

IN THE MATTER OF the Resource Management Act 1991

AND

IN THE MATTER OF of an application pursuant to s 88 of the Resource Management Act 1991

APPLICATION BY Gisborne District Council, (Land Rivers and Coastal Section)

FOR An upgrade to the Waipaoa Flood Control Scheme

STATEMENT OF SUPPLEMENTARY EVIDENCE BY

JOSS PALMER RUIFROK

Date: 03 September 2018

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Introduction

1. My name is Joss Palmer Ruifrok. My qualifications and experience are set out in my first brief of evidence dated 21 November 2017.
2. I am the Council engineer responsible for managing the upgrade to the Waipaoa Scheme. Despite that qualification, I confirm again that I have read the 'Expert Witnesses Code of Conduct' contained in the Environment Court of New Zealand Practice Note 2014 and agree to comply with it. In particular the opinions expressed in this supplementary evidence are my professional opinion. Where I have relied on the evidence of other witnesses, I have stated so. In particular, in relation to the hydraulic flood modelling, I do not have particular expertise in this area and rely upon the technical reports and evidence produced by Mr Craig Goodier, from Hawkes Bay Regional Council.

Scope of Supplementary Evidence

3. This supplementary evidence should be read in conjunction with the resource consent application and supporting documents filed by the Applicant, including further information provided as part of s92 requests received by the Applicant. It should also be read in conjunction with earlier briefs of evidence filed by the Applicant, and further information provided as part of the refinements to the flood modelling. That includes a further report from the Applicant prepared by myself (with input from the Applicant's relevant experts) and filed on 17 August 2018. As a number of matters are contained within the Applicant's further report of August 2018 I do not intend to cover them again in this supplementary brief, and instead this brief focuses particularly on responding to matters covered in Mr Todd Whittaker's Supplementary s42A Planning report and associated attachments dated 27 August 2018 ("Supplementary s42A Report").
4. In particular it focuses on:
 - Issues canvassed in Section 2 of the Supplementary s42A Report relating to Scope, in particular:
 - Stopbank Heights
 - Earthworks,
 - Stopbank bypass across the Muhanga Stream, Ormond Township,
 - Issues canvassed in Section 3 of the Supplementary s42A Report relating to the Effects Assessment undertaken by Mr Whittaker, and in particular in relation to:
 - Wi Pere Trust land,
 - Dwellings located directly upstream of the scheme,
 - Bridges (Matawhero Bridge & Rail Bridge),
 - Comments on the recommended Proposed Conditions attached as Appendix 3 to Mr Whittaker's Report.

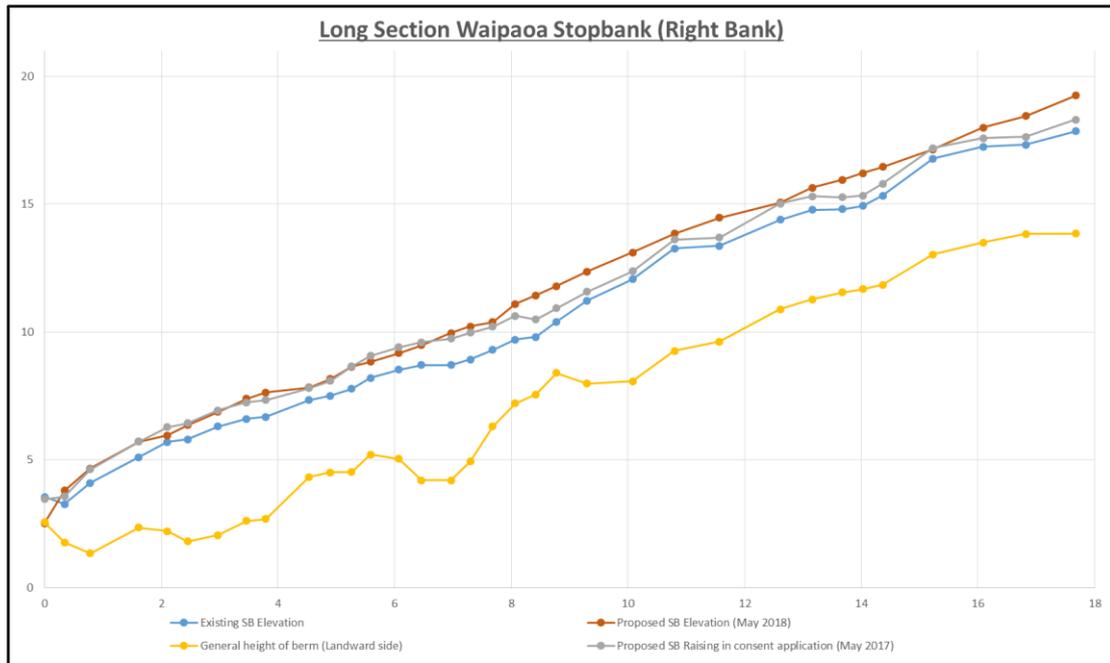
Issues relating to Scope

Stopbank Heights

5. The Applicant's report dated 17 August 2018 contained details relating to further work undertaken by the Applicant in relation to hydraulic modelling. It also contained details relating to the variability of the existing stopbank levels¹. In short, there is a high level of natural variability in the existing stopbanks due to natural settlement and other site specific issues. That level of existing variability was demonstrated by the Applicant as a result of a formal topographical survey undertaken over an 8km section of the existing stopbanks, and again detailed in the report. As also noted in the Applicant's report, detailed design will be undertaken prior to construction of each stage, and is provided for within the conditions. The Report notes that the Application always recognised that the modelling undertaken was to provide indicative stopbank heights at various locations, subject to detailed design including topographical surveys.
6. It is also important to note that the existing stopbanks form the context of the current Application, as the proposal is to upgrade the Applicant's existing assets. Therefore in my view it is inaccurate to simply focus simply on the 'number changes' in stopbank heights, without any consideration of the existing context, and in particular the existing height of the stopbanks. Mr Whittaker appears to recognise that, because at paragraphs 31-32 of his Supplementary s42A Report he outlines a number of factors that he considers are relevant to the assessment of scope, and states that "*..the above context is important and it does provide an opportunity to assess the change in scope as having similar effects to the application as notified*".
7. In order to put the changes in stopbank height in their appropriate context, the Applicant provided the following graphic in its Report², which provided in particular the heights of the existing stopbanks (blue line) against the notified application (grey line) and the current proposed elevations (orange line):

¹ Report by Applicant dated 17 August 2018, pages 6-7

² Right Bank graphic shown below from page 8 of the Report, but graphic representation of the left bank was also included at page 9 of the Report.



8. As that graphic demonstrates, there are in fact areas where the elevations now drop below the notified version (particularly at the downstream end of the scheme, and some areas where the levels have increased).
9. I consider therefore that Table 1 created by Mr Whittaker is not as helpful to the assessment because it fails to recognise the relative height of the existing stopbanks, which provide an important context for the changes (for example in some cases the existing stopbank height is 4 or 5m in height which is considered a reasonably substantive structure).
10. For example, near the middle of the scheme, the increase (at marker 16L has gone from the original estimated raising of 0.94m to 1.25m (i.e. 0.31m increase) in the context of an existing stopbank height of about 3.5m above the general ground level. However, that marker point appears to have been calculated and included in Mr Whittaker's Table 1 as one of the '8' listed cross-sections between 1m and 1.25m increase. There are a number of other cross-sections which suffer from the same affliction, including where estimated raising levels have dropped. For example, in relation to the right bank Table 1 indicated a 'maximum increase' of 1.6m. This was located at Mile Marker 25R, which has actually decreased now to 1.29m, but that figure is presumably included as one of the '10' cross-sections between 1.26m and 1.5m increase in Mr Whittaker's table. Again that decrease is in the context of an existing stopbank height of about 3m above the general ground level.
11. In addition, Mr Whittaker's Table 1 does not identify the locations of the 'maximum increase' marker points he has included in his table, or even identify whether they are at the same location. As I have noted above, one of the previous 'maximum increases' on the right bank has actually reduced as a result of the modelling. The maximum increase on the right bank of 1.78m shown in Mr Whittaker's Table 1 relates to Mile Marker 28R at the very upper end of the scheme and has only increased from 1.32m to 1.78 from what was originally indicated in the resource consent application. I consider therefore that it is more helpful to understand the context of the changes using the graphics from pages 8-9 of the Applicant's Report.
12. I note that the context of any increases from a visual and landscape perspective are addressed in the updated landscape assessment by Mr Janic Slupski attached to the Applicant's Report.

Earthworks

13. Mrs Morgan will comment in her supplementary evidence on the basis on which the Application referred to areas from which borrow material would be required and average excavation depth.
14. From an engineering perspective, I wish to make several comments on the Supplementary s42A Report and technical reports attached.
15. Firstly, the Application provides for undertaking upgrades to the existing stopbanks over a length of 64km, which will be undertaken over a number of construction seasons in order to minimise the effects on the environment as far as that is possible. Extensive conditions are proposed which will work through the detailed design phase of each section before it commences, and topographical surveys will not be undertaken until the relevant phase is ready to proceed. The likely timeframe for the whole project is 10-12 years.
16. Given the scale and extent of earthworks and inherent variability of the stopbank heights (as highlighted following the detailed survey of about 8km of stopbank where Stage 1 construction is proposed (refer Figure 1 on Page 7 of the Applicant's Report), it is inevitable that there will be a level of uncertainty at this stage about the exact volume of borrow material required for the earthworks.
17. As such, the Applicant applied for excavation from borrow areas over a total borrow area of 334ha (3.34 million m²), spread across multiple sites.
18. As I have noted above, the effects of any earthworks can be mitigated by the extensive consent conditions proposed by the Applicant, which provide for a Construction Environmental Management Plan (CEMP) that will address any adverse effects associated with excavation. I note on that basis Mr Whittaker's conclusion at paragraph 51 that the effects of the earthworks can be mitigated to ensure that the off-site effects are no more than minor.
19. I also wish to briefly respond to comments made by Sarah Thompson and Paul Murphy³ which, for ease of reference, are set out below:

We consider the significant increase in earthworks volume goes beyond the scope of the original project. We question whether there is sufficient competent material available for the proposed extent of earthworks. We note no earthwork material testing has occurred to assist in determining material competency. The increased extent of earthworks will also require further engineering assessments and is likely to lead to increased timeframes and the risk of importing material from greater distances than original anticipated.
20. Firstly, I note that no reasons are given by Ms Thompson or Mr Murphy for their conclusion that the earthworks go 'beyond the scope' of the original project. No analysis of the original Application has been undertaken to support that conclusion and it appears to conflict with Mr Whittaker's conclusion about the effects of the earthworks at paragraph 51, which I have outlined above.
21. Based on the 1.4 million m³ of borrow material currently estimated, the average depth of excavation of the borrow areas has been calculated at 0.42m deep. As will be outlined further by Mrs Morgan in her supplementary evidence, the original Consent Application referred to a 1m nominal depth of excavation over a 334 Ha area.

³ Technical Report by Sarah Thompson and Paul Murphy dated 23 August 2018, at page 28

22. In any event, depths will vary from site to site depending on the borrow requirements at each location. As I have highlighted above, the Construction Environmental Management Plan (CEMP) will provide for the environmental effects to be managed, mitigated, and addressed as part of the physical works construction phase/s.
23. In terms of the suitability of material for the intended purpose, this is a matter also raised in the Technical Memo by Mr Kouvelis (at Section 3.2). Although this is technically a construction matter for the Applicant to consider, I note that ground investigation work was carried out by LDE Ltd in their report *“Foundation Conditions and Stability of Selected Sections of the Waipaoa Stop Banks, Poverty Bay Flats, April 2014”*. The investigations indicated that;
- ‘in general terms the stopbanks are underlain by silt and clayrich alluvium overlying beach alluvium in the lower reaches. The covering of silt and clay-rich alluvium is indicated to be reasonably thin at the river mouth area (2 to 3m thick), and progressively increases in thickness upstream. In some areas, particularly at the northern end of the subject area the sand does not exist within 10m of the surface.’*
24. Cohesive silt and clay rich alluvial materials are ideal for the construction of stopbanks. With this material being 2-10m depth throughout the Waipaoa scheme there is unlikely to be a shortage of material.
25. In the unlikely scenario where there is an undersupply of available borrow material to upgrade the stopbank within the borrow areas for which consent is sought, then the Applicant may need to consider additional land purchases as the Project progresses, or additional costs incurred related to loss in productivity/efficiencies associated with longer haulage distances to get suitable borrow material to site. These are matters that can be dealt with by the Applicant as the Project proceeds, bearing in mind the long time frame over which the work is intended to be undertaken. It is understood that another resource consent would be required for this additional borrow material and that would be applied for if the need arises.
26. In relation to the estimated timeframes for the work, the increase in material may have an impact on contract periods to be slightly longer (i.e. to account for the additional material to be excavated, transported and compacted) or simply larger or more efficient construction equipment may need be utilised to mobilise the increase in earthwork quantities. These are matters that the Applicant will work through as it undertakes its construction schedules.
27. As per the CEMP, construction works are constrained to occur with the drier summer months, and comprehensive consent conditions have been proposed (which the Applicant has largely agreed on). These conditions address matters associated with erosion, sediment controls, and other environmental issues and effects associated with the proposed construction activities. An increase in material volumes and earthworks does not materially change or have an impact on the environmental requirements that still need to be complied with over the construction season.

Stopbank Bypass across Muhunga Stream

28. From an engineering perspective I wish to respond to comments in the Supplementary s42A Report (paragraph 25) that *‘There is some discomfort within the technical team regarding the Ormond Bypass’*. That statement appears to relate to comments in the Technical Report by Ms Thompson and Mr Murphy that the stopbank bypass goes *“beyond the scope of the original project.”* And that the *“additional feature has potential to create adverse effects beyond that described in the original consent application”*. No further clarification or explanation is provided by the experts.

29. Again, from an engineering perspective, I note that at caucusing the experts agreed that *'The bypass did not disadvantage the houses around Ormond'*. That conclusion is consistent with the Applicant's Report that the proposed amendment will be beneficial by providing additional storage and attenuation benefits, and reduce the flood risks to the adjacent properties and to the wider community⁴.
30. In addition, the Applicant's Report highlighted the reduction in effects as a result of the bypass, including reduction in construction impacts, and a significant reduction in the scale and intensity of work in the Ormond area, including removing the need to upgrade or replace approximately 200m of concrete revetment walls. The bypass also specifically addresses the concerns raised by Mr Thompson about works to those walls.
31. Mr Slupski will comment further on landscape impacts in this location, which appear to have been accepted by the reporting officer. Mrs Morgan will comment further on the suggestion by Ms Thompson/Mr Murphy and Mr Whittaker that the matter could be dealt with through a s127 variation.
32. I also wish to note further that the Applicant has undertaken consultation with the residents in Ormond⁵ who have expressed a support for the proposed bypass and an understanding that the new stopbank would reduce the overall flood risks to both them and the wider community.
33. Finally I note that Mr Murphy and Ms Thompson (at page 29) question the long term plan for the stopbanks located upstream of the proposed new floodgate location.
34. It is anticipated that resource consent would be required before these structures could be removed. Regardless, consultation would need to occur with the community prior to the potential removal of these structures. Consideration around either the renewal of these structures, repair or their removal would be made towards the end of their useful life.
35. Although stopbanks don't have an end of useful life, provided they are maintained correctly, concrete flood walls do. The concrete walls in this location were installed in 1983, and have been given an indicative useful life of 100 years. Consideration around the renewal, repair or removal of the concrete structures would need to be made towards the end of their useful life.

Issues canvassed in Section 3 of the Supplementary s42A Report relating to the Effects Assessment

Wi Pere Trust Land

36. The impacts of the proposed stopbank upgrade on the Wi Pere Trust land are detailed extensively in the Applicant's Report⁶. In particular, the Report outlines the extensive further modelling work that has been undertaken by the Applicant in order to understand further the effects on that property. The results of that modelling have been provided to the Wi Pere Trust, and discussions have been ongoing.
37. It is important to note that the engineers at the technical caucusing have agreed that the 1%AEP event at 2090 (accounting for climate change) which has been modelled by the Applicant represents a "low probability" event. As outlined in the Report, the Applicant has

⁴ Report by Applicant dated 17 August 2018, page 16

⁵ Report by Applicant dated 17 August 2018, pages 17-18

⁶ Pages 21-36

recognised the existing situation at the Wi Pere Trust land, which is that regardless of whether the upgrade to the existing stopbanks proceeds, the Wi Pere land is already subject to flooding – a fact that is recognised by the overlay maps in the district plan, and evidenced in the recent June 2018 flooding events.

38. Given the previous assertions by Mr Peacock in his earlier evidence filed that an increase in flood water over the Wi Pere property could mean that the packhouse, sheep yards and nearby house ‘could be damaged or even swept away by floodwaters’, the Applicant undertook further analysis to investigate that claim. The results are detailed in the Applicant’s Report and concluded that while the houses in particular are likely to be inundated in both scenarios (no upgrade and upgrade), because of low velocities ‘damage to light structures is unlikely to occur’.
39. It is noted that Mr Kouvelis has not provided any comments on the Applicant’s Report in this respect and instead simply states that in his opinion there is ‘an obligation’ on the Applicant to provide mitigation where there is any increase in flood risk to private property. No basis for that statement has been provided. At paragraph 46 Mr Whittaker states that mitigation measures available for Wi Pere Trust could include raising of building foundations and/or localised bunding works.
40. As noted by Mr Whittaker at paragraph 26, the Applicant has provided a significant amount of information and assessment on the flood levels for the Wi Pere Trust landholding. The Applicant has been in consultation with the Trust, but has been unable to reach agreement to date and the Applicant will advise the Commissioner further on this matter prior to commencement of the hearing.

Dwellings located directly upstream of the scheme

41. Again, the effects of the proposal on three upstream houses has been modelled further and discussed in the Applicant’s Report⁷. The modelling undertaken by the Applicant indicates that there will be a less than minor effect on three (3) properties in a 1% AEP at 2090 (accounting for climate change) event.
42. This matter has been discussed further with the two relevant landowners and the Applicant is confident that agreement will be reached with the upstream owners around mitigation.
43. It is anticipated that the Applicant will be in a position to advise the Commissioner further on this matter prior to the commencement of the Hearing.

Houses Adjacent to the Stopbank / Prejudice to Third Parties

44. In general there are two main township areas where dwellings are located next to the existing stopbank. These are around the Muhanga Stream / Ormond Township (17 houses), and around the Patutahi Township next to the Whakaahu Stream (8 houses).
45. Around the Ormond Township, many of these residents living close to the stopbank were spoken to by the Applicant following submissions as a result of the public notification process, or as part of specific consultation undertaken associated around the proposed Muhanga Stream bypass⁸. During this consultation there was general support for the stopbank raising work proposed.

⁷ Pages 37-39

⁸ Pages 17-18, para 101

46. Stopbank heights in the Patutahi Township are about 3m in height relative to the ground level on the protected side. The proposed stopbank raising around the Patutahi area is indicated by cross section T8R near the confluence of the Whakaahu and the Waipaoa River which is 1.28m (raising of 0.88 was originally indicated).
47. Stopbank heights in the Ormond Township are about 1.5m-2m in height above the general ground level. The proposed stopbank raising around the Ormond area is indicated by cross section 21L which is 0.48m (this is a 200mm decrease from what was originally indicated (0.68m)).
48. Throughout the Scheme, the existing stopbank heights are up to 4 or 5m high above the general ground level in places (maximum stopbank height of 6.27m, the average is about 3m). The heights of the proposed stopbank raising ranges from 0m up to 1.78m.
49. It should be noted that where the largest area of raising is proposed (1.78m at 28R) under the revised levels, 1.32m of raising was stated in the original resource consent application at that location (increase of 460mm). There are no houses located nearby cross section 28R.

Waipaoa Bridges (Matawhero Bridge & Rail Bridge)

50. Again, the potential effect on Waipaoa bridges is detailed in the Applicant's Report⁹. The engineers agreed at technical caucusing that they were *'Comfortable with the model around the bridges at this stage, but requires further attention to design at a later date'*.
51. It should be noted that consultation was undertaken by the Applicant with both KiwiRail and NZTA prior to public notification. Neither of those parties lodged a submission.
52. In any event, dialogue and open communications with NZTA have been continuing regarding any potential implications of the proposed stopbank improvement works, particularly around the Matawhero Bridge, and the Applicant is confident that further attention to these structures can be addressed at the detailed design stage.

Construction Staging / Risk

53. It is important to note that the Scheme is not fully complete and capable to convey the design flow until the last section of stopbank has been completed.
54. The draft construction sequencing has been outlined in the CEMP. The construction sequencing to 'top up' the existing Scheme has followed a risk based approach. The sequencing of works provides for the eastern stopbanks to be upgraded first. This will provide for improved protection of both rural and urban environs, and especially critical lifeline services such as the Hospital and Airport. Following completion of the eastern stopbank, upgrade of the western stopbank starting from the Rivermouth in an upstream direction will be completed.
55. The construction sequencing currently promoted by the Applicant should be taken as indicative only. There must be flexibility within the construction sequencing to account for any changes in the risk information, damage following flood events, and reprioritising as a result of external factors such as funding, or alignment with the cycle trail roll-out.
56. The detailed design for each construction season is envisaged to be completed 12-18mths in advance of construction works occurring in order to ensure certainty around land access discussions and negotiations, and necessary planning to be completed well in advance of any construction activities commencing.

⁹ Pages 39-40

57. Maintenance and repair works are undertaken as part of the Land, Rivers and Coastal in-house operational team. Bends and other vulnerable river bank areas are often protected by tree plantings (normally willows), but also including other species. These trees are a valuable asset to the flood control scheme and considerable maintenance work, such as tree layering in conjunction with fencing to exclude stock, is carried out to maintain these assets in good working condition. Inspections and conditional assessment are also regularly undertaken to audit and identify changes and maintenance requirements to the Waipaoa Flood Control Scheme. Following the upgrade of the Scheme this maintenance and repair work will continue and be undertaken as per Activity Management Plans and other operational documents and manuals.

Conditions

58. Although the Applicant has reached agreement with the Consent Authority on a vast majority of the conditions, there are still several conditions outstanding that are not agreed. The Applicant will continue to work with the Consent Authority to try and reach agreement on the draft conditions in advance of the hearing. Mrs Morgan will comment more directly on the proposed conditions in her supplementary evidence, but I wish to make several comments from an engineering perspective.
59. Mrs Morgan will address more substantively conditions recommended by the Consent Authority in relation to fish passage. I wish to note that allowance for fish passage involves allowing water to pass through structures, which in some cases can increase those structures to greater risks and/or failure during a flood event. The purpose of the flood control scheme upgrade is to construct a scheme that provides a greater level of flood protection to the community. The Applicant has provided recommended conditions that it considers draws an appropriate balance between providing for fish passage while ensuring it will not compromise the flood protection scheme.
60. Earthworks Condition 70. The Reporting Officer has amended this condition (presumably on the recommendation of Ms Thompson / Mr Murphy) to reduce the extent of earthworks (in length) at any one time from 500m to 200m.
61. The proposed 200m restriction in site length will significantly hamper construction. It is unclear of the reasons why this length has been decreased to 200m, as none have been provided. This condition will in my opinion lengthen the construction period and thus lengthen the duration before the Scheme is fully operable. It will also have an impact on scheme costs, as contractor efficiencies will be reduced.
62. With or without grass cover, stopbanks have a residual risk of failure during a flood event. The increase in risk during construction is minor and in my view does not warrant such a restrictive condition.



Joss Ruifrok
Senior Project Engineer

03 September 2018