

Appendix 7: s53(2)(a) Fast Track Approvals Act 2024, Technical Advice - Stormwater

Table 1	
Date	23/04/2026
To	Sam Prystupa, Environment Canterbury
From	Philip Visser Claassens, Principal Civil Engineering – Beca Limited
Project advice provided for	NZTA – Woodend Bypass Project
Documents referred to	Documents included as part of the substantive application: - State Highway 1 North Canterbury- Woodend Bypass project (Belfast to Pegasus), Substantive Application under the Fast-Track Approvals Act 2024, NZ Transport Agency (NZTA), October 2025 - Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, <u>Consultation Pack Cover Report</u>, NZ Transport Agency (NZTA), Reference: 11320 Revision: B, 2025-09-05 - C25C 262119-55 RMA262089 - Fast-track - Woodend Bypass Project (Belfast to Pegasus) - 4A - General Arrangement - PART 1 (Drw. No. 11320-AUR-0350-PWI-RD-DRG-9001 to 9110, Rev A) - C25C 262119-56 RMA262089 - Fast-track - Woodend Bypass Project (Belfast to Pegasus) - 4A - General Arrangement - PART 2 (Drw. No. 11320-AUR-0350-PWI-RD-DRG-9111 to 9117, Rev A) - C25C 262119-57 RMA262089 - Fast-track - Woodend Bypass Project (Belfast to Pegasus) - 4B - Typical Cross Sections (Drw. No. 11320-AUR-0350-PWI-RD-DRG-9151 to 9160, Rev A) - Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, <u>Stormwater and Flooding Assessment</u>, NZ Transport Agency (NZTA), Document code: 11320-AUR-0350-PWI-SW-RPT-0003, Revision: D, Dated: 17 October 2025. Note that this includes the following report as Appendix A Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, <u>Flooding Assessment Report</u>, NZ Transport Agency (NZTA), Document code: 11320-AUR-0350-PWI-SW-RPT-0001, Revision: A, Dated: 20 August 2025. - Volume 2D: <u>Proposed Resource Consent Conditions</u> (October 2025) Additional documents provided to Environment Canterbury by the applicant but not part of the substantive application: - Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, <u>Updated Stormwater Information</u>, NZ Transport Agency (NZTA). - Attachment A: Response to ECan stormwater and river engineering matters, 10 April 2026 - Attachment B: Belfast to Pegasus Motorway & Woodend Bypass Stormwater – 100% Detailed Design drawings (Drw. No. 11320-AUR-0350-PWI-SW-DRG-0001 to 12110, Dated: 2025-12-12) - Attachment C: Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, Stormwater Design Report 100% (Rev B, 19 December 2025). This report includes a number of appendices.

	○ Attachment D: Belfast to Pegasus Motorway & Woodend Bypass Pre-implementation and MSQA Professional Services, Flood Assessment Report (Rev B, 19 December 2025) ○ Attachment E: Stormwater Discharge Summary, Discharge Rate to Receiving Water Body for the 5-year ARI Event & Discharge Rate to Receiving Water Body for the 12 Hour Event (no revision or date) ○ Attachment F: Belfast to Pegasus (B2P) Motorway and Woodend Bypass - Flood Assessment Report –Commentary on work carried out by Aurecon, Waimakariri District Council (WDC), Document code: RDG-32-138-03 / 260408092074, 8 April 2026 ● Volume 2D: Proposed Resource Consent Conditions (April 2026 – updated construction consent conditions and associated schedules)
Qualifications	I am a Principal Civil Engineer specialising in stormwater hydraulic structures, with over 18 years of experience. I have been employed at Beca since December 2025 and am based in the Christchurch office. I hold a Bachelor of Engineering (Hons) in Environmental Engineering (University of Pretoria, 2010) and a Bachelor of Civil Engineering (University of Pretoria, 2007). I am a member of Engineering New Zealand and the NZ Rivers Group. My experience spans the full project lifecycle, with strengths in stormwater design, river engineering, construction, Safety in Design, environmental effects and project delivery.
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. Aurecon, on behalf of NZ Transport Agency (NZTA), has assessed the stormwater and flooding effects of the Woodend Bypass / Belfast to Pegasus (B2P) as presented in the substantive application documents, an approximately 11 km grade-separated four-lane motorway that bypasses Woodend.
2. The Aurecon assessment covers stormwater and flooding for the SH1 Woodend Bypass pre-development, post-development and post-development with mitigation to support application for resource consents.
3. The Project crosses the Kaiapoi River, Cam River, Quarry Lakes, McIntosh Drain, Waihora Stream and Taranaki Stream catchments.
4. The existing SH1 runoff is mostly untreated and unattenuated, with direct discharges to drains and rivers.
5. General Arrangement drawings and typical cross-sections have been provided as part of the documentation included in the substantive application, illustrating the proposed road formation and overview of the stormwater system.
6. The Aurecon report included in the substantive application notes that stormwater management will include the following elements, however there is limited detail on the design approach or sizing.
 - a. External works including cut-off drains for the 100-year ARI including climate change, channel realignments with fish passage and new culverts.
 - b. Bridge works comprising strengthening the Kaiapoi River Bridge without geometry change and constructing a new Cam River Bridge. Scour magnitude is within acceptable limits at the Kaiapoi bridge, and no additional scour protection is proposed. Rock riprap is required at the Cam River Bridge.
 - c. Stormwater treatment using swales, bioinfiltration, bioretention basins and possible proprietary devices targeting TSS, metals, hydrocarbons and nutrients to mitigate the water quality effects.
 - d. Catchment drainage will be managed with swales, bioinfiltration and bioretention basins and channel realignments, so runoff meets NZTA standards and is treated before entering the receiving environment.
 - e. Just north of Gladstone Road, the realigned channel crosses a historic landfill identified as a HAIL site for about 100m. Management options are being considered include partial or full removal of landfill material, depending on geotechnical suitability.

7. NZTA has provided additional documents to Environment Canterbury, which do not form part of the substantive application. These are listed in the “Documents referred to” in the table at the start of this Technical Advice. They include: the applicant’s response to the issues raised in Table 2 of an earlier version of our Technical Advice dated 04/11/2025; an Aurecon 100% Stormwater Detailed Design report; Aurecon 100% Stormwater Design Drawings that include stormwater layout and long section drawings, standard and typical detail drawings; an updated Aurecon Flood Assessment Report; and letter from Waimakariri District Council regarding the modelling.
8. The additional documentation includes stormwater management information developed as part of 100% Detailed Design. This includes:
 - a. External works, including cut-off drains, channel realignment and cross culverts, were sized for the 100-year ARI event, including climate change RCP 8.5 up to 2100.
 - b. Cut-off drains north of the Cam River have been evaluated within the Aurecon model for the 100-year ARI, including RCP 8.5 to 2100 climate change, and cut-off drains south of the Cam River are proposed to remain consistent with existing dimensions. Cut-off drains are planned to be at the current ground level where possible, and it was identified that at some locations, the cut-off drains may intercept groundwater (Lineside Road to Cam River). Aurecon has stated that the cut-off drains will not increase the amount of groundwater intercepted in this area compared to the existing channels in this area. Limited detail is provided with regard to groundwater interception elsewhere.
 - c. Channel realignments have been evaluated using the Aurecon model for the 100-year ARI, including RCP 8.5 to 2100 climate change, and were designed to match the existing channel geometry, slope and hydraulic function and to preserve fish passage and overall channel stability. No detail is provided in terms of stream diversion sizes, geometry, erosion and scour protection or fish passage. It is stated that proposed stream diversion sizes and geometry will be finalised and incorporated into the issue-for-construction (IFC) detailed design.
 - d. Cross culverts have been sized for the 100-year ARI event to have no significant increase in flood levels at neighbouring dwellings and for the 200-year ARI event to limit the increase in flood levels at neighbouring dwellings to no more than 20 mm. Major and significant culverts were modelled using the Aurecon model, and two existing significant culverts, to be replaced like-for-like and located outside of the modelling extent, were assessed outside of the model. No detail is provided in terms of base flows, including potential groundwater flows, within the cross culverts and the effect on capacity.
 - e. Fish passage at cross culverts is proposed to be designed in accordance with the New Zealand Fish Passage Guidelines v2.0. At culvert replacements and extensions, it is proposed to match the existing culvert size, level and embedment. The proposed design for new culverts in wet streams does not provide details on low-flow channels, the suitability of embedment material in terms of scour or the impact of a long culvert on fish passage.
 - f. Scour protection details at culvert outlets are provided, but no design event or expected velocities at the outlet and downstream of the outlet structure are provided.
 - g. Stormwater treatment using grassed swales, bioinfiltration swales, bioretention swales, bioinfiltration basins, and bioretention basins is proposed, targeting

- sediment (TSS), heavy metals and hydrocarbons based on treating the water quality flow rate of 5 mm/hr and water quality volume of 25 mm.
- h. Swales have been sized to capture and convey runoff up to the 10-year ARI event, and where there is no secondary flow path, the 100-year ARI will be conveyed.
 - i. Detail is provided on the type and location of the proposed stormwater treatment devices, including total catchment area, water quality treatment volumes and flows. No detail is provided on stormwater hydraulics or treatment results.
 - j. The provided 100% Detailed Design drawings do not distinguish between the different types of treatment swale types as presented in the 100% Detailed Design report.
 - k. Piped infrastructure, including inlets, has been designed in accordance with NZTA guidelines for the up to the 10-year ARI event and up to the 100-year ARI event if there are no secondary overland flow paths available.
 - l. No specific design of attenuation for runoff from additional impervious areas is proposed as part of the 100% Detailed Design.
9. The basis of Aurecon's assessment is a hydrological and hydraulic model, adapted from the Waimakariri District Council (WDC) Flood Model, run for the 100-year ARI and 200-year ARI events.
10. Aurecon's assessment included in the substantive application concludes that the flood and scour effects are mitigated. Increased flooding is reported to be mostly confined within NZTA owned land, or land to be acquired, in the 100-year and 200-year ARI events. It concludes that the flooding effects on buildings and residual impacts are less than minor.
11. Aurecon's assessment included in the substantive application states that the SH1 Woodend Bypass stormwater design treats runoff to NZTA standards, mitigates flooding and erosion, and confines residual effects to NZTA land. It concludes that the project effects are less than minor and the project improves environmental outcomes relative to the existing SH1 corridor.
12. The additional information provided by NZTA to Environment Canterbury includes a letter from WDC, dated 8 April 2026, setting out its review of the Aurecon Flood Assessment Report based on a draft version of the report dated 20 August 2026 (presumably the Rev A report included in the substantive application) and further information and report revisions provided by Aurecon. It concludes that the Waimakariri District Council is satisfied that the model is appropriate to assess the effects from the proposed works.
13. Draft consent conditions are proposed in Volume 2D of the application. These focus on water quality and compliance with NZTA design standards.

Agreement with the Applicant

14. The project will have an effect on:

- a. Increased impervious surfaces associated with the new infrastructure.
- b. Altered flow paths arising from the new motorway and new hydraulic structures and channel realignments.
- c. Changes to flow regimes including in affected watercourses and floodplains.
- d. Increases in water levels to existing drainage features and NZTA property.
- e. Scour and erosion risks at culverts, bridges and realigned channels.
- f. Discharges to receiving environments.

Benefits of the project

15. Refer to other comments.

Outstanding areas of contention and significance of these

Discussions with Applicant

16. We met with the applicant via Teams on 23 March 2026 to discuss the issues raised in Table 2 of our initial Technical Advice to Environment Canterbury dated 04/11/2025.

17. Since that meeting the applicant has provided additional documents to Environment Canterbury that do not form part of the substantive application, as noted above. It is recommended that this additional documentation be officially requested by the Panel from the applicant.

Outstanding areas of contention

18. The principal areas of contention are summarised in Table 2.

Significance of these matters

19. The basis of Aurecon's assessment is a hydrological and hydraulic model, adapted from the WDC Flood Model, run for the 100-year and 200-year ARI events. Aurecon's model has a number of key changes from WDC's model. Aurecon's assessment uses TUFLOW rather than MIKE modelling software, it has a smaller extent than WDC's model with boundary conditions from the WDC model. It uses different LiDAR data, and it uses the same nested storm rainfall as the WDC model, but a different hydrological method (Hortons).
20. It appears that only limited validation of the Aurecon model has been undertaken, by comparing flood depth maps with those from the WDC model. It is not clear if there has been any comparison of the hydrological methods and resulting loss (i.e. conversion of rainfall to runoff), or comparison of hydrographs at key points (volume and flow) between the two models.
21. The comparison of flood depth maps provided (Figure 2-4 and 2-5 of SW-RPT-0001 Rev A) shows more flooding in the WDC model than the Aurecon model. The difference map provided (Figure 2-6 of the SW-RPT-0001 Rev A) is difficult to interpret because of the range of values in the legend. Aurecon concludes that its TUFLOW model results have similar flood depths and extents to the WDC model and therefore, its TUFLOW model is fit for purpose. But this does not appear to be supported by the information provided.
22. In the additional information provided to Environment Canterbury but not part of the substantive application, Aurecon's updated Flood Assessment Report does not appear to include a more comprehensive comparison of the Aurecon model results versus the WDC model results.
23. It is unclear whether Maximum Probable Development (MPD) in the catchments was included in the flood modelling to reflect increased imperviousness from future land use change.
24. Aurecon's model extent is limited to the north-east of the Ruataniwha/Cam River and therefore the model does not include the full project. The project alignment to the south-west of the Ruataniwha/Cam River is in an area identified in WDC's models as being affected by flooding, and the project could potentially exacerbate these effects.

25. In the additional information provided to Environment Canterbury, but not part of the substantive application, Aurecon has provided a simplified assessment of the effects south of the Ruataniwha/Cam River (Stormwater Design Report 100%, Rev B, 19 December 2025 - Appendix G, Flood Impact Assessment South of Cam River). This assessment considers the effect of the additional filling within the existing floodplain on flood levels north of the Kaiapoi River and south of the Cam River using a 'bathtub' analysis for three scenarios (the overtopping case, and the 100-year, 200-year and 500-year ARI events). It does not consider the effects on flood levels in smaller events when the filling would be a greater proportion of the floodplain. It also does not consider the localised effects of increased peak flows from the new impervious area and the effects of the changes to the drainage paths.
26. Aurecon's model has been used as the basis of the assessment of flooding effects using three cases: pre-development, post-development and post-development with mitigation. In the Flood Assessment Report included in the substantive application (Revision A), no detail is provided on the post-development road vertical alignment (in the "post-development" and "post-development with mitigation" models), or the proposed stormwater mitigation measures (included in the "post-development with mitigation" model). In other words, it's not clear what infrastructure is proposed to mitigate the effects.
27. In the updated Revision B Flood Assessment Report provided to Environment Canterbury as additional information, but not part of the substantive application, more information is provided on what is included in the "post-development with mitigation" case model, but the reporting is still not comprehensive.
28. The modelling results assessment appears to be focused on existing floor level flooding of private property, rather than any flooding on private property or outside the designation. This is the case for both the modelling report included in the substantive application and the updated modelling report provided to Environment Canterbury. Any changes in flood level outside the designation should be considered and mitigated, not just those affecting existing floor levels.
29. Aurecon's modelling does not assess changes in peak flows at discharge points or consider flooding smaller design events such as the 10-year ARI event. Peak flows are important for localised effects. Flooding in smaller design events can be significant for the receiving environment and the community over time. This is the case for both the modelling report included in the substantive application and the updated modelling report provided to Environment Canterbury.
30. In the additional information provided to Environment Canterbury, a letter from WDC has been provided with WDC's review comments on Aurecon's model. However, it is important to note that this is not an independent peer review.

31. The information provided as part of the substantive application is limited with regard to stormwater management detail, including attenuation, treatment and conveyance as well as the connection to existing stormwater networks and waterways.
32. The proposed resource consent conditions for the operations phase stormwater discharge as provided in the substantive application, are very light on detail. The updated proposed resource consent conditions provided by NZTA to Environment Canterbury did not include any updates to the operations phase stormwater discharge conditions. The proposed resource consent conditions for the operations phase stormwater discharge do not adequately address the requirements for:
- a. Water quality treatment design
 - b. Attenuation of peak flows from new impervious areas
 - c. Culvert or bridge sizing for conveying cross-catchments
 - d. Fish passage at culverts
 - e. Mitigating effects of filling within the floodplain
 - f. How the mitigation of effects on flood risk will be demonstrated (e.g. hydraulic modelling requirements including events and afflux limits)
 - g. Effect of groundwater inflows on stormwater infrastructure capacity
 - h. Groundwater influence on proposed infiltration devices
 - i. Special requirements for managing stormwater within landfill areas

Solutions and/or Conditions sought

33. We recommend that the panel request the additional information provided to Environment Canterbury.
34. The proposed consent conditions should be developed to adequately address the key design criteria for all aspects of the stormwater management design, including water quality, quantity and flood risk. Suggested conditions are provided in Table 2.
35. The hydrologic and hydraulic model is a key tool used by the applicant to carry out the design and demonstrate its performance. This model should be independently peer reviewed by a suitably qualified person, and any peer review findings or recommendations addressed by the applicant. This peer review should be arranged by and at the cost of the applicant. This should be included as a consent condition.
36. The consent conditions should also include requirements for: the design to be submitted to Environment Canterbury; key aspects of the design to be independently peer reviewed; the design to be certified by a Chartered Professional Engineer (CPEng) that it meets the consent conditions; and as-built information to be provided to Environment Canterbury along with certification by a CPEng that the system has been built in accordance with the design. Suggested conditions are provided in Table 2.

Table 2: Solutions

Ref	Issue	Solution	Condition wording	Consideration against FTAA
1	The information provided as part of the substantive application provides very limited information on the proposed stormwater management design. Additional information provided by NZTA to Environment Canterbury provides more detail on the proposed stormwater management design; however, this information is not part of the substantive application.	We recommend that the Panel requests that the applicant provide the additional information as provided to Environment Canterbury.	N/A	
2	The general arrangement drawings provided as part of the substantive application have very limited information on the proposed stormwater system and how it will connect to the existing stormwater networks and waterways.	Include a resource consent condition for the consent holder to provide a stormwater design report with supporting technical documentation for the proposed development, including predicted flood levels and sizing of treatment devices and treatment that will be achieved. Including drawings detailing proposed stormwater	<i>Final Detailed Design & Certification of Design</i> <i>At least 20 Working Days prior to starting any works on the stormwater management system authorised by this Consent, the final detailed design for all aspects of the stormwater management system, including treatment, attenuation, drainage plans and the reticulated stormwater network, stream and drain</i>	
3	Technical design information is required to substantiate the proposed stormwater management design,			

	including attenuation, treatment and conveyance.	management areas and integration with existing drainage	<i>realignments, and cross-drainage shall be submitted to Canterbury Regional Council. This shall include detailed design drawings, calculations and reports.</i> <i>This shall be accompanied by a certificate signed by a Chartered Professional Engineer (CPEng) experienced in stormwater management design certifying that the design complies with Conditions <<insert relevant design and peer review condition numbers XX to XX>> of this consent.</i>	
4	Aurecon's model is the basis of the assessment. This needs to be more thoroughly validated to determine its suitability.	Include a resource consent condition for the flood model to be peer reviewed	Model Peer Review <i>Where the design relies on hydrological and hydraulic modelling, the consent holder shall arrange, at its own cost, for the modelling and the assessment of the model results to be independently peer reviewed by a suitably qualified and experienced person who was not involved in the preparation of the original model. The peer review shall confirm that:</i> - <i>the model extents and modelling methodology is appropriate for the site and scale of the Project;</i> - <i>input data, assumptions, parameters, extent and</i>	
5	There is an area of the alignment (south of the Cam River) which is outside the extent of the model. It is therefore not clear how the effects and performance of mitigation will be assessed in this area.			
6	Future development. Section 3, SW-RPT-0003 Rev B. Flood assessment does not allow for Maximum Probable Development (MPD) in catchments.			

7	Model extents. Section 3 of SW-RPT-0003 Rev B. Appears reported flood maps (Fig 3-4 to 3-7) do not extend far enough south to illustrate existing flooding in the Kaiapoi catchment (Ch 0 to 600).		<i>boundary conditions are reasonable;</i> - <i>the model is calibrated or validated where practicable; and</i> - <i>the conclusions regarding flood levels, depths, velocities and hazard are robust.</i> <i>The peer reviewer's comments and confirmation that any required changes have been addressed shall be provided to Canterbury Regional Council.</i>	
8	Modelling 10-year event. Section 3 of SW-RPT-0003 Rev B and Section 2 of SW-RPT-0001 Rev A. Reporting of smaller events, such as the 10-year ARI event, for both pre- and post-development conditions is required to assess any increase in localised flooding on nearby properties. Flooding of buildings is referenced, but flooding of properties should also be assessed and reported.			
9	Mitigation measures included in post-development with mitigation model.			
10	The design proposes like-for-like replacement of cross-culverts at sections of the alignment (e.g. Chainage 16020, 9200, etc).			

11	Bridges and large culverts. Section 4.2.1 (Kaiapoi River Bridge) and Section 4.2.2 (Cam River Bridge) of SW-RPT-0003 Rev B. Culverts with a cross-sectional area of 3.4 m² or greater are classified as major culverts under the NZTA Bridge Manual (SP/M/022, 3rd Edition). A peer review of the bridge structures and large culverts is recommended.	Obtain peer review from a Chartered Professional Engineer for all culverts, bridges, and conveyance structures with an area of 3.4 m² or greater and to include scour calculations and mitigation details. An agreed upstream afflux limit of an agreed increase in millimetres should be set for the 100-year ARI event and the soffit of all proposed bridges should be at least 1.2m above the modelled 100-year ARI water level, allowing for climate change and sea level rise.	Bridge and Major culvert Peer Review <i>Prior to construction, the applicant shall submit a detailed design for all bridge structures and conveyance structures with an area 3.4 m² or greater completed by a suitably qualified and experienced Chartered Professional Engineer (CPEng).</i> <i>The consent holder shall arrange, at its own cost, for the detailed design to be independently peer reviewed by a suitably qualified and experienced person who was not involved in the preparation of the original design.</i> <i>The peer reviewer's comments and confirmation that any required changes have been addressed shall be provided to Canterbury Regional Council.</i>	
12	HAIL site. Sections 4.4.5 & 5.1 of SW-RPT-0003 Rev B. (Gladstone Road to Pegasus Interchange) identifies a HAIL site.	Unresolved risk should be confirmed. The potential for project runoff to come into contact with contaminants within the Hail site should be assessed and if the material is to remain in place, a separation layer should be designed to prevent contamination of runoff.	Existing contaminated land risk a) <i>Stormwater discharges to ground shall not occur into HAIL areas or where contaminated soil has been reused or retained.</i> b) <i>Operational stormwater shall not mobilise contaminated soil in HAIL areas or where</i>	

			<i>contaminated soil has been reused or retained.</i>	
13	Erosion and scour protection. Section 5.3.2 of SW-RPT-0003 Rev B. (Proposed mitigation) “forces may be concentrated, such as at channel bends and confluences, geotechnical reinforcement linings will be provided to prevent scour and erosion before the establishment of vegetation. <u>Riprap and rock linings are not proposed within any of the realigned channels</u> except at bridge structures and culvert outlets.”	Erosion and scour protection to be provided where necessary. Included consent condition regarding this.	<i>Erosion and scour:</i> a) <i>The construction, operation, and maintenance of stormwater infrastructure shall not cause erosion, scour, bed degradation, bank instability, or excessive sediment deposition within:</i> - <i>the stormwater infrastructure,</i> - <i>any realigned channel, or</i> - <i>any downstream receiving environment.</i> <i>The discharge of stormwater shall not cause any increase in sediment load beyond background levels in any watercourse.</i> <i>The discharge shall not result in erosion or scour of any adjacent land, structure, or property.</i> b) <i>Scour and erosion protection for minor culverts and minor stream diversions shall be designed in accordance with NZTA P46 Stormwater Management and Minor Stream Diversion Design Specification (Feb 2025)</i>	

			c) <i>Scour and erosion protection for major culverts and stream diversion, including river works, shall be designed in accordance with the NZTA Bridge Manual (3rd edition).</i>	
14	Resource Consents The proposed resource consent conditions lack sufficient detail and do not adequately address water quality, attenuation, flood levels, mitigation of adverse effects, maintenance, etc, as well as requirements for certification of design.	Rewrite proposed operational stormwater discharge consent conditions to include: - Water quality treatment design - Attenuation of peak flows from new impervious areas - Waterway realignments and culvert or bridge sizing for conveying cross-catchments - Fish passage at culverts - Mitigating effects of filling within the floodplain - How the mitigation of effects on flood risk will be demonstrated (e.g. hydraulic modelling requirements including events and afflux limits) - Effect of groundwater inflows on stormwater infrastructure capacity - Groundwater influence on proposed infiltration devices - Special requirements for managing stormwater within landfill areas.	Stormwater treatment <i>Stormwater run-off from added trafficable pavement areas of the Project must have first-flush treatment where practicable, in a dedicated stormwater management device before discharging to the receiving environment. First flush treatment shall:</i> <i>Be designed to treat the runoff from a first flush rainfall depth of 25 mm for volume-based devices or a first-flush rainfall intensity of 5 mm/hr for flow-based devices</i> <i>Be designed in general accordance with:</i> <i>The Waka Kotahi NZ Transport Agency 'Stormwater Treatment Standard for State Highway Infrastructure' dated May 2010;</i> <i>The Waka Kotahi NZ Transport Agency 'P46</i>	

		These need to include specific design requirements (e.g. for water quality design the first flush or water quality rainfall depth or design storm; or for attenuation the ARI events which need to be attenuated) as well as references to design standards and guidelines. And: j. Require design information to be submitted to ECan along with certification of the design by a CPEng engineer stating that the stormwater system has been designed in accordance with the consent conditions (refer item 2 and 3 of this table). k. Require as-built information to be submitted to ECan along with certification by a CPEng engineer that the stormwater system has been constructed in accordance with the design.	<i>Stormwater Specification' dated 2025, including the requirements for operation and maintenance.</i> c) <i>Achieve greater than 75% TSS removal;</i> d) <i>Be designed and operated to avoid as far as practicable the discharge of hydrocarbons and litter to the receiving environment.</i> Stormwater attenuation a) <i>The stormwater system shall be designed so that at each discharge point the post-development peak discharge rate is no higher than the pre-development peak discharge rate in the 2-year, 5-year, 10-year, 20-year, 100-year and 200-year ARI events.</i> b) <i>The Project involves filling within the floodplain. The effects of this shall be offset so that there is not increase in flood levels or extents outside the designation boundary in the 10-year, 100-year and 200-year ARI events.</i> c) <i>Where modelling is used to demonstrate the performance of the stormwater management design, pre-development vs post-development flood difference mapping (afflux maps) shall be</i>	
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			<i>provided for the 10-year, 100-year and 200-year ARI events, demonstrating that the Project does not increase flood levels outside the designation.</i> Flood Levels <i>Outside of the designation, the Project shall not cause any more than the following changes to existing flood levels during the 200-year ARI flood event, inclusive of climate change, unless otherwise agreed by the applicant and the landowner in writing:</i> <i>a) In urban areas located within areas mapped as no or low flood hazard, flood levels shall not increase by more than 20 mm.</i> <i>b) At any existing building in rural or urban areas located within areas mapped as no or low flood hazard, flood levels shall not increase by more than 20 mm.</i> <i>c) At any urban areas located within areas mapped as medium or high flood hazard, flood levels shall not increase.</i> <i>d) At any existing building in rural or urban areas located within areas mapped as medium or high flood</i>	
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			<i>hazard, flood levels shall not increase.</i> e) <i>Within rural areas where no existing buildings are present, flood levels shall not increase by more than 50 mm.</i> <i>For the purposes of this condition, flood hazard is $D \times V$ (depth x velocity) and flood hazard ratings shall be determined in accordance with the most recent Waimakariri District Council Natural Hazards maps.</i> Stormwater management devices (treatment & attenuation) a) <i>When located on a piece of land that is contaminated land at the time the piece of land is disturbed by construction activities, stormwater management devices must be designed to have a low permeability liner (permeability of equal or less than 1×10^{-9} m/s).</i> b) <i>Stormwater management devices must consider groundwater inflow in sizing of the device and not cause or exacerbate flooding.</i> c) <i>In highly permeable areas stormwater management devices must be designed to minimise the transport of contaminants to</i>	
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			<i>underlying groundwater and a 1m separation shall be maintained to the highest seasonal groundwater.</i> d) <i>Stormwater run-off from the Project must be managed to contain contaminants from an emergency spillage or event prior to discharge, excluding forebays.</i> e) <i>Stormwater management devices must be fully operational prior to the highway being open for public use.</i> Waterway realignments, culverts and bridges a) <i>Waterway realignments, culverts and bridges shall be designed so that the Project does not increase flood levels outside the designation in the 100-year ARI event.</i> b) <i>Major culverts and bridges shall be designed in accordance with the NZTA Bridge Manual (3rd edition).</i> Fish passage a) <i>All new culverts must be designed, constructed, and maintained to provide for fish passage at all times, in</i>	
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			<i>accordance with the requirements of the National Environmental Standards for Freshwater (NES-F) and the New Zealand Fish Passage Guidelines (2024). Without limitation, the culvert design shall:</i> <i>- maintain a naturalised bed or embedment that replicates the upstream and downstream channel bed;</i> <i>- avoid perched outlets or inlets under all flow conditions;</i> <i>- enable fish passage across the range of flows reasonably expected to occur at the site; and</i> <i>- avoid excessive water velocities, turbulence, or drops that would impede the movement of indigenous fish species present or likely to be present.</i> <i>b) Where existing culverts are retained, modified, or replaced, the consent holder shall ensure that fish passage is maintained or improved, and that the works do not result in a reduction in fish passage compared to the pre-works condition. Where an existing culvert does not currently provide adequate fish passage, the consent holder</i>	
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			<i>shall, as part of the works, implement reasonable and practicable measures to enable fish passage, which may include:</i> - <i>culvert bed retrofitting or roughening;</i> - <i>installation of baffles or natural substrate;</i> - <i>outlet or inlet regrading; or</i> - <i>partial or full culvert replacement.</i> <i>Any upgrade works shall be designed and implemented in accordance with the requirements of the National Environmental Standards for Freshwater (NES-F) and the New Zealand Fish Passage Guidelines (2024).</i> c) <i>As-built details demonstrating compliance with fish passage requirements shall be provided to the consent authority following completion of works.</i> As-builts <i>Within two months of completion of construction of the stormwater systems, the consent holder must submit to Canterbury Regional Council:</i> a) <i>All as-built plans of the stormwater system installed; and</i>	
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			<i>b) A certificate signed by a suitably experienced chartered professional engineer (CPEng) certifying that the stormwater systems have been constructed in full accordance with the design, location and installation specifications submitted as part of this consent;</i> <i>c) A statement signed by the CPEng confirming that they are competent to certify the engineering work</i>	
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