	-
Nickel	g/m³	< 0.0005	-	-	-	-
Zinc	g/m³	0.022	-	-	-	-

1952505.17
Y6.1 26-Mar-2018 1:13 pm
Client Chromatogram for TPH by FID



1952505.32
SS7.1 [Y7.1] 26-Mar-2018 1:14 pm
Client Chromatogram for TPH by FID



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
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:5786,2805,10734;2695]	0.002 - 60 mg/kg dry wt	17, 32
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	4, 8, 10-15, 17, 23-24, 26, 29-30, 32
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	34-36
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	11, 15, 23, 33
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	11, 15, 17, 23, 32-36

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	13-14, 18-22, 29-30
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	11, 15, 17, 23, 32-33
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	11, 15, 17, 23, 32-33

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy metals Potable (As,Cd,Cr,Cu,Ni,Pb,Zn)	Analysed as received (after acid preservation, if required), ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.00005 - 0.0010 g/m^3	31

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.

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

Julie Comfort

From: Patricia Harte
Sent: Thursday, 28 June 2018 3:59 p.m.
To: Ward, Sean
Cc: Ross Moffatt (Ross.Moffatt@xtra.co.nz); Andy Hall
Subject: Whisper Creek - conditions
Attachments: RMA2018176 -- Draft conditions.docx

Hi Sean

Attached is a consolidated version of the conditions you have sent through over time. We have deleted duplicates and shown amendments in red and/or strikethrough and underline.

We are happy to discuss these changes.

Are there any more conditions proposed? Please advise where the process is at now with the application as things have become a bit jumbled.

Regards

Patricia Harte
Principal

Davie Lovell-Smith Ltd
Planning Surveying Engineering
PO Box 679 | Christchurch | Phone (03) 963 0701 | Mobile 021 807 905 | www.dls.co.nz

RMA/2018/176 Conditions collated by DLS from Sean Ward's emails

As at 28 June 2018

ENGINEERING CONDITIONS

General

3.1 Asset Design and Construction

All infrastructure assets to be vested in the Council are to be designed and constructed in accordance with the Christchurch City Council's Infrastructure Design Standard (the IDS) and the Construction Standard Specifications (the CSS).

3.2 Quality Assurance

The design and construction of all assets is to be subject to a project quality system in accordance with Part 3: Quality Assurance of the IDS.

A. Submit a Design Report, Plans and Design Certificate complying with clause 3.3.2 to the Subdivision Engineers (Planning Team 1). The Design Report and engineering plans are to provide sufficient detail to confirm compliance with the requirements of the IDS and this consent.

B. Submit a Contract Quality Plan for review by the Council and an Engineer's Review Certificate complying with clause 3.3.3.

Physical works shall not commence until a Council Engineering Officer confirms that the above documentation has been received and accepted.

C. Submit an Engineer's Report and Completion Certificate complying with clause 3.3.4.

An Engineer's Report is a document specific to a project, which describes how the project was managed and administered in compliance with the IDS, the Construction Standard Specifications, the Contract Quality Plan and the resource consent or project brief. It provides background information to the release of the 224(c) certificate.

Note: Part 3 of the IDS sets out the Council's requirements for Quality Assurance. It provides a quality framework within which all assets must be designed and constructed. It also sets out the process for reporting to Council how the works are to be controlled, tested and inspected in order to prove compliance with the relevant standards. It is a requirement of this part of the IDS that the applicant provides certification for design and construction as a pre-requisite for the release of the 224c certificate. The extent of the documentation required should reflect the complexity and/or size of the project.

In addition to the above, the applicant is to design all infrastructure to resist the effects associated with earthquake induced liquefied soils. All liquefaction hazard mitigation shall be designed for a 1 in 150 year return period serviceability limit seismic design event and a 1 in 500 year return period ultimate limit state seismic design event as defined in NZS1170.5.2004.

3.3 The surveyor is to forward a copy of the title plan and survey plan to the Subdivision Planner (that issued the consent), Resource Consents & Building Policy Unit as soon as the plan has been lodged (or earlier if possible) for checking at Land Information New Zealand for entering into the Council GIS system.

3.10 Pipeline CCTV inspections are to be carried out on all gravity pipelines in compliance with the Council Standard Specifications (CSS):
https://www.ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections/

3.11 As-Built plans and data shall be provided for all infrastructure and private work in compliance with the Infrastructure Design Standards (IDS):

https://www.ccc.govt.nz/consents-and-licences/construction-requirements/infrastructure-design-standards/as-built-survey-and-data-requirements/

Water Supply

4.1 The point of supply is the 200mm main at the Lower Styx Rd and Spencerville Rd corner

4.2 All lots are to be supplied with a rural restricted water supply of at least $2m^3$ per day. The submains are to be installed to 1m past each lot boundary.

4.3 Engineering drawings are to be sent to the Subdivision Engineers for approval by Ian Johnson of the Asset and Network Planning Unit.

4.3 Consent Notice
This property is supplied with a rural restricted water supply. A storage tank for fire fighting purposes is to be installed at building consent stage. The tank is to be at least 2,000 litres.

2. This development shall be served as a rural restricted water supply. All lots shall be served with a water supply to their boundary. Submains shall be installed to 1 m past each lot boundary. Rear lots shall be served with laterals installed by a Licensed Certified Plumber into their net site areas under a Building Consent for each stage. Alternatively, the consent holder can seek Building Consent (BC) exemption for the installation of the private laterals. Where the laterals are installed under BC exemption construction shall be in accordance with the CSS and the IDS. Where applicable, dummy connection boxes shall be installed at the entrance of the R.O.W. A copy of the Code Compliance Certificate shall be forwarded through to the Council's Engineering Team as part of the Section 224c application.

3. The water supply to the development shall be designed by a suitably qualified person in accordance with the Infrastructure Design Standard to the satisfaction of the Water & Wastewater Asset Planning Team. Engineering drawings supported by hydraulic model outputs shall be sent to the Subdivisions Engineer for acceptance by the Three Water & Waste Asset Planning Team prior to the commencement of any physical work.

4. The work shall be carried out by a Council approved water supply installer at the expense of the applicant. Refer to: http://www.ccc.govt.nz/Water/AuthorisedInstallers for a list of contractors.

Consent Notice:

a. This property is supplied with a rural restricted water supply. The property is required to provide on-site storage in accordance with Council's standards and specifications, at the time of building consent. The minimum storage capacity must be 48 hours normal gross supply, but at least 2,000 litres in volume.
b. This property must provide on-site storage for firefighting purposes to comply with the New Zealand Fire Service firefighting Water Supplies Code of Practice (SNZ PAS 4509:2008).

Sewage

5.1 The point of supply is the manhole in the 300mm main at the Lower Styx Rd and Spencerville Rd corner

5.2 The sewer system is to comprise an approved Pressure Sewer System designed in accordance with Council's Infrastructure Design Standards, Construction Standard Specifications and Private Sewer Pumping Station Specification. Engineering drawings supported by hydraulic

calculations for all pressure sewer mains shall be sent to the Subdivision Engineer for acceptance prior to the commencement of any physical work.

5.3 Each lot shall have a Boundary Kit located within the legal road or R.O.W. outside the boundary of each lot. The lateral from the Boundary Kit is to extend into the net site of each lot.

5.4 Properties in a R.O.W. shall be serviced by a single pressure main to each lot. ~~An isolation valve shall be installed on the pressure main at the boundary of the ROW and the public road. Easements in gross shall be created over Pressure Sewer Systems in private R.O.Ws.~~

5.5 Installation of the boundary kit and connection to Council's sewer system shall be carried out by a Council Authorised Drainlayer (Pressure Sewer Reticulation)

5.6 Only one pump brand shall be installed within the subdivision. The brand installed as part of the first stage or the initial lots of the subdivision shall become the default brand across the subdivision. This shall be determined and provided as part of the 224 application.

5.7 Consent Notice for all residential lots:

This property will require a pressure sewer system comprising a pump and storage chamber to be supplied by ~~either~~ EcoFlow Ltd ~~or Aquatec~~ (determined by the developer) and installed at building consent stage. The pressure sewer system will be supplied complete with an IOTA OneBox Control Panel.

The pumping chamber sewer system shall be installed by a Council Authorised Drainlayer (Pressure Sewer Tanks) in accordance with Councils Infrastructure Design Standards and Councils Construction Standard Specifications.

The property owner shall be responsible for the power costs of operating the system.

5. Provision will be made for odour treatment and corrosion protection at the discharge point in Lower Styx Road in accordance with Council's Infrastructure Design Standards, Construction Standard Specification and operational requirements. Engineering drawings supported by design calculations and specifications for the odour treatment facility and corrosion protection works shall be sent to the Subdivision Engineer for acceptance prior to the commencement of any physical work. Corrosion treatment to the receiving manhole invert is required.

7. Measures shall be put in place to Council's satisfaction and acceptance for enabling initial operation of the local pressure sewer system within the subdivision during the build phase to ensure a self-cleansing flow and limiting sewage age within the system when the design number of pressure sewer tanks are not yet in operation.

9. Ownership and control of the local pressure pump, chamber, boundary kit and OneBox Control Panel will be vested with Council. The property owner shall enter into a Deed with the Christchurch City Council, drafted in terms approved by the Christchurch City Council, vesting ownership in the system prior to Code Compliance Certificate being issued for a dwelling on the relevant site.

10. The Council and its agents or contractors shall have the right of access to the property for the purpose of maintenance, monitoring or renewal of any part of the local pressure sewer system vested with Council.

11. The electricity supply for the system shall be from the dwelling and metered to the dwelling serviced by the system. The property owner shall be responsible for the power costs of operating the system.

12. The property owner shall ensure adherence with the operational requirements of the local pressure sewer system and if in breach of this obligation, the property owner shall promptly at the property owner's expense properly and substantially repair and make good all injury or damage caused to the local pressure sewer system. If the property owner fails to promptly comply with this obligation then the Council may perform the obligation and recover any costs incurred from the Property Owner.

13. Conditions 7 to 11 above shall be recorded pursuant to Section 221 of the RMA in a consent notice registered on the titles of each property.

Stormwater

6.1 Stormwater laterals are to be laid to at least 600mm inside the building area of all residential lots at the subdivision stage. The laterals are to be laid at sufficient depth to ensure protection and adequate fall is available to serve the building platform ~~furthermost part of the lot.~~ Alternatively the consent holder may seek discharge of stormwater to ground by consent from Environment Canterbury

6.9 An Erosion and Sediment Control Plan (ESCP) is to be submitted for review as part of the design report. The ESCP is to include (but is not limited to):

- Site description, i.e. topography, vegetation, soils etc
- Details of proposed activities.
- A report including the method and time of monitoring to be undertaken.
- A locality map.
- Drawings showing the site, type and location of sediment control measures, onsite catchment boundaries and offsite sources of runoff.
- Drawings and specifications showing the positions of all proposed mitigation areas with supporting calculations if appropriate.

The performance criteria for the ESCP, unless directed by Council through the engineering acceptance process, will be based on Environmental Canterbury's Erosion and Sediment Control Guidelines (2007).
http://www.ecan.govt.nz/Our+Environment/Land/ErosionAndSediment/ErosionSedimentControlGuidelines.htm

The ESCP is to be implemented on site during the subdivision construction phase and no works are to commence until such time as the ESCP has been accepted.

The ESCP is to be designed by a suitably qualified person and a design certificate supplied with the plan. (Use the certificate from Appendix IV of the CCC Infrastructure Design Standard Part 3)

Note Pursuant to Section 128 of the Resource Management Act 1991 Council reserves the right, during the construction phase, to review this condition to impose further controls in respect to Sedimentation Control and Management

Minimum Levels and Filling

7.1 To be considered satisfactory for ~~sewer and~~ stormwater drainage minimum ground levels on building platforms within each new lot shall:

a) Have a minimum RL 12.00. The minimum floor level for the development is 12.30.

and

b) drain freely to natural drainage patterns, roads, reserves or stormwater facilities.

7.3 The applicant's attention is drawn to note that the 2% AEP hydraulic level in the Styx River at this location is RL11.90m in terms of CCC datum. Any land below this level will be subject to inundation and the Council may require a S36(2) notice under the Building Act to be placed on the title of the property. For further information the applicant is advised to contact a building consent officer in the Council's Environmental Services Unit.

7.7 All filling exceeding 300mm above excavation level shall be in accordance with the Code of Practice for earthfill for residential purposes NZS 4431: 1989. A duly completed certificate in the form of Appendix A of NZS 4431 shall be submitted to the Council for all lots within the subdivision that contain filled ground, prior to the issue of a Section 224 Conditions Certificate.

7.9 The consent holder is to submit a report and calculations detailing any filling proposed against existing boundaries and the mitigation proposed to avoid adverse effects on adjoining properties.

7.9 The construction details of any retaining wall required to retain fill are to be submitted to the Subdivisions Engineer for acceptance. The wall construction and materials are to be certified in addition to the NZS 4431 certification.

Access Formation

8.1 The access formation shall be designed and constructed in accordance with the CCC Infrastructure Design Standard. Physical works shall not commence until a Council engineering officer confirms that the Design Report, Plans and Design Certificate complying with clause 3.3.1 of the IDS and the Contract Quality Plan and Engineer's Review Certificate complying with clause 3.3.2 has been received by Council.

NES- Land contamination

9.1 The recommendations of the Detailed Site Investigation and Remediation Action Plan (Malloch Environmental Limited, May 2018) are to be followed. Upon conclusion of works a Site Validation Report shall be submitted to Council for acceptance prior to 224 approval.

9.2 Should there be any surplus soils that require disposal off site these cannot necessarily be considered clean fill and must go to an authorised facility. Evidence of this disposal is to be provided to Council by way of laboratory results, waste manifests and or weighbridge receipts within two months of the disposal. This may be delivered by email to envresourcemonitoring@ccc.govt.nz .

Transport/Roading

10.1 Right turn bay to be provided on Spencerville Road at the western road intersection (Road 1).

10.2 The intersection of Road 2 with Spencerville Road shall be designed to comply with Figure 13, Appendix 7.5.10

10.3 Access to Lots 16 and 17 shall be located at the apex of the bend on Spencerville Road.

10.4 Hidden access signs shall be installed on Spencerville Road with the final location to be confirmed with the Team Leader, Council Traffic Operations Team.

10.5 Planting on the inside of the curve of Road 3 shall be either below 1.1 metres in height or pruned/limbed to be above 1.8 metres.

10.6 No fencing on the inside of the curve of Road 3 shall be above 1.1metres in height.

10.7 Turning facilities to ensure a Council rubbish truck can turn at the southern end of Road 1 shall be constructed.

Stormwater

1. Stormwater generated from all allotments and roading constructed under this application shall discharge into a new stormwater mitigation system to be constructed within proposed Lot 100 on the approved plan. Unless approved by Council engineers, the system shall meet the requirements of the CCC Waterways, Wetlands and Drainage Guide (WWDG 2003 including Chapters 6, 21 and Appendix 10 updated 2011/12), the Infrastructure Design Standard (IDS 2017) and the Construction Standard Specifications (CSS 2017).

2. The applicant shall demonstrate that authorisation for construction phase stormwater discharge has been obtained from Environment Canterbury.

3. The consent holder shall obtain certification from the Christchurch City Council that the discharge of operational phase stormwater will comply with the conditions of the Council's operative stormwater network discharge consent, otherwise consent from the Canterbury Regional Council will be required.

4. The stormwater runoff from all allotments, reserves and roading areas shall be collected via channels, sumps, pipes or swales and discharged into a *sedimentation basin*. Unless otherwise approved by Council engineers, the *sedimentation basin* shall:
    a. have sufficient volume to capture the runoff resulting from the first 25mm of rain falling on impervious surfaces within the catchment;
    b. not exceed a depth of 1 metre average as measured from the basin floor to the design water surface;
    c. be designed with internal batter slopes averaging 1 metre vertical in 4 horizontal or flatter, and;
    d. discharge to a *stormwater wetland* via a controlled outlet.

5. Unless otherwise approved by Council engineers, the *stormwater wetland* shall:
    a. be sized using the Christchurch City Council Simplistic Method for Wetland Sizing (WWDG, p. 6-35);
    b. be designed with a variable permanent water depth of 250mm average;
    c. contain a live stormwater storage depth of 500mm;
    d. be protected from flooding of the 500mm live storage volume for storm events up to the ten year return interval.
    e. be designed with internal batter slopes averaging 1 metre vertical in 4 horizontal or flatter, and;
    f. discharge into Spencers Drain.

6. In addition to the above requirements, the stormwater management system shall be designed with sufficient volume to control peak discharges back to 'greenfields' flow rates for all storms up to and including the 2 percent annual exceedance probability storm event of critical duration for Spencers Drain. The parameters and coefficients used to model runoff hydrology shall be confirmed with Council engineers at the detailed engineering design phase.

7. The stormwater conveyance system shall be designed to ensure that even for events where the critical peak stormwater runoff flow rate occurs that all resulting first flush runoff shall actually reach the sedimentation basin. A combination of primary and secondary conveyance systems may be used to ensure this level of service is achieved.

8. Safe and adequate access to the surface water management and mitigation facilities for maintenance and sediment removal shall be provided and designed in accordance with WWDG Clause 6.8 & 6.9.

9. ~~A planted landscape buffer of average width 5 metres is to be established between all stormwater basins and private allotments as mitigation for the utility works. The buffer shall be measured from the property boundary to the edge of the critical two percent annual exceedance probability high water surface. Planting of the buffer zones shall be a cost of the development.~~

10. ~~Stormwater laterals are to be laid to at least 600mm inside the boundary of all lots at the subdivision stage. Unless otherwise approved by Council engineers, the laterals are to be laid at sufficient depth to ensure protection and adequate fall is available to serve the furthermost part of the lot.~~

11. ~~Any portions of allotments not captured in the stormwater management system shall have those areas protected by an easement or no-build covenant prohibiting structures and impervious surfaces.~~

12. The primary stormwater reticulation network shall be designed to convey (at minimum) the critical twenty percent annual exceedance probability storm event. No flooding of private property shall occur during the critical ten percent annual exceedance probability storm event and no flooding of buildings shall occur during the critical two percent annual exceedance probability storm event.

13. The designer of the surface water management system shall provide a report which identifies all secondary flowpaths proposed. All secondary flowpaths are to be protected by an easement in gross, if required.

14. The consent holder shall provide easements in gross over all public stormwater infrastructure located outside of legal road or utility reserve areas.

15. Engineering plans, specifications and calculations for the design and construction of all stormwater management infrastructure shall be submitted to the 3 Waters and Waste Planning and Resource Consents Units for acceptance.

16. The consent holder shall operate and maintain surface water management infrastructure to vest into Council for at least 12 months following the issue of the section 224(c) certificate, after such time Council may accept responsibility for operation and maintenance.

17. The applicant shall provide as-built plans of the surface water management systems and confirm that they have been constructed in accordance with the approved plans and comply with the IDS, particular Part 3: Quality Assurance and Part 12: As-Builts.

18. A maintenance and operations manual for all stormwater management systems shall be provided and shall form part of the engineering acceptance. This manual is to include a description of the activity, the design assumptions, maintenance schedule and monitoring requirements.

I have set out below proposed conditions for the land use consent providing for residential activity within areas outside the Resort Community Areas i.e. within the Golf Course and Open Space Activity Area. These conditions specify generally that the Resort Community standards apply except in specific circumstances.

Earthworks

1. The earthworks and construction work shall be under the control of a nominated and suitably qualified engineer.

2. Dust emissions shall be appropriately managed within the boundary of the property and in accordance with the *Regional Air Plan*. Dust mitigation measures such as water carts or sprinklers shall be used on any exposed areas. The roads to and from the site are to remain tidy at all times.

3. All loading and unloading of trucks with excavation or fill material shall be carried out within the subject site.

4. An approved Traffic Management Plan (TMP) shall be implemented for this earthworks / construction activity and no works are to commence until such time as the TMP has been installed. The TMP shall be prepared by an STMS accredited person and submitted to and approved by the Christchurch Transport Operation Centre – please refer to www.tmpforchch.co.nz.

5. The Erosion and Sediment Control Plan shall show the positions of all stockpiles on site. Temporary mounds shall be grassed or covered to prevent erosion until such time as they are removed. Topsoil stockpiles shall not exceed 2.0 m in height to protect the integrity of the soil microbes.

~~6. All filling and excavation work shall be carried out in accordance with an Environmental Management Plan (EMP) which shall include an Erosion and Sediment Control Plan (ESCP). Unless approved as part of a separate ECan resource consent for stormwater discharge or Ecan resource consent for excavation/filling the EMP will require formal acceptance by Christchurch City Council's Subdivision Engineer (email to rcmon@ccc.govt.nz) prior to any work starting on site. The accepted EMP shall be implemented on site over the construction phase and no works are to commence until such time as the EMP has been installed. The EMP shall be designed by a suitably qualified person and a design certificate (template available on request) supplied with the EMP for acceptance at least 5 days prior to the works commencing. The best practice principles, techniques, inspections and monitoring for erosion and sediment control shall be based on ECan's Erosion and Sediment Control Toolbox for Canterbury http://esccanterbury.co.nz/. The EMP shall include (but is not limited to):~~

- ~~The identification of environmental risks including erosion, sediment and dust control, spills, wastewater overflows, dewatering, and excavation and disposal of material from contaminated sites;~~
- ~~A site description, i.e. topography, vegetation, soils, etc;~~
- ~~Details of proposed activities;~~
- ~~A locality map;~~
- ~~Drawings showing the site, type and location of sediment control measures, on-site catchment boundaries and off-site sources of runoff;~~

- ~~Drawings and specifications showing the positions of all proposed mitigation areas with supporting calculations if appropriate;~~
- ~~Drawings showing the protection of natural assets and habitats;~~
- ~~A programme of works including a proposed timeframe and completion date;~~
- ~~Emergency response and contingency management;~~
- ~~Procedures for compliance with resource consents and permitted activities;~~
- ~~Environmental monitoring and auditing, including frequency;~~
- ~~Corrective action, reporting on solutions and update of the EMP;~~
- ~~Procedures for training and supervising staff in relation to environmental issues;~~
- ~~Contact details of key personnel responsible for environmental management and compliance.~~

~~Note: IDS clause 3.8.2 contains further detail on Environmental Management Plans.~~

7. No earthworks shall commence on site prior to completion and presentation to Council of an Engineering Completion Certificate (IDS – Part 3, Appendix VII), signed by an appropriately qualified and experienced engineer. This is to certify that the erosion and sediment control measures have been properly installed in accordance with ECan's Erosion and Sediment Control Toolbox for Canterbury for the work proposed on site.

8. The fill sites shall be stripped of vegetation and any topsoil prior to filling. The content of fill shall be clean fill.

9. Unstabilised earthworked areas shall not exceed 5 ha at any time.

10. Where existing natural drainage patterns are significantly altered or cut off due to fill placed to building platforms, alternative overland flow paths shall be created and protected where these cross downstream properties.

11. Filling placed within the Flood Ponding Management Area shall be balanced by compensatory storage (cut) volumes within that area. Surplus cut material shall not be placed within Flood Ponding Management Area.

12. All filling exceeding 300mm above excavation level shall be in accordance with the Code of Practice for Earthfill for Residential Purposes NZS 4431:1989. At the completion of the work an engineering report including a duly completed certificate in the form of Appendix A of NZS 4431 shall be submitted to Council at rcmon@ccc.govt.nz for all lots within the subdivision that contain filled ground.

13. At the completion of the earthworks operations, the berm areas outside the line of the roadway construction shall be sown down with grass seed.

14. All bared surfaces shall be adequately topsoiled and vegetated as soon as possible to limit sediment mobilisation.

15. Should the Consent Holder cease or abandon work on site for a period longer than 6 weeks, or be required to temporarily halt construction during earthworks, they shall at first take adequate preventative and remedial measures to control sediment discharge / run-off and dust emission, and shall thereafter maintain these measures for as long as necessary to prevent sediment discharge or dust emission from the site.

Geotechnical

1. Liquefaction Hazard and Lateral Spread Mitigation

All liquefaction hazard and lateral spread mitigation on site shall be designed in accordance with the recommendations in the Tonkin and Taylor Geotechnical Assessment for Proposed Subdivision – Whisper Creek dated 22 December 2017.

2. Asset Design and Construction

All infrastructural assets to be vested in the Council shall be designed and constructed in accordance with the IDS 2016 and the Construction Standard Specifications (CSS).

In addition to the above, to be considered suitable in terms of section 106(1A)(a) and (b) of the Resource Management Act, all proposed infrastructure shall be designed to resist the effects associated with earthquake induced liquefiable soils and lateral spread from a seismic event as defined below.

To mitigate liquefaction (vertical settlement) hazards and lateral spread (horizontal displacement), any proposed asset structures shall be designed for a seismic event with a "1 in 25 year period of return" under the serviceability limit state (SLS) and with a "1 in 500 year period of return" for the ultimate limit state (ULS) as defined by NZS 1170.5:2004.

Beyond a SLS seismic event, it is recognised asset structures may become progressively less serviceable.

Note: Asset structures shall include but not be limited to gravity and pressure pipelines, manholes, chambers, valves, hydrants, stormwater treatment devices, culverts or any other physical asset to be vested in Council including road pavements. Bridges and pump stations shall be designed to importance level 3 (IL3) as defined in NZS 1170.

3. Ground Improvement

Site earthworks to the residential building platforms shall be carried out to provide a minimum finished ground level of 12.0m RL (CDD), to maintain the crust thickness assumed in the geotechnical assessment and so the technical category TC2 equivalence at a minimum. The technical category will be confirmed in the Geotechnical Completion Report prepared for the section 224(c) certificate under condition ?6?.

4. Foundation Design

Any structure requiring a Building Consent, in terms of Building Act provisions, shall have specific foundation design by a suitably experienced chartered engineer or by an appropriately qualified geotechnical engineer. The design shall take into consideration the potential for liquefaction and associated effects (vertical settlement and lateral spread) and shall be investigated and categorised in accordance with MBIE Guidelines '*Repairing and rebuilding houses affected by the Canterbury earthquakes*' (3rd Edition 15 March 2017) or subsequent revisions.

Note: The Tonkin and Taylor Geotechnical Assessment for Proposed Subdivision – Whisper Creek dated 22 December 2017 recommends either a concrete waffle slab to Option 4 or timber floor foundations for TC2 land, to MBIE guidelines '*Repairing and rebuilding houses affected by the Canterbury earthquakes*' (2012) Part A clause 5.

Note: These requirements are contingent upon TC1 and TC2 land equivalence being achieved by the proposed earthworks and remediation works. Should the land not be brought to the indicated level by site earthworks / remediation the wording of the consent notices will differ according to the technical category to which the land is equivalent.

This is an ongoing condition which will be secured by consent notice.

5. Consent Notice

That a consent notice in terms of Section 221 of the Resource Management Act be registered on the titles for all lots that are categorised in the Final Geotechnical Report as TC2 land.

If for any reason lots are given a Geotechnical Technical Category 3 Classification, these lots should be withdrawn from the development and shown as balance lots that do not met the requirements of Section 106 of the Resource Management Act without further mitigation measures being undertaken.

6. Geotechnical Completion Report

Prior to the request for the section 224 certificate the Consent Holder shall supply a Final Geotechnical Report, including on the mitigation measures put in place during the construction phase to minimise both the liquefaction and lateral spread potential of the land during the SLS and a ULS seismic event in condition x2x. The report shall recommend the Technical Category of the land in terms of the MBIE guidance document '*Repairing and Rebuilding Houses Affected by the Canterbury Earthquakes*' and include a Statement of Professional Opinion on the Suitability of Land for Building Construction, using the template in IDS Part 4 Appendix II.

1. Local Purpose (Utility) Reserves

1.1 Lot 100 is to be vested as Local Purpose (Utility) Reserves and hold no credits towards the final Reserve Development Contributions assessment.

The agreed developments on the 'Accepted' landscape plans for Lot 100 is to hold no credit against the Reserve Development Contributions.

Advice note: Any proposed easements across the Local Purpose (Utility) reserve will need to be made to the Council's Reserves Officer Subcommittee for approval, prior to the issue of 224C.

2. Design and Development of reserves and streetscapes

2.1 Landscape plans for the reserve (Lot 100), and streetscapes are to be submitted as part of the Landscape Design Report to the Asset and Network Unit (Parks) for acceptance. All landscaping is to be carried out in accordance with the Accepted plan.

2.2 Where the Consent Holder has applied to vest assets as detailed on Accepted Landscape Plans, but the Asset and Network Unit (Parks) have not agreed to the value of the assets being credited against the Reserve Development Contributions or to reimburse the value of the assets to the Consent Holder, then the Consent Holder may vest the assets at their own expense.

2.3 The Landscape Design Report and plans are to provide sufficient detail to confirm compliance with the requirements of the IDS, the CSS: and the WWDG: 2003. All landscaping required by this condition is to be carried out in accordance with the accepted report and plan(s) at the Consent Holder's expense, unless otherwise agreed. The Consent Holder shall maintain the works for 12 months for the Establishment Period (Maintenance and Defects Period) from the time of issue of the Section 224 Certificate.

3. Establishment Period (Defects Liability Period)

3.1 The Establishment Period (Defects Maintenance) for Lot 100 will include an inspection by Parks Operations staff after the first 6 months. Any diseased, dead or replacement plantings are to be replaced at the Consent Holder's expense. The Establishment Period and the term on the bond shall be extended by a further 12 months for the replacement planting(s). Refer: CSS, Section Establishment. The Consent Holder is to keep an accurate and up-to-date monthly report on plant and tree conditions during the Establishment Period of the works undertaken. The report shall be submitted, if requested, by the Engineer within five days of the end of each month during the Establishment Period (Refer sample report: *Landscape Construction Monthly Establishment Report,* CSS, Part 7 Appendix 1).

~~3.2 The Consent Holder shall enter into a separate bond with Council Asset & Network Unit (Parks) Team to the value of 50% of the cost to replace and replant all plants on the recreation reserves. The bond shall be held for the Establishment Period of a minimum of 12 months and shall be extended by a further 12 months for the replacement planting(s), if required. The bond shall be released after the plants have been inspected and Accepted by the Council Parks Operation staff~~.

4. Street Trees

4.1 The Consent Holder shall submit a plan(s) for proposed street trees to the Council's Asset & Network Unit (Parks) Team for acceptance. The plan(s) are to provide sufficient details to confirm compliance with the requirements of the IDS (current version) and the CSS Part 7: Landscapes (current version). All street tree works are to be carried out in accordance with the accepted report and plan(s) at the Consent Holder's expense. The Consent Holder shall maintain the street trees for 12 months Establishment Period (Defects Maintenance) from the time the trees have been planted up until the final inspection and acceptance of the trees by the Council Parks Operations staff. The Establishment Period and the term of the bond shall be extended by a further 12 months for the replacement planting(s), if required.

~~4.2 The Consent Holder is to keep an accurate and up-to-date monthly report on tree conditions and establishment works undertaken. The report shall be submitted, if requested, by the Engineer within five days of the end of each month during the Establishment Period (Refer sample report: *Landscape Construction Monthly Establishment Report,* CSS, Part 7 Appendix 1).~~

4.3 The Consent Holder shall enter into a separate bond with Council Asset & Network Unit (Parks) Team to the value of 50% of the cost to replace and replant all street trees. The bond shall be held for the Establishment Period of a minimum of 12 months and shall be extended by a further 12 months for the replacement planting(s), if required. The bond shall be released after the trees have been inspected and Accepted by the Council Parks Operation staff.

5. Final Completion / Handover

5.1 The Consent Holder shall submit, if requested, the required completion documentation in accordance with IDS Part 2:2.12 Completion of Land Development Works and the Quality Assurance System to provide evidence that the work is completed in accordance with the agreed standards and conditions of this consent. This is to be submitted, if requested, on completion of the 12 month Establishment Period, prior to formal handover to Council and release of the Establishment Bond.

6. As – Builts

6.1 The Consent Holder shall submit As-Built plans showing street tree species and locations and confirm that they have been planted in accordance with the accepted plans and comply with the IDS, in particular Part 12 (As Builts).

LAND USE CONSENT – CONDITIONS PROPOSED BY APPLICANT

1. All residential activity in lots or parts of lots which are not within a Community Resort Activity Area shall comply with the Resort Community Activity Area Built form standards except as set out in conditions 2 and 3.

2. The minimum building setbacks shall be as follows
   a. Setback from Spencerville Road is 10metres
   b. Setback from the Zone boundary is 20m except as provided for in a. above.
   c. Setback from all other boundaries is 5m

3. Other than for Lot 17, no vehicle access shall gained from Spencerville Road

Responses to request for information from Sean Ward dated 27 February 2018 – RMA/2018/176

Transport:

The applicant requested TDG to prepare Scheme Design Safety Audit addressing the four transportation matters set out below. The designer of the roading for the Whisper Creek subdivision (Andy Hall of DLS) has provided comments on these matters in the Audit which has now been forwarded to the Council transportation engineers. We have attached this Audit in response to this request.

1. *Please provide a scheme design safety audit - particularly regarding non-complying access to Spencerville Road (Rule 13.9.5.3.1) with 2 roads proposed and 2 individual site access. Individual property access to 80kph road with limited sight lines due to bend in road - Rule 7.4.3.8(g).*

2. *Please provide an assessment of the effect of the proximity of the two proposed roads to each other on an 80kph frontage road - Rule 7.4.3.8(d).*

3. *Road widening is likely required for safe access from Spencerville Road, Rule 7.4.3.8(b). Minimum requirement would be Appendix 7.5.10, Figure 14 and with 70 lots (can any of these be subdivided in future) would probably require a full right turn facility on Spencerville Road and left slip lane. The safety audit above should address these matters.*

4. *There is a further non-compliance with Rule 8.6.4 with local road serving more than 20 residential units providing only one footpath. Please provide an assessment of effects of this non-compliance, the matter may also be addressed in the scheme safety audit.*

Spencerville Road:
The request noted that a formed section of Spencerville Road runs across the north-west corner of the site and that it is assumed that this land will be vested to Council as legal road as part of this subdivision.

Comment: If the Council wish to acquire this land the applicant is happy to discuss this possibility.

Stormwater: - Comments by Andy Hall

1. *The Infrastructure Report states that a Runoff Coefficient of 0.35 has been used for the development. Is this a first flush coefficient, a 2% AEP coefficient or what? How did they arrive at this number…I note it is lower than that used for L1 zoning. It is more in line with a rural use.*

   Comment: The C of 0.35 is for the first flush calculation. If we reference Table 6-10 of the Waterways Wetlands and Drainage Guide, there is no C for this rural residential type development. The Living Hills zone is 0.38 but I believe that we are lower than that so have assumed 0.35.

2. *The farm drains that will receive the discharge from this development are not well mapped or understood. It is unclear if these are Council or private drains. Can the applicant please elaborate on the ownership and easement rights in relation to the drains and map out how they get to the Styx (and whether or not they cross other private property).*

   Comment: The site will drain into a small tributary of Spencers Drain. Please refer to the attached Davie Lovell-Smith plan titled “Spencers Drain”. The water then drains north across Spencerville Road for a distance of approximately 1.35km before entering the Styx River opposite 969 Lower Styx Road. Spencers Drain is covered by easements in favour of CCC all the way to where it

connects to the Styx River – refer attached Deposited Plans 9363 and 5889 and associated title documents. An easement will be placed over the tributary as part of this development.

3. *The application states that Council will likely be looking for "Partial Detention" in accordance with the Styx SMP. This is true, however I don't believe this area of land was included in the original Styx SMP modelling. If we go with partial detention, there is the potential also that increased discharges to waterways which have insufficient capacity may have adverse local flooding effects. My hunch is that the effects will be minimal due to the fact that the downstream land is rural, low lying and already floods. Can the applicant comment on this matter*?

   Comment: We agree that the area is low lying and flood prone. It is also subject to tidal variations. When considering all of this, we would suggest that the adverse effects of this development on the area are minimal.

4. *Some of the large lots (26, 31, 32, 48, etc) will not be entirely picked up in the stormwater system. Will the areas of land that drain away from the network have any development on them? Will all roof and hardstand be able to be captured in the network*?

   Comment: Building platforms above the flood plain will be constructed on the Eastern side of those lots and close to the roadway infrastructure. The majority of the hard stand will be in this area and will drain to the basins. The balance areas of the lots will be rural in nature and stormwater will follow natural flow paths.

Water and Wastewater: - Comments by Andy Hall

1. ***Water:*** *The IDS for restricted water supply will apply i.e. "Design any rural restricted supply to provide 3 m3/day for each property. Provide each property with a restrictor at the time of connection that will pass 1, 2 or 3m^3 over a 24-hour period, depending on the volume applied under a building consent." Council will most likely only approve 1 m^3 per property per day.*

   Therefore to state in the application that each property will receive 6,171 litres per day, will be in contradiction to the IDS.

   The figure of 5 l/s in preliminary response was based on an initial query for 160 lots at a 'design requirement' of 3 m^3 per property.
   Comment: The Applicant requests to have 3m³/day/property as based on the original advice?

2. ***Wastewater:*** *All local pressure sewer systems to be vested in Council will be supplied with IOTA One Box Controllers – this will be included as Consent Notices.*
   Comment: Agreed

3. ***Wastewater:*** *The design of the pressure sewer main must be supported by detailed hydraulic calculations and assumptions regarding the maximum number of simultaneous operations.*
   Comment: Agreed

4. ***Wastewater:*** *The issue of odour treatment is not addressed at all – how and where will odour treatment be incorporated / located?*
   Comment: We are happy to take advice from CCC as to the odour control. We would suggest a charcoal/carbon filter in the berm at the intersection of Spencerville Road and Lower Styx Road. Due to the flooding nature of the area, a bark bed may prove to be cumbersome.

Patricia Harte and Andy Hall – 11 April 2018

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.

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:
Whisper Creek Project

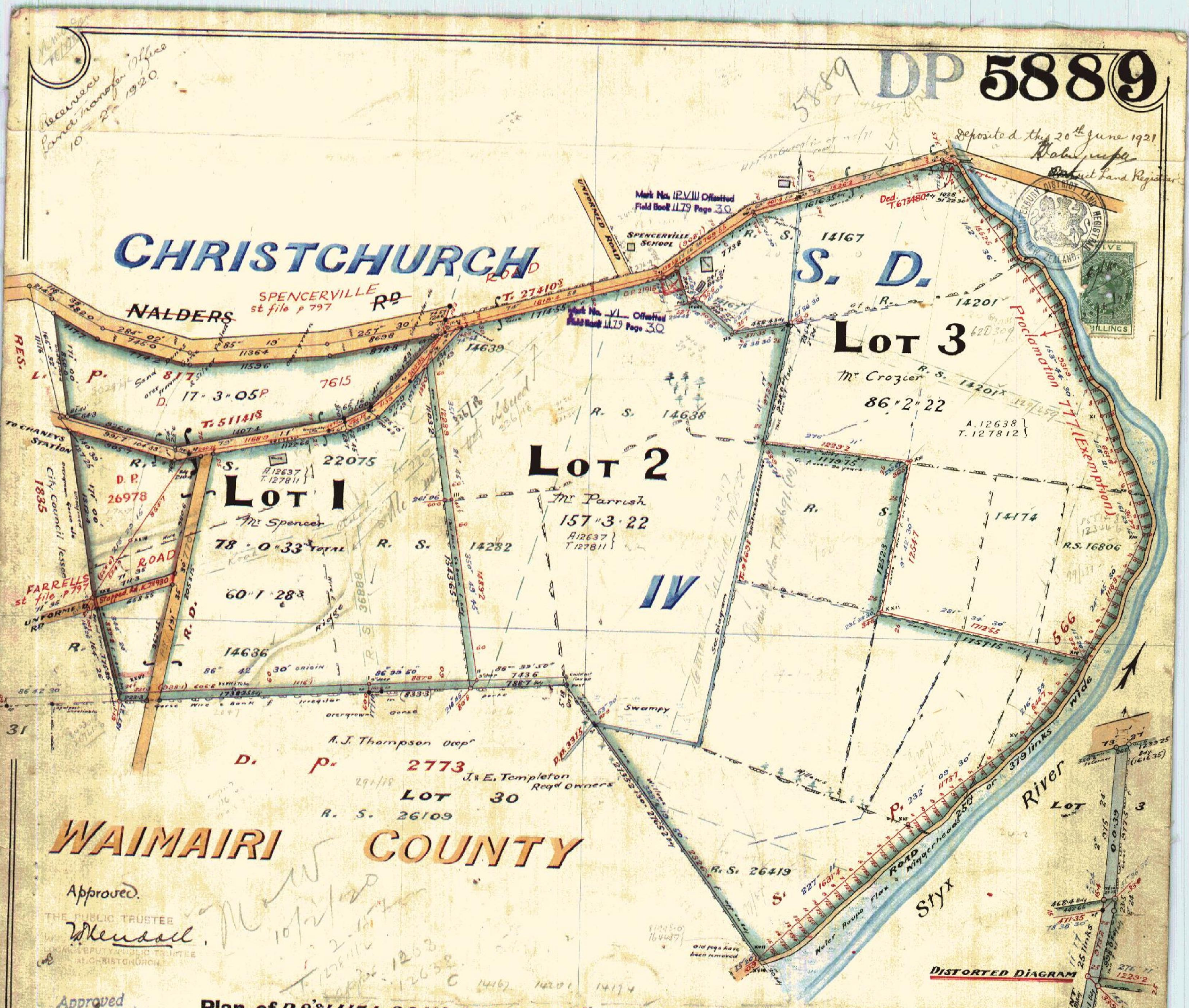
SHEET TITLE:
Spencers Drain

DRAWING STATUS
For Discussion Purposes

SCALE : 1:5000@A1 1:10000@A3
DATE : March 2018

CAD FILE : J:\19432\Eng\Drawings\SW Concept.dwg
REVISION : R0

DRAWING No : **H.19432**
SHEET No: 1 OF 1



Approved.

THE PUBLIC TRUSTEE

W. Kendall

LOCAL DEPUTY PUBLIC TRUSTEE AT CHRISTCHURCH

Approved

G H Bullard

Chief Surveyor.

Date 16/6/21

Plan of *R.S.'s 14174, 26419, 16806, 14201x, 14167IV, Pt 14638, 14282, 22075, 14636 14639, 14167, 14201, 36888*

Comprised in *Pt C.T. 131f218 Old Deeds 185 D.12 now 335/50 - 336/212*

Surveyed by *Fred. W. Freeman* **, Licensed Surveyor,** *August* **, 1919**

Correct W. C. Laverredge

DECLARATION.

SCALE: 5 chains to an inch.

I, *Fred. W. Freeman*, of *Christchurch*, Licensed Surveyor, do solemnly and sincerely declare that this plan has been made from surveys executed by me, and that both plan and survey are correct, and have been made in accordance with the regulations of the Surveyors' Board, dated the 8th day of August, 1907.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Justices of the Peace Act, 1908.

Declared at *Christchurch*, this *18* day of *October*, 19*19* before me,—

Fred W. Freeman
Licensed Surveyor.

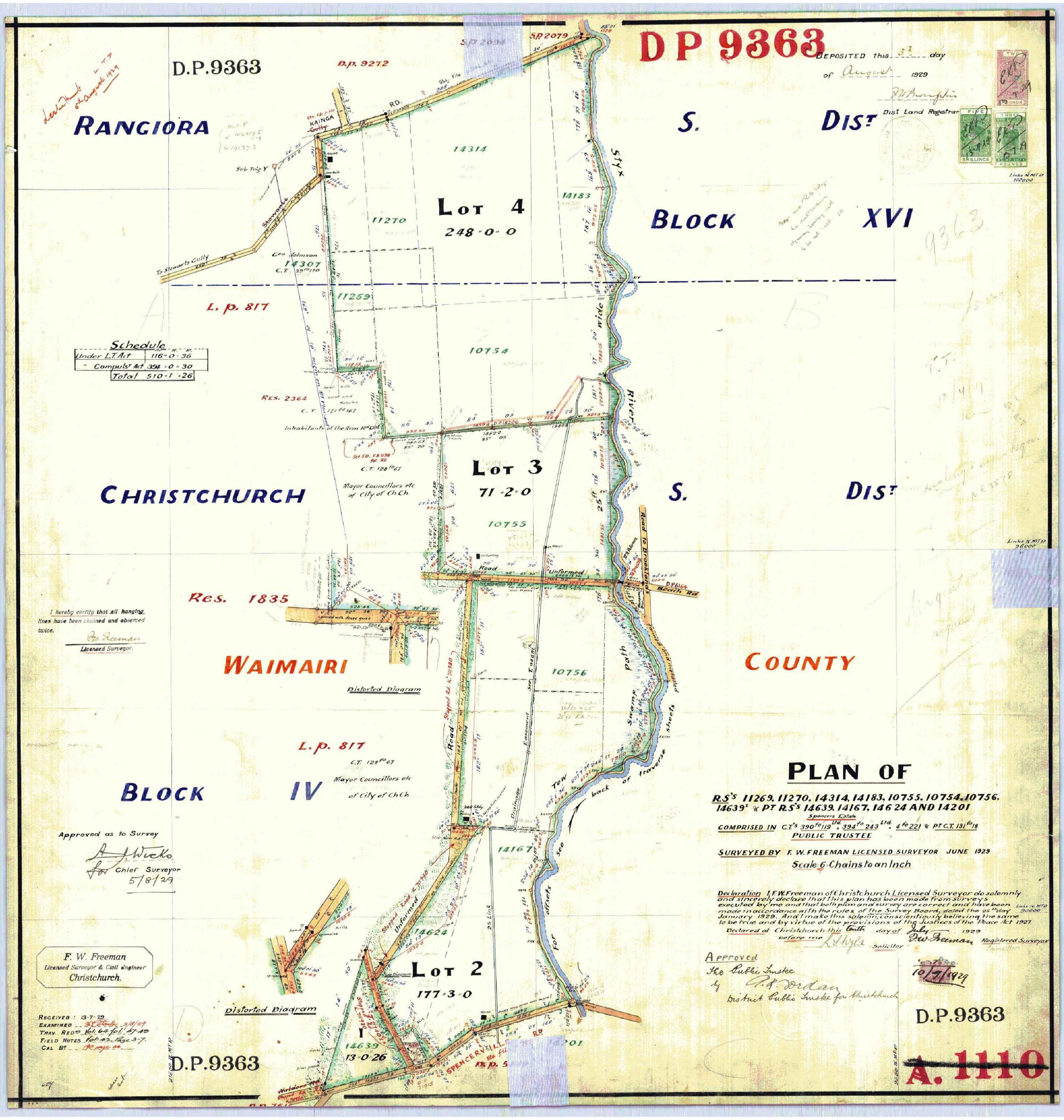
James Anderson
Justice of the Peace [or Solicitor, or Notary Public].

Sols & Surveyor notified 20/6/21

473

5889

~~B4547~~



DP 9363
D.P.9363
Deposited this 5th day of August 1929
Dist. Land Registrar
Links N.MTR 102000
RANGIORA
S. DIST.
BLOCK XVI
D.p. 9272
S.P. 2094
S.P. 2079
KAINGA
RD.
Sub Trig Y
To Stewarts Gully
Geo Johnson
14307
C.T. 39 fo 170
14314
14183
11270
LOT 4
248 - 0 - 0
Styx
11269
L. p. 817
10754
Schedule
Under L.T. Act 116 - 0 - 36
" Compuls^y Act 394 - 0 - 30
Total 510 - 1 - 26
Res. 2364
C.T. 171 fo 167
Inhabitants of the Avon R^d Dist.
C.T. 128 fo 67
Mayor Councillors etc of City of Ch.Ch.
CHRISTCHURCH
LOT 3
71 - 2 - 0
10755
River
25 ft wide
S. DIST.
Road
Unformed
Road to Brooklands
Beach Rd
D.P. 6164
Res. 1835
I hereby certify that all hanging lines have been chained and observed twice.
F.W. Freeman
Licensed Surveyor.
WAIMAIRI
COUNTY
Distorted Diagram
10756
Easement
Drainage
Swamp
Tow path
See back of traverse sheets for offsets
L.p. 817
C.T. 128 fo 67
Mayor Councillors etc of City of Ch.Ch.
BLOCK IV
Stopped Rd. K. 711930
Approved as to Survey
A. J. Wicks
for Chief Surveyor
5/8/29
14167
14624
Unformed
25 Link
F. W. Freeman
Licensed Surveyor & Civil Engineer
Christchurch.
LOT 2
177 - 3 - 0
1
14639
13 - 0 - 26
Distorted Diagram
SPENCERVILLE RD
14201
Received : 13-7-29
Examined 3/8/29
Trav. Red^ns Vol. 64 fol. 47-49
Field Notes Vol. 43, Page 3-7.
Cal. B^r 190 page 44
D.P.9363
PLAN OF
R.S's 11269, 11270, 14314, 14183, 10755, 10754, 10756, 14639^x & P^t R.S's 14639, 14167, 14624 AND 14201
Spencers Estate
COMPRISED IN C.T.'s 390 fo 119 Ltd., 394 fo 243 Ltd., 4 fo 221 & P^t C.T. 131 fo 18
PUBLIC TRUSTEE
SURVEYED BY F. W. FREEMAN LICENSED SURVEYOR JUNE 1929
Scale 6 Chains to an Inch
Declaration I, F.W. Freeman of Christchurch Licensed Surveyor do solemnly and sincerely declare that this plan has been made from surveys executed by me and that both plan and survey are correct and have been made in accordance with the rules of the Survey Board, dated the 25th day January 1929. And I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the Justices of the Peace Act 1927
Declared at Christchurch this tenth day of July 1929
before me L. S. Hyde Solicitor
F.W. Freeman Registered Surveyor
Approved
The Public Trustee
by P. R. Jordan
District Public Trustee for Christchurch
10/7/1929
D.P.9363
A. 1110

QuickMap Title Details

Information last updated as at 03 Apr 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier	**603603**
Land Registration District	**Canterbury**
Date Issued	26 June 2013

Prior References

CB421/285 CB7A/1352

Type	Fee Simple
Area	75.0813 hectares more or less
Legal Description	Lot 2 Deposited Plan 460430

Proprietors

Murray Christopher Wakelin as to a 1/2 share
John Nicholas Rundle, Jenny Marie Wakelin, Karen Fay Wakelin and Murray Christopher Wakelin as to a 1/2 share

Subject to drainage and other rights (in gross) over part marked A on DP 460430 in favour of the Waimairi County Council created by Deed of Easement 113117 (179/537)

QuickMap Title Details

Information last updated as at 03 Apr 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier **CB778/48** **Part-Cancelled**

Land Registration District **Canterbury**

Date Issued 03 December 1958

Prior References

CB423/28

Type Fee Simple

Area 99.0165 hectares more or less

Legal Description Part Lot 4 Deposited Plan 9363

Proprietors

Raymond Anthony Winter

113117 (179D537) Deed of Easement in gross

Type	Servient Tenement	Easement Area	Grantee
Drainage and other rights	Part Lot 4 Deposited Plan 9363 - herein	Part herein	The Waimairi County Council

963267.1 Compensation Certificate pursuant to Section 19 Public Works Act 1981 - 5.11.1991 at 9.28 am

988625.1 Gazette Notice declaring part (1265 square metres) of the within land to be acquired for road and shall vest in the Christchurch City Council - 15.4.1992 at 9.11 am

QuickMap Title Details

Information last updated as at 03 Apr 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier	**CB12F/259**
Land Registration District	**Canterbury**
Date Issued	10 April 1973

Prior References

CB421/286

Type	Fee Simple
Area	20.8413 hectares more or less
Legal Description	Part Lot 3 Deposited Plan 9363

Proprietors

Raymond Anthony Winter

113117 (179/537) Deed of Easement in gross

Type	Servient Tenement	Easement Area	Grantee
Drainage and other rights	Part Lot 3 Deposited Plan 9363 - herein	Part herein	The Waimairi County Council

QuickMap Title Details

Information last updated as at 03 Apr 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier	**CB12F/258**
Land Registration District	**Canterbury**
Date Issued	10 April 1973

Prior References

CB421/286

Type	Fee Simple
Area	8.0937 hectares more or less
Legal Description	Lot 1 Deposited Plan 29838

Proprietors

Raymond Anthony Winter

113117 (179/537) Deed of Easement in gross

Type	Servient Tenement	Easement Area	Grantee
Drainage and other rights	Lot 1 Deposited Plan 29838 - herein	Part herein	The Waimairi County Council

QuickMap Title Details

Information last updated as at 03 Apr 2018

COMPUTER FREEHOLD REGISTER
DERIVED FROM LAND INFORMATION NEW ZEALAND

Identifier	**CB9B/730**
Land Registration District	**Canterbury**
Date Issued	02 December 1969

Prior References

CB335/50

Type	Fee Simple
Area	35.0015 hectares more or less
Legal Description	Part Lot 3 Deposited Plan 5889

Proprietors

Ross Frederick Christopher Winter as to a 1/3 share
Karen Anne Winter as to a 1/3 share
Janice Helen Winter as to a 1/3 share

94691 Transfer creating the following easements in gross

Type	Servient Tenement	Easement Area	Grantee	Statutory Restriction
Drain	Part Lot 3 Deposited Plan 5889 - herein	part herein	The Waimairi County Council	

113117 (179/537) Deed of Easement in gross \

Type	Servient Tenement	Easement Area	Grantee	Statutory Restriction
Drain	Part Lot 3 Deposited Plan 5889 - herein	Part herein	The Waimairi County Council	

777 Order in Council imposing Building Line Restriction - 09.06.1921

Davie Lovell Smith

Whisper Creek

Scheme Design Stage
Road Safety Audit Report

April 2018

TDG Ref: 15396 rsa 180405 whisper creek subdivision.docx

Davie Lovell Smith

Whisper Creek

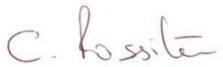
Road Safety Audit Report

Quality Assurance Statement

Prepared by:

Chris Rossiter

Principal Transportation Engineer



Reviewed by:

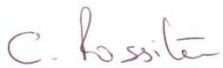
Andrew Leckie

Project Transportation Engineer

Approved for Issue by:

Chris Rossiter

Principal Transportation Engineer



Status: FINAL

Date: 5 April 2018

PO Box 256, Christchurch 8140
New Zealand

P: +64 3 348 3215

www.tdg.co.nz

Table of Contents

1. Background

1.1 Scope of Audit

Davie Lovell Smith (DLS) has prepared subdivision plans for land that forms part of Lot 2 DP 5889 on the southern side of Spencerville Road, north of Christchurch. The land forms part of the Special Purpose (Golf Resort) zone set out in the Christchurch District Plan. The proposed subdivision will create four new roads to be vested with Christchurch City Council (CCC), two recreation reserves to be vested with CCC and 70 residential lots. Access to the subdivision is proposed via two new intersections on Spencerville Road.

CCC has requested that a road safety audit of the concept plans be completed and that the audit addresses the following matters.

1) Please provide a scheme design safety audit - particularly regarding non-complying access to Spencerville Road (Rule 13.9.5.3.1) with 2 roads proposed and 2 individual site access.

2) Individual property access to 80kph road with limited sight lines due to bend in road - Rule 7.4.3.8(g).

3) Please provide an assessment of the effect of the proximity of the two proposed roads to each other on an 80kph frontage road - Rule 7.4.3.8(d).

4) Road widening is likely required for safe access from Spencerville Road, Rule 7.4.3.8(b). Minimum requirement would be Appendix 7.5.10, Figure 14 and with 70 lots (can any of these be subdivided in future) would probably require a full right turn facility on Spencerville Road and left slip lane.

1.2 Documents Provided

The SAT has been provided with the following documents for this audit:

- Davie Lovell Smith Drawing Set E19432, revision R8

The plans do not include any indicative road cross-section designs or footpath alignments. It is recommended that these are subject of a road safety audit at the detailed design stage for the roads.

1.3 Safety Audit Procedure

A road safety audit is a term used internationally to describe an independent review of a future road project to identify any safety concerns that may affect the safety performance. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.), carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, that is, minimisation of death and serious injury. The road safety audit is a safety review used to identify all areas of a project that are inconsistent with a safe system and bring those concerns to the attention of the client in order that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a road safety audit is summarised as:

> *To deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project.*

A road safety audit should desirably be undertaken at project milestones such as:

- Concept Stage (part of Business Case);
- Scheme or Preliminary Design Stage (part of Pre-Implementation);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A road safety audit is not intended as a technical or financial audit and does not substitute for a design check on standards or guidelines. Any recommended treatment of an identified safety concern is intended to be indicative only, and to focus the designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the "*NZTA Road Safety Audit Procedures for Projects Guideline",* the audit report should be submitted to the client who will instruct the designer to respond. The designer should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team recommendation that is accepted, the client shall make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations to be completed by the designer, safety engineer and client for each issue documenting the designer response, client decision (and asset manager's comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer's response to the client and the client's decision on each recommendation shall be given to the road safety audit team leader as part of the important feedback loop. The road safety audit team leader will disseminate this to team members.

1.4 The Safety Audit Team

The road safety audit was carried out in accordance with the "*NZTA Road Safety Audit Procedure for Projects Guideline – Interim Release May 2013"*, by the following Safety Audit Team (SAT):

- Chris Rossiter, Principal Transportation Engineer, TDG; and,
- Andrew Leckie, Project Transportation Engineer, TDG

The safety audit team undertook an initial desktop audit and a site visit on Thursday 29 March 2017. The site visit was completed during the day with fine weather conditions.

1.5 Report Format

The potential road safety problems identified have been ranked as follows:

The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and type of vehicle involved.

Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the Concern Assessment Matrix in **Table 1** below.

The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Severity (Likelihood of Death or Serious Injury Consequence)	**Frequency (Probability of a Crash)**			
	Frequent	**Common**	**Occasional**	**Infrequent**
Very Likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very Unlikely	Moderate	Minor	Minor	Minor

Table 1: Concern Assessment Matrix

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each concern category is given in **Table 2** below.

Concern	Suggested action
Serious	Major safety concern that must be addressed and requires changes to avoid serious safety consequences
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor concern that should be addressed where practical to improve safety

Table 2: Concern Categories

In addition to the ranked safety issues it is appropriate for the safety audit team to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. A comment may include items where the safety implications are not yet clear due to insufficient detail for the stage of project, items outside the scope of the audit such as existing issues not impacted by the project or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instances suggestions may be given by the auditors.

1.6 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SAT. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report. Safety audits do not constitute a design review or an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

2. Safety Audit Findings

2.1 Spencerville Road Intersections

2.1.1 Western Intersection – Sight Distance Minor

The Austroads Guide to Road Design Part 4A sets out recommended minimum sight distance requirements for new intersections. Spencerville Road has a speed limit of 80km/h and the corresponding minimum Safe Intersection Sight Distance requirement is 180m based on a 2 second reaction time. This reduces to 133m under the Extended Design Domain criteria.

The available sight distance to the east from the western intersection exceeds 200m but the sight distance to the west is constrained by trees to 170m. It has been noted that the plans suggest that the road carriageway has been constructed outside of the legal road reserve and it was not clear during the site inspection whether the fence line followed the legal boundary and there is some uncertainty regarding the sight distance.

Observations of passing vehicles indicated that the typical speed was less than 80km/h but there were insufficient vehicles to determine an 85th percentile speed with confidence.

Overall, it was considered that the available sight distance to the west was acceptable but could be improved by removing some trees on the inside of the curve in the road.

Recommendation:

Update road reserve boundaries to reflect the existing road alignment.

Ensure that any planting within the road reserve is maintained below a maximum height of 1m.

Ensure that any trees planted close to the road reserve boundary are managed so that they do no obstruct required sight lines.

Frequency Rating:	**Infrequent**	*Severity Rating*:	**Unlikely**

Designer Response: *We can confirm that the road seal encroaches into the applicants land by approximately 1.2m. The existing fence is up to 6.5m inside the applicants land. CCC may be interested in purchasing this small triangle and we would be happy to discuss this with them. It is confirmed that there will not be any planting in the berm as part of this application.*

Safety Engineer:

Client Decision:

Action Taken:

2.1.2 Intersection Separation Minor

The Austroads Guide to Road Design Part 4 recommends that there is a minimum of five seconds travel time between intersections. At 80km/h, this represents a distance of 111m and 125m at 90km/h. The plans provided show the two proposed intersections on Spencerville Road separated by a distance of 130m.

Since the proposed intersection separation exceeds the Austroads minimum requirement, and Spencerville Road has a straight and level alignment between the intersections, this is considered acceptable.

The proposed alignment of the subdivision road on approach to the eastern intersection is not straight and meets Spencerville Road at an angle. It is desirable for new intersections to be formed at right angles where possible as this maximises visibility in all directions and ensures that all turning manoeuvres are simple.

Recommendation:

Straighten the southern approach to the eastern intersection while ensuring that the intersection separation remains greater than 125m.

Frequency Rating:	**Infrequent**	*Severity Rating*:	Unlikely

Designer Response: *The angle of the eastern entrance will be made perpendicular to the existing road boundary*

Safety Engineer:

Client Decision:

Action Taken:

2.1.3 Road Widening Moderate

Spencerville Road has a carriageway width of about 6.5m along the frontage to the proposed subdivision. No details have been provided regarding any proposed alterations to Spencerville Road to accommodate turning traffic.

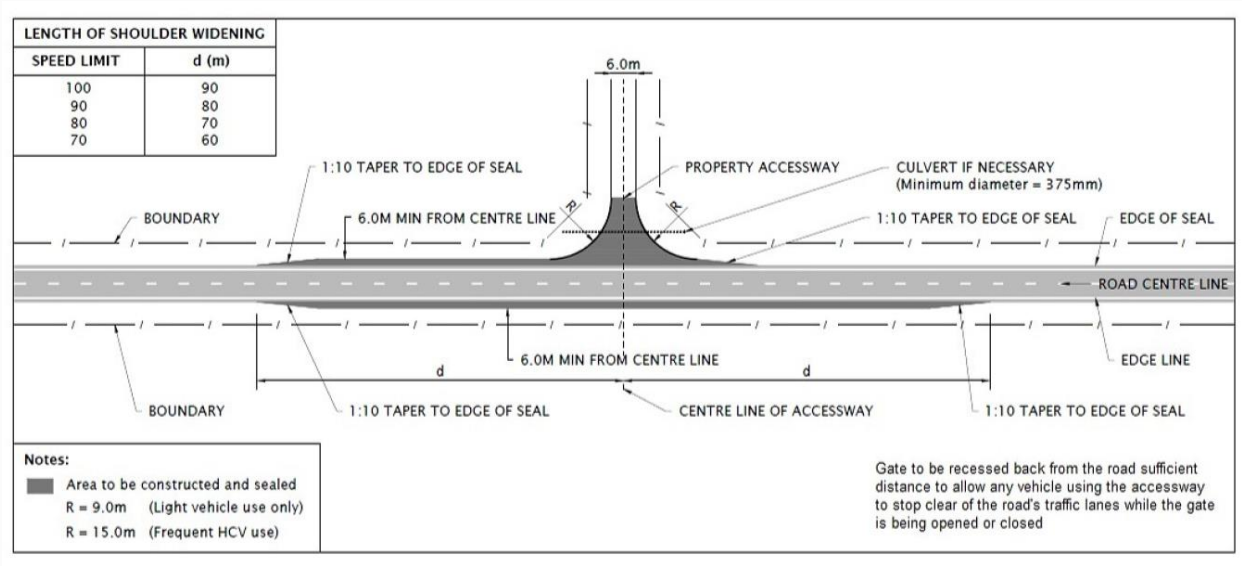
In the event that a vehicle has to stop within the carriageway before turning right into the subdivision, there is potential for a rear end collision because a following vehicle would not have sufficient space to manoeuvre around it.

Recommendation:

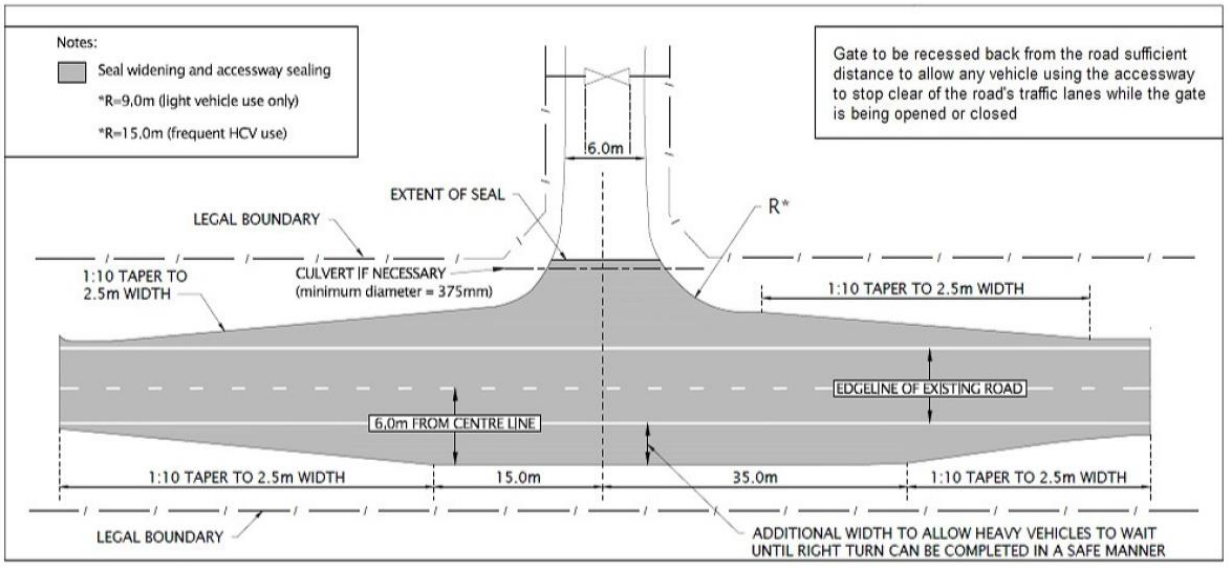
Recommend widening the northern shoulder to provide at least 6m of sealed surface between the road centre line and edge of seal. The widening should extend for a distance of 70m each side of the new intersections.

Frequency Rating: **NA** *Severity Rating*: **NA**

Designer Response: *It is proposed that the intersection of Road 1 onto Spencerville Road will comply with Figure 14 in Appendix 7.5.10 of the Christchurch District Plan.*



It is proposed that the intersection of Road 2 onto Spencerville Road will comply with Figure 13 in Appendix 7.5.10 of the Christchurch District Plan.



Safety Engineer:

Client Decision:

Action Taken:

2.2 Property Access

2.2.1 Lot 16 Minor

Lot 16 has frontage to Spencerville Road only and is located on the inside of a curve in the road. The plans provided indicate that the carriageway crosses the lot boundary close the apex in the curve.

Safe access to Lot 16 is only possible along a short section of the road frontage close to the curve apex.

Recommendation:

Restrict vehicle crossing locations for Lot 17 to locations within 5m of the curve apex.

Recommend that the lot boundary is updated as part of the subdivision process to reflect the actual road alignment.

Frequency Rating:	**Infrequent**	*Severity Rating*:	**Unlikely**

Designer Response: *Access to Lot 16 will be restricted to 5m either side of the curve apex*

Safety Engineer:

Client Decision:

Action Taken:

2.2.2 Lot 17 Minor

Lot 17 has frontage to Spencerville Road only and is located 120m to the east of a curve in the road.

It is desirable to provide the full SISD requirement (180m at 80km/h) at a property access where possible and as a minimum the EDD SISD (133m at 80km/h).

The available sight distance from the eastern boundary of Lot 17 was assessed as being about 120m to the west which does not meet the Austroads criteria. This could contribute to drivers entering Spencerville Road in front of approaching vehicles and causing a crash. Although this only affects the right turn out movement from the property, and current traffic volumes on Spencerville Road are low, the potential for crashes can mitigated by modifying the access arrangements.

Recommendation:

Consider providing property access to Lot 17 from the internal road.

Frequency Rating:	**Infrequent**	*Severity Rating*:	Unlikely

Designer Response: *Access to Lot 17 cannot be provided internally but access can be restricted to within 6m of the eastern boundary of the lot.*

Safety Engineer:

Client Decision:

Action Taken:

2.2.3 Lot 58 Minor

Lot 58 has frontage to a new road and is located on the inside of a small radius curve. Although the subdivision plans do not show the anticipated road configuration, it is considered unlikely that a sight distance of more than 30m could be achieved at any location along the lot boundary.

Although traffic volumes on this section of road will be very low, less than 50 movements per day, there will be a need to ensure that the road design encourages vehicle speeds of less than 30km/h.

Recommendation:

Ensure that the road design promotes a speed environment of less than 30km/h.

Frequency Rating:	**Infrequent**	*Severity Rating*:	Unlikely

Designer Response: *The curve in the road has radius of 40m. a sight distance of 30m can be achieved. It is suggested that there is to be no planting on the berm around the inside of this curve.*

Safety Engineer:

Client Decision:

Action Taken:

2.3 Internal Roads

2.3.1 Lot 203 Minor

Lot 203 represents the southern section of new road. Although it is understood that the road has been designed to allow for future expansion of the subdivision, no provision for turning has been made at the southern limit. This could result in larger vehicles such as

rubbish trucks having to reverse a distance of more than 100m before being able to turn around.

Although any reverse manoeuvre will occur at low speed, it does increase the potential for crashes.

Recommendation:

Consider providing a temporary turning area until the road is extended to the south.

Frequency Rating:	**Infrequent**	*Severity Rating*:	Unlikely

Designer Response: *A temporary turning area will be provided.*

Safety Engineer:

Client Decision:

Action Taken:

3. Audit Statement

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed or modified in order to improve safety. The problems identified have been noted in this report.

Chris Rossiter, Principal Transportation Engineer

Signed: C. Rossiter Date: 5 April 2016

Andrew Leckie, Project Transportation Engineer

Signed: . Date: 5 April 2018

Designer:	*Name……..*	*Position……*
	Signature……..	*Date……..*
Safety Engineer:	*Name……..*	*Position……*
	Signature……..	*Date……..*
Project Manager:	*Name……..*	*Position……*
	Signature……..	*Date……..*
Action Completed:	*Name……..*	*Position……*
	Signature……..	*Date……..*

Project Manager to distribute audit report incorporating decision to designer, Safety Audit Team Leader, Safety Engineer and project file. ***Date:……..***

Appendix A Audit Drawings

Strategic Directions 3.3.7 Objective - Urban growth, form and design – replacement assessment 13 July 2018

Strategic Directions 3.3.7 Objective - Urban growth, form and design

A well-integrated pattern of development and infrastructure, a consolidated urban form, and a high quality urban environment that:…..

c. Provides for urban activities only:

- *i. within the existing urban areas; and*
- *ii. on greenfield land on the periphery of Christchurch's urban area identified in accordance with the Greenfield Priority Areas in the Canterbury Regional Policy Statement Chapter 6, Map A; and*

d. Increases the housing development opportunities in the urban area to meet the intensification targets specified in the Canterbury Regional Policy Statement, Chapter 6, Objective 6.2.2 (1); particularly:

- *i. in and around the Central City, Key Activity Centres (as identified in the Canterbury Regional Policy Statement), larger neighbourhood centres, and nodes of core public transport routes; and*
- *ii. in those parts of Residential Greenfield Priority Areas identified in Map A, Chapter 6 of the Canterbury Regional Policy Statement; and*
- *iii. in suitable brownfield areas; and…..*

Comment: If the development is considered an "urban activity" then it is not consistent with the objective as the site is not within any of the areas listed. Residential use is specifically provided for within the Specific Purpose (Golf Resort) Zone. It must be assumed then that residential use is acceptable as part of the planned Golf Resort. It can also be assumed that limited residential subdivision (up to 71 lots) on its own is also acceptable in this Zone as it is provided for. This is the same situation as applies to the Clearwater Golf Course which is a well-established facility containing range of activities that are unquestionably urban. With regard to recent case law, resort back to broad policies such as Strategic Objective 3.3.7 should be undertaken with care when it is clear that there is a specific provision made in the District Plan for activities that do not neatly fall within a more broadly expressed objective. It is assessed that while the proposed is inconsistent with this objective, it is not contrary to it. In these circumstances it is considered that inconsistency with this Strategic Objective should not be determinative.

With regard to the "benefit" that is derived from the proposed development, at the stage of lodging this application the benefit arises mainly from the increased native planting along and within the boundaries of the application site and within the area to be enhanced to provide for stormwater retention and treatment. Another positive is that the lower area of the site is not going to be developed and is available for enhancement associated with the vision for the Styx River and environs. In addition, the applicant is willing to provide for the development of a bridleway and other connections for walking, biking and riding but is waiting on the Council to specify what it wants to achieve in terms of location, form and legal arrangements for these facilities.

Julie Comfort

From: Patricia Harte
Sent: Wednesday, 22 August 2018 9:43 a.m.
To: Ward, Sean
Subject: Whisper Creek

Hello Sean

Further to my email of 20 August we wish to clarify that LMM Investments 2012 Limited request their application to include consent to breach Natural Hazard provision 5.4.5.1.P14 Residential Unit. In particular they seek consent to locate residential units on lots within the Lower Styx Ponding Area which either are not on piles or have a ground floor area greater than 200m2.

We also suggest that to give effect to the land use consent for each of the lots over time it would be appropriate to place a condition on the subdivision consent requiring compliance with the standards in the land use consent and a consent notice supporting this condition. In that way there should be no issues as to whether the land use consent has been given effect to. We also suggest that the lapse period be extended from 5 to 10 years.

Happy to discuss

Patricia Harte
Principal

Davie Lovell-Smith Ltd
Planning Surveying Engineering
PO Box 679 | Christchurch | Phone (03) 963 0701 | Mobile 021 807 905 | www.dls.co.nz

Julie Comfort

From: Patricia Harte
Sent: Monday, 20 August 2018 4:56 p.m.
To: Ward, Sean
Cc: Ross Moffatt (Ross.Moffatt@xtra.co.nz); Andy Hall
Subject: Whisper Creek Redesigned Subdivision and conditions
Attachments: Whisper Creek Subdvision 20 Aug 18.pdf; RMA2018176 -- Draft conditions.docx; LAND USE CONSENT condition.docx

Hello Sean

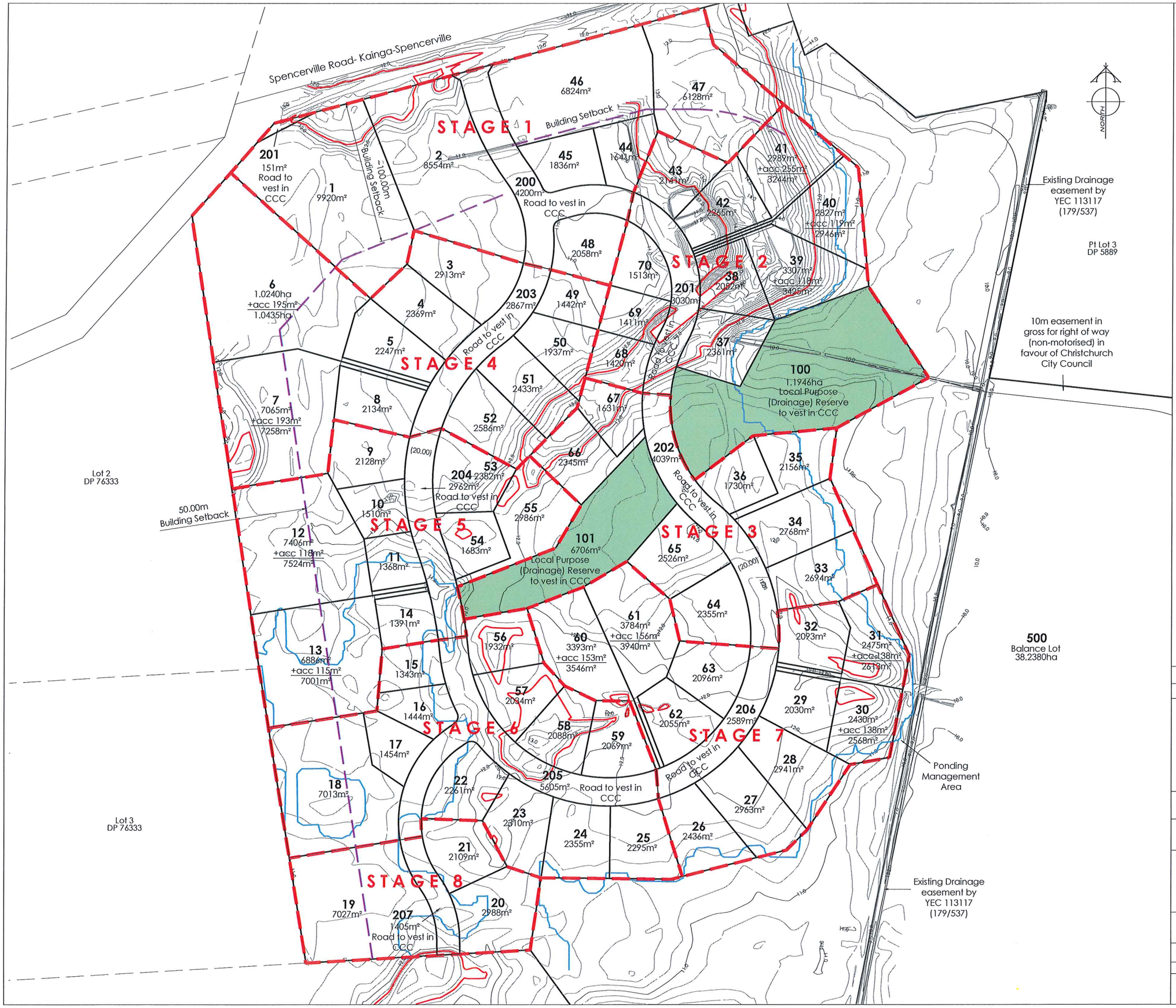
We have finalised the subdivision layout to meet the requirements we discussed last week– see attached.

I have also amended some of the transport and reserves conditions following the amended design and changed lot numbers. I have also rewritten the built form standards to apply to the residential units based on the Whisper Creek Golf Resort rules and also the Residential Large lot rules as there were very few standards in the Whisper Creek rules. I have included this with the other conditions and also sent it as a separate document.

Let me know if you want to discuss further.

Regards.
Patricia Harte
Principal

Davie Lovell-Smith Ltd
Planning Surveying Engineering
PO Box 679 | Christchurch | Phone (03) 963 0701 | Mobile 021 807 905 | www.dls.co.nz



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 consent purposes only. No liability is accepted if the plan is used for any other purposes.
4. This plan is subject to the granting of subdivision and/or resource consents and should be treated as a proposal until such time as the necessary consents have been granted by the relevant authorities.
5. Contours have been produced from topographical data provided by others. No liability is accepted in relation to the accuracy of the topographical data.
6. Boundary information has been derived from Terraview.
7. This site is earthquake affected and there are likely to be changes in the final boundaries as a result . All boundaries are approximate only until the final land transfer survey is complete. No liability is accepted in relation to any changes to boundary dimensions and areas as a result of earthquake movement.
8. Levels are in terms of Christchurch Drainage Datum Jan 2014 Issue.
9. Contour Interval 0.20m
10. Origin of Levels
    BM 3785
    (EHAY)
    RL=17.506m
    Located on the intersection of Belfast Road and Main North Road.

Legend

- Finished Floor Level 12.3m
- Flood Ponding Area

Total Area :63.9446ha

Comprised in: C.F.R. CB1B/387

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:
Whisper Creek Project

SHEET TITLE:
Proposed Subdivision of Part Lot 2 DP 5889

DRAWING STATUS
Proposed Subdivision

SCALE : 1:1250@A1 1:2500@A3
DATE : August 2018
CAD FILE : J:\19432\E19432-Subdcon R10.dwg
REVISION : **R10**
DRAWING No : **E.19432**
SHEET No: 1 OF 2

RMA/2018/176 Conditions collated by DLS from Sean Ward's emails

As at 28 June 2018

ENGINEERING CONDITIONS

General

3.1 Asset Design and Construction
All infrastructure assets to be vested in the Council are to be designed and constructed in accordance with the Christchurch City Council's Infrastructure Design Standard (the IDS) and the Construction Standard Specifications (the CSS).

3.2 Quality Assurance
The design and construction of all assets is to be subject to a project quality system in accordance with Part 3: Quality Assurance of the IDS.

A. Submit a Design Report, Plans and Design Certificate complying with clause 3.3.2 to the Subdivision Engineers (Planning Team 1). The Design Report and engineering plans are to provide sufficient detail to confirm compliance with the requirements of the IDS and this consent.

B. Submit a Contract Quality Plan for review by the Council and an Engineer's Review Certificate complying with clause 3.3.3.

Physical works shall not commence until a Council Engineering Officer confirms that the above documentation has been received and accepted.

C. Submit an Engineer's Report and Completion Certificate complying with clause 3.3.4.

An Engineer's Report is a document specific to a project, which describes how the project was managed and administered in compliance with the IDS, the Construction Standard Specifications, the Contract Quality Plan and the resource consent or project brief. It provides background information to the release of the 224(c) certificate.

Note: Part 3 of the IDS sets out the Council's requirements for Quality Assurance. It provides a quality framework within which all assets must be designed and constructed. It also sets out the process for reporting to Council how the works are to be controlled, tested and inspected in order to prove compliance with the relevant standards. It is a requirement of this part of the IDS that the applicant provides certification for design and construction as a pre-requisite for the release of the 224c certificate. The extent of the documentation required should reflect the complexity and/or size of the project.

In addition to the above, the applicant is to design all infrastructure to resist the effects associated with earthquake induced liquefied soils. All liquefaction hazard mitigation shall be designed for a 1 in 150 year return period serviceability limit seismic design event and a 1 in 500 year return period ultimate limit state seismic design event as defined in NZS1170.5.2004.

3.3 The surveyor is to forward a copy of the title plan and survey plan to the Subdivision Planner (that issued the consent), Resource Consents & Building Policy Unit as soon as the plan has been lodged (or earlier if possible) for checking at Land Information New Zealand for entering into the Council GIS system.

3.10 Pipeline CCTV inspections are to be carried out on all gravity pipelines in compliance with the Council Standard Specifications (CSS):
https://www.ccc.govt.nz/consents-and-licences/construction-requirements/construction-standard-specifications/pipeline-cctv-inspections/

3.11 As-Built plans and data shall be provided for all infrastructure and private work in compliance with the Infrastructure Design Standards (IDS):

https://www.ccc.govt.nz/consents-and-licences/construction-requirements/infrastructure-design-standards/as-built-survey-and-data-requirements/

Water Supply

4.1 The point of supply is the 200mm main at the Lower Styx Rd and Spencerville Rd corner

4.2 All lots are to be supplied with a rural restricted water supply of at least $2m^3$ per day.
The submains are to be installed to 1m past each lot boundary.

4.3 Engineering drawings are to be sent to the Subdivision Engineers for approval by Ian Johnson of the Asset and Network Planning Unit.

4.3 Consent Notice
This property is supplied with a rural restricted water supply. A storage tank for fire fighting purposes is to be installed at building consent stage. The tank is to be at least 2,000 litres.

2. This development shall be served as a rural restricted water supply. All lots shall be served with a water supply to their boundary. Submains shall be installed to 1 m past each lot boundary. Rear lots shall be served with laterals installed by a Licensed Certified Plumber into their net site areas under a Building Consent for each stage. Alternatively, the consent holder can seek Building Consent (BC) exemption for the installation of the private laterals. Where the laterals are installed under BC exemption construction shall be in accordance with the CSS and the IDS. Where applicable, dummy connection boxes shall be installed at the entrance of the R.O.W. A copy of the Code Compliance Certificate shall be forwarded through to the Council's Engineering Team as part of the Section 224c application.

3. The water supply to the development shall be designed by a suitably qualified person in accordance with the Infrastructure Design Standard to the satisfaction of the Water & Wastewater Asset Planning Team. Engineering drawings supported by hydraulic model outputs shall be sent to the Subdivisions Engineer for acceptance by the Three Water & Waste Asset Planning Team prior to the commencement of any physical work.

4. The work shall be carried out by a Council approved water supply installer at the expense of the applicant. Refer to: http://www.ccc.govt.nz/Water/AuthorisedInstallers for a list of contractors.

Consent Notice:

a. This property is supplied with a rural restricted water supply. The property is required to provide on-site storage in accordance with Council's standards and specifications, at the time of building consent. The minimum storage capacity must be 48 hours normal gross supply, but at least 2,000 litres in volume.
b. This property must provide on-site storage for firefighting purposes to comply with the New Zealand Fire Service firefighting Water Supplies Code of Practice (SNZ PAS 4509:2008).

Sewage

5.1 The point of supply is the manhole in the 300mm main at the Lower Styx Rd and Spencerville Rd corner

5.2 The sewer system is to comprise an approved Pressure Sewer System designed in accordance with Council's Infrastructure Design Standards, Construction Standard Specifications and Private Sewer Pumping Station Specification. Engineering drawings supported by hydraulic

calculations for all pressure sewer mains shall be sent to the Subdivision Engineer for acceptance prior to the commencement of any physical work.

5.3 Each lot shall have a Boundary Kit located within the legal road or R.O.W. outside the boundary of each lot. The lateral from the Boundary Kit is to extend into the net site of each lot.

5.4 Properties in a R.O.W. shall be serviced by a single pressure main to each lot. ~~An isolation valve shall be installed on the pressure main at the boundary of the ROW and the public road. Easements in gross shall be created over Pressure Sewer Systems in private R.O.Ws.~~

5.5 Installation of the boundary kit and connection to Council's sewer system shall be carried out by a Council Authorised Drainlayer (Pressure Sewer Reticulation)

5.6 Only one pump brand shall be installed within the subdivision. The brand installed as part of the first stage or the initial lots of the subdivision shall become the default brand across the subdivision. This shall be determined and provided as part of the 224 application.

5.7 Consent Notice for all residential lots:

This property will require a pressure sewer system comprising a pump and storage chamber to be supplied by ~~either~~ EcoFlow Ltd ~~or Aquatec~~ (determined by the developer) and installed at building consent stage. The pressure sewer system will be supplied complete with an IOTA OneBox Control Panel.

The pumping chamber sewer system shall be installed by a Council Authorised Drainlayer (Pressure Sewer Tanks) in accordance with Councils Infrastructure Design Standards and Councils Construction Standard Specifications.

The property owner shall be responsible for the power costs of operating the system.

5. Provision will be made for odour treatment and corrosion protection at the discharge point in Lower Styx Road in accordance with Council's Infrastructure Design Standards, Construction Standard Specification and operational requirements. Engineering drawings supported by design calculations and specifications for the odour treatment facility and corrosion protection works shall be sent to the Subdivision Engineer for acceptance prior to the commencement of any physical work. Corrosion treatment to the receiving manhole invert is required.

7. Measures shall be put in place to Council's satisfaction and acceptance for enabling initial operation of the local pressure sewer system within the subdivision during the build phase to ensure a self-cleansing flow and limiting sewage age within the system when the design number of pressure sewer tanks are not yet in operation.

9. Ownership and control of the local pressure pump, chamber, boundary kit and OneBox Control Panel will be vested with Council. The property owner shall enter into a Deed with the Christchurch City Council, drafted in terms approved by the Christchurch City Council, vesting ownership in the system prior to Code Compliance Certificate being issued for a dwelling on the relevant site.

10. The Council and its agents or contractors shall have the right of access to the property for the purpose of maintenance, monitoring or renewal of any part of the local pressure sewer system vested with Council.

11. The electricity supply for the system shall be from the dwelling and metered to the dwelling serviced by the system. The property owner shall be responsible for the power costs of operating the system.

12. The property owner shall ensure adherence with the operational requirements of the local pressure sewer system and if in breach of this obligation, the property owner shall promptly at the property owner's expense properly and substantially repair and make good all injury or damage caused to the local pressure sewer system. If the property owner fails to promptly comply with this obligation then the Council may perform the obligation and recover any costs incurred from the Property Owner.

13. Conditions 7 to 11 above shall be recorded pursuant to Section 221 of the RMA in a consent notice registered on the titles of each property.

Stormwater

6.1 Stormwater laterals are to be laid to at least 600mm inside the building area of all residential lots at the subdivision stage. The laterals are to be laid at sufficient depth to ensure protection and adequate fall is available to serve the building platform ~~furthermost part of the lot.~~ Alternatively the consent holder may seek discharge of stormwater to ground by consent from Environment Canterbury

6.9 An Erosion and Sediment Control Plan (ESCP) is to be submitted for review as part of the design report. The ESCP is to include (but is not limited to):

- Site description, i.e. topography, vegetation, soils etc
- Details of proposed activities.
- A report including the method and time of monitoring to be undertaken.
- A locality map.
- Drawings showing the site, type and location of sediment control measures, onsite catchment boundaries and offsite sources of runoff.
- Drawings and specifications showing the positions of all proposed mitigation areas with supporting calculations if appropriate.

The performance criteria for the ESCP, unless directed by Council through the engineering acceptance process, will be based on Environmental Canterbury's Erosion and Sediment Control Guidelines (2007).
http://www.ecan.govt.nz/Our+Environment/Land/ErosionAndSediment/ErosionSedimentControlGuidelines.htm

The ESCP is to be implemented on site during the subdivision construction phase and no works are to commence until such time as the ESCP has been accepted.

The ESCP is to be designed by a suitably qualified person and a design certificate supplied with the plan. (Use the certificate from Appendix IV of the CCC Infrastructure Design Standard Part 3)

Note Pursuant to Section 128 of the Resource Management Act 1991 Council reserves the right, during the construction phase, to review this condition to impose further controls in respect to Sedimentation Control and Management

Minimum Levels and Filling

7.1 To be considered satisfactory for ~~sewer and~~ stormwater drainage minimum ground levels on building platforms within each new lot shall:

a) Have a minimum RL 12.00. The minimum floor level for the development is 12.30.

and

b) drain freely to natural drainage patterns, roads, reserves or stormwater facilities.

7.3 The applicant's attention is drawn to note that the 2% AEP hydraulic level in the Styx River at this location is RL11.90m in terms of CCC datum. Any land below this level will be subject to inundation and the Council may require a S36(2) notice under the Building Act to be placed on the title of the property. For further information the applicant is advised to contact a building consent officer in the Council's Environmental Services Unit.

7.7 All filling exceeding 300mm above excavation level shall be in accordance with the Code of Practice for earthfill for residential purposes NZS 4431: 1989. A duly completed certificate in the form of Appendix A of NZS 4431 shall be submitted to the Council for all lots within the subdivision that contain filled ground, prior to the issue of a Section 224 Conditions Certificate.

7.9 The consent holder is to submit a report and calculations detailing any filling proposed against existing boundaries and the mitigation proposed to avoid adverse effects on adjoining properties.

7.9 The construction details of any retaining wall required to retain fill are to be submitted to the Subdivisions Engineer for acceptance. The wall construction and materials are to be certified in addition to the NZS 4431 certification.

Access Formation

8.1 The access formation shall be designed and constructed in accordance with the CCC Infrastructure Design Standard. Physical works shall not commence until a Council engineering officer confirms that the Design Report, Plans and Design Certificate complying with clause 3.3.1 of the IDS and the Contract Quality Plan and Engineer's Review Certificate complying with clause 3.3.2 has been received by Council.

NES- Land contamination

9.1 The recommendations of the Detailed Site Investigation and Remediation Action Plan (Malloch Environmental Limited, May 2018) are to be followed. Upon conclusion of works a Site Validation Report shall be submitted to Council for acceptance prior to 224 approval.

9.2 Should there be any surplus soils that require disposal off site these cannot necessarily be considered clean fill and must go to an authorised facility. Evidence of this disposal is to be provided to Council by way of laboratory results, waste manifests and or weighbridge receipts within two months of the disposal. This may be delivered by email to envresourcemonitoring@ccc.govt.nz .

Transport/Roading

10.1 Right turn bay to be provided on Spencerville Road at the western road intersection (Road 1).

~~10.2 The intersection of Road 2 with Spencerville Road shall be designed to comply with Figure 13, Appendix 7.5.10~~

~~10.3~~10.2 Access to Lots ~~16~~ 1 and ~~17~~ 6 shall be located at the apex of the bend on Spencerville Road.

~~10.4~~10.3 Hidden access signs shall be installed on Spencerville Road with the final location to be confirmed with the Team Leader, Council Traffic Operations Team.

~~10.5 Planting on the inside of the curve of Road 3 shall be either below 1.1 metres in height or pruned/limbed to be above 1.8 metres.~~

Comment [PH1]: Road 2 has been deleted

Comment [PH2]: Lots renumbered with redesign as per plan R10

Comment [PH3]: Road 3 removed

~~10.6~~10.4 ~~No fencing on the inside of the curve of Road 3 shall be above 1.1metres in height.~~

Comment [PH4]: Road 3 removed

~~10.7~~10.5 Turning facilities to ensure a Council rubbish truck can turn at the southern end of Road 1 shall be constructed.

Stormwater

1. Stormwater generated from all allotments and roading constructed under this application shall discharge into a new stormwater mitigation system to be constructed within proposed Lot 100 on the approved plan. Unless approved by Council engineers, the system shall meet the requirements of the CCC Waterways, Wetlands and Drainage Guide (WWDG 2003 including Chapters 6, 21 and Appendix 10 updated 2011/12), the Infrastructure Design Standard (IDS 2017) and the Construction Standard Specifications (CSS 2017).

2. The applicant shall demonstrate that authorisation for construction phase stormwater discharge has been obtained from Environment Canterbury.

3. The consent holder shall obtain certification from the Christchurch City Council that the discharge of operational phase stormwater will comply with the conditions of the Council's operative stormwater network discharge consent, otherwise consent from the Canterbury Regional Council will be required.

4. The stormwater runoff from all allotments, reserves and roading areas shall be collected via channels, sumps, pipes or swales and discharged into a *sedimentation basin*. Unless otherwise approved by Council engineers, the *sedimentation basin* shall:
    a. have sufficient volume to capture the runoff resulting from the first 25mm of rain falling on impervious surfaces within the catchment;
    b. not exceed a depth of 1 metre average as measured from the basin floor to the design water surface;
    c. be designed with internal batter slopes averaging 1 metre vertical in 4 horizontal or flatter, and;
    d. discharge to a *stormwater wetland* via a controlled outlet.

5. Unless otherwise approved by Council engineers, the *stormwater wetland* shall:
    a. be sized using the Christchurch City Council Simplistic Method for Wetland Sizing (WWDG, p. 6-35);
    b. be designed with a variable permanent water depth of 250mm average;
    c. contain a live stormwater storage depth of 500mm;
    d. be protected from flooding of the 500mm live storage volume for storm events up to the ten year return interval.
    e. be designed with internal batter slopes averaging 1 metre vertical in 4 horizontal or flatter, and;
    f. discharge into Spencers Drain.

6. In addition to the above requirements, the stormwater management system shall be designed with sufficient volume to control peak discharges back to 'greenfields' flow rates for all storms up to and including the 2 percent annual exceedance probability storm event of critical duration for Spencers Drain. The parameters and coefficients used to model runoff hydrology shall be confirmed with Council engineers at the detailed engineering design phase.

7. The stormwater conveyance system shall be designed to ensure that even for events where the critical peak stormwater runoff flow rate occurs that all resulting first flush runoff shall actually reach the sedimentation basin. A combination of primary and secondary conveyance systems may be used to ensure this level of service is achieved.

8. Safe and adequate access to the surface water management and mitigation facilities for maintenance and sediment removal shall be provided and designed in accordance with WWDG Clause 6.8 & 6.9.

9. ~~A planted landscape buffer of average width 5 metres is to be established between all stormwater basins and private allotments as mitigation for the utility works. The buffer shall be measured from the property boundary to the edge of the critical two percent annual exceedance probability high water surface. Planting of the buffer zones shall be a cost of the development.~~

10. ~~Stormwater laterals are to be laid to at least 600mm inside the boundary of all lots at the subdivision stage. Unless otherwise approved by Council engineers, the laterals are to be laid at sufficient depth to ensure protection and adequate fall is available to serve the furthermost part of the lot.~~

11. ~~Any portions of allotments not captured in the stormwater management system shall have those areas protected by an easement or no-build covenant prohibiting structures and impervious surfaces.~~

12. The primary stormwater reticulation network shall be designed to convey (at minimum) the critical twenty percent annual exceedance probability storm event. No flooding of private property shall occur during the critical ten percent annual exceedance probability storm event and no flooding of buildings shall occur during the critical two percent annual exceedance probability storm event.

13. The designer of the surface water management system shall provide a report which identifies all secondary flowpaths proposed. All secondary flowpaths are to be protected by an easement in gross, if required.

14. The consent holder shall provide easements in gross over all public stormwater infrastructure located outside of legal road or utility reserve areas.

15. Engineering plans, specifications and calculations for the design and construction of all stormwater management infrastructure shall be submitted to the 3 Waters and Waste Planning and Resource Consents Units for acceptance.

16. The consent holder shall operate and maintain surface water management infrastructure to vest into Council for at least 12 months following the issue of the section 224(c) certificate, after such time Council may accept responsibility for operation and maintenance.

17. The applicant shall provide as-built plans of the surface water management systems and confirm that they have been constructed in accordance with the approved plans and comply with the IDS, particular Part 3: Quality Assurance and Part 12: As-Builts.

18. A maintenance and operations manual for all stormwater management systems shall be provided and shall form part of the engineering acceptance. This manual is to include a description of the activity, the design assumptions, maintenance schedule and monitoring requirements.

I have set out below proposed conditions for the land use consent providing for residential activity within areas outside the Resort Community Areas i.e. within the Golf Course and Open Space Activity Area. These conditions specify generally that the Resort Community standards apply except in specific circumstances.

Earthworks

1. The earthworks and construction work shall be under the control of a nominated and suitably qualified engineer.

2. Dust emissions shall be appropriately managed within the boundary of the property and in accordance with the *Regional Air Plan*. Dust mitigation measures such as water carts or sprinklers shall be used on any exposed areas. The roads to and from the site are to remain tidy at all times.

3. All loading and unloading of trucks with excavation or fill material shall be carried out within the subject site.

4. An approved Traffic Management Plan (TMP) shall be implemented for this earthworks / construction activity and no works are to commence until such time as the TMP has been installed. The TMP shall be prepared by an STMS accredited person and submitted to and approved by the Christchurch Transport Operation Centre – please refer to www.tmpforchch.co.nz.

5. The Erosion and Sediment Control Plan shall show the positions of all stockpiles on site. Temporary mounds shall be grassed or covered to prevent erosion until such time as they are removed. Topsoil stockpiles shall not exceed 2.0 m in height to protect the integrity of the soil microbes.

~~6. All filling and excavation work shall be carried out in accordance with an Environmental Management Plan (EMP) which shall include an Erosion and Sediment Control Plan (ESCP). Unless approved as part of a separate ECan resource consent for stormwater discharge or Ecan resource consent for excavation/filling the EMP will require formal acceptance by Christchurch City Council's Subdivision Engineer (email to rcmon@ccc.govt.nz) prior to any work starting on site. The accepted EMP shall be implemented on site over the construction phase and no works are to commence until such time as the EMP has been installed. The EMP shall be designed by a suitably qualified person and a design certificate (template available on request) supplied with the EMP for acceptance at least 5 days prior to the works commencing. The best practice principles, techniques, inspections and monitoring for erosion and sediment control shall be based on ECan's Erosion and Sediment Control Toolbox for Canterbury http://esccanterbury.co.nz/. The EMP shall include (but is not limited to):~~

- ~~The identification of environmental risks including erosion, sediment and dust control, spills, wastewater overflows, dewatering, and excavation and disposal of material from contaminated sites;~~
- ~~A site description, i.e. topography, vegetation, soils, etc;~~
- ~~Details of proposed activities;~~
- ~~A locality map;~~
- ~~Drawings showing the site, type and location of sediment control measures, on-site catchment boundaries and off-site sources of runoff;~~

- ~~Drawings and specifications showing the positions of all proposed mitigation areas with supporting calculations if appropriate;~~
- ~~Drawings showing the protection of natural assets and habitats;~~
- ~~A programme of works including a proposed timeframe and completion date;~~
- ~~Emergency response and contingency management;~~
- ~~Procedures for compliance with resource consents and permitted activities;~~
- ~~Environmental monitoring and auditing, including frequency;~~
- ~~Corrective action, reporting on solutions and update of the EMP;~~
- ~~Procedures for training and supervising staff in relation to environmental issues;~~
- ~~Contact details of key personnel responsible for environmental management and compliance.~~

~~Note: IDS clause 3.8.2 contains further detail on Environmental Management Plans.~~

7. No earthworks shall commence on site prior to completion and presentation to Council of an Engineering Completion Certificate (IDS – Part 3, Appendix VII), signed by an appropriately qualified and experienced engineer. This is to certify that the erosion and sediment control measures have been properly installed in accordance with ECan's Erosion and Sediment Control Toolbox for Canterbury for the work proposed on site.

8. The fill sites shall be stripped of vegetation and any topsoil prior to filling. The content of fill shall be clean fill.

9. Unstabilised earthworked areas shall not exceed 5 ha at any time.

10. Where existing natural drainage patterns are significantly altered or cut off due to fill placed to building platforms, alternative overland flow paths shall be created and protected where these cross downstream properties.

11. Filling placed within the Flood Ponding Management Area shall be balanced by compensatory storage (cut) volumes within that area. Surplus cut material shall not be placed within Flood Ponding Management Area.

12. All filling exceeding 300mm above excavation level shall be in accordance with the Code of Practice for Earthfill for Residential Purposes NZS 4431:1989. At the completion of the work an engineering report including a duly completed certificate in the form of Appendix A of NZS 4431 shall be submitted to Council at rcmon@ccc.govt.nz for all lots within the subdivision that contain filled ground.

13. At the completion of the earthworks operations, the berm areas outside the line of the roadway construction shall be sown down with grass seed.

14. All bared surfaces shall be adequately topsoiled and vegetated as soon as possible to limit sediment mobilisation.

15. Should the Consent Holder cease or abandon work on site for a period longer than 6 weeks, or be required to temporarily halt construction during earthworks, they shall at first take adequate preventative and remedial measures to control sediment discharge / run-off and dust emission, and shall thereafter maintain these measures for as long as necessary to prevent sediment discharge or dust emission from the site.

Geotechnical

1. Liquefaction Hazard and Lateral Spread Mitigation

All liquefaction hazard and lateral spread mitigation on site shall be designed in accordance with the recommendations in the Tonkin and Taylor Geotechnical Assessment for Proposed Subdivision – Whisper Creek dated 22 December 2017.

2. Asset Design and Construction

All infrastructural assets to be vested in the Council shall be designed and constructed in accordance with the IDS 2016 and the Construction Standard Specifications (CSS).

In addition to the above, to be considered suitable in terms of section 106(1A)(a) and (b) of the Resource Management Act, all proposed infrastructure shall be designed to resist the effects associated with earthquake induced liquefiable soils and lateral spread from a seismic event as defined below.

To mitigate liquefaction (vertical settlement) hazards and lateral spread (horizontal displacement), any proposed asset structures shall be designed for a seismic event with a "1 in 25 year period of return" under the serviceability limit state (SLS) and with a "1 in 500 year period of return" for the ultimate limit state (ULS) as defined by NZS 1170.5:2004.

Beyond a SLS seismic event, it is recognised asset structures may become progressively less serviceable.

Note: Asset structures shall include but not be limited to gravity and pressure pipelines, manholes, chambers, valves, hydrants, stormwater treatment devices, culverts or any other physical asset to be vested in Council including road pavements. Bridges and pump stations shall be designed to importance level 3 (IL3) as defined in NZS 1170.

3. Ground Improvement

Site earthworks to the residential building platforms shall be carried out to provide a minimum finished ground level of 12.0m RL (CDD), to maintain the crust thickness assumed in the geotechnical assessment and so the technical category TC2 equivalence at a minimum. The technical category will be confirmed in the Geotechnical Completion Report prepared for the section 224(c) certificate under condition ?6?.

4. Foundation Design

Any structure requiring a Building Consent, in terms of Building Act provisions, shall have specific foundation design by a suitably experienced chartered engineer or by an appropriately qualified geotechnical engineer. The design shall take into consideration the potential for liquefaction and associated effects (vertical settlement and lateral spread) and shall be investigated and categorised in accordance with MBIE Guidelines '*Repairing and rebuilding houses affected by the Canterbury earthquakes*' (3rd Edition 15 March 2017) or subsequent revisions.

Note: The Tonkin and Taylor Geotechnical Assessment for Proposed Subdivision – Whisper Creek dated 22 December 2017 recommends either a concrete waffle slab to Option 4 or timber floor foundations for TC2 land, to MBIE guidelines '*Repairing and rebuilding houses affected by the Canterbury earthquakes*' (2012) Part A clause 5.

Note: These requirements are contingent upon TC1 and TC2 land equivalence being achieved by the proposed earthworks and remediation works. Should the land not be brought to the indicated level by site earthworks / remediation the wording of the consent notices will differ according to the technical category to which the land is equivalent.

This is an ongoing condition which will be secured by consent notice.

5. Consent Notice

That a consent notice in terms of Section 221 of the Resource Management Act be registered on the titles for all lots that are categorised in the Final Geotechnical Report as TC2 land.

If for any reason lots are given a Geotechnical Technical Category 3 Classification, these lots should be withdrawn from the development and shown as balance lots that do not met the requirements of Section 106 of the Resource Management Act without further mitigation measures being undertaken.

6. Geotechnical Completion Report

Prior to the request for the section 224 certificate the Consent Holder shall supply a Final Geotechnical Report, including on the mitigation measures put in place during the construction phase to minimise both the liquefaction and lateral spread potential of the land during the SLS and a ULS seismic event in condition x2x. The report shall recommend the Technical Category of the land in terms of the MBIE guidance document '*Repairing and Rebuilding Houses Affected by the Canterbury Earthquakes*' and include a Statement of Professional Opinion on the Suitability of Land for Building Construction, using the template in IDS Part 4 Appendix II.

1. Local Purpose (Utility) Reserves

1.1 Lots 100 and 101 are ~~is~~ to be vested as Local Purpose (Utility) Reserves and hold no credits towards the final Reserve Development Contributions assessment.

The agreed developments on the 'Accepted' landscape plans for Lot 100 and Lot 101 is to hold no credit against the Reserve Development Contributions.

Advice note: Any proposed easements across the Local Purpose (Utility) reserve will need to be made to the Council's Reserves Officer Subcommittee for approval, prior to the issue of 224C.

Comment [PH5]: Both lots to be used for utility purposes – see plan R10

2. Design and Development of reserves and streetscapes

2.1 Landscape plans for the reserve (Lots 100 and 101), and streetscapes are to be submitted as part of the Landscape Design Report to the Asset and Network Unit (Parks) for acceptance. All landscaping is to be carried out in accordance with the Accepted plan.

Comment [PH6]: See above

2.2 Where the Consent Holder has applied to vest assets as detailed on Accepted Landscape Plans, but the Asset and Network Unit (Parks) have not agreed to the value of the assets being credited against the Reserve Development Contributions or to reimburse the value of the assets to the Consent Holder, then the Consent Holder may vest the assets at their own expense.

2.3 The Landscape Design Report and plans are to provide sufficient detail to confirm compliance with the requirements of the IDS, the CSS: and the WWDG: 2003. All landscaping required by this condition is to be carried out in accordance with the accepted report and plan(s) at the Consent Holder's expense, unless otherwise agreed. The Consent Holder shall maintain the works for 12 months for the Establishment Period (Maintenance and Defects Period) from the time of issue of the Section 224 Certificate.

3. Establishment Period (Defects Liability Period)

3.1 The Establishment Period (Defects Maintenance) for Lots 100 and 101 will include an inspection by Parks Operations staff after the first 6 months. Any diseased, dead or replacement plantings are to be replaced at the Consent Holder's expense. The Establishment Period and the term on the bond shall be extended by a further 12 months for the replacement planting(s).

Comment [PH7]: See above

Refer: CSS, Section Establishment. The Consent Holder is to keep an accurate and up-to-date monthly report on plant and tree conditions during the Establishment Period of the works undertaken. The report shall be submitted, if requested, by the Engineer within five days of the end of each month during the Establishment Period (Refer sample report: *Landscape Construction Monthly Establishment Report,* CSS, Part 7 Appendix 1).

~~3.2 The Consent Holder shall enter into a separate bond with Council Asset & Network Unit (Parks) Team to the value of 50% of the cost to replace and replant all plants on the recreation reserves. The bond shall be held for the Establishment Period of a minimum of 12 months and shall be extended by a further 12 months for the replacement planting(s), if required. The bond shall be released after the plants have been inspected and Accepted by the Council Parks Operation staff~~.

4. Street Trees

4.1 The Consent Holder shall submit a plan(s) for proposed street trees to the Council's Asset & Network Unit (Parks) Team for acceptance. The plan(s) are to provide sufficient details to confirm compliance with the requirements of the IDS (current version) and the CSS Part 7: Landscapes (current version). All street tree works are to be carried out in accordance with the accepted report and plan(s) at the Consent Holder's expense. The Consent Holder shall maintain the street trees for 12 months Establishment Period (Defects Maintenance) from the time the trees have been planted up until the final inspection and acceptance of the trees by the Council Parks Operations staff. The Establishment Period and the term of the bond shall be extended by a further 12 months for the replacement planting(s), if required.

~~4.2 The Consent Holder is to keep an accurate and up-to-date monthly report on tree conditions and establishment works undertaken. The report shall be submitted, if requested, by the Engineer within five days of the end of each month during the Establishment Period (Refer sample report: *Landscape Construction Monthly Establishment Report,* CSS, Part 7 Appendix 1).~~

4.3 The Consent Holder shall enter into a separate bond with Council Asset & Network Unit (Parks) Team to the value of 50% of the cost to replace and replant all street trees. The bond shall be held for the Establishment Period of a minimum of 12 months and shall be extended by a further 12 months for the replacement planting(s), if required. The bond shall be released after the trees have been inspected and Accepted by the Council Parks Operation staff.

5. Final Completion / Handover

5.1 The Consent Holder shall submit, if requested, the required completion documentation in accordance with IDS Part 2:2.12 Completion of Land Development Works and the Quality Assurance System to provide evidence that the work is completed in accordance with the agreed standards and conditions of this consent. This is to be submitted, if requested, on completion of the 12 month Establishment Period, prior to formal handover to Council and release of the Establishment Bond.

6. As – Builts

6.1 The Consent Holder shall submit As-Built plans showing street tree species and locations and confirm that they have been planted in accordance with the accepted plans and comply with the IDS, in particular Part 12 (As Builts).

LAND USE CONSENT – CONDITIONS PROPOSED BY APPLICANT

~~1. All residential activity in lots or parts of lots which are not within a Community Resort Activity Area shall comply with the Resort Community Activity Area Built form standards except as set out in conditions 2 and 3.~~

~~2. The minimum building setbacks shall be as follows~~

~~a. Setback from Spencerville Road is 10metres~~

~~a. Setback from the Zone boundary is 20m except as provided for in a. above.~~

~~b. Setback from all other boundaries is 5m~~

~~3. Other than for Lot 17, no vehicle access shall gained from Spencerville Road~~

Comment [PH8]: Replaced by comprehensive standards for all lots below.

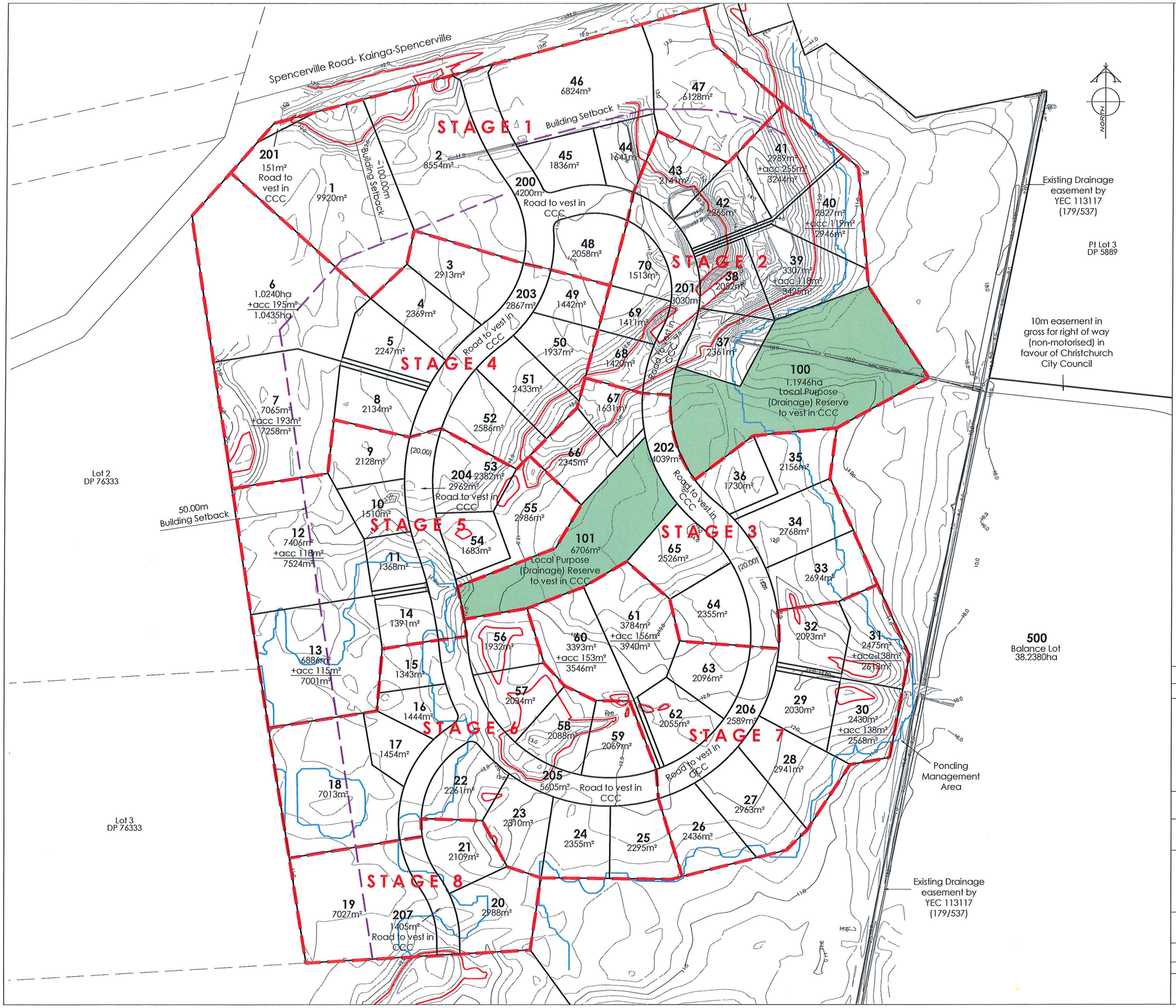
1. All residential units and minor residential units within the lots 1 to 70 of subdivision RMA/208/176 shall comply with the following Built Form Standards:

Type	**Standard**
Height	Maximum height of 8m Minor Residential Unit maximum height of 5.5m
Recession Planes	Recession planes from a point 2.3m above internal boundaries as shown in Diagram F of Appendix 14.16.2 of the Christchurch District Plan
Maximum building footprint	400m2 for a residential unit
Road boundary setback	100m setback from Spencerville Road for properties west of the subdivision access
	50m back from Spencerville Road for properties to the east of the subdivision access
	5.5m for buildings with a garage door facing the road
	5.0m for buildings without a garage door facing the road
Zone boundary setback	50m setback from the Rural Zone boundary which is not also a road boundary
Minor Residential Unit	Existing site where minor residential unit is to be built contains only one residential unit
	Maximum floor area of 80m2
	Parking areas for both units is to be accessed form the same access
Access	Other than for lots 1 and 6 no access shall be gained from Spencerville Road

LAND USE CONSENT condition WHISPER CREEK RESIDENTIAL DEVELOPMENT 20 Aug 18

All residential units and minor residential units within the lots 1 to 70 of subdivision RMA/208/176 shall comply with the following Built Form Standards:

Type	**Standard**
Height	Maximum height of 8m Minor Residential Unit maximum height of 5.5m
Recession Planes	Recession planes from a point 2.3m above internal boundaries as shown in Diagram F of Appendix 14.16.2 of the Christchurch District Plan
Maximum building footprint	400m2 for a residential unit
Road boundary setback	100m setback from Spencerville Road for properties west of the subdivision access
	50m back from Spencerville Road for properties to the east of the subdivision access
	5.5m for buildings with a garage door facing the road
	5.0m for buildings without a garage door facing the road
Zone boundary setback	50m setback from the Rural Zone boundary which is not also a road boundary
Minor Residential Unit	Existing site where minor residential unit is to be built contains only one residential unit
	Maximum floor area of 80m2
	Parking areas for both units is to be accessed form the same access
Access	Other than for Lot 1 and Lot 6 no access shall be gained from Spencerville Road



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9. Contour Interval 0.20m
10. Origin of Levels
    BM 3785
    (EHAY)
    RL=17.506m
    Located on the intersection of Belfast Road and Main North Road.

Legend

- Finished Floor Level 12.3m
- Flood Ponding Area

Total Area :63.9446ha

Comprised in: C.F.R. CB1B/387

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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:
Whisper Creek Project

SHEET TITLE:
Proposed Subdivision of Part Lot 2 DP 5889

DRAWING STATUS
Proposed Subdivision

SCALE : 1:1250@A1 1:2500@A3
DATE : August 2018
CAD FILE : J:\19432\E19432-Subdcon R10.dwg
REVISION : **R10**
DRAWING No : **E.19432**
SHEET No: 1 OF 2

Julie Comfort

From: Patricia Harte
Sent: Friday, 14 September 2018 5:52 p.m.
To: 'Ward, Sean'
Cc: Andy Hall; Ross Moffatt (Ross.Moffatt@xtra.co.nz)
Subject: RE: Whisper Creek
Attachments: 20180914174618813.pdf; 20180914174639947.pdf

HI Sean

Thanks for the update.

Regarding the matters you have raised below:

1. **Status of Subdivision**
Subdivision non-complying status due to location within Flood Ponding Management Area - Rule 5.4.5.3 – This has not changed. We listed this as a non-compliance and that it made the subdivision Non-complying when we lodged the consent.

2. **Building in the FPMA**
Regarding our recent request to apply for buildings in the Flood Ponding Management Area we had always known this was required but it was overlooked in preparing the application - we simply wanted to correct this.

3. **Filling in FPMA and compensatory storage**
Regarding filling within sites, the areas to be filled have changed with the new layout although the that requiring filling area not large. I have attached a basic plan highlighting in pink the area that will need to be filled to provide for access and house platforms. We have not calculated the volumes but will do so once you are satisfied with our approach regarding filling.

We have considered options for areas for these compensatory storage areas both on the east and west side of the development outside areas where houses can locate. You mentioned that would be being at the same RL – what was meant?. As an aside do you know what the RL of the FPMA is as it does not seem to coincide with our surveyed contours. If you are happy with the area of fill then , we will calculate the volumes and prepare plan showing excavation and compensatory fill areas.

4. **Tsunami**
Regarding tsunami I have attached the plans from the studies undertaken to determine likely impacts from the two major modelled tsunamis (on ECan website) – these both show there is no anticipated inundation of this site. Also attached is a plan of the Evacuation zones and an explanation that these ”evacuation zones” area not hazard or risk zones. The area is in the yellow zone where evacuation is only recommended if there is an official warning. The yells zone appears to be largely abased around property boundaries rather than contours.

5. **S106**
The one area not dealt with in the Statement of Professional Opinion is flooding as is commonly the case with subdivisions in the identified flooding areas. Given the limited area of land within the FPMA where people will be residing and the proposals (to be supplied) for compensatory storage it would seem likely that the subdivision will not make worse or accelerate or result in damage from erosion subsidence, slippage or inundation.

6.**LLink Road width** – this is a matter that can be dealt through conditions.

7.Other matters
I was unsure what you are referring to in several of your comments so we will need to talk and discuss further. I am out of town on Monday but otherwise free next week.

Regards
Patricia

From: Ward, Sean [mailto:Sean.Ward@ccc.govt.nz]
Sent: Friday, 14 September 2018 9:08 a.m.
To: Patricia Harte
Cc: Andy Hall
Subject: RE: Whisper Creek

Hi Patricia – I am still grappling with writing up a notification report despite statements that it would be finished last week.

I am having some difficulty with some of the changes you are proposing. In particular this point below regarding the FPMO areas on the site. I note that he proposal (subdivision) now is non-complying in terms of 5.4.5.3 NC2 as the lots noted below cannot comply with the exceptions.

You state that there will be minimal filling in the application proper (and that this will be compensated elsewhere on the site) however my reading of the amended scheme plan (and probably what prompted your email below) indicates that at least Lots 11, 14, 15, 16, 17 18 and 19 will require quite a bit of filling in the FPMA areas to allow for dwellings that are either not on piles or are in excess of 200m^2 in footprint area (noting also that those parameters are intended to delimit effects – and that Council has previously on other sites taken a strong line on this matter).

I am presuming that what you are proposing is more than a footprint fill, to allow for practicable access to dwellings, and useable site areas outside the FPMA. (practical access realistically needs to be addressed also in terms of some of the proposed allotments whose road frontage appears to lie almost fully within the FPMA also). The 106 assessment you have provided is really pretty scant about anything other than geotechnical matters (and those aren't in question from comments I have from Yvonne McDonald), there is quite a bundle of natural hazard on the site, and it isn't all neatly addressed in one place. I am not qualified to address it in a report without some evidential confirmation from expert parties, but recent changes to the RMA in terms of 106 set out what needs to be covered. Also after searching the property info today (info that goes onto a LIM) I see that the ECan tsunami inundation model indicates in a worst scenario situation that this site may be affected by inundation. I can't see any mapping of it in the DP, but should for completeness be referenced in any 106 assessment also if listed on the property. I suspect it is near the inner (landward) edge of any area of influence, so may not be material against other water based hazards mapped in the DP.

It is not clear where compensatory storage (generally at the same RL) could actually be provided given that the allotments are sited, at the perimeter of the development area proposed, either abutting or partly within the FPMA. Your proposed expansion of the activity below to include more significant filling in the FPMA doesn't provide any detail at all of how this is addressed. This matter is pivotal (and I hadn't really registered the effect of what you were proposing below previously) as these ponding areas (or their capacity) are expressly protected by policy, I don't think this particular matter is addressed at all in the application, and with amendments as below certainly isn't a minor matter. I am not sure in light of the change that the matter of determining location and volume of compensatory storage can safely be left until after a consent is issued, as I am not sure you can actually provide it. As above the compensatory storage should be at the same RL and clearly result in a neutral situation.

The new road alignment/layout also requires construction of the road through the FPMA at the southern end of the site, and there will also need to be compensatory storage for any filling required for this work as I presume you aren't intending to leave the road below water in the ponding area.

Andy had appeared to indicate to me that you weren't really touching the FPMA and that it is all also hydraulically linked back to the source of water. But realistically this can't be the case with what is proposed below. It isn't tenable to allow sites to be filled after the subdivision either, as any future owner will have no ability to provide compensatory storage.

I also raised with Andy the matter of the road linking to the south boundary, and that it needed to be (as on the original layout) at the same legal width as the other roads in the development. That could however be conditioned, in terms of an outcome of the engineering plan approval process.

I am happy to discuss further, but today likely I won't be available as I am in a meeting that is booked for the whole day. I am very much hoping it doesn't run all day, but expect that it might.

Regards,

Sean

From: Patricia Harte [mailto:Patricia.Harte@dls.co.nz]
Sent: Wednesday, 22 August 2018 9:43 a.m.
To: Ward, Sean <Sean.Ward@ccc.govt.nz>
Subject: Whisper Creek

Hello Sean

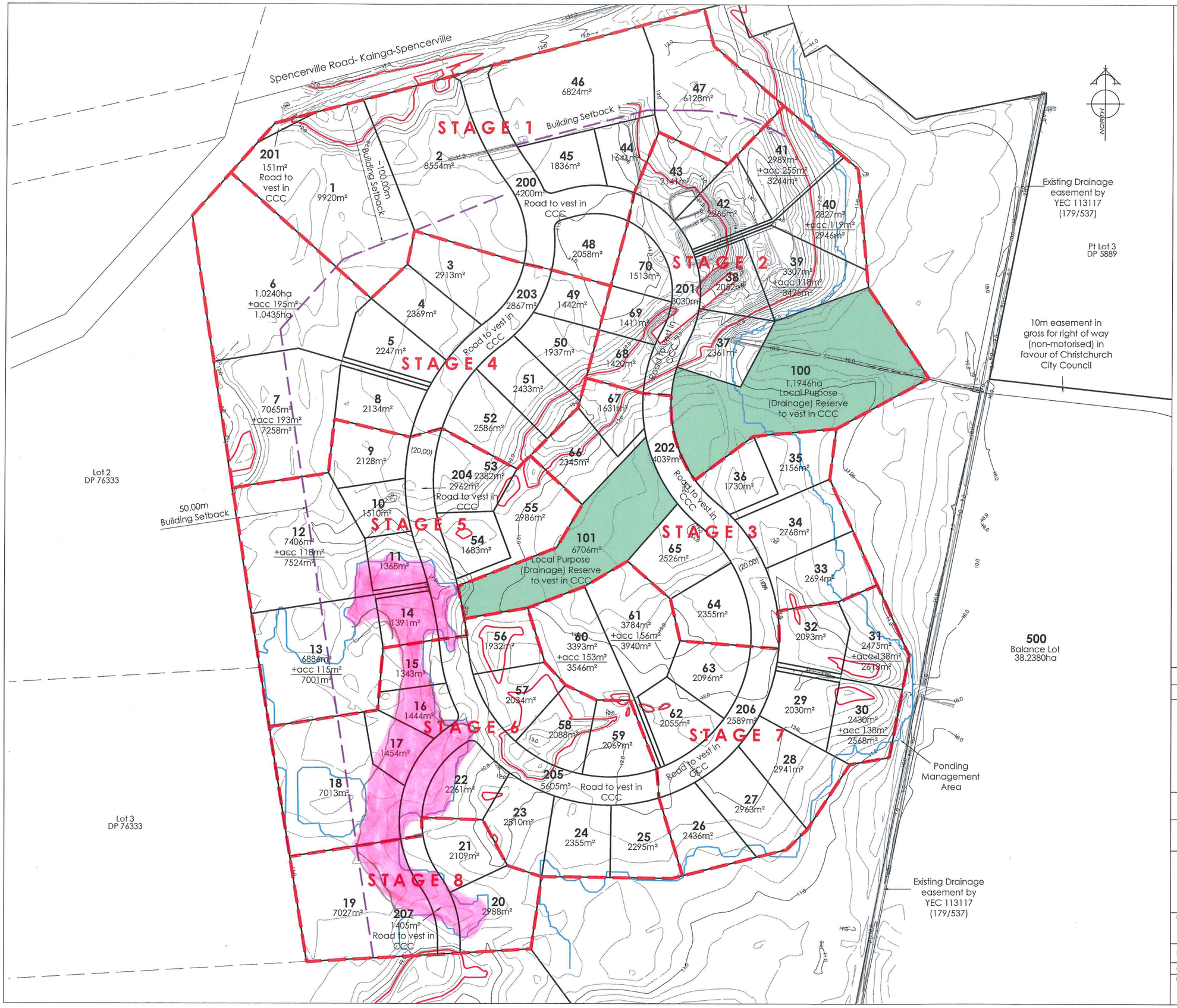
Further to my email of 20 August we wish to clarify that LMM Investments 2012 Limited request their application to include consent to breach Natural Hazard provision 5.4.5.1.P14 Residential Unit. In particular they seek consent to locate residential units on lots within the Lower Styx Ponding Area which either are not on piles or have a ground floor area greater than 200m2.

We also suggest that to give effect to the land use consent for each of the lots over time it would be appropriate to place a condition on the subdivision consent requiring compliance with the standards in the land use consent and a consent notice supporting this condition. In that way there should be no issues as to whether the land use consent has been given effect to. We also suggest that the lapse period be extended from 5 to 10 years.

Happy to discuss

Patricia Harte
Principal

Davie Lovell-Smith Ltd
Planning Surveying Engineering
PO Box 679 | Christchurch | Phone (03) 963 0701 | Mobile 021 807 905 | www.dls.co.nz



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m/s. Water in the Waimakariri River (not taken into account in our modelling) could allow surges to travel further up-river than shown in this modelling.

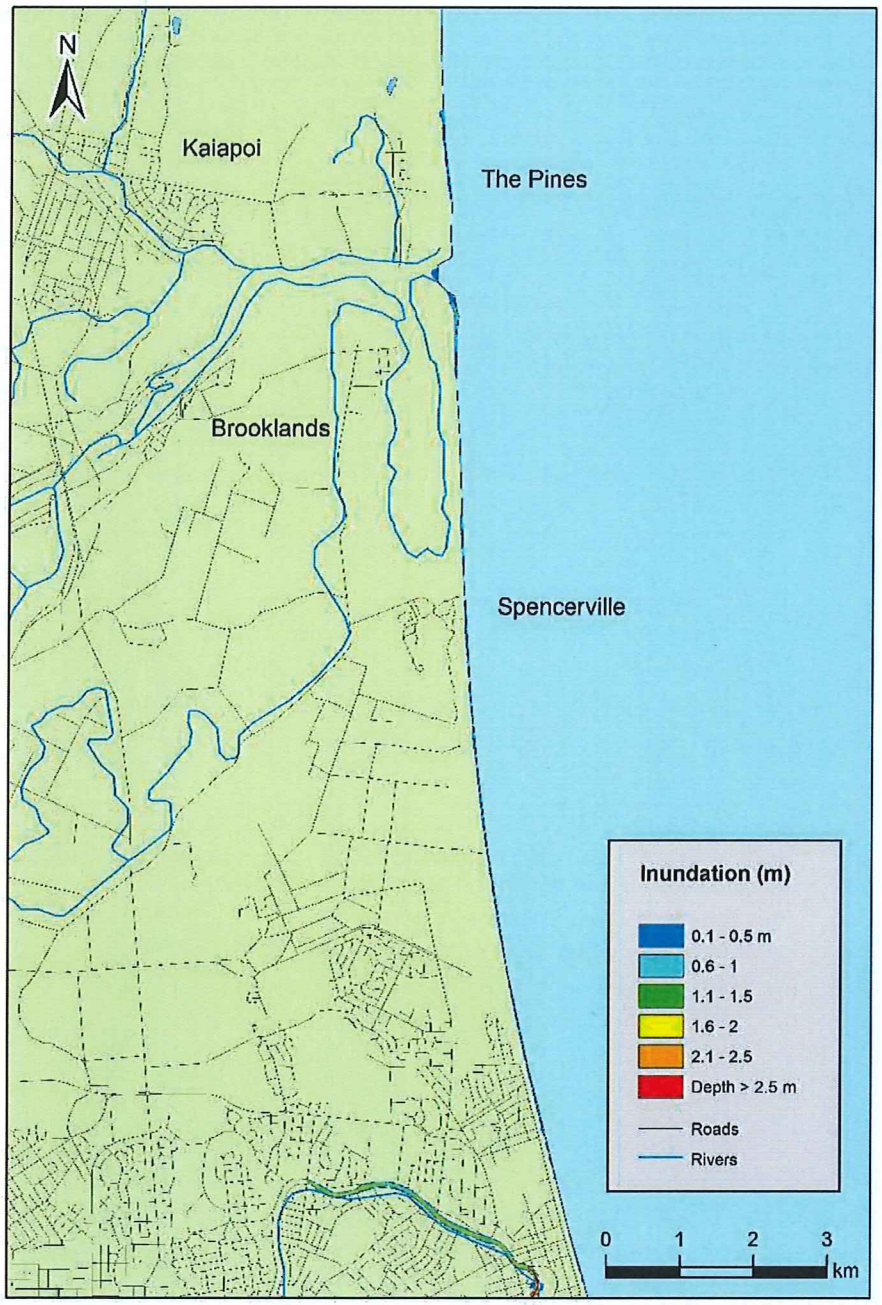

Figure 4-15: Maximum inundation depth for The Pines, Kairaki, Kaiapoi, Brooklands and Spencerville for the Wairarapa scenario assuming the largest wave arrived at MHWS. Inundation depths are only shown for inundated land.

at the Waimakariri River Mouth. Water in the Waimakariri River (not taken into account in our modelling) could allow surges to travel further up-river than shown in this modelling.

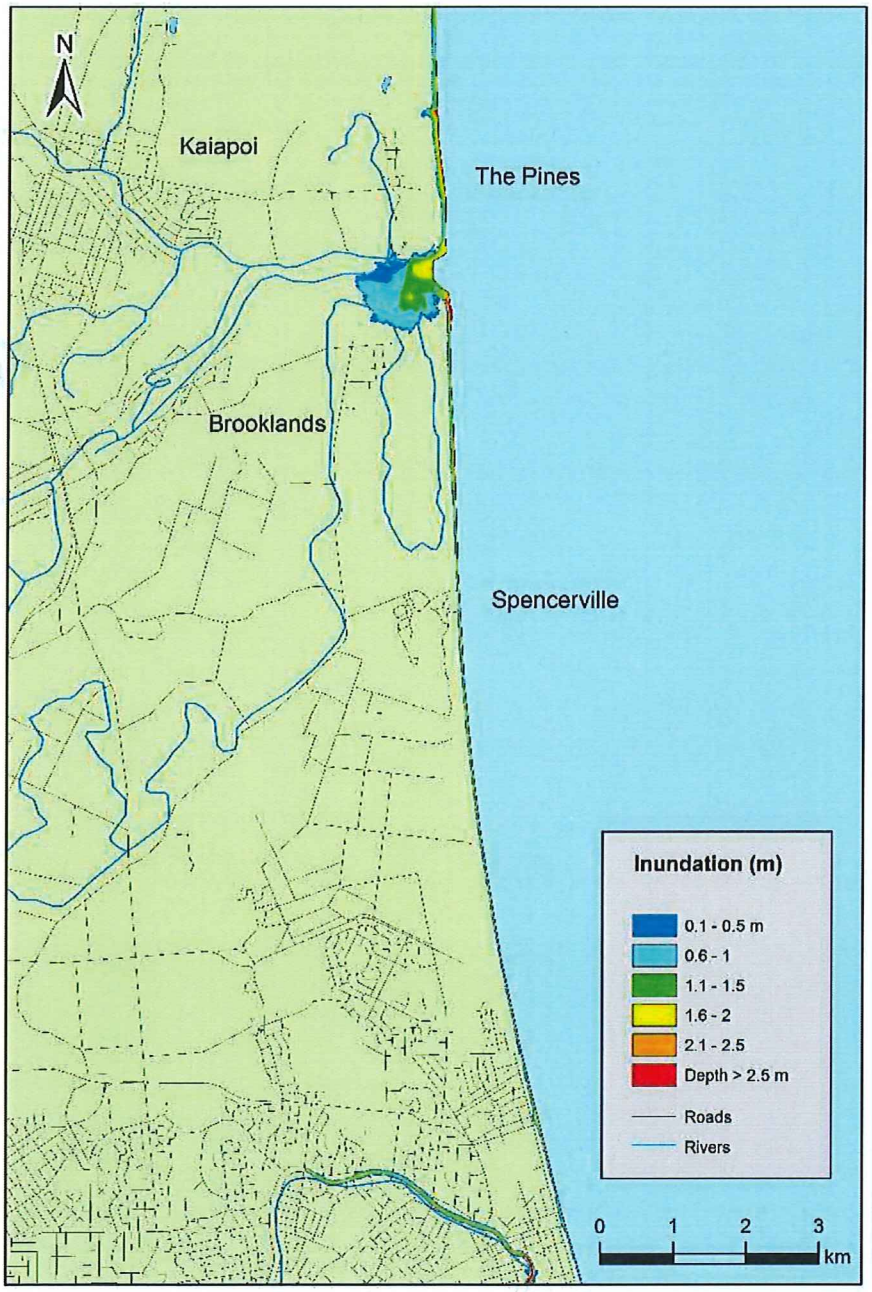

Figure 5-15: Maximum inundation depth for The Pines, Kairaki, Kaiapoi, Brooklands and Spencerville for the combined scenario assuming the largest wave arrived at MHWS. Inundation depths are only shown for inundated land.

4.2.7 The Pines to Spencerville (including Kairaki, Kaiapoi, Brooklands)

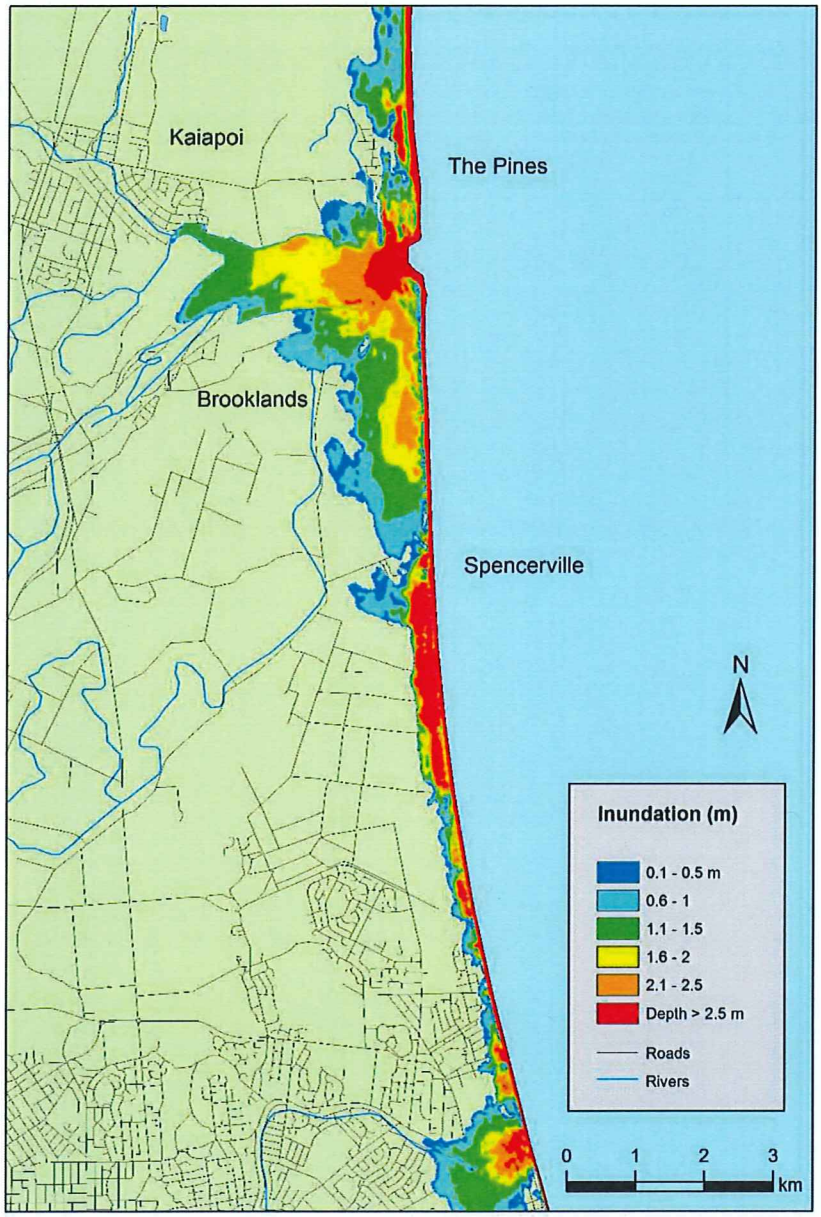

Figure 4-15: Maximum inundation depth for The Pines, Kairaki, Kaiapoi, Brooklands and Spencerville assuming the largest wave arrived at MHWS. Inundation depths are only shown for inundated land.

Maximum inundation and maximum speed assuming the largest wave arrives at MHWS for The Pines, Kairaki, Kaiapoi Brooklands and Spencerville are shown in Figure 4-15 and Figure 4-16 respectively. Kairaki is inundated under 1-2 m of water and this inundation reaches the edges of the Pines too. The stop banks seem to protect Kaiapoi and the oxidation ponds from the tsunami. Brooklands and Spencerville are also severely inundated. Water in the Waimakariri River (not taken into account in our modelling) could allow surges to travel further up-river than shown in this modelling.

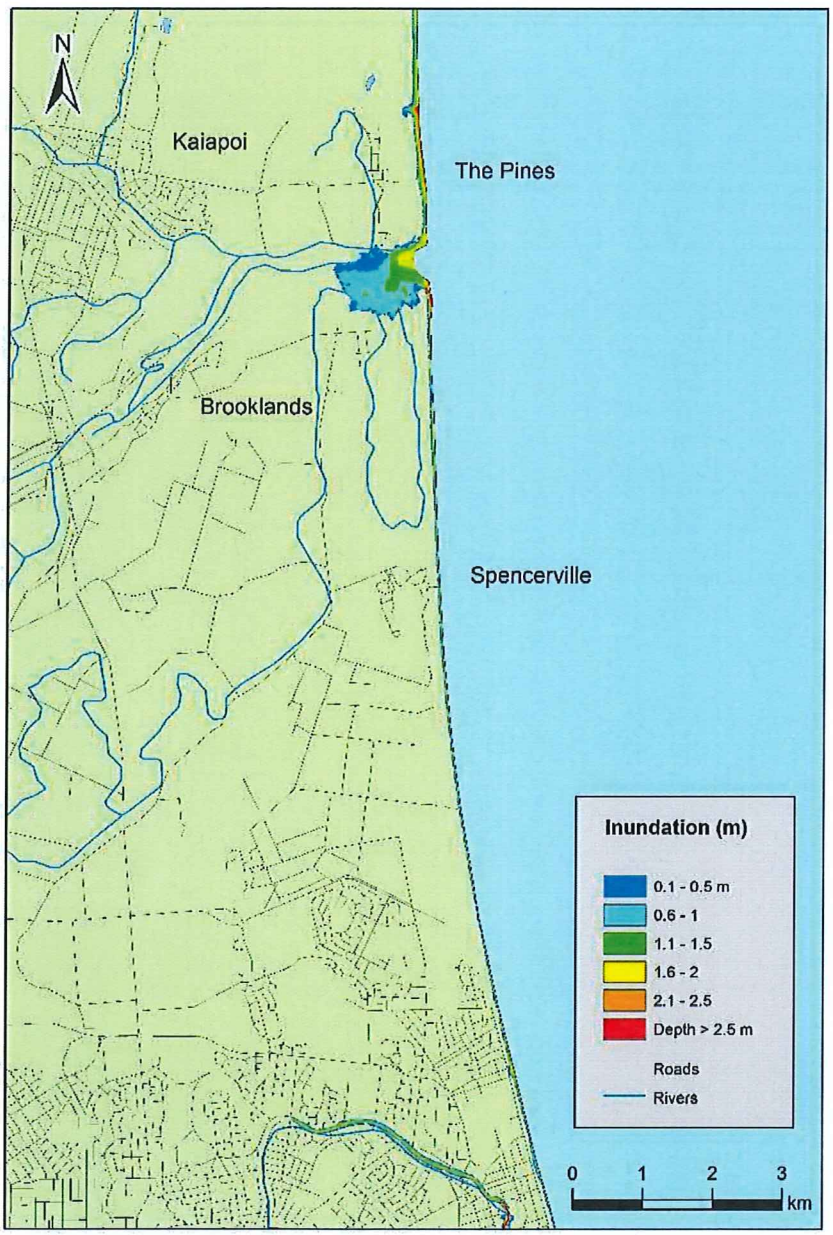

Figure 3-15: Maximum inundation depth for The Pines, Kairaki, Kaiapoi, Brooklands and Spencerville for the Hikurangi scenario assuming the largest wave arrived at MHWS. Inundation depths are only shown for inundated land.

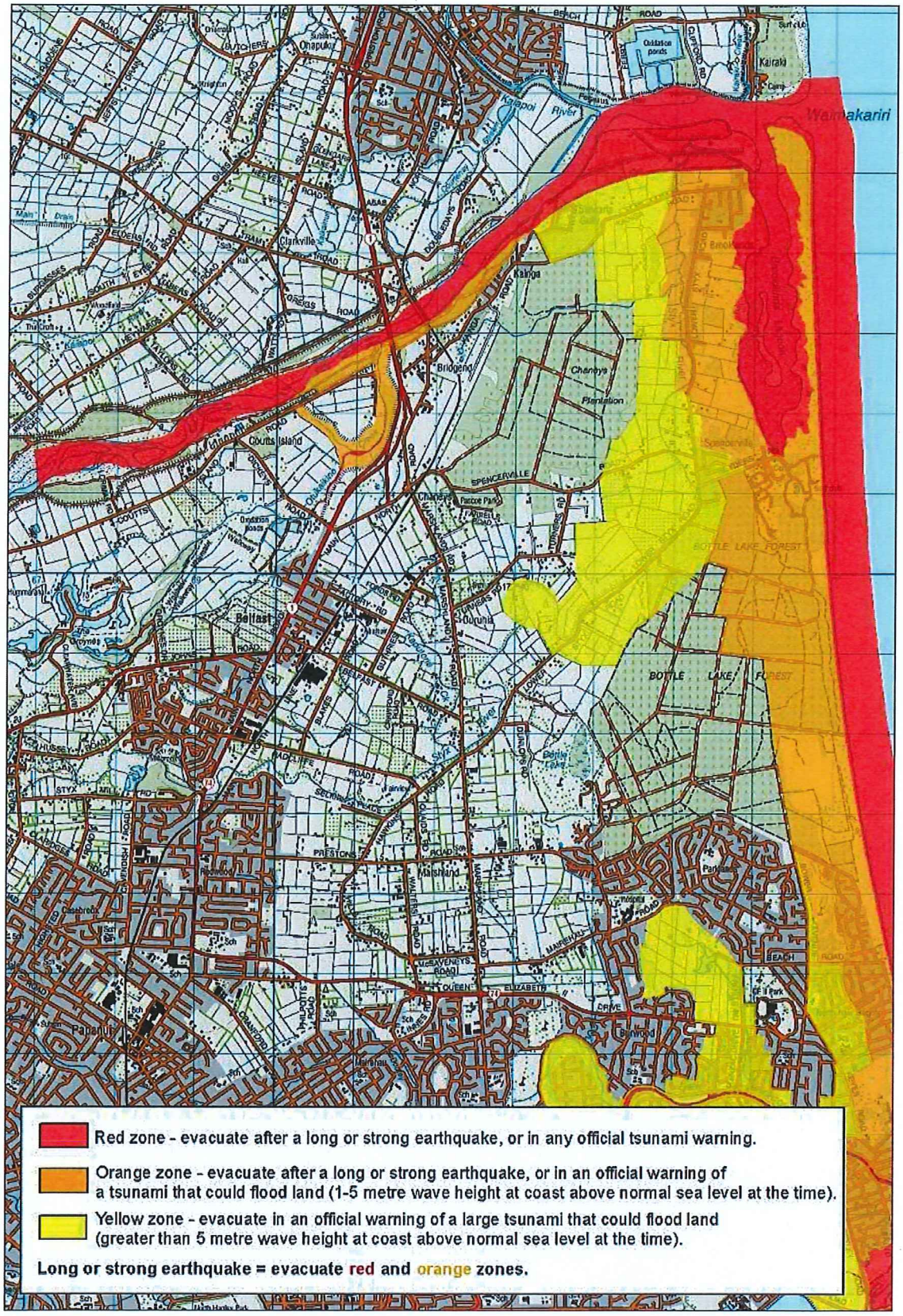

Figure 5-1: Tsunami evacuation zones for Christchurch City north. For illustration only – interactive webmaps are available on the Christchurch City Council and Canterbury Maps websites. Each grid line is 1 km

Executive summary

Background:

Tsunami evacuation zones are the areas that people should evacuate from, or stay out, of as a precaution during an official tsunami warning, or after a long or strong earthquake.

Christchurch City has had tsunami evacuation zones in place for coastal Christchurch from the Waimakariri River to Taylors Mistake since 2007. There are currently no tsunami evacuation zones in place for Banks Peninsula.

The problem:

The existing Christchurch City zones needed to be updated to take into account:

- changes in ground levels after the 2010/11 Canterbury earthquakes, particularly around the Avon River
- changes in land use since the 2010/11 Canterbury earthquakes
- new tsunami modelling undertaken for Christchurch and Banks Peninsula since 2007
- new guidelines for developing tsunami evacuation zones issued by the Ministry of Civil Defence & Emergency Management (MCDEM) in 2008 and updated in 2016.

The existing Christchurch City zones were developed before Banks Peninsula District Council was incorporated into Christchurch City Council in 2006, and thus only covered the area from the Waimakariri River mouth to Taylors Mistake. New zones needed to be developed to cover Banks Peninsula from Godley Head to the outlet of Lake Ellesmere/Te Waihora.

What we did:

Environment Canterbury and Christchurch City Council staff worked together to determine the tsunami evacuation zones. This report documents the methodology and information used in this process.

We used hydrodynamic modelling of several tsunami scenarios, along with simpler rule-of-thumb modelling using wave heights at coast to develop revised tsunami evacuation zones for Christchurch City from the Waimakariri River mouth to Taylors Mistake. We also developed new tsunami evacuation zones for Banks Peninsula from Godley Head to the outlet of Lake Ellesmere/Te Waihora.

We took into account historic tsunami behaviour, paleotsunami information, available lidar/topographic data, the practicalities of evacuating or closing parks and other public areas, and the locations of schools and elderly care facilities. Where possible we used roads or other obvious landmarks as zone boundaries so that people can more easily determine whether they are in or out of a zone.

We used a three zone approach (red, orange and yellow zones) as outlined in the latest Ministry of Civil Defence & Emergency Management's *Director's Guideline for Tsunami Evacuation Zones*, although our use of the orange and yellow zones differs from that recommended in the Director's Guideline. The rationale for the zone boundaries for each particular area is explained in this report.

We did not take future sea level rise into account, as evacuation zones are to be used now, not in 50 or 100 years' time (we recommend that the zones are reviewed at least once every five years).

The resulting tsunami evacuation zones are not tsunami hazard zones, or tsunami risk zones, or tsunami inundation zones. They are areas that we recommend people evacuate from as a precaution after they feel a long or strong earthquake, or in an official tsunami warning. Every tsunami is different depending on its source, the direction it is arriving from, and the sea state and tide at the time, and there

is no one tsunami that would inundate an entire zone. Rather, the zones represent an 'envelope' around many different possible tsunami scenarios.

What does it mean?

We recommend that:

- People keep out of the **red** zone (coastal rocks, beaches, estuaries, harbours, bays and river mouths) in an official warning of a tsunami up to 1 metre wave height at coast (a Beach and Marine warning).
- People evacuate the **red** and **orange** zones in an official warning of a tsunami up to 5 metres wave height at coast (a Land and Marine warning).
- People evacuate the **red**, **orange** and **yellow** zones in an official warning of a tsunami larger than 5 metres wave height at coast (a Land and Marine warning).
- People evacuate the **red** and **orange** zones immediately if they feel a **long** (more than one minute) **or strong** (difficult to stand up) **earthquake**. People do not need to evacuate the yellow zone in a long and strong earthquake because, with our current understanding, there are no local or regional tsunami sources that would cause a tsunami larger than 5 metres wave height at coast for the Christchurch coastline and inhabited parts of the Banks Peninsula coastline. (There are some isolated areas of the northern Banks Peninsula coastline where a local or regional source tsunami could cause a greater than 5 metre wave height at coast and in these areas the orange zone has been extended inland further.)

The tsunami evacuation zones are fundamentally about life safety and are primarily for evacuation planning and public education. The tsunami evacuation zones are not appropriate for property-specific land use planning, but may be useful for strategic development planning and infrastructure planning as they do indicate areas of higher vulnerability where future development should generally be more carefully managed. The tsunami evacuation zones can be included on Land Information Memoranda (LIMs) and Land Information Requests (LIRs), but these must be clearly worded to explain what the zones do and don't mean.

Our understanding of New Zealand's tsunami hazard is always improving. We recommend that the tsunami evacuation zones are reviewed within five years, taking into account:

- the effects of any actual tsunami
- new tsunami modelling (both scenario and probabilistic), which would also take into account any sea level rise
- changes to the natural environment
- changes in land use
- changes in demographics
- any changes to the recommended approach for delineating tsunami evacuation zones.