Before the Selwyn District Council

under: the Resource Management Act 1991

in the matter of: Proposed Private Plan Change 69 to the Operative District Plan: Lincoln South

and: **Rolleston Industrial Developments Limited**
Applicant

Statement of Evidence of Eoghan O'Neil (Flooding / stormwater)

Dated: 4 November 2021

Reference: JM Appleyard (jo.appleyard@chapmantripp.com)
LMN Forrester (lucy.forrester@chapmantripp.com)

chapmantripp.com
T +64 3 353 4130
F +64 3 365 4587

PO Box 2510
Christchurch 8140
New Zealand

Auckland
Wellington
Christchurch

chapman tripp

STATEMENT OF EVIDENCE OF EOGHAN O'NEILL

INTRODUCTION

1 My full name is Eoghan Michael O'Neill.

2 I am a Technical Director with Pattle Delamore Partners Ltd and have been employed in that capacity since October 2012. I am a Chartered Professional Engineer with approximately 20 years' experience in the planning and design of wastewater, water supply and stormwater infrastructure. I hold Bachelor of Engineering and Master of Engineering Science degrees awarded by University College Dublin. Much of my experience is related to the planning of infrastructure to facilitate development. I have prepared and presented evidence to Plan Change Hearings, Resource Consent Hearings and the Environment Court on numerous occasions. I have performed this role both as a Council employee and as a consultant on behalf of applicants. I am familiar with the plan change application by Rolleston Industrial Developments Limited (*the Applicant*) to rezone approximately 190 hectares of land on Springs Road, Lincoln to enable approximately 2000 residential sites and a small commercial zone.

3 I have been asked by the applicant to review the stormwater and flooding assessments for the Plan Change 69 (PC69) area which have been carried out to date by Inovo Projects Ltd and e2 Environmental Consulting Ltd.

CODE OF CONDUCT

4 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 7 of the Environment Court Practice Note 2014. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

5 My evidence will deal with the following:

5.1 A review of the Infrastructure Report prepared by Inovo Projects, as it relates to stormwater and flooding, including the appended Stormwater Concept Design Report prepared by e2 Environmental Consulting Ltd.

5.2 A review of the "Outline Development Plan (ODP) – Lincoln South" (April 2021) (the ODP) as per Attachment 4 of the Private Plan Change request (Amended application 7 April 2021).

5.3 A review of the Land Engineering Report prepared by Mr Tim Morris, as it relates to stormwater infrastructure and flooding.

5.4 Provide commentary on the conclusions and recommendations of the Section 42a Report as it relates stormwater and flooding.

5.5 Provide recommendations for further work to inform the subdivision design of the PC69 area.

SUMMARY OF EVIDENCE

6 My evidence below addresses a number of concerns identified during my review of the stormwater and flood assessments carried out in preparation of the PC69 application. A number of these concerns have also been raised by submitters and the Section 42a report.

7 The appropriateness of the modelling relied on for the assessments has been discussed. It is my opinion that the SDC flood hazard model which has been relied on for stormwater and flood assessments is not fit for the purpose of delineating flood extents across much of the PC69 area. These activities are outside of the intended scope of the model construction. Nevertheless, the SDC model is still a valuable source of flood information and indicative areas of flooding and overland flow.

8 Based on an assessment of historical flood information of the PC69 site and the SDC model results, I cannot support the proposed Living X zone which has now been removed from the Plan Change ODP. Additional working has also been added to the ODP to ensure *"Development within the ODP area shall be designed to account for the effects of floodplain filling and this may dictate subdivision construction methodology and minimum floor levels and mitigation to avoid effects from floodwater on third parties".*

9 It is my opinion that more detailed and validated site-specific modelling is required to appropriately locate SMA infrastructure, accurately predict flood depths across the Plan Change site, assess mitigation options for filling of areas subject to inundation and assess appropriate floor levels of future development within the site. This modelling will need to consider a range of storm events such as the 20% AEP, 5% AEP, 2% AEP and 0.2% AEP storm intervals. This modelling would need to be carried out prior to any subdivision consents being granted to develop land within the Plan Change Area. The modelling will also need to incorporate new topography for the subdivisions to the north of the Plan Change area and latest climate change predictions including rainfall and extreme tide predictions.

10 I consider that development of the proposed Living Z zone in the ODP is appropriate subject to further modelling being carried out prior to subdivision to appropriately locate the SMA's, set appropriate floor levels for building and assess mitigation options. I believe it is appropriate for this modelling to be carried out prior to the consent application for subdivision stage with SDC and prior to the consent application for stormwater discharge with ECan. Through proposed changes to the ODP, these applications will be required to demonstrate to the consenting authority (SDC) that the proposed development meets stormwater objectives and does not result in adverse effects to third parties. Therefore, I conclude that this further modelling is not integral to the decision making of the Plan Change process.

EVIDENCE

Infrastructure Report

11 The Infrastructure Report prepared by Inovo Projects Ltd details the proposed stormwater treatment and flood management proposed for the future development of PC69 along with some commentary on potential for flood inundation on the site.

12 The PC69 site is bounded by Collins Rd to the south, Ararira/LII River to the east, the existing urban edge of Lincoln to the north and an unnamed drain to the west. Springs Rd bisects the PC69 site and separate drainage networks to the west and east of Springs Rd currently drain the site to the Ararira/LII River. The site generally slopes in a northwest to southeast direction with the highest land being approximately 11.9 m NZVD (2016) sloping to approximately 2.9 m NZVD (2016) elevation at its lowest point in the south east of the Plan Change area. The area west of Springs Rd drains to a drain which runs southwest along Collins Road before connecting with a larger drain that follows Sergeants Road until it enters the Ararira/LII River approximately 3.4 km downstream from the site. The area to the east of Springs Rd drains to the Ararira/LII River via three primary drainage features, the Lincoln Main Drain towards the north of the site, Springs Creek which flows west to east across the centre of the site and Collins Rd Drain which flows west to east along Collins Rd at the southern site boundary.

13 The Infrastructure Report describes that stormwater will be managed within two catchments, East and West, being those areas east and west of Springs Rd. The low permeability of the soils at the site are not conducive to discharge of stormwater to ground, therefore the proposed discharge for each catchment is ultimately to the Ararira/LII River. Stormwater Management Areas (SMA's) are proposed to be constructed at the downstream end of each catchment with stormwater treatment and attenuation proposed to be provided in accordance with the Wetlands and Waterways Design Guide (WWGD) published by Christchurch City Council.

14 Appendix A of the Infrastructure Report details a Stormwater Concept Design Report prepared by e2 Environmental which provides a high-level analysis undertaken for the concept design of the required SMA's. This report details the design philosophy for the SMA's and presents conceptual sizing of the proposed treatment and detention facilities. This includes first flush basins to retain the first 20mm of rainfall in each catchment, treatment wetlands to treat the first flush for each catchment and detention basins to retain stormwater and maintain hydraulic neutrality between pre- and post-development flows up to the 2% Annual Exceedance Probability (AEP) event.

15 The conceptual sizing of the SMA infrastructure is noted to be high level and I consider that the approach taken to size the various components, and the assumptions used, are appropriate for the Plan Change stage of the process. The proposed treatment train is consistent with best practice for residential stormwater treatment and, once properly designed and constructed, should provide a high level of treatment for stormwater runoff from the proposed development, both in terms of quantity and quality. Critically, I do not consider it is necessary to fully flesh out the design of the stormwater treatment train. It is my opinion that the appropriate stage to do this is at the resource consent stage which will need to be lodged with ECan prior to construction. I consider that the concept plan from e2 Environmental demonstrates that there is a feasible solution for stormwater treatment, both in terms of quality and volume. I will discuss this further in Section 31 of my evidence.

16 The proposed Plan Change area is located next to the Ararira/LII River and is subject to inundation of floodwaters from the Ararira/LII River during storm events. The Infrastructure Report includes estimates of the depth of flooding at the site resulting from a 0.2% AEP storm event. The flood level information presented is noted to be based on data from *"Selwyn District Council, 2019, Selwyn's flooding and coastal hazard mapping, retrieved October 12, 2020 from https://apps.canterburymaps.govt.nz/SelwynNaturalHazards map information"* (SDC Model).

17 To review the appropriateness of the flood management assessment detailed in the Infrastructure Report, it is first important to understand the modelling data on which the assessment has been based. The SDC Model was developed by Danish Hydraulic Institute (DHI) Ltd to provide a basis for district wide flood hazard mapping in the Selwyn District.

18 The SDC model takes a district wide "rain on grid" modelling approach to model extreme storm events in the Selwyn District. "Rain-on-grid" involves directly applying rainfall to a hydrodynamic surface-flow model, which accounts for infiltration and surface roughness. The SDC model was used to model surface flows during

0.5% and 0.2% AEP events for the RCP8.5 and RCP4.0 climate change scenarios. Sea level rise was also taken into account and ECan provided an estimate for the water level at Te Waihora. Land elevations in the model were represented by a 10m by 10m grid which was derived from various LiDAR sources. The model was not modified to allow for flow though culverts under major roads or the high overflow point of roads and the railway line. This approach is typical in the industry when preparing a rapid flood hazard assessment and is considered appropriate for large return period events when infrastructure is often overwhelmed and conveyance is dominated by secondary flow paths. Surface roughness was represented by Mannings friction loss defined at a 10x10 resolution. Land cover spatial variation was derived from the landcover database managed by Landcare Research and a Mannings Roughness was applied to each land use.

19 The model report notes that model was validated using the July 2017 storm event and that this stage of the modelling was carried out in close collaboration with Environment Canterbury (ECan). It is noted in the DHI model report that *"after considerable effort to improve the model performance ECAN agree (email 31 Oct 2019) that the model is suitably validated and can be used to make flood hazard related predictions".*

20 A number of limitations are listed in the report, notably that the 10m by 10m grid is rather coarse and that "only some calibration/validation has been carried out for the July 2017 event and no other storm events were assessed". With respect to the use of the model data at PC69 it is noted that land topography to the north the PC69 site has been altered significantly through the development of Te Whāriki subdivision and other developments. This development will not be accounted for in the SDC model as the land was developed after the capture of the LiDAR data.

21 This may have an impact on the inundation predicted on the higher parts of the site as a result of diversion of overland flows from north of the Plan Change area. However, given the gradient of the site is relatively steep (1 in 200) in this location, I don't expect that the diverted overland flow paths would create a new high flood hazard classification. Overland flows will ultimately discharge to the Ararira/LII River, either through the PC69 site or elsewhere. I would expect that the volume of water in the flood plain to the south east of the site remain similar. The flood extent of the ponding area in the south east of the site is therefore expected to remain relatively unchanged and the flood high hazard prediction would remain the same.

22 The SDC model has been deemed suitable by ECan for use as a district wide tool to predict high flood hazard areas. High hazard areas are defined in the Canterbury Regional Policy Statement

(CRPS) as land with flooding deeper than 1m depth in the 0.2% AEP event or land with a depth (m) x flow (m/s) greater than 1 m2/s. A High Hazard Area has been identified within the PC69 site. It is located in the southeast portion of the site and approximately follows the 3.2m elevation contour. Land within this high hazard area is not suitable for residential development in accordance with the requirements of Policy 11.3.1 of the CRPS. Additionally, depending on the frequency of inundation, it is also potentially unsuitable for the location of SMA's.

23 Following a review of the DHI model report, I concur with ECans opinion that the model is appropriate for assessing flood hazard and furthermore, I consider it is appropriate for assessing flood hazard for the PC69 site. It is my opinion the model is a district wide flood hazard identification tool and is not intended, or suitable, for the purpose of assessing floor level requirements, effects of floodplain filling or effects of mitigation. Whilst it provides a valuable set of data which can be used to consider flood risks and inundation potential across the district, it should not be used to as a basis for estimating the extent of shallow flood inundation across the site. As a general comment, for the PC69 site, I consider the SDC Model to be more accurate for assessing the extent of ponding area next to the Ararira/LII River and less accurate for the delineation of flood extent associated with overland flow paths. It is my opinion that the SDC model is not sufficiently developed or validated to accurately assess floor level requirements, effects of floodplain filling or effects of mitigation across the Plan Change area.

24 Figure 1 attached to this evidence shows the extent of the ponding area as indicated by the SDC model for 0.2% AEP event and the 0.5% AEP event. The overall ponding area is indicated to flood to depths of 1 – 1.5 m at the south-eastern end of the site during a 0.2% AEP event with flood waters generally extending to a maximum level of approximately 4.2 m elevation NZVD. There is very little difference in flood extent predicted between the 0.2% AEP and the 0.5 % AEP. This is due to the connectivity of this ponding area to a very large flood plain which requires very significant changes in volume to achieve small changes in level. Figure 1 also delineates the approximate flood extent observed through historical aerial photographs of flooding on the site during storm events in 1986 and 2013.

25 The 1986 storm event, which resulted in a larger flood inundation area has been assessed as being approximately a 10% AEP event based on historical rainfall data for the area. This data has been derived from the Lincoln rainfall recorder available from the NIWA cliflo site. When accounting for climate change, this event would be considered between a 20% AEP and a 50% AEP event. The estimated extent of the 1986 flood area is approximately the same

as the flood high hazard area predicted by the SDC model with an approximate water elevation of 3.2 m NZVD 2016.

26 The ODP submitted with the application proposes the location of a "Stormwater Management" area within the high hazard area. The first flush basins and detention basins of the SMA's should typically be located close to or above the 2% AEP flood level to ensure effective treatment can be provided in the design event. The wetlands can be located within the 2% AEP inundation area provided that the flood level over the wetland base water level is less than 0.5m depth and is not derived from development runoff i.e. the storage over the wetland is part of the flood plain and not for the purposes of site stormwater attenuation. Based on this, I don't consider that the SMA indicated in the eastern part of the ODP is suitably located. The SMA, particularly the first flush basins and detention storage, will need to be located closer to or above the 2% AEP flood extent. In order to drain stormwater to this SMA, any residential development will also need to be higher than the 2% AEP. Given that the stormwater treatment system will require resource consent from ECan, I consider that it is appropriate to identify the exact positioning of the stormwater system during this consenting process. It's ability to perform to its optimum level will be dependent on being appropriately located and this will be a matter for assessment as part of the discharge consent application. I address this further in Section 31. On this basis it is my understanding that the "Stormwater Management" area in the eastern part of the ODP has been relocated to be above the 3.5 m contour which I believe is appropriate, subject to further modelling at the time of subdivision.

27 The "Living X" zone is proposed to be located in the balance of the 0.2% AEP ponding area up to the 4m contour. The Infrastructure Report notes the following with respect to this Living X zone, "*Areas of the site below the RL 4m contour line can potentially be developed as larger residential lots subject to setting minimum building platform levels and allowing part of these lots to flood in extreme events."* Given that that residential development in the Living X zone would need to be located above the 2% AEP flood level, it is not possible to say with certainty that all or any or the Living X area would be able to be developed. Assessment of historical rainfall would suggest that this ponding area is inundated to the 3.2m contour during a 20% AEP with climate change added. A conservative range, based on a floodplain volume assessment, would suggest that the likely ponding extent in this area for a 2% AEP with climate change is somewhere between the 3.7m contour and the 4m contour which leaves little available developable land even at the more conservative estimate of 3.7m elevation. The SDC model is not suitable for determining accurately the 2% AEP extent, therefore without new fit for purpose modelling I am not currently able to support residential development within the Living X zone.

28 The Stormwater Concept Design Report prepared by e2 Environmental details flood management options for the site based on an assessment of the flood depths and flow paths predicted in the SDC Model. The e2 report details eight Flood Management Zones "*which require varying levels of engineering design to ensure the overland flow paths and flooded areas are safely managed".* These eight Flood Management Zones are delineated in Figure A1 of the Stormwater Concept Design Report. Table 3 of the report describes the nature of the flood risk for each zone i.e. fluvial ponding from the Ararira/LII River or overland flow path and provides options for management of this flood risk.

29 Of the eight flood management zones indicated on Figure A1 of the report, the majority are associated with overland flow paths originating to the north of the Plan Change area. The location and extent of these flow paths and their associated indicative flooding will likely have changed significantly as a result of the development of the subdivision to the north of the site as this will have diverted many of these flow paths. This is likely to have a positive effect for the Plan Change area, however updated modelling of the site is required to assess this more accurately.

30 The extent of ponding associated with some of these flow paths indicated in the Infrastructure Report will also potentially be exacerbated by the lack of modelled stormwater culverts in the model south of the PC69 area. Updated modelling prior to subdivision will assist with both resolving anomalies associated with the SDC model and informing any mitigations that may need to be implemented through the design of the subdivision infrastructure.

31 It is my opinion that more detailed and validated site-specific modelling is required to appropriately locate SMA infrastructure, accurately predict flood depths across the Plan Change site, assess mitigation options for filling of areas subject to inundation and assess appropriate floor levels of future development within the site. This modelling will need to consider a range of storm events such as the 20% AEP, 5% AEP, 2% AEP and 0.2% AEP storm intervals. This modelling would need to be carried out prior to any subdivision consents being granted to develop land within the Plan Change Area. The modelling will also need to incorporate new topography for the subdivisions to the north of the Plan Change area and latest climate change predictions including rainfall and extreme tide predictions.

32 For the area above the 4 m contour, it is my opinion that flood extents of the 0.2% AEP model are primarily as a result of conveyance of overland flow paths rather than the fluvial flooding present in the southeast corner of the site. Updated site specific modelling will more accurately delineate the extent of these flow paths for the current situation. Through subdivision design, these

conveyance pathways can be managed to ensure that flood waters in extreme storm events do not result in flooding of properties or stormwater infrastructure. In the higher parts of the site, above the 4m contour, it is my opinion that there are sufficient mitigation options available to ensure that this can be managed and addressed at the subdivision consenting stage. To provide confidence to SDC that this will be addressed appropriately at subdivision the following wording had been added to the ODP:

33 *"Development within the ODP area shall be designed to account for the effects of floodplain filling and this may dictate subdivision construction methodology and minimum floor levels and mitigation to avoid effects from floodwater on third parties".*

34 In his evidence, Murray England for SDC notes that the Plan Change area is not included within the SDC global stormwater discharge consent and a site-specific stormwater discharge consent for the development will need to be secured from ECan. Prior to lodgement of a discharge consent application, site specific flood modelling will need to be undertaken in order to identify the appropriate locations for the SMA infrastructure. No subdivision consent can be granted until there is a stormwater discharge consent in place, I therefore consider that there are sufficient controls in place to require this modelling to be carried out as part of the subdivision master planning work prior to lodgement of any subdivision consent.

35 In summary, I don't believe that development below the 4m contour at the site is supported by appropriate modelling to show that effects of flooding can be appropriately mitigated. Development of land above the 4 m contour is appropriate subject to further modelling being undertaken to accurately delineate and manage overland flow paths through the site.

36 I am of the opinion that there are sufficient controls in place to require this additional modelling to be carried out prior to the lodgement of a stormwater consent application to ECan. or a subdivision consent application. With the exclusion of the proposed residential zoning of land below the 4 m contour, I don't consider that this additional modelling is integral to the decision to rezone the PC69 area. I believe that it is appropriate for this work to be done following the completion of the Plan Change process.

RESPONSE TO SECTION 42A REPORT

37 Sections 66 to 73 of the Officers Section 42a (S42a) Report deals with the flooding issues at the PC69 site. The Investigating Officer bases his assessment of the flooding issues on a review of the suitability of the land for development undertaken by Mr Tim Morris of Tonkin and Taylor.

38 In Section 72 of his S42a report Mt Boyes identifies *"two primary matters arising in relation to flooding"*. These are the adequacy of the mapping currently available and the appropriateness of Living X development within an area known to be subject to inundation.

39 I agree with Mr Boyes and Mr Morris that development within the Living zone is not supported by appropriate modelling and should therefore not be rezoned for residential purposes. On this basis, the Living X zone has been deleted from the ODP provisions. I believe the balance of the site, above the 4 m elevation contour, can be developed and any inundation currently indicated in the SDC model can be managed appropriately though conveyance design or compensatory storage which will be more achievable on the higher parts of the site.

40 A new site-specific model will need to be constructed and validated to assist with the subdivision master planning and it is my opinion that it is appropriate for this to be done after the Plan Change process is completed.

41 Sections 109 to 112 of Mr Boyes report deal with the appropriate location of stormwater infrastructure. I agree with My Boyes and Mr Morris that the SMA's should not be located within areas subject to significant and frequent inundation. As described in Section 21 of my evidence, the SMA,'s particularly the first flush basins and detention storage, will need to be located closer to or above the 2% AEP flood extent. The ODP has been updated to reflect this recommendation with the relocation of the SMA to an area between the 3.5 m and 4.0 m elevation.

42 A new updated model will be required to be developed to appropriately locate the SMA's and stormwater infrastructure for subdivision and set floor levels within the Living Z zone. I believe that it is appropriate for this modelling to be done at subdivision planning stage, following the completion of the Plan Change process.

RESPONSE TO SUBMITTERS

43 Submitters Professor Philip Hulme and Kathleen Liberty present evidence showing inundation as a result of sea level rise. This evidence is derived from coastal.climatecentral.org which takes climate change predictions and applies a "bath tub" model to elevation data. A "bath tub" model essentially takes a water elevation and identifies all land below this elevation. It is possible that areas less than a given elevation do not flood (as they are surrounded by high land or flood defences neither of which the

model currently accounts for). There are two key components to this model, the predicted water elevation and the terrain elevation.

44 At the time of writing, I understand that climate central utilises NASADEM terrain data combined with a machine learning algorithm that truths elevation data against LIDAR surveys in the U.S. and Australia. It is unclear how accurate this terrain approximation is for Lincoln.

45 Water elevation predictions are derived from international research. They appear to be updated frequently but at the time of writing, the SLR predictions for Lyttleton appear to be derived from NASA predictions (https://sealevel.nasa.gov/ipcc-ar6-sea-level-projection-tool?psmsl_id=247). For 2030, the SSP5-8.5 scenario, the prediction for sea level rise is 1.14 m for 2120. The SDC model has adopted a SLR of 1.06 m, similar to the NASA prediction..

46 Whilst I consider the coastal.climatecentral.org to be a useful tool, the predictions made by this model at a global scale, are indicative and a more accurate inundation prediction can be made using the latest scientific predictions and data for the Canterbury Region.

47 I consider that the best currently available data source to represent the terrain elevation is provided by LiDAR. This has been captured for the proposed site (and much of the Selwyn Region) in 2016 and 2017. A digital elevation model derived from this LiDAR is available from the Land Information New Zealand website (https://data.linz.govt.nz). The digital elevation model has a resolution of 1 m (i.e., a 1 m by 1 m square (1 m²) is represented by a single elevation value). This resolution is 900 times that of the STRM 3.0 data. I consider that this is the best representation of the terrain surface that is currently available. This is the terrain surface that has been employed in the SDC model as a 10m x 10m grid.

48 Sea level rise predictions specific to New Zealand have been developed by NIWA for various climate change scenarios. I consider NIWA's estimates to be the most appropriate basis for estimating the effects of sea level rise and the impacts of that on the PC69 site. The SDC model has taken climate change related sea level rise into account. The SDC model notes that ""*Te Waihora/Lake Ellesmere and the coast to the South act as the downstream boundaries for the model. A water level time series is applied for Te Waihora/Lake Ellesmere starting at RL 1.1m and increasing to RL 1.8m over a 36 hour period, as recommended by Environment Canterbury. A constant water level of RL 0.67m and RL 1.06 m is applied at the coastal downstream end of the model for the RCP4.5 and RCP8.5 scenarios respectively, as per Ministry for the Environment guidance. These levels account for sea level rise out to 2120."* I note that the MFE guidance referred to in the above statement is informed by NIWA.

49 Any future modelling work for the site prior to subdivision will involve review of the latest available climate change, sea level rise, tidal impact and storm surge information and appropriately apply this to the model.

50 A number of submitters register concern on the effects of floodplain filling for site development. I agree that this will need to be addressed and any adverse effects will need to be mitigated. I consider that this should be addressed at the subdivision consent stage and stormwater consent stage.

CONCLUSIONS

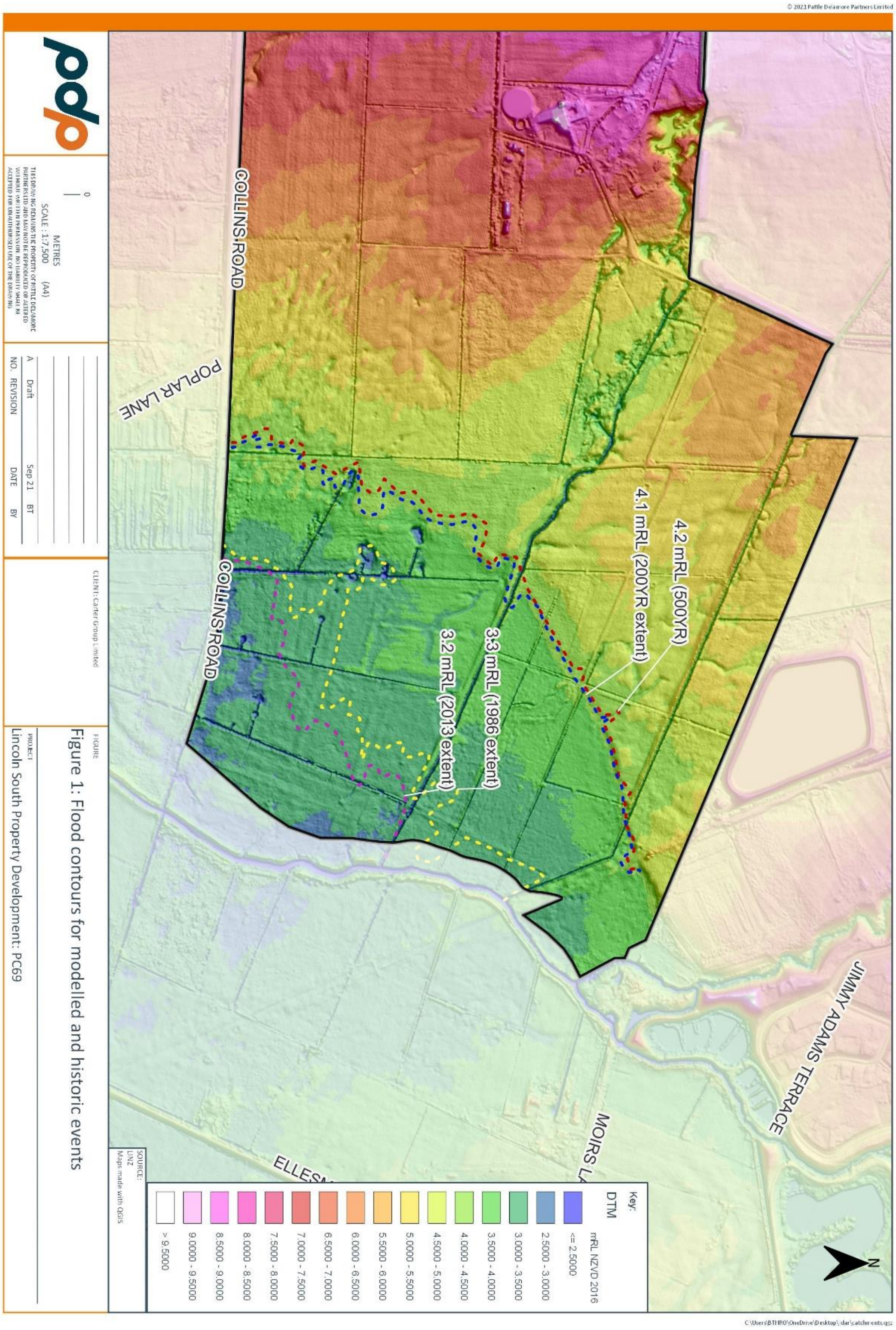
51 In conclusion, I consider that development of the proposed Living X zone in the ODP is not appropriate, and I note that the ODP has been amended accordingly. I consider that development of the proposed Living Z zone in the ODP is appropriate subject to further modelling being carried out prior to subdivision to appropriately locate the SMA's, set appropriate floor levels for building and assess mitigation options. I believe it is appropriate for this modelling to be carried out prior to the consent application for subdivision stage with SDC and prior to the consent application for stormwater discharge with ECan. These applications will be required to demonstrate to the consenting authority (SDC and ECan) that the proposed development meets stormwater objectives and does not result in adverse effects to third parties. Therefore, I conclude that this further modelling is not integral to the decision making of the Plan Change process.

52 I do not consider that development in the proposed Living X zone in the ODP is supported by appropriate modelling and should therefore not be rezoned for residential purposes. I understand the ODP has been updated to reflect this conclusion.

Dated: 4 November 2021

_____

Eoghan O'Neill



© 2021 Pattle Delamore Partners Limited
METRES
SCALE : 1:7,500 (A4)
A Draft Sep 21 BT
NO. REVISION DATE BY
CLIENT: Carter Group Limited
FIGURE
Figure 1: Flood contours for modelled and historic events
PROJECT
Lincoln South Property Development: PC69
COLLINS ROAD
POPLAR LANE
COLLINS ROAD
4.2 mRL (500YR)
4.1 mRL (200YR extent)
3.3 mRL (1986 extent)
3.2 mRL (2013 extent)
JIMMY ADAMS TERRACE
SOURCE:
LINZ
Maps made with QGIS
Key:
DTM
mRL NZVD 2016
<= 2.5000
2.5000 - 3.0000
3.0000 - 3.5000
3.5000 - 4.0000
4.0000 - 4.5000
4.5000 - 5.0000
5.0000 - 5.5000
5.5000 - 6.0000
6.0000 - 6.5000
6.5000 - 7.0000
7.0000 - 7.5000
7.5000 - 8.0000
8.0000 - 8.5000
8.5000 - 9.0000
9.0000 - 9.5000
> 9.5000
N