

**BEFORE INDEPENDENT HEARING COMMISSIONERS APPOINTED BY THE
WAIMAKARIRI DISTRICT COUNCIL**

IN THE MATTER OF

The Resource Management Act 1991 (**RMA** or
the Act)

AND

IN THE MATTER OF

Hearing of Submissions and Further
Submissions on the Proposed Waimakariri
District Plan (**PWDP** or **the Proposed Plan**)

AND

IN THE MATTER OF

Hearing of Submissions and Further
Submissions on Variations 1 and 2 to the
Proposed Waimakariri District Plan

AND

IN THE MATTER OF

Submissions and Further Submissions on the
Proposed Waimakariri District Plan by
Bellgrove Rangiora Limited

**EVIDENCE OF DAVID PATRICK DELAGARZA
ON BEHALF OF BELLGROVE RANGIORA LIMITED
REGARDING HEARING STREAM 12E**

Dated: 30 April 2024

Presented for filing by:
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INTRODUCTION

- 1 My name is David Patrick Delagarza.
- 2 I am a Senior Stormwater Engineer and an Associate in Aurecon's Christchurch office.
- 3 I hold the qualifications Bachelor of Science in Civil Engineering and Professional Engineer.
- 4 I have 20 years of experience in stormwater and floodplain engineering. This includes design of stormwater quality and flood attenuation facilities, infiltration basins and conducting floodplain assessments and stormwater assessments and design for largescale residential developments.
- 5 My role in relation to the proposed Waimakariri District Plan and Variation 1 is as an independent expert witness to Bellgrove Rangiora Limited (**Bellgrove** or **BRL**) on stormwater and flood management matters.
- 6 Although this is not an Environment Court proceeding, I have read the Environment Court's Code of Conduct and agree to comply with it. My qualifications as an expert are set out above. The matters addressed in my evidence are within my area of expertise, however where I make statements on issues that are not in my area of expertise, I will state whose evidence I have relied upon. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in my evidence.

SCOPE OF EVIDENCE

- 7 In my evidence I present my assessment of the stormwater and flood management effects of Bellgrove's proposal to rezone 31.2ha of land in South East Rangiora as part of the Waimakariri District Plan review.
- 8 In my evidence I address the following issues:
 - (a) Stormwater quality;
 - (b) Stormwater management;
 - (c) An assessment of flood hazard and associated flood management; and
 - (d) Groundwater resurgence management.

9 In preparing my evidence, I have reviewed the following documents and evidence:

- (a) **'Indicative Concept Layout Plan'** – *Bellgrove Rangiora, Concept Layout Bellgrove South*, DWG no. 509177-0000-SKT-CC-1000- Rev. B, dated 3 April 2024
- (b) The **'Revised SER ODP'** shows the overall SER-ODP and incorporates the changes sought by Bellgrove (DWG: 509177-W00001-GIS-UU-0002, dated 18 April 2024);
- (c) Inch Property, Kippenberger Avenue, Rangiora, *Preliminary Geotechnical Investigation Report*, Westpark Rangiora Limited, Aurecon New Zealand, Reference 506685, Revision 1, 2019-07-30.
- (d) Waimakariri District Flood Mapping, available on Waimakariri District Natural Hazards Interactive Viewer ¹

10 In preparing my evidence I have reviewed the evidence of the following people:

- i. Mr Jan Kupec– geotechnical matters;
- ii. Mr Jason Trist – infrastructure; and
- iii. Dr Tracy-Mines – ecology.

11 I have assessed these above issues based on the methodology and criteria established in:

- (a) Waimakariri District Council Engineering Code of Practice; and
- (b) Christchurch City Council Waterways, Wetlands and Drainage Guide².

SUMMARY OF MY EVIDENCE

12 The proposed rezoning of 15 Kippenberger Avenue (Lot 2 DP 394668, Lot 2 DP 452196) and 74 Northbrook Road (Lot 2 DP 12090) from Rural Lifestyle Zone (**RLZ**) to Medium Density Residential Zone (**MRZ**) in the pWDP, can be

¹ Waimakariri District Council Natural Hazards Indicative Viewer, <https://waimakariri.maps.arcgis.com/apps/instant/portfolio/index.html?appid=c6bc05f87d4f47ecae975e5241657913>

² *Waterways, Wetlands and Drainage Guide, Ko Te Anga Whakaora mō Ngā Arawai Rēpō*, CCC, <https://ccc.govt.nz/environment/water/water-policy-and-strategy/waterways-wetlands-and-drainage-guide>

supported from a stormwater and flood management perspective, and there are multiple options that can be employed as needed for managing flood risk.

- 13 Future stormwater and flood management design of development of the Site will seek to manage overland flow paths in a manner which does not adversely impact future residential development or the surrounding properties. On site stormwater attenuation would mitigate the effects of the development.
- 14 In addition, primary and secondary stormwater treatment provided as part of future development will substantially improve the quality of the stormwater runoff from the site.
- 15 I have inputted to the revised SER-ODP which identifies one large 6.5ha stormwater management area (SMA) sized to collect, attenuate, and treat the development stormwater runoff from the Site including the Additional Land and an additional 2.6 ha of land beyond the Site. Siting the SMA in the south—eastern area of the Site will allow gravitational conveyance of collected runoff to this SMA.
- 16 There have been no recorded groundwater resurgence issues on the Site indicating it is unlikely the Site experiences groundwater resurgence. This will be further investigated and confirmed as part of detailed design prior to subdivision.
- 17 More in-depth flood modelling work is required to confirm the details of the proposed flood management strategy for future development on the Site and the flood hazard and displacement effects arising from proposed filling of the site (up to 1 m in southern sections). This work will occur in the next few months and be provided as supplementary evidence.

CONTEXT

- 18 My evidence relates to the proposed rezoning of approximately 31.2 ha of land east of Rangiora town 15 Kippenberger Avenue (Lot 2 DP 394668, Lot 2 DP 452196) and 74 Northbrook Road (Lot 2 DP 12090) (**the Site**) from Rural Lifestyle Zone (**RLZ**) to Residential Medium Density Zone (**MRZ**) in the proposed Waimakariri District Plan (**pWDP**)

THE SITE

- 19 The existing land use on the Site is agricultural, consisting predominantly of open pasture or grazing and baleage.
- 20 The Site is bounded to the east by the Cam/Ruataniwha River which drains from northwest to the southeast. Downstream from the site the North Northbrook waterway drains south towards to merge with the Northbrook waterway. Refer Figure 1 below.

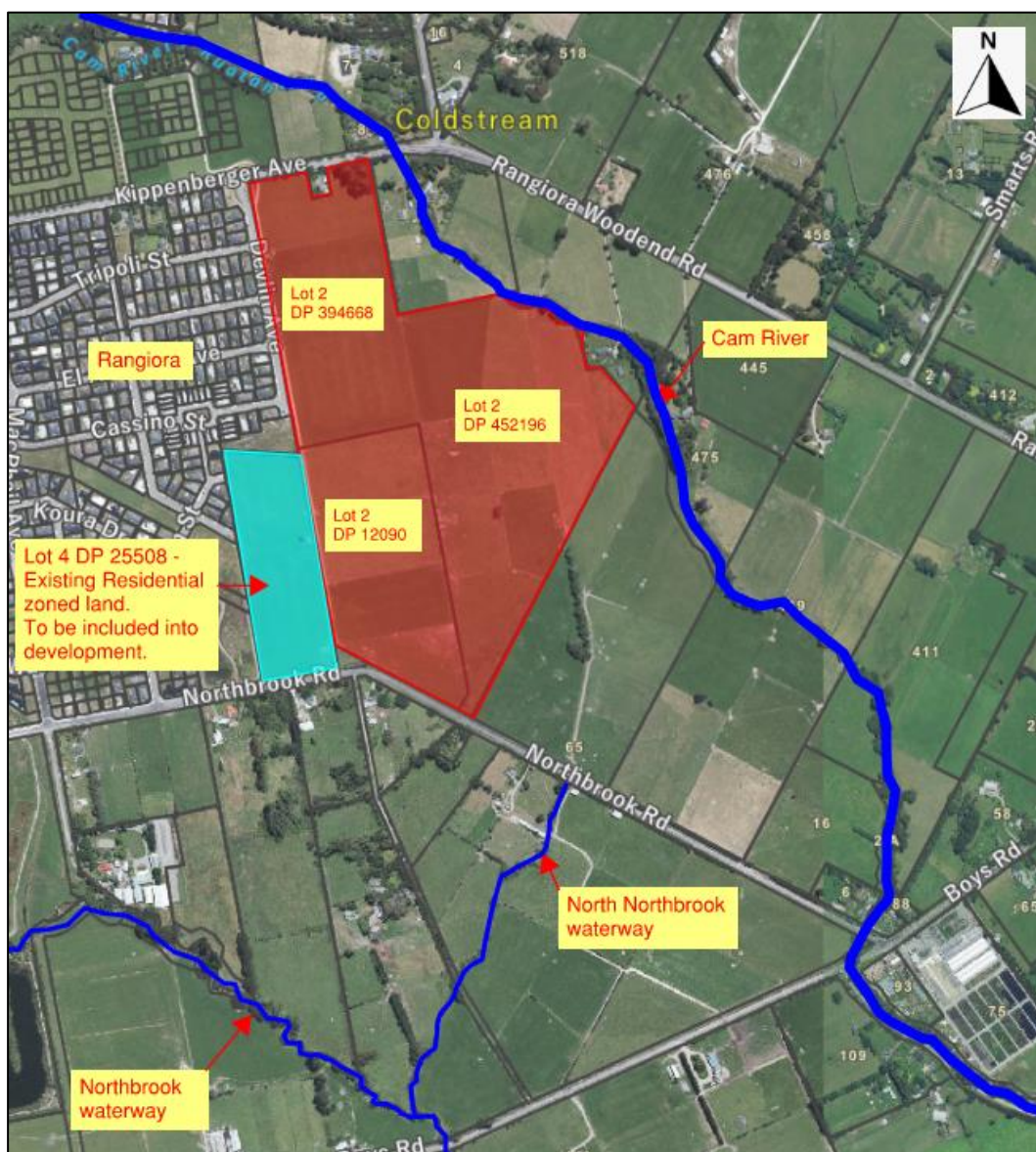


Figure 1 Natural waterways surrounding the wider Bellgrove South development site (Ref.: Canterbury Maps, 2024)

- 21 LIDAR contour information indicates that the Site is generally sloped from northwest to the south towards the North Northbrook waterway. Refer Figure 2 below.



Figure 2 High level LiDAR contour information for the development site (Ref.: LINZ, 2024)

22 The ecological evidence of Dr Tracy-Mines outlines that a spring has been identified on the eastern boundary of the Site and a probable spring in the southwestern corner. It is understood these springs are fed by artesian groundwater within the underlying gravel strata of the site³. Refer Figure 3 below.

23 In addition, the ecological evidence prepared by Dr Tracy-Mines has identified a number of damp and wet areas in the southernmost section of the property as well as areas of riparian vegetation largely concentrated in the southern area of the site. Refer Figure 3 below. Dr Tracy-Mines confirms that these areas do not support a natural ecosystem of plants and animals and are excluded from the NPS-FM and CRPS definition of a natural inland wetland. Additionally, they are not considered to be wetlands under the pWDP definition of a wetland.

³ Inch Property, Kippenberger Avenue, Rangiora, Preliminary Geotechnical Investigation Report, Westpark Rangiora Limited, Aurecon, 2019-07-30, Reference: 506685, Revision 1

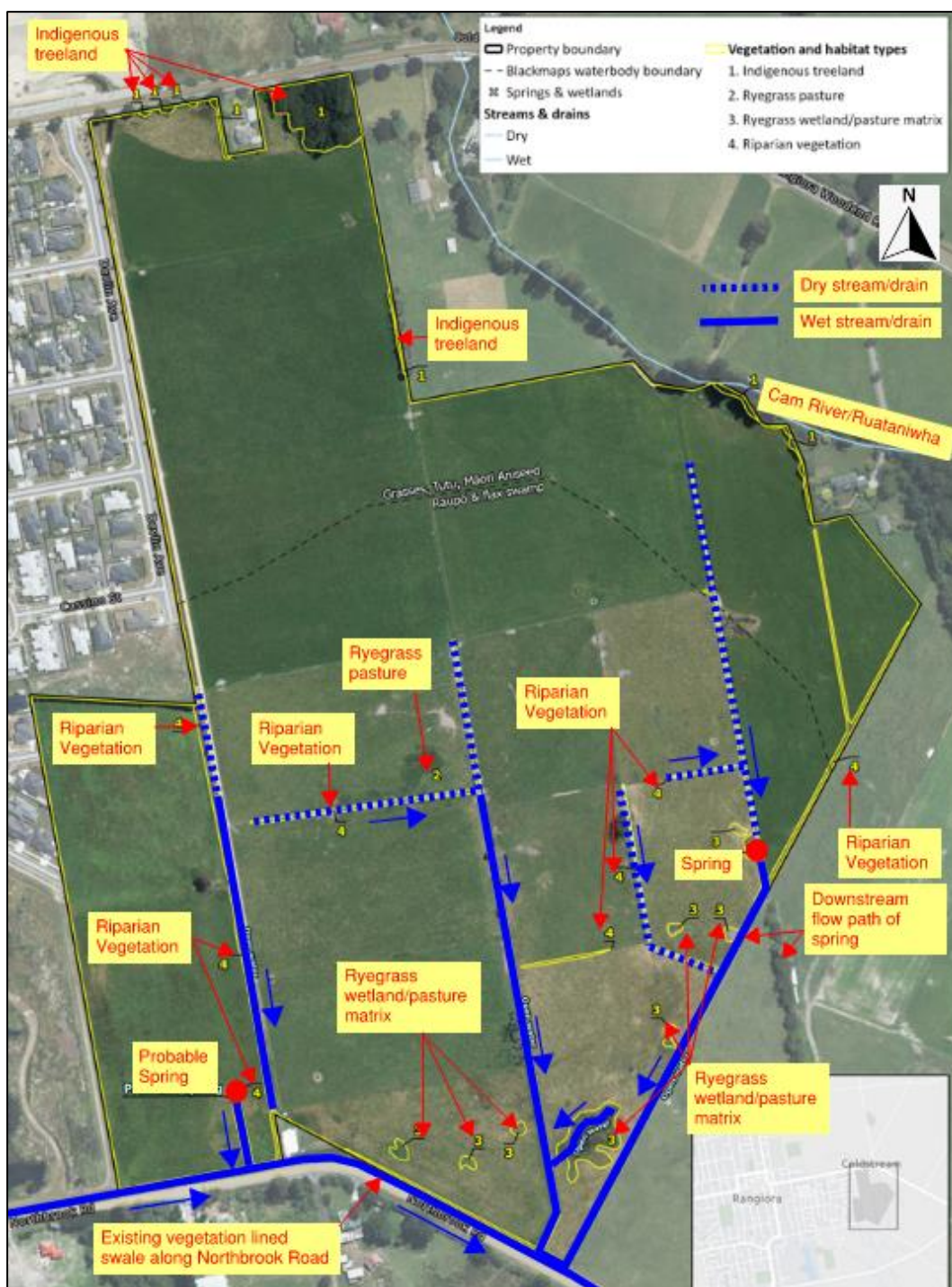


Figure 3 Bellgrove South preliminary ecological investigation outcomes showing location of identified springs, wetlands, and areas with riparian vegetation. Also shown are the onsite open channel drains and their direction of flow. (Ref. Email correspondence, Dr Morgan Tracy-Mines, Wildlands, 08 April 2024).

24 Waimakariri District Council's (WDC) flood risk map indicates that majority of the site is located within "very low" and "low" flooding hazard areas for the modelled 200-year all flood hazard event. Modelled results indicate there are only isolated areas of "medium" flood hazard on the development site. Refer Figure 4 below.

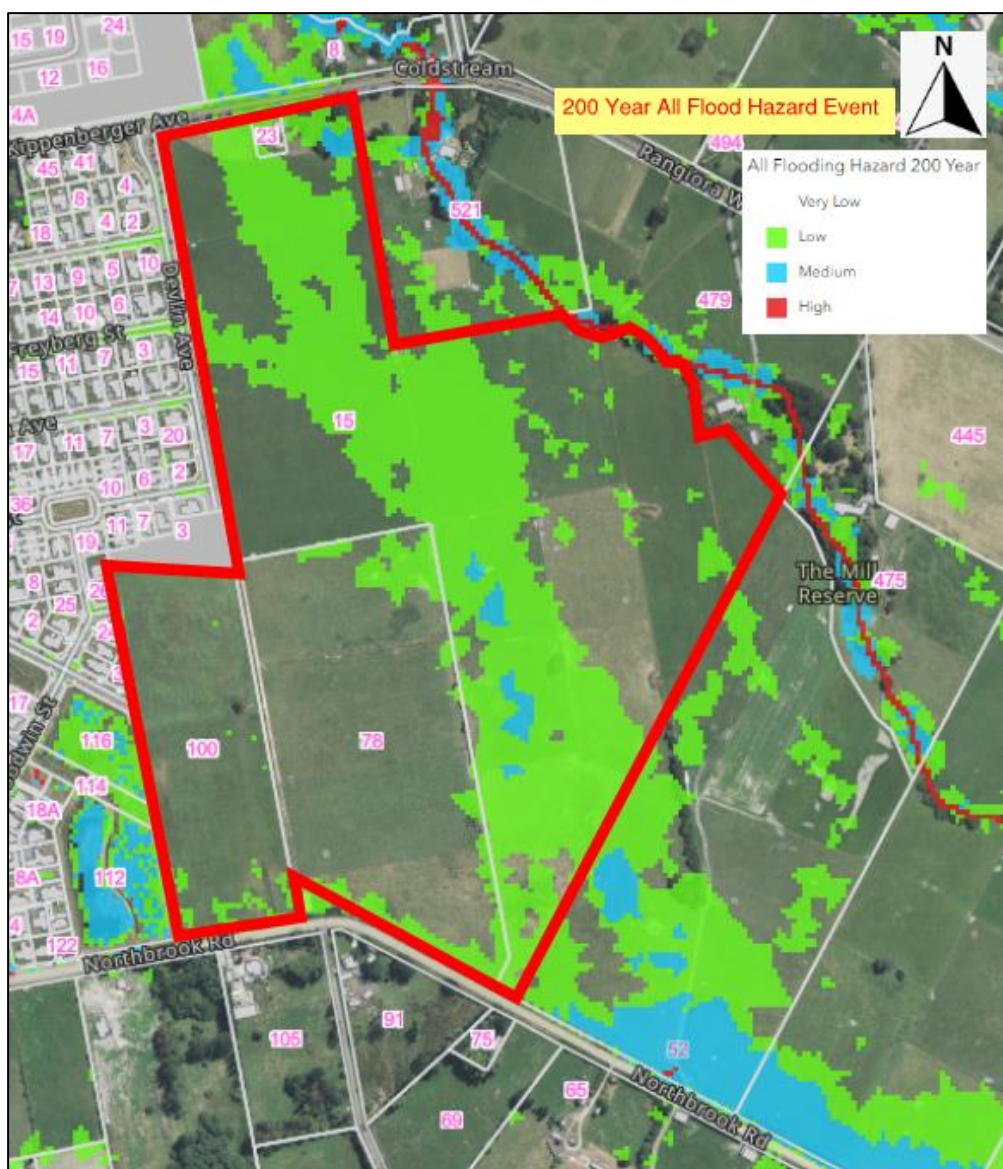


Figure 4 Modelled flood risk for the full extent of the Bellgrove South site (Ref.: Waimakariri District Council Natural Hazards Interactive Viewer, 2024)

25 The WDC 200-year localised flood event flood risk map indicates that in this event some flow from the Cam/Ruataniwha River, breaks out of the Cam/Ruataniwha River north of the site (north of Kippenberger Avenue), spills from the southern bank, creating an overland flow path. This breakout overland flow from the Cam/Ruataniwha River flows overland across the Site, and the neighbouring lots in a south easterly direction before reconverging with the Cam/Ruataniwha River downstream at the location of the intersection of Northbrook Road and Boys Road. Refer Figure 5 below.

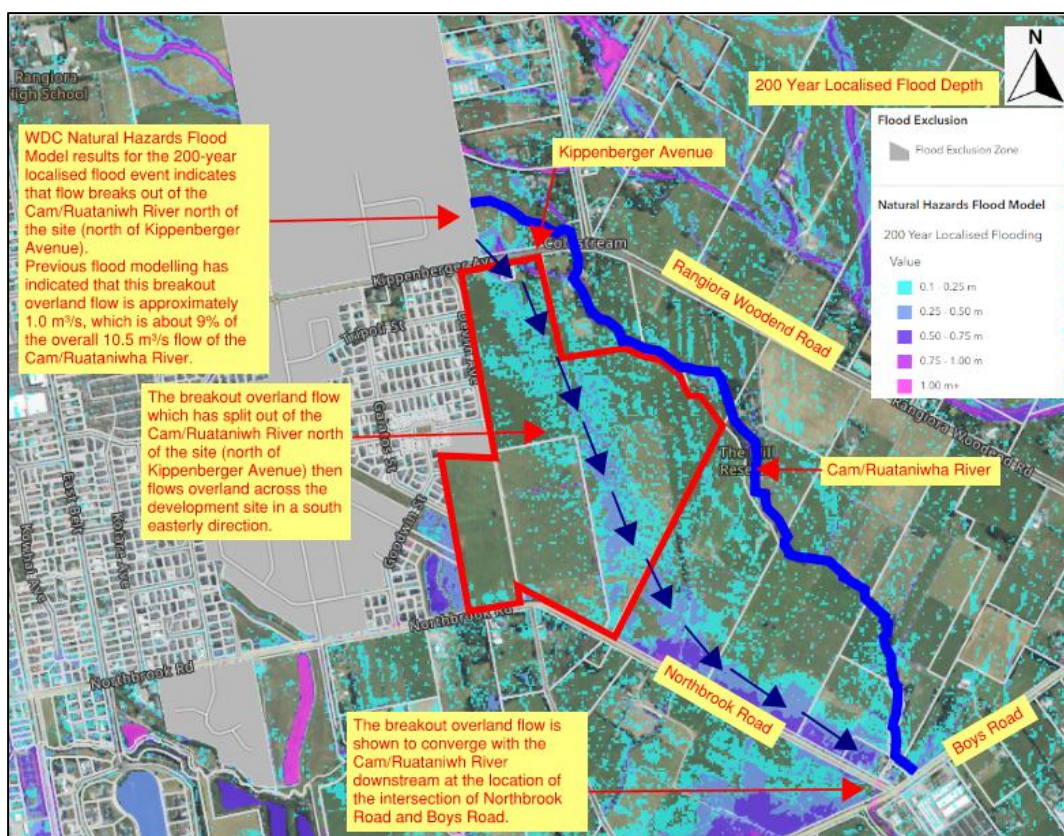


Figure 5 Modelled onsite flooding depth for the full extent of the Bellgrove South site and the wider area based on a 200-year localised flood event. Modelling results indicate that the Cam/Ruataniwha River breakout overland flow traverses the Site and converges again with the Cam/Ruataniwha downstream at the location of the Northbrook Road and Boys Road intersection (Ref.: Waimakariri District Council Natural Hazards Interactive Viewer, 2024)

26 WDC's 200-year localised flood event flood risk map indicates that most of the site is not subject to flooding in excess of 0.5m. Where portions of the Site are subject to flooding, the majority of the area is subject to flooding of depth 0.1 m – 0.25 m with some locations within the central site experiencing onsite flooding of 0.25 m – 0.50 m for the modelled 200-year localised event. Refer Figure 6 below.

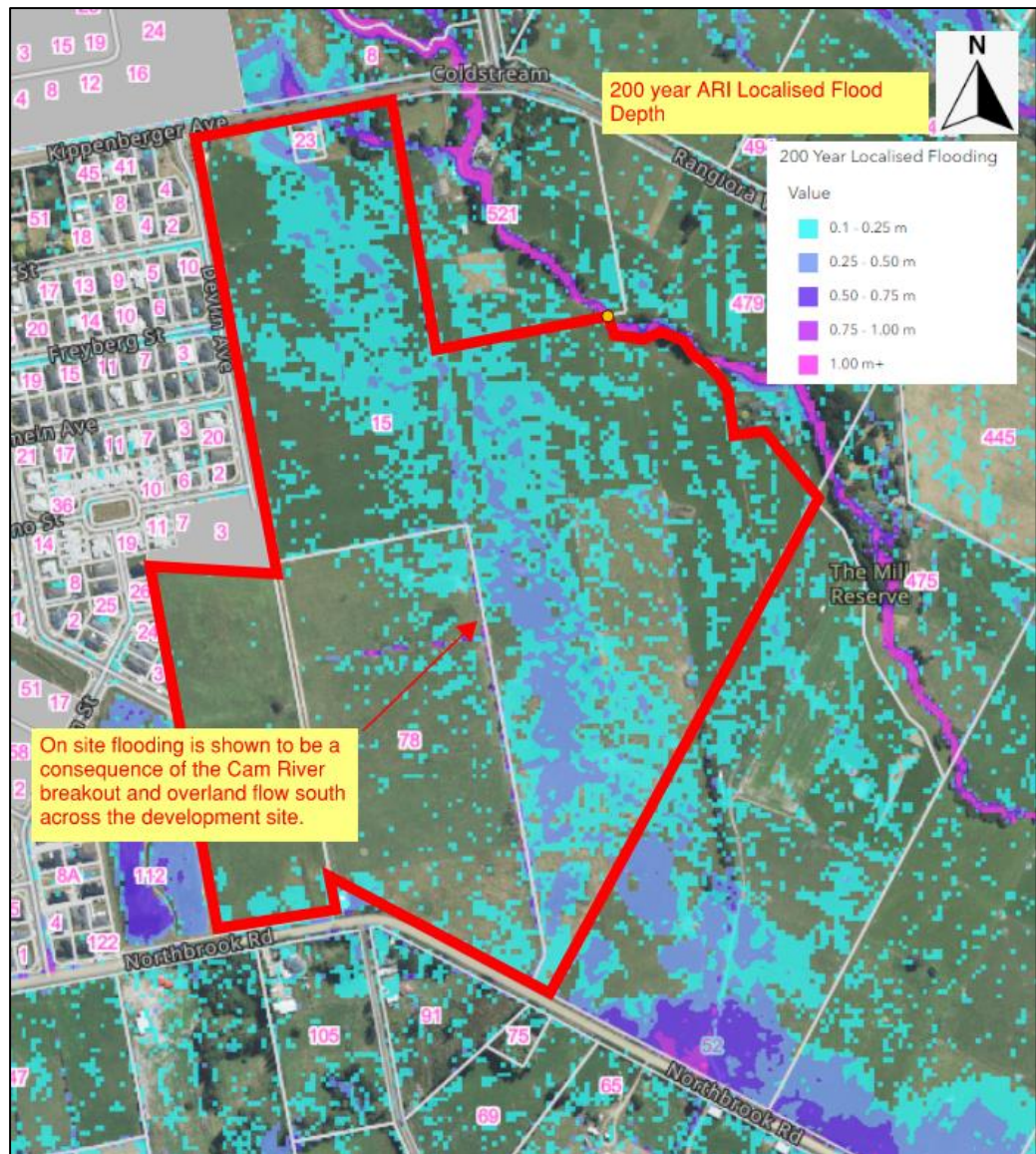


Figure 6 Modelled onsite flooding depth for the full extent of the Bellgrove South site based on a 200-year localised flood event (Ref.: Waimakariri District Council Natural Hazards Interactive Viewer, 2024)

- 27 The WDC 200-year localised flood event flood risk map also indicates that only the central area of the Site is subject to onsite flooding of depth 0.1 m – 0.25 m and 0.25 m – 0.50 m for the modelled 200-year Ashley River Breakout Event. Refer Figure 7 below.

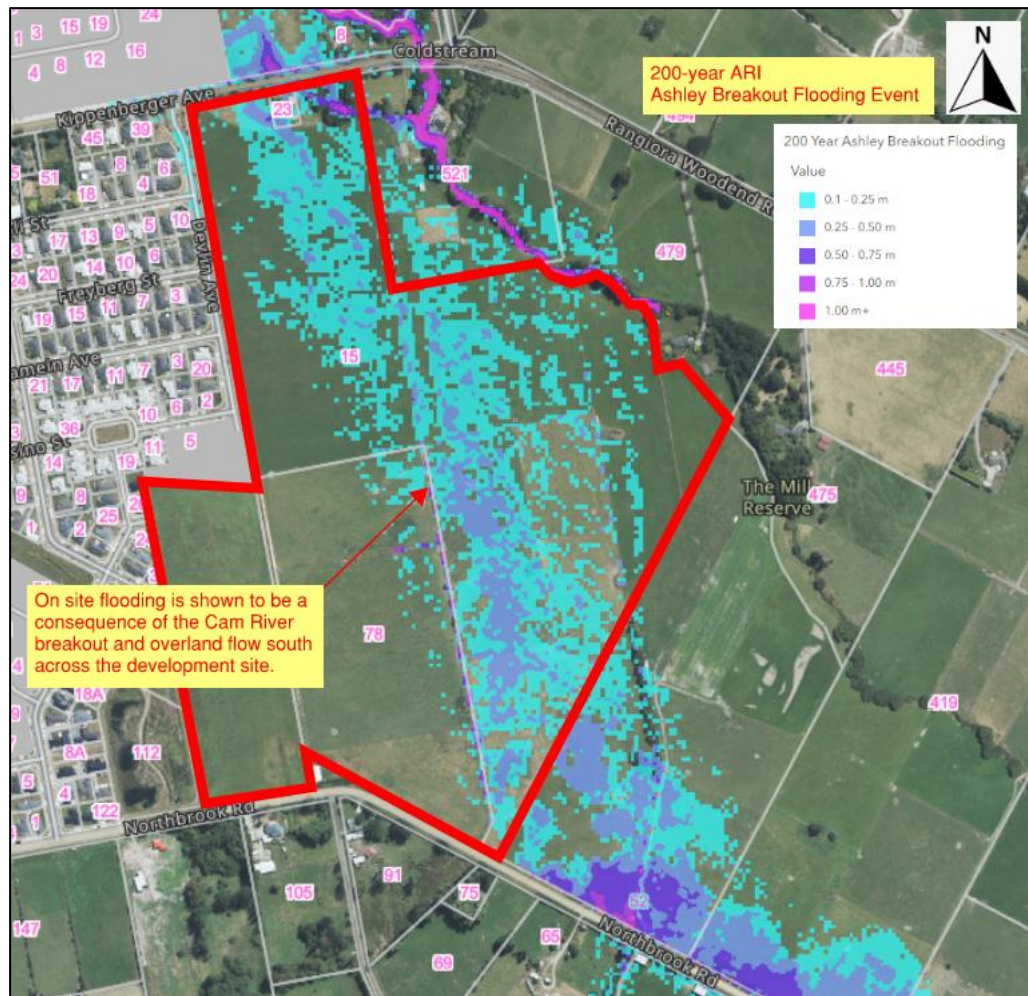


Figure 7 Modelled onsite flooding depth for the full extent of the Bellgrove South site based on a 200-year Ashley River Breakout event (Ref.: Waimakariri District Council Natural Hazards Interactive Viewer, 2024)

28 Geotechnical investigation and analysis outcomes ⁴ indicate that the groundwater level onsite is shallow at 1.0 m BGL towards the northern boundary of the site. Towards the southern boundary the groundwater level gets progressively higher until it is 0.5 m AGL. This elevated groundwater table was determined to be largely driven the presence of artesian groundwater onsite. Refer Figure 8 below.

⁴ Inch Property, Kippenberger Avenue, Rangiora, Preliminary Geotechnical Investigation Report, Westpark Rangiora Limited, Aurecon, 2019-07-30, Reference: 506685, Revision 1

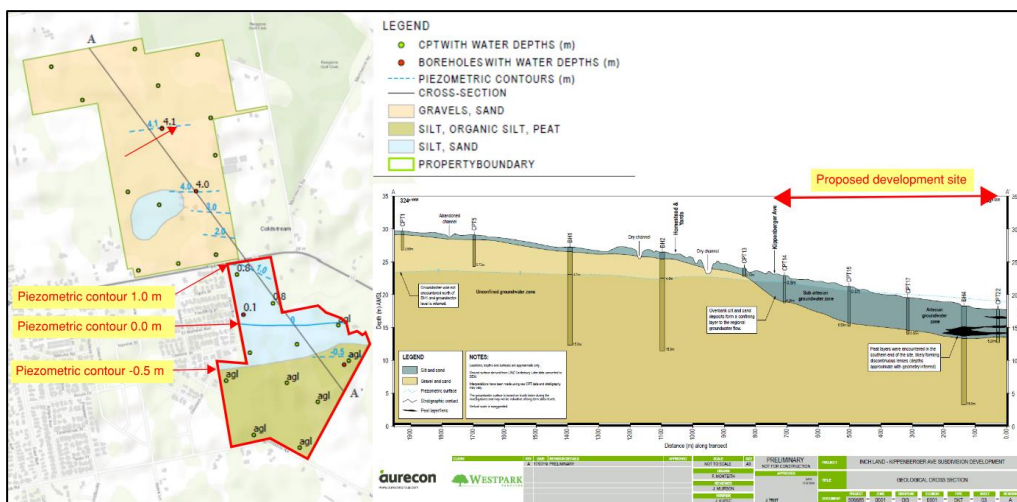


Figure 8 Extract from preliminary geotechnical investigation report indicating the determined piezometric contours for Bellgrove South and the underlying geology which is influencing the presence of artesian groundwater onsite (Ref.: Inch Property, Kippenberger Avenue, Rangiora, Preliminary Geotechnical Investigation Report, Westpark Rangiora Limited, Aurecon, 2019-07-30, Reference: 506685, Revision 1)

THE RECEIVING ENVIRONMENT

29 WDC flood mapping and LiDAR contour information (refer Figure 2) suggests that rainfall that falls onto the site is drained southwards towards the open swale along Northbrook Road. The conveyance of this flow is via a series of existing of open farm drains which converge and discharge into the swale located in the road reserve on the north side of Northbrook Road (refer Figure 3 and the photograph in Figure 10 below).

30 The swale along Northbrook Road flows in a south easterly direction towards Boys Road where it converges with the Cam /Ruataniwha River. Approximately 200m southeast of the site along Northbrook Road there is an existing 2.4 m wide x 1.2 m high box culvert (measured onsite) which connects the drain to the North Northbrook waterway (refer to the photograph at Figure 11 below).

31 The North Northbrook waterway drains into the Northbrook waterway which drains into the Cam /Ruataniwha River approximately 2.5 km southeast of the development site. Refer Figure 9 which provides an overview of the receiving waterways downstream of the proposed development site.

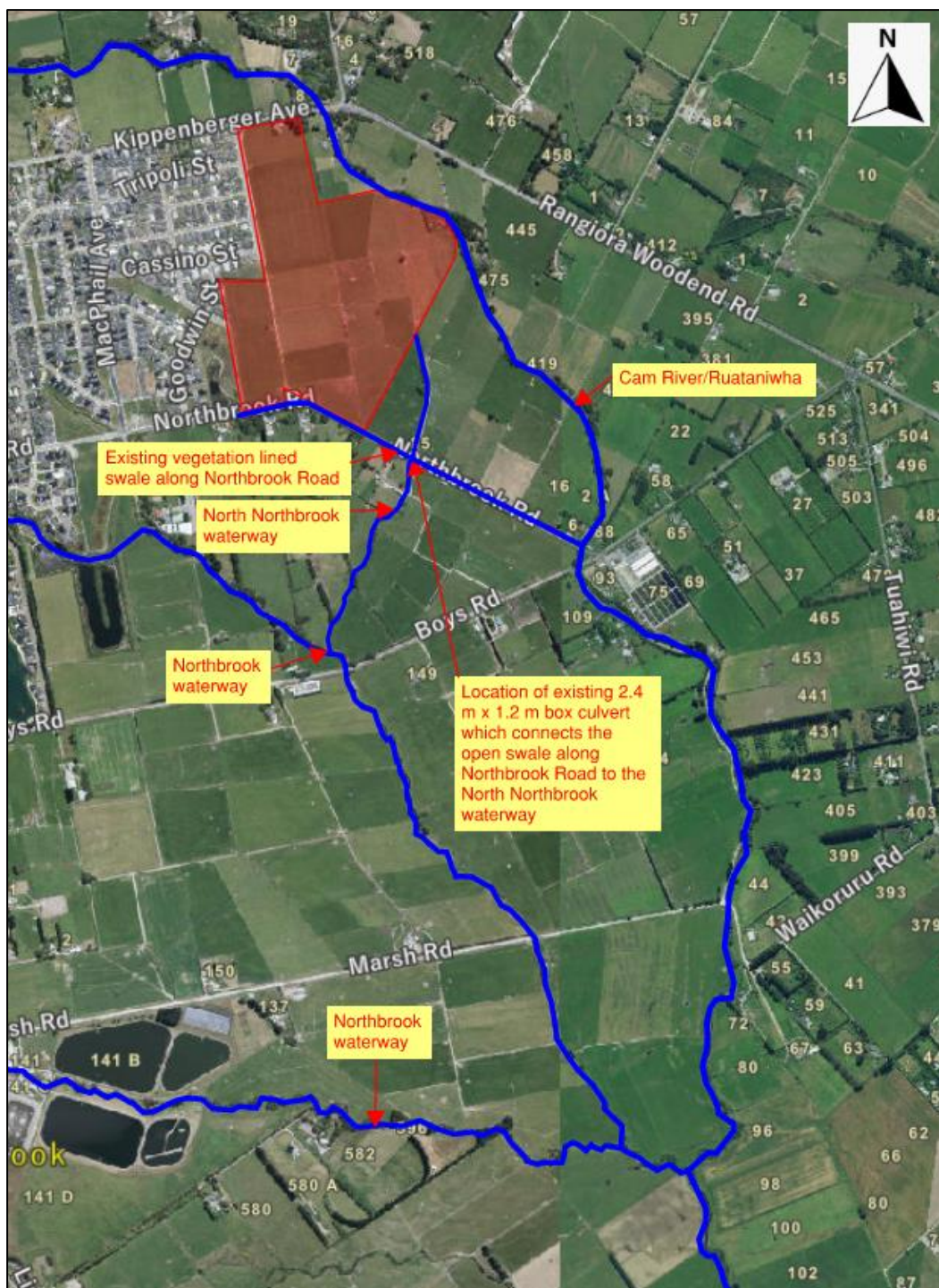


Figure 9 Receiving waterways downstream of Bellgrove South (Ref.: Canterbury Maps, 2024)

32 The existing swale along Northbrook Road is lined with vegetation and grass. Refer Figure 10 and Figure 11 below.

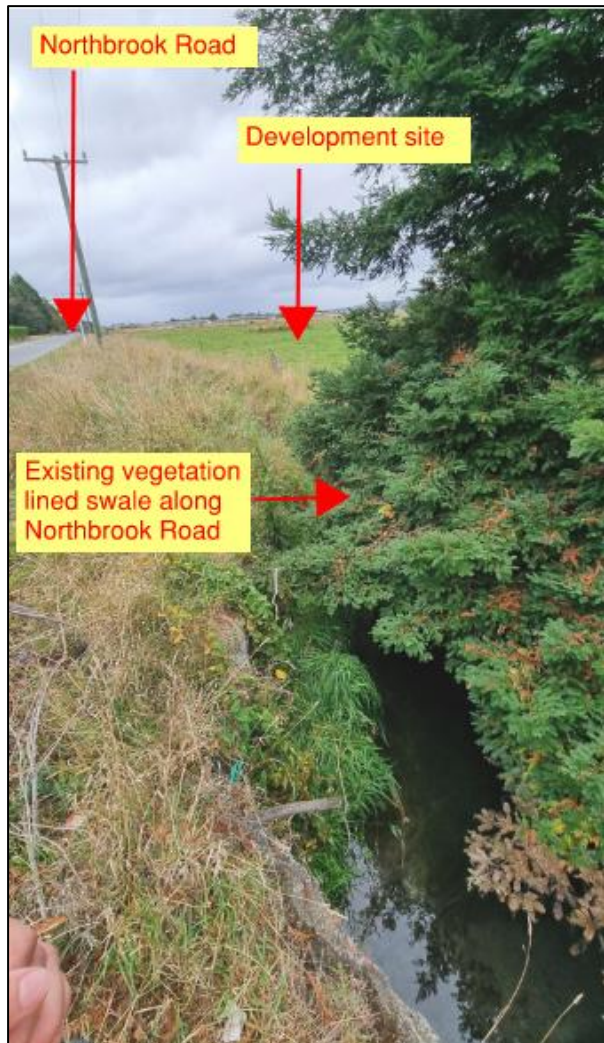


Figure 10 Existing vegetation lined swale along Northbrook Road with the proposed development site in the background (image taken from onsite investigation)



Figure 11 Existing vegetation lined swale and 2.4 m x 1.2 m box culvert along Northbrook Road which connects the swale to the downstream North Northbrook waterway (image taken from onsite investigation)

- 33 Residential development of Lot 4 DP 25508 (100 Northbrook Road) is already anticipated and provided for by both the Operative Waimakariri District Plan and the pWDP. The existing stormwater management facility located to the west of the Site has been sized to accommodate future development of this land and as a result this land is not discussed further in this analysis.

THE PROPOSAL

- 34 Bellgrove seeks to rezone the full extent of Bellgrove South from RLZ to MRZ in the pWDP. Excluding Lot 4 DP 25508 (100 Northbrook Road) which is already proposed to be zoned MRZ as part of Variation 1, this is an area of approximately 31.2 ha (refer to the area in red in Figure 12 below which is referred to as the Site in my evidence).



Figure 12 Area of land sought to be rezoned MRZ in the pWDP (Ref.: Canterbury Maps, 2024)

- 35 The Site lies within the South East Rangiora Development Area (**SER-DA**) and the South East Rangiora Outline Development Plan (**SER-ODP**) of the pWDP except for a 3.3ha triangular portion of land along the eastern boundary of Lot 2 DP 452196 (refer to the **Additional Land** in blue in Figure 13 below).

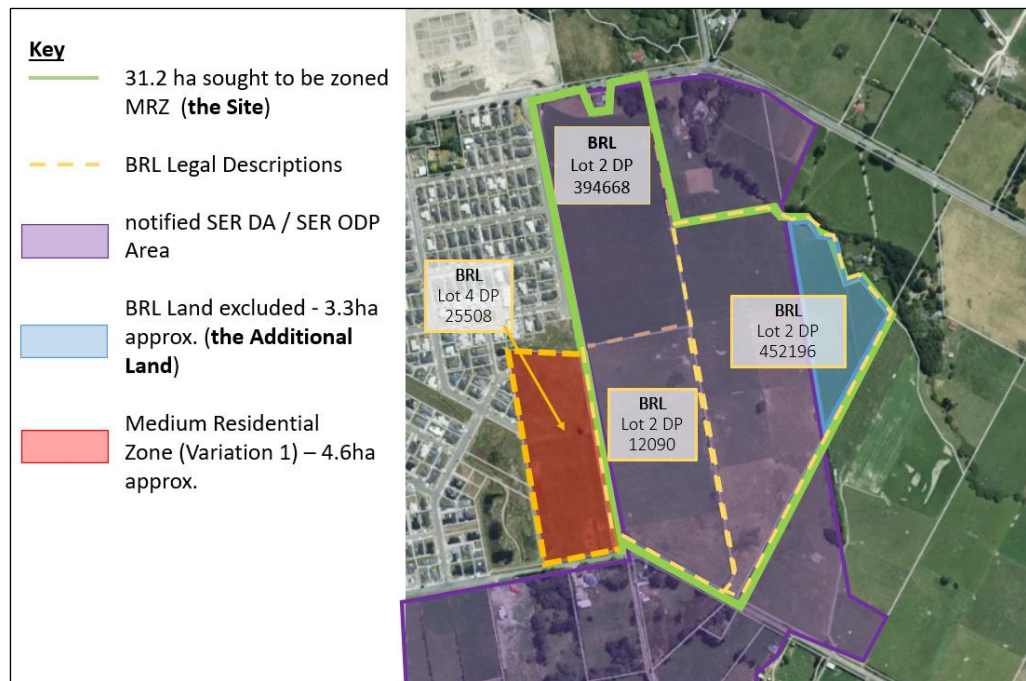


Figure 13 Bellgrove South Landholding Information

- 36 Development of the Bellgrove South (refer red, purple and blue areas of Figure 13), should the land be rezoned to MRZ, is anticipated to yield approximately 437 lots as per the indicative concept lot layout.
- 37 The 31.2ha Site to which this rezoning request to MRZ applies (refer purple and blue areas of Figure 13) will yield approximately 363 residential lots.
- 38 In addition, the development would include associated open space reserves, an esplanade reserve along the Cam/Ruataniwha River and civil infrastructure including roading, stormwater facilities and greenspace in accordance with the revised SER-ODP.
- 39 The changes sought by Bellgrove to the notified SER-ODP are shown on the on the revised SER-ODP included as **Attachment 1**. Changes of relevance to this stormwater and flood management evidence are:
- (a) Changes to the open space network to include the provision of a stormwater facility (stormwater reserve) within the southern portion and south-eastern corner of Bellgrove South (approximately 6.5 ha in size);
 - (b) Identification of all the residential land as Medium Density Residential; and

- (c) Inclusion of the area of Additional Land.

Proposed stormwater features

40 From a stormwater management perspective, future development in accordance with the Revised SER ODP would comprise:

- (a) A proposed stormwater reticulation network that conveys primary stormwater discharges (up to the 5-year ARI event) to the proposed SMA located within the Stormwater Reserve area of the SER-ODP. Secondary flows, up to the 50-year ARI event, would also be conveyed overland via the development's roading network and swales to the SMA.
- (b) The revised SER-ODP identifies one large SMA (6.5 ha) sized to collect, attenuate, and treat the development stormwater runoff from the Site including the area of Additional Land and an additional 2.6 ha of land beyond the Site not owned Bellgrove that adjoins western bank of the Cam/Ruataniwha River at Kippenberger Avenue. This will be treated as two individual sub-catchments (refer **Attachment 2** showing the Concept Stormwater Treatment Layout) This SMA is to be located in the southern area of the site, coinciding with the natural low point of the site. Siting the SMA in this area will allow gravitational conveyance of collected runoff to this SMA (refer Figure 2).
- (c) The SMA will contain two basins and two detention basins for each of the two development sub-catchments. The discharge from these individual catchment systems will be conveyed into a single large communal wetland which will provide secondary stormwater treatment for both sub-catchments. The treated stormwater will then be discharged into the existing vegetation lined swale along Northbrook Road where it will be conveyed to the downstream North Northbrook waterway and the Cam/Ruataniwha River discharge point at the intersection of Boys Road and Northbrook Road.
- (d) Due to the high groundwater level, soakage to ground is not achievable for this site. Consequently, storm runoff from each residential lot will be directed to the development's stormwater reticulation network which will convey the flow to the SMA for attenuation, treatment, and

discharge downstream into the North Northbrook and the Cam/Ruataniwha River.

- (e) The SMA will be designed to provide peak flow attenuation for the pre vs. post development site runoff, restricting peak discharge rates to below the predevelopment rates.

41 A spring has been identified within the proposed SMA (refer Figure 3). This spring's flow splits downstream of the spring; part of the flow is diverted along a waterway into the neighbouring lot (65 Northbrook Road) and is then conveyed to the existing 2.4 m x 1.2 m box culvert on Northbrook Road. The other downstream flow path is along the development boundary and into the vegetated open swale along Northbrook Road (Refer Figure 3). Initial design has indicated that the development of the SMA can be arranged to ensure that the basins are appropriately setback from this spring in order to ensure it is safeguarded.

Proposed flood management features

- 42 From a flood management perspective, development in accordance with the revised-SER-would likely comprise:
- (a) Offsite flood flows from the Cam/Ruataniwha River up to the 200-year ARI local and Ashley River breakout events contained within the Cam /Ruataniwha River and the adjacent green esplanade reserve. Alternatively, some of the flows may be re-directed through the roading network to the SMA as part of the development design (this would be confirmed through flood modelling).
 - (b) Local overland (secondary) flow paths up to the 50-year ARI would be directed via the roading network and swales to the development's SMA.
 - (c) Freeboard would be provided for the finished floor level of all structures as required by NZ Building Code and the Waimakariri District Council Engineering Code of Practice.
 - (d) Comprehensive flood modelling will be undertaken to ensure the outcomes discussed above are achieved.

Proposed raising of the Site

- 43 Lastly, the geotechnical evidence of Mr Kupec outlines that the southern portion of the Site would be raised by approximately 1m as part of the subdivision development process.

STORMWATER ASSESSMENT

- 44 Stormwater generated from future residential lots and the road network within the Site would be directed to the development's stormwater reticulation network which would convey flows to the SMA shown on the revised SER-ODP for attenuation, treatment, and discharge downstream into the downstream North Northbrook waterway and the Cam/Ruataniwha River. The SMA shown in the revised SER-ODP has been sized according to the requirement for treatment outlined in the guidance provided by Christchurch City Council; *Waterways, Wetlands and Drainage Guide, Ko Te Anga Whakaora mō Ngā Arawai Rēpō*. The SMA will be managed to ensure that hydraulic neutrality is achieved for the development site i.e., post development stormwater runoff flows do not exceed pre-development stormwater runoff flows for the 100-year ARI event based on HIRDS V4, with RCP 8.5 2100 climate projections.
- 45 Sub-catchment first flush basins have been sized to treat 25mm rainfall depth for each of the individual sub-catchment areas.
- 46 Sub-catchment attenuation basins have been initially sized based to capture the full hydrograph for the 18-hour duration of the 50-year ARI event based on HIRDS V4, with RCP 8.5 2100 climate projections. This volume is likely to significantly overestimate the volume required to achieve the pre-development flow rates. The actual volume and outlet configuration will be confirmed during the detailed design phase. The communal wetland has been sized to provide a residence time of 2 days and an operating depth of 0.25m.
- 47 Discharge from the communal wetland into the vegetation lined swale along Northbrook Road (refer Figure 3 and Figure 9) will not exceed pre-development discharge rates. Additionally, the existing downstream flow split at the location of the existing 1.2m x 2.4m box culvert (refer Figure 9, Figure 10 and Figure 11), will be maintained. This will ensure that all post development downstream discharge effects will be mitigated.

- 48 The hydraulic capacity and gravity conductivity of the SMA basins and wetland will be carefully considered in the determination of the appropriate development levels and the required filling on site particularly in the context of the site's high groundwater table.
- 49 Overall, the stormwater management can be designed to ensure stormwater neutrality for the proposed residential development.

STORMWATER QUALITY

- 50 The Site currently supports open pasture grazing and baleage. No existing stormwater treatment facilities are apparent and therefore stormwater runoff from the undeveloped Site is expected to contain contaminants associated with these activities, including nutrients and sediment. Currently untreated stormwater runoff from the Site is discharged into the vegetation lined swale along Northbrook Road which then conveys the flow to the downstream North Northbrook waterway and the Cam/Ruataniwha River.
- 51 The first flush and attenuation basins and the communal wetland facility proposed as part of the Proposal would comprise a treatment train that will provide primary and secondary treatment to remove contaminants before discharging it into the vegetation lined swale along Northbrook Road which then conveys the flow to the downstream North Northbrook waterway and the Cam/Ruataniwha River. The treatment provided by the SMA associated with the proposed development is expected to substantially improve the quality of the stormwater runoff from the Site.

FLOOD MANAGEMENT ASSESSMENT

- 52 As discussed above, in both the modelled 200-year ARI flood scenarios (200-year ARI Localised Flood Depth and the 200-year Ashley River Breakout event), a portion of the Cam/Ruataniwha River breaks out of the south (true right) bank of the river and flows southeast overland across the development site (Refer Figure 5, Figure 6 and Figure 7). Previous flood modelling has indicated that this breakout overland flow is approximately 1.0 m³/s, which is about 9% of the overall 10.5 m³/s flow of the Cam/Ruataniwha River.
- 53 In-depth flood modelling has not been completed for the proposed development. Comprehensive flood modelling will be completed as part of the engineering design and will confirm the flood outcomes discussed below. The

outcomes from this modelling will be filed as supplementary evidence in due course.

- 54 It is anticipated that detailed design for development of the Site would look to retain the Cam/Ruataniwha River breakout overland flow (refer Figure 5) within the Cam/Ruataniwha River's overbanks i.e., directing the breakout overland flow back into the Cam/Ruataniwha River. This would mean that the additional flow from the breakout overland flow which would otherwise be overland flow traversing the Site, would now be conveyed within the esplanade reserve which makes up the overbanks of the Cam/Ruataniwha River. It is likely that the filling outlined in paragraph 43 to raise the Site would result in the redirection of the breakout overland flow into the esplanade reserve already, however localised grading within the esplanade reserve may still be required to ensure flows are not impounded. At this high-level stage, no work is anticipated to be required within the bed of the Cam/Ruataniwha River to increase its capacity.
- 55 If modelling indicates that retaining the breakout overland flow in the Cam/Ruataniwha River will not have an adverse effect on downstream properties, then the Site will be graded to retain this flow within the Cam/Ruataniwha River. If flood modelling indicates that retaining the additional flow from the breakout overland flow within the Cam/Ruataniwha River would result in adverse effects on downstream properties, then the design would look to route the breakout overland flow south through the SMA. It would then be discharged into the vegetation lined swale along Northbrook Road which then conveys the flow to the downstream North Northbrook waterway and the Cam/Ruataniwha River. Refer Figure 14 below for an overview of these methodologies.

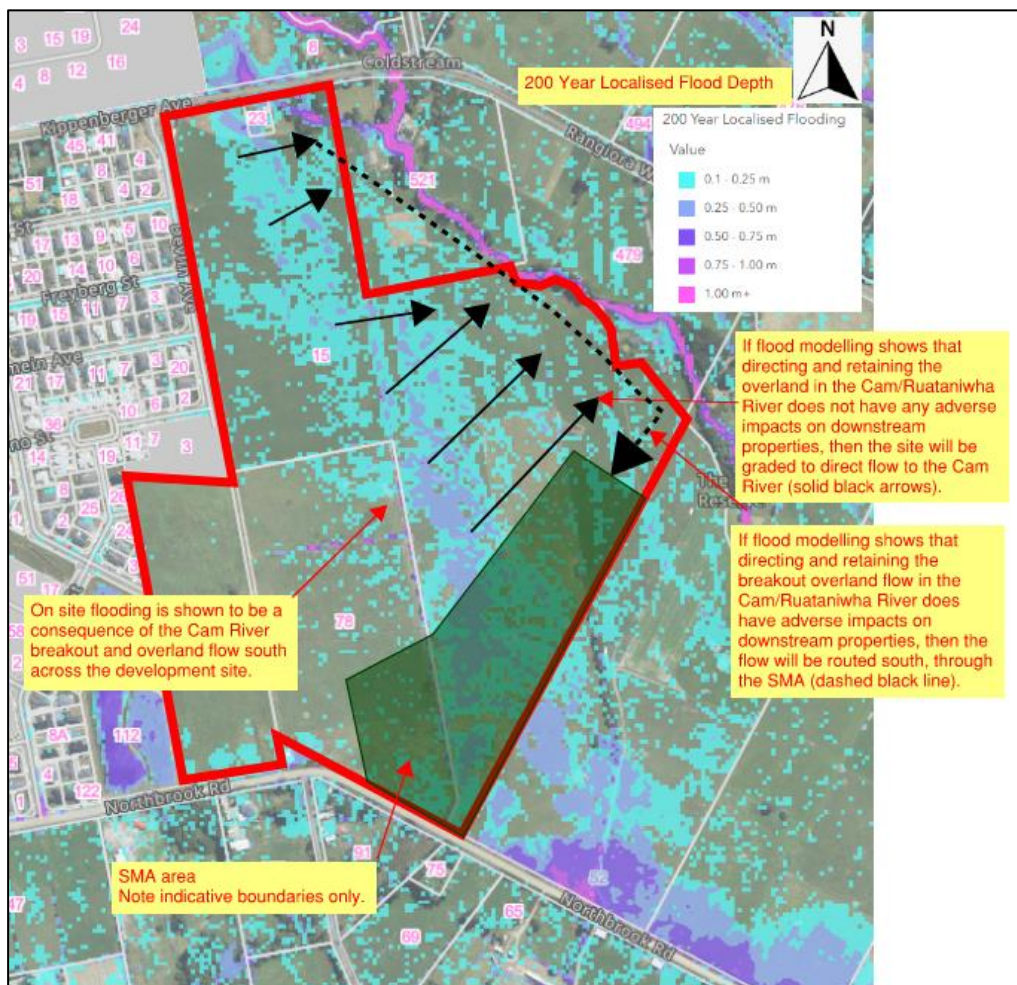


Figure 14 Modelled onsite flooding depth for Bellgrove South based on a 200-year localised flood event (Ref.: Waimakariri District Council Natural Hazards Interactive Viewer, 2024) with proposed methodologies for either directing to, and retaining overland flow in the Cam/Ruataniwha River or, for routing the overland flow along the proposed Cam/Ruataniwha River esplanade and to the SMA.

56 Overall, the future design of development of the Site will seek to manage overland flow paths in a manner which does not adversely impact future residential development or the surrounding properties.

GROUNDWATER RESURGENCE

57 A detailed groundwater study which establishes an understanding of groundwater resurgence for this site, has not been undertaken.

58 Based on discussions with WDC⁵ it is understood that WDC do not have any information indicating groundwater resurgence being an issue on this site since

⁵ Meeting with Chris Bacon, Network Planning Team Leader, Waimakariri District Council, Wednesday, 27th March 2024

they generally hold this information only for residential sites and this site is an existing farmland.

59 Environment Canterbury have provided information ⁶ which indicates that groundwater depth modelling at 2 wells within 0.3 km and 1.7 km of the development site, indicates some correlation with groundwater resurgence and high precipitation events. Environment Canterbury note these readings could be influenced by the underlying clay layers in the area.

60 Therefore, at a high level based on the information on hand, it is not anticipated that the Site has any groundwater resurgence issues, but this will be further investigated and confirmed as part of detailed design prior to subdivision.

RELEVANT PLANNING PROVISIONS

61 Section 6 'Matters of National Importance' of the Resource Management Act (RMA) outlines that the use and development of land shall recognise and provide for the management of significant risks from natural hazards.

62 In addition, Section 106 of the RMA enables consent authorities the right to refuse to grant a subdivision consent if it considers there is a significant risk from natural hazards.

63 Lastly, the Canterbury Regional Policy Statement (**CRPS**), Chapter 11 outlines that new subdivision, use and development is to be avoided where it increases the risk of natural hazards to people, property and infrastructure (or where avoidance is not possible, risks minimised) (Objective 11.2.1). The CRPS has a number of policies related to high hazard areas which for flood hazards it defines as *flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1 or where depths are greater than 1 metre, in a 0.2% annual exceedance probability flood event*. Specifically in relation to this I consider that the Site and Additional Land area are not located within a high flood hazard area. I note that the WDC 200 Year Flood Map identifies high flood hazard risk (which none of the Site or Additional Land area has been identified as being subject to) this does not use the same definition for high flood hazard as the CRPS. Despite this, I note that

⁶ Email correspondence from Karalee Connell (Environment Canterbury) to Cecylia Karcz (Aurecon), 2 April 2024

the depth of flow within the Site and Additional Land area is less than 500mm, and it is extremely unlikely that the velocity in this area exceeds 2m/s required to result in a dxv (depth x velocity product) hazard over 1.0.

ADDITIONAL CONSIDERATIONS

64 Additional flood hazard modelling based on the indicative earthworks design levels for MRZ development of the site will be undertaken in the next few months. This will cover both flood hazard and displacement effects arising from proposed filling of the site (up to 1 m in southern sections). This will be filed as supplementary evidence in due course.

CONCLUSION

65 Based on the level of information available, it is my opinion the proposed RMZ zoning sought by Bellgrove for the Site can be supported from a stormwater and flood management perspective and there are no significant issues precluding development. Stormwater management for the proposed development can be managed in a way that mitigates its impacts using primary and secondary treatment and attenuation facilities. There are multiple alternatives for managing overflow from the Cam/Ruataniwha River that do not adversely impact future residential development or the surrounding properties. More in-depth flood modelling work will confirm the final design required to achieve this outcome. The outcome from this modelling will be filed as supplementary evidence in due course.

66 Thank you for the opportunity to present my evidence.

David Patrick Delagarza
30 April 2024

ATTACHMENT 1 – REVISED SER-ODP

**ATTACHMENT 2 – CONCEPT STORMWATER TREATMENT LAYOUT FOR
BELLGROVE SOUTH**