## Appendix 5: Flood Hazard Assessment

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Trices Road Rezoning Group
C/O Fiona Aston
Aston Consultants
PO Box 1435
Christchurch, 8140

Attn: Fiona Aston

Dear Fiona,

# Trices Road Rezoning Group – Flood Hazard Assessment

e2Environmental Ltd (e2) have been engaged by Trices Road Rezoning Group to assess the Flood Hazard and appropriate mitigation to support the proposed Plan Change development of 28.7 hectares of land bounded by Trices Road, Birchs Road and Hamptons Road, in Prebbleton.

The flood hazard and anticipated mitigation have been assessed against the proposed District Plan and associated Selwyn District Council (SDC) flood maps which are expected to come into effect in 2022.

## Flood Hazard

Review of the SDC Flood Maps[1] confirms that the site is not subject to:

- coastal flooding,
- flooding from the Waimakariri River,
- flooding from the Selwyn River.

There are no local waterways / water bodies within the site boundary and the only source of flooding is therefore pluvial flooding which occurs when the land can't absorb rainfall and excess water either runs off or ponds.

1 https://ecanmaps.ecan.govt.nz/portal/apps/webappviewer/index.html?id=57c74073c2f14a85ac0caf30073ae48a

In terms of the proposed District Plan the site is classified as being within the 'Plains Flood Management Overlay'.

Figures A1 and A2 in Attachment A provide an overlay of the current proposed masterplan and the 1 in 200 (0.5% AEP)[2] and 1 in 500-year (0.2% AEP) pluvial flood depths.

From review of the overlays it can be seen that:

- In both the 200-year and 500-year rainfall events there are:
  - o significant areas of the site that are free from flooding.
  - o significant areas of the site where the flood depth is < 200 mm.

- apart from isolated pockets of localised ponding there are three preferential overland flood flow paths (local drainage routes) through the site.

- Flood depths in the preferential flood flow paths (localised drainage routes) are typically < 500 mm.

- In the 200-year event, flooding > 500 mm depth is limited to a very small isolated area near the eastern boundary. The maximum flood in this area is 0.63 m

- In the 500-year event there are a few very small isolated pockets of flooding > 500 mm, the largest of these is again a small area near the eastern boundary where the maximum flood depth is 0.74 m.

The flood flow paths (localised drainage routes) are confirmed by review of the lidar (Figure 1 below).

*Figure 1 – Lidar & Local Drainage Routes*


[2] Annual Exceedance Probability, i.e. the probability that the event will be exceeded in any given year.

SDC were approached to confirm the flood hazard within the site (where the site flood hazard is assessed as being the flood depth measured in meters x flood velocity measured in meters / second). A high hazard area is defined in the proposed District Plan as being an area where the pluvial flood hazard is > 1.

The SDC flood hazard overlay (Figure A3 in Attachment A) shows that the majority of flooding for the 1 in 500 year event with RCP8.5 Climate Change allowance[3], within the site, has a flood hazard of <0.2. The overlay shows only one isolated pocket of flooding near the northern boundary where the flood hazard increases to 0.3. The site flood hazard is therefore classified as low for infants and small children and all adults.[4]

## Defences against Water

The site is not located within proximity to any existing flood defences / stop banks and as such the proposed development will not effect any existing defences against water.

## Flood Mitigation

In accordance with the proposed District Plan (Natural Hazards - Policy 12) the site earthworks would be undertaken to ensure that the off-site flood hazard was not exacerbated as a result of the proposed development. It is considered that this would involve maintaining the three preferential overland flood flow paths through the site. It is anticipated that, where possible, the overland flow paths would be aligned to follow the road network.

Review of the indicative ODP overlay (Figures A1 and A2) shows a reasonable correlation between the proposed road network and existing preferential flow paths. Limited areas of overland flow are expected upstream and downstream of the road network to collect flows into the road network and to discharge them in a manner that mimics the existing situation. It is expected that development within these areas would be managed by formalising the overland flow route (if possible), setting finished floor levels, maintaining ground levels, requiring permeable fencing etc and possibly consent notices to maintain and protect the existing flood flow routes. The post development preferential flow paths would be identified and protected through the planning process.

It is considered that managing flood flow paths through the site in this manner would allow development (which may include raising ground levels / impermeable house foundations) outside of the flood flow paths without exacerbation of the offsite flood hazard.

The assessment shows that there are no areas of high flood hazard within the site boundary which would be inappropriate for development.

In accordance with the Proposed District Plan (Natural Hazards - Policy 10) all future residential dwellings would be provided with Finished Floor Levels set 300mm above the 200-year flood event, noting that the proposed District Plan provisions may alter through the submission and decision making process.

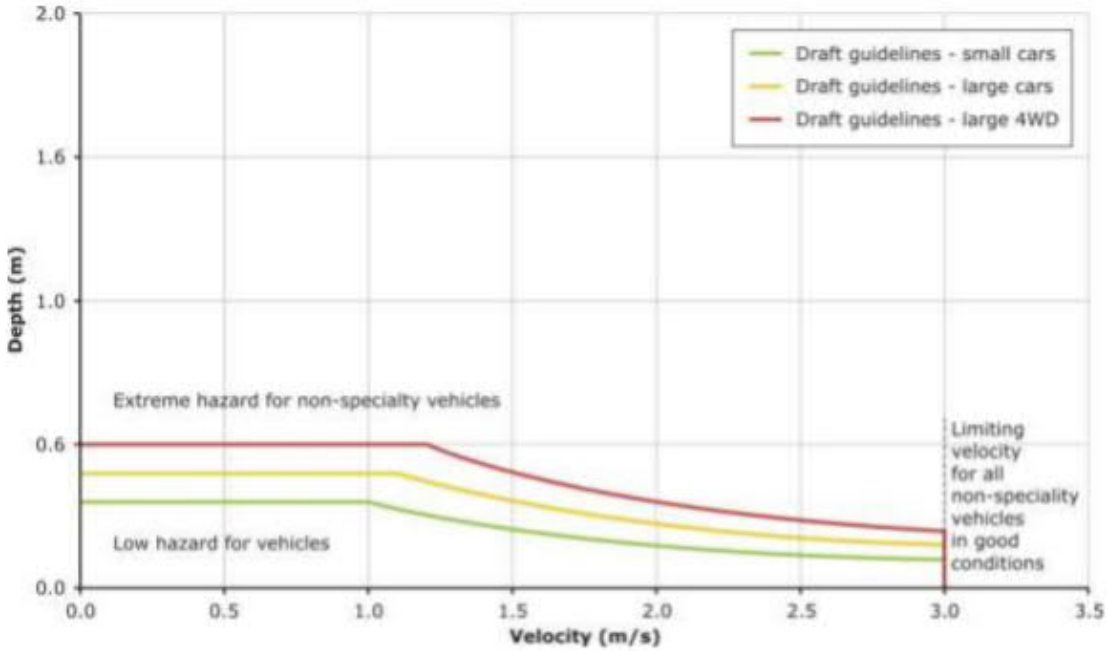
It is also important to consider access / egress to and from the site during flood events and as such the road network should be designed to be free from inundation during a 5-year (20% AEP) event and be passable in a 10-year event. Although it is anticipated that the 3 preferential flood flow paths will be maintained through the site using the road network it is considered that:

1) Constructing preferential flood flow paths through the site will allow the on-site flood hazard to be managed,

[3] The flood modelling assumes rainfall related to the worst-case climate change emission scenario Representative Concentration Pathway (RCP 8.5).
[4] DHI Regional Policy Statement Modelling for Selwyn District Council – District Plan, November 2019, Figure 5-1, pg. 13

2) The low flow hazard suggests that velocities are low which implies therefore that the 1 in 200 year and 1 in 500-year flood flow depths for the majority of the site (< 200 mm) would not present a hazard to small cars and site flood depths up to 600 mm depth (almost all of the site) would not present a hazard to emergency vehicles.[5]

*Figure 2 – Flood Hazard to Vehicles*




Source: Modelled after Shand et al. (2011)

Proposed District Plan Natural Hazards - Policy P11, which relates to the location of residential dwellings between a waterbody and any defence against water is not considered to be applicable to this development.

## Conclusion

It is the conclusion of this assessment that the site flood hazard as identified within the SDC Flood Maps could be fully mitigated during the detailed design and subdivision process to allow the development of the Trices Road Rezoning Group Land for residential purposes.

Yours sincerely

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[5] Australian Institute for Disaster Resilience, (2012). Technical flood risk management guideline: Flood Hazard, Guideline 7-3, Figure 9.

## Attachment A Flood Overlays

***Figure A1 – 1 in 200-year pluvial flooding***

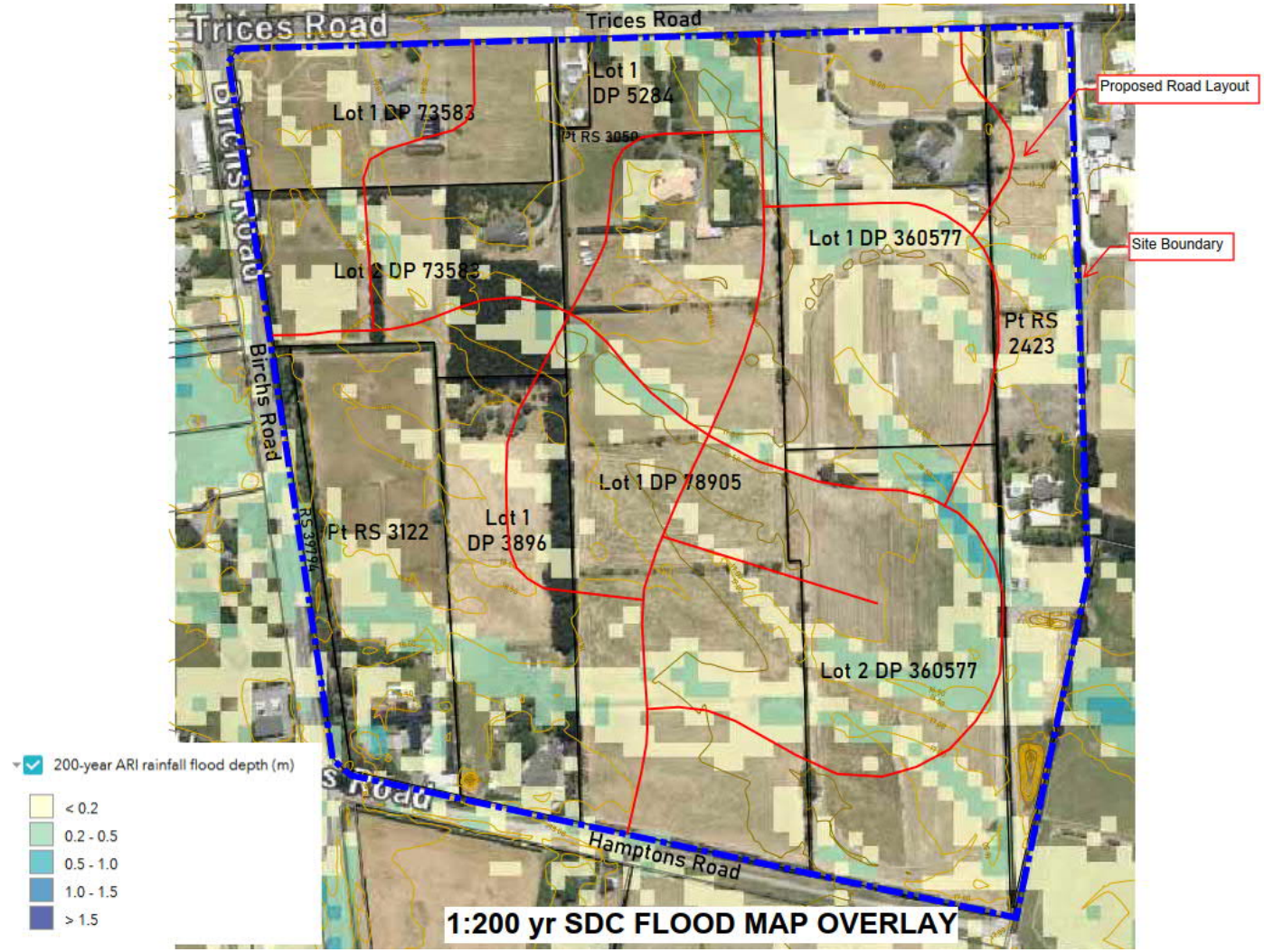

***Figure A2 – 1 in 500-year pluvial flooding***

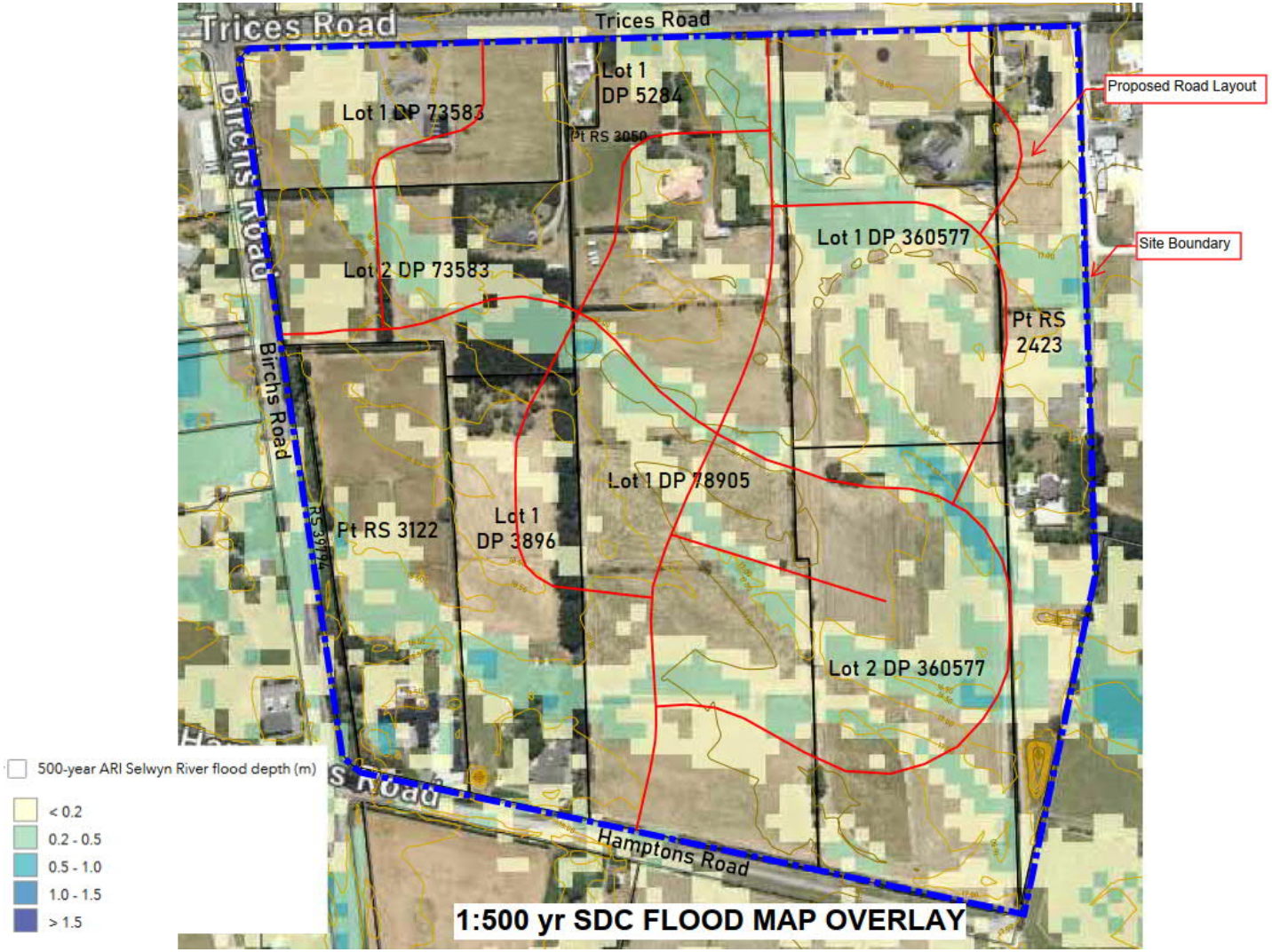

***Figure A3 – 1 in 500-year Flood Hazard***