

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of applications by Waka Kotahi NZ Transport Agency to Manawatu Whanganui Regional Council for resource consents associated with the construction and operation of Te Ahu a Turanga: Manawatū Tararua Highway.

**SECTION 87F REPORT OF JONATHAN DAVID BELL – STORMWATER
AND HYDROLOGY**

A. QUALIFICATION AND EXPERIENCE

1. My full name is Jonathon (Jon) David Bell. I am currently employed as the Manager Investigations and Design at the Manawatu-Whanganui Regional Council (“**Horizons**”) where I have worked for the past nine years. In my role, I am responsible for the hydraulic modelling of water ways, as well as the design of flood control and erosion protection works. I am also responsible for the design of drainage networks and various hydraulic structures throughout the region.
2. I hold a Masters in Civil Engineering from Cardiff University in the United Kingdom. I am a Chartered Professional Engineer (CPEng) and a Chartered Member of Engineering New Zealand (CMEngNZ). I have 13 years of experience practicing as a civil engineer, with a particular interest in river works since 2007.
3. I have been requested by Horizons to provide river management expertise on the resource consent applications by Waka Kotahi NZ Transport Agency (the “**Applicant**”) for resource consents associated with the construction and operation of Te Ahu a Turanga: Manawatū Tararua Highway (the “**Project**”).
4. Having worked in the region for a number of years I am very familiar with the area that the Project covers, and I have been involved in discussions about various aspects of the Project since an alternative route was first considered following the indefinite closure of State Highway 3 (“**SH3**”) through the Manawatū Gorge.

B. CODE OF CONDUCT

5. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that except where I state that I am relying on the evidence of another person, this report is within my expertise.

C. SCOPE OF REPORT

6. The focus of my report is around the potential for adverse effects, in terms of flood and erosion risks, associated with the Project. In broad terms, I have considered these effects with regard to the works/activities that are described in

the technical reports of Dr Jack McConchie¹ (Technical Assessment D) and Mr David Hughes² (Technical Assessment B). I have considered both flood and erosion risks associated with the proposed works in waterways, and also those associated with the management of stormwater and run-off as part of the Project.

7. My evidence reviews the assessment of effects associated with the quantity of water that is expected to run off the land into the receiving environment. This includes construction and road run-off and the management of stormwater across the Project area, stream flow and velocities, and flooding and erosion issues associated with Project works in and around watercourses. In preparing this report I have read the report of Mr Kerry Pearce and Mr Logan Brown on behalf of Horizons as they relate to erosion and sediment control, and stormwater.
8. Relevantly the hydrology and hydraulic modelling relied on by the Applicant has informed (relevant to my areas of expertise) the erosion and sediment control devices, the requirements for bridges and culverts, and flood risk for the Project.
9. In addition to the information provided by the Applicant, I also consider the submissions of Mr. Shoebridge who has raised concerns relating to the management of stormwater, and Meridian Energy Limited (“**Meridian**”).
10. In the interest of brevity, I will not describe in detail the proposed works as that information has clearly been provided by the Applicant. In particular, the Project has been described in the Project-Wide Design and Constriction Report (DCR) (Volume II), the Drawing Set (Volume III) and the related Assessment of Environmental Effects (AEE). I focus my assessment on the potential effects of the proposed works, that have been provided in the AEE by the Applicant.

D. EXISTING ENVIRONMENT

11. The existing environment is described in detail in the reports of Dr. McConchie and Mr. Hughes. It is my opinion that their descriptions are both accurate and

¹ Te Ahu a Turanga: Technical Assessment D – Hydrological Assessment, Dr. Jack McConchie, TAT-0-06001-CO-RP-0003.

² Te Ahu a Turanga: Technical Assessment B – Stormwater Management Design, Mr David Hughes, TAT-0-DR-06001-CO-RP-0001.

provide a good baseline for the AEE. As such, I have taken these as read and have not reproduced them within my report.

E. ASSESSMENT OF POTENTIAL EFFECTS

Manawatū River Bridge (BR02)

12. In his technical report and attached appendices (Technical Assessment D), Dr. McConchie has considered the impacts that the construction of the Manawatu River Bridge (BR02) will have on flows in the Manawatu River, the impact of the proposed bridge on flood levels, and the potential for scour or erosion problems to develop as a result of the construction of the bridge.
13. Other than a localised 'bow-wave' immediately upstream of one of the bridge piers Dr. McConchie concludes that the effects on flood levels are "extremely small."³
14. When considering potential for scour or erosion problems to be created or exacerbated, the critical consideration is how the bridge will affect flow velocities. Dr. McConchie states that: "*Any significant change in velocity is restricted to three locations. The greatest change is an increase in velocity, up to 1.5m/s, within the centre of the active channel. There is also a small increase in velocity at the entrance to the 'Parahaki bypass channel' on the true left of the Manawatū River. The other change is a reduction in velocity in the lee of Pier 2.*"⁴
15. The other consideration of Dr. McConchie related to the potential impacts of the proposed bridge on Parahaki Island. Dr Conchie found that: "*the construction of the bridge and piers will have no adverse effects on Parahaki Island.*"⁵
16. In paragraph 38 of his evidence Dr. McConchie states "*The proposed scour protection will further mitigate any potential adverse effects to Parahaki Island; it is not required for the protection of the pier.*" I concur with this statement.

³ Paragraph 35, Technical Assessment D, Dr. Jack McConchie.

⁴ Paragraph 36, Technical Assessment D, Dr. Jack McConchie.

⁵ Paragraph 37, Technical Assessment D, Dr. Jack McConchie.

17. Dr. McConchie’s technical report, and attached appendices, illustrates that his conclusions have been reached through a sound consideration of the hydrology of the river. Dr McConchie’s analysis has also been informed by the use of a detailed 2 dimensional model of the river in the reach of interest. In my opinion the technical work undertaken by Dr McConchie has been based upon sound assumptions, and used appropriate techniques and methodologies.
18. In paragraph 301 of his report Dr. McConchie states that in his professional opinion *“the effects of constructing the proposed bridge over the Manawatū River are likely to be extremely small and localised to the immediate vicinity of the centre pier (Pier 2). Any changes to the existing flood hazard will in my professional opinion be no more than minor.”* I fully concur with this assessment.

Mangamanaia Stream Bridge (BR07)

19. In his technical report (Technical Assessment D), at paragraphs 302-340, Dr. McConchie discusses the impacts of the construction of the Mangamanaia River Bridge (BR07) on the stream and its floodplain in detail. In conclusion, Dr. McConchie found that *“the effects of constructing the proposed bridge over Mangamanaia Stream will be extremely small, and overall are likely to be positive”*⁶. His commentary summarises the findings of the technical work that is detailed within the Appendix, D4, to the report, including the impacts on flood levels, flood durations and flow velocities. Having considered all of the information provided with the application, I concur with Dr. McConchie.

Eastern Roundabout

20. The eastern roundabout is proposed to be constructed on an active floodplain. The Applicant provides (in Appendix D.5 of Technical Assessment D) a detailed assessment of the impact of the construction of the roundabout on the floodplain.
21. In my view it has been demonstrated that whilst there will be some displacement of floodwater, these effects will be localised within 10-20 metres of the roundabout. While I agree with Dr. McConchie that the effects of the proposed

⁶ Paragraph 56, Technical Assessment D, Dr. Jack McConchie

roundabout will generally be positive, I do note that the localised negative effects could be considered significant by individual landowners.

22. The technical work, described in Appendix D.5⁷ of Dr. McConchie's report, has quantified the changes in flood risk to the land around the proposed roundabout. It is shown that some locations will experience a reduction in flood levels, while flood depths are likely to be greater in other locations.
23. Having reviewed the technical information provided with the application, I am of the view that the technical assessment has been done in a robust manner, using appropriate assumptions and engineering judgements. I am therefore of the opinion that there has been an appropriate and solid assessment of the changes in flood risk associated with the proposed eastern roundabout.

Central Alignment

24. In addition to the bridges and roundabout discussed above, the central alignment of the proposed road will cross a number of watercourses. For this reason a number of works, as addressed by Mr. Hughes' in Technical Assessment B, will be required (the "**stormwater works**"). These include:
 - (a) Nine stormwater wetlands; ten stormwater wetland swales; ten flow through treatment swales; and 17 new sediment basins to treat stormwater from the new highway and cut slopes;
 - (b) 25 cross culverts and 8 access culverts to reconnect streams and to assist cross catchment drainage;
 - (c) Approximately, 74 cut-off drains of varying size and shape to intercept and convey overland flow away from road embankments and to the appropriate cross culverts; and

⁷ Appendix D.5 – Te Ahu a Turanga - Manawatū Tararua Highway: Flood risk analysis – Eastern Roundabout, Technical Assessment D.

- (d) Approximately, 39 stream diversions of varying size and shape to recreate and reconnect streams and to assist cross catchment drainage.
25. While considering the effects of these works, my focus has been on their potential impacts in terms of the creation or exacerbation of flooding or erosion problems. This inevitably includes the level of service proposed to achieve the stormwater treatment. The desired water quality to be achieved through operational stormwater treatment is dealt with in the evidence of Mr Pearce and Mr Brown.
26. Having reviewed Mr Hughes' technical report⁸ and appendices, I am of the view that that the design of the stormwater works has been carried out to appropriate standards and is based upon appropriate assumptions and technical work.
27. Mr Hughes' report (Technical Assessment B) looks in detail at the environmental effects associated with stormwater throughout the central alignment of the proposed road. These effects are summarised in Table B3 of his report; which sets out the potential effects, the proposed mitigations and the residual effects.
28. Mr Hughes' goes on, in paragraph 109, of Technical Assessment B to conclude "*the proposed stormwater design will, as far as practicable, avoid, minimise or mitigate any residual effects. Any remaining residual effects are considered less than minor and will be managed under the proposed resource conditions.*"
29. In my opinion the application includes a technically sound assessment of environmental effects in respect of proposed stormwater works, and I concur with the assessment of the residual effects in Table B3 of Mr. Hughes' report.

F. SUBMISSIONS

Submission by Mr. Nick Shoebridge (#8)

30. Mr. Shoebridge raises two concerns relating to the management of stormwater.
31. Mr Shoebridge's first concern relates to the construction of a bund around part of his family's land. I understand that the bund is unrelated to the current Project,

⁸ Technical Assessment B – Stormwater Management, Mr. David Hughes.

but was constructed sometime in the past by the Applicant. Mr Shoebridge comments that the construction of the bund has “rainwater runoff straight into our property around our home.” Connected to this issue is Mr Shoebridge’s second concern, which relates to the Applicant’s plans for the management of stormwater for the Project, which will drain to a creek that runs through his property.

32. At Appendix D.5 of Technical Assessment D, Dr McConchie (via a memorandum) details work on the flood risk caused by the proposed roundabout adjacent to Mr. Shoebridge’s property. Figure 6 of that memorandum shows the modelled difference in flood depths to be caused by the new road layout. The modelling demonstrates that there are some areas of Mr Shoebridge’s property that would experience an increase in flood level, while other areas would see lower flood levels during a storm event.
33. In my opinion the model used by Dr McConchie provides a good indication of the impacts of the proposed road construction on stormwater inundation in the area. However, as the memorandum states in Section 3: “*the results should not be taken as absolute and used for comparison purposes only.*”
34. Further, while the model shows the difference in flood levels between the existing state and those that would be seen following construction of the new road, it is not evident from the assessment if the existing state takes into account impacts of the existing bund, which was one of the initial concerns of Mr Shoebridge.
35. Therefore, while the Applicant has developed a model that is capable of demonstrating how the construction of the new road will affect flood levels at Mr. Shoebridges’s property, it not clear to me, what baseline condition has/should be assessed, i.e. before or after the construction of the existing bund.
36. The modelling results also show that there will be some local increases in flood levels in and around Mr. Shoebridge’s property. Having reviewed the model results, I consider these effects to be no more than minor when considering the totality of the Project works. I am unable to comment as to whether or not Mr. Shoebridge would consider the effects on his property to be significant.

Submission by Meridian Energy Limited (#13)

37. Whilst not opposing the resource consent application, Meridian do not believe that sufficient evidence has been provided to demonstrate that the flood effects associated with the proposed works are no more than minor. In section 5 of their submission it is stated that: *“The standards to be applied to Meridian’s stormwater infrastructure differs from that for the Highway and it is not well identified in the technical reports or conditions. This specifically applies to culvert conveyance, return periods, stormwater attenuation and water quality. It is noted that the stormwater systems for Meridian’s access tracks are separate to the highway. Meridian’s concern is that additional encumbrance will be placed on the wind farm as a result of the consent conditions as proposed.”*
38. The standards that Meridian’s stormwater infrastructure are required to be designed to do differ from those proposed by the Applicant for these consents. The differences in these come about from the higher standards that are required by the Applicant themselves, to ensure the resilience of their own infrastructure.
39. Meridian state: *“while the Agency indicates that streams and waterways downstream of the works will be assessed and erosion effect mitigated, there is limited evidence to suggest that a full assessment has been undertaken. This is of concern to Meridian, as greater than design events could increase the flows into the systems within Meridian’s wind farm. Erosion effects may be seen as a result and this may cause other unwanted effects or place an onus upon Meridian to carry out additional repair sometime in the future.”*
40. Meridian is requesting sufficient evidence be provided to demonstrate that the flood effects are no more than minor before consent is granted. I believe that this can be achieved via appropriate conditions of consent. The Applicant has proposed conditions (WW1 a & b) which will ensure that culverts do not adversely affect the ability of the watercourses to convey flood flows, up to and including 1% AEP (1-in-100 year) flood event via the culverts and associated overland flow paths. If these conditions are imposed on the consent, then they should ensure that the proposed works will not adversely affect Meridian’s own infrastructure.

G. DISCUSSION AND CONCLUSIONS

41. Having reviewed the hydrology and stormwater reports provided as part of the consent application, it is my opinion that the impacts of the Project works have been fully considered by the Applicant. For the reasons above, I also reach the view that overall, the adverse effects of the proposal are no more than minor.

H. PROPOSED CONDITIONS

42. In Appendix E of Volume 1 of the resource consent application, the Applicant has proposed a number of conditions. These conditions have been grouped together according to the issues that they seek to address. In reviewing the application I have focused on the conditions associated with Stormwater (SW1), Bridges (BD1 – BD7), and Works in the Bed of Watercourses (WW1-WW3). I have commented on each of these conditions below:

SW1 – Operational Stormwater Standards

43. This condition will ensure that all stormwater management devices will be designed and constructed to achieve the appropriate design standards. As such, I recommend that this condition is included as a condition of consent.

BD1 – Bridge Design Standard

44. This condition will ensure that the bridge is designed to the standards that are discussed in the resource consent application. As such, I recommend that this condition is included as a condition of consent.

BD2 – Bridge Construction and Operation Standards

45. As well as ensuring that the bridges constructed under the consent will not affect the ability of the Rivers to convey flood flows, the four conditions set out at BD2 will ensure that the impacts on the geomorphology of the rivers is also minimised. Condition BD2c also will ensure that if any issues were to develop over the course of the Project, that they would be remedied by the Applicant. As such, I recommend that all four of these conditions are included as conditions of consent.

BD3 – Public Access and River Navigation

46. There are two conditions suggested here that both relate to public safety. While both of these conditions appear sensible to me, this particular area is outside of my field of expertise and as such I do not comment on the appropriateness of the suggested conditions. However, I was provided with a copy of correspondence between Horizons and Maritime New Zealand as to these matters indicating that Maritime New Zealand was satisfied with additional information provided to it by the Applicant, and no further action was considered necessary. A copy of the relevant email is attached at **Annexure A**.

BD4 & BD5 – Flood Contingency Management Plan (FCMP)

47. The four conditions in this section require a FCMP to be submitted to the Council for information, and describe the objective of the Plan, as well as what it must include. This is an appropriate condition to be apply to the resource consent as it will ensure that appropriate measures are in place to minimise risks associated with any flood events occurring during the construction of the proposed bridges. As such, I recommend that this condition is included as a condition of consent.

BD6 – Bridge As-Built Plans

48. This condition states: *“Within twelve (12) months of the completion of construction of the Manawatū River, Eco-Bridge and Mangamanaia Stream bridge structures, a certification statement and as-built plans must be provided to the Manawatū-Whanganui Regional Council to demonstrate that the structures have been constructed in accordance with the conditions of these resource consents.”* This is an appropriate condition and as such, I recommend that this condition is included as a condition of consent.

WW1 – Culvert Design Standards

49. The two proposed conditions in this section will ensure that culverts do not adversely affect the ability of the watercourses to convey flood flows, up to and including 1% AEP (1-in-100 year) flood event via the culverts and associated overland flow paths. These two conditions are necessary to ensure that the

proposed culverts do not cause an increased flood risk from the various watercourses that the culverts will be located in.

WW2 – Works in the Bed of Watercourses Standards

50. The first six suggested conditions appear to be related to water quality issues. As this is outside of my field of expertise, I have not commented on them.
51. However, proposed condition (g) states: “*Works in the bed of a stream or river must only commence where there is at least four (4) days of settled weather forecast by the New Zealand Meteorological Service for that water body’s catchment.*” I recommend that this is included as a condition of consent as it will assist in ensuring that works are able to be completed in a manner which causes minimum disturbance to the streams.
52. I also recommend inclusion of suggested condition WW2(h) as it requires the remediation of any erosion or scour issues caused by the construction works.

WW3 – Culvert As-Built Plans

53. This condition states: “*Within twelve (12) months of the installation of all culverts, as-built plans must be provided to the Manawatū-Whanganui Regional Council to demonstrate that the structures have been placed in accordance with the conditions of these resource consents*”. This is an appropriate condition and as such, I recommend that this condition is included as a condition of consent.

Additional Conditions

54. I am of the opinion that the conditions recommended above are adequate to ensure that the potential adverse environmental effects of the proposed works are no more than minor. As such I have no additional conditions to recommend.

JON BELL

28 May 2020

ANNEXURE A

From: Blair Simmons <Blair.Simmons@maritimenz.govt.nz>
Sent: Tuesday, 12 May 2020 3:28 PM
To: Jasmine Mitchell
Cc: Mark St Clair (m.stclair@hyc.co.nz); Scott Bernie
Subject: RE: Te Ahu a Turanga - Resource Consent - Manawatu Bridge construction

Good Day Jasmine

MNZ is satisfied with the additional information as provided by Damien McGahan.

You can therefore take my email to Damien on 30 April as confirmation that nothing further is required by MNZ at this time and we are satisfied with the measures put in place to ensure the safety of navigation on the particular stretch of river during the construction of the bridge "BR02".

Kind regards

Blair

Blair Simmons | Deputy Compliance Manager
Maritime New Zealand | Central Region
Tauranga Office
Nō te rere moana Aotearoa

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From: Jasmine Mitchell <Jasmine.Mitchell@horizons.govt.nz>
Sent: Tuesday, 12 May 2020 10:58 AM
To: Blair Simmons <Blair.Simmons@maritimenz.govt.nz>
Cc: Mark St Clair (m.stclair@hyc.co.nz) <m.stclair@hyc.co.nz>
Subject: Te Ahu a Turanga - Resource Consent - Manawatu Bridge construction

Morning Blair,

I understand that Damien McGahan has send you a copy of the additional information for the construction of the bridge across the Manawatu River.

Damien has provided an email on the basis that Maritime New Zealand is satisfied with the assessments undertaken by Waka Kotahi NZ Transport Agency. For completeness, I would just like to check there is nothing further you require and we can take the email provided to satisfied any Maritime New Zealand requirements?

I have attached a copy of the email from Damien we received.

A full copy of the section 92 information is available on our website or if you would like me to provide a copy please let me know.

If you have any further questions please let me know.

Nga mihi

Jasmine



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