IN THE MATTER of the Resource Management Act 1991 ("RMA" or "the Act")

AND

IN THE MATTER of a submission by **AMBURY PROPERTIES LIMITED** in respect of the **PROPOSED WAIKATO DISTRICT PLAN** pursuant to Clause 6 of Schedule 1 of the Act seeking the rezoning of land at Ohinewai

SUMMARY STATEMENT OF AJAY DESAI IN RESPECT OF FLOODING IN PREPARATION FOR EXPERT CONFERENCING

1. INTRODUCTION

1.1 My name is Ajay Desai. I am a stormwater modeller with Wood and Partners Consultants Limited (Woods). I have been advising Ambury Properties Limited in relation to the potential for flooding of its land and land in the vicinity (including flood modelling work and related issues) relevant to APL's submission seeking rezoning of its land at Ohinewai.

1.2 I prepared the Flood Assessment Report for the Sleepyhead Estate project and have been involved in working collaboratively with the Waikato Regional Council (WRC) on flood modelling work for this Proposal.

1.3 I will be presenting expert evidence at the hearing of the Ohinewai submissions. That evidence is due in July 2020. In the meantime, this statement has been prepared in preparation for expert conferencing in relation to flooding that has been scheduled for 17 June 2020, in compliance with the direction from the Hearing Panel that APL is to provide a summary of its position on the topics that are to be the subject of expert conferencing.

Scope of statement

1.4 As a basis for expert conferencing, this statement will:

(a) Identify what I see as being the key issues for determination in relation to flooding and set out my expert opinion on that issue and the reasons for my views (Section 2); and

(b) Set out my core conclusions (Section 3).

Expert Witness Code of Conduct

1.5 I have read the Code of Conduct for Expert Witnesses, contained in the Environment Court Consolidated Practice Note (2014) and I agree to comply with it. I can confirm that the issues addressed in this statement are within my area of expertise and that in preparing my statement I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

2. KEY ISSUES RELEVANT TO FLOODING AND MY OPINION ON THESE ISSUES

2.1 I have worked with Mr Olliver and others to identify the key issues that need to be determined in relation to flooding. The purpose of this section is to set out the relevant issues and then my expert opinion in relation to each issue, and the reasons for my opinion.

Storage capacity of Lower Waikato Waipa Flood Control Scheme

Does the development of the Ohinewai Structure Plan area significantly reduce the storage capacity of the Lower Waikato Waipa Flood Control Scheme and adversely affect its function?

2.2 In my opinion, this is highly unlikely, for the following reasons:

2.3 Additional work has been undertaken in discussion with Mercury Energy and WRC to estimate flood storage lost as a result of development undertaken in accordance with the APL submission. These assessments compared the total storage within Lake Waikare against rainfall volume for various storm events and the displacement volume from the fill within development area.

2.4 In my opinion, the reduction in flood storage is negligible for the reasons outlined below.

(a) Based on the volume-based analysis, total storage lost in terms of volume is less than 0.5% for extreme events (100yr with Climate

Change and higher) and no loss in storage at operating level for Lake Waikare as per the gate operation procedures.

2.5 The peak water level that Lake Waikare Control Gate can reach is approximately 7.98mRL and 8.0mRL for the 100yr storm event with Climate Change adjustment as per TR2018-02[1] and NIWA's High Intensity Rainfall Design System (HIRDS) v4 RCP8.5 (2081 – 2100)[2] respectively. This increase corresponds to a maximum of 111.3mm for the 100yr storm event. The increase in water level with the proposed development is approximately 7.0mm at the design spillway level of 7.37mRL and approximately 13mm when the northern natural spillway at 8.0mRL is operative. This increase is considered to be negligible.

2.6 The increase in water level with the proposed development is approximately 1.0mm at 6.3mRL which is the highest recorded flood level at Lake Waikare.

2.7 Based on a separate time of concentration (tc) analysis, the tc for local storm runoff was compared against the tc from the upstream contributing area based on SCS Unit Hydrograph method, as specified in the Waikato Stormwater runoff modelling guidance (TR2018/02). The tc for the proposed Ohinewai development is less than 10 minutes compared to the upstream Matahuru and Lake Waikare catchments which have which are ~7hrs and ~4hrs respectively.

2.8 The general approach for the development (1.79 sq. km) would be to pass flows forward before the upstream flows reach Lake Waikare (206 sq. km) without coinciding the peak of the upstream catchment. This confirms that the flows from this development can be passed forward without impacting on predicted flood levels at Lake Waikare / Lake Rotokawau with no reduction in flood storage.

Adverse flooding effects

Will the development of the Ohinewai Structure Plan area lead to adverse flooding effects beyond the site boundaries?

2.9 In my opinion, this is unlikely, for the following reasons:

(a) Modelling has been undertaken by Woods using a conservative tailwater level of 8mRL and an operating level of 5.4mRL for Lake Waikare in discussion with WRC. These models were simulated for

[1] Waikato Stormwater runoff modelling guidance (June 2018)
[2] NIWA High Intensity Rainfall Design System, Version 4 (August 2018)

2yr, 10yr and 100yr storm events and results confirm that there is no increase in water levels or flood extents within the proposed site or any of the neighbouring sites. This is a result of total site area within the proposed development (1.79sq. km) being insignificant when compared to the downstream floodplain extents (34.66 sq. km) and the total contributing area to Lake Waikare (208 sq. km).

(b) A blockage assessment has also been undertaken assuming the Tahuna Road culvert (along Tahuna Drain) to be 100% blocked using tailwater levels of 5.4mRL and 8.0mRL for Lake Waikare. Based on the model results, being tailwater controlled, full blockage of the culvert does not result in overtopping of Tahuna Road and there are no increased flood risk on the proposed development or neighbouring properties.

Emergency Management Plan provisions

Can the risk of a Waikato River stop bank failure affecting the Ohinewai Structure Plan area be effectively managed via proposed Emergency Management Plan provisions?

2.10 In my opinion, the proposed development is safe from flooding from Waikato River stop bank failure, for the following reasons:

(a) Initial modelling indicated that breach flows are expected to enter site along the western boundary along State Highway 1 crossing North Island Main Trunk railway. Emergency Management Plan modelling has been undertaken in consultation with WRC. This involved running a highly conservative scenario with water levels of 10.2mRL and 8.0mRL applied along the Waikato River and Lake Waikare over a period of three days with stop bank failure/breach at three locations to understand risk with overland flow paths directed towards the proposed development.

(b) The latest detailed modelling undertaken confirms that the stop bank breach flows are generally contained to the west of State Highway 1 and flows crossing the State Highway 1 do not enter the development including factory site and instead flow along the northern boundary eastwards towards Lake Waikare. The latest model was refined to represent these critical assets with high resolution details limiting the model element sizes to approximately $5m^2$ instead of $25m^2$ used in previous modelling exercise.

Matauranga Maori perspective

Does the approach to flood management adequately acknowledge cultural issues and include a Matauranga Maori perspective?

2.11 In my opinion, it does for the following reasons:

(a) A key aspect of matauranga Maori is that the holders of this knowledge are tangata whenua, and access to this detailed knowledge relies entirely upon consultation and engagement with these groups. The project team from Woods presented at a Hui with the Tangata Whenua Governance Group on 22 October 2019 on the proposed stormwater management framework. The framework at that time was being fine-tuned and the presentation of the concept and discussion was to seek feedback from iwi on the proposed measures.

(b) The proposed development discharges flows to Lake Rotokawau through the wetland park area post treatment which can be used by communities and be used as flood storage area during large storm events.

(c) Safety of communities, both within the proposed site and neighbouring properties has been the focus and appropriate assessment has been completed to assess and flood risk with storm events and stop bank breach scenarios from Waikato River.

3. CONCLUSION

3.1 In my opinion the site is suitable for development for the following reasons:

(a) There is no increased flood risk to the neighbouring properties as an effect of the proposed development and this has been demonstrated with the modelling and additional work undertaken.

(b) The storage – rainfall analysis completed for Lake Waikare confirms that there no flood effects in terms of elevated flood levels or loss in storage at Lake Waikare which is the receiving environment.

(c) There is no flood risk to the properties within the development site as these will have the floor levels raised approximately 500mm above the 100yr flood plain.

3.2 For the reasons outlined above, and as a result of my broader analysis, there is in my professional opinion no reason why the rezoning of Ohinewai cannot be approved as proposed on the basis of potential flood risk.

Ajay Desai

29 May 2020