



4 December 2018

• Graham McDermid  
3 Bears Running Limited  
PO Box 2870  
**CHRISTCHURCH 8140**

Dear Graham

## **CLAYTON ROAD SUBDIVISION FLOOD HAZARD RISK ASSESSMENT**

### **1.0 Introduction**

PDP have been engaged by 3 Bears Running Limited to complete a flood hazard risk assessment for a proposed 17 Lot subdivision located on Clayton Road, Ashwick Flat, Canterbury.

The proposed subdivision is located within a 8.09 ha property bounded by Monument Road to the northwest, Clayton Road to the southeast and rural properties to the northeast and southwest. The location of the property is shown on Figure 1 appended to this report. The property is currently grazed pasture which will be developed in the future into 17 semi-rural residential lots varying in size from 3,214 m<sup>2</sup> to 6,035 m<sup>2</sup>. Earthworks will be required to raise the future dwelling platforms above existing ground levels and for the proposed subdivision road. The earthworks associated with the subdivision road are expected to be minimal. The proposed subdivision scheme plan is appended to this report.

The purpose of this report is to identify the potential flood hazard risks within the proposed subdivision and to outline how these hazards will be mitigated.

### **2.0 Background**

The 8.09 ha property is located within a rural setting in Ashwick Flat, Canterbury. The Two Thumb Range is located approximately 10 km to the west and the Four Peaks Range approximately 6 km to the east. The South Opuha River is located approximately 1 km north of the property. The South Opuha River flows east to west from the Two Thumb Range into Lake Opuha located approximately 1.3 km northeast of the property.

In August 2018, Environment Canterbury (ECan) completed a preliminary flood assessment for the property (ECan: 'Flood Hazard Assessment – Proposed Subdivision', 30 August 2018). This assessment identified an existing natural swale running from northwest corner to the eastern boundary of the property. ECan reported that this swale potentially conveys runoff from rural land to the west of Monument Road. ECan also identified that this swale may convey overflow from the South Opuha River in a major flood event. The location of the existing swale is shown on Figure 1. The full ECan flood assessment document is appended to this report.



As defined by the Mackenzie District Council (MDC), the minimum floor height required for new dwellings is 150 mm above the expected 500 year Average Recurrence Interval (ARI) flood event (MDC Section 6 – Residential Zone Rules 3.1.1.e ii). The New Zealand Building Code requires floors levels above the 50 year ARI flood level. The ECan flood assessment recommended that floor levels within the subdivision should be at least 400 mm above existing ground level in order to meet the more restrictive MDC requirements.

### 3.0 Site Visit

PDP completed a site visit at the property in November 2018. During the site visit, a PDP engineer carried out a general site walkover and identified drains and surface water structures (such as culverts) within the area.

The main surface water feature within the property identified during the site visit was a natural swale that runs from the northwest corner to the eastern boundary of the property (as previously identified by ECan). Flow enters the swale at the northwest corner of the property from a 375 mm diameter culvert under Monument Road. This culvert collects runoff from rural land to the north of Monument Road. From the eastern boundary, the swale continues east/southeast to Clayton Road. Two 300 mm diameter culverts under Clayton Road discharge the swale into drains which ultimately flow into Lake Opuha. The location of the culverts and swale are shown on Figure 1. At the time of the site visit (during dry weather conditions), the swale within the property and upstream of Monument Road was dry.

A second 2 x 220 mm diameter culvert is located 600 m west of the property and conveys runoff from north of Monument Road into an open drain. This drain flows southeast through rural land to a 650 mm diameter culvert at Clayton Road. The location of the culverts and drain are shown on Figure 1. At the time of the site visit, the drain had a base flow of approximately 10-30 L/s. The ECan assessment identified that this drain potentially spills into a secondary flow path and flows northeast into the property as shown on Figure 1. This potential spill location was confirmed by the PDP engineer during the site visit.

Within the property, there are a number of shallow depressions which collect and convey localised runoff from within the property. These depressions follow the general slope of the property in a southeast direction. At the time of the site visit, no surface water flow or ponding was observed within the property.

### 4.0 Potential Flood hazards

Based on the information collected from background information and the site visit, the potential flood hazards within the property have been identified to include:

- ∴ Flow within the existing swale originating from the northwest corner of the property and spill from nearby drain;
- ∴ Localised surface water runoff from within the property; and
- ∴ Overflow of the South Opuha River.

### 5.0 Flood Conveyance in Existing Swale

PDP have undertaken a hydrological and hydraulic analysis to calculate the potential flow within the existing swale during the 50 and 500 year ARI events.

Flow into the swale originates from two catchments located to the north of Monument Road. Figure 2 shows the two delineated catchment areas (labelled Catchment A and Catchment B) based on an analysis of topographical information.

HEC-HMS software using the SCS Curve Number method was used to calculate the peak flow from the catchments upstream of the property for the 50 and 500 year ARI events. The peak flow for Catchment A during the 50 and 500 ARI events was calculated to be 0.35 m<sup>3</sup>/s and 1.06 m<sup>3</sup>/s respectively. The peak flow for Catchment B during the 50 and 500 ARI events was calculated to be 1.57 m<sup>3</sup>/s and 4.36 m<sup>3</sup>/s respectively. Figure 2 shows the locations of the resulting peaks flows. Model input data sheets are appended to this letter.

As identified by ECan and PDP's site visit, the drain 600 m to the east of the property potentially spills into a secondary flow path and flows west into the property as shown on Figure 1. The maximum capacity of this drain before spill occurs has been estimated at be 1.28 m<sup>3</sup>/s (see calculations appended). It has been assumed that the remaining flow of 0.29 m<sup>3</sup>/s and 3.08 m<sup>3</sup>/s for 50 year and 500 year ARI events respectively flows into the property as shown on Figure 1.

The total combined flow within the swale during the 50 and 500 ARI events is 0.64 m<sup>3</sup>/s and 4.14 m<sup>3</sup>/s respectively.

HEC-RAS hydraulic software was used to calculate the water level within the existing swale during the 50 and 500 year ARI events. The model uses the peak flow rate as calculated in the HEC-HMS model and cross sections delineated from detailed topographical survey of the property (survey is appended to this letter). Model input data sheets are appended to this letter.

The hydraulic model does not take into account any restrictions provided by the culverts along Monument and Clayton Roads. Based on detailed topographical survey information, Clayton Road is not elevated above the surrounding area. Therefore, if the culverts are unable to convey the peak flow, water will flow over Clayton Road with negligible backwater effects. At the upstream end, assuming no culvert restrictions will result in a higher peak flow and water level within the property. This assumption is considered conservative for the purposes of this assessment.

Figure 3 shows the maximum flood extent as calculated by the HEC-RAS model during the 50 and 500 year ARI events. The model results show that flood water encroaches on Lots 4, 5 and 6 of the proposed subdivision scheme plan. The model shows that the flow is contained within the existing swale during both events except for a spill out of the swale at the downstream end of the swale within Lot 5.

To mitigate flood hazard risk from flow within the existing swale, it is recommended that no development, including buildings and earthworks occurs within the 500 year ARI flood extent as shown in Figure 3. The swale should also be kept clear of any vegetation other than grasses. It is also recommended a 400 mm freeboard allowance is included above the 500 year ARI flood extent as shown on Figure 3 for future building floor levels within Lots 4, 5 and 6.

## 6.0 Localised Runoff

Within the property, there are a number of shallow depressions which collect and convey localised runoff. The soil type within the property has been identified as a silt loam (SMaps Online: Eyre f Silt Loam). Silt loams are expected to have a moderate infiltration rate when thoroughly wetted. Given the relatively high infiltration capacity and minimal upstream catchment area of these depressions, minimal runoff is expected from within the property during rainfall events.

To mitigate flood hazard risk from localised runoff, it is recommended that all building floor levels are at least 400 mm above existing ground levels. For Lots 4, 5 and 6, the floor level required will be governed by the 500 year ARI flood extent as shown on Figure 3 plus 400 mm freeboard as outlined in Section 5.

## 7.0 Overflow from Opuha River

The property is located within the southern edge of a Potential Flooding Area as shown on MDC flooding maps (MDC District Plan: Flood maps). This mapping has been derived from aerial photos, contour maps (low resolution) and ground inspection.

There is insufficient topographical information for the Opuha River and the surrounding area to carry out a detailed flood assessment of the Opuha River during the 500 year ARI event. Based on the detailed topographical information of the property, flood conveyance will be provided within the existing swale which has been assessed in Section 5. In the event that flood water exceeds the capacity of the swale, water will flow as overland flow across the property. It is recommended that to allow for sufficient overland flow, all building floor levels are at least 400 mm above existing ground levels. For Lots 4, 5 and 6, it is recommended that all building floor levels are at least 400 mm above the 500 year ARI flood level within the existing swale as outlined in Section 5.

## 8.0 Conclusions and Recommendations

Based on the information collected from background information and the site visit, the potential flood hazards within the property have been identified to include flow within the existing swale originating from the northwest corner of the property, localised surface water runoff from within the property and overflow of the South Opuha River.

To mitigate flood hazard risk to the future subdivision it is recommended that:

- ∴ No development, including buildings and earthworks is to occur within the 500 year ARI flood extent as shown in Figure 3 of this report.
- ∴ All building floor levels within lots 4, 5 and 6 are at least 400 mm above the 500 year ARI flood extent as shown of Figure 3 of this report;
- ∴ For all remaining lots, all building floor levels are at least 400 mm above existing ground levels;
- ∴ All practical measures are undertaken to avoid building any structure within localised low points or depressions; and
- ∴ The existing swale should be kept clear of all dense vegetation other than grasses.

## 9.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by 3 Bears Running Limited and Environment Canterbury whom were not directly contracted by PDP for the work. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of 3 Bears Running Limited for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Please contact the undersigned if you have any queries.

Yours sincerely

**PATTLE DELAMORE PARTNERS LIMITED**

Prepared by



**Richard Brunton**

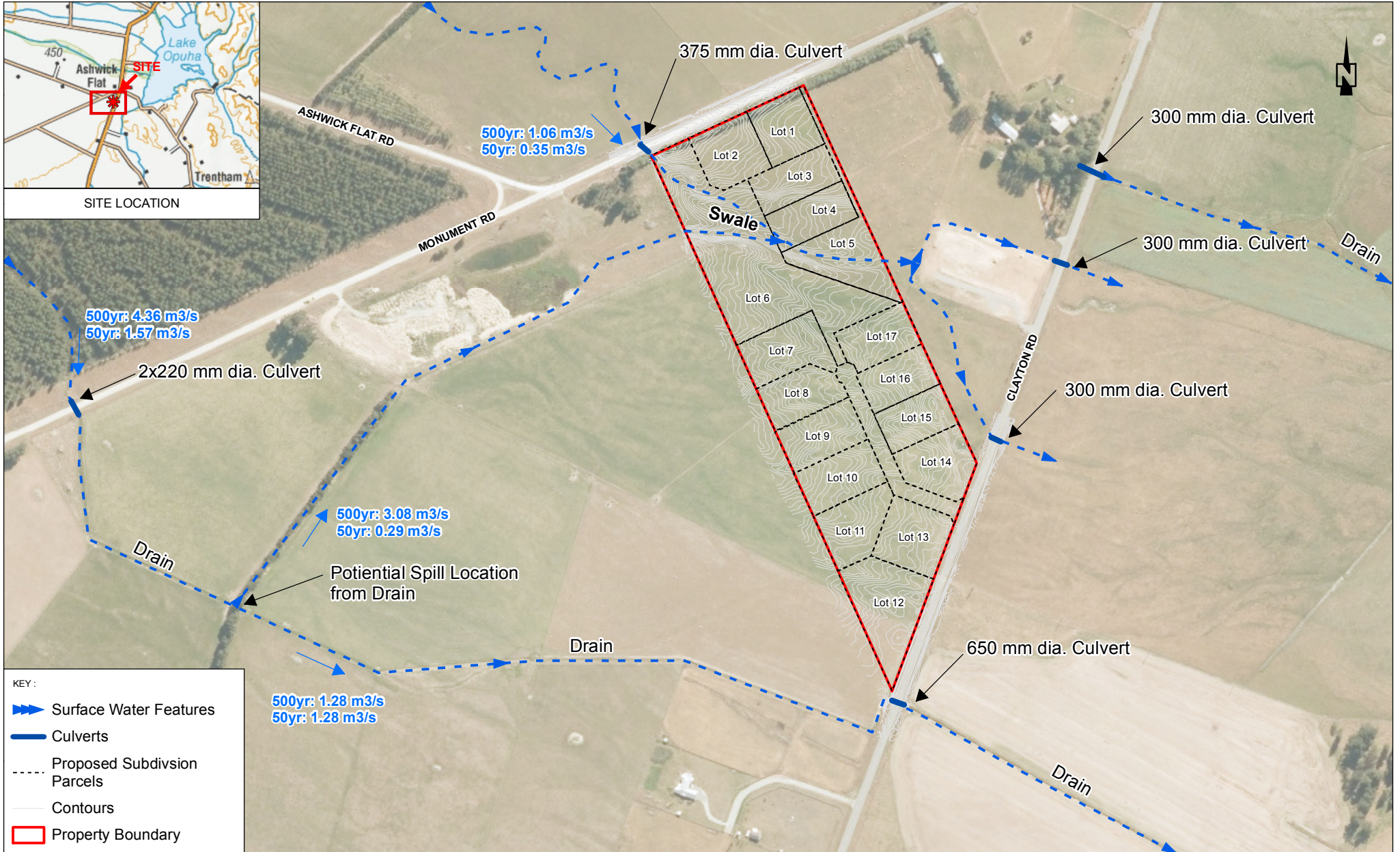
Senior Environmental Engineer

Reviewed and Approved by



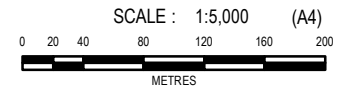
**Steve Pearce**

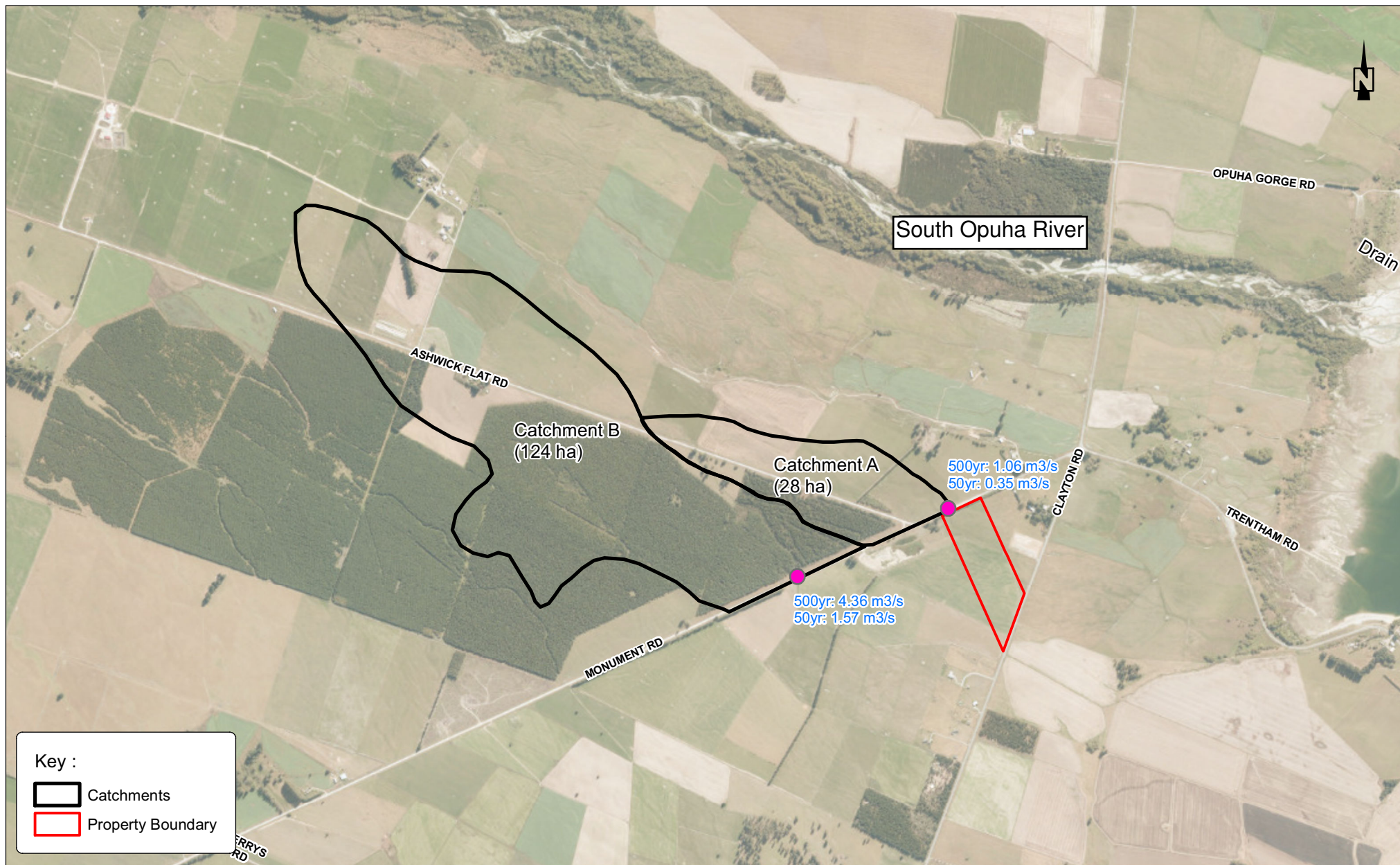
Technical Director



SOURCE:  
 1. SATELLITE IMAGERY (FLOWN 2015) DERIVED FROM GOOGLE EARTH PRO (MAY NOT BE SPATIALLY ACCURATE).  
 2. CADASTRAL INFORMATION AND INSET SOURCED FROM THE LINZ DATA SERVICE [HTTPS://DATA.LINZ.GOVT.NZ/](https://data.linz.govt.nz/) AND LICENSED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE.

FIGURE 1 : PROPERTY LOCATION AND SURFACE WATER FEATURES





**Key :**

- Catchments
- Property Boundary

SOURCE:  
 1. SATELLITE IMAGERY (FLOWN 2015) DERIVED FROM GOOGLE EARTH PRO (MAY NOT BE SPATIALLY ACCURATE).  
 2. CADASTRAL INFORMATION AND INSET SOURCED FROM THE LINZ DATA SERVICE [HTTPS://DATA.LINZ.GOV.T.NZ/](https://data.linz.govt.nz/) AND LICENSED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE.

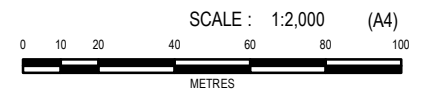
FIGURE 2 : CATCHMENTS

SCALE : 1:20,000 (A4)

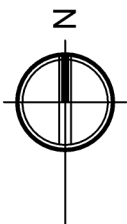


SOURCE:  
 1. SATELLITE IMAGERY (FLOWN 2015) DERIVED FROM GOOGLE EARTH PRO (MAY NOT BE SPATIALLY ACCURATE).  
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**FIGURE 3 : MAXIMUM FLOOD EXTENT DURING 50 YEAR AND 500 YEAR ARI EVENTS**

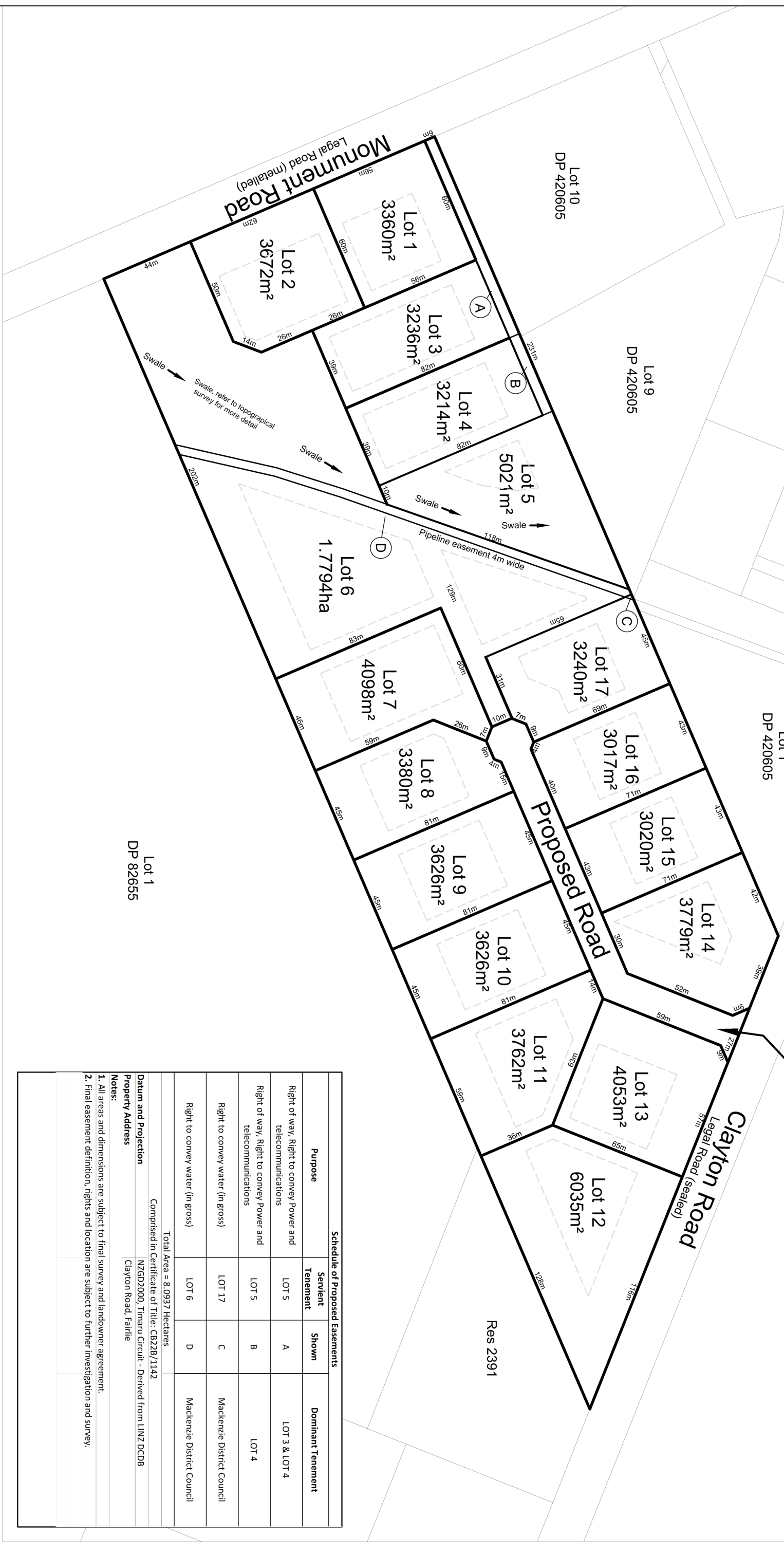






Buildable Areas  
20m clear of external boundaries  
6m clear of internal boundaries  
5m clear of swales

ALL AREAS AND DIMENSIONS ARE  
APPROXIMATE ONLY AND ARE  
SUBJECT TO FINAL SURVEY



Lot 1  
DP 82655

**Schedule of Proposed Easements**

Purpose	Servient Tenement	Dominant Tenement
Right of way, Right to convey Power and telecommunications	LOT 5	LOT 3 & LOT 4
Right of way, Right to convey Power and telecommunications	LOT 5	LOT 4
Right to convey water (in gross)	LOT 17	Mackenzie District Council
Right to convey water (in gross)	LOT 6	Mackenzie District Council

Total Area = 8.0937 Hectares

Comprised in Certificate of Title: CB22B/1142

Datum and Projection NZGD2000, Tīmanu Circuit - Derived from LINZ DCDB

Property Address Clayton Road, Fairlie

**Notes:**

- All areas and dimensions are subject to final survey and landowner agreement.
- Final easement definition, rights and location are subject to further investigation and survey.

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CONSTRUCTION PROJECTS	CONTRACT DRAWINGS	REF. DRAWING No.	REV.	DESCRIPTION	DATE	DESIGNED	DRAWN	CHECKED	APPD	CLIENT	DRAWING TITLE	REVISION
											Proposed Lots 1 - 17 & 200 Being a Subdivision of Part RS 32380	5242-001



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**Notes:**

Surveyed using GPS equipment.  
 Properly boundaries shown have been sourced from LINZ and are indicative only. Full redefinition survey would be required for confirmation of boundaries.  
 Contours are 0.1m intervals, calculated from ground level measurement survey.  
 Horizontal coordinates are in terms of NZGD 2000, Timaru Circuit 2000, origin of survey is LINZ mark AAN8, RL 405.83m  
 Levels are in terms of Lyttelton Vertical Datum 1937

*CAD and Production by:*

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**APPLICANT**

**TEKORORUA AUTHORITY**  
 Mackenzie District Council

LAND DISTRICT	DATE
Canterbury	

*Drawing Title:*

Clayton Road  
 TOPOGRAPHICAL SURVEY  
 PI-RS 32380

*Prepared for:*

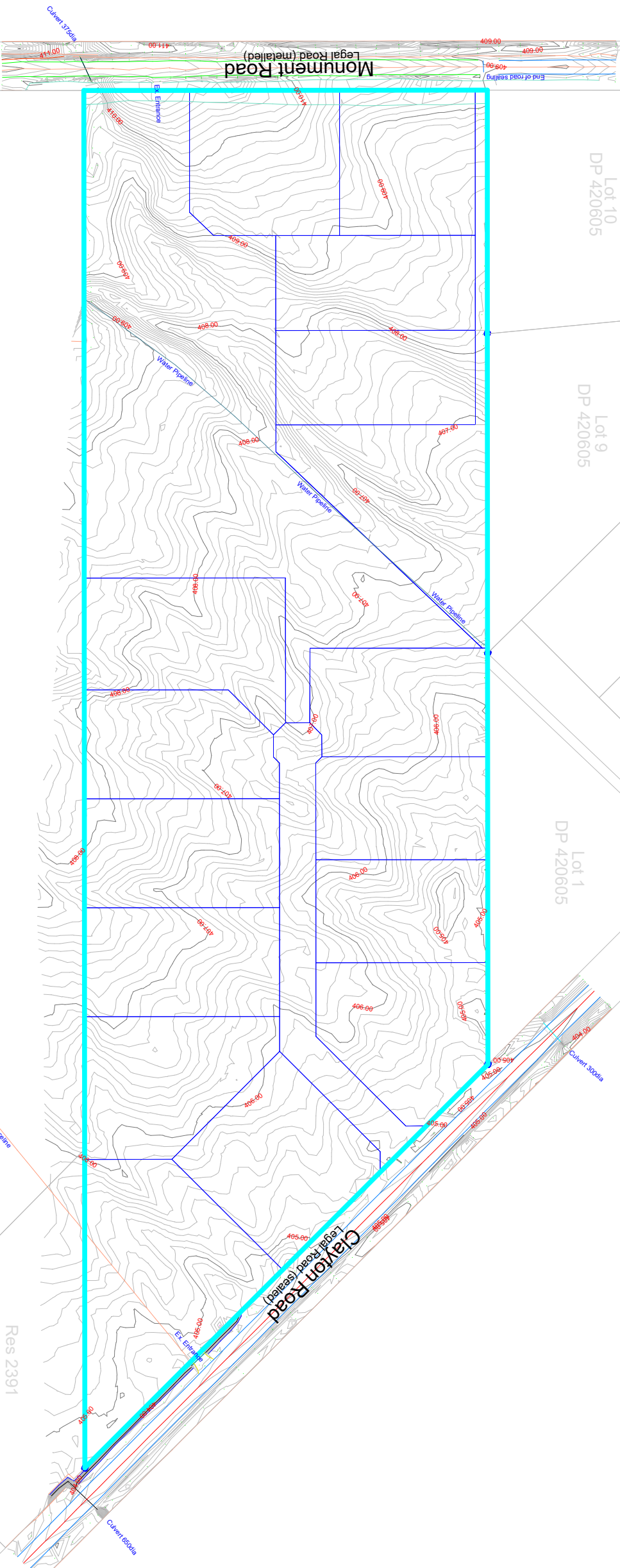
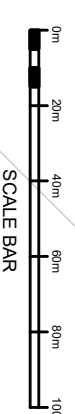
Rev	DESCRIPTION	DATE
A	ORIGINAL ISSUE	23/08/18

Rev	DESCRIPTION	DATE

**SCALE**  
 1:2000 @ A3

**DATUM & LEVEL**  
 Coordinates - Timaru 2000  
 Levels - Lyttelton 1937

DATE	DATE	DATE
19/07/2018	MZ	23/08/2018
23/08/2018	BK	



Lot 1  
 DP 82655

Lot 1  
 DP 420605

Lot 9  
 DP 420605

Lot 10  
 DP 420605

Res 2391

HIRDS V4 Depth-Duration-Frequency Results

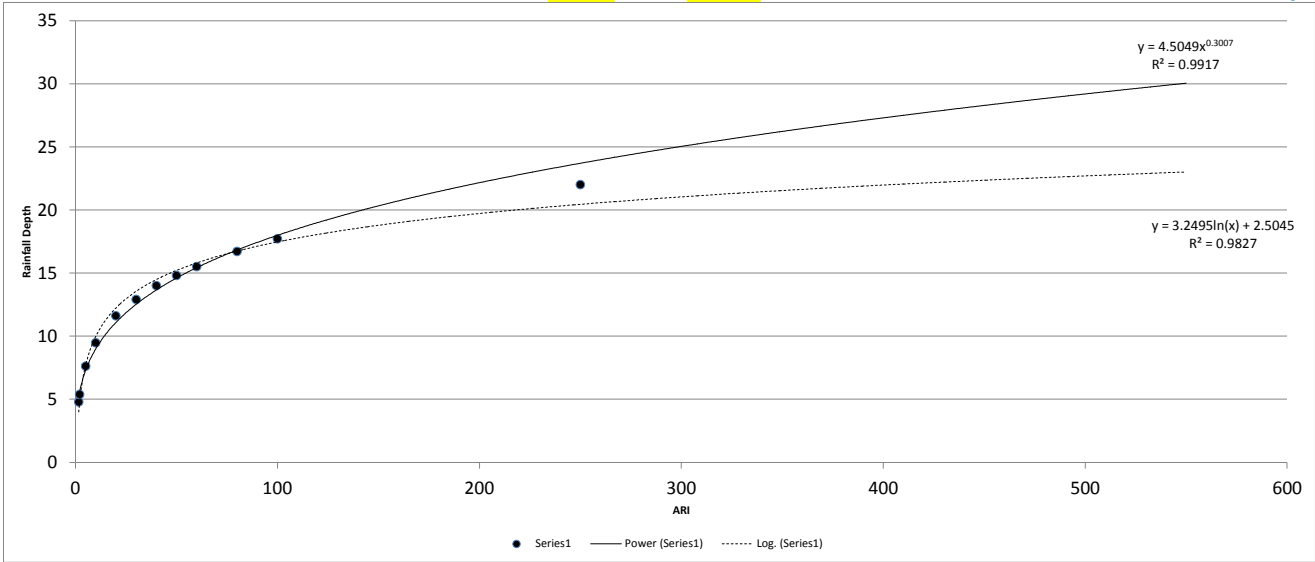
Sitename: Ashwick Flat  
 Coordinate system: WGS84  
 Longitude: 170.8207  
 Latitude: -43.9957  
 DDF Model

Parameters: c d e f g h i  
 Values: -0.0091628 0.5059979 0.0150604 -0.006238 0.3057204 -0.0083006 2.38741829  
 Example: Duration (hr: ARI (yrs) x y Rainfall Depth (mm)  
 24 100 3.1780538 4.6001492 155.10951

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	93m	2h	148m	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	4.78	6.41	7.73	10.9	15.6	15.5	19.6	27.3	38.1	51.8	67.3	76.6	82.8	87.4
2	0.5	5.38	7.19	8.66	12.2	17.4	17.3	21.8	30.3	42.3	57.3	74.3	84.4	91.2	96.1
5	0.2	7.61	10.1	12.1	16.9	24.1	23.9	30.1	41.3	57.3	77	99.2	112	121	127
10	0.1	9.47	12.5	15	20.8	29.5	29.2	36.7	50.2	69.2	92.6	119	134	144	151
20	0.05	11.6	15.2	18.2	25.1	35.5	35.1	44.1	59.9	82.2	109	140	157	169	177
30	0.033	12.9	17	20.2	27.9	39.4	38.9	48.8	66.1	90.4	120	153	172	184	193
40	0.025	14	18.3	21.8	29.9	42.2	41.7	52.3	70.7	96.6	128	163	182	195	205
50	0.02	14.8	19.4	23	31.6	44.6	44	55.2	74.4	101	134	170	191	205	214
60	0.017	15.5	20.3	24.1	33	46.6	46	57.6	77.5	106	140	177	198	212	222
80	0.012	16.7	21.8	25.9	35.4	49.8	49.1	61.5	82.6	112	148	187	210	224	234
100	0.01	17.7	23	27.3	37.3	52.5	51.7	64.7	86.6	118	155	196	219	234	245
250	0.004	22	28.4	33.6	45.7	64.0	63	78.8	105	141	185	232	259	276	288
500	0.002	29.2	37.6	44.3	59.7	83.5	82.0	102.4	135.2	181.4	236.1	295.0	327.9	348.7	363.3
500	0.002	22.7	29.5	34.9	47.5	66.8	65.7	82.2	109.9	148.5	195.0	245.5	274.2	292.5	305.5
500	0.002	25.9	33.5	39.6	53.6	75.1	73.9	92.3	122.5	164.9	215.6	270.3	301.0	320.6	334.4
															<b>Average</b>

Linearly extrapolated + 16%



## Rational Method Runoff

Calculates catchment runoff using rational method and time of concentration from CCC WWDG

Catchment B

CLIENT: 3 Bears Running Ltd

DSN BY: NP

DATE: 11/21/18

CHK BY: RB

DATE: 11/23/18

### Method Description:

Runoff method as per Rational Method  $Q=CiA$  and CCC WWDG

### Catchment Parameters

Catchment Area	124	ha
Catchment Length	2700	m
Catchment Slope	1.50%	%
Runoff Coefficient	0.10	
Roughness	-	
Rainfall Intensity	-	mm/hr
Catchment Relief	-	m

### Airport Method (Use for $C < 0.4$ )

Tc	148	mins
Lag Time	89	mins

### Bransby Williams ( $C > 0.4$ )

Tc	88	mins
Lag Time	53	mins

### MIDUSS

Tc	-	mins
Lag Time	-	mins

### Kirpich

Tc	-	mins
Lag Time	-	mins

### Kerby-Hatheway

Kerby Roughness parameter	0.4	
Tc	101	mins
Lag Time	60	mins

Table 3: Kerby's roughness parameter.

Description	N
Pavement	0.02
Smooth, bare packed soil	0.10
Poor grass, cultivated row crops or moderately rough bare surfaces	0.20
Pasture, average grass	0.40
Deciduous forest	0.60
Dense grass, coniferous forest, or deciduous forest with deep litter	0.80

#### • Bransby William Formula

Used if Rational Method runoff coefficient is greater than 0.40.

$$t_c = \frac{0.057 L}{S_w^{0.2} A^{0.1}}$$

#### • Airport Equation

Used if Rational Method runoff coefficient is less than 0.40.

$$t_c = \frac{3.26 (1.1 - C) L^{0.5}}{S_w^{0.33}}$$

Where:

$t_c$  = time of concentration, minutes  
 $C$  = Rational method runoff coefficient  
 $L$  = catchment or watershed length, m  
 $S_w$  = catchment or watershed slope, %  
 $A$  = catchment or watershed area, ha

#### • MIDUSS

$$t_c = \left[ \frac{L n}{\sqrt{S}} \right]^{0.6} i_{eff}^{-0.4}$$

Where:

$t_c$  = time of concentration, minutes  
 $k$  = 6.989 for metric units  
 $L$  = flow length (m)  
 $n$  = Manning's roughness coefficient  
 $S$  = slope of catchment or watershed, m/m  
 $i_{eff}$  = effective rainfall (mm/h)

#### 5.3. Kirpich Method

For small drainage basins that are dominated by channel flow, the Kirpich (1940) equation can be used. The Kirpich equation is

$$t_c = 0.0078(L^3/h)^{0.385} \quad (5)$$

where:

$t_c$  = time of concentration (min),  
 $L$  = length of main channel (ft), and  
 $h$  = relief along main channel (ft).

Some authors use an adjustment factor for the Kirpich approach to correct for paved channels. The Kirpich method is limited to watershed with a drainage area of about 200 acres.

#### 5.4. Kerby-Hatheway Method

For small watersheds where overland flow is an important component, but the assumptions inherent in the Morgali and Linsley approach are not appropriate, then the Kerby (1959) method can be used. The Kerby-Hatheway equation is

$$t_c = \left[ \frac{0.67 N L}{\sqrt{S}} \right]^{0.467} \quad (6)$$

where:

$t_c$  = time of concentration (min),  
 $N$  = Kerby roughness parameter (dimensionless), and  
 $S$  = overland flow slope (dimensionless).

Overland flow rarely occurs for distances exceeding 1200 feet. So, if the watershed length exceeds 1200 feet, then a combination of Kerby's equation and the Kirpich equation may be appropriate. Certainly, the combination of overland flow and channel  $t_c$  is an appropriate concept. Values for Kerby's roughness parameter,  $N$ , are presented on table 3.

## Rational Method Runoff

Calculates catchment runoff using rational method and time of concentration from CCC WWDG

CLIENT: 3 Bears Running Ltd  
 DSN BY: NP  
 DATE: 11/21/18  
 CHK BY: RB DATE: 11/23/18

Catchment A

### Method Description:

Runoff method as per Rational Method  $Q=CiA$  and CCC WWDG

### Catchment Parameters

Catchment Area	28	ha
Catchment Length	1300	m
Catchment Slope	2.00%	%
Runoff Coefficient	0.10	
Roughness	-	
Rainfall Intensity	-	mm/hr
Catchment Relief	-	m

### Airport Method (Use for $C < 0.4$ )

Tc	93	mins
Lag Time	56	mins

### Bransby Williams ( $C > 0.4$ )

Tc	46	mins
Lag Time	28	mins

### MIDUSS

Tc	-	mins
Lag Time	-	mins

### Kirpich

Tc	-	mins
Lag Time	-	mins

### Kerby-Hatheway

Kerby Roughness parameter	0.4	
Tc	67	mins
Lag Time	40	mins

Table 3: Kerby's roughness parameter.

Description	N
Pavement	0.02
Smooth, bare packed soil	0.10
Poor grass, cultivated row crops or moderately rough bare surfaces	0.20
Pasture, average grass	0.40
Deciduous forest	0.60
Dense grass, coniferous forest, or deciduous forest with deep litter	0.80

- Bransby William Formula**  
Used if Rational Method runoff coefficient is greater than 0.40.

$$t_c = \frac{0.057 L}{S_w^{0.2} A^{0.1}}$$

- Airport Equation**  
Used if Rational Method runoff coefficient is less than 0.40.

$$t_c = \frac{3.26 (1.1 - C) L^{0.5}}{S_w^{0.33}}$$

Where:  
 $t_c$  = time of concentration, minutes  
 $C$  = Rational method runoff coefficient  
 $L$  = catchment or watershed length, m  
 $S_w$  = catchment or watershed slope, %  
 $A$  = catchment or watershed area, ha

- MIDUSS**

$$t_c = \left[ \frac{L n}{\sqrt{S}} \right]^{0.6} i_{eff}^{0.4}$$

Where:  
 $t_c$  = time of concentration, minutes  
 $k = 6,989$  for metric units  
 $L$  = flow length (m)  
 $n$  = Manning's roughness coefficient  
 $S$  = slope of catchment or watershed, m/m  
 $i_{eff}$  = effective rainfall (mm/h)

### 5.3. Kirpich Method

For small drainage basins that are dominated by channel flow, the Kirpich (1940) equation can be used. The Kirpich equation is

$$t_c = 0.0078(L^3/h)^{0.385} \quad (5)$$

where:

$t_c$  = time of concentration (min),  
 $L$  = length of main channel (ft), and  
 $h$  = relief along main channel (ft).

Some authors use an adjustment factor for the Kirpich approach to correct for paved channels. The Kirpich method is limited to watershed with a drainage area of about 200 acres.

### 5.4. Kerby-Hatheway Method

For small watersheds where overland flow is an important component, but the assumptions inherent in the Morgali and Linsley approach are not appropriate, then the Kerby (1959) method can be used. The Kerby-Hatheway equation is

$$t_c = \left[ \frac{0.67NL}{\sqrt{S}} \right]^{0.467} \quad (6)$$

where:

$t_c$  = time of concentration (min),  
 $N$  = Kerby roughness parameter (dimensionless), and  
 $S$  = overland flow slope (dimensionless).

Overland flow rarely occurs for distances exceeding 1200 feet. So, if the watershed length exceeds 1200 feet, then a combination of Kerby's equation and the Kirpich equation may be appropriate. Certainly, the combination of overland flow and channel  $t_c$  is an appropriate concept. Values for Kerby's roughness parameter,  $N$ , are presented on table 3.

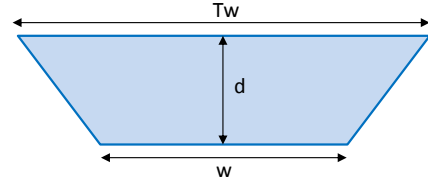
# Open Channel Capacity

Reference: Mannings Equation

CLIENT: 3 Bears Running LTD  
 DSN BY: NP  
 DATE: 11/22/18  
 CHK BY: \_\_\_\_\_ DATE: \_\_\_\_\_

## INPUTS

Base Width	w	m	0.5
Depth	d	m	0.50
Mannings n	n		0.035
Channel Slope	s	m/m	0.02
Bank Slope	n	1V: 2.0 H	



## CALCULATIONS

Top Width	Tw	m	2.50
Wetted Surface Area	A	m <sup>2</sup>	0.75
Channel Wetted Perimeter	P	m	2.74
Hydraulic Radius	R	m	0.27

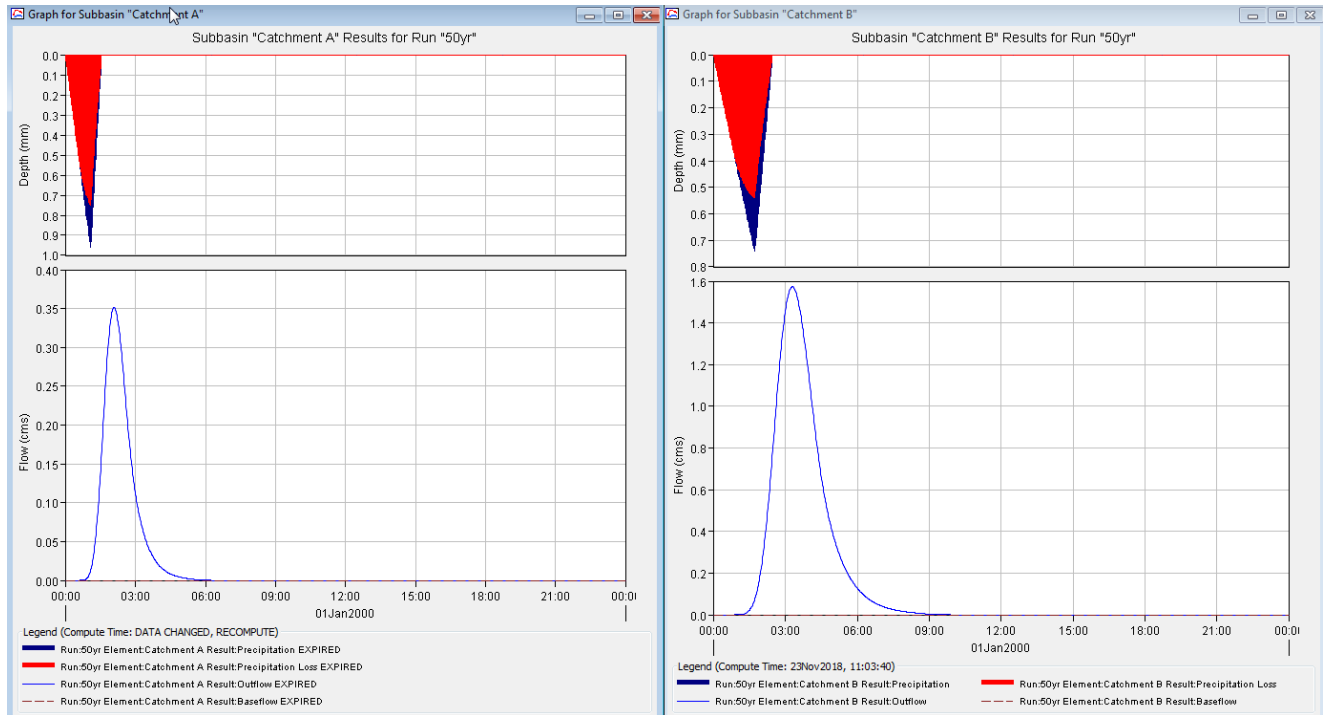
$$Q = A \times \frac{R^{2/3} \times S^{1/2}}{n}$$

<b>Discharge</b>	<b>Q</b>	<b>m<sup>3</sup>/s</b>	<b>1.28</b>
<b>Velocity</b>	<b>V</b>	<b>m/s</b>	<b>1.70</b>

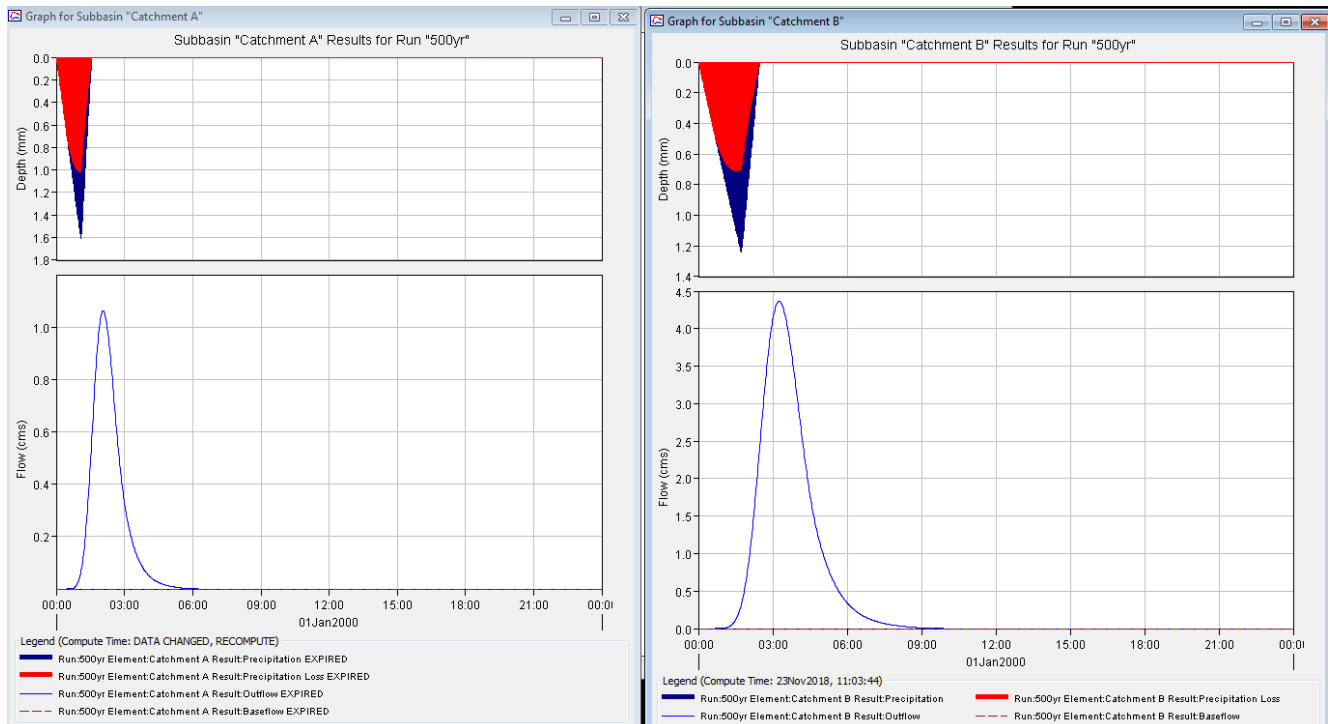
Froude number	F		0.77	Subcritical Flow
Shear Stress (tractive force)	ts bed	N/m <sup>2</sup>	76.4	
	ts bank	N/m <sup>2</sup>	69.9	

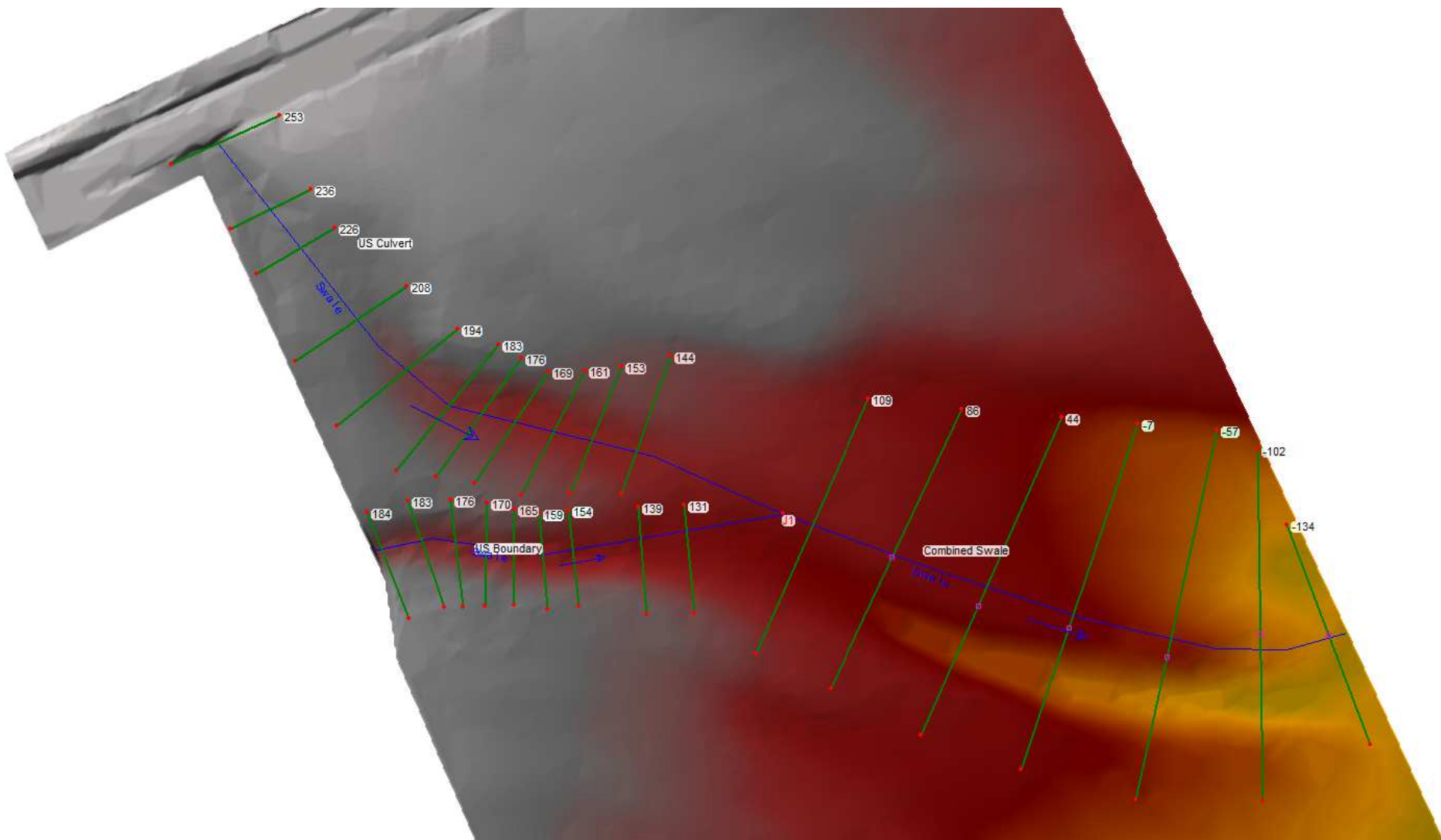
# HEC-HMS Model Outputs

## 50 Year ARI Event:



## 500 Year ARI Event:







30 August 2018

Graham McDermid  
Architects Plus Ltd  
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Christchurch

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Dear Graham

**Flood Hazard Assessment – Proposed Subdivision  
Clayton & Monument Roads, Ashwick Flat, Part RS 32380, Valuation no: 25280 170 14**

This approximately 7.93 ha property is located about 900 m south of the South Opuha River and extends between Monument and Clayton Roads. All of the property is covered with shallow swales (historic flow paths) and other subtle depressions. A deeper and more significant swale, which originates around 4 km upstream, enters the property near the northwest corner. A second swale also crosses Monument Road and joins into the major swale within the northwest corner of the property. I have attached a map with some descriptions of these features I collated from a visit to the site.

Environment Canterbury has not carried out a detailed investigation into flooding in this area and has little historic flood information specific to the property.

Flood Mapping carried out by the Canterbury Regional Council (for Mackenzie District Council Planning Maps) in 1999 indicates the property is on the southern edge of "being floodable" from upstream breakouts from the South Opuha River. The mapping for this area was carried out using a combination of aerial photographs, contour maps and a ground inspection. The flood extent shown on the Mackenzie District Council planning maps can be described as indicative only.

Two deep swales enter the northwest corner of the property and merge before flowing to the southeast and leaving the property roughly halfway along the west boundary. You have marked this swale on your attached subdivision layout (refer other maps also). It is important to note that while the "main swale channel" is roughly 5 – 7 m wide there is a 30-40 m strip of land, mostly on the north side of the swale, that is also significantly lower than the rest of the subdivision area. I have very approximately marked the lower ground in blue hatch on the attached map.

The major swale and associated low ground will carry significant local runoff originating from upstream, including potentially some overflows from the South Opuha River in major rainfall events. The flooding in the swale, and associated lower area, has the potential to be relatively deep and given the steep fall in the land in this area (the gradient is about 1 in 50) will be fast flowing.

The remainder of the property, clear of the swale and adjacent low ground, is also traversed by numerous more subtle swales. In these areas the swales are non-contiguous and not linked to any major upstream source of floodwater. While these features still have the potential to carry local runoff following periods of prolonged or heavy rainfall the potential depth of flooding is considerably less.

**Key Ref:** 18176  
**Contact:** Chris Fauth

**As defined by the Mackenzie District Council, the minimum floor height required for new dwellings is 150 mm above the expected 500 year Average Recurrence Interval (ARI) flood level. This is obviously an extreme event that would result in both deep flooding within the swale and low part of the property and widespread but shallower runoff across the remainder of the property.**

Note: Average Recurrence Interval (ARI) represents the average time period between floods of a certain size.

**The major swale, and lower area approximately marked in blue hatch on the attached plan is a critical flood carrying feature of the Ashwick Flat floodplain. It is important this area is left unaltered and free of development in order to allow runoff to flow through the site as it currently does. This is particularly important given the presence of houses downstream of the subdivision and the significant increase in development on this floodplain generally.**

**For the bulk of the subdivision area (not in or adjacent to the major swale) a floor level of 400 mm above existing ground level should be suitable for new dwellings. This floor level allows for shallow flooding and includes some allowance for uncertainty as well as the 150 mm freeboard required by Mackenzie District Council. When choosing building sites within each proposed lot, all practical care should also be taken to avoid shallow swales.**

The widespread, shallow but fast flowing runoff that is anticipated across the subdivision area can be easily impacted on by built development. Thought should be given to fencing, hedging and other developments that might occur across the floodplain and create impediments to the downstream flow of local runoff.

I have asked Alanna Hollier (Planner with Environment Canterbury) to add some comments regarding wastewater, as follows:

For the installation of on-site wastewater systems into the proposed subdivision I have attached the wastewater rules from the Land and Water Regional Plan. As the development will result in the subdivided lots being smaller than 4 hectares a resource consent will be required under Rule 5.9, as condition 2 of Rule 5.8 will not be met. Please be advised that an assessment of cumulative effects from the proposal will need to be included as part of the consent application. The system will need to be designed to industry good practices, such as inclusion of a secondary treatment system.

If you have any further queries, please contact Customer Services on 0800 324 636. You can also use this number to book a free 1-hour pre-application meeting with a consent planner to talk through the proposal in more detail.

When considering the figures and comments given above, it is important you understand the following matters:

1. The information provided is the best information Environment Canterbury has available at this time. Flood depths, flows and return periods may change as further investigations into flooding in this area are completed.
2. Environment Canterbury is not the only organisation holding information on flooding. The Mackenzie District Council or neighbours may have further details of flooding which has occurred at this property.

3. In the calculation of flood depths, Environment Canterbury makes some allowance for water build-up against obstacles but local influences such as solid fences or hedges may alter flood depths at the property.
4. Flood flows may be diverted by debris. This may alter flood depths at the property.
5. Changes in the floodplain e.g. raising roads or altering swales may alter flood levels at the property.
6. Seasonal variations e.g. height of crops, may alter flood depths at the property.
7. **Many uncontrollable factors influence flooding. The prediction of flood depths requires many assumptions and is not an exact science.**

I hope this information is of assistance. Please do not hesitate to contact me if you require any clarification.

Yours sincerely

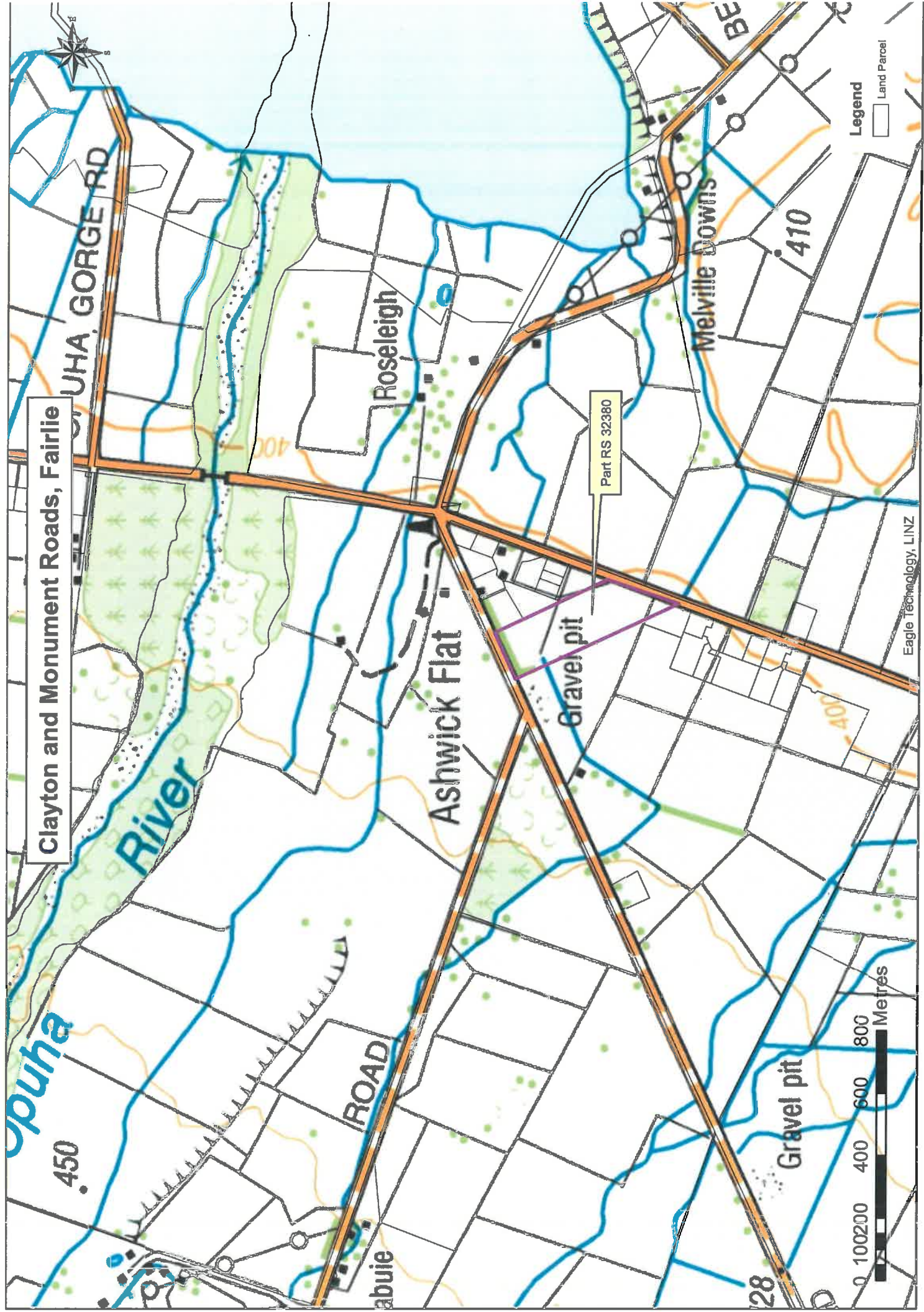


**Chris Fauth**  
Senior Scientist (Natural Hazards)

cc: Manager Planning and Regulations  
Mackenzie District Council

**Attachments:**

- Topographic map showing location of property
- Aerial photograph of the property
- Proposed subdivision layout provided by the applicant
- Aerial photograph with notations regarding some key features of the area
- Mackenzie District Plan – Flood Map
- Land and Water Plan on-site wastewater rules (x3)



Clayton and Monument Roads, Fairlie

Part RS 32380

Legend  
Land Parcel

0 100 200 400 600 800 1000  
Metres

Eagle Technology, LINZ

# Clayton and Monument Roads, Fairlie

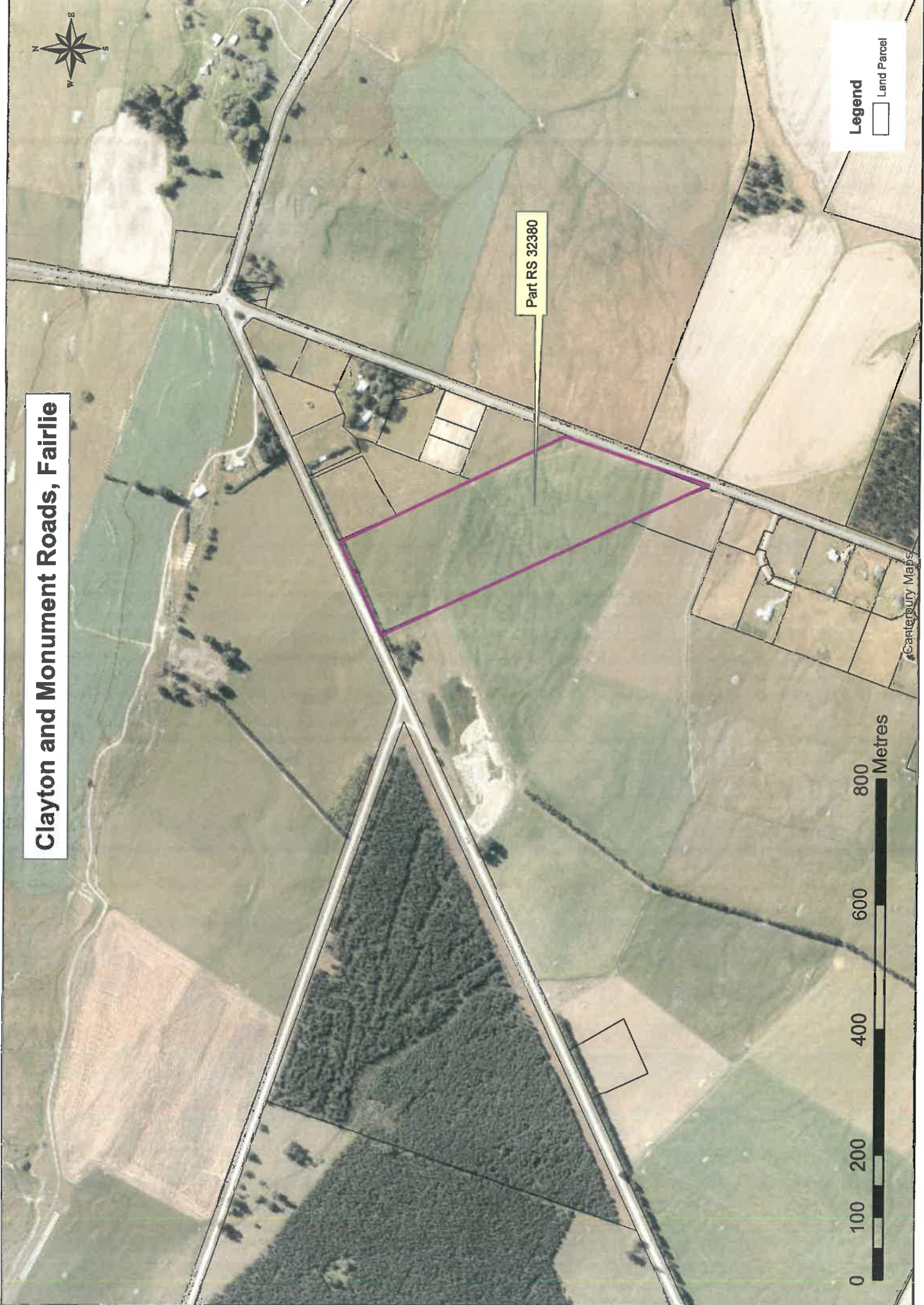


Part RS 32380

Legend  
□ Land Parcel



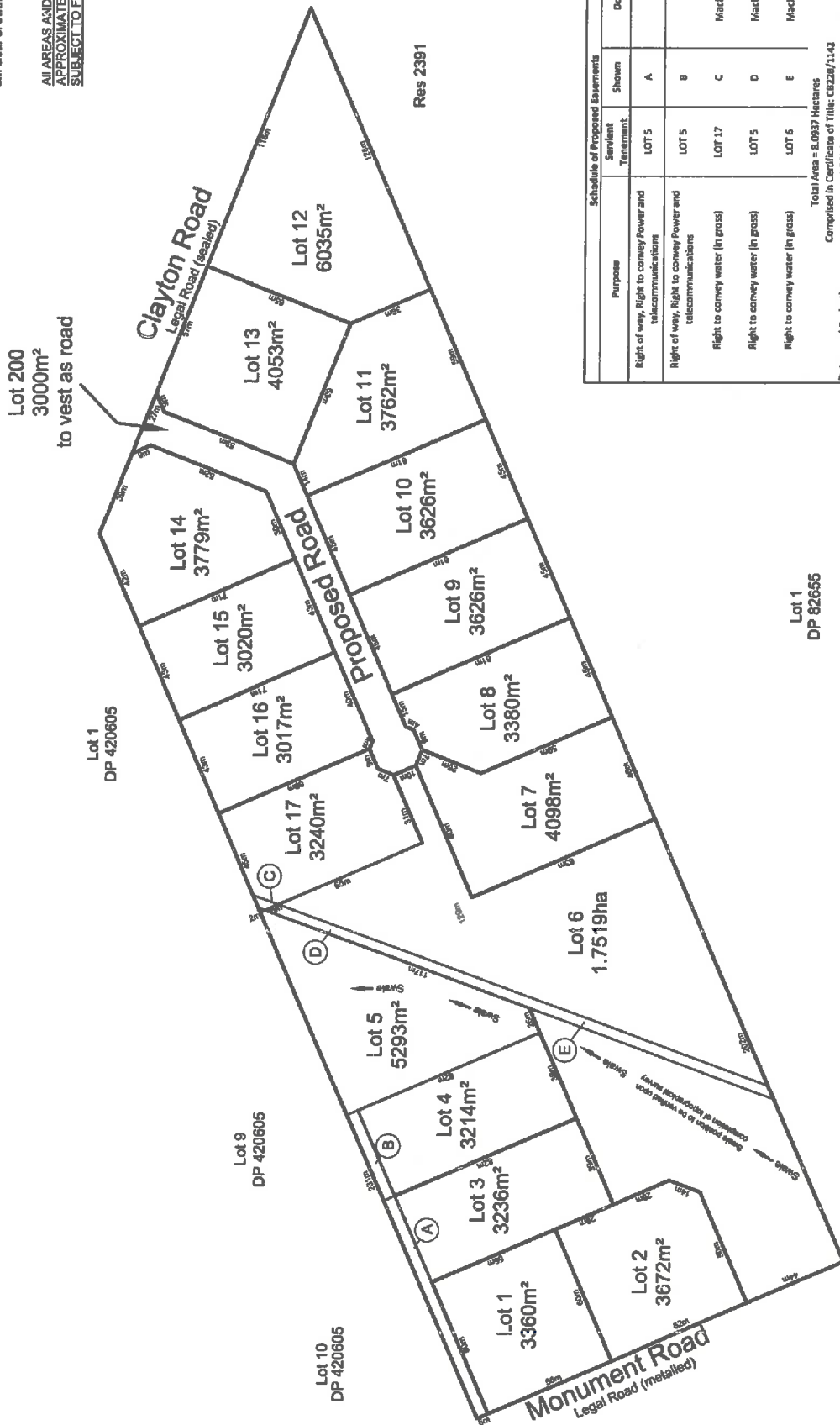
Canterbury Maps





**Buildable Areas**  
 20m clear of external boundaries  
 6m clear of internal boundaries  
 5m clear of swales

**ALL AREAS AND DIMENSIONS ARE APPROXIMATE ONLY AND ARE SUBJECT TO FINAL SURVEY**



Purpose	Servient Tenement	Shown	Dominant Tenement
Right of way, Right to convey Power and telecommunications	LOT 5	A	LOT 3
Right of way, Right to convey Power and telecommunications	LOT 5	B	LOT 4
Right to convey water (in gross)	LOT 17	C	Mackenzie District Council
Right to convey water (in gross)	LOT 5	D	Mackenzie District Council
Right to convey water (in gross)	LOT 6	E	Mackenzie District Council

Total Area = 8.0937 Hectares  
 Comprised in Certificate of Title: CB228/1143  
 NZS2000, Tiersu Circuit - Derived from LINZDCDB  
 Clayton Road, Fairlie

**Notes:**  
 1. All areas and dimensions are subject to final survey and landowner agreement.  
 2. Final easement definition, rights and location are subject to further investigation and survey.

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NO.	DATE	BY	DESCRIPTION

NO.	DATE	BY	DESCRIPTION

NO.	DATE	BY	DESCRIPTION

Proposed Lots 1 - 17 & 200 Being a Subdivision of Part RS 32380

LANDS & SURVEY

5242-001

# Features of Ashwick Flat Area.

Note these are approximate based on ground observations (where access into property was possible) and estimates using aerial photographs

This continues upstream but haven't mapped (see topo)

Secondary, but still significantly sized, swale (is possibly an off-shoot of the main inflow swale shown in darker blue). A low flow culvert (18 inch - far smaller than channel capacity) goes beneath Monument Road and into subdivision area. Evidence on downstream side of road (debris and road) shingle suggesting higher flows wash over monument road.

Blue hatch is wider area of lower land around swale (very approx). This is lowest part of property.

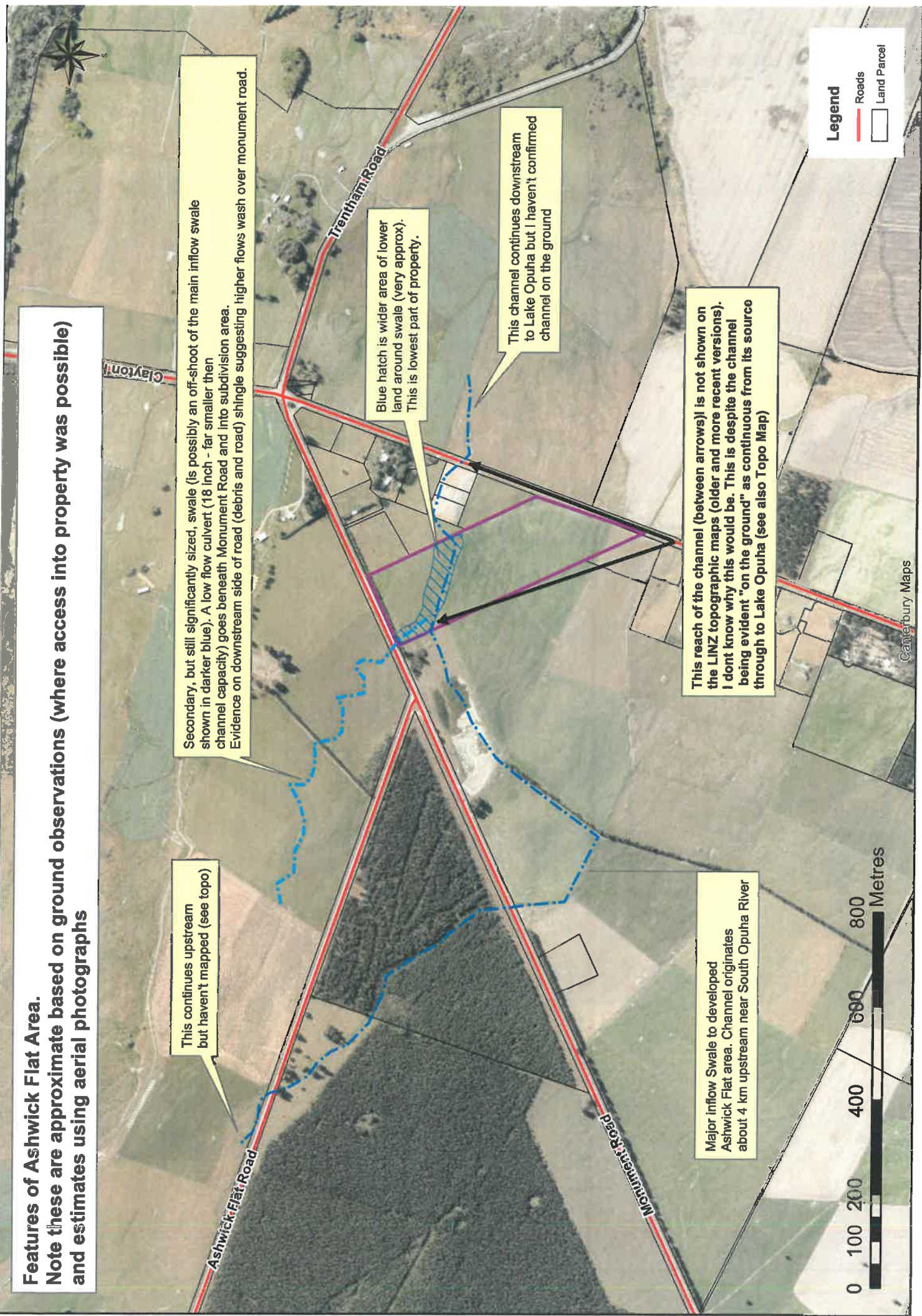
This channel continues downstream to Lake Opuha but I haven't confirmed channel on the ground

This reach of the channel (between arrows) is not shown on the LINZ topographic maps (older and more recent versions). I don't know why this would be. This is despite the channel being evident "on the ground" as continuous from its source through to Lake Opuha (see also Topo Map)

Major inflow Swale to developed Ashwick Flat area. Channel originates about 4 km upstream near South Opuha River



Canterbury Maps



# Ashwick Flat Flooding Areas

 Flooding Area  
 Territorial Local Authority Boundary

1 0 1 2 Kilometres  
1:50000

MacKenzie DC

Lake Opuha

Please Note: The areas of flooding identified on the flooding area maps (opposite) are based on information of known flood events. The areas identified are indicative only and a flood assessment of individual properties is needed to identify the severity and extent of flooding within a property.



**On-site Wastewater**

**Notes:**

1. *In addition to the provisions of this Plan and any relevant district plan, any activity which may modify, damage or destroy pre 1900 archaeological sites is subject to the archaeological authority process under the Heritage New Zealand Pouhere Taonga Act 2014. An archaeological authority is required from Heritage New Zealand to modify, damage or destroy any archaeological site, whether recorded or not in the New Zealand Heritage List/Rārangi Kōrero website*
  2. *Detailed information about separation distances for on-site effluent disposal systems is available from the Institute of Environmental Science and Research. Information includes the Guidelines for separation distances based on virus transport between on-site domestic wastewater systems and wells (ESR 2010)*
- 5.7 The discharge of wastewater from an existing on-site wastewater treatment system onto or into land in circumstances where a contaminant may enter water is a permitted activity, provided the following conditions are met:**
1. The discharge was lawfully established prior to 1 November 2013; and
  2. The treatment and disposal system has not been altered or modified from that established at the time the system was constructed, other than through routine maintenance; and
  3. The volume of the discharge has not been increased as a result of the addition of buildings, an alteration of an existing building, or a change in use of a building that is connected to the system; and
  4. The treatment and disposal system is operated and maintained in accordance with the system's design specification for maintenance or, if there is no design specification for maintenance, Section 6.3 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and
  5. The discharge is not onto or into land:
    - (a) where there is an available sewerage network; or
    - (b) that is listed as an archaeological site; or
    - (c) where the discharge would enter any surface waterbody; or
    - (d) within 20 m of any surface waterbody or the Coastal Marine Area; or
    - (e) within 50 m of a bore used for water abstraction; or
    - (f) within a Community Drinking-water Protection Zone as set out in Schedule 1 of this Plan; or
    - (g) where there is, at any time, less than 1 m of vertical separation between the discharge point and groundwater; and
  6. The discharge does not result in wastewater being visible on the ground surface; and
  7. The discharge does not contain any hazardous substance.
- 5.8 The discharge of wastewater from a new, modified or upgraded on-site wastewater treatment system onto or into land in circumstances where a contaminant may enter water is a permitted activity, provided the following conditions are met:**
1. The discharge volume does not exceed 2 m<sup>3</sup> per day; and

2. The discharge is onto or into a site that is equal to or greater than 4 hectares in area; and
- 2a. The discharge is not located within an area where residential density exceeds 1.5 dwellings per hectare and the total population is greater than 1000 persons; and
3. The discharge is not onto or into land:
  - (a) where there is an available sewerage network; or
  - (b) that is contaminated or potentially contaminated; or
  - (c) that is listed as an archaeological site; or
  - (d) in circumstances where the discharge would enter any surface waterbody; or
  - (e) within 20 m of any surface waterbody or the Coastal Marine Area; or
  - (f) within 50 m of a bore used for water abstraction; or
  - (g) within a Community Drinking-water Protection Zone as set out in Schedule 1; or
  - (h) where there is, at any time, less than 1 m of vertical separation between the discharge point and groundwater; and
4. The treatment and disposal system is designed and installed in accordance with Sections 5 and 6 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and
5. The treatment and disposal system is operated and maintained in accordance with the system's design specification for maintenance or, if there is no design specification for maintenance, Section 6.3 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and
6. The discharge does not result in wastewater being visible on the ground surface; and
7. The discharge does not contain any hazardous substance.

**5.8A The discharge of wastewater from an existing, new, modified or upgraded back country hut wastewater treatment system onto or into land in circumstances where a contaminant may enter water is a permitted activity, provided the following conditions are met:**

1. The discharge volume does not exceed 2 m<sup>3</sup> per day; and
2. The treatment and disposal system has a written system design specification for maintenance (and if such a system design specification for maintenance does not exist, a written system design specification for maintenance shall be prepared in accordance with Section 6.3 of New Zealand Standard AS/NZS 1547:2012 On-site Domestic Wastewater Management by the 31<sup>st</sup> of December 2017) and is operated and maintained within that specification; and
3. The discharge is not onto or into land:
  - (a) where there is an available sewerage network; or
  - (b) that is contaminated or potentially contaminated; or
  - (c) that is listed as an archaeological site; or
  - (d) in circumstances where the discharge would enter any surface waterbody; or
  - (e) within 20 m of any surface waterbody or the Coastal Marine Area; or
  - (f) within 50 m of a bore used for water abstraction; or
  - (g) within a Community Drinking-water Protection Zone as set out in Schedule 1; or
  - (h) where there is, at any time, less than 1 m of vertical separation between the discharge point and mean seasonal high water table; and

4. The discharge does not result in wastewater being visible on the ground surface, unless the discharge occurs as a result of a land application system that has been specifically designed to treat and discharge wastewater through application of wastewater to the land surface; and
5. The discharge does not contain any hazardous substance.

**5.9B The discharge of wastewater from an existing, new, modified or upgraded back country hut wastewater treatment system onto or into land in circumstances where a contaminant may enter water that does not meet one or more of the conditions of Rule 5.8A is a discretionary activity.**

**5.9 The discharge of wastewater from:**

- (a) an existing on-site wastewater treatment system onto or into land in circumstances where a contaminant may enter water that does not meet one or more of the conditions of Rule 5.7; or**
- (b) a new, modified or upgraded on-site wastewater treatment system onto or into land in circumstances where a contaminant may enter water that does not meet one or more of the conditions of Rule 5.8;**

**is a restricted discretionary activity.**

***The exercise of discretion is restricted to the following matters:***

1. The actual and potential environmental effects of not meeting the condition or conditions of Rule 5.7 for an existing system; and
2. The actual and potential direct and cumulative environmental effects of not meeting the condition or conditions of Rule 5.8 for a new, modified or upgraded system; and
3. The actual and potential environmental effects of the discharge on the quality and safety of human and animal drinking-water; and
4. The effect of on-site wastewater treatment system density in the local area including known on-site wastewater treatment system failures, the material health status of the community, groundwater quality, the nature of effects of current sewage disposal methods, treatment options available and affordability.

#### **Swimming Pool or Spa Water**

**5.10 The discharge of swimming pool or spa pool water into water or onto or into land in circumstances where a contaminant may enter water is a permitted activity, provided the following conditions are met:**

1. The discharge of filter backwash water is only onto land, and the discharge does not enter any surface waterbody or wetland, including via a stormwater system; and
2. For swimming pool or spa pool water discharges that do not contain filter backwash water, the discharge may be either onto land or into water, provided:
  - (a) that for all discharges:
    - (i) there are no copper chemicals or flocculants, including aluminium salts, in the discharge and the concentration of sodium chloride (common salt) does not exceed 3500 g/m<sup>3</sup>; and

District Plan matter	Comment / Assessment	Conclusion
<p><i>Section 7 - Rural Objective 6 - Rural Amenity And Environmental Quality: A level of rural amenity which is consistent with the range of activities anticipated in rural areas, but which does not create unacceptably unpleasant living or working conditions for the District's residents or visitors, nor a significant deterioration of the quality of the general rural and physical environment.</i></p>	<p>The proposal is considered to maintain the amenity of the surrounding rural environment, and will not create unpleasant living or working conditions for residents or visitors. Nor will it degrade the quality of the rural and physical environment.</p>	<p>Consistent</p>
<p><i>Section 7 - Rural Policy 6B - Setback Of Buildings</i></p> <p><i>To require residential dwellings to be setback from property boundaries to reduce the probability of the residents of these dwellings being exposed to significant adverse effects from an activity on a neighbouring property, and to maintain the visual character of the rural area particularly as viewed from the state highways.</i></p>	<p>The applicant proposes to vary the required 20m setback from internal boundaries (i.e. the boundaries between lots within the subdivision. A 20m setback still applies to external and road boundaries) to 6m.</p> <p>The reduced setbacks within the site will enable a greater flexibility in the building footprint location, while still enabling a generous setback to the boundaries, which in turn will maintain appropriate levels of amenity for residents.</p>	<p>Consistent</p>
<p><i>Section 7 - Rural Policy 6D - General Amenity Controls To encourage and/or control activities to be undertaken in a way which avoids, remedies or mitigates adverse effects on the amenities and physical environment of rural areas</i></p>	<p>Given the nature of the activity (i.e. low density residential lots), it is considered that the proposal will have minimal impact on the amenities and physical environment of the rural areas.</p>	<p>Consistent</p>
<p><i>Section 7 - Rural Objective 7 - Natural Hazards Minimal loss of life, damage to assets and infrastructure, or disruption to the community of the District, from natural hazards.</i></p>	<p>The extent of flooding associated with a 50 and 500 year flood events has been identified in the PDP report. The applicant volunteers conditions which require that no building or earthworks occur within</p>	<p>Consistent</p>

<p><i>Section 7 - Rural Policy 7A - Proximity To Waterways To control the proximity of buildings to waterways to limit potential loss of life and damage to property.</i></p>	<p>these areas. Consequently the proposal adequately avoids and mitigates potential adverse effects from flooding / waterway hazards.</p>	
<p><i>Objective 1 - Subdivision Servicing: The provision of necessary services including safe and efficient access to subdivided allotments in anticipation of the likely effects of land use on those allotments.</i></p>	<p>Regarding policies 1-2, the proposal has been assessed by Mr Nick Fuller (Novo Group Senior Transport Engineer) who considers that the traffic effects (including access to the network and within the subdivision is appropriate).</p> <p>No further pedestrian and amenity linkages are considered necessary in respect of Policy 3.</p>	<p>Consistent</p>
<p><i>1 To integrate subdivision roading with the existing roading network in an efficient manner which reflects expected traffic levels and the safe management of vehicles and pedestrians.</i></p> <p><i>2 To achieve safe and effective vehicular access to properties in subdivisional developments.</i></p> <p><i>3 To achieve provision of pedestrian and amenity linkages where useful linkages can be further developed.</i></p> <p><i>4 To minimise the adverse visual and physical effects of subdivision roading.</i></p> <p><i>5 To require that water supplies to subdivided allotments are of a sufficient capacity and of a drinkable standard.</i></p> <p><i>6 To require upon subdivision, that all new lots be provided with a means of connection to a reticulated water supply system, where water from such a system is available.</i></p>	<p>Noting the assessment of Mr Fuller, the proposal is considered to minimise the visual and physical effects of roading in respect of Policy 4.</p> <p>In regard to policies 5-6, as noted in the AEE, adequate provision is available for water supply from the Allendale Rural Water Scheme.</p> <p>As per the AEE, the applicant accepts any financial contributions required by Council for lots 1-17 in regard to Policy 7.</p> <p>In regard to Policy 9, stormwater will be managed through soakage (and an application to ECAN is awaiting approval). Notably, the existing swales / overland flow paths through the site are to be retained.</p> <p>In regard to policy 12, no on-site harvesting or re-use of stormwater for nonpotable uses is proposed. Notably however, such measures may be implemented by individual lot owners when the lots are developed.</p>	

<p><i>7 To require that the provision of any necessary additional water supply, stormwater control or sewage disposal infrastructure and the upgrading of existing infrastructure is undertaken or contributed to by subdividers where appropriate, in recognition of the scale and nature of the anticipated land users.</i></p> <p><i>8 To encourage the retention of natural open waterways for stormwater to ensure disposal in a manner which maintains or enhances the quality of surface and ground water.</i></p> <p><i>9 To require that stormwater is disposed of in a manner that avoids inundation of land within or adjoining the subdivision.</i></p> <p><i>10 N/A</i></p> <p><i>11 N/A</i></p> <p><i>12 To encourage the harvesting and/or re-use of stormwater for non-potable uses where appropriate.</i></p> <p><i>13 To require, upon subdivision, that anticipated development is provided with a means of disposing of sanitary sewage in a manner which is consistent with maintaining public health and minimises adverse effects on the environment.</i></p> <p><i>14 To require upon subdivision, that all new lots be provided with a means of connection to a reticulated sanitary system, where such a system is available. Where a reticulated system is not available, on site or stand alone</i></p>	<p>In regard to policies 13 and 14, wastewater will be accommodated by discharge permits lodged with ECAN (which are awaiting approval).</p> <p>In regard to policy 16, as outlined in the AEE, power and telephone connections can be provided to the site.</p>	
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<p><i>communal treatment systems may be installed, subject to any discharge consents required.</i></p> <p>15 N/A</p> <p>16 To require that adequate provision is made for the supply of reticulated energy and communication facilities and that the method of reticulation is appropriate to the amenities of the area.</p>		
<p><i>Objective 2 - Cost Of Services To Be Met By Subdividers and Developers: The costs of the provision of existing services, new services or the upgrading of services which are necessitated by subdivision or development, is to be met by the subdividers and/or developers.</i></p>	<p>The applicant accepts these requirements</p>	<p>Consistent</p>
<p>1 To require subdividers and developers to meet the costs of new or upgraded services (including head works), which are attributable to the impacts of the subdivision or development, including where applicable:</p> <ul style="list-style-type: none"> <li>• roading and access;</li> <li>• water supply;</li> <li>• sewage disposal;</li> <li>• stormwater disposal;</li> <li>• trade waste disposal;</li> <li>• provision of electricity; and</li> <li>• provision of telecommunications.</li> </ul> <p>2 To require contributions for creation of new allotments and multi-unit residential development for the purpose of recouping costs</p>		

<p><i>of existing public utility services provided by the Council that serve the land in the subdivision or development.</i></p> <p><i>3 To provide for any contributions to be in accordance with the methods of determination specified in the Rules.</i></p>		
<p><i>Objective 5 - Avoidance Of Natural Hazards</i></p> <p><i>The avoidance of subdivision in localities where there are significant natural hazards, unless these can be mitigated without significant adverse effects on the environment.</i></p>	<p>See assessment of Rural Objective 7 and 7A above.</p>	<p>Consistent</p>
<p><i>1 To ensure that subdivision is either restricted, subject to mitigation measures, or avoided in areas subject to risk from flooding, subsidence or slippage, or from hazards associated with active faults.</i></p> <p><i>2 To ensure that mitigation measures do not give rise to unnecessary adverse impacts on the environment.</i></p> <p><i>3 Require esplanade provision be made to mitigate natural hazards.</i></p>		
<p><i>Objective 6 – Design And Location The avoidance of adverse environmental effects associated with subdivision design and location</i></p>	<p>The lot design / building platform locations will take specific account of the secondary flow path flowing from the north-west corner of the site through the centre. There is no other notable topography through the site, or significant landscape or amenity features.</p>	<p>Consistent</p>
<p><i>1 To require that the creation of new allotments take into account as far as possible underlying topography and the maintenance of the integrity of any significant nature conservation</i></p>		



*site; and that any adverse effect on landscape, nature conservation values and amenity are avoided or mitigated.*

1 October 2019



3 Bears Running Limited  
Attn To: Graham McDermid  
PO Box 2870  
**Christchurch 8140**

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E. [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz)  
[www.ecan.govt.nz](http://www.ecan.govt.nz)

Dear Graham McDermid

### **Notice of Resource Consent Decision**

**Record Number:** CRC191946  
**Applicant Name:** 3 Bears Running Limited  
**Activity Description:** To discharge stormwater into land.  
**Decision:** Granted

### **Decision**

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

1. Any adverse effects on the environment of the activity will be minor.
2. The activity is consistent with the policies of the regional plan or national policy statement.

### **Commencement of consent**

Your resource consent commences from the date of this letter advising you of the decision.

If you object to or appeal this decision, the commencement date will then be the date on which the decision on the appeal is determined.

### **Lapsing of consent**

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

### **Your rights of objection and appeal**

#### **▪ Objection to Decision**

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

- **Right to Appeal**

You may appeal the decision of the consent authority to the Environment Court in accordance with section 120 of the RMA. The notice of appeal must be lodged with the Court within 15 working days of receipt of this decision, at PO Box 2069, Christchurch. A copy of the appeal should also be forwarded to Environment Canterbury within the same timeframe.

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

- **Objection to Costs**

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

### **Monitoring of conditions**

It is important that all conditions of consent are complied with, and that the consent holder continues to comply with all conditions, to ensure that the activity remains lawfully established.

You can find online Information regarding the monitoring of your consent at [www.ecan.govt.nz/monitoringconsent.pdf](http://www.ecan.govt.nz/monitoringconsent.pdf).

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

### **Further information about your consent**

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

### **Queries**

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

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

Yours sincerely



### **Consents Planning Section**

cc:  
Lands and Survey (South) Limited  
PO Box 36758  
Merivale  
**Christchurch 8146**

---

# RESOURCE CONSENT CRC191946

*Pursuant to Section 104 of the Resource Management Act 1991*

## The Canterbury Regional Council (known as Environment Canterbury)

---

GRANTS TO:	3 Bears Running Limited
A DISCHARGE PERMIT (S15):	To discharge stormwater into land.
COMMENCEMENT DATE:	01 Oct 2019
EXPIRY DATE:	01 Oct 2044
LOCATION:	Monument and Clayton Roads, Fairlie

---

### **SUBJECT TO THE FOLLOWING CONDITIONS:**

#### **LIMITS**

- 1 The discharge shall be only stormwater from the proposed 18 Lot residential subdivision of Part RS 32380, located between Monument Road and Clayton Road, Fairlie, labelled as "Applicant's Site" on Plan CRC191946A, attached to and forming part of this resource consent. The discharge shall be only stormwater from:
  - a. roofs;
  - b. hardstand areas on each individual lot; and
  - c. roading.

**Advice note:** *There will be 17 residential lots and Lot 18 contains an access road to the subdivision.*

- 2 The discharge of roof stormwater shall not arise from:
  - a. Copper building materials; or
  - b. Unpainted galvanised sheet materials.

#### **STORMWATER SYSTEM**

- 3 Stormwater shall be discharged to land via the stormwater treatment system as shown on the attached Plans CRC191946B, CRC191946C and CRC191946D attached to and forming part of this resource consent, as follows:
  - a. Stormwater generated from roof and hardstand areas shall be discharged to soakage pits via a sealed system that excludes all other stormwater; and

- b. Stormwater generated from the sealed road off Clayton Road shall be discharged to and receive treatment in a swale prior to discharging into drainage reserve on Clayton Road.

4 Each soakage pit shall be:

- a. As a minimum designed and constructed to store and dispose of all rainfall events as a minimum up to and including the 10 percent annual exceedance probability (10%) 1 hour duration rainfall event.
- b. Have a base that extends into free drainage soil strata; and
- c. Have at least 0.6 metre separation distance between the base of the soak pit and highest seasonal groundwater level at the site

5 The swales shall:

- a. Designed and constructed to convey all rainfall events up to and including the 2 percent annual exceedance probability (2% AEP) 10 minute duration rainfall event.
- b. Be vegetated with grass;
- c. Be uniformly vegetated with grass of at least 50 millimetres in height but no greater than 150 millimetres.

6 The discharge of stormwater generated under the authority of this consent shall not:

- a. Enter neighbouring properties;
- b. Enter surface water bodies; and
- c. Exacerbate flooding on surrounding sites.

7 There shall be no discharge of stormwater onto or into an on-site wastewater land application system.

8 There shall be no discharge of stormwater within 20 metres of the overflow path (flood swale) identified on Plan CRC191946B as 'overland flowpath', attached to and forming part of this consent.

## **DESIGN PLANS AND CERTIFICATION**

9 A certificate signed by the person responsible for designing the swale system or a suitably qualified person shall be submitted to the Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance, to certify that the system is constructed and installed in accordance with condition(s) (3) and (5) of this consent.

## INSPECTIONS AND MAINTENANCE

- 10 The stormwater system shall be maintained as follows, but not be limited to:
- a. Inspecting the soakage pits and grassed swales at least once every six months;
  - b. Removing any visual hydrocarbons, debris or litter within ten working days of the inspection;
  - c. Removing any accumulated sediment in the grassed swale that is a total of five percent of the area of the device.
  - d. Repairing any erosion or scour of the swales within five days of the inspection.
  - e. Any material removed from the devices shall be disposed of at an appropriate location.

- 11 In addition to condition 10, the swales shall be:
- a. Maintained so that the grass is in a healthy and uniform state with the exception of seasonal browning off.
  - b. Replanted where erosion or die-off has resulted in bare or patchy soil cover.
  - c. Mowed regularly or maintained so that grass is at a minimum length of 40-150 millimetres.

## SPILLS

- 12 All practicable measures shall be taken to avoid spills of fuel or any other hazardous substances on the hardstand surfaces of the site. The spill protocol shall include but not be limited to:
- a. In the event of a spill of fuel or any other hazardous substance, the spill shall be cleaned up as soon as practicable, the stormwater system shall be inspected and cleaned and measures taken to prevent a recurrence;
  - b. The Canterbury Regional Council, Attention: Regional Leader Monitoring and Compliance, shall be informed within 24 hours of a spill event that exceeds 5 litres, and the following information provided:
    - i. The date, time, location and estimated volume of the spill;
    - ii. The cause of the spill;
    - iii. The type of hazardous substance(s) spilled;
    - iv. Clean up procedures undertaken;
    - v. Details of the steps taken to control and remediate the effects of the spill on the receiving environment; and

- vi. An assessment of any potential effects of the spill; and Measures to be undertaken to prevent a recurrence.

## ADMINISTRATION

- 13 The Canterbury Regional Council may, once per year, on any of the last five days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:
- a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent and which it is appropriate to deal with at a later stage; or
  - b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment; or
  - c. Requiring the consent holder to carry out monitoring and reporting instead of, or in addition to, that required by the consent.
- 14 If this consent is not exercised before 30 September 2029 it shall lapse in accordance with section 125 of the Resource Management Act 1991.

***Advice note:***

*'Exercised' is defined as implementing any requirements to operate this consent and undertaking the activity as described in these conditions and/or application documents.*

**Issued at Christchurch on 1 October 2019**

Canterbury Regional Council

# Plan CRC191946A





# Plan CRC191946B

Drawing Picked: 02/02/2018 2:29 PM

Lot 1  
DP 420605



**NOTE:**

1. GIVEN THE SITE IS LOCATED ON THE HIGH GROUND, THERE ARE NO DIRECT UPSTREAM CATCHMENT. REFER TO CANTERBURY CONTOUR MAP SCREEN SHOT.
2. GIVEN THE FLAT TERRAIN AND LENGTHY TIME OF CONCENTRATION, IT IS ASSUMED ANY SMALL UPSTREAM FLOW SHALL BE DISSIPATED THROUGH INITIAL GROUND INFILTRATION AND EVAPOTRANSPIRATION

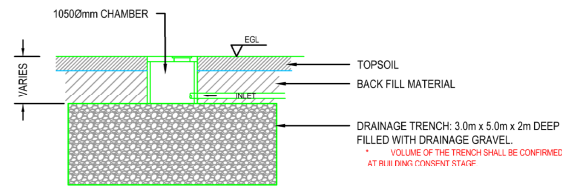
**SOAKAGE DISCHARGE CALCULATIONS PER SITE:**

ADOPTED CHRISTCHURCH CITY COUNCIL 'WATERWAY AND WETLAND DRAINAGE GUIDE' STANDARD, SOAKAGE VOLUME TO BE CALCULATED 1m<sup>3</sup> PER 40m<sup>2</sup>, i.e. APPROXIMATE 2.5%.

ASSUMED THE ROOF AND DRIVEWAY AREA 400m<sup>2</sup>

VOL(SOAK PER SITE) = 400 x 0.025/0.3 = 30m<sup>3</sup>

THEREFORE:  
TRENCH SIZE = 3.0m x 5.0m x 2m DEPTH = 30m<sup>3</sup>



TYPICAL SOAKPIT CROSS SECTION  
SCALE NTS

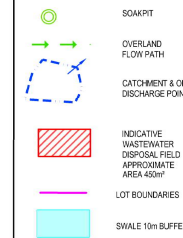
**COPYRIGHT©**

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**GENERAL NOTES:**

1. LEVELS ARE IN TERMS OF LITTELTON DATUM 1987
2. COORDINATES ARE IN TERMS OF GEODETIC DATUM 2000, TIRARU CIRCUIT
3. NO BUILDING IS TO BE BUILT WITHIN THE VICINITY OF THE MAJOR STORMWATER LINE OR OVERLAND FLOW PATH

**LEGEND**



**CAD AND PRODUCTION BY:**



**DRAWING TITLE:**

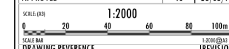
**STORMWATER CATCHMENT AND DISCHARGE PLAN**

**PREPARED FOR:**

**CLAYTON ROAD  
CANTERBURY  
PT RS 32380**

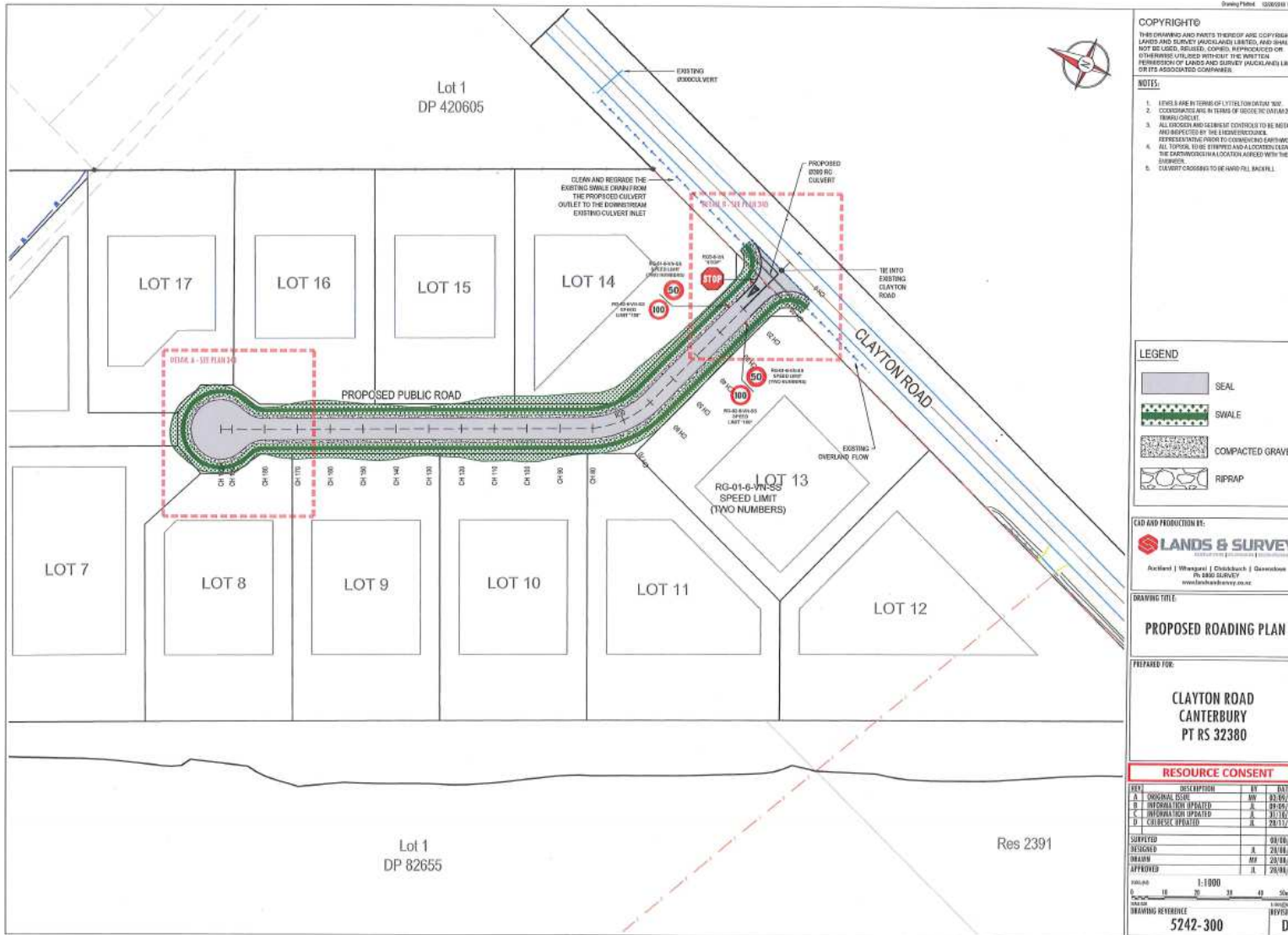
**RESOURCE CONSENT**

REV	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	JL	22/03/19
B	OVERLAND FLOW PATH UPDATED	JL	10/04/19
C	WW DISPOSAL FIELD ADDED	JL	20/05/19
D	LAZUREMENTS	DS	4/02/19
E	LOT BOUNDARIES ADDED	KC	24/02/19
SURVEYED		BK	23/02/19
DESIGNED		JL	23/03/19
DRAWN		JL	23/03/19
APPROVED		TS	23/03/19



DRAWING REFERENCE: **5242-400** REVISION: **E**

# Plan CRC191946C



Drawing Path: 132000191946C.dwg

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**NOTES:**

- LEVELS ARE IN TERMS OF LYTTELTON DATUM 2000.
- COORDINATES ARE IN TERMS OF DECE 1950 UTM 5000, TRIMBLA CRD/CL.
- ALL CHECKS AND ASSESSMENT CONTROLS TO BE METICULOUSLY AND INSPECTED BY THE ENGINEER/CONSULTANT REPRESENTATIVE PRIOR TO COMMENCED CONSTRUCTION.
- ALL TOPSOIL TO BE STRIPPED AND A LOCATION RECORD OF THE EXISTING/PROPOSED ROAD TO BE KEPT WITH THE SUBMITTAL.
- STREET CROSSINGS TO BE MARKED WITH BACKSILL.

**LEGEND**

- SEAL
- SWALE
- COMPACTED GRAVEL
- RIPRAP

**CAD AND PRODUCTION BY:**  
**LANDS & SURVEY**  
 Auckland | Whangarei | Christchurch | Dunedin  
 Ph: 0800 55 55 55  
 www.landsurvey.co.nz

**DRAWING TITLE:**  
**PROPOSED ROADING PLAN**

**PREPARED FOR:**  
**CLAYTON ROAD  
 CANTERBURY  
 PT RS 32380**

**RESOURCE CONSENT**

REV.	DESCRIPTION	BY	DATE
A	CONSENT ISSUE	MF	20/09/18
B	INTERVAL HIGH UPDATED	A	09/09/18
C	INTERVAL HIGH UPDATED	A	31/10/18
D	CONSENT REISSUED	A	28/11/18

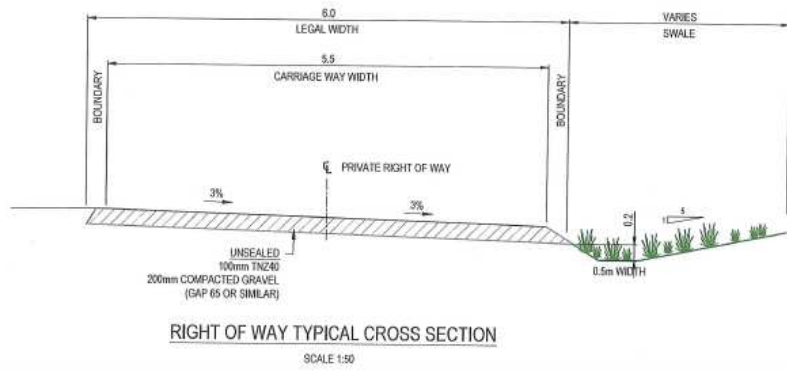
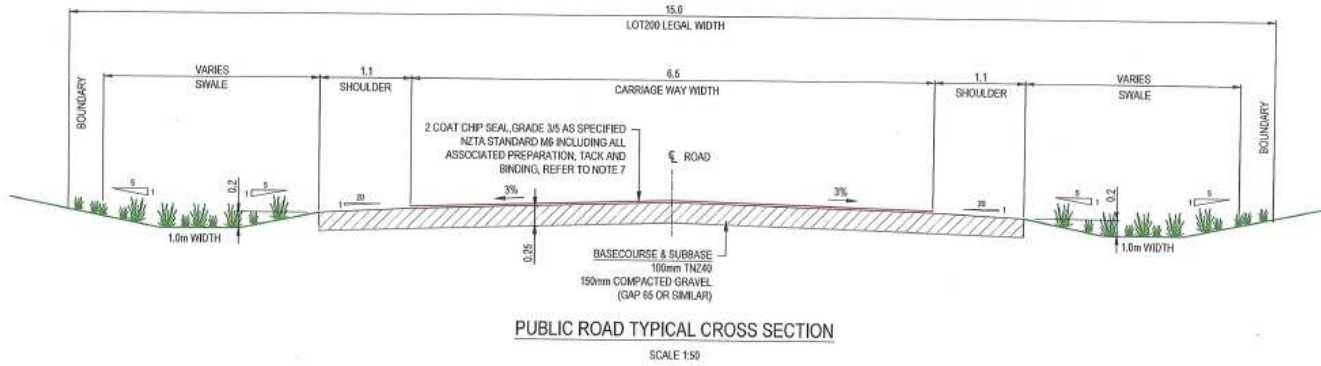
SUPPLIED: 09/09/18  
 DESIGNED: A 28/09/18  
 DRAWN: MF 20/09/18  
 APPROVED: A 28/09/18

SCALE: 1:1000  
 0 10 20 30 40 50m

**DRAWING REFERENCE:** 5242-300  
**REVISION:** D

# Plan CRC191946D

Drawing/Title: 5242/390



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- NOTES:**
- FOR GENERAL NOTES REFER TO PLAN 300
  - ALL DIMENSIONS ARE IN METERS UNO
  - ALL PAVEMENT DEPTHS ARE DESIGNED ON SPECIFIED COR MEASUREMENTS. DEPTHS MAY BE ADJUSTED BY THE ENGINEER FOLLOWING TESTS OF THE SUBGRADE SURFACE.
  - LEVELS SHOWN ARE FINISHED LEVELS.
  - HARDPIL TO BE PLACED WHERE PIPELINES CROSS OR WHERE LINES CROSS CARRIAGEWAYS.
  - ALL PAVEMENT LAYERS REQUIRE INSPECTION AND APPROVAL FROM THE SUPERVISING ENGINEER.
  - TWO COAT CHIP SEAL SPECIFICATION SHALL BE IN ACCORDANCE WITH NZTA SPECIFICATION PUBLICATION M6.

DESIGN AND PRODUCTION BY:  
**LANDS & SURVEY**  
Auckland | Whangarei | Christchurch | Queenstown  
PO BOX 50000  
www.landsandsurvey.co.nz

DRAWING TITLE:  
**PROPOSED ROADING TYPICAL CROSS-SECTION**

PREPARED FOR:  
**CLAYTON ROAD CANTERBURY PT RS 32380**

RESOURCE CONSENT			
REV	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	JW	03/09/18
B	INFORMATION UPDATED	JL	02/02/19
C	INFORMATION UPDATED	JL	21/10/19
D	CHANGE CLARIFIED	JL	28/11/19
CHECKED			
DESIGNED			
DRAWN			
APPROVED			
SCALE: AS SHOWN			
DRAWING REFERENCE: 5242-390			REVISION: D

## Exercising of resource consent CRC191946

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

---

**GRANTED TO:** 3 Bears Running Limited  
**A DISCHARGE PERMIT (S15):** To discharge stormwater into land.  
**LOCATION:** Monument and Clayton Roads, Fairlie

---

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

A consent can only be made active after the activity has commenced and all pre-requisite conditions have been fulfilled e.g. installation of water meter and/or fish screen. If you require further advice, please contact our Customer Services section on 0800 324 636 or by email at [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz).

Providing this information will:

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

**If consent CRC191946 is not used before 30 September 2024 this consent will lapse and no longer be valid.**

### Declaration:

I have started using this resource consent.

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

---

**Date I started using this resource consent** (Note: this date cannot be in the future): \_\_\_\_\_

**Signed:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Full name of person signing** (please print): \_\_\_\_\_

Please return to:

**Business Support  
Environment Canterbury  
PO Box 345  
Christchurch 8140**

**Fax: (03) 365 3194  
Email: [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz)**

**File: CRC191946  
Customer No: EC101297**

1 October 2019



3 Bears Running Limited  
Attn To: Graham McDermid  
PO Box 2870  
**Christchurch 8140**

**Customer Services**  
P. 03 353 9007 or 0800 324 636

200 Tuam Street

PO Box 345  
Christchurch 8140

E. [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz)

[www.ecan.govt.nz](http://www.ecan.govt.nz)

Dear Graham McDermid

### **Notice of Resource Consent Decision**

**Record Number:** CRC191947  
**Applicant Name:** 3 Bears Running Limited  
**Activity Description:** To discharge onsite wastewater to land.  
**Decision:** Granted

### **Decision**

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

1. Any adverse effects on the environment of the activity will be minor.
2. The activity is consistent with the policies of the regional plan or national policy statement.

### **Commencement of consent**

Your resource consent commences from the date of this letter advising you of the decision.

If you object to or appeal this decision, the commencement date will then be the date on which the decision on the appeal is determined.

### **Lapsing of consent**

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

### **Your rights of objection and appeal**

#### **▪ Objection to Decision**

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

- **Right to Appeal**

You may appeal the decision of the consent authority to the Environment Court in accordance with section 120 of the RMA. The notice of appeal must be lodged with the Court within 15 working days of receipt of this decision, at PO Box 2069, Christchurch. A copy of the appeal should also be forwarded to Environment Canterbury within the same timeframe.

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

- **Objection to Costs**

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

### **Monitoring of conditions**

It is important that all conditions of consent are complied with, and that the consent holder continues to comply with all conditions, to ensure that the activity remains lawfully established.

You can find online Information regarding the monitoring of your consent at

[www.ecan.govt.nz/monitoringconsent.pdf](http://www.ecan.govt.nz/monitoringconsent.pdf).

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

### **Further information about your consent**

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

### **Queries**

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

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

Yours sincerely



### **Consents Planning Section**

cc:

Lands and Survey (South) Limited

PO Box 36758

Merivale

**Christchurch 8146**

---

# RESOURCE CONSENT CRC191947

*Pursuant to Section 104 of the Resource Management Act 1991*

## The Canterbury Regional Council (known as Environment Canterbury)

---

GRANTS TO:	3 Bears Running Limited
A DISCHARGE PERMIT (S15):	To discharge onsite wastewater to land.
COMMENCEMENT DATE:	01 Oct 2019
EXPIRY DATE:	01 Oct 2034
LOCATION:	Monument and Clayton Roads, Fairlie

---

### **SUBJECT TO THE FOLLOWING CONDITIONS:**

- 1 The discharge shall be only domestic wastewater originating from a proposed 18 Lot subdivision of property with a legal description of Part RS 32380, located between Monument Road and Clayton Road, Fairlie, as shown on Plan CRC191947A, attached to and forming part of this resource consent.

**Advice note:** *There will be up to 17 residential lots with individual on-site treatment and discharge systems in the proposed subdivision and Lot 18 contains an access road to the subdivision.*

### **Wastewater Treatment and Disposal**

- 2 The volume of wastewater discharged from a single dwelling shall not exceed:
  - a. 1000 litres per day for a three-bedroom dwelling;
  - b. 1400 litres per day for a four-bedroom dwelling; and
  - c. 1600 litres per day for a five-bedroom dwelling.
- 3 Each discharge shall be only from a single dwelling with a maximum of five bedrooms.
- 4 The wastewater shall be discharged into land only at or about NZTM 2000 1426931 mE 5125454 mN via the land application system located within the discharge envelopes, labelled on Plan CRC191947B, attached to and forming part of this consent.

- 5 Prior to discharging to each land application system, the wastewater shall:
- a. receive secondary treatment in an aerated wastewater treatment system (Oasis Series S2000L system) or alternative treatment system which provides the equivalent or better-quality treatment; and
  - b. pass through a proprietary effluent filter.
- 6 The wastewater treatment system and land application system shall not include chlorine disinfection.
- 7 After exiting each treatment system, the wastewater shall be pumped to a subsurface, drip irrigation land application system as shown on Plan CRC191947C attached to and forming part of this consent, and as described below:
- a. The drip irrigation lines shall be installed at least one metre apart;
  - b. The emitters on the drip irrigation lines shall be spaced at not more than 600 millimetres apart;
  - c. The drip irrigation lines shall be installed a maximum of 150 millimetres below ground level and covered with between 100 and 150 millimetres of topsoil;
  - d. The land application system shall have a minimum area of 286 square metres for a three-bedroom dwelling; 400 square metres for a four-bedroom dwelling; and 457 square metres for a five-bedroom dwelling.
  - e. The soil above the drip irrigation tubing shall be grassed or planted with vegetation. The grass or plantings shall be kept in a healthy state. Replanting shall occur when erosion or die-off has resulted in bare or patchy soil cover.
- 8 The wastewater shall be evenly dosed over each land application system at a rate not exceeding 3.5 millimetres per day.
- 9 The perimeter of each land application system shall be fenced if it located in a paddock with stock, or shall be clearly demarcated by signage or marker pegs. The consent holder shall ensure that there is no activity undertaken on top of the land application system that may cause damage to the disposal system (for example: stock grazing, car parking or deep rooted trees).
- 10 A minimum depth of 900 millimetres of unsaturated soil shall be maintained at all times between the base of the drip irrigation lines and the highest groundwater level.
- 11 There shall be no on-site wastewater system located within the overland flow path (swale) identified on Plan CRC191946B attached to and forming part of this consent.



- 12 The consent holder shall ensure that all practicable measures are taken to divert stormwater and surface runoff away from each land application system to ensure that the performance of the system is not impeded.
- 13 There shall be no ponding of treated or untreated wastewater on the land surface and no overland discharge of treated or untreated wastewater.
- 14 There shall be no discharge:
- a. within 20 metres of any surface water body; and
  - b. to surface water as a consequence of the exercise of this consent.
- 15 There shall be no discharge within 50 metres in any direction, of any authorised and/or existing bores.

### **Installation**

- 16 Within one month of the installation of each treatment and land application system, the consent holder shall provide to the Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance, the following:
- a. A signed copy of a compliance certificate certifying:
    - i. that the installation of the wastewater treatment system, land application system, any ancillary treatment devices and associated pipework has been installed by a person with at least two years' experience in the installation of such systems; and
    - ii. the installed wastewater treatment system is capable of achieving the treatment standard and separation to groundwater specified in conditions (5) and (10) of this consent; and
    - iii. that the system has been installed in accordance with the conditions of this consent.
  - b. A copy of a signed 'as built plan' which clearly shows the location of the installed wastewater treatment system and land application system, and the separation to property boundaries and surface water bodies; and
  - c. Photographs which show:
    - i. the height of the installed distribution lines relative to ground level; and
    - ii. fencing or markers demarcating the perimeter of the land application system.

**Maintenance**

- 17 Each wastewater treatment and land application system shall be serviced and maintained at least once every six months by a qualified person with at least two years' experience in the maintenance of such systems. The maintenance shall include but not be limited to:
- a. Ensuring that the lid(s) of the wastewater treatment system are readily accessible at all times;
  - b. Measuring the depth of solids and scum in the wastewater treatment system(s);
  - c. Pumping out the wastewater treatment tank(s) if the solids and scum layers combined are greater than one half the depth of the wastewater treatment tank(s);
  - d. Removal of the sludge from the base of pump chamber(s) when the sludge is at a maximum depth of 60 millimetres
  - e. A visual inspection of the components outlined in the clauses below, and cleaning, repairing or replacing as required:
    - i. aeration devices;
    - ii. proprietary effluent filter;
    - iii. electrical parts;
    - iv. audible alarms; and
    - v. the distribution pump;
  - f. Flushing the distribution lines;
  - g. Inspection of the distribution pipes at the site of the land application system to ensure that they are operating correctly and replacing as required.
- 18 Within one month of the installation of each wastewater treatment and land application system, the consent holder shall provide to the Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance, a signed copy of a maintenance contract or agreement. The maintenance contract:
- a. Shall be with the system supplier or an alternative contractor experienced in the maintenance of the wastewater treatment and land application system;
  - b. Shall specify details of the maintenance required under condition (19) of this consent; and
  - c. If the contract changes during the duration of this consent, a new contract in accordance with (a) and (b) of this condition shall be forwarded to the Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance, within one month of the contract being signed.

- 19 Following every service a written report shall be prepared and kept by the consent holder. In addition, the consent holder shall keep written records of all repairs made to any part of the wastewater treatment and land application system. The consent holder shall forward a copy of the written reports and records of repairs to the Canterbury Regional Council, Attention Regional Leader - Monitoring and Compliance, on request.

### **Administration**

- 20 The Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:
- a. Dealing with any adverse effect on the environment that may arise from the exercise of the consent or
  - b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

**Advice Note:** *On sale of the property, the consent holder shall inform the new property owner of the volume and location of the wastewater discharge, maintenance requirements and the requirement to comply with consent conditions.*

- 21 If this consent is not exercised before 30 September 2024 it shall lapse in accordance with section 125 of the Resource Management Act 1991.

*Advice note:*

*'Exercised' is defined as implementing any requirements to operate this consent and undertaking the activity as described in these conditions and/or application documents.*

**Issued at Christchurch on 1 October 2019**

Canterbury Regional Council