# Appendix 3: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice – Contaminated Land

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| Date | 16/09/2025 |
| To | Joanne Mitten, Principal Consents Planner, Environment Canterbury |
| From | Hana Christenson, Senior Scientist – Contaminated Land and Waste Science, Hazards Science, Environment Canterbury |
| Project advice provided for | NZTA – Woodend Bypass Project |
| Documents referred to | Ground Contamination Investigation (Dec 2025)<br>Construction Methodology<br>Stormwater and Flooding Assessment |
| Qualifications | I hold a Bachelor of Science in Chemistry with first class honours, and a Doctor of Philosophy in Antarctic Studies. I have ten years of professional experience completing research, consulting and regulatory work on the geochemistry of contaminants in the environment. I have been a senior scientist in the Contaminated Land and Waste Team at Environment Canterbury for two years where responsibilities include |
| Code of Conduct | 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 2023. This technical report has been prepared in accordance with that Code. In particular, unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express. |

## Executive summary/overview

1. The Ground Contamination Investigation presents a summary of contamination risk areas for the project site, summarises contamination at three of these and presents an overview for contamination investigations yet to occur. This includes assessment criteria proposed for the project.
2. There are areas of agreement with the applicant in terms of the investigation requirements for contamination, and the management of operational stormwater avoiding interaction with contaminated materials.
3. Areas of disagreement are largely centered around soil reuse criteria and remediation requirements, particularly the application of Class 4 ‘leaching to water’ landfill waste acceptance criteria. We consider that landfill disposal has other assessments applied through a consenting process that ensure constraints for siting of landfills are assessed and risks to receptors are mitigated through appropriate siting or other controls. This site has shallow groundwater and multiple surface water systems that we consider mean that the Class 4 leaching to water guidelines are not appropriate.
4. There are also several alterations that I recommend making to the conditions to strengthen the protection of receptors to potential contamination risks.

## Agreement with the Applicant

5. The contaminated land investigation assesses contamination presence at three HAIL sites in the roading corridor, the sheep dip Area A and the former DJ Elder Blackcurrant orchard Area B. The landfill at 162 Gladstone Rd was added to the most recent version of the Ground Contamination Investigation and indicates the fill does not comprise significant municipal wastes in the areas that were test pitted. Other contaminated and putrescible materials were present. There are multiple other HAIL or potential HAIL sites that have not been investigated, and investigation is proposed to occur prior to construction. An updated investigation report including these sites should be supplied for approval by CRC as a condition of consent to ensure the investigations' sufficiency. This has been agreed by the applicant, however I note that conditions currently state investigations will be supplied 2 months after earthworks are completed, whereas they should be provided well before earthworks commence.
6. Contamination discovery protocols will be important for managing unknown contamination disturbed during the project. This is proposed to be managed through a contamination site management plan, and these would normally be provided at least in draft form as part of a consent application. However, I understand this will not be provided as part of the application documents. Given the areas not yet investigated, and the potential for unknown contamination to be disturbed by the works, this will be an important part of risk mitigation. I concur that the final plan should be submitted for approval by CRC to ensure its sufficiency, as a condition of consent.
7. I recommend that the Contamination Site Management Plan includes measures which ensure that soil reuse is fit for purpose and protective of the environment, and this should include soil segregation and management procedures. Where reuse of soil above the Class 4 adopted WAC is proposed, management of risks from soil might be required and these should be detailed in the CSMP. Proposed remediation targets and methods should be included in the Contamination Site Management Plan, which should be submitted for approval by CRC as a condition of consent. In general I concur with the proposed information to be included in the CSMP, but note disagreement of the criteria for soil reuse and management requirements where Class 4 adopted criteria are exceeded.
8. I recommend a condition requiring a contaminated site works completion report which denotes the source, fate, location and any ongoing management required for reused contaminated soils in the project, as well as disposal documentation for materials that were not retained on site. This should be completed by a SQEP. This recommendation is closely but not entirely aligned with the newly proposed condition, with more detail provided below.
9. Disturbance and any reuse of soils contaminated with asbestos should occur in accordance with all applicable local and national guidelines. I note conditions do not currently reference relevant guidelines, and I consider this would be appropriate and would aid enforcement if it were required.

10. After the March meeting we held, the applicant made clear that all imported soil to site will be cleanfill, which should ensure that any imported soil will pose an acceptable risk to receptors and limits the maximum potential effects of the proposed contaminated soil reuse.

11. I consider that stormwater infrastructure including swales and infiltration areas will have a greater potential for scour and leaching. I concur that contaminated soils, and soils from contamination areas should not be used in stormwater infrastructure, and I support the avoidance of operational stormwater discharges into the HAIL sites that is proposed in the Ground Contamination Investigation. I note that there is not currently conditions around disposal of accumulated materials from operational phase stormwater infrastructure, and I comment further on this below.

## Benefits of the project

12. Disturbance of contaminated soil has the potential to mobilise contamination, however if best practise approaches to management of the contamination are taken, the proposal might lower the overall risk posed by contaminated soils in the proposed roading corridor relative to them being left unmanaged *in situ*.

13. This project has also highlighted a desire to minimise waste generation through the reuse of soils. I consider that minor alterations to the planned approach will enable this to be achieved whilst lowering risk to the environment from existing contamination.

14. This project proposes to use concrete piling where piling is necessary for bridges, and I consider this an approach that will avoid risks of using treated timber piles in low oxygen groundwater that can mobilise the copper, chromium, arsenic and boron treatment chemicals.

## Outstanding areas of contention and significance of these

*Discussions with Applicant*

15. A discussion took place over MS Teams between Lucy Hine, Paul Walker, Kristina Mead, Sam Prystupa, Joanne Mitten, Alice Butler and myself on 23rd March 2026 to discuss initial comments on the application. Areas of agreement have been summarised above, and outstanding areas of disagreement are listed below, with additional context on why we consider that our concerns remain unresolved.

*Outstanding areas of contention*

16. I disagree with the pathway assessments in the updated conceptual site model. I disagree that the leaching to groundwater pathway is incomplete and do not accept that the WasteMINZ Technical Guidelines for Disposal to Land (TGDL) Class 4 'leaching to water' values for class four controlled fill are protective of shallow Canterbury groundwaters (e.g. arsenic 140 mg/kg and lead 460 mg/kg). Fundamentally, these values are for an appropriately-sited landfill, and are not generally applicable for any soil anywhere in New Zealand.

17. The reuse of soils proposed is an initiative that will reduce waste and associated emissions from the project, which I agree with the applicant on. I support this and recommend that it is a process that is robustly managed to minimise risk to the environment from the contamination. The use of the WasteMINZ Class 4 'leaching to water' criteria have significant uncertainties built in through the selection of partition coefficients, and the acceptance of leachate that is 20x MAV for drinking water. I consider that for soil reuse that will be uncapped, the WasteMINZ Class 4 'adopted' waste acceptance criteria would be more protective of groundwater and associated receptors. Where some management will be in place to mitigate risks to groundwater (such as contamination that is sealed beneath the road or encapsulated beneath a low permeability cap), I consider then a higher contamination threshold such as the proposed class 4 "leaching to water" values is appropriate.

18. The WasteMINZ Technical Guidelines for Disposal to Land provide guidance relating to the siting, design, operation and monitoring of landfills in New Zealand. They state that the final decision on site specific requirements for a landfill are made by an appropriate regulatory authority following a comprehensive site-specific assessment of effects on the environment. The guidelines are not intended to reduce the necessity for developing site specific requirements for investigations, design, operation or monitoring of landfills.

19. This application proposes to use waste acceptance criteria for land fills as a criteria for soil reuse as part of the project. The Class 4 leaching to water exposure scenario is proposed to be used, and the applicant proposes that this value is protective of groundwater and surface water systems.

20. The WasteMINZ Technical Guidelines for Disposal to Land have siting criteria for Class 4 fills, with constraints which include drinking water aquifers, water courses, water supply catchments, estuaries, marshes and wetlands. Where these constraining features are present, engineered controls could be utilised in combination with waste acceptance criteria and monitoring to manage effects. Alternatively, such sites might simply be poor choices for a landfill location.

21. The proposal looks to apply Class 4 'leaching to water' criteria as a criteria to allow reuse of soils across the project area (excluding in areas within 20m of surface water systems). Soil contaminant standards for commercial/industrial landuse will also be applied. The

Class 4 leaching to water waste acceptance criteria are tabulated below, against some other guideline values that are used in New Zealand to protect receptors.

22. The contaminant concentrations y with entrained sediment, in addition to groundwater which might interact with surface water or be used as a drinking water resource.

23. The Class 4 leaching to water WAC were derived in three main ways. For trace element contaminants, criteria were largely derived from a national dataset which looked to develop a relationship between total recoverable contaminant concentrations and contaminant concentrations that would leach in a synthetic precipitation leaching procedure test. Partition coefficients were used for organic contaminants. For trace elements, target leachate concentrations were calculated by multiplying drinking water or surface water guideline values by factors of 20 and 100 respectively, then selecting the lower leachate value. Then the corresponding total recoverable contaminant concentration where approximately 3% of the SPLP results exceeded the target concentration was determined. For some trace elements however, the leaching to water WAC were selected by judgement to accommodate variability in datasets and cater to areas and regions that have naturally elevated trace element concentrations in soils.

24. I note that the dilution attenuation factors (DAFs) that are utilised in the WasteMINZ Guidelines are the same as have been used by the USEPA in derivations for leaching (USEPA, 1996). There are assumptions on source size and mixing that are built into the DAFs which include well depths below the groundwater table of 15-300 feet (circa 5-100 metres), which may not approximate the shallow groundwater (e.g., 1-2 metres depth) and proximal surface water that are present in parts of the project area.

25. There is also misalignment between the guideline inference that groundwater quality at drinking water quality guideline levels is acceptable, and the Canterbury Land and Water Regional Plan that limits groundwater quality at property boundaries to half of the Maximum Acceptable Value in drinking water.

26. Neither do the proposed guideline values consider redox chemistry, which is of critical importance in the project area and can increase the mobility of contaminants to well in excess of SPLP

27. For a national guideline for landfill waste acceptance criteria, where site specific risk assessment of fill materials will ensure they are located to minimise risk to receptors, I believe the WAC derivation approach has merit. However, I don't believe they are appropriate as a proxy for unrestricted reuse of soils in areas where numerous constraining site selection features that are outlined in the guidelines are present.

28. The assumptions that underlie the derivation of Class 4 leaching to water values are derived from a national dataset. Soils in the Canterbury region are often well draining due to alluvial gravel and sediments due to alluvial gravels and sediments derived from weathering of the southern alps. The majority of the Woodend Bypass project where contaminated soils are anticipated to be disturbed occurs on recent soils, with some

yellow brown sand and gley (Tonkin and Taylor, 2007). These soils are anticipated to have much different chemistry and sorption characteristics than soils that are derived from less weathered parent materials that have greater concentrations of minerals that act as adsorbing phases for contaminants. The Class 4 leaching to water WAC might not be protective of groundwater in Canterbury soils. Internal Environment Canterbury data that we have reviewed demonstrates that the Class 4 adopted values are likely to pose an acceptable risk to environmental receptors including groundwater and surface water, as well as to be protective of human health.

29. I do not believe the WAC in the WasteMINZ Technical Guidelines were ever intended to derive soil reuse values that protect shallow (<1-3 m depth) Canterbury groundwaters that are proximal to surface water environments such as are present in the project area. I consider that the proposed reuse of soils with these levels of contamination might pose risk to receptors both during construction phase work through sediment risks to surface water, as well as an ongoing risk from leaching and potential erosion.

30. Rather, I consider that the WAC were intended to reflect levels which will pose an acceptable risk in an appropriately sited landfill (noting that acceptability in the TGDL does not align with acceptable groundwater quality in the Canterbury Land and Water Regional Plan) when used with other controls and mitigations including siting, operational controls, and potentially engineering controls as well.

31. Table A below presents Class 4 leaching to water and adopted waste acceptance criteria together with various guideline values to protect different human health and ecological receptors. The Class 4 leaching to water and the NESCS Commercial/industrial Soil Contaminant Standards are proposed for soil reuse for this project (lowest values highlighted in green). Values exceeded by the proposed reuse criteria are bolded, indicating that ecological receptors might not be protected by the Class 4 leaching to water WAC. The table also displays the highest background level used for regulatory purposes in soils at the site where available, with the three soil types for trace element levels including regional recent, gley, and yellow brown sandy (Tonkin and Taylor 2007).

32. I note that New Zealand does not have comprehensive guideline values for soil contaminant levels that protect groundwater. The Class 4 leaching to water values in Table A that have an asterisk have been determined based on judgment rather than a specific methodology approach.

Table A. Comparison between various Guideline Values, including the Class 4 adopted WAC (which I recommend in this case) in order to limit associated hazards and risks.

| *All values in mg/kg* | Class 4 Leaching to water WAC | Class 4 Adopted WAC | NESCS Human Health Commercial-Industrial | Ecological receptor | ANZG DGV for sediment quality | ANZG GV-high for sediment quality | Highest background level in project area |
|---|---|---|---|---|---|---|---|
| As | 140 | 17 | 70 | **20** | **20** | 70 | 12.58 (RR) |
| Cd | 10* | 0.8 | 1,300 | **1.5** | **1.5** | 10 | 0.28 (Gley) |

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|---|---|---|---|---|---|---|---|
| Cr | 150 | 150 | 6,300 | 300 | **80** | 370 | 22.7 (RR) |
| Cu | 280 | 220 | 10,000 | **220** | **65** | **270** | 20.3 |
| Pb | 460 | 160 | 3,300 | **30** | **50** | **220** | 40.96 |
| Hg | 3* | 0.7 | 4,200 | **0.7** | **0.15** | **1** | 0.11 |
| Ni | 32* | 35 | | 35 | **21** | 52 | 20.7 |
| Zn | 1200* | 190 | | **190** | **200** | **410** | 93.94 |
| TPH (C7-9) | 600 | 110 | | **110** | **280** | **550** | |
| TPH (C10-14) | | 58 | | **70** | | | |
| Benzene | 0.11 | 0.11 | | | | | |
| Ethylbenzene | 10 | 10 | | | | | |
| Total Xylene | 25 | 25 | | | | | |
| B(a)P TEQ | 24 | 2.8 | 35 | **2.8** | | | 0.922 |
| Dieldrin | 0.2 | 0.1 | 160 | | **0.0028** | **0.007** | |
| Total DDTs | 26 | 2 | 1,000 | **1.8** | **0.0012** | **0.005** | 0.431 |
| Total PAHs | | | | | **10** | **50** | |

33. I consider that the distance from surface water to sites where reuse of contaminated soil with contaminant concentrations above DGV should be reviewed in consultation with our water quality scientists. From my perspective, the stormwater risks of construction with these materials might pose significant risk to surface water in such close proximity. I recommend that a larger buffer distance on the order of 100 m would be more protective. This suggestion would be mitigated by the adoption of the Class 4 adopted waste acceptance criteria rather than the 'leaching to water' criteria currently proposed, since the "adopted" criteria would be more protective of both groundwater and surface water receptors.

34. I consider that conditions should control the maximum concentrations of contaminants for reuse if Class 4 leaching to water criteria are applied. If Class 4 "adopted" WAC are applied instead, then I consider minor variability in contaminant concentrations could still pose an acceptable risk, and if agreeable from a consent compliance monitoring perspective, a 'mean concentration' could be incorporated into consent conditions together with a maximum concentration. If 'mean concentration' is used in conditions, then I recommend that specific direction on how the 'mean' should be calculated also be included, noting that many different methods exist for establishing various types of means.

35. There is potential for sediments that accumulate in the operational stormwater infrastructure to be contaminated with trace elements and organic contaminants. Using clean materials in the infrastructure will best enable capture of contaminants, and it would be appropriate for

36. In the Ground Contamination Investigation the comparison to ANZG default guideline values did not account for a unit difference for organic compounds, which are listed as micrograms per kilogram in the guidelines, rather than the milligrams per kilogram used

for other contaminants (1 microgram per kg = 0.001 mg/kg), and this criteria is exceeded by a factor >100. This risk is likely to be highest with regard to soil runoff in stormwater. The DDT ambient value of 0.431 mg/kg should not be applied for soil or soil reuse near waterways.

37. Appendix H of the Contamination Investigation indicates sampling will be focussed in many of the old building footprints. I also recommend explicitly also targeting the building halo for buildings that may have had lead paint application.

38. The threshold at which a remedial action plan should be developed is not yet agreed. This is partially due to disagreement on the levels of contamination at which soil reuse is appropriate. If exceedances of ANZG GV-high are detected, I recommend a remediation action plan should be developed, in addition to the contamination site management plan. The remediation action plan should be supplied to Environment Canterbury for review. Consent conditions should ensure appropriate mitigations will manage the risk of the potential contamination.

*Solutions and/or Conditions sought*

39. The major disagreement is on the criteria for soil reuse, detailed in condition C1.13. I believe the current proposal for reuse of soil with contaminant concentrations up to Class 4 leaching to water WAC with the only restriction being a distance of more than 20 m from waterways poses potential risk to receptors both in the construction and operational phases of the project as detailed above. I would like to see use of Class 4 adopted values, or greater distances around waterways implemented as detailed above. Clause c would be strengthened if like the above clauses it referenced national guidance that sets limits and appropriate remedial approaches (NZGAMAS 2024). As noted above, using mean concentrations should be applied only if more conservative reuse criteria are imposed, and conditions should still limit maximum concentrations for soil reuse. I recommend that any methodology for determining mean concentrations should be agreed in conditions also.

40. Condition C1.6 states that erosion and sediment controls should be in place prior to any works within 10 m of a watercourse or wetland. I do not consider this to be sufficiently protective for construction phase management of contaminated soils, particularly where their reuse is proposed at levels well above sediment guideline values 20 m from waterways.

41. I support the limit on maximum disturbance areas at one time recommended for condition C1.9. I note this is not incorporated into the amendment proposed.

42. For condition C1.11 the new condition (after the meeting on March 23rd) proposes to supply DSIs to CRC within two months of the completion of earthworks. I consider that this should be supplied to CRC prior to earthworks occurring which will enable an assessment of the sufficieny of the investigation to identify contamination, and also will

enable compliance staff to ensure that the CSMP is being properly implemented to protect against the potential level of risk posed by each site.

43. The works completion report condition is aligned with NESCS limits, and it would be useful to update the CRC condition so that it aligns with the final consent conditions around soil reuse (i.e. update clause c from comparison with relevant SCS to comparison with relevant consented reuse and remediation criteria). Records of works/soil disposal should also include the fate of contaminated soil disposed/reused within the site.

44. I note that the C4 discharge permit does not cover discharge of contaminated soil to land. I don't have planning expertise, but just wanted to ensure that contaminated soil reuse/disposal is appropriately captured in C1.

45. MP12 and MP13 have aspects that are acceptable, and aspects that we do not agree on based on the difference of opinion on soil reuse criteria.

46. Condition O3.6 states that a programme for stormwater infrastructure maintenance will be provided to CRC. I would recommend adding to this condition that sediment from stormwater infrastructure should be tested for contamination and disposed at a facility consented to receive it, with evidence of any disposal included in the annual reports when they are supplied.

| Table 2: Solutions | | | |
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| **Issue** | **Solution** | **Condition wording** | **Consideration against FTAA** |
| Outstanding investigations to be completed – please ensure these are submitted to ECan for approval. | Agreement that this will be a condition of consent | | |
| Contamination Site Management Plan – please submit this for our review as soon as possible. | I understand this is not proposed to be submitted as part of the application. This is a critical part of risk mitigation, and even a draft would be useful to provide comment on. I recommend the final plan be submitted for approval by CRC as a condition of consent to ensure its sufficiency. | | |
| Use of WasteMINZ Class 4 'leaching to water' criteria – please only use these where some mitigation/capping will be used – I do not concur that they are | Awaiting solution. These are appropriate for soil reuse where there is some management in place (for example, under sealed surfaces and >1m above groundwater). | | |

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| appropriately protective of shallow groundwater. | | | |
| Surface water protection - Extend distance for reuse of soil with contamination up to DGV from 20 m to 100 m from surface water | No solution agreed as yet. | | |
| Soil reuse – unmanaged Please use Class 4 adopted waste acceptance criteria for soil reuse that will not have capping or other management to mitigate potential effects. | No solution agreed as yet. | | |
| Landfill dewatering - This might extract groundwater with significant contamination, and conditions on quality for discharge might be appropriate | No solution agreed as yet. | | |

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| Conditions should control the concentrations of contaminants for reuse, rather than the ‘mean concentration’ which might pose risk and be difficult for enforcement | No solution agreed as yet. | | |
| In the Contaminated Land Investigation the comparison to ANZG default guideline values did not account for a unit difference for organic compounds, and this criteria is exceeded by a factor >100. This risk is likely to be highest with regard to soil runoff in stormwater. The DDT ambient value of 0.431 mg/kg should not be applied for soil or soil reuse near waterways. | No solution agreed as yet. | | |
| Discharge of stormwater into contaminated soils should be avoided | No solution agreed as yet. | | |

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| across the entire project, and contaminated soil reuse should not occur in stormwater infrastructure. | | | |
| Appendix G of the Contamination Investigation indicates sampling will be focussed in many of the old building footprints. Please explicity target the building halo as well for buildings that may have had lead paint application. | No solution agreed as yet. | | |