Attachment A: Response to ECan stormwater and river engineering matters

Ref	Comment from	ECan Issue	ECan Solution	NZTA Response
1	Jacobus Nicolaas Steenkamp	It is unclear whether the design has assessed opportunities for alternative attenuation and treatment, such as wetlands that achieve higher treatment standards. Missing details of how the proposed systems will connect to the existing stormwater networks.	Provide information in the report on the options/alternatives considered and reasons for adopting the proposed stormwater management approach.	The stormwater treatment system has been designed to meet NZTA stormwater treatment standard and P46, and is further detailed in the 100% Stormwater Drawings and Stormwater Design Report 100%. Our options were informed by earlier designs and heavily constrained by available space within the designation boundary. The design was improved upon by adding several stormwater ponds where space was available in the Taranaki and Waihora catchment areas near the Pegasus Interchange. The philosophy of the project makes use of conveyance swales and culverts, including existing passive flooding areas, to mitigate the impact to the greatest extent practicable, while assessing any residual impacts. These are assessed through the flood modelling described in the Flood Modelling Report Revision B. Proposed condition O3.4 requires stormwater to be treated, where practicable, in dedicated stormwater management devices which are designed to achieve minimum standards in relation to attenuation and treatment
2	Jacobus Nicolaas Steenkamp	The general arrangement drawings provided have very limited information on the proposed stormwater system and how it will connect to the existing stormwater networks and waterways.	Provide drawings detailing proposed stormwater system/management areas and integration with existing drainage and waterways.	The locations of connections to the existing stormwater system are indicated in the consent drawings and further detailed in the 100% Stormwater Drawings. A table of connection points and their approximate discharges is shown in Attachment E. The Stormwater Design Report (Attachment C) describes the discharge patterns and mitigations for each catchment.

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3	Jacobus Nicolaas Steenkamp	Technical design information is required to substantiate the proposed stormwater management design, including attenuation, treatment and conveyance.	Provide a stormwater design philosophy report with supporting technical documentation for the proposed development, including predicted flood levels and sizing of treatment devices and treatment that will be achieved. Provide drawings detailing proposed stormwater management areas and integration with existing drainage	As noted above, the 100% Stormwater Drawings and associated stormwater and flood modelling reports are attached to this response for ECan's information. The 100% Stormwater Drawings and associated reports include additional detail of the stormwater management system. The system is compliant with P46 and the NZTA stormwater treatment specifications.
4	Jacobus Nicolaas Steenkamp	Aurecon's model is the basis of the assessment. This needs to be more thoroughly validated to determine its suitability.	Flood model to be peer reviewed	The flood model has been developed from the current Mike Flood WDC districtwide model for the area and applied for the purpose of assessing flood effects associated with the Project, which is located in a predominantly rural catchment with high infiltration rates, limited development (both surrounding and downstream), and a low overall flood risk profile. Existing drainage patterns are largely maintained, and there are few sensitive receptors within the modelled flood extents. While an independent peer review has not been undertaken, the model has been subject to a robust validation and quality assurance process to confirm its suitability. This includes: • Review and endorsement by Waimakariri District Council. See correspondence in Attachment F. • **Verification** of catchment boundaries, drainage paths, and flood extents against surveyed topography and available hydrological data, including surveyed channel topography, where available and existing culverts.

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				• **Infiltration** parameters sourced from relevant district criteria. • Application of **conservative assumptions**, including exclusion of potential increases in infiltration and outflow within treatment swales and check dams, to ensure that flooding effects are not underestimated. As this model has been developed to inform a project-specific effects assessment, it is not intended to be duplicative of WDC flood model results within the project area. Key refinements include the inclusion of updated topography (including surveyed channels), inclusion of surveyed culvert data, and a finer mesh resolution. This results in a model that has higher peak flows and volumes than the WDC model but is considered suitable and conservative for the purpose of assessing impacts of the Project. Where volumetric impacts occur (i.e. within downstream bathtub areas, and the Lineside to Cam section) the flooding assessment is based on conservative assumptions (i.e without consideration of increased outflow or enhanced infiltration within treatment swales). Based on the rural, undeveloped, low energy nature of the catchment, and the conservative assumptions in the modelling and effects assessment, any modifications to the flooding model as a result of a peer review would be unlikely to change the assessment of the impacts, and therefore is considered unnecessary.
5	Jacobus Nicolaas Steenkamp	There is an area of the alignment 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.	Information to be provided on how effects and performance of mitigation will be assessed in this area.	The area of the alignment outside of the extent of the flood model is the area south of the Cam River. This area traverses a low lying 'bathtub' inundation area. The flooding impacts of the Project have been assessed based on the displaced volume due to the Project works, resulting in only minor differences (<5mm) in flood levels for various water levels. This is documented in Appendix G of the Stormwater Design Report 100%.

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5	Jacobus Nicolaas Steenkamp	Future development. Section 3, SW-RPT-0003 Rev B. Flood assessment does not allow for Maximum Probable Development (MPD) in catchments.	Provide information why MPD was not allowed for in the design. The review should include future developments identified in the Waimakariri District Plan, covering Kaiapoi, Rangiora, areas north of Beach Road, Woodend and Pegasus. Assess potential changes in land use and run-off and the implications of the project for these developments.	Over the past year, the project team has engaged extensively with WDC regarding the appropriate approach to assess the flooding impacts of the Project, including selection of appropriate models and events. In agreement with WDC, and consistent with P46, we have incorporated inputs from WDC's 100- and 200-year models to assess the impacts of the Project. This represents the 'best available' model for this purpose and is in line with the methodology used by WDC for assessment of flooding impacts for all development within the district. This model includes enhanced roughness and reduced infiltration rates for proposed future land development areas, which have been incorporated into the project specific model. The modelling approach adopted is considered appropriate and proportionate, and the Project is not expected to preclude or materially constrain future development.
7	Jacobus Nicolaas Steenkamp	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).	The model covers only the north-east of the Ruataniwha/ Cam River and does not include the full project. It is therefore unclear how effects outside the model area have been assessed. The alignment south-west of the Ruataniwha/ Cam River lies in a flood-prone area in WDC's models, and the project could worsen flooding there.	The area south of the Cam River traverses a low lying 'bathtub' inundation area. The flooding impacts of the project have been assessed based on the displaced volume due to the project works, resulting in only minor differences (<5mm) in flood levels for various water levels. This is documented in Appendix G of the Stormwater Design Report 100%.
8	Jacobus Nicolaas Steenkamp	Modelling 10-year event. Section 3 of SW-RPT-0003 Rev B and Section 2 of SW-RPT-0001 Rev A. Reporting of smaller	Include the report of the 10-year ARI flood event and results.	As discussed above, extensive engagement has been undertaken with WDC to assess the flooding impacts. This includes the selection of appropriate models and events. In agreement with WDC, we have assessed the impacts for the 100- and 200-year events,

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		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.		including assessment at properties, see Flood Modelling Report Revision B and correspondence from WDC in attachment F Undertaking a 10-year study would extend beyond typical development requirements in the region, and the WDC districtwide flood model has not been run for this event. Running this model would require adding new rainfall parameters to the districtwide flood modelling, processing and validating the outputs and extracting new hydrographs for the TuFlow flood model. Based on the limited impacts of the 100-year flooding areas traversed by the Project and rural land use with limited area impacted by flooding, a flood assessment of the 10-year event would be unlikely to identify any significant flooding impact.
9	Jacobus Nicolaas Steenkamp	Mitigation measures included in post-development with mitigation model.	Provide details on the mitigation measures included in the post-development with mitigation model.	The philosophy of the project makes use of conveyance swales and culverts, including existing passive flooding areas, to mitigate the impact to the greatest extent possible, while assessing any residual impacts. This is in alignment with the stormwater philosophy adopted in the specimen design, which does not make use of large attenuation facilities. The Flood Modelling Report Revision Band Stormwater Design Report 100% document the details of the culverts and swales used for flood conveyance.
10	Jacobus Nicolaas Steenkamp	The design proposes like-for-like replacement of cross-culverts at sections of the alignment (e.g. Chainage 16020, 9200, etc).	Like-for-like replacement or extension of existing culverts is likely to increase losses and cause upstream effects. Provide pre-and post-development flood modelling and hydraulic results to demonstrate no adverse effects and specify the design standards followed.	All culverts have been assessed for hydraulic capacity. Where like-for-like replacement is proposed, the capacity has been assessed using TuFlow hydraulic model and HY8 modelling software in accordance with P46 and the NZTA Bridge Manual. The pre and post assessment of flooding effects for the proposed culverts is documented in the Flood Modelling Report Revision B. Within the Lineside to Cam section, flooding is largely controlled by bathtub volumetric and tailwater conditions. Culverts 1 and 2 are within this area and are being replaced on a like-for-like basis due to asset condition/age rather than in response to the Project. No

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				lengthening of the existing culverts is required to facilitate this work. The capacity of the new culverts remains unchanged and will have no impact on the overall catchment hydraulics.
11	Jacobus Nicolaas Steenkamp	Contaminant removal rates. Section 5.1.2, Table 5-1 of SW-RPT-0003 Rev B. Removal rates vary 70% to 80% which is lower than required in P46:2024.	Provide updated reference and comparison in updated information.	The contaminant removal rates shown in Table 5-1 of SW-RPT-0003 Rev B are largely based on those found in Table 8-1 of the NZTA Stormwater Treatment Standard for State Highway Infrastructure (2010), which is the currently active stormwater treatment guidance document. P46 and its guidance document[1] does not impose contaminant removal rates for standard treatment devices. The guidance document requires, "Proprietary devices shall typically be designed to achieve a minimum of 75% total suspended solids (TSS) removal", however the proposed treatment devices (swales, basins, etc) are not proprietary devices. The contaminant removal is therefore considered appropriate and in line with current standards.
12	Jacobus Nicolaas Steenkamp	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	Structural peer review has been undertaken on all bridges (Jacobs) and major culverts (independent team within Aurecon as permitted by the NZTA Highways Structures Design Guide). The Project has an NZTA asset owner departure for reduced freeboard at the Cam River bridge, based on the low velocity of the Cam River and adjacent overtopping location of the roadway. The scour assessment for the Cam River bridge identified only minimal scour risk, affecting the embankments only, and the scour design follows straightforward design criteria from FHWA HEC-23, design guideline 14.

[1] NZTA P46G:2025 Stormwater management and minor stream diversion design specification - guidance document. Available at https://nzta.govt.nz/assets/resources/stormwater-specification/P46-Stormwater-management-and-minor-stream-diversion-design-specification-guidance-document.pdf

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			100-year ARI water level, allowing for climate change and sea level rise.	It is noted that for large culverts on the project, the sizing is typically dictated by non-hydraulic constraints such as fish passage and ecological outcomes. In many cases, the culvert velocities are less than those in the adjacent river reaches. This reflects the general low energy environment of the waterways, reflecting the low risk of scour and erosion. Erosion protection at culvert outlets has been designed in accordance with NZTA bridge manual criteria. No further peer review is considered necessary or appropriate based on the low risk environment. We understand that ECan is no longer seeking a peer review of the Kaiapoi River Bridge as it is an existing structure.
13	Jacobus Nicolaas Steenkamp	South of Kaiapoi River Bridge. Section 4.4.1 and 3.2.1 of SW-RPT-0003 Rev B. Within the Kaiapoi urban area the project extent is only to the south bound lane, with drainage to the eastern side of the proposed main alignment. There appears to be some uncertainty of the drainage in the area.	Provide more information of the area, or further consultation and confirmation with Waimakariri DC (WDC) on the current stormwater conditions, drainage, flow patterns and pump requirements.	The design team has consulted with WDC to confirm flow and discharge patterns for the added lane south of the Kaiapoi Bridge. In this area, the flow enters the median, where it will be treated and discharged directly to the drain. As the asset owner for the Kaiapoi stormwater network, WDC have agreed to this discharge.
14	Jacobus Nicolaas Steenkamp	Kaiapoi River Bridge. Discharge to the river. Section 4.4.1 of SW-RPT-0003 Rev B.	It is recommended that the bridge drainage design be confirmed, including whether road surface flood extents necessitate catchpits or scuppers on the structure. The design should also confirm whether drainage from bridge joints can be captured and directed to the abutments for stormwater treatment and mitigation.	The existing Kaiapoi River Bridge drains directly to the river without stormwater catchpits or scuppers. The work at the bridge consists of adding one lane of deck area without undertaking significant structural retrofitting or any modification to the eastern edge of the bridge deck or barrier. Adding a stormwater reticulation was assessed, however it was determined retrofitting a robust system that had minimal maintenance requirements would be difficult and technically challenging, potentially introducing safety in design and aquaplaning risks. As such it is deemed impractical to capture and treat runoff from the bridge structure. Based on the very limited additional area of the bridge (approx. 20%), this does not materially

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			Stormwater runoff from completed bridge decks should be directed to a stormwater treatment device prior to discharge beyond the abutments, in a manner that does not cause bank or abutment erosion.	increase the risk of bank erosion risk or water quality effects beyond the existing condition.
15	Jacobus Nicolaas Steenkamp	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 should be assessed and if the material is to remain in place, a separation layer should be designed to prevent contamination of runoff.	Ground contamination investigations are ongoing, and will be completed prior to earthworks being undertaken in the respective area. A new condition is proposed to this effect (within condition set circulated 2 April 2026). Condition O3.2(d)(ii) requires that the stormwater design shall, where practicable, ensure operational stormwater discharges to ground do not occur into HAIL areas or where contaminated soil has been reused or retained. Following investigation, the design of the stormwater infrastructure through these areas will be confirmed, this may include the requirement for impermeable liners.
16	Jacobus Nicolaas Steenkamp	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. Riprap and rock linings are not proposed within any of the realigned channels except at	Consider asset life and environmental risk of proposed erosion protection. Other alternatives might be soil-filled and void-filled riprap and biodegradable geotextiles for channel stabilisation.	100% Stormwater Drawings show riprap proposed at culvert outlets. Additionally, riprap will be provided where swales and cutoff drains intersect with waterways above the invert of these drains. Waterways where planting or landscaping is provided will use organic fibre (wool or coconut) geotextile to stabilise soil as planting establishes where practicable. It is noted that the overall energy environment in the catchments is very low and extensive erosion protection is not required for vegetated channels as peak velocities do not exceed erosive thresholds for vegetated ground.

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		bridge structures and culvert outlets."		
17	Jacobus Nicolaas Steenkamp	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 draft conditions to include: a. Water quality treatment design b. Attenuation of peak flows from new impervious areas c. Motorway level relative to flood level d. Culvert or bridge sizing for conveying cross-catchments 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. Special requirements for managing stormwater within landfill areas. The need to include specific design requirements (e.g. for water quality design the first flush or water quality rainfall	The proposed conditions on the construction consents have been updated to address ECan's concerns around construction phase stormwater discharge – please see version circulated 2 April 2026. The following points are noted in regard to the operational resource consents. Conditions O3.4 and O3.5 address the design of the operational stormwater system, including requirements relating to water quality, including within HAIL sites, and flooding and requiring the design be undertaken by a SQP Condition 2.7 relates to culvert design and requires these be designed by a SQP NZTA will continue to work with ECan to refine the condition set. However conditions limiting motorway level relative to flood level and filling within the floodplain are not considered appropriate given the project designation authorising the motorway is already in place.

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			depth or design storm; or for attenuation the ARI events which need to be attenuated) as well as references to design standards and guidelines. Requirement for certification of design by a CPEng engineer should also been included.	
18	Minke Unwin	The details of stormwater discharge into the Cam River are not clear. The proposed changes to flow and timing should be outlined so an assessment on the effects on the flood capacity of the waterway can be conducted.	Please provide details of current vs proposed stormwater discharges into the Cam River due to the changes. If these are significant, it is possible to discuss this with the River Engineering team at ECan as the stopbanks downstream of this location are planned for upgrade over the next few years. From Doc 2H: The discharge may increase the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20%. The concern stands. The capacity of the Cam River is 34cumecs, so we need to see discharge volumes and timings for smaller events 10year, 20year (most important) and 50 year ARI.	We have developed a Stormwater Discharge Summary Table identifying outfall locations, the relevant receiving catchment, and the rate of discharge from the site into the receiving waterbodies for the 5-year ARI. For the Cam River the discharge rates 5, 10, 20 and 50 year ARI is calculated. This is shown in Attachment E. For the Cam River, the increases to the discharge are well under 1% for all events considered, including the 20% AEP (i.e. meets permitted activity condition 3 of CLWRP Rule 5.95).

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19	Minke Unwin	There is no estimate of changes in stormwater quantities discharging to waterways due to the Project. This should be combined with approximate existing normal and storm flows. This is important information for the assessment of effects on the flood carrying capacity of the waterways.	Flooded area in a 100 and 200 year ARI are considered, but we are also concerned about stormwater quantities discharging into the current water bodies in smaller events eg 10 year, 20 year and 50 year ARI. Approx volume changes and timing should be identified. We cannot confirm that the effects are less than minor without comparing these to existing flows and flood peak.	We have developed a Stormwater Discharge Summary Table identifying outfall locations, the relevant receiving catchment, and the rate of discharge from the site into the receiving waterbodies for the 5-year ARI. For the Cam River the discharge rates 5, 10, 20 and 50 year ARI is calculated. This is shown in Attachment E. For the Cam River, the increases to the discharge are well under 1% for all events considered, including the 20% AEP. Although there is limited existing hydrologic information for smaller events for the other waterways in the catchment (Waihora Stream, Taranaki Stream and McIntosh Drain), the assessment has estimated the 5 year ARI flows using the rational method. For Taranaki Stream and McIntosh Drain, the combined inflows from the Project both reflect a 1.6% increase in the 20%AEP event. However the overall flooding impacts in 1 in 100 year event are less than minor and the same is true for lesser events, given the limited flood extents and impacts to surrounding areas. Within the Waihora catchment, the increases are more pronounced. This is due to the currently undeveloped, small nature of the existing catchment. However, as the overall flooding impacts in 1 in 100 year event are less than minor the same is true for lesser events, given the limited flood extents and impacts to surrounding areas. It is likely that the increases shown in the table for Waihora are overstated. The assessment has not considered diverted inflows from Taranaki Stream into the Waihora headwaters, nor has it considered the extremely highly infiltrating soils that dominate the catchment. It is likely that most or all of the added flows would infiltrate within the main flowpath, contributing very little to discharge downstream of the Project.

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				Likewise, any potential erosion and geomorphological impacts from the Project during smaller events are expected to be minor, given the low gradient nature of the receiving waterways, highly infiltrating soils, and overall low energy hydraulic environment.
20	Minke Unwin	Native vegetation has been proposed along the banks of the waterways. Waterways can become choked by plants if not correctly planned, reducing flood capacity.	Environment Canterbury has developed guides for planting in and around waterways with flood functioning in mind. Contact the River Engineering team for further guidance on species and spacings which are appropriate in different waterways.	The plant species selection and density have considered waterway guides in the landscape detailed design drawing package. Authorisation under the Canterbury Flood Protection and Drainage Bylaw 2013 will be sought separately (it cannot be sought under the FTAA) for planting within 7.5 m of defences against water.
21	Minke Unwin	Cut off drains have been proposed and have been designed to an acceptable flow. It is unclear where the discharge locations of these will be, and if they are discharging to different waterways. There is concern about whether the downstream drains or waterways are able to accommodate the extra flow.	From Doc 2H: The discharge may increase the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20%. The concern stands	All cutoff drains retain offsite flows within their original catchments. No cutoff drains will result in diversion of cross catchment flows to other catchments or will result in increased flows.
22	Minke Unwin	The likely requirement of temporary bunding or coffer dam for the new bridge abutments should not interfere with the minimum channel	Designed so that the water surface does not exceed 2.55m R.L (NZVD16) at 34cumecs in the main channel. A large flow event is possible (though less likely) at any time, and design	While temporary bunding or coffer dams may be necessary, they are considered unlikely as the new abutments are outside the channel. Any such structure would likely require approval under the Canterbury Flood Protection and Drainage Bylaw 2013. This

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		volume during a design flood event.	consideration should be given to whether the site must/can remain dry in a large flood.	approval cannot be sought under the FTAA and would be sought separately.
23	Minke Unwin	Temporary structures for the Cam River Crossing have been mentioned in in Document 2H, but no details have been given as to what that might look like or how that will interact with the flood capacity of the river.	If there are ideas on construction methodology and the possibility of temporary structures in the riverbed, it would be good to share this early so we can work out problems. Partially addressed in Doc 2H. Same solution as above point.	As above.
24	Minke Unwin	Any damage to flood protection assets caused by the Project must be repaired as soon as practicable, and in anticipation of a high rainfall event.	(none provided)	Activities affecting flood protection assets would likely require approval under the Canterbury Flood Protection and Drainage Bylaw 2013. This approval cannot be sought under the FTAA and would be sought separately.