Before a Board of Inquiry
Transmission Gully
Notices of Requirement and Consents

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*under:* the Resource Management Act 1991

*in the matter of:* Notices of requirement for designations and resource consent applications by the NZ Transport Agency, Porirua City Council and Transpower New Zealand Limited for the Transmission Gully Proposal

*between:* **NZ Transport Agency**
*Requiring Authority and Applicant*

*and:* **Porirua City Council**
*Local Authority and Applicant*

*and:* **Transpower New Zealand Limited**
*Applicant*

# Second statement of rebuttal evidence of Dr Timothy Simon Richmond Fisher (Sediment Yield Peer Review) for the NZ Transport Agency and Porirua City Council

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Dated: 16 February 2012

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**SECOND STATEMENT OF REBUTTAL EVIDENCE OF DR TIMOTHY SIMON RICHMOND FISHER FOR THE NZ TRANSPORT AGENCY AND PORIRUA CITY COUNCIL**

## INTRODUCTION

1 My full name is Timothy Simon Richmond Fisher.

2 I have the qualifications and experience set out at paragraphs 2 - 6 of my rebuttal evidence, dated 27 January 2011.

3 I repeat the confirmation given in that evidence that I have read, and agree to comply with, the Code of Conduct for Expert Witnesses (Consolidated Practice Note 2011).

4 In this statement of rebuttal evidence, I:

4.1 Respond to the supplementary evidence of:

(a) Mr Brian Handyside, on behalf of the Director-General of Conservation (*DOC*); and

(b) Ms Helen Kettles, on behalf of DOC.

5 I do not respond to the section 42A reports, provided by Dr Murray Hicks and Mr Gregor McLean, as these are covered in the second rebuttals of **Mr Martell**, **Ms Malcolm** and **Mr Gough**, respectively.

6 The fact that this rebuttal statement does not respond to every matter raised in the evidence of submitter witnesses within my area of expertise should not be taken as acceptance of the matters raised. Rather, I rely on my evidence, including this further rebuttal statement, to set out my opinion on what I consider to be the key sediment matters for this hearing.

7 For the purposes of this evidence, I will refer to the NZ Transport Agency (*the NZTA*) Project and the Porirua City Council (*PCC*) Project collectively as the "Transmission Gully Project" (and hereafter, *the TGP* or *the Project*).

## SUMMARY OF EVIDENCE

8 I consider in general that the consent conditions proposed with amendment resulting from expert conferencing on 13th and 15th February provide a suitably precautionary approach to managing the risks to the environment from sediment discharges during construction. I note that refinement of wording for proposed conditions is continuing.

## SUPPLEMENTARY EVIDENCE OF MR HANDYSIDE

### Stabilisation trigger events

9 Mr Handyside's[1] supplementary evidence supports the approach I have outlined[2] in my evidence requiring all practicable erosion and sediment control measures to be put in place if a stabilisation trigger event is forecast. However, Mr Handyside asked for clarification of the term "all practicable" and raised this issue again in conferencing[3]. In response to this I note that the stabilisation trigger event has been:

9.1 Defined in the proposed conditions (13 February);

9.2 Added to condition E.3 as a sediment and erosion control objective:

> *if a stabilisation trigger event is forecast, deploy erosion control measures on all open/active earthworks (refer to ESCMP requirements in Conditions E14A and E14B);*

9.3 Added to condition E.5 as a requirement of ESCPs:

> *Approach and procedures for ensuring advance warning of a heavy rainfall and stabilisation trigger event and the responses that are required in accordance with Condition E3. The ESCP shall detail the procedures and have the resources (supplies, equipment and labour) necessary to deploy the required erosion control measures within the period between forecast and peak rainfall for the stabilisation trigger event;*

10 I note that some changes to the wording of these conditions are proposed as a result of conferencing on 15 February, and the conference statement should be referred to when this is ready.

### Sediment management peer review panel

11 Mr Handyside[4] supports the proposal for a Sediment Management Peer Review Panel that I have recommended[5]. The sediment generation experts (**Ms Malcolm**, Dr Basher, Dr Hicks and I) also support[6] the proposed Sediment Management Peer Review Panel.

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1 Mr Handyside supplementary evidence 3 February 2012, paragraph 14.

2 Dr Fisher rebuttal evidence 27 January 2012, paragraph 69.

3 Planner and Sediment Expert Conferencing 8 February 2012, paragraph 14

4 Mr Handyside supplementary evidence 3 February 2012, paragraph 15.

5 Dr Fisher rebuttal evidence 27 January 2012, paragraph 83.

6 Expert Conference Joint Report to the Board of Inquiry – Sediment Generation Experts, 13 February 2011, paragraph 9.

Mr Handyside has asked for details of the terms of reference and objectives for such a panel and raised this issue again in conferencing[7]. Details of the Sediment Management Peer Review Panel have been added to the proposed conditions (13 February) that I have contributed to and support. Some refinement of the scope for the Peer Review Panel is continuing (conference 15 February).

**Uncertainty**

12 A key issue is the uncertainty in the sediment yield estimates. The sediment generation experts have recognised that this occurs due to the estimation methods and that it is inherent in sediment science[8][9]. The agreed position of the sediment generation experts to manage this risk is that

> *"We agree conditions are the best way of controlling effects and these should be comprehensive and precautionary to manage uncertainty and to protect the sensitive receiving environment."* [10]

**Earthworks area restrictions**

13 I do not support the maximum area restriction of 9 ha per annum of bare land that Mr Handyside proposes for conditions E.1 and E.2. Mr Handyside[11] and Dr Basher[12] have previously criticised the USLE method and the assumptions used by **Ms Malcolm** in Technical Report 15 (also conferencing 7/8 December[13]). In response to this criticism, **Ms Malcolm** undertook more detailed work to determine a revised sediment yield based on more detailed USLE calculations. It was agreed in conferencing on 20 January that *"the revised sediment estimate provides a better estimate and a reduced uncertainty in modified USLE parameters"*[14]. I do not support Mr Handyside's proposed areas as they are based on a USLE assessment that is far simpler than any estimate undertaken to date, with greater uncertainty in all parameters. It is my opinion that the revised sediment yield estimate remains the best estimate and should be used as the basis for determining areas for conditions E.1 and E.2.

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7 Planner and Sediment Expert Conferencing 8 February 2012, paragraph 27

8 Expert Conference Joint Report to the Board of Inquiry – Earthworks and Sediment Control Conferencing, 20th January 2011, paragraph 9.

9 Expert Conference Joint Report to the Board of Inquiry – Sediment Generation Experts, 13 February 2011, paragraph 7.

10 Expert Conference Joint Report to the Board of Inquiry – Sediment Generation Experts, 13 February 2011, paragraph 13.

11 Mr Handyside evidence in chief 21 December, paragraphs 44 – 47

12 Dr Basher evidence in chief 21 December 2011, paragraphs 7 – 15 and 29 – 50.

13 Earthworks and Sediment Control Conferencing 7/8 December 2011, paragraphs 15, 17, 19, 21 and 23.

14 Earthworks and Sediment Control Conferencing 20 January 2012, paragraph 8

14 I would also note that there is potentially some conservatism in the areas proposed by **Ms Malcolm,** as these are based on the revised sediment estimates, which gave 27% less total sediment for the Q10 events compared to the estimates in Technical Report 15 that were used as the basis for assessing the effects in the harbour[15].

15 Specific limitations in the approach of Mr Handyside which result in the smaller areas that he proposes are detailed in the second rebuttal of **Ms Malcolm**[16] and I agree with the points she makes, so for sake of brevity I do not repeat these points here.

16 What Mr Handyside does do that I support is recognise the uncertainty in the sediment estimates and suggest measures to account for it. Ms Kettles[17] supports Mr Handyside's areas for the reason that his approach is precautionary.

17 Mr Handyside cites my recommendation for a precautionary approach[18], which I still support due to the scale of the earthworks and the sensitivity of the receiving environment. However, I do not support arbitrarily halving the earthworks area, which is what Mr Handyside proposes to account for the uncertainty. Such an arbitrary approach might be warranted if the effects from sediment on the receiving environment were causing significant effects, but **Dr De Luca's** assessment of the Project's effects on the Porirua harbour is[19]:

> *Suspended sediment in all modelled scenarios was determined to not cause adverse effects on marine ecological values due to sediment dropping out of suspension within 24 hours after the peak of the storm event.*
>
> *Of the modelled scenarios, all but two events were considered to have negligible or low adverse effects on marine ecological values, primarily as sediment deposition was either minimal or largely confined to parts of the harbour with low ecological values.*

18 **Dr De Luca**[20] details that the two events for scenarios with the 10 year rainfall and specific wind conditions for the Duck/Pauatahanui had adverse effects of high significance and for the Kenepuru/Porirua had adverse effects of moderate significance[21]. These events have probabilities of occurrence during the peak two

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15 Dr Fisher rebuttal evidence, paragraph 50.

16 Ms Malcolm second rebuttal, 16 February 2012

17 Ms Kettles supplementary evidence 3 February, paragraph 21

18 Dr Fisher rebuttal evidence 27 January 2012, paragraph 57.

19 Dr De Luca evidence in chief, paragraphs 15 and 16.

20 Dr De Luca evidence in chief, paragraph 19.

21 Dr De Luca evidence in chief, paragraphs 17 and 18.

year construction period of 13% and 7%, respectively. Furthermore, putting these events into perspective, the Project component of the sediment during these events comprises only 5-6% of the sediment that would be deposited in the harbour without the Project. **Dr De Luca** concludes that the adverse effects from these events are likely to be small in comparison to baselines that may be affected, and the habitat in these areas must be relatively resilient, and is likely to naturally recover over time.

19 Dr Keesing[22] considers:

> *"Predictions of suspended sediment increase in the streams range from 2 to 43% above the background in a 10 year storm, but there is little predicted stream deposition. While periodic larger disturbances are not harmless, they are short term and do not significantly or permanently adversely affect the existing stream communities."*

20 Therefore, given this context of effects as assessed by ecologists, I consider that the approach to managing uncertainty by halving the earthworks areas as suggested by Mr Handyside is too conservative.

21 Progress on this issue was made in the conferencing of sediment management experts on 15 February 2012. There was agreement in principal that a suitably precautionary approach might be to limit the earthworks areas in the first year of the construction, so that the performance of the erosion and sediment control systems and the total sediment yield from the Project could be monitored, assessed and reported. If changes to practices were necessary they could be made via staging and ESCPs in keeping with the adaptive management approach. Or changes in areas could be made for subsequent years, which are allowed for in the change and review clauses of conditions E.1, E.2 and E.2B. The action from the conference was for **Mr Edwards** to advise on the areas required for the first year of construction and for the sediment experts to consider the suitability of these areas.

22 There are other approaches, such as by other consent conditions, that also add to the precautionary approach being proposed.

**Rigorous and precautionary conditions**

23 My preferred approach is to ensure rigorous consent conditions that allow for the erosion and sediment activities to be controlled and monitored, and potential effects to be monitored. The proposed consent conditions are collectively more comprehensive and rigorous than I have seen elsewhere and reviewed in the preparation this evidence (including the Waterview Connection

[22] Dr Keesing evidence in chief, paragraphs 20 and 21.

Project, NGTR[23], Westwind, Mill Creek, Westchester Drive). Key features of the conditions that give me comfort that effects will be rigorously managed include:

23.1 An adaptive management approach that has been used on large scale earthworks projects in Wellington, such as Westwind and as is proposed for Mill Creek;

23.2 Area limits for earthworks (E.1 and E.2) based on the NGTR where area limits were applied. For that project the sensitive receiving environments of the Nukumea and Otanerua streams[24] and the Waiwera and Puhoi estuaries[25] were major concerns;

23.3 Area limits for earthworks in the first year (detailed above) as proposed during conferencing of sediment management experts on 15 February 2012, with performance feedback and changes to earthworks in subsequent years if necessary;

23.4 Requirements for progressive stabilisation (E.3C) based on the condition from NGTR;

23.5 Earthworks slope controls (E.3D) again based on the condition from NGTR;

23.6 Conditions relating to trigger stabilisation events (>50 mm/day), requiring deployment of erosion control measures across non-stabilisation areas. This is a Project initiative to provide extra erosion control including stabilisation during extreme rainfall events (Definitions, E.3(jj) and E.5(l));

23.7 Inclusion of a design standard of 70% removal of total suspended sediment (E.3A(e)), as it is unusual to specify the performance required for erosion and sediment control systems;

23.8 Stabilisation trials (E.31) to find the most effective stabilisations measures for the Project;

23.9 The requirement for erosion and sediment plans to consider the particular requirements of winter working (E.5(p)). I note that during conferencing of sediment management experts on

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[23] Northern Gateway Toll Road (NGTR) which was known as ALPURT B2 during consenting.

[24] Nukumea and Otanerua steam were considered unique in the Auckland Region due to the undisturbed soft bottom stream habitats. The steams and the NGTR alignment are in Recommended Area and Protection under the DOC Protected Natural Areas Programme.

[25] Puhoi and Waiwera estuaries border the Wenderholm Regional Park, with the Puhoi estuary also bordering the Mahurangi Regional Park.

15 February 2012, it was proposed that winter earthworks conditions be strengthened;

23.10 Erosion and sediment control monitoring (E.14A and 14B and detailed in the ESCMP found in the CEMP and Technical Report Appendix 15L) that goes beyond the normal practises of inspection of devices to include:

(a) physical monitoring of sediment detention devices (pond and decanting earth bunds);

(b) instream monitoring upstream/downstream of worksites;

(c) continuous upstream/downstream monitoring at catchment control locations (including 1 year of pre-construction monitoring) (see comments to follow); and

23.11 The inclusion of a Sediment Management Peer Review Panel (E.5A and E.5D) to provide expert independent review to GWRC and the consent holder. This has been used elsewhere but I am not aware of it specifically being used before for sediment and erosion control matters. The condition allows the Manager of the Regional Council and DOC to suggest independent experts for this Panel.

24 These conditions are over and above what would normally be used to control earthworks activities on a standard project, and rightly so given the scale of the Project and environmentally sensitive receiving environments. A number of these conditions have been added to the proposed conditions as a result of submissions, evidence and expert conferencing. Collectively they provide me with the satisfaction that a precautionary approach has been used for the Project, and one that meets or exceeds best practice.

**SUPPLEMENTARY EVIDENCE OF MS KETTLES**

25 Ms Kettles[26] notes her agreement with **Dr De Luca** on a requirement for continuous monitoring of erosion and sediment control discharges. I note the agreed preference of sediment generation experts[27] for continuous monitoring (of flow and turbidity) at catchment control points upstream and downstream of the Project. I consider that continuous monitoring at catchment control points is better for the following reasons:

[26] Ms Kettles supplementary evidence 3 February, paragraph e.i

[27] Expert Conferencing Joint Report to the Board of Inquiry – Sediment Generation Experts, 13 January 2012, paragraph 10.

25.1 Continuous monitoring at catchment control points allows for the total sediment yield from the Project to be estimated (subject to the uncertainty of the monitoring methodology and technologies). This can then be fed back into the Project in accordance with the adaptive management approach. For example at the end of the first year of construction with reduced areas to confirm ESC practices and project sediment loads.

25.2 Continuous monitoring at catchment control points allows the NZTA and PCC to be clear on what sediment is being generated from the Project versus other sources (which will be the majority of sediment load).

25.3 I am also concerned that continuous monitoring of erosion and sediment control discharges may not be achievable as there will be potentially many discharge locations.

25.4 Monitoring of sediment retention devices (ponds and decanting earth bunds) is proposed and these are the majority of sediment treatment devices anyway.

26 Ms Kettles' concern with condition G.15E(ii) regarding the "stabilisation trigger" has been addressed by planner and sediment expert conferencing[28] which considered "heavy rain" and "stabilisation trigger events" and suggested rewording and follow up actions. This is reflected in the conditions proposed by **Ms Rickard** (13 January 2012). Further consideration was given to the "stabilisation trigger events" during sediment management conferencing on 15 February, and minor changes to wording were agreed and will appear in the conferencing statement (subject to final editing and signing).

**Dr Timothy Simon Richard Fisher**
16 February 2012

[28] Expert Conferencing Joint Report to the Board of Inquiry – Planner and Sediment Expert Conferencing, 8 January 2012, paragraphs 11, 12 and 14.