

**Before Independent Hearing Commissioners
In Ngāruawāhia**

Under the Resource Management Act 1991 (the Act)

In the matter of of a submission by Ambury Properties Limited and others 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

and Ambury Properties Limited (Ambury)
(Submitter)

and Waikato Regional Council
(Further Submitter)

Statement of evidence of Ghassan Wadi Basheer for the Waikato Regional Council – Flooding and Stormwater

13 August 2020

1 Qualifications and experience

- 1.1 My name is Ghassan Wadi Basheer. I am the Principal Technical Advisor within the Regional Resilience Team of the Integrated Catchment Management Directorate (**ICM**) of the Waikato Regional Council (**WRC**). I have been in this role since July 2013.
- 1.2 I hold a Bachelor's Degree in Civil Engineering from the University of Technology, Baghdad, 1976, and a Master's Degree in Urban and Regional Planning from Baghdad University, Baghdad, 1978. I am a member of the Rivers Group of Engineering New Zealand, and a member of New Zealand Society on Large Dams.
- 1.3 I have over 40 years of experience in a wide range of planning, civil engineering and technical management fields, including hydrology and hydraulics, river engineering, flooding and drainage. I have been employed by WRC since November 1996. I have held several roles within ICM including Works Supervisor and manager of the Lower Waikato and Waipa Flood Control Scheme (**LWWFCS**) works and assets, Assets Engineer for all flood protection schemes, Technical Services Programme Manager, Special Projects Manager and Principal Technical Advisor.
- 1.4 My relevant experience in relation to the rezoning request includes:
- a WRC's river management, flood protection and drainage services provided within the Lower Waikato Management Zone.
 - b The design, service levels, asset management plans and operational requirements of the LWWFCS, which comprises stopbanks, floodgates, pump stations, river and drainage works, flood storage and ponding areas.
 - c The Resource Consents and day-to-day operation of the Community Work Control Gates (Te Onetea Gate, Lake Waikare Gate and Whangamarino Control Gates).
 - d Managing the 1998 flood (the largest since the Scheme was built), coordinated response and remedial works operations.
 - e Oversight and review of the Lower Waikato hydraulic modelling undertaken over the last 20 years.

- f Managing and contributed to the development of the High Flow Management Plan for Mercury (Mighty River Power) hydroelectric dams on the Waikato River.
 - g Provided technical expert evidence and advice on Resource Consent applications for other development as required by WRC within the Lower Waikato River Catchment, including the Control Gates (eg. Te Onetea, Lake Waikare and Whangamarino Gates) of the LWWFCS and construction of the Waikato Expressway.
- 1.5 My evidence is given on behalf of WRC in relation to the submission seeking rezoning of land at Ohinewai by Ambury Properties Limited (**Ambury**) in respect of the proposed Waikato District Plan.

2 Involvement with the proposal

- 2.1 I have submitted a summary statement on flood risk and was party to the expert conferencing held in relation to and in preparation for this rezoning application. I am generally familiar with the site, though I was not party to the site visit.

3 Code of conduct

- 3.1 While I acknowledge that I am an employee of WRC, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with it in the preparation of this statement of evidence and during expert witness conferencing. I also confirm that the matters addressed in this statement of evidence are within my area of expertise, except where I rely 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 I express.

4 Scope of evidence

- 4.1 My evidence addresses the following:
- a Vulnerability of the site to flooding from the Waikato River and/or Lake Waikare and measures to avoid, remedy and/or mitigate flood risks.
 - b Response to evidence of Mr Ajay Desai on behalf of Ambury, including corrections and clarification to statements made in evidence by Mr Desai;
 - c Response to the submission of Shand Properties Ltd (**SPL**); and

d Comments on the Waikato District Council Officer's S42 Report.

5 Summary of evidence

- 5.1 The site is currently protected from flooding by the LWWFCS to specific rural standards, which are not suited for urban development. The vulnerability of the site to flooding and residual flood risks can be addressed by setting minimum building platform levels for all residential, commercial and industrial areas within the development in accordance with section 4.3.5.2 of NZS 4404:2010 Land Development and Subdivision Infrastructure. I consider that these should be 8.30 mRL for commercial and industrial buildings and 8.50 mRL for residential buildings – unless an alternative height for the 100 year + climate change flood is determined.
- 5.2 Ambury has undertaken additional modelling to assess flood risks resulting from stopbank breach scenarios. This technical work has not been discussed and/or shared with the Regional Resilience Team of WRC to confirm parameters and results. Accordingly, I am unable to comment on the appropriateness of the minimum ground level of 8.05 mRL that is proposed in the district plan provisions.
- 5.3 Ambury has undertaken additional modelling of stormwater systems within the development to assess flood risks within the site and neighbouring properties. This technical work has not been discussed and/or shared with the Regional Resilience Team of WRC to confirm parameters and results.
- 5.4 There are some statements in Mr Desai's evidence, which do not clearly and/or correctly describe the LWWFCS operational parameters which need to be noted and/or amended.
- 5.5 The proposed rezoning of the SPL property from the Rural Zone to the Country Living Zone, presented as a submission to this District Plan review, included a desktop assessment of flood risks. The assessment lacks detailed modelling. It also assumes that the LWWFCS will adequately protect the site from flooding. In my opinion, it is not appropriate for the SPL property to be re-zoned for a more intensive land use in the absence of more specific information on how flood risk can be adequately managed in this location.

6 Vulnerability of the site to flooding

- 6.1 The APL site is located within the floodplain of the Waikato River and Lake Waikare and is protected against Waikato River flooding by a stopbank as part of the LWWFCS.

- 6.2 The stopbank is designed to prevent overtopping in a 100 year design event. The crest level of the stopbank is set 300 mm above the design flood level. This difference between flood level and stopbank crest level is referred to as the freeboard. The freeboard provides a buffer for uncertainties in flood level predictions, wave action, floating debris and river changes. In designing the LWFCS, two standard freeboard height standards were adopted, a rural standard height of 300 mm, and an urban standard height of 600 mm. This was to reflect the level of risk of stopbank overtopping in each area. Accordingly, from a scheme management perspective, the existing stopbank is not suited for protection of urban settlement.
- 6.3 In my opinion, there are two main flood concerns in respect of potential flood effects on the proposed Ambury development:
- a Flooding during extreme rain events (typically 100 year + climate change); and
 - b Risk of breach of stop-banks – a low probability but potential high consequence event.
- 6.4 Both these flood risks need to be managed. The proposed approach is to fill in the area and raise the landform to be above flood levels – both in relation to extreme rain events and a breach of the stopbanks. Analysis undertaken by Mr Desai indicates that this can be undertaken with minimal loss of flood storage, given the substantial catchment of Lake Waikare and the design and operation of the flood control scheme.

Flooding during extreme rain events

- 6.5 Lake Waikare is an integral part of the Lower Waikato Flood Protection Scheme design. The Lake's water level was lowered and this level is controlled within a certain range (5.40 mRL – 5.75 mRL) at all times to ensure availability of adequate flood storage. The level controls are authorised by resource consents, which are subject to review and variations.
- 6.6 The Waikato River overtops the Rangiriri Spillway in events exceeding the 50 year flood. In a 100 year design event, Lake Waikare level is estimated to rise to 7.37 mRL.
- 6.7 Climate change effects on Waikato River flooding and its consequent implication on Lake Waikare levels have not been modelled or assessed.

- 6.8 Along the northern foreshore of the Lake, a stopbank is constructed with its height set at 8.0 mRL. Within this stopbank, a short section is lowered to 7.37 mRL to act as a spillway. The worst-case scenario is that the Lake will rise above 8.0 mRL at which time the foreshore stopbank will be overtopped and flood waters will discharge towards the Whangamarino Wetland under such extreme scenarios. It should be noted that the Lake level reached 8.38 mRL in 1958 before the Scheme was constructed.
- 6.9 Accordingly, to adequately protect the development from flooding, I consider that the proposed district plan provisions need to incorporate the following:
- a A default 100 year minimum flood height of 8.0 mRL with the ability to review this at subdivision/development stage subject to more detailed assessment of the 100 year + climate change flood heights – noting that this could be higher or lower than 8.0 mRL; and
 - b The minimum freeboard for setting the building platform levels within the development shall be 500 mm above the 100 year flood level for habitable dwellings and 300 mm for commercial and industrial buildings in accordance with NZS4404:2010. Accordingly, the minimum building platform levels should be 8.30 mRL for commercial and industrial buildings and 8.50 mRL for residential buildings – unless an alternative height for the 100 year + climate change flood is determined.
 - c The ability to consider flooding at subdivision/development stage to ensure the broader effects of flooding (on roads, parks and reserves, stormwater devices etc) are understood and appropriately managed.

Stop Bank Breach Modelling

- 6.10 Council was provided with the results of flood breach modelling, including the development ground levels that were used in this modelling¹. This information showed that the post development ground surface levels within the site (development areas, not reserves) that were utilised in that modelling were largely above 9 mRL and all were above 8.10 mRL.
- 6.11 Council was subsequently advised by Mr Desai² that he had remodelled the stop bank breach scenario using lower development ground levels and that the site was not inundated at a ground elevation of 8.05 m. However, Council has not been provided the remodelled information to confirm this and the basis for this

¹ Email from Mr Desai 2 July 2020.

² Email dated 3 July 2020.

ground height is not addressed in Mr Desai's evidence. Following receipt of the Ambury evidence, I am advised that Mr Mayhew raised this matter with Mr Olliver and then discussed it with Mr Penfold on 24 July 2020. However, I have not been provided with any additional analysis.

- 6.12 In my opinion, to ensure that the development is adequately protected from a stop bank breach, the proposal provisions should provide for the following:
- a Ground height should be no less than that modelled in the stopbank breach scenario, unless it is demonstrated at subdivision or consent stage that the development area (excluding parks and reserves etc.) can be developed at a lower level and not be inundated by a stop bank breach event. As I have advised above, I cannot confirm that a ground level of at least 8.05mRL is appropriate to achieve this.
 - b The ability to consider residual flood risks at the sub-division/development stage to enable this to be considered at this time when more detail is available to take into account the final detailed design for the development. This may lead to a requirement for an emergency management plan to address matters such as access and response, should a stopbank breach event occur.

7 Response to evidence of Mr Ajay Desai on behalf of Ambury

- 7.1 My comments relate to statements in Mr Desai's evidence relating to emergency management plan assessment and stormwater model sensitivity. In addition, there are several statements which do not correctly describe the system operation and ICM's scope of responsibility, which I address to ensure correct information and clarity.

Issue 1 – Emergency Management Plan

- 7.2 Paragraphs 2.21 and 2.22 suggest that stopbank breach scenario modelling was undertaken following the Expert Conferencing and indicates that the site is not subject to flooding under a stopbank breach scenario.
- 7.3 This additional refinement of the model and associated assumptions, leading to a proposed minimum ground level of 8.05 mRL, have not been reviewed by WRC. Therefore, I consider that:
- a This ground level should be demonstrated as being appropriate before it is included in any proposed plan provisions; and

- b Residual flood risk should be able to be considered at the sub-division/development stage to ensure that it is adequately managed in the context of the detailed design. This should also include the provision of a risk-based emergency management plan, if required, to manage the residual risks from a stopbank breach.

Issue 2 – Stormwater - Sensitivity Model Scenario

- 7.4 Paragraph 2.24 of Mr Desai's evidence suggests that sensitivity analysis for the post development scenario was undertaken to assess vulnerability of the site to flooding as a result of a 10 year storm event with no storage available within the Central Park Area. He advises that the results have shown no increase in flood risk within the site and neighbouring properties. He then concludes that the stormwater devices within the Central Park Area would not have any effect on flood extent and levels.
- 7.5 The stormwater devices' design, model assumptions, setting and scenario runs have not been presented to WRC for review and confirmation of results. In general, if there is no storage within the stormwater network and devices, additional water will result in increased flood level and extent. This could ultimately cause flooding on adjacent properties downstream, unless the overflow bypasses the stormwater network.
- 7.6 In my opinion, the local effects of increased stormwater runoff as a result of the development can be addressed through design and construction of appropriate stormwater devices and assessed at the resource consent stage.

Issue 3 – Corrections and Clarifications

- 7.7 There are some inaccuracies in Mr Desai's evidence in respect of the LWWFCS that I would like to correct.
- 7.8 The statement at paragraph 3.8 of Mr Desai's evidence should be corrected from:

The Lake Waikare Catchment is influenced by the LWWFCS and falls under the Lower Waikato Management Zone. It is a comprehensive river control scheme designed to provide flood protection within the floodplains of the Lower Waikato and Waipa Rivers. It is managed by the Land Drainage Team at WRC.

to say:

"Lake Waikare is an integral part of the LWWFCS. The scheme is designed to provide flood protection and drainage improvements within the Lower Waikato

and Waipa Rivers. The scheme is managed under the Lower Waikato Management Zone within the Integrated Catchment Management Directorate of WRC”.

7.9 At paragraph 3.15 Mr Desai states that:

“The Waikare Spillway operates when Lake Waikare exceeds 7.37 RL, the maximum water level that the lake can achieve before the Waikare Spillway is operative would be ~ 8.0 m”.

7.10 This statement is not clear and does not accurately describe the system operation and should state:

“The Waikare Spillway located within the Northern Foreshore Stopbank of the Lake operates at 7.37 mRL. When Lake levels exceed 8.0 mRL, the whole length of the Northern Foreshore Stopbank will be overtopped and will act as a spillway.”

7.11 The highest recorded Lake level was 8.38 mRL, during the 1958 flood. Therefore, setting building platform levels (for residential) at 8.50 mRL as I have advised in paragraph 6.9 is an appropriate minimum platform level that addresses flooding from the Lake Waikare side.

8 Shand Properties Ltd (SPL) Submission

8.1 The SPL site is located adjacent to the Waikato River and is isolated from the river by a stopbank constructed in the early 1960's as part of the LWWFCS.

8.2 In my opinion, there are three flood-related concerns:

- a The Scheme stopbank is built to withstand a current 100year flood with a rural standard freeboard of 300 mm. While climate change effects have not been assessed, it is highly likely that the current stopbank will be overtopped under a future 100year flood + climate change event.
- b The stopbank foundations are sandy silt material and experienced seepage during the 1998 flood, which caused surface flooding of the area. While WRC continues to monitor and maintain the stopbank, failure or breach of the stopbank is a possibility, especially under higher water levels. Such scenarios have not been considered in SPL's submission. It should be noted that evacuation following a sudden failure is likely to be difficult, and possibly not successful, due to close proximity of the area to the stopbank.

- c The current Scheme floodgates and pump station are of low rural standard. Any intensification of residential development would need to be supported by a significant upgrade of the flood protection infrastructure.

9 Response to the Council Officer's report

- 9.1 I agree with the conclusions and recommendations stated in Section 5.3.3 of the Officer's Report in relation to flooding. My comments are as follows:
 - a Section 152- The peer review of the Waikato River flood modelling undertaken by Tonkin & Taylor was submitted as part of my statement to the expert conferencing.
 - b Section 156- last bullet point. I suggest adding the word "future" before "1% AEP" to ensure Climate Change is considered.
 - c I suggest adding another bullet point that sets a minimum building platform level of 8.5 mRL to all residential buildings, and 8.30 mRL to all commercial and industrial buildings affected by Lake Waikare flooding. This is to ensure clarity and consistency of application across Ambury development and any other future development around Lake Waikare.

10 Conclusion

- 10.1 While I have not been provided with updated stopbank breach modelling, in my opinion the outstanding flooding issues do not preclude the rezoning of the Ambury site, and these can be addressed during the detailed design and resource consents phase through the setting of appropriate building platform levels and other measures.
- 10.2 Appropriate building platform levels should be set to protect the development from flooding and plan provisions to enable flood risk to be considered at subdivision/development when the final design is known to ensure that flood risk is appropriately managed.
- 10.3 In my opinion, it is inappropriate for the SPL property to be re-zoned for a more intensive land use in the absence of more specific information on how flood risk can be adequately managed in this location.

Ghassan Basheer

13 August 2020