

IN THE MATTER of the Resource Management Act 1991

IN THE MATTER of Proposed Plan Change 22 to the
Operative Waikato District Plan

STATEMENT OF EVIDENCE OF MICHAEL GEORGE CHAPMAN

THREE WATERS

19 FEBRUARY 2020

1. INTRODUCTION

Qualifications and Experience

- 1.1 My name is Michael George Chapman. I have 20 years of experience as a flood and stormwater engineer in New Zealand, India and the United Kingdom. My career to date has focused on stormwater and flood risk management in both urban and natural environments. I have worked for the private, public and NGO sectors.
- 1.2 I have a Master of Science Degree (Honours) in Hydrology and Freshwater Management from the University of Waikato (1988). I am a Member of Engineering New Zealand (MENG NZ 1032906), the New Zealand Hydrological Society and Water New Zealand.
- 1.3 I currently hold the position of Director – Stormwater Engineer with Te Miro Water Consultants Ltd in Hamilton. I have held this position since 2018. Between 2010 and 2018 I held the position of Principal Engineer at Harrison Grierson Consultants Ltd in Auckland. I have been the lead author and designer for a wide range of stormwater management plans to support plan variations, resource consents and detailed design for land development projects. I have prepared numerous catchment scale flood models, detailed stormwater pipe models and integrated catchment management plans for private sector clients as well as for district and regional councils.

Code of Conduct

- 1.4 I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note 2014. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Involvement in the Project

- 1.5 I was engaged by the Applicant, Builtsmart Property Partnership ("**BPP**"), to be the lead author and designer of the Three Waters Assessment to support the preparation of the Proposed Plan Change 22 ("**PC22**").

Purpose and Scope of Evidence

- 1.6 The purpose of my evidence is to address matters relevant to flood hazard management. My evidence specifically addresses the following matters:
- (a) Description of existing Huntly South ponding area (Section 3).
 - (b) Existing flood risk (Section 4).
 - (c) Residual flood risk (Section 5).
 - (d) Approach to 'level for level' floodplain compensation (Section 6).
 - (e) Wastewater and water supply (Section 7 and 8)
 - (f) Comments on the Council Officer's Section 42A report (Section 9).
 - (g) Conclusions (Section 10).
- 1.7 A summary of my evidence is set out in Section 2 below.

2. SUMMARY

- 2.1 The existing Builtsmart site is in South Huntly adjacent to SH1. The proposed expansion area is located directly to the north of the existing site. As detailed in the

evidence of Ms Fowler, the proposed expansion area is currently zoned Living Zone under the Operative Waikato District Plan ("**Operative Plan**"), with Builtsmart advancing a private plan change to the Operative Plan to re-zone the site to Light Industrial.

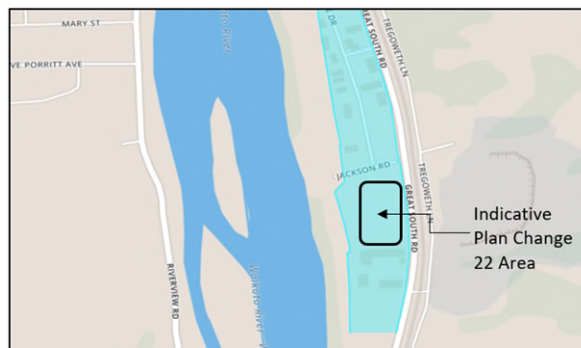
- 2.2 A Three Waters Assessment was prepared to support PC22. The assessment considers flood risk management within the site and off-site, and the potential impacts on the Lower Waikato River Flood Scheme and the Huntly South Ponding Area.
- 2.3 The flood risk assessment is based on providing 'level for level' floodplain compensation. That is to ensure flood storage volume is available at all levels of flooding. The storage area will accommodate ponding during small storm events as well as less frequent but more extreme storm events up to and including the 1% AEP + climate change event.
- 2.4 'Level for level' floodplain compensation is considered nationally and internationally to be a best practice solution for managing the impacts of infilling floodplains to facilitate development. The design will ensure people and property are not put at increased risk of flooding as a result of the development.
- 2.5 The proposed design reconfigures the existing ponding area to provide flood storage within a new basin located in the north of the site to allow development in other areas. The developed parts of the site are also designed to flood once the ponding area exceeds the capacity of the new basin. The site is estimated to flood to a maximum level of 11.8m RL during a regional 1% AEP event + climate change event.
- 2.6 The site could not be feasibly developed if the entire ponding volume was contained in a basin. This would result in minimal area available for development. Therefore, a combined approach was required with storage compensation provided both within a basin and by allowing the site to flood during less frequent storm events.
- 2.7 The proposed development lends itself well to a flood resilient construction and design, in my opinion. The hardstand and house building bay areas will be concrete. Bay sides will be metal post and wall panels (no plaster board) and open on at least one side. Power supply will be fed from the ceiling ducting with sockets positioned at least 1m above the floor level (above the estimated 1% AEP level). As described

in the evidence of Ms Fowler, these matters will be considered in the subsequent resource consent process required should PC22 be approved.

- 2.8 PC22 will result in a land use change from residential living to light industrial. Changing land use from residential to industrial will reduce the residual flood risk inherent in this location in that it is in an area defended from flooding by stop banks adjacent to the Waikato River.
- 2.9 Overall, in my opinion, the proposed flood risk management solutions will mitigate the effects of infilling the existing ponding area by providing 'level for level' floodplain compensation coupled with flood resilient design and operation. The land use change from residential living to industrial will also result in a reduced residual flood risk – that is to reduce further the inherent risk that remains for areas located within flood defended areas.

3. DESCRIPTION OF EXISTING HUNTLY SOUTH PONDING AREA

- 3.1 The Huntly South Assessment 1 is a planning layer within the Operative Plan designed to safeguard flood capacity during high rainfall. The area represents ponding up to the 1% AEP event (Figure 1) which has historically been subject to infilling for development with, at times, limited assessment of the effects on flooding. Therefore, the Waikato Regional Council ("**WRC**") seeks to ensure appropriate investigations are undertaken that not only address loss of flood storage but also the implications of additional impervious coverage.



- 3.2 A description of the assessment area from the Operative Plan is provided below:

Huntly South Assessment Area 1 covers a specified area in Huntly South between the state highway and the river where the ponding capacity of land has been seriously reduced by past filling. Tighter

controls on further filling are necessary to maintain the remaining holding capacity.

- 3.3 The Operative Plan also shows a “1% Design Flood Level”. The design level is 11.7mRL to the north of the site. The 11.7mRL is consistent with the 11.7mRL provided in the WRC Huntly Flood Management Plan 1992/15.

4. EXISTING FLOOD RISK

- 4.1 The ponding area represents a current risk to people and property. Compared to flooding from the main Waikato River, the risk is lower due to the slower moving nature of ponding water albeit to depths greater than 1.5m in places.
- 4.2 The Draft Natural Hazards chapter of the Proposed Waikato District Plan (“**Proposed Plan**”), and associated hazards map, identifies the wider area as the “Huntly South Ponding Area” consistent with the Operative Plan. The draft chapter includes objectives and policies relating to the avoidance of development within “High Risk Flood Areas”. The site is not located within a High-Risk Flood Area. The description of the Huntly South Ponding Area is as follows:

Only one flood ponding area that experiences floodwater ponding in a 1% AEP rainfall event has been identified on the planning maps. This area is located in the southern part of Huntly adjacent to the river and is called the Huntly South Ponding Area. It has been specifically identified because it is an integral part of the Lower Waikato-Waipā Flood Control Scheme that is managed by the Waikato Regional Council. Consequently, the flood plain rules in this District Plan also apply to the Huntly South Ponding Area as identified in the District Plan.

5. RESIDUAL FLOOD RISK

- 5.1 The existing Builtsmart site and the expansion area is within a defended area – that is, the area is defended from Waikato River flooding by stop banks and localised flooding by pumps and floodgates. Although this area is defended from river flooding up to the 100yr event, it still has the potential to flood. The site may flood due to a larger than design event, e.g. an event greater than the 100yr + climate change whereby the Waikato River may overtop the stop bank. The area may also flood due to failure of the stop bank defence. These scenarios are unlikely but can still happen.

- 5.2 This risk that remains - once a defence is in place - is known as "residual risk". The Waikato Regional Policy Statement includes policies and methods about residual risk, including that residual risk zones shall be identified in District Plans. Currently the Operative Plan does not show this area as at residual risk of flooding due to a failure in the defence (rather, it identifies this area as at risk from localised ponding).
- 5.3 A stop bank breach, failure, collapse or overtopping event adjacent to the site could potentially result in rapid inundation of the site. The modelled 100yr + climate change maximum level is ~12.2mRL as shown by main channel cross section results close to the site (as confirmed by feedback received from WRC). This level is more than 1m above proposed hardstand areas and likely to be associated with higher velocities depending on the nature of failure.
- 5.4 Residual risk is difficult to design and prepare for. WRC has no modelling information on the impact of breach or overtopping scenarios. In worst cases, while river levels are high, there may be little time to evacuate if a stop bank failure occurred without warning while people were at work.
- 5.5 Residual risk is ideally managed at a strategic level in setting aside areas for future development. This site is currently zoned for residential development. Changing zoning to a less vulnerable activity such as light industrial does considerably reduce, but not eliminate, the residual risk to people and property.
- 5.6 This risk has been communicated to BPP. They are aware of the risk and are comfortable to accept this risk. As set out later in this evidence, I recommend that some key flood risk management measures are implemented prior to the site functioning as a working area as outlined in the Three Water Assessment to support PC22. These matters can be addressed through the subsequent consenting process.

6. APPROACH TO LEVEL FOR LEVEL FLOODPLAIN COMPENSATION

- 6.1 In general, flood storage compensation works can be divided into direct and indirect. These terms come from UK CIRIA report C624 "Development and flood risk – guidance for the construction industry" (2004).
- 6.2 Direct or 'level for level' schemes re-grade the land at the same level as that taken up by the development. Direct schemes therefore provide a direct replacement for the lost storage volume. Indirect methods rely on water entering a new storage area

via culvert or engineered structure and can be some distance from the infill area. Indirect schemes are less preferred because they are more vulnerable to failure.

- 6.3 A direct scheme is proposed for the site whereby 'level for level' and volume for volume compensation is provided to replicate ponding volumes lost by the development, such that the same volume is available at every flood level and ponded water can freely access (fill and drain) as currently occurs.
- 6.4 The proposed design provides the optimal combination, balancing basin area and operational area while the hardstand level is set at 11.0mRL. This level is at the estimated 50% AEP 'regional ponding level' and within the 10% AEP and 1% AEP level. The existing and proposed flood storage curve is shown in Figure 2.
- 6.5 Figure 2 shows the final design storage volume is above the existing storage volumes at all levels. This shows we achieve the principles and objectives of providing 'level for level' compensation. Also, the existing levels at the site boundary do not change to allow ponding water to freely enter the site to occupy the storage areas.

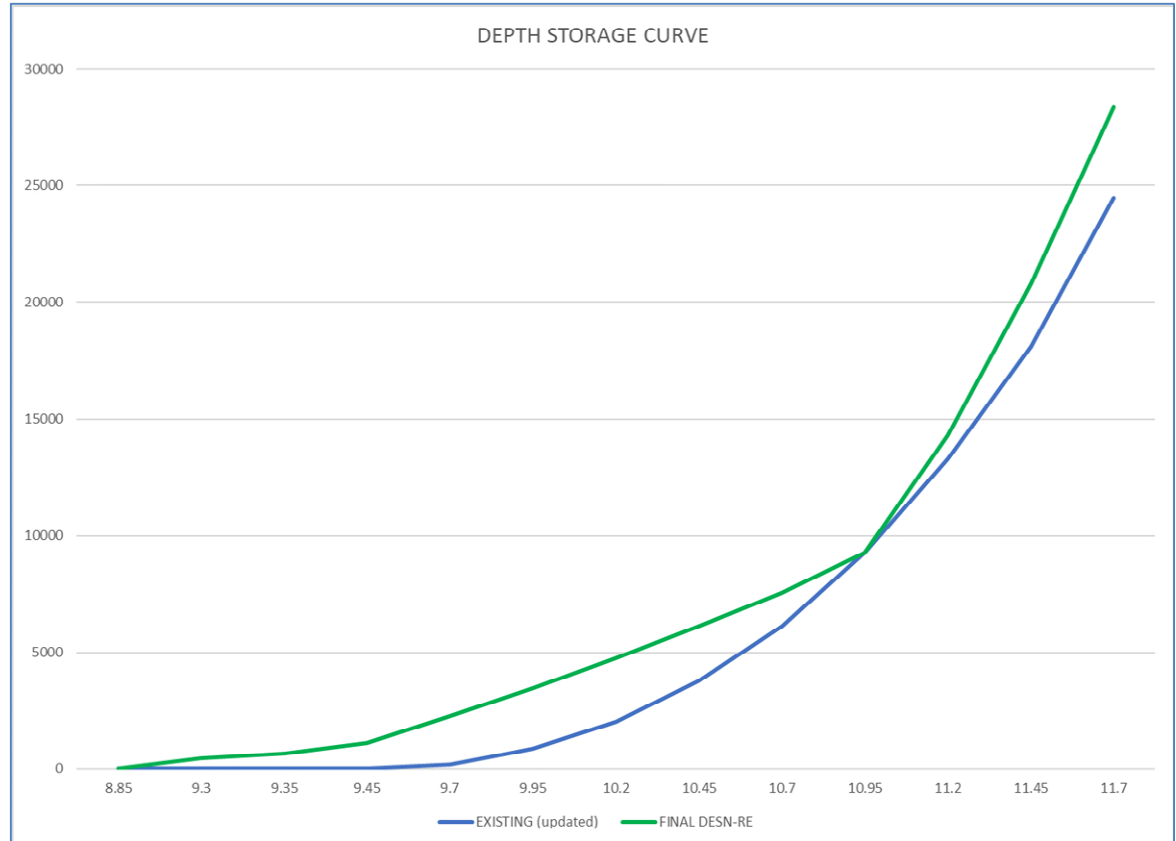


Figure 2: Existing and proposed flood storage curves

- 6.6 The shape of the storage basin has undergone several design iterations to ensure that 'level for level' compensation is maintained while providing a workable solution for BPP. The final basin design incorporates a new area to the north resulting in an L shape basin and the removal of retaining walls, which is a preferred amenity outcome allowing the sides to be planted.

7. WATER SERVICING

- 7.1 There are two existing 150mm diameter principal Waikato District Council ("**WDC**") water mains that run along the property road frontage, one on either side of Great South Road (State Highway 1). A third 355mm diameter WDC bulk water main is located on the eastern side of the road which serves a catchment to the south. These existing pipelines are supplied by the nearby Huntly Water Treatment Plant located on Jackson Road.
- 7.2 WDC has confirmed that the existing water supply network has adequate capacity to accommodate the proposed private plan change.

8. WASTEWATER SERVICING

- 8.1 An existing 225mm diameter wastewater gravity main passes through the western part of the site which is part of a network that outlets into a nearby WDC wastewater pump station on George Drive to the north (approximately 400m north of the plan change area). There are currently two wastewater connections within the plan change area servicing the existing residential dwellings within the site.
- 8.2 WDC has confirmed that the existing wastewater network has adequate capacity to accommodate the proposed private plan change.

9. COMMENTS ON THE COUNCIL OFFICER'S REPORT

- 9.1 I have reviewed the aspects of the Council officer's Section 42A report relevant to stormwater matters, including the memorandum of Mr Fokianos and Mr Vojdanský (Bloxam, Burnett and Olliver ("**BBO**")) attached as Appendix 3 to the report.
- 9.2 I agree that the matters raised in the conclusion of BBO's report (page 4) are relevant and that it is appropriate for these matters to be considered at the resource consent stage.

- 9.3 In response to BBO's comment that "No more information on the impervious measurement was provided" (page 2), the total impervious surface area within the catchment is estimated below (white fill). This built area is a mixture of predominantly large lot residential with some industrial. A 50% impervious assumption for built up areas is used to generate TP 108 runoff volume estimates for the entire ponding area catchment.



Figure 3: Impervious surface within the ponding area catchment

10. CONCLUSIONS

- 10.1 'Level for level' floodplain compensation is proposed within the site to mitigate the effects of infilling part of the existing Huntly South ponding area.
- 10.2 The storage area is provided within a new attenuation basin as well as allowing the site hardstand areas and house building bays to also flood.
- 10.3 The development will adopt a flood resilient design and operation to mitigate the impacts of floodwater entering the site.

- 10.4 A flood management plan is recommended which will address the built form, construction methods and materials to be resilient to floodwater inundation, as well as a site evacuation and flood awareness plan for staff and visitors. This plan should be kept 'live' and potentially integrated into the Health and Safety Protocols for Builtsmart.
- 10.5 BPP is aware of the flood risk associated with the new development resulting from a regional ponding event as well as the residual risk created by occupying land directly adjacent to the Waikato River in an area defended by stopbanks, pumps and floodgates.

Michael George Chapman

19 February 2020