Before the Expert Panel
I mua i te roopu tohunga

FTAA-2512-1157

Under	the Fast-track Approvals Act 2024 ('**FTAA**')
In the matter of	a substantive application under the FTAA for an alteration to an existing designation, resource consents, a wildlife approval, archaeological authorities and a complex freshwater fisheries activity, to construct, maintain and operate the Belfast to Pegasus Project
By	**New Zealand Transport Agency Waka Kotahi** Applicant

Statement of Evidence of Paul Edward Walker (contaminated land)

Dated 15 May 2026

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Statement of evidence of Paul Edward Walker

1 Introduction

1.1 My full name is Paul Edward Walker.

1.2 I am a Principal Consultant at Tonkin & Taylor Ltd. I have been in this position since August 2015. I am responsible for the design, completion and review of contaminated land-related assessments throughout New Zealand.

1.3 I hold a Masters of Science in Soils and Environmental Pollution and Bachelor of Science in Physical Geography. I have over 27 years of experience in the assessment, remediation and management of contaminated land in the UK and New Zealand. I am certified by the Environmental Institute of Australia and New Zealand (EIANZ) as a Certified Environmental Practitioner (CEnvP).

1.4 I have been involved in the State Highway 1 North Canterbury – Woodend Bypass Project (Belfast to Pegasus) ('the **Project**') since March 2025. I am the principal reviewer of the Ground Contamination Investigation report lodged with the Project's substantive application.

1.5 My evidence has been prepared to support the New Zealand Transport Agency Waka Kotahi ('**NZTA**') response to comments from invited parties. This statement of evidence responds to comments from Environment Canterbury ('**ECan**'), and specifically the document 'Appendix 3: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Contaminated Land', from Hana Christenson to Joanne Mitten, dated 1 May 2026 (the '**ECan report**').

2 Code of conduct

2.1 While the application is not before the Environment Court, I confirm that I have read and am familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and I agree to comply with it.

2.2 Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

3 Scope of evidence

3.1 My evidence addresses the following:

a Acceptable contaminant concentrations in soil generated by the Project's construction earthworks that can be reused on site – 'soil reuse criteria'.

b The sampling approach to be undertaken to demonstrate that contaminant concentrations met the soil reuse criteria.

c Set back distance from surface water.

4 Executive summary

4.1 The Applicant and ECan agree that soil reuse is to be encouraged as it promotes a range of environmental benefits. Soil will be most likely reused in noise bunds, embankments and landscaping.

4.2 The areas of disagreement between the Applicant and ECan for soil reuse principally relate to the selection and application of numerical soil reuse criteria, and set back distances for the reuse of soil in proximity to surface water and wetlands.

4.3 In respect of the selection of soil reuse criteria, I consider that the 'leaching to water' criteria proposed by the Applicant are appropriate as they were specifically developed for the protection of groundwater and surface water. The 'leaching to water' criteria incorporate layers of conservatism that compound to outweigh the uncertainty in their derivation or how site-specific or region-specific factors may increase the potential for unacceptable effects. Use of the 'leaching to water' criteria allows for a greater volume of soil to be appropriately reused onsite with cost and sustainability benefits for the Project.

4.4 ECan proposes that a maximum concentration is set for each contaminant that would apply to any individual sample in a data set used to assess soil for reuse. I consider that any such maximum value would be arbitrary and would not reflect the contribution of that sample to the potential for contaminant discharge from the soil. It could also unnecessarily render stockpiles unusable on the basis of a single elevated sample or require soil management in much smaller stockpiles which would increase administrative burden and cost. Instead I recommend that the 95% Upper Confidence Limit (UCL) is used for assessment against soil reuse criteria as this approach provides a conservative estimate of average concentrations and is recommended as a suitable approach in NZ guidelines

relating to the assessment of surplus soil for disposal. It allows for a simpler and more streamlined reuse of soil for the Project.

4.5 The Applicant proposes that soil reuse within 20m of surface water or wetlands will be subject to an additional control through compliance with guidelines for sediment quality. This is to provide additional protection to surface waters and wetlands in areas where soil could migrate to surface water in overland flow, without unreasonably constraining soil reuse. ECan has proposed a 100m set back, though does not provide the basis for this distance. Given the relatively flat nature of the Project site, I consider that the potential for migration of contaminants in soil from 20 m distance is low. During construction (typically higher risk due to exposed surfaces) robust erosion and sediment controls will be in place until soil surfaces are stabilised through vegetation growth, so the direct runoff of contaminated sediment into surface water is unlikely. On this basis I consider the 20m setback adequate and the 100m setback unnecessary. A lesser setback distance provides NZTA with a larger area within the constrained Project footprint to sustainably and appropriately reuse soil.

5 Response to comments from Environment Canterbury

Soil Reuse Criteria – areas of disagreement.

5.1 The Applicant and ECan agree that the reuse of soils generated by the Project's construction earthworks is an initiative that can reduce waste and emissions and the unnecessary use of landfill capacity. Soil will be reused in noise bunds, embankments and landscaping. Disagreement between the Applicant and ECan centres on the allowable contaminant concentrations in the soil to be reused.

5.2 Both the Applicant and ECan propose reuse criteria that correspond to default Waste Acceptance Criteria ('**WAC**') for a Class 4 Managed Fill facility, as defined in the Waste Management Institute of New Zealand Technical Guidelines for Disposal to Land, Revision 3.1, September 2023 (the '**TGDL**'). The Class 4 WAC set out in that TGDL were derived by Pattle Delamore Partners ('**PDP**') and peer reviewed by a technical working group of senior contaminated land and waste management specialists.

5.3 The reuse criteria proposed by ECan are the 'Adopted' WAC values presented in Table C-3 of the TGDL. The 'Adopted' WAC are generally the lowest (most protective) of individual criteria separately derived to protect human health, ecological, groundwater and surface water receptors – i.e. the 'limiting pathway'. In most cases the 'Adopted' criteria are those which protect terrestrial biota (soil microbes, invertebrates, plants, wildlife and livestock) or human health in the

context of residential land use where up to 25% of produce consumed by residents is grown on the site.

5.4 By contrast, the Applicant has selected reuse criteria that were derived to primarily be protective of groundwater quality ('leaching to water' criteria) to reflect:

a The way in which soil is likely to be reused – i.e. in landscaping on the sides of elevated sections and within noise bunds, with minimum potential for future disturbance or human exposure; and

b The key receptors most likely to be exposed to contamination present in the reused material – principally surface water and groundwater quality, and to a lesser extent to protect future users of the site (workers on/adjacent to the road, future landowners outside of the road corridor). Complying with residential land use standards within the road corridor is not necessary as the road will not include residential land use. Protection of terrestrial biota in the road corridor from exposure to contaminants is also not of primary concern.

5.5 ECan disagrees with the use of the 'leaching to water' criteria proposed by the Applicant due to the belief that the 'leaching to water' criteria are not sufficiently protective of groundwater quality in Canterbury. ECan raises specific concerns regarding the derivation and application of the 'leaching to water' criteria. I respond to these concerns below.

Derivation and application of soil reuse criteria.

5.6 A Class 4 Controlled Fill facility is defined by the TGDL as predominantly natural soil and construction and demolition material that may contain chemical concentrations greater than local natural background concentrations but with specified total concentrations. In the absence of nationally applicable guidelines or standards specifically for soil reuse, the TGDL WAC for a Class 4 facility largely capture the intent of what soil reuse guidelines would be – the beneficial use of soil material generated from brownfield development, which contains contaminants at concentrations which present low risk of adverse environmental or human health effects.

5.7 Because of the material they accept, Class 4 facilities do not require the same level of siting consideration as Class 1 or Class 2 landfills. The TGDL state that for a Class 4 facility, site ownership, location and transport distance are likely to be the predominant siting criteria. The TGDL further states that the siting

approach for these fills does not require a significant focus on containment, and that the maximum chemical contaminant limits are intended to be the primary means of controlling potential adverse effects. The TGDL should not be interpreted as supporting unrestricted use of soils that meet Class 4 WAC as ECan suggests in paragraph 27 of the ECan report. Rather, the TGDL define WAC that are sufficiently conservative and therefore protective where there are site features (such as shallow groundwater and nearby surface water) that would constrain the establishment of Class 1, 2 and 3 facilities.

5.8 The derived WAC for a Class 4 facility are listed in Table C-3 of the TGDL. For each of the listed contaminants WAC were derived to account for different receptors and contaminant exposure pathways. It is important to note that the WAC for each of the receptors/pathways considered are 'screening'-level or 'Tier 1' criteria. Tier 1 criteria are typically based on coarse assumptions and are generally derived so that there is a high degree of confidence that contaminant concentrations at or below the derived value are unlikely to result in unacceptable effects. Where contaminant concentrations exceed the derived value, it does not mean that an unacceptable risk automatically exists, but that further assessment of the risk is warranted. Whilst Tier 1 criteria inherently incorporate uncertainty, because they are intended to be used as a first pass, they also incorporate conservative assumptions to capture a broad range of conditions.

5.9 As ECan notes, the Class 4 'leaching to water' criteria were derived using a national data set of soil and soil leachate analyses. The derivation method has been summarised by ECan and is set out in detail in the PDP report "Derivation of Class 3 and Class 4 Landfill waste Acceptance Criteria, June 2021". I will not repeat the derivation process here, but I note the following assumptions and considerations in the derivation which describe the compounding conservatism that is baked into the derivation process and addresses specific ECan concerns:

a The derivation for metals is based on soil leachate data obtained using the Synthetic Precipitation Leaching Potential ('**SPLP**') method which is intended to mimic leaching that could occur during infiltrating rainfall. As the SPLP method involves agitating a volume of soil in a larger volume of slightly acidic water over 12-18 hours, it is more 'aggressive' than natural rainfall infiltration conditions. SPLP analysis is therefore likely to over-predict leaching when compared to natural rainfall infiltration conditions in which the soils are highly unlikely to be fully saturated. Although ECan has indicated (paragraph 28) that the mineralogy of Canterbury soils means that they may have greater potential to leach contaminants, I consider that this increased

potential (if it exists) has already been accounted for by the use of SPLP data which is likely to over-estimate leaching.

b For organic contaminants such as petroleum hydrocarbons, leaching from soil into water is heavily dependent on the presence of organic carbon in the soil. In its derivation of WAC for organic contaminants, PDP states *"For the Class 4 derivations and foc [fraction of organic carbon] of 1% has been assumed in the Guidelines. This is a reasonable (and conservative) value for most of New Zealand soils but may not be conservative for sandy or granular soils with low organic carbon. However, if it is assumed that most waste soil will have at least 1% foc, then even if some of the soil is sandy, on average the waste mass will have an foc of 1% or more".* It is likely that the majority of soil reused will be topsoil and shallow soil and that the foc would be higher than 1%. The effect of assuming a low foc in soils is to over-estimate the amount of organic contaminants that will partition (leach) from soil into soil leachate and from there to groundwater.

c The derivation allows for a 20-fold dilution of contaminants in the soil leachate from the point it is generated in the soil pores as it migrates through soil, into groundwater and to the groundwater receptor (assumed to be present at the site boundary). The 20-fold dilution factor is taken from a United States Environmental Protection Agency (USEPA) report "Soil Screening Guidance: Technical Background Document. Second Editions May 1996". The 20-fold dilution value was derived using data from hundreds of monitoring sites in the US and is stated to be applicable to sources up to 0.5 acres (0.2 hectares) in size – though may be applicable to larger sites. It is important to note that the 20-fold dilution value is based on a number of assumptions that are likely to be more conservative than at Project site, including:

    i The criteria derivation method assumes that contaminated soils extend to the groundwater table, meaning that the derivation does not allow for the natural processes of attenuation (reduction in contaminant concentrations) that contaminated leachate would undergo as it moves through unsaturated soil. By not considering attenuation, the derivation over-estimates the concentration of contamination that reaches groundwater. Whilst the depth to groundwater varies across the Project site, it is not proposed to reuse soils below the water table – rather, soils will be placed at or above current ground level (i.e. approximately 1-2m above the highest groundwater levels). Attenuation of contaminants in leachate (if generated) would therefore be expected to

occur to some degree as leachate migrates through unsaturated soil to the water table. However, by assuming that waste extends to groundwater, the derivation effectively accounts for situations where groundwater at the Project site is less than 1-2m below ground level, the issue raised by ECan in paragraph 24.

ii It is assumed that the receptor groundwater well is at the edge of the source, meaning that there is no dilution of contamination in the aquifer between the source and the receptor. No groundwater use currently occurs at the edge of the road corridor (the assumed extent of reused soil) and therefore dilution in groundwater between the site and groundwater user would be expected.

d The derivation of WAC for metals is based on identifying a soil total concentration which, based on the national dataset, would 97%-98% of the time result in an SPLP generated leachate concentration that would be less than the NZ Drinking Water Standard ('**DWS**') Maximum Acceptable Values ('**MAVs**') assuming 20-fold dilution between the soil pore space and groundwater receptor. In other words based on the national data set there is only a 2-3% chance that soil containing the maximum 'leaching to water' WAC would result in the concentration in groundwater exceeding the NZ DWS even assuming a dilution factor that is conservative for the reasons described above, and assuming leachate generation that is likely to be over-estimated by SPLP analysis.

e The derivation is based on meeting NZ DWS MAV at the site boundary, based on a 20-fold dilution factor. I acknowledge that this does not align with the Canterbury Land and Water Regional Plan that limits groundwater quality at the property boundary to half the DWS MAV (refer to ECan paragraph 25). However, for the reasons described above, I consider that the derivation already includes sufficient conservatism, such that the regional water quality limits would not be exceeded at the site boundary were soils at up to 'leaching to water' WAC reused.

f Similarly, I consider that the derivation includes sufficient conservatism to account for the existence of conditions such as oxygen-deficient conditions, or low pH conditions which could increase the potential for leaching (refer ECan paragraph 26). I would also add that whilst the potential for localised low pH or anaerobic conditions cannot be discounted they are unlikely to be extensive given that it is intended to reuse soil material with a relatively small

proportion of organic matter compared to that which would be accepted in a Class 1 or Class 2 landfill.

5.10 ECan states (paragraph 28) that whilst the 'leaching to water' WAC are potentially not protective of Canterbury groundwater, the internal data that it has reviewed demonstrates that the 'Adopted' WAC are likely to pose an acceptable risk to environmental receptors including groundwater and surface water. I note that the 'Adopted' WAC values are between 2 and 20 times lower than the 'leaching to water' WAC proposed by the applicant. Whilst lower WAC would logically lower the risk of unacceptable effects occurring in groundwater or surface water, from an already low point, ECan has not provided any evidence which clearly justifies why the 'Adopted' WAC and not the 'leaching to water' WAC (or values between the two) are appropriate. ECan has not provided, for example, how utilising the 'Adopted' WAC would reduce the risk of an unaccepted water quality effect occurring compared to the 'leaching to water' WAC.

5.11 The selection of appropriate WAC/reuse criteria is important since it ultimately determines the success of the reuse initiative. Setting the reuse criteria too low without appropriate justification could significantly constrain soil reuse to the point it becomes unfeasible and the sustainability and cost benefits for the Project may not be realised (without any environmental gain). Conversely, setting the criteria too high risks the occurrence of unacceptable water quality effects, which undermines the intended environmental benefit of soil reuse.

5.12 In my opinion, the 'leaching to water' criteria proposed by the applicant are preferable to the 'Adopted' criteria as they are derived to be protective of water quality and incorporate compounding conservatism that is likely to address the uncertainty and site factors noted by ECan whilst not unnecessarily constraining soil reuse.

Sampling approach to confirm contaminant concentrations meet reuse criteria.

5.13 The Applicant proposes to base assessment against the reuse criteria on the arithmetic mean of soil contaminant concentrations in a stockpile or volume of material that is proposed for reuse. The sampling frequency will be based on the frequencies outlined in the Waste Management Institute of New Zealand document "Technical Guidelines: Characterising Surplus Soil for Disposal, September 2024" and will rely on the discretion of the Project Suitably Qualified and Experienced Practitioner ('**SQP**') in aspects of sample selection.

5.14 ECan has stated (paragraph 34) that if 'leaching to water' WAC criteria are applied then control should be placed on the maximum contaminant

concentration in any individual sample in order to account for variability in sampling results.

5.15 I have considered how a maximum value could be set. The Ministry for the Environment "Contaminated Land Management Guidelines No. 5 – Site Investigation and analysis of Soils, Revised 2021" states that "*Averaging a data set is not always appropriate. Generally, localised areas where contaminant concentrations are more than twice the guideline value should not be included in site average calculations, as the hotspot should be addressed as an exposure area in its own right*". This guidance is intended to apply to the assessment of in situ soil concentrations against land-use based exposure standards, rather than soil which has been excavated and placed in a stockpile (likely undergoing mixing in the process). Applying a maximum value to any individual sample in a data set that has been obtained from the random sampling of a stockpile is, in my opinion arbitrary and does not explain the significance of that individual sample in the context of the stockpile as a whole. In addition, applying a maximum concentration to any individual sample could unnecessarily render an entire stockpile of material unacceptable. This risk can to some extent be reduced by limiting stockpile sizes but doing so increases sample numbers and costs and increases the administrative effort of managing soil reuse.

5.16 In practice contaminant discharges from the stockpiled material would not be driven by a single elevated result as this could represent a relatively small proportion of contaminated material in a larger volume of less contaminated material. Contaminant discharges from the stockpiled material would instead be expected to average across the material footprint. Accounting for outliers (elevated concentrations in one or a small number of individual samples) could be achieved by using the 95 per cent upper confidence limit of the arithmetic mean (95 % UCL) instead of a simple arithmetic mean. I note that the Waste Management Institute of New Zealand document "Technical Guidelines: Characterising Surplus Soil for Disposal, September 2024" states that use of 95% UCL is appropriate for the characterisation of stockpiles providing that it is implemented by a SQP that understands the use of statistical tools. Overall, it is the mass of a contaminant that could migrate to the underlying groundwater that is of concern, and the 95% UCL provides a more robust assessment of that while maintaining a simple approach for implementation.

Setback distance to surface water

5.17 The Applicant proposes that soil reuse within 20m of surface water features or wetlands will only be allowed where contaminants concentrations do not exceed

the lower of the Australian and New Zealand default guideline values ('**DGV**') for sediment quality or the 'leaching to water' WAC or landuse-specific criteria depending on the location inside or outside of the road corridor. The 20m setback and reuse criteria are intended to protect waterways and wetlands where there is potential for runoff of contaminants entrained in overland flow and where that soil may enter surface water.

5.18 In paragraph 33 of the ECan report, ECan states that a larger buffer distance "on the order of 100m" would be more protective of surface water. Although extending the buffer distance logically does reduce the risk of contaminated soil migrating in overland flow to surface water, ECan does not provide a basis for the 100m distance or why the 20m proposed set back would not provide adequate protection. I also note that in paragraph 33 ECan also notes that the requirement for the larger buffer distance would be mitigated by the use of the 'Adopted' Class 4 WAC. However, I point out that the proposed reuse criteria for within the 20m buffer are in all instances lower (more protective) than the adopted Class 4 WAC.

5.19 In my opinion, the 20m setback incorporating the use of more conservative reuse criteria provides for an adequate additional level of protection for surface water considering that the site is relatively flat with limited potential for runoff generation, and during construction environmental management will require that erosion and sediment control will be in place until soil surfaces are adequately stabilised.

6 Conclusion

6.1 In conclusion:

a The Applicant and ECan agree that soil reuse is to be encouraged as it promotes a range of environmental benefits.

b The areas of disagreement between the Applicant and ECan principally relate to the selection and application of numerical soil reuse criteria, set back distances for the reuse of soil in proximity to surface water and wetlands, and the triggers for active remediation.

c In respect of the selection of soil reuse criteria, it is my view that the 'leaching to water' criteria proposed by the applicant are appropriate as they were specifically developed for the protection of groundwater and surface water in New Zealand. The 'leaching to water' criteria incorporate layers of conservatism that compound to outweigh the uncertainty in their derivation

or how site-specific or region-specific factors may increase the potential for unacceptable effects.

d I recommend that the 95% UCL is used for assessment of soil concentrations against soil reuse criteria. This is because it is the mass of a contaminant that could migrate to the underlying groundwater that is of concern, and the 95% UCL provides a more robust assessment of that while maintaining a simple approach for implementation and is recommended as a suitable approach in NZ guidelines relating to the assessment of surplus soil for disposal.

e Given the relatively flat nature of the Project site, I consider that the potential for generating runoff is low. This, together with robust erosion and sediment controls that will be in place until soil surfaces are stabilised through vegetation growth means the direct runoff of contaminated sediment into surface water is unlikely. On this basis I consider the 20m setback adequate for application of more conservative reuse criteria.

Paul Edward Walker
15 May 2026