Appendix 3: Flood Hazard Assessment

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Surveying • Planning • Engineering

Gould Developments Limited

&

Four Stars Development Limited

FLOOD ASSESSMENT

ROLLESTON RESIDENTIAL RE-ZONING

139 Levi Road
294-232 Lincoln Rolleston Road
5-25 Nobeline Drive

Prepared by:

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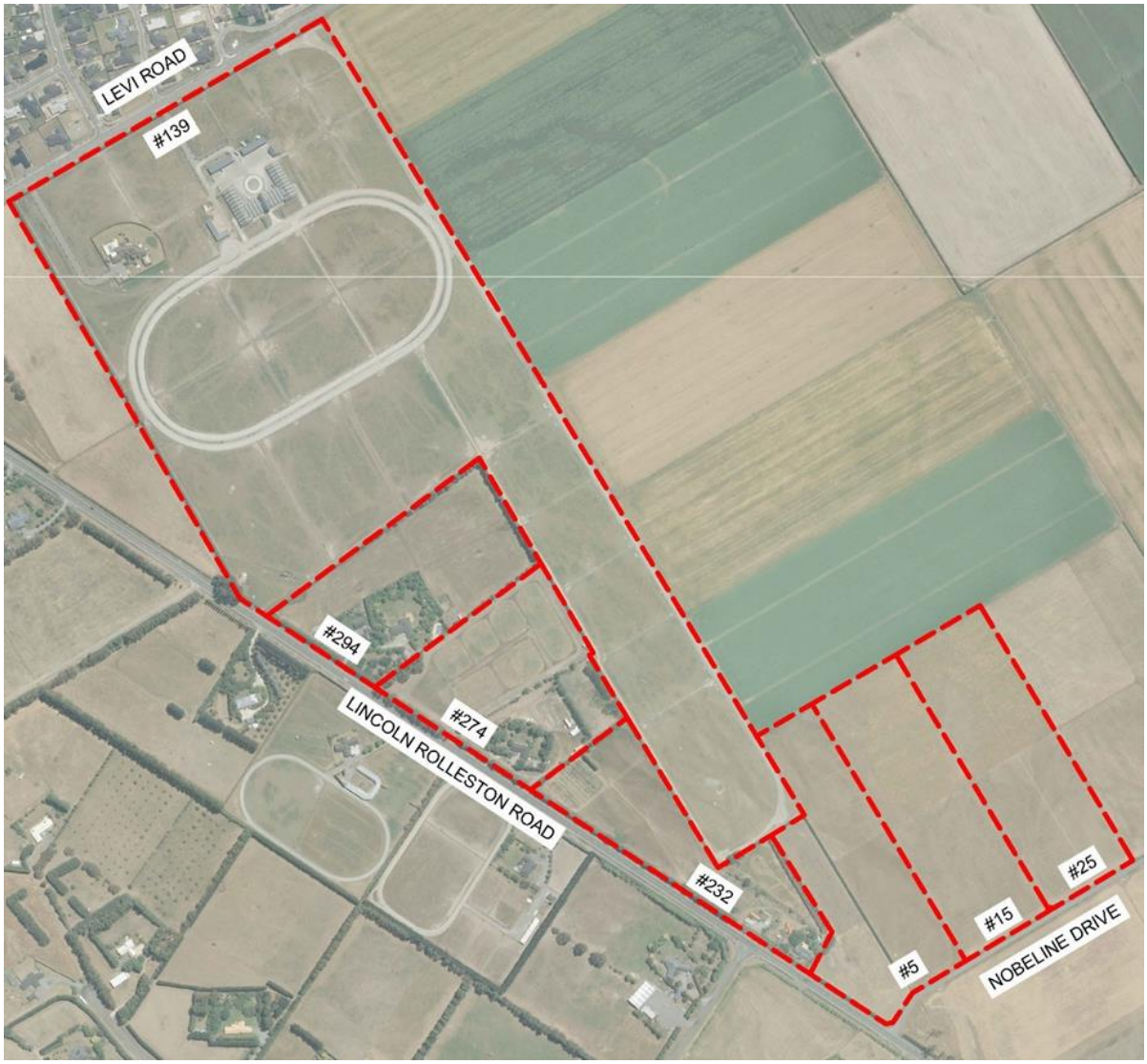
Date: 05/11/2020
Reference: CH5653

1 Introduction

Paterson Pitts Group have been commissioned by Gould Developments Limited & Four Stars Development Limited to provide a high-level flood assessment report for an application for residential rezoning of rural land as graphically shown below within Rolleston;

2 Site Location and Description

The site is generally bounded by Levi Road, Lincoln Rolleston Road and Nobeline Drive as illustrated below;



Please note that for the most part the opposite side of Lincoln Rolleston Road has been developed from rural lifestyle properties to residential use.

The site consists of 6 x separate titles as tabulated below.

ADDRESS	RT REF	LEGAL DESCRIPTION	LEGAL AREA
139 Levi Road	463353	Lot 2 DP 416195 & Lot 2 DP 322710	30.4300ha
232 Lincoln Rolleston Road	CB39B/871	Lot 3 DP 67190	3.2820ha
274 Lincoln Rolleston Road	CB39B/870	Lot 2 DP 67190	4.010ha
294 Lincoln Rolleston Road	CB39B/869	LOT 1 DP 67190	4.0000ha
5 Nobeline Drive	695247	Lot 7 DP 483709	4.0805ha
15 Nobeline Drive	695248	Lot 8 DP 483709	4.0558ha
25 Nobeline Drive	695249	Lot 9 DP 483709	4.0393ha

Three of the titles contain dwellings with a number of rural accessory buildings including large stables at 139 Levi Road.

The total area of all 7 x titles is 53.89ha. The site forms an irregular shape, it is 1.3km from Levi Road to Nobeline Drive. Each road has the following frontage length.

Levi Road : 428m

Lincoln Rolleston : 918m

Nobeline Drive : 350m

Topographically the site generally slopes from Levi Road in a SE direction towards the intersection of Lincoln Rolleston Road and Nobeline Drive. Overall, there is a height difference of 9.5m, this equates to a grade of 1:140 as depicted on the Preliminary Contour Plan and Canterbury Maps Lidar Contours located in Appendix A.

Levi Road and Lincoln Rolleston Road are both classified as Arterial roads and are double lane.

A private plan change is sought for the 53.89ha to be converted from Rural to residential zoning. As a guide for the overall yield will be in the order of 660 residential sites. The area north of the 50db contour will realize approximately 220 sites, the area south a further 220 and the mid area that is predominantly under the 50db contour a further 220.

3 Flood Assessment

Selwyn District Council (SDC) in conjunction with Environment Canterbury (ECan) developed computer flood modelling across the district to help determine areas sensitive to flooding and/or coastal hazards. The project was undertaken for SDC's District Plan Review. This information is publicly available via the following internet link.

https://apps.canterburymaps.govt.nz/SelwynNaturalHazards/

It is important to consider all forms of flooding when seeking a private plan change to confirm that such a change is appropriate. This flood assessment is an interpretation of the modelling completed by SDC and Ecan which is consistent with the purpose of the modelling.

For clarity, the site is not shown to be within the Waikariari Flood Plain Map nor Coastal Hazards Map.

The computer-based flood modelling maps located in Appendix **B** for the site, has predicted the extent and depth of flooding that could occur over the site during a one-in-200-year (0.5% AEP) - Sheets 1 & 2, and a one-in-500-year (0.2% AEP) - Sheets 3 & 4, rainfall event.

The key patterns during the one-in-200-year and one-in-500-year events are;

1/- generally the site will have some minor discrete ponding, being less than 200mm. There is isolated pockets of ponding between 200-500mm, and a single spot with a depth of 500-1000mm.

2/- the site does not appear to be receiving flows from adjacent sites and any ponding appears to be the result of runoff from the site itself.

3/- a concentrated flow develops through #15 Nobeline Drive in a SSE direction to Nobeline Drive, this is well aligned with a proposed indicative road to Nobeline Drive.

4/- ponding occurs adjacent to the Lincoln-Rolleston Road.

Any future subdivision will be designed to current SDC standards and the intention is for stormwater runoff to be discharged to ground via engineered soakage. At present, subdivisions should be designed with primary stormwater systems for one-in-10-year (10% AEP) events and secondary systems for one-in-50-year (2% AEP), with engineered soakage systems designed to cater for both the primary and secondary events. The intention is therefore to provide for stormwater soakage up to the one-in-50-year (2% AEP), however, it is noted that at SDC's discretion and where the downstream environment is suitable, the soakage system may be 'relaxed' to allow secondary event flows to overland follow paths.

As the primary and secondary events are less than the 0.5% and 0.2% AEP's, SDC's 5 Waters Services Activity Management Plan Volume 1, 2018 recognises associated overloading in Section 3.3 Stormwater Page 122 of 397 by the following excerpt ***"It is inevitable that the parts of the piped system will be overloaded to varying degrees whenever rainfall with a return period in excess of the design storm occurs."***

Typically the lots will be designed to be elevated above the roads, which will be achieved by either cutting roads in and grading them to have 1:500 minimum fall towards the roads, or if roads cannot be cut in, building up the lots to be above the roads. This will allow the roading network to become the flow path for flood waters in excess of the soakage system design capacity. Flood flows will ultimately drain away from the site via the road network and re-join the existing natural overland flow paths. Due to the surfaces of roads having a lower friction coefficient than a natural ground surface, the velocity of overland flow will increase. This increased velocity in conjunction with the primary and secondary controls will reduce the flood water depths presently modelled. Through detailed design the road network and if required road reserve will be designed with a suitable cross-sectional area to convey the design flood events and protect future dwellings.

This design methodology, subject to detailed engineering design, will mitigate significant flood events for the site as currently modelled by SDC and Ecan.

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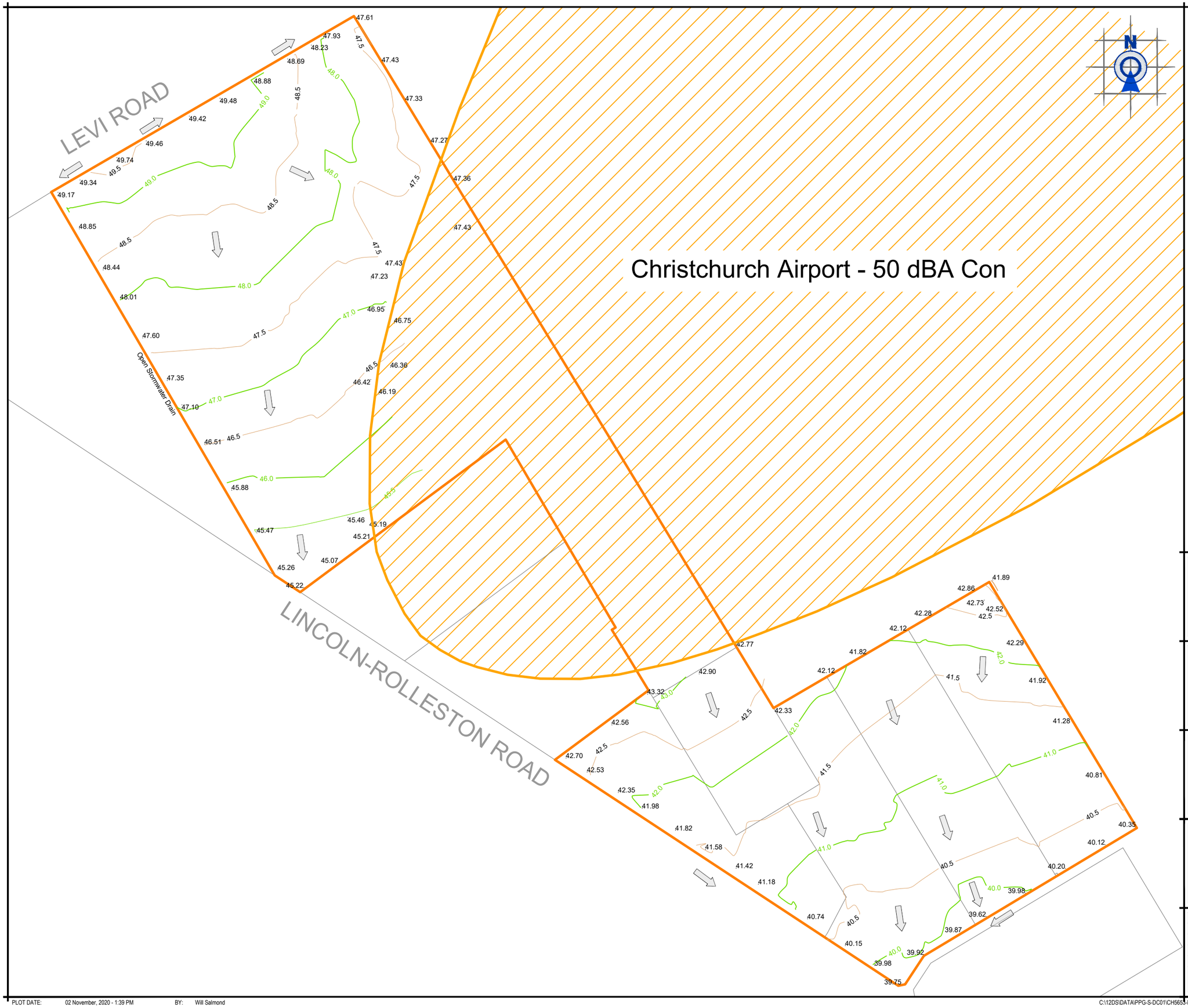
Appendix A

Preliminary Contour Plan

Canterbury Maps Lidar Contours



LEGEND:

- OVERLAND FLOW DIRECTION
- SITE BOUNDARY
- 10.00 SPOT LEVELS

NOTE:
1. FIELD WORK COMPLETED 08/09/2020
2. EQUIPMENT: TRIMBLE GPS RTK
3. ORIGIN OF LEVELS:
   LYTTELON VERTICAL DATUM 1937
   B882 (UG 32) - RL 55.908m
4. AREAS AND MEASUREMENTS ARE SUBJECT TO TITLE SURVEY
5. BOUNDARIES SHOWN ARE INDICATIVE ONLY

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E christchurch@ppgroup.co.nz

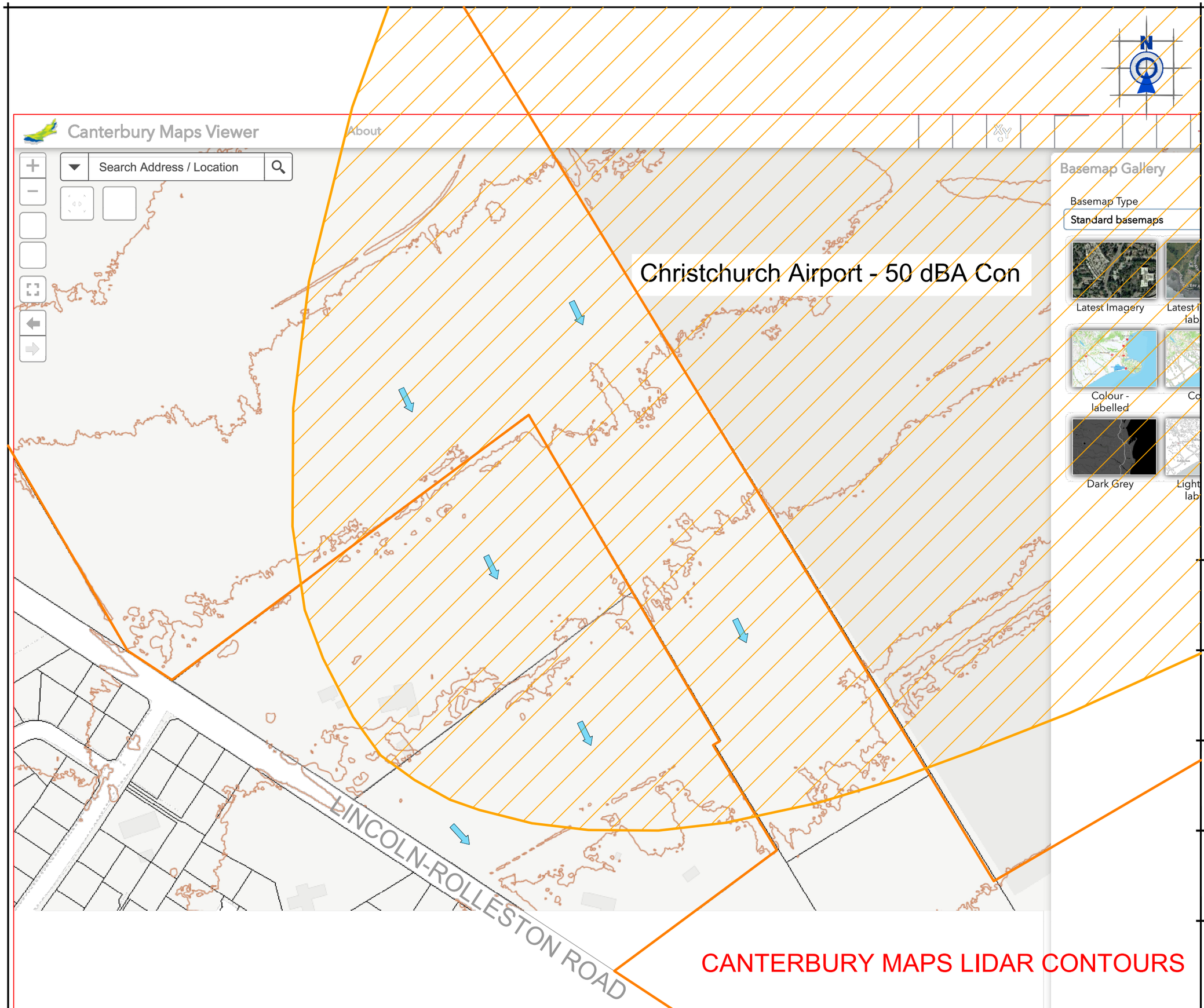
Client/Location:

Gould Developments Limited
&
Four Stars Development Limited

Purpose/Drawing Title:

Preliminary Contour Plan Levi Road / Lincoln-Rolleston Road

Surveyed by:	SS	Original Size:	Scale:		
Designed by:		A3	N.T.S		
Drawn by:	SS		DO NOT SCALE		
Checked by:					
Approved by:					
Job Ref: CH5653		Sheet No: 100	Revision No: A	Date Created: 24/09/2020	



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E christchurch@ppgroup.co.nz

Client/Location:

Gould Developments Limited
&
Four Stars Development Limited

Purpose/Drawing Title:

Preliminary Contour Plan
Levi Road / Lincoln-Rolleston Road

Surveyed by:	SS	Original Size:	Scale:		
Designed by:		A3	N.T.S		
Drawn by:	SS		DO NOT SCALE		
Checked by:					
Approved by:					
Job Ref: CH5653		Sheet No: 101	Revision No: A	Date Created: 24/09/2020	

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Appendix B

Flood Maps

Find address or place

Ruby Drive

Levi Road

Lincoln Rolleston Road

Lincoln Rolleston Road

Environment Canterbury Regional Coun

Layer List

Layers

Land Parcels

Current District Plan

Flood Zones

- Lake Ellesmere Flood Area
- Lower Plains Flood Area
- Waimakariri Flood Plain

200-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

200-year ARI Selwyn River flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

100m

200-YEAR ARI RAINFALL FLOOD DEPTH

SHEET 1 OF 4

Find address or place

Lincoln Rolleston Road

Robertine Drive

Environment Canterbury Regional Coun

100m

Layer List

Layers

Land Parcels

Current District Plan

Flood Zones

- Lake Ellesmere Flood Area
- Lower Plains Flood Area
- Waimakariri Flood Plain

200-year ARI rainfall flood depth (m)

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- 1.0 - 1.5
- > 1.5

500-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

200-YEAR ARI RAINFALL FLOOD DEPTH

Find address or place

Ruby Drive

Levi Road

Lincoln Rolleston Road

Lincoln Rolleston Road

Environment Canterbury Regional Coun

Layer List

Layers

Land Parcels

Current District Plan

Flood Zones

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- Lower Plains Flood Area
- Waimakariri Flood Plain

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- 0.2 - 0.5
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- 1.0 - 1.5
- > 1.5

500-year ARI rainfall flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-YEAR ARI RAINFALL FLOOD DEPTH

100m

SHEET 3 OF 4

Find address or place

Layer List

Layers

Land Parcels

Current District Plan

Flood Zones

- Lake Ellesmere Flood Area
- Lower Plains Flood Area
- Waimakariri Flood Plain

200-year ARI rainfall flood depth (m)

- < 0.2
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200-year ARI Selwyn River flood depth (m)

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- 1.0 - 1.5
- > 1.5

500-year ARI rainfall flood depth (m)

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- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-year ARI Selwyn River flood depth (m)

- < 0.2
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5

500-YEAR ARI RAINFALL FLOOD DEPTH

100m

SHEET 4 OF 4