PATTLE DELAMORE PARTNERS LTD
Level 2, 134 Oxford Terrace
Christchurch Central, Christchurch 8011
PO Box 389, Christchurch 8140, New Zealand

Office +64 3 345 7100
Web **www.pdp.co.nz**

20 February 2025

Jon Trewin
Policy Planner
Selwyn District Council
2 Norman Kirk Drive
ROLLESTON 7643

Dear Jon

ROLLESTON ACCESS IMPROVEMENTS: NOR STORMWATER REVIEW - PACKAGE 1

1.0 Introduction

Selwyn District Council (SDC) engaged Pattle Delamore Partners Ltd (PDP) to provide a technical review of the proposed stormwater design for the SH1 Rolleston Access Improvements as part of the Notice of Requirements (NoR). The technical review consisted of the following proposed works:

- Package 1 – SH1 / Dunns Road Roundabout and associated works.
- Package 2 – Overpass and balance of the works.

As part of the technical review, PDP provided comments on the stormwater management report for packages and any further information (RFI) required for SDC to determine the effects of the NOR.

This letter provides a summary of the technical review of Package 1.

1.1 Information Reviewed

The following information was reviewed:

- *BECA, SH1 Rolleston Access Improvements – Stormwater Management Report Package 1 (Rev 02, Oct 2024).*

The following information was considered as part of the review:

- *Waka Kotahi, Assessment of Effects on the Environment: SH1 Rolleston Access Improvements – Package 1 (30 October 2024).*
- *Waka Kotahi, Notice of Requirement for Alteration of a Designation s181(1) Resource Management Act 1991: Designation NZTA-1 (October 2024)*
- *Consent Order Decision No. [2024] NZEnvC 269 (31 October 2024).*

1.2 Purpose

The purpose of this letter is to summarise the review process and provide recommendations to SDC.

2.0 RFIs & Responses

PDP reviewed the technical information provided, as listed in Section 1.1, and issued a register of RFI's and responses to SDC. The review timelines are listed below.

- PDP issues the RFI register on 12 November 2024.
- SDC provided an updated RFI register with responses from the applicant on 10 December 2024.
- PDP reviewed responses received and issued an updated RFI register on 18 December 2024.
- SDC will provide the RFI register with final responses from applicants on 5 February 2025.

PDP reviewed the responses as received on 5 February 2024 from the applicant and provided closing comments to be considered by SDC. Refer to Attachment 1 for the RFI register relating to the proposed stormwater design for Package 1.

3.0 Recommendations

PDP is satisfied that the applicant has addressed the RFI's for the NoR Package 1.

Based on the responses provided in terms of the "flood risk assessment", PDP is satisfied that the proposed activity is likely to have a less than minor effect on the downstream and upstream environment. This is based on the following responses as provided by the applicant:

- The applicant advised that the proposed cross-drainage will align with existing overland flow paths;
- The applicant advised that the proposed discharge to ground would be for a catchment larger than the additional impervious area created by the project; and,
- The applicant advised that the proposed cross-drainage is proposed to capture the existing overland flow paths impeded by the project alignment and convey them across the project corridor and discharge to the existing flow paths.

PDP recommends that as part of the design development going forward, the design provides sufficient detail on the proposed cross-drainage and to satisfy that pre-development flood risk does not change as a result of the proposed cross-drainage infrastructure.

4.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Selwyn District Council. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Selwyn District Council for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

Philip Claassens

Technical Director - Water Infrastructure

Reviewed & Approved by

Murray Kerr

Technical Director – Water Infrastructure

Attachment 1: RFI register.

RFI Register - Stormwater					
Document reference	**SDC Request**	**Beca Response**	**SDC Response**	**Beca Further Response**	**Reviewer/SDC Further Response**
Stormwater					
70	Groundwater (incl Geotechnical Interpretive Report) - The highest groundwater depth was based on a short monitoring period between 12 July and 12 August 2024. Has the highest recorded groundwater in the area been considered based on any other monitoring data? And if so, what was the highest recorded?	The monitoring period was limited to the duration of site works, which occurred over winter when the water table was expected to be higher. The nearest piezometer to the Project site is M36/0085 (1km west from roundabout) on CanterburyMaps, which shows groundwater levels from 7.4 to 20.9m below ground level (based on data from 1982 to 2010). The level adopted for design is at approximately the 90th percentile of levels observed in M36/0085. More recent data at piezometer M36/0217 3.5km northeast of overpass) shows levels from 10.5-21.8m bgl (from 1974 to 2024).	Satisfactory response. Closing comment - it is important to report on the highest recorded groundwater level based on available data rather than a shorter period (e.g., the period from 12 July to 12 August) as groundwater levels can vary from year to year.	Noted.	Closed
71	3.4.1 Rainfall - Applicant to confirm the location or station used to extract the data. It appears that the rainfall data is from the Burnham RAWS station.	It is confirmed the HIRDS V4 data was taken from the BURNHAM RAWS site (ID:O00886).	Noted.	N/A	Closed
72	3.4.3 Catchments - Key assumption that the cross-catchments outside of the NOR footprint are generally assumed not to enter the Package 1 stormwater system. Does this apply to the catchments to the north of Two Chain Road? What confidence/proof is there to confirm this assumption?	The assessment of the cross-catchments used a combination of LIDAR data and the Selwyn District Council Flood Hazard Map. The LIDAR around the Two Chain Road / Walker Road intersection shows the levels falling east and west along Two Chain Road, rather than south down Walkers Road. The Flood Hazard Map flood depths would seem to correlate with the major flow paths heading further east and west from the Walkers Road / SH1 junction. This is reflected in the cross-catchments shown in drawing 3338703-10-CD-2011.	Referring to Figure 2.2 in the Package 1 report, a large flow path breaching Two Chain is shown to the south of the intersection with Walkers Road. Interrogating the available flood data (SDC flood maps) and what is presented in the report confirms the response provided noting the overland flow paths to the south and north of the proposed site will remain unchanged. The post-development cross-catchment are shown on 3338703-10-CD-2012, and not 2011 as per the response.	Noted.	Closed
73	3.4.5 Ground Soakage Rates - The total contributing catchment is > 1,000 m2 and there is a residential area downstream of the proposed site. Based on Table 3-4, what was the justification for the lower factor of safety applied (i.e., 5 vs the table recommended 10)?	Stormwater runoff from at least the additional impervious area within the project extents will be discharged to ground, up to the 1% AEP event. As discussed in Section 5 of the Stormwater Management Report, due to the geometric design and proposed catchments, the proposed basins are likely to provide attenuation and soakage to ground for an area greater than the additional impervious area created by the Project. The basins and swales will be located and designed so that during events larger than the 1% AEP design event (or if the soakage does not perform as intended and the basin overflows in a smaller event), stormwater will follow the existing overland flow paths. In terms of the factor of safety applied to the soakage test rates to arrive at design rates based on Table 3-4 of the report (from CIRIA SuDS manual, Table 25.2), while the catchment areas are greater than 1,000m², the consequence of failure (i.e. overflow to existing overland flow paths) is considered to be minor and therefore a factor of 5 has been applied.	It is noted that overflow from the basins during an event exceeding the 1% AEP will follow existing overland flow paths and we agree that this is appropriate. In terms of the response given below to address why a factor of safety of 5 was adopted, please provide comment why the consequences of failure is considered to be minor? The current response provide a statement that the consequences will be minor but does not say why it would be minor. *"In terms of the factor of safety applied to the soakage test rates to arrive at design rates based on Table 3-4 of the report (from CIRIA SuDS manual, Table 25.2), while the catchment areas are greater than 1,000m², the consequence of failure (i.e. overflow to existing overland flow paths) is considered to be minor and therefore a factor of 5 has been applied."*	The consequence of failure is assessed as minor based on the existing scenario and the impact of the proposed works. Within the scheme extents, the existing drainage is limited to a number of soakpits as described in Section 2.5 of the report. The Project is estimated to create an additional 10,150m² of impervious area, however, the proposed stormwater basins are designed to capture and discharge to ground up to the 1% AEP event for 18,000m² of impervious area. In the event that the soakage rate is not as high as anticipated, then in a large event the basins could fill up and overflow to the south. This overflow path to the south would be along the existing secondary flow path to the west of and along Dunns Crossing Road. (It is also important to note that in this case, the basin would still provide some attenuation of flows.)	**Noted - Satisfactory response**
74	3.4.5 Ground Soakage Rates Observation - The SDC engineering code of practice requires consideration to Waterways, Wetlands and Drainage Guide (WWDG) Chapter 6 when considering infiltration rates. The recorded infiltration rates are high (as expected for the type of soils) and the design soakage rate is higher that the 75 mm/hr recommended by WWDG. This is acceptable based on the result and agree with recommendation made that further soakage test is required during construction. Test should be done at location and depth proposed of proposed soakage basins.	The infiltration media for the first flush basins will be design during the detailed design stage of the project. The design will follow best practice guidance from "CRC for Water Sensitive Cities - Appendix C: Guidelines for filter media in stormwater biofiltration systems, which is based on extensive research and operational experience. Infiltration through the design soakage media is likely to be in the region of 100mm-300mm/hr initially, but this can fluctuate over time due to clogging and compaction. The basins are sized to capture the first flush runoff volume (i.e. runoff from 25mm of rainfall) and the drain down time for the long-term case is checked assuming a minimum 20mm/hr infiltration rate (with clogging), with a maximum drain down of 24 hours to maintain healthy grass cover. Further testing of the soakage rates of the underlying ground will be carried out during construction to confirm soakage rates in the locations of first flush and soakage basins. If poor rates are identified then the assumed infiltration and soakage rates and design will be re-assessed, however this is considered unlikely.	Satisfactory response.	N/A	Closed
75	4.3 Overview of Stormwater Approach - Has a flood risk assessment been completed to determine the effect if the proposed stormwater infrastructure exceeds the level of service it is designed for? This is a requirement as per the SDC engineering code of practice.	A flood risk assessment or hydraulic modelling has not been undertaken for the Project, as the cross-catchment flows have been managed and site runoff up to the 1% AEP as part of the design. Cross-catchment drainage will be designed to capture and convey flows up to the 1% AEP event across the alignment to existing overland flow paths. Runoff from the road corridor will be managed by the proposed stormwater system with collection, conveyance and soakage basins and soak pits that discharge to ground up to the 1% AEP event, mitigating the water quantity effects. In events greater than the 1% AEP, there will be stormwater overflow from the basins, which will follow along the existing overland flow paths.	The SDC Engineering Code of Practice (Section 8.4.4) states the following: "Council's committed Levels of Service for stormwater require that a flood risk assessment is carried out as part of design for subdivisions and infrastructure assets. This assessment must consider effects when the stormwater network exceeds its design level of service. This may require modelling to demonstrate likely areas and extent of ponding/flooding, flow velocities and ponding depths, and duration of flooding in large events". In Section 2.5 it is noted that there is no existing stormwater cross-drainage infrastructure within the Package 1 extent. The flood mapping shown in Figure 2-2 of the report shows that there are some breaching/ponding along and over SH1 within the Package 1 extent. The cross-drainage shown in Figure 4-3 confirms that upstream contributing catchments will drain towards the proposed Package 1 work. As part of Package 1 proposed new cross-drainage infrastructure is to be installed to the north and the south of the roundabout (Refer Section 4.4.5). In Section 4.4.5 the statement is made that *"Cross-drainage peak flows will be conveyed safely across Package 1 by cross-drainage network up to the 1% AEP event, without flooding the state highway and without increasing flood risk outside of the designation or to private properties"*. The concern is that new cross-drainage is proposed where previously no cross-drainage existed. Please provide information on what the effect of this new infrastructure would be on the downstream environment.	Whilst a separate flood risk assessment has not been carried out, the existing SDC flood mapping and historical groundwater information, along with more recent site investigation and soakage testing have been considered as part of the design. The design for the Project includes discharge to ground up to the 1%AEP for a catchment larger than the additional impervious area created by the project. In events larger than the design 1% AEP event, there will still be a significant volume of stormwater discharged to ground. If the basins fill up and overflow, the overflow path to the south would be along the existing secondary flow path to the west of and along Dunns Crossing Road. The cross-drainage is proposed to capture the existing overland flow paths impeded by the Project alignment and convey them across the Project corridor, discharging to the existing flow path. In this large catchment these relatively short lengths of culvert, small modifications and areas of existing ponding will not significantly alter the routing/timing and scale of flow peaks.	**Noted - Response satisfactory as part of assessment of effects. Closing comment - It is recommended that the applicant provides detail that the proposed cross-drainage design will not increase the flood risk down and upstream of the proposed development as part of the design development.**

76	4.3.1 Road Corridor Catchment - Referencing Figure 4.1, there will be an expected change in slope in some areas in the catchment (e.g., on ramps, subway). Has consideration been given to the effect on stormwater runoff due to the change in slope and/or material (hardfill)?	No additional factors have been applied to changes in slope as the impact is anticipated to be minor / insignificant.	Noted ,however this should be considered in detailed design.	Noted.	Closed
77	4.3.2 Cross-Drainage Catchments - Has a pre-development catchment(s) been delineated to determine the current cross-drainage catchment and flow paths? The post-development crossdrainage catchment should be compared and assessed against the pre-development catchments to determine if there is any change in catchment (e.g., flow) on the downstream (and upstream if applicable) environment. Current Figure 4-3 presents the proposed post-development catchment plan for package 1 only.	A pre vs post assessment is not required. The impact of the proposed geometric design has been assessed and the cross-catchments delineated. The cross-drainage network collects these cross-catchment flows and conveys them across the project footprint and back to the existing overland flow paths, which were determined using a combination of LIDAR and the Selwyn District Council Flood Hazard Map.	For the pre-development scenario there is no existing cross-drainage infrastructure (as per our understanding from the Package 1 report). By installing infrastructure, discharge to the downstream of SH 1 will be facilitated where in the pre-development there would have been ponding. Has the impact of installing cross-drainage been assessed? We concur that the flood mapping shows existing overland flow paths, but won't this be exacerbated due to new cross-drainage infrastructure?	Refer response to RFI 75	**Refer to RFI 75**
78	4.4.2 Treatment - The removal efficiency of the infiltration treatment is listed very broad. To understand the potential effect of runoff, what are the contaminants expected from the road and will there be an increase or decrease in the concentrations due to the proposed activity? What is the expected removal efficiency of the infiltration basin and, based on the efficiency to remove the required pollutants, is the conclusion that the proposed treatment provided is sufficient (based on relevant water quality guidelines and/or consents)? https://niwa.co.nz/freshwater/urban-runoffquality-information-system-urqis can be consulted for water quality data.	Treatment via first flush is an industry accepted method of treatment with very good removal efficiencies. Section 4.4.2 lists the expected contaminants including total suspended sediment (TSS), metals, and hydrocarbons, and good removal of nutrients. In accordance with WWDG Chapter 6 Section 6.4 First Flush Interception, the detailed design accounts for the capture of runoff from the first 25mm of stormwater rainfall depth. This is generally accepted to achieve treatment of 78% of the rainfall depth as noted in Section 6.4. Currently, only informal treatment occurs in the project catchment within the grassed berm areas. The first flush basins have a catchment area greater than the additional impermeable created as part of the project. Therefore, the impact of the project is expected to be less than minor.	To clarify the initial RFI - the Package 1 report (Section 4.4.2) list the contaminants which a biofiltration device is considered good at removing, but the section does not refer to the contaminants expected from the road. The WWDG is a good source to refer to the efficiency of pollutant removal (Refer to table 6-6 of the WWDG). Although the response provided does not answer the RFI fully, a soakage basin is expected to remove a range of contaminants (TSS between 60 to 100%, nutrients between 40 to 80%, Trace metals between 40 to 100%).	N/A	Closed
79	4.4.3 Discharge to Ground Refer to RFI #70 - Consideration needs to be given to the highest recorded groundwater level (the recorded period of July to August 2024 is considered short) and that should be used to determine if the performance of the proposed infiltration basin will be affected by groundwater mounding or not. It is likely that the highest historical recorded groundwater level is well outside of the influence of groundwater mounding, however it is important to consider available historic information as part of the assessment.	The monitoring period was limited to the duration of site works, which occurred over winter when the water table was expected to be higher. Longer term monitoring may indicate shallower levels than that measured, particularly after large rainfall events. The nearest piezometer to the Package 1 site is M36/0085 (1km west from roundabout) on Canterbury Maps, which shows groundwater levels from 7.4 to 20.9m below ground level (based on data from 1982 to 2010). The level adopted for design is at approx. the 90th percentile. More recent data at piezometer M36/0217 3.5km northeast of overpass) shows levels from 10.5-21.8m bgl (from 1974 to 2024). Additional mounding assessment necessary given nearby data.	Satisfactory response.	N/A	Closed
80	4.4.4 Attenuation - Can sizing calculations be provided for both the sizing of the attenuation and the treatment?	At this stage, the preliminary design informs the consenting requirements and provides for the footprint. The calculations will be refined during the detailed design based on geometric detailed design. Detailed design calculations will be included in the detailed design reports.	Noted - although detail is not provided, the land available within the proposed basin areas.	N/A	Closed
81	4.4.5 Cross-Drainage - The cross-drainage has been designed to collect the eastern and western cross-catchments. In section 2.5 it is indicated that there is no existing cross-drainage through SH. Will the proposed cross-drainage infrastructure result in a change in flood risk downstream now that there is new flow paths via the proposed cross-drainage infrastructure? If so, what will the effect of this cross-drainage infrastructure be?	There is no existing cross-drainage network across SH1, however, there are cross-catchment flow paths across SH1. The cross-drainage network will be designed to collect those cross-catchment 1% AEP flows and convey them beneath the project footprint and discharge them into the existing flow paths. The short sections of pipe across the project footprint are not expected to change the routing or timing of the peak flows. No change is therefore expected on downstream flood risk.	Refer to RFI #75 & #77. We acknowledge that there is a flow path across SH1 based on the SDC Flood Hazard mapping, however these present results for the 200 and 500-year return events. Will installing cross-drainage increase discharge to the downstream environment during smaller events (i.e., less than what is presented in the SDC Hazard Flood Mapping)? If the intent is to not increase flood risk to the downstream environment, an understanding of the existing level of the service for the road (i.e., during which event it will overtop) should be presented and during which event the cross-drainage will discharge to the downstream environment.	Refer response to RFI 75	**Refer to RFI 75**
82	5.1 Overview - In figure 5-1, what happens to the post-development runoff from the catchment between the Northern Catchment and the Subway Catchment?	A soak pit is proposed to capture and discharge to ground the runoff from this area.	Noted.	N/A	Closed
83	6 Construction Stormwater Management - Is there an increased risk of flooding during the construction phase and if so, how will it be managed?	Construction stormwater will be managed through the erosion and sediment control (E&SC) plan and will follow the fundamental principles of good E&SC practice for the Canterbury region.	Noted.	N/A	Closed
84	DRG 2102: Civil - Drainage Inlets - Has the proposed inlets (sumps) been sized to capture the 1% AEP event and has consideration been given to reduced performance due to blockage? Will secondary flow paths direct the runoff towards the proposed attenuation and infiltration basins?	In low points, double sumps have been provided where only single sumps are required for capacity, to provide some redundancy for blockage. Where no secondary overland flow path is available off the road corridor of SH1, the network has been designed for the 1% AEP for capture and conveyance to manage peak flows.		N/A	Closed
85	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): The location o the cross-drainage inlets needs to be confirmed as currently they are shown to be located within the proposed abandoned road portions.	The location of the cross-catchment inlets and outlets will be confirmed during the detailed design stage.	Noted - refer to RFI #81.	Refer response to RFI 75	**Refer to RFI 75**
86	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): Will this system operate as a bubble-up and if so, how will sediment and the potential loss of conveyance due to sediment build-up be managed?	This system will operate as a bubble up due to the local ground levels and sediment build-up will be managed via a maintenance schedule. Sediment build-up is likely to be limited as the inflows are via grassed areas surrounding the cross-drainage inlets, which will provide sediment capture. A sump will also be provided at the cross-drainage outlet point for sediment capture.	Noted.	N/A	Closed
87	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD 9 and 11): Refer to RFI #12. Would the proposed cross-drainage result in an increased flood risk downstream where previously no cross-drainage was present?	Refer to A81.	Refer to RFI #81 response.	Refer response to RFI 75	**Refer to RFI 75**
88	DRG 2102: Civil - Drainage Cross-drainage infrastructure (SWSD12): How will the captured upstream runoff discharging into the proposed conveyance swale be manage to not drain/spill into the proposed southern attenuation basin?	The cross-drainage infrastructure will be designed to accommodate the flow from the cross-catchments, up to and including the 1% AEP.	Noted.	N/A	Closed