Before the Expert Panel appointed under the Fast-track Approvals Act 2024 **FTAA-2604-1207**

Under	**the Fast-track Approvals Act 2024 (FTAA)**
In the matter	**of the Southern Link Inland Port**
By	**Southern Link Property Limited**

STATEMENT OF EVIDENCE BY DR CLAIRE CONWELL ON BEHALF OF SOUTHERN LINK PROPERTY LIMITED

STORMWATER QUALITY

19 August 2026

SIMPSON GRIERSON

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1. INTRODUCTION

1.1 My full name is Claire Elaine Conwell.

1.2 I hold a PhD in aquatic ecotoxicology from the University of Melbourne (Australia, 2007), and First Class Honours in aquatic ecotoxicology from the Royal Melbourne Institute of Technology (Australia, 2000) and a Bachelor of Science from Monash University (Australia, 1999). I am a member of Water New Zealand (including membership of the Stormwater Group) and the Environmental Institute of Australia and New Zealand (EIANZ).

1.3 I am an accredited Hearings Commissioner under the Making Good Decisions programme, and I am a Certified Environmental Practitioner (**CEnvP**) under the EIANZ accreditation scheme.

1.4 I am currently employed as a Principal Consultant and Team Leader (Water Quality) with Stantec NZ Limited (commenced January 2025). Prior to joining Stantec I worked as a Principal Environmental Consultant and Team Leader with SLR NZ (2 years, 9 months), and formerly as a Senior Associate Consultant (Water Resources), for Jacobs NZ for two years and four months. Prior to Jacobs, I was employed with the Greater Wellington Regional Council (GWRC) as a Senior Coastal Scientist (2017 -2019) and as a Scientist – Water Quality (2011-2017). Prior to GWRC, I was employed as an environmental consultant for five years at the Cawthron Institute (Nelson).

1.5 I have authored more than 100 technical reports in environmental management, produced more than 10 conference presentations in the field of ecotoxicology and water quality, and published several peer reviewed science papers and co-authored a book chapter in marine hydrocarbon pollution.

1.6 I have experience across a range of stormwater related projects including:

(a) Fast Track Application: Homestead Bay Subdivision, Queenstown, for RCL Homestead Bay Ltd: I undertook the assessment of stormwater quality likely to be discharged from the proposed new subdivision and residential development in Queenstown;

(b) Christchurch Urban Streams – Addington, Riccarton and Haytons Catchments, for Environment Canterbury. I led the project team to deliver the analysis and synthesis of freshwater quality across three priority catchments. Key outcomes were to identify the current state of water quality in the urban catchments, identify trends, and to understand the influence of land use characteristics across the catchments, and to provide recommendations for future monitoring; and

(c) Wellington State Highway Stormwater Consent (WGN220179) Year 1 Annual Monitoring Report, for New Zealand Transport Agency Waka Kotahi. I led the Assessment of Effects for the resource consent application of stormwater discharges from the Wellington State Highway Network for NZTA Waka Kotahi. Following this I led the Development of the Stormwater Monitoring Plan, Year 1 and 2 Adaptive Monitoring Plan, and authored the Year 1 Annual Monitoring Report.

1.7 My role in relation to the Southern Link Inland Port (**SLIP**) has been to provide an assessment of the potential key stormwater contaminants generated from the SLIP. In doing so, I authored the document 'Southern Link Inland Port - Stormwater Contaminant Load Model Assessment' (17 April 2026)(**CLM Memorandum**) which is provided in **Appendix 1**.

1.8 I have been asked by Southern Link Property Limited (**SLPL**) to provide a response to specific matters within my areas of expertise contained in written comments on the SLPL application from persons invited by the Panel to comment under s 53 of the FTAA. Specifically, my evidence responds to Appendix 4 to the comment by Otago Regional Council (**ORC**), which is a freshwater ecology review by Mr Chang / Ms Lion-Cachet of Beca (**Beca Review**). The review asserts that uncertainty remains regarding the magnitude of operational stormwater effects on Silver Stream. I respond to some of these concerns under the following topics:

(a) general concerns about the suitability of the Contaminant Load Model (**CLM**);

(b) application of load reduction factors;

(c) conversion of annual load concentrations;

(d) Port Chalmers monitoring data and the use of the CLM, noting this was included to supplement additional analyses to address several concerns about the CLM tool;

(e) contaminant profile and speciation;

(f) dilution in the receiving environment; and

(g) level of species protection.

1.9 I have relied upon technical analyses provided by Cedric Papion, C.WEM Water Network Specialist with 22 years' experience, who has undertaken analyses of available data acquired for Port Chalmers, and provided comparative assessment to the output and method set out using the Contaminant Load Model (**CLM**) process (detailed in Section 5).

1.10 My response also relies on information set out in:

(a) Freshwater Ecological Assessment and Terrestrial Ecology EcIA. Prepared by e3 Scientific, March 2026 (Part B.03 and B.04 of the substantive application for the SLIP);

(b) Southern Link Inland Port – Stormwater Monitoring Plan. Prepared by e3 Scientific, June 2026 (lodged with Panel on 17 June 2026);

(c) Southern Link Inland Port – Stormwater Contaminant Load Model Assessment included as **Appendix 1** to this evidence; and

(d) Southern Link Inland Port Stormwater Assessment. Prepared by Stantec, 15 April 2026 (Part B.13 of the substantive application for the SLIP).

Code of Conduct

1.11 I confirm that I have read the Code of Conduct for Expert Witnesses contained in section 9 of the Environment Court Practice Note 2023 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise, and I have not omitted material facts known to me that might alter or detract from my evidence.

2. GENERAL RESPONSE TO CONCERNS RELATING TO THE CLM ASSESSMENT

2.1 By way of context, during informal discussions between SLPL and ORC, a draft CLM memorandum was prepared by Stantec and provided to ORC. The draft CLM memorandum is commented on in Attachment 4 to the Beca Review, in an email from Ms Lion-Cachet to Hannah Goslin.

2.2 The Beca Review (page 3) states that the CLM (set out in the final CLM memorandum attached in **Appendix 1**) applies the Auckland Council's Contaminant Load Model to the SLIP as a 'quantitative tool' to provide an assessment of the effects of operational stormwater from the proposed site.

2.3 This is an incorrect interpretation of the CLM draft memorandum and the CLM tool.

2.4 The CLM draft memo provided during consultation states it has been set out as a 'semi-quantitative but conservative assessment'. The caveats and limitations of the CLM tool are clearly listed but appear not to have been acknowledged by Mr Chang/Ms Lion Cachet.

2.5 An updated version of the draft CLM memorandum is attached this evidence as **Appendix 1.**[1] If I refer to the 'CLM memorandum', I am referring to Appendix 1.

2.6 The following sections separately address the comments made within the Beca Review regarding the general approach to the application of load reduction factors, conversion of annual loads to concentrations, contaminant profile and speciation, dilution assumptions and the level of species protection.

2.7 The Beca Review infers there are a number of technical failings in the CLM memorandum. I do not accept that the matters raised give rise to concerns about the efficacy of the overall approach to the work I have completed.

2.8 Overall, it is my opinion that the matters raised do not undermine the purpose for which the CLM tool was applied to the assessment.

2.9 The CLM tool was applied as a screening-level, first-order tool to identify principal contaminants of concern and compare relative treatment performance. The tool provided a high-level assessment of likely annual contaminant loads and annual average concentrations from the fully developed operational site. It supported the identification of the principal stormwater contaminants of concern, compared the relative contribution of different source areas, tested the benefit of the proposed treatment train, and provided context against available stormwater monitoring data and guideline values.

2.10 The CLM tool was not presented as, or intended to be, a fully quantitative compliance model or as the sole basis for determining ecological effects in the Silver Stream receiving environment, which was inferred in the Beca review. The Beca review stated: '*…the CLM assessment was not revised and does not appear to have been relied on upon in subsequent technical*

1 There were no content changes to the CLM memo between the draft version reviewed by Beca/ORC (15 May 2026) and the final provided in Appendix 1 to this statement of evidence.

assessments'. This inference in the Beca review is, in my opinion, misleading.

2.11 The CLM memorandum and further supplementation with the Port Chalmers analyses (Section 5) have been useful in informing the proposed stormwater management approach, including the confirmation of on-site management, as well as informing key contaminants that are potentially important in long term storm water monitoring. In particular, it supports the need for a treatment train comprising catchpits, UPTs/GPTs and the attenuation pond; and it confirms the need for post-construction monitoring of key stormwater indicators, including total suspended sediment (**TSS**), copper, zinc and total petroleum hydrocarbons (**TPH**).

2.12 For clarity, there was no technical justification or statutory requirement to revise the CLM memorandum in light of the concerns raised by Mr Chang/Ms Lion Cachet. Each of the technical aspects of the concerns are addressed below.

3. APPLICATION OF LOAD REDUCTION FACTORS [Beca Review, Appendix 4]

3.1 This section responds to the comments in the Beca review regarding '*compounding of load reduction factors*' (Appendix 4, bottom of page 3), and item '*1. Application of Load Reduction Factors*' in Attachment 4 (Email review of CLM dated 15 May), on page 23 Appendix 4.

3.2 The CLM tool has been used as a screening-level tool to compare relative contaminant loads and treatment performance, rather than as a precise prediction of treatment efficiency or receiving environment effects.

3.3 The sequential treatment-train approach adopted is appropriate for this purpose and is consistent with the way treatment processes are represented in the CLM User Manual (Auckland Council 2010).[2]

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2 Auckland Council 2010. Contaminant Load Model User Manual. Auckland Regional Council Technical Report TR2010/003. https://knowledgeauckland.org.nz/media/1748/tr2010-003-contaminant-load-model-user-manual.pdf.

3.4 The HyndsFilter/UPT[3] treatment is expected to target coarse and particulate-bound contaminants, while the attenuation pond provides additional settlement for fine particulates, detention and flow-buffering benefit.

3.5 The uncertainty inherent in applying generic load reduction factors is acknowledged, but it is also emphasised that the numerical specifications for contaminant yield and reduction factors, have been robustly derived largely based on Auckland monitoring data and supplemented with international literature (ARC, 2017).

3.6 The detailed design report is the appropriate stage to demonstrate how the final stormwater treatment devices will achieve the required stormwater management objectives. That process will confirm the detailed configuration, sizing, hydraulic operation, treatment function, maintenance requirements and monitoring interfaces for the system.

3.7 The detailed design, implementation of the SMP, and adaptive management through consent conditions provide appropriate and practical mechanisms for verifying actual treatment performance.

3.8 Residual uncertainty, particularly around dissolved metals, fine particulates, hydrocarbons or other contaminants not fully represented in the desktop CLM memorandum, is also appropriately managed through detailed design, operational monitoring and adaptive management, rather than by interpreting the CLM as a blunt quantitative compliance tool.

4. CONVERSION OF ANNUAL LOADS TO CONCENTRATIONS

4.1 This section responds to the comments in the Beca review regarding '*reliance on annualised concentration estimates'* (Appendix 4, bottom of

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3 Universal Pollutant Trap.

page 3), and item '*2. Conversion of Annual Loads to Concentrations'* in Attachment 4 (Email review of CLM dated 15 May), on page 23 Appendix 4.

4.2 The annual load-to-concentration conversion was undertaken as a screening exercise to provide context against available benchmarks. It was not presented, and should not be interpreted, as an event-based concentration estimate, first-flush assessment, event mean concentration or compliance threshold after reasonable mixing.

4.3 The limitations of annualised, volume-weighted concentrations, including that these do not represent smaller, or first-flush events are acknowledged. The output of the CLM tool was not presented as such. These limitations, however, do not undermine the use of the CLM for identifying the principal contaminants of concern and comparing relative treatment performance.

4.4 Robust event-based assessments require site-specific flow and event monitoring data. In addition, specific event mean concentrations may not represent the actual discharge quality to Silver Stream where runoff is captured, stored, attenuated and released through the attenuation system.

4.5 In this regard, monitoring at the pond outlet, coupled with upstream and downstream receiving-environment monitoring, is more directly relevant to assessing the quality of stormwater actually discharged to Silver Stream than on-site EMC sampling alone.

4.6 The use of rainfall volume rather than runoff volume does not materially alter the conclusions of the CLM memo. The site is expected to be predominantly impervious, so annual rainfall over the operational footprint is a reasonable approximation of annual runoff volume for this screening purpose.

5. PORT CHALMERS MONITORING DATA AND USE OF THE CLM

5.1 I have supervised an analysis of data provided by Port Otago Limited, relating to quarterly stormwater monitoring undertaken at Port Chalmers, in accordance with conditions of ORC discharge permits (resource consent RM21.038.01), relating to the discharge of stormwater into the Otago Harbour. The Port Chalmers monitoring data provides an additional line of evidence for the Southern Link Inland Port stormwater assessment as the activities currently conducted at Port Chalmers will mirror those being undertaken at the SLIP. The purpose of the analysis was to consider whether the application of the CLM tool adequately represents contaminant generation from a port-related environment, and whether annual volume-weighted average contaminant concentrations may underrepresent potential environmental effects associated with first-flush conditions and smaller storm events.

5.2 To enable comparison between the CLM and observed data, a CLM analysis was prepared for Port Chalmers using a similar approach to that applied at the Southern Link Inland Port. The review compared contaminant loads predicted by the CLM with annualised contaminant loads estimated from stormwater monitoring undertaken at Port Chalmers. The objective was to determine whether the CLM-derived contaminant load estimates were comparable to those observed at a similar port environment with broadly similar activities.

5.3 The assessment involved applying contaminant yield factors listed in Appendix B of the Auckland Council (2010) CLM User Manual to Port Chalmers site estimated surface areas (Figure 1), calculating annual contaminant loads for TSS, total zinc, total copper and TPH, estimating annual contaminant loads from available Port Chalmers monitoring data and nearby rainfall records, and comparing the CLM-derived and monitoring-derived annual contaminant loads.

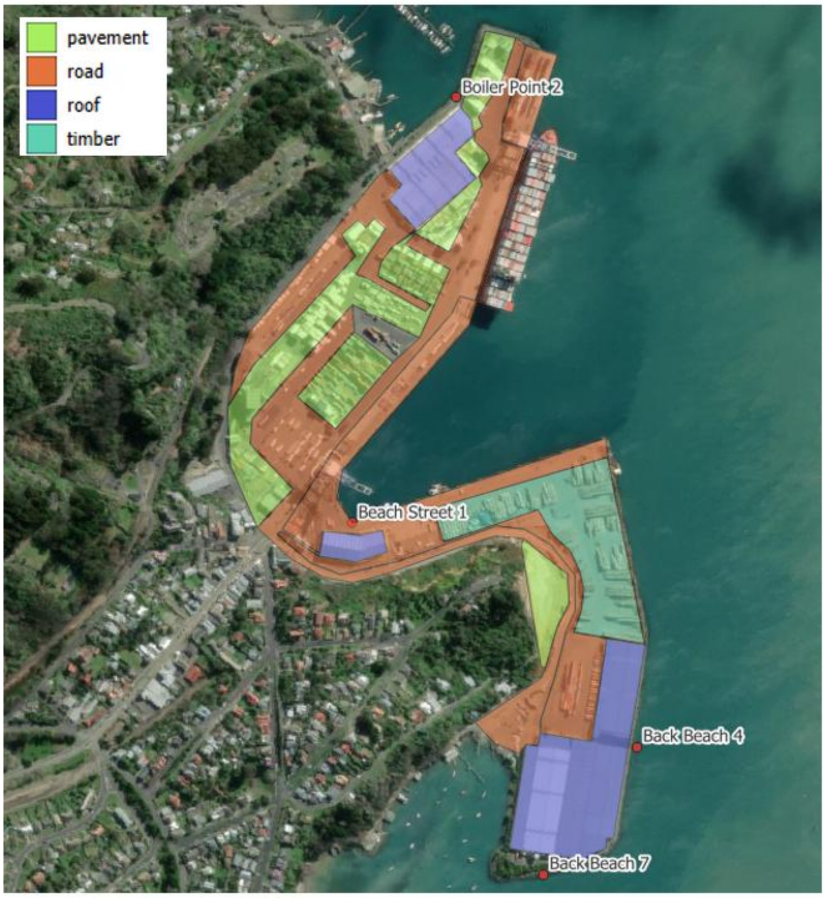

Figure 1: Estimate of main land use activities across Port Chalmers.

5.4 The available Port Otago monitoring data provided contaminant concentrations in mg/L, whereas the CLM predicts annual contaminant loads in kg/year. Long-term rainfall data were therefore used to convert measured concentrations into annual contaminant loads for comparison with CLM tool outputs. Approximately 20 years of rainfall records from the Otago Regional Council rainfall gauge "Leith at Pinehill" were used to represent long-term average climatic conditions.

5.5 Annualised contaminant loads were estimated by combining representative contaminant concentrations derived from the stormwater monitoring programme with long-term average annual rainfall data. Average concentrations for each contaminant were multiplied by estimated annual runoff volume, calculated from the contributing catchment area and average annual rainfall, to derive annual contaminant loads. This approach assumed that monitored concentrations were adequately representative of long-term average runoff quality and provides an order-of-magnitude estimate suitable for feasibility-level assessment.

5.6 Several assumptions for the comparison were required. These included that:

(a) the Port Chalmers monitoring data are broadly representative of average runoff quality;

(b) that the long-term rainfall records are representative of average annual runoff conditions at Port Chalmers;

(c) that rainfall can be used as a proxy for runoff volume in a predominantly impervious environment;

(d) that generic CLM land-use categories reasonably represent port-related operational areas; and

(e) that the future Inland Port may exhibit contaminant generation characteristics broadly comparable to those observed at Port Chalmers.

5.7 The analysis, as shown in **Figure 2**, found that CLM-derived estimates for TSS, zinc and TPH were broadly comparable to annualised loads estimated from monitoring data. CLM-derived copper loads were approximately an order of magnitude greater than loads derived from the available monitoring data. No alternative CLM land-use category was identified that would reasonably reproduce the lower copper loads observed in the monitoring dataset.

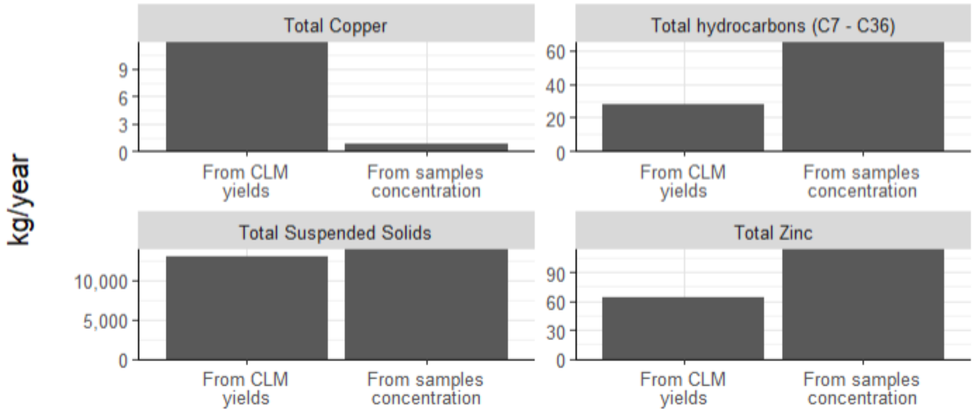

Figure 2: Comparison of Port Chalmers CLM-derived concentrations versus pooled monitoring data for Port Chalmers stormwater.

5.8 The limited monitoring data set available means that the Port Chalmers comparison is not a fully quantified validation of the CLM tool, but in my opinion, it provides sufficient evidence that the approach is reasonable for a port-related environment and can be used as a tool for informing high-level estimates of contaminant loads for the proposed Inland Port.

5.9 The analysis also considered first-flush effects. It recognised that contaminant concentrations can increase during the initial stages of storm events and that annual average loads may not capture short-term concentration peaks. However, it was found that the available Port Chalmers monitoring data does not adequately characterise first-flush behaviour because the available sampling did not tend to capture the initial period of rainfall. This is demonstrated in **Figure 3** which shows the antecedent rainfall prior to the actual sample time.

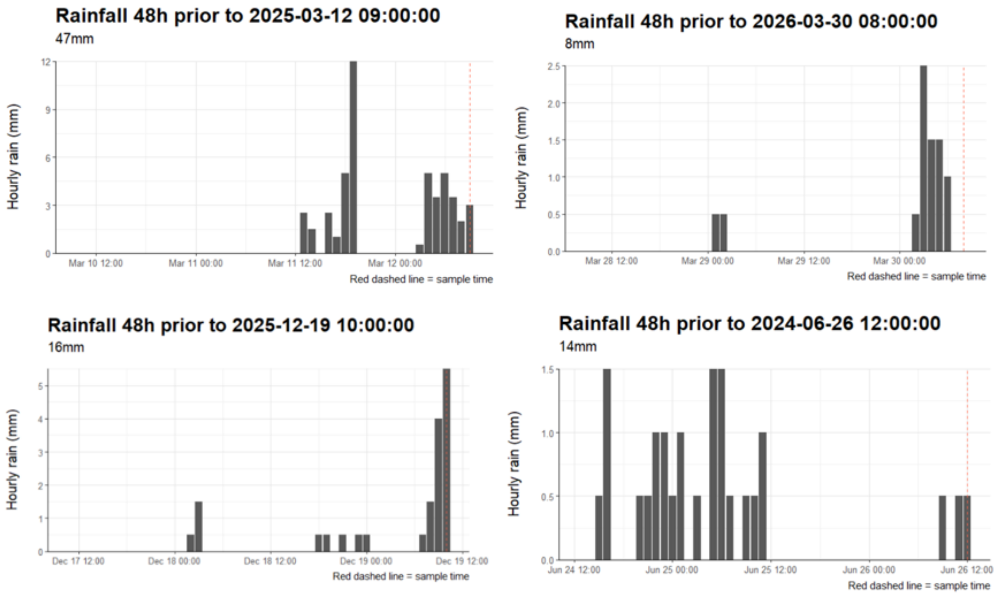

Figure 3: Comparison of sampling time, shown by red dashed line, against preceding 48-hour rainfall.

5.10 Further, the limited dataset also cannot be used to develop a robust concentration-flow relationship, noting the absence of flow data. Published first-flush relationships are highly variable and site-specific. Any quantitative estimate of first-flush concentrations for the proposed Inland Port based on the limited Port Chalmers data would therefore be highly speculative and subject to substantial caveats and assumptions, rendering it of limited value.

5.11 The key limitations of the analysis include the generic nature of CLM contaminant yield factors, limited representation of port-specific activities within CLM land-use categories, the relatively small and quarterly based stormwater monitoring dataset for Port Chalmers, the absence of flow-weighted monitoring, and insufficient data to quantify first-flush effects.

5.12 In terms of broader water quality, results from Port Chalmers demonstrate organic contaminants (TPH and SVOCs) are consistently below detection limits, and several metals/metalloids associated with industrial sites (arsenic, cadmium, chromium, nickel, lead) were also frequently below detection thresholds. Key stormwater contaminants, TSS, copper and zinc, as well as several nutrient constituents were consistently detected in stormwater samples.

5.13 For key contaminants of concern, including TSS, copper and zinc (and as summarised in Table 3-4 of the CLM memorandum), Port Chalmers data are in the reported range of other industrial stormwater assessments. Thus, the effort and focus to manage these key contaminants is on effective source control to avoid or reduce contaminants at their point of generation, rather than solely relying on downstream treatment.

5.14 Effective contaminant source control should therefore be integrated at the detailed design stage, so that building/construction material selection, site layout and operational areas are configured to minimise generation of key contaminants such as TSS, copper and zinc from the outset. These may include consideration of low-contaminant building and cladding materials, avoiding or minimising exposed galvanised metal surfaces.

5.15 Other key practices, including separating high-risk areas such as container washdown (and directing washdown water to trade waste), site maintenance, refuelling and hazardous substance storage, provision for covered or bunded storage for bulk materials and chemicals, maintaining sealed and swept yards to reduce sediment and particulate metals, and using designated spill containment and response areas for operational activities are all practices that have been identified for the SLIP site.

5.16 Overall, the Port Chalmers monitoring analysis supports the conclusion that the CLM provides a reasonable basis for estimating contaminant loads at a feasibility assessment level. Predicted contaminant loads for TSS, zinc and TPH were broadly consistent with loads estimated from available Port Otago monitoring data, while copper was overpredicted.

6. CONTAMINANT PROFILE AND SPECIATION

6.1 This section responds to the comments in the Beca review regarding '*incomplete representation of contaminants'* (Appendix 4, top of page 4), and item '*3. Contaminant Profile and Speciation'* in Attachment 4 (Email review of CLM dated 15 May), on page 24 Appendix 4.

6.2 The CLM appropriately focuses on TSS, zinc, copper and hydrocarbons as the key stormwater indicator contaminants. It was not intended to identify or quantify every possible operational contaminant scenario or intermittent activity.

6.3 Potential residual risks associated with activities such as container washing, vehicle maintenance, hazardous substances, fertiliser or timber handling are appropriately managed through on-site operational controls, first-flush capture for washdown pad, spill management procedures, routine inspections and audits, targeted monitoring and adaptive review of the monitoring suite. For example, all container wash water, and residues associated with vehicle maintenance and refuelling all involve a bunded treatment area that captures all treatment water that are collected and disposed to trade waste under license.

6.4 The CLM memo does not include every possible contaminant that could arise from future operational activities at the site, and the CLM also acknowledges that TPH yield factors are not included in the CLM for the category of 'paved non-road industrial' surfaces.

6.5 In my opinion, these limitations do not invalidate the CLM or require further contaminant load modelling at this stage. Rather, they reflect the intended envelope of the CLM assessment as a screening tool focused on common stormwater indicator contaminants.

6.6 Potential gaps in the assessment of contaminants are appropriately addressed through onsite operational controls and monitoring. This includes spill prevention and response procedures, hazardous substances management, routine inspection and maintenance, targeted monitoring for hydrocarbons where relevant, and the ability to adapt the monitoring suite if site activities or monitoring results indicate an increased risk.

6.7 It is emphasised that the draft Stormwater Monitoring Plan (**SMP**)[4] already includes TPH within the operational monitoring suite. This provides a means to verify the effectiveness of source controls, spill prevention and response, hazardous substances management (where TPH are involved), inspection and maintenance procedures (particularly in relation to the use and maintenance of heavy machinery on site). Thus, the SMP (and integrated adaptive management framework) is an appropriate mechanism for verifying whether hydrocarbons are appropriately controlled in routine discharges.

6.8 Further, the SMP provides for a mechanism to escalate monitoring to include additional contaminant suites (SVOCs, cleaning agents, etc) in the event that triggers are exceeded.

6.9 The container washbay has been specifically designed to minimise the potential for washdown contaminants to enter the stormwater network. Under normal operating conditions, washdown wastewater and rainfall falling on the washbay area will be collected and directed to the trade waste system, rather than to the stormwater system.

6.10 Potential washdown-related contaminants may include suspended solids, hydrocarbons, trace metals and residual cleaning products such as surfactants, detergents and degreasers. The specific contaminant profile will depend on the containers being cleaned and the cleaning products used, and is therefore more appropriately managed through trade waste controls and operational procedures than through the CLM.

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4 Contained within the memorandum prepared by e3Scientific, titled 'Southern Link Inland Port – Stormwater Monitoring Plan', dated 6 June 2026, lodged with the additional information provided by SLPL on 17 June 2026.

6.11 Overflow from the washbay system to the stormwater network would only occur during storm events that exceed the design capacity of the dedicated washbay collection system. During these conditions, any wash down activities would also cease. In those circumstances, the collection system is expected to capture the initial first flush before any surcharge occurs, so the runoff most likely to contain residual washdown contaminants would be directed to the trade waste system. Any residual overflow during larger events would then be mixed with stormwater from the wider site within the attenuation system before discharge to Silver Stream, during conditions when receiving-water flows are expected to be elevated.

6.12 In relation to total versus dissolved metals, the CLM tool generates annual average total copper and total zinc loads, which are standard stormwater metrics and are the basis for many stormwater monitoring datasets and contaminant yield relationships.

6.13 The CLM memo clearly acknowledges that the ANZG DGVs for metals are expressed as dissolved concentrations, and that comparing total metal concentrations with dissolved guideline values is not a direct like-for-like comparison. However, for a screening assessment, this comparison is conservative because total metals include both particulate-bound and dissolved fractions and therefore tend to overstate, rather than understate, potential dissolved-metal risk.

6.14 The treatment train described in the Stormwater Assessment report (Stantec, 15 April 2026) (Part B.13 of the substantive application) is also intentionally designed to remove particulate-bound contaminants, including particulate-bound metals. As particulate material is removed, the remaining metals will tend to be in the dissolved phase. That outcome does not invalidate the CLM or alter its screening purpose. Rather, it reinforces the appropriateness of analysing both total and dissolved metals during the initial operational monitoring period, so that the SMP can confirm actual discharge quality, assess risk against receiving-environment triggers, and allow the monitoring suite to be adapted over time if dissolved fractions are shown to be low risk.

6.15 This distinction between total and dissolved zinc is important because dissolved zinc is the more biologically available fraction relevant to aquatic toxicity, whereas total zinc is the parameter most commonly measured and modelled in stormwater assessments.

6.16 Available New Zealand information indicates that dissolved zinc often forms a substantial proportion of total zinc, but the proportion is variable and source-dependent.[5] The cited dissolved zinc range of 50–80% of total zinc (as referred to by E. Lion-Cachet and R. Chang in the Beca Review) does not appear to be supported by verified published sources of research/findings.

6.17 The URQIS[6]-derived urban stream data indicate a typical dissolved fraction closer to approximately 50%, while some source-specific runoff, such as galvanised roof runoff, may have much higher dissolved fractions.

6.18 Thus, in my opinion it is appropriate to use total zinc for initial load-based screening, as per the CLM output. It is not possible or appropriate to apply a generic conversion factor to determine the apportionment between total and dissolved fractions, nor assume that up to 80% of zinc in onsite stormwater (prior to treatment and attenuation) is in the dissolved phase. Rather, this is appropriately assessed via monitoring of both total and dissolved zinc to confirm site-specific partitioning.

7. DILUTION IN THE RECEIVING ENVIRONMENT

7.1 This section responds to the comments in the Beca review regarding '*simplified dilution assumptions*' (Appendix 4, top of page 4), and item '*4.*

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5 Gadd, J. and Milne, J. (2019). Monitoring water quality in urban streams and stormwater: Guidance for New Zealand practitioners. NIWA Client Report 2019168AK, prepared for Envirolink. Available at: https://niwa.co.nz/sites/default/files/FINAL_%20Monitoring%20WQ%20streams_Guidance%20Manual_August%202019.pdf.

6 Urban Runoff Quality Information System (URQIS) | Earth Sciences New Zealand | NIWA.

Dilution in the Receiving Environment' in Attachment 4 (Email review of CLM dated 15 May), on page 24 Appendix 4.

7.2 The catchment-area comparison in the CLM memo was used as a high-level proxy to demonstrate the relative scale of the site and downstream catchment. It was not intended to represent a precise dilution calculation for all rainfall events.

7.3 Dilution will vary between events and the lowest-dilution conditions may occur during smaller events. However, the stormwater attenuation system will provide storage, detention and gradual release, and smaller events may be retained or partly reduced through storage, infiltration and evapotranspiration before discharge.

7.4 Operational discharges will also generally occur during rainfall when Silver Stream flows are elevated.

7.5 For these reasons, the dilution discussion provides useful context at a screening level, with actual receiving-environment effects appropriately monitored through upstream, outlet and downstream monitoring and via the proposed adaptive management framework.

7.6 In relation to low-dilution event scenarios, the attenuation pond is intended to function as a buffering and flow-regulating system rather than as a permanently wet pond. It is designed to remain dry between rainfall events and to temporarily store runoff before releasing it at a controlled rate. For small rainfall events, a proportion of onsite runoff may be retained within the pond or reduced through temporary storage, infiltration and evapotranspiration, resulting in little or no measurable discharge to Silver Stream.

7.7 As rainfall depth and runoff volumes increase, water levels within the attenuation pond will rise and discharge will occur through the outlet structure at a controlled rate. This controlled release reduces peak discharge rates and delays runoff and diluted contaminant loads entering Silver Stream. Consequently, the lowest receiving-water dilution conditions are partly mitigated by the fact that very small events may not discharge, while larger events that do discharge will generally coincide with greater dilution in the pond and elevated flows and dilution rates in Silver Stream.

8. LEVEL OF SPECIES PROTECTION

8.1 This section responds to the comments in the Beca review regarding '*limited justification for the adopted level of ecological protection'* (Appendix 4, top of page 4), and item '5. *Level of Species Protection'* in Attachment 4 (Email review of CLM dated 15 May), on page 24 Appendix 4.

8.2 The CLM memorandum appropriately referred to the 95th percentile default guideline value[7] (DGV) because Silver Stream, while recognised as having high ecological value due to its fish assemblage and trout fishery values, is also a highly modified receiving environment. A waterbody can support important ecological values while still being a modified or impacted system. This context is important when selecting the appropriate guideline level for a screening assessment.

8.3 The presence of threatened or at-risk species does not necessarily require the adoption of the 99th percentile DGV for the CLM screening comparison, which was inferred in the Beca review. The 99th percentile DGV represents a very high level of protection and is generally more applicable to reference for near-pristine environments. As stated above, the 95th percentile DGV is more appropriate for a modified receiving environment such as Silver

7 The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) provide for 'level of protection' afforded to a wate body based on its ecosystems conditions. This may be the current or desired health status of an ecosystem, relative to the degree of human disturbance. Slightly to moderately disturbed systems are referred to as 'Ecosystems in which aquatic biological diversity may have been adversely affected to a relatively small but measurable degree by human activity'. An example cited in the ANZG (2018) for this category includes 'rural streams receiving runoff from land disturbed to varying degrees by grazing or pastoralism'. The guidance also states for levels of protection that 'some relaxation of the stringent management approach used for unmodified ecosystems may be appropriate'.

Stream, while still providing a conservative benchmark for screening and informing monitoring requirements.

8.4 It is acknowledged that ORC has requested consideration of the 99th percentile DGV to support aspirations for catchment improvement. However, in my opinion applying that benchmark is considered overly precautionary for the modified setting and could result in technical non-compliance even where ecological risk is assessed as low.

8.5 For these reasons, the 95th percentile DGV is in my view the more appropriate guideline level for the CLM screening assessment. The final trigger framework should nevertheless be confirmed through the SMP using baseline data, operational discharge monitoring and upstream/downstream receiving-environment monitoring, with adaptive management responses if monitoring indicates a project-related change. This is the general approach set out in the current proposed conditions, which I support.

9. SMP, TRIGGER VALUES AND ADAPTIVE MANAGEMENT

9.1 The SMP provides the appropriate mechanism for confirming actual stormwater discharge quality and receiving-environment response during operation.

9.2 The key purpose of the SMP is not to replicate the CLM memo, but to verify treatment performance in practice through monitoring of relevant indicator parameters, including TSS, hydrocarbons and metals, and through comparison of upstream, outlet and downstream monitoring results.

9.3 Trigger values should be set using baseline data and should operate as practical investigation and response triggers rather than fixed assumptions derived from the CLM.

9.4 The SMP framework appropriately allows for review of analytes, monitoring frequency and response actions as the operational dataset develops. This is important because initial monitoring may indicate that some parameters, such as dissolved metal fractions or hydrocarbons, present a lower risk than assumed, while other site-specific risks may warrant escalation.

9.5 Following this, an adaptive management framework that is clearly linked to consent conditions is also appropriate, but which retains sufficient flexibility to respond to monitoring results. The framework provides for investigation following trigger exceedances, escalation where effects are persistent or attributable to site activities, and refinement of the monitoring suite where data demonstrate that particular contaminants are consistently low risk. This approach is more robust and practical than relying on the CLM as a fixed compliance benchmark.

10. CONCLUSION

10.1 In summary, the concerns raised by Mr Chang and Ms Lion-Cachet in the Beca Review do not, in my opinion, undermine the use of the CLM as a stormwater quality screening and comparative tool. The residual uncertainties are appropriately managed through detailed design, stormwater treatment, on-site operational controls, and adaptive management implemented through the SMP outlined in the proposed conditions of consent.

10.2 In principle, the inclusion of a discharge characterisation method in the SMP that can represent event-based discharge quality, as compared with discrete grab sampling alone, is supported. In my view, the inclusion of sampling from the attenuation pond outlet or forebay itself is an adequate proxy for onsite-EMC characterisation, as it represents the <u>actual</u> concentration of the attenuated stormwater on-site, prior to mixing in the Silver Stream receiving environment. This is a key aspect of the draft SMP that has been overlooked by the Beca review. The most appropriate sampling method (e.g. stage-based, flow-weighted or equivalent sampling) from the attenuation pond outlet or forebay should be confirmed through detailed design and be reflected in the final SMP and consent conditions.

Dated: 19th August 2026

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Dr Claire Conwell

Appendix 1: CLM Assessment Memorandum

Stantec

Memo

To:	Southern Link Property Limited	From:	Dr Claire Conwell Level 15, 10 Brandon Street Wellington 6011 Mail to: PO Box 13052, Christchurch 8140
Project/File:	310206525	Date:	17 April 2026

Reference: Southern Link Inland Port - Stormwater Contaminant Load Model Assessment

1 Summary

Stantec New Zealand (**Stantec**) has undertaken a stormwater contaminant load assessment for the proposed Southern Link Inland Port (**SLIP, also referred to as the Site**). The assessment applies Auckland Council's Contaminant Load Model (CLM v2, 2010), a recognised and conservative industry tool, to estimate annual average stormwater contaminant loads and concentrations for the fully developed site.

The modelling focuses on key stormwater contaminants typically associated with industrial and transport activities, including sediment, copper, zinc, and hydrocarbons. Results indicate that, with the proposed stormwater management measures in place, predicted contaminant concentrations discharged from the site are generally consistent with (or below), those reported for comparable industrial sites. Modelled concentrations are also near or below national median values for industrial stormwater discharges.

The proposed stormwater treatment train—comprising catchpits, pollutant traps, and an attenuation pond—is expected to provide substantial reductions in contaminant loads prior to discharge. Modelling indicates high levels of sediment removal and meaningful reductions in metal and hydrocarbon loads, representing a robust and effective treatment approach consistent with current good practice.

The SLIP site represents a small proportion of the Silver Stream upper catchment, and stormwater discharge will occur primarily during rainfall events when stream flows are elevated. As a result, any residual contaminants following on-site treatment will be substantially diluted following discharge. It is expected key contaminant concentrations, in particular metals, will meet applicable guidelines (e.g. the ANZG (2018) 95th percentile default guideline values for species protection) after reasonable mixing in the Silver Stream receiving environment.

Overall, the assessment demonstrates that stormwater effects from the SLIP can be effectively managed through established stormwater controls. With the proposed measures in place, stormwater discharges are expected to result in low environmental risk and no significant adverse effects on the receiving environment.

2 Background

Stantec has been engaged by Southern Link Property Limited (**SLPL**) to undertake a suite of technical assessments to support the substantive application for the SLIP under the Fast-track Approvals Act 2024.

The purpose of this technical memorandum is to set out a desktop assessment of the potential key stormwater contaminants generated from the SLIP, to support assessment of potential environmental effects.

2.1 Scope of assessment

This scope of this assessment is to:

- Describe the likely annual contaminant loads using Auckland Council's Contaminant Load Model[1] (CLM v2, 2010) generated from the various functional areas of the site through construction and operation, based on the available technical design assessments[2].
- Describe the likely annual average concentrations of key stormwater contaminants discharge to the Silver Stream (tributary of the Taieri Catchment).
- Compare the annual average concentration of stormwater key contaminants against available data and available guideline thresholds to assess the relative risk of SLIP derived stormwater contaminants to the receiving environment.

2.2 Description of the activity

The development will occur as described in the Project Description of SLPL's Substantive Fast-track Application which should be referred to for a complete description of the Inland Port development and relates to construction, use and operation of the SLIP.

In summary, the Inland Port will include:

- A new rail siding off the Taieri Branch Line to enable loading, unloading and operation of a rail freight shuttle service to Port Chalmers and the wider rail network.
- Approximately 80,000 m^2 of high stud warehousing (chilled and ambient).
- Truck canopy and unloading areas.
- A 5 ha container depot facility enabling the inspection, cleaning, upgrading and repair of containers including for food grade repacking.
- Up to 5 ha of container terminal for storage of full containers including refrigerated containers.

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[1] Auckland Regional Council 2010. Contaminant Load Model User Manual. Auckland Regional Council Technical Report TR2010/003. https://knowledgeauckland.org.nz/media/1748/tr2010-003-contaminant-load-model-user-manual.pdf. It is noted here the CLM is no longer supported by Auckland Council or NIWA (now Earth Science New Zealand)

[2] Based on Drawing C9.002 (Rev. 8) from Master Plan- Concept 9.2 (Williams Architects Ltd. April 2026) and Drawing 310206525-STN-00-210-DR-CI-070001 (Rev. C) (Stantec 2026. Southern Link Inland Port – Civil Works and Earthworks. Report prepared for Southern Link Property Limited. April 2026)

- Break bulk storage facilities.
- Road widening.
- Ancillary activities to support the above including earthworks, construction of the rail siding, site access, internal roadways and vehicle parking, hardstand areas, landscaping, buildings for storage, administration and maintenance facilities, and associated infrastructure and works including measures necessary to manage stormwater and stabilise the site.

Construction of the Inland Port is anticipated to be undertaken in three stages however the timing of the delivery of each stage, and discrete works within each stage, may change in response to demand for logistics capacity at the Inland Port. Each stage of works will involve site clearance, earthworks, construction of buildings, hardstanding and access, installation of infrastructure, landscaping and works and management activities necessary to manage environmental effects during construction including erosion and sediment controls and construction management activities.

Potential stormwater contaminants generated during each stage of construction will be dealt with through their respective Erosion and Sediment Control Plans. The staged construction will limit the amount of exposed sediment at any point during each stage. Each stage of construction will be temporary in nature, compared to the operational stage(s). The completed operational site is therefore the focus for this assessment, since it represents the largest active area that has the potential to produce the greatest contaminant load and is longer lasting in terms of potential effects.

Figure 2-1 shows the Master Plan general site layout.

Reference: Southern Link Inland Port - Stormwater Contaminant Load Model Assessment

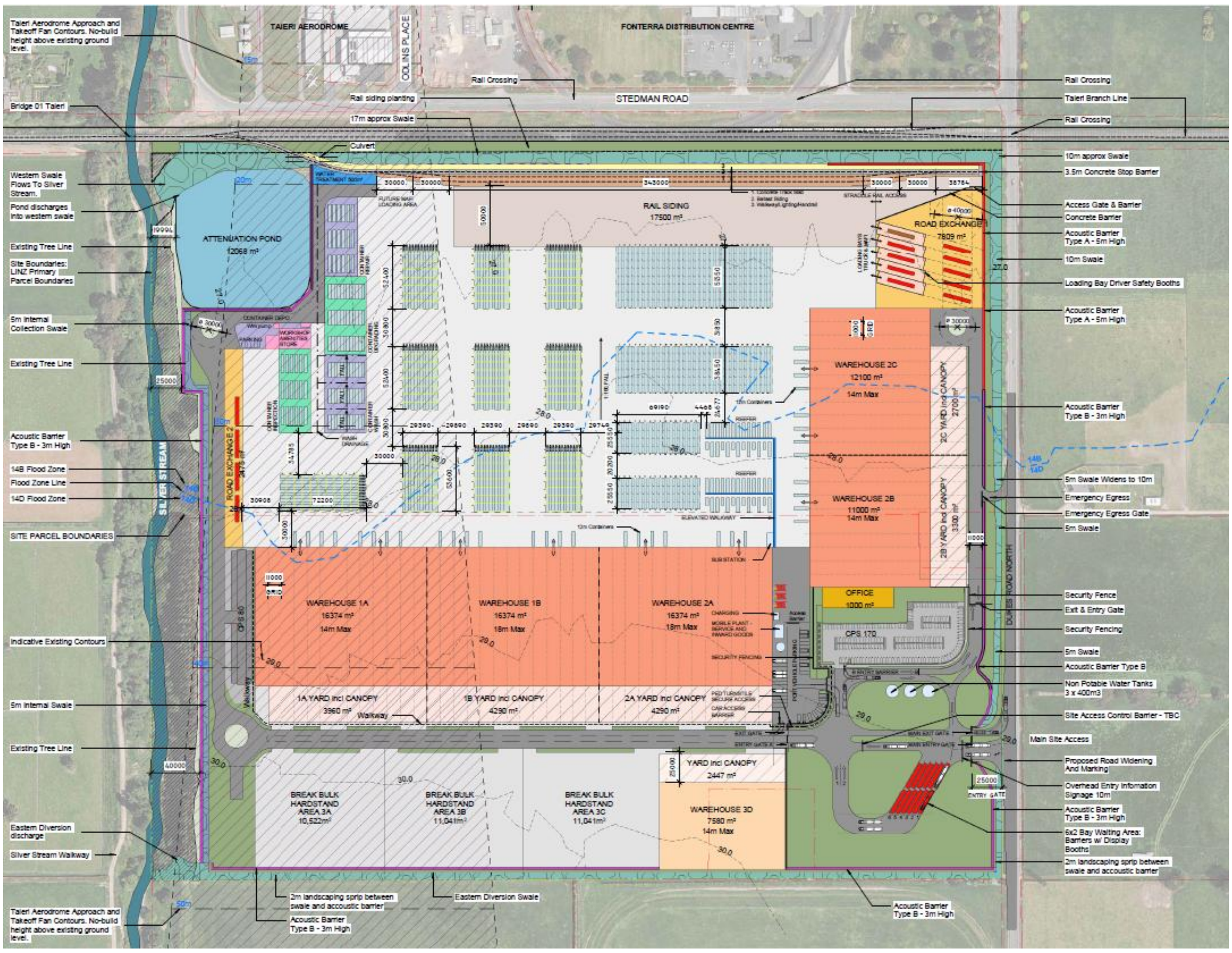

Figure 2-1: Master Plan for the proposed development. From Drawing C9.002 (Rev. 8) from Master Plan- Concept 9.2 (Williams Architects Ltd. April 2026).

Figure 2-2 shows the general stormwater treatment train. The SLIP Stormwater Assessment Technical Report (Stantec 2026[3]) sets out the proposed stormwater treatment train in detail, and is summarised as follows:

- **All catchments:** Install roadside catchpits across the internal road network to capture coarse grits, solid debris, and natural leaf litter. Catchpits serve as the initial onsite treatment of stormwater.
- **All discharge points**: Install GPTs/UPTs or similar at each outlet to capture floating plastics, hydrocarbons, and suspended sediments with sizes down to approximately 100–150 microns. These traps are typically proprietary manhole units installed below the road corridor surface, equipped with short bypass pipelines running parallel to the main primary system pipelines. This configuration enables water quality runoff—up to 5-10 mm/hr of rainfall—to be directed through the GPT or similar devices, while higher flow volumes during larger storms will bypass the traps via the primary pipeline. At this stage, it is anticipated up to two GPT/UPT will be installed at Outlets 1 and

[3] Stantec (2026). Southern Link Inland Port - Stormwater Assessment. Report prepared for Southern Link Property Limited. April 2026

2 to the attenuation pond, accommodating stormwater drained across the impervious area of the site[4].

- It is anticipated stormwater will be diverted and discharged to an onsite stormwater attenuation pond, allowing flows to traverse the pond footprint and receive supplementary "polishing" treatment. The final design and configuration remain subject to technical (e.g. geotechnical) considerations.

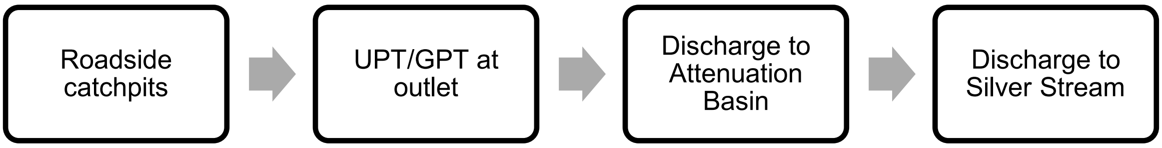

Figure 2-2: Conceptual stormwater treatment train

For the purpose of the CLM assessment, the likely stormwater quality generated from the full operational site (post-construction) is calculated and set out in Section 3.1, with results assessed against available monitoring results and example guideline thresholds for context in Section 3.2.

2.3 Existing environment

Silver Stream is a significant tributary of the Lower Taieri River, which has been modified by engineering works to provide land drainage and flood protection to the lower Taieri (LAWA 2026, Silver Stream at Taieri Depot site[5]). The stream rises in the Silverpeaks hills north of Dunedin and flows initially southwards through a steep-sided forested valley before turning west at the eastern edge of the Taieri Plains at the foot of Three Mile Hill. It continues in a south-westerly direction past the northern edge of Mosgiel, reaching the Taieri River two kilometres north of Allanton. Its total length is about 30 kilometres (LAWA 2026).

The stream provides significant habitat for koaro and habitat for fish spawning and juvenile fish (LAWA 2026). Stream water quality is described as 'reasonable' but is known to be intermittently impacted from industrial/agricultural[6] and residential stormwater discharges and possibly septic tank discharges (LAWA 2026).

A general description of the Silver Stream receiving environment, as summarised from NZ River Maps data base is provided in Table 2-1.

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[4] Refer to Section 3.5.3.1.2 in Stantec (2026) Stormwater Technical Report and see Drawing 310206525-STN-00-401-DR-CI-0 (Rev D, April 2026).

[5] Land, Air, Water Aotearoa (LAWA) - Silver Stream at Taieri Depot

[6] Land, Air, Water Aotearoa (LAWA) - Silverstream at Three Mile Hill Road

Table 2-1: Summary of key characteristics of Silver Stream

Site	Silver Stream[1]
REC stream reach	14281150
NZTM (at reach summarised)	1395997 E, 4918115 N
REC classes[2]	Cool-dry climate, low elevation topography, hard sedimentary geology, indigenous forest land cover (upstream catchment), and low gradient valley landform
Stream Order	1
Catchment area[3]	74.2 km^2
Median flow	0.35 m^3/s
MALF[1]	0.107 m^3/s
Q10 (at Gordon Road)	164 m^3/s
Q100 (at Gordon Road)	267 m^3/s

[1]Data from https://shiny.niwa.co.nz/nzrivermaps/
[2]Information is summarised from 'Generated on DN2.4' from NZ River Maps. See Changes to NZ River Maps for full explanation
[3] Upstream catchment area

2.4 Assumptions

Key assumptions included in this assessment include:

- The application of the contaminant load model (**CLM**) (Section 2.1) provides a semi-quantitative but conservative assessment of the key stormwater contaminants generated from the full operational area of the site (post all construction stages). This is provided as an estimate of annual average contaminant loads and converted to an annual average contaminant concentrations.
- The discharge of construction related contaminants (namely total suspended sediment) is managed under the site-specific Erosion and Sediment Control Plans (**ESCP**) during the construction phases and is not included in this CLM assessment.
- First flush, and low rainfall or ambient baseflow conditions are not specifically included in the CLM approach. This requires targeted and site-specific water quality sampling campaigns, such as the use of continuous instruments and/or autosamplers to target specific rainfall events, which cannot be undertaken at this stage prior to construction.
- Given the above, acute toxicity or maximum concentrations cannot be assessed. A qualitative assessment of potential risk to the surface water receiving environment is provided on the basis of the estimated annual average concentrations only.
- CLM provides for estimates of total suspended sediment (**TSS**), total copper (**TCu**), total zinc (**TZn**), and total petroleum hydrocarbons (**TPH**) only. These are regarded as the principal contaminants of

concern for the site and are widely regarded as key stormwater contaminants particularly associated with roading networks (such as state highways), commercial and industrial areas. As such, contaminant source yield factors (e.g. for copper and zinc) have been robustly derived, largely based on Auckland monitoring data and supplemented with international literature (ARC, 2010[7])

- Other water quality parameters that are important descriptors of stormwater physico-chemical stress (conductivity, chloride, pH, temperature, dissolved oxygen), or additional potential contaminants (other metals, ammoniacal-N, nitrate-N, BOD, E. coli) (Gadd et al. 2014[8]) are not included in the CLM, but may be required at a later date, depending on future requirements. For example, if activities such as fertilizer handling and storage, or treated timber handling occur on the site, these will likely generate specific contaminant profiles that will require additional control methods to be developed and implemented. Other potential contaminants that are derived from site specific activities at the site (e.g. spillover from wash-down areas) are not included in this assessment. Contaminants generated via washdown areas will be treated as wastewater and will not be discharged to the stormwater collection system unless in the event of large rain event that may result in an overflow to the stormwater system.
- Source areas of key stormwater contaminants are assumed to be generated from impervious areas of the site only. Pervious areas (e.g. open grass) are assumed to be largely pervious to rainfall, with any rain infiltrating to land. Under high rainfall and where land is saturated, excess sheet flow across open grassed area will be drained but the contribution to annual average contaminant loads is assumed to be low to negligible.
- The final design and configuration of the treatment train is subject to change and will be confirmed in the final design. Initial design (Stantec 2026, footnote 3) indicates all impervious area derived stormwater will be channelled through two outlets fitted with either GPT or UPT, prior to discharge to the attenuation pond. Therefore for the purpose of the CLM calculations, it has been assumed that all stormwater across the impervious surface of the site is directed to the conceptual treatment train (Figure 2-2), and reduction factors for an example UPT (HyndsFilter) have been applied.

3 Assessment of contaminant loads

3.1 Contaminant load desktop assessment

3.1.1 Sources

The Auckland Council's Contaminant Load Model (CLM, v2.0, 2010) was used to calculate annual average contaminant load discharges for each site. The CLM is a spreadsheet—based model to enable estimations of stormwater contaminant loads on an annual basis. The model is very simple in principle

[7] Auckland Regional Council 2010. Contaminant Load Model User Manual. Auckland Regional Council Technical Report TR2010/003. https://knowledgeauckland.org.nz/media/1748/tr2010-003-contaminant-load-model-user-manual.pdf
[8] NIWA Client report

— the area of a particular land use (source), measured by area in square metres (m^2) within the study area (the site or stormwater catchment of interest), is multiplied by the model's default loads of contaminants discharged from that land use (source yield) to provide an annual load from that source. The loads from each source within the defined footprint of the site or catchment are then added together to provide an annual contaminant load for the catchment of interest.

The CLM was applied to the SLIP site to calculate indicative contaminant loads for the different land use categories specified in the application technical drawings (see footnote 1). For this study, it was used to calculate indicative contaminant loads for TSS, TCu, TZn, and TPH discharged across an operational year after full site development.

Table 3-1 lists the source and associated total areas, main treatment, and key assumptions for each source area. Area dimensions for each building or covered area, paved area, and unpaved open area were obtained from technical planning drawings (see footnote 1 for details).

Lineal meters equivalent, equating to the closest estimate of paved road surface area (square metres) was applied to the CLM data input[9] for road area. Vehicle per day (VPD) estimate category of <1000 (as per the CLM category) was applied to all road lineal meters.

It is noted here that heavy machinery such as straddlers/side loaders will operate across the area designated as 'Heavy Duty Pavement'. For the CLM, this area has been classed as 'paved surfaces other than roads – industrial'. As such, the corresponding yield factors for TSS, TCu and TZn are higher than those yield factors for roads but yield factors for TPH are not provided. It is therefore assumed that modelled loads (and concentrations) TSS, TCu and TZn represent an over-estimation of contaminant load, but TPH may be underestimated.

3.1.2 Incorporation of Reductions due to Treatment

Project specific load reduction factors for key contaminants were factored into the CLM based on anticipated Universal Pollutant Trap (**UPT**) specifications for the HyndsFilter (SW 32[10]). The default load reduction factor secondary treatment device (swales) was applied for TPH reductions.

Across the final calculated loads, the CLM reduction factors listed in Table C1 'Roads and other paved surfaces' for 'Wet pond' was then applied to the calculated contaminant loads after the initial primary treatment to estimate the treatment applied in the attenuation pond itself.

[9] Applying the lineal metres to the closest estimate of road lanes (summed across single, double or triple lanes carriageways) overestimated the actual footprint of the paved area of road carriageways. This would have overestimated the contaminant discharge from the road component by ~250%.
[10] SW32-HyndsFilter.pdf

3.1.3 Conversion of Loads to Concentrations

The annual average contaminant loads were converted to an annual average concentration using the twenty year annual average rainfall data recorded by Otago Regional Council (ORC) rain gauge (Silverstream at Taieri Depot[11], which is ~4.5 km southwest of the site).

Twenty-year annual average rainfall (1/1/2006 to 1/1/2025) returned an average rainfall of 695.33 mm. Across the impervious proportion of the 40 ha SLIP site (~33 ha), this equates to an average annual rainfall volume of 226,617 m^3. It is noted effects of climate change on Mean Annual Rainfall is expected to be relatively small, in the order of +2% depending on emissions scenario and future period[12].

The annual average contaminant load modelled from the impervious area was converted to an annual average concentration by dividing the load (g/year) by the average volume of rainfall across the impervious site (m^3/year). The result produced an annual average concentration (g/m^3).

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[11] Data - ORC Environmental Data Portal
[12] Climate Projections Map

Table 3-1: Site source specifications and load reduction factors applied. All source areas apply to operational areas only.

Source	Total Area (m^2)	Main treatment	Assumptions
Warehouse (6 areas)	79,802	• Catchpit and UPT/ GPT • Discharge to Attenuation Pond	All building and paved area stormwater directed to the UPT as primary treatment pathway, prior to discharge to swale. Reduction factors for the UPT are applied. All covered buildings assumed to be Zinc/aluminium coated (Colorsteel/Colorcote etc). All open non-road paved areas were treated as an 'industrial' category (this may overestimate actual loads[1]). Custom reduction factors for the HyndsFilter UPT (including TSS, TCu and TZn) are applied. An estimated mid-range reduction factor for TPH from UPT is applied[2]
Warehouse canopy (6 areas)	20,988		
Buildings (offices etc): Office, Workshop Store	1,300		
Paved areas: • Heavy Duty Pavement • Vehicle Access Pavement • Railway Siding Formation • Carpark Areas • Concrete Footpath Pavement • Break Bulk Hardstand	223,824 (total)		
Non-source area			
Grass/open space (pervious)	61,518		Not included in CLM as a contaminant source area. Reduction factors ('wet pond'[13]) were applied to the final loads calculated to be discharged to the attenuation pond
Attenuation pond, Water treatment area	12,568		
TOTAL	**400,000**		

[1] The CLM contaminant yield factors for TSS, TZn and TCu are higher for category 'paved (non road) and industrial' compared with 'road <1000 VPD' category. Thus for Heavy Duty Pavement areas, which includes heavy vehicle movement such as straddlers, the contaminant yield may be overestimated for this vehicle type, compared with vehicle movements factored into the 'road <100 VPD' category.

[2]The HyndsFilter SW 32 can remove hydrocarbons from stormwater through its media adsorption and membrane filtration stages, though it is not specifically an oil/water separator.

[13] Table C1 in Appendix C, CLM User Manual (Auckland Council 2010)

Table 3-2 lists the modelled annual average contaminant yield from the operational site, along with the calculated annual average concentration of key contaminants after the conceptual treatment train.

Table 3-2: Contaminant load output and average concentration from the operational SLIP site including conceptual treatment train load reduction factors (UPTs, and attenuation pond)

Source	TSS (kg/year)[1]	TZn (kg/year)[1]	TCu (kg/year)[1]	TPH (kg/year)[2]
Warehouse, including canopy and buildings	56.15	0.74	0.070	-
Roads	61.85	0.04	0.02	0.44
Paved areas (all other than roads)	694.96 (85)	41.93 (98)	9.08 (99)	-
Total (kg/year)	813	42.7	9.17	0.44
Average Concentration prior to attenuation pond retention (g/m^3)[3]	3.59	0.19	0.04	0.002
Average Concentration after attenuation pond retention (g/m^3)[4]	0.9	0.13	0.02	<0.002

[1] Based on manual reduction factors for HyndsFilter SW32 specifications.

[2] Based on default reduction factor for swale as primary treatment.

[3] Based on 20-year average annual rainfall of 695 mm/year. Concentration equals average annual load (g/year), divided by the average annual volume of rainfall across the site (m3/year).

[4] CLM reduction factors listed in Table C1 'Roads and other paved surfaces' for 'Wet pond' were applied to the calculated contaminant loads after the initial primary treatment to estimate the treatment provided by the attenuation pond.

For comparison, the modelled annual average contaminant loads, without treatment and with proposed treatment, are listed in Table 3-3.

Table 3-3: Comparison of modelled annual average contaminant loads and concentrations with no treatment train versus conceptual treatment train

Source	TSS (kg/year)[1]	TZn (kg/year)[1]	TCu (kg/year)[1]	TPH (kg/year)[2]
Total – no treatment (kg/year)	7390.47	118.64	21.31	0.89
Total – with treatment (kg/year)	203.24	29.9	5.5	0.38
Percentage load reduction with conceptual treatment train	97%	75%	74%	57%

It is apparent across the site that the conceptual treatment train of UPTs and attenuation pond retention will substantially reduce all modelled contaminant loads, compared with no treatment train at all. The conceptual treatment train can potentially achieve >95% TSS reduction, compared with no treatment at all. Similarly, TZn and TCu are reduced by ~75%, and TPH by nearly 60%.

3.2 Comparison of CLM data to previous investigations and contaminant toxicity ranges

3.2.1 Results and References

Table 3-4 lists the estimated SLIP contaminant concentrations compared with available data and thresholds from the following sources:

- Port Otago quarterly monitoring (5-year data range) – results of quarterly stormwater monitoring across the industrial site comparable in scale and activity to the proposed SLIP site.
- Urban Runoff Quality Information System (**URQIS**) database – provides information collated from regional monitoring about the quality of stormwater from different locations and land uses and under different flow conditions.
- ANZG (2018) default guideline values (**DGV**) from the Australian and New Zealand Water quality Guidelines – provides contaminant guideline chronic values for the protection of ecological sensitivities in surface water receiving environments. Guidelines are applicable for surface waters after reasonable mixing has occurred, and do not apply to point source concentrations prior to mixing.
- New Zealand River Maps database –national level statistical model for surface water features/parameters. Includes modelled TSS[14]

Table 3-4: Contaminant ranges and thresholds for the Port Otago routine consent monitoring, URQIS database and ANZG (2018) DGV.

Source	TSS (g/m^3)	TZn (g/m^3)	TCu (g/m^3)	TPH (g/m^3)
SLIP site (after attenuation pond retention)	0.9	0.13	0.02	<0.002
Port Otago[1]	<3 - 220	<0.021 – 0.61	<0.011 – 0.017	<0.5 – 1.6
URQIS[2] (median, 90th percentile)	15 (160)	0.11 (0.65)	0.014 (0.054)	2.6 (32)
ANZG (2018)[3]		0.008	0.0014	0.007[4]
NZRM[4]	1.96	-	-	-

[1] From Appendix B, in SLR (2025) Stormwater Outfalls: Annual Report 2025. Consent RM21.038.01. Report prepared for Port Otago Ltd. March 2026.

[14] Unwin, M.J., Larned, S.T. (2013) Statistical models, indicators and trend analyses for reporting national-scale river water quality. NIWA client CHC2013-033 report to MfE, 71pp.

[2] urqis.niwa.co.nz (heavy industrial, all NZ, all SW, all flow conditions, all data types). Oil and Grease data as no summary statistics are available for total TPH.
[3] www.waterquality.gov.au, 95th percentile default guideline value for dissolved zinc and copper. Note that the DGVs are applied after the zone of reasonable mixing in the Silver Stream receiving environment, not at the point of discharge itself.
[4] There are no DGV listed for petroleum hydrocarbon, the reference value for chronic toxicity of total petroleum hydrocarbons (TPH) is referred to but does not represent a species level of protection. See https://www.waterquality.gov.au/anzguidelines/ guideline-values/default/water-quality-toxicants/toxicants/oils-petroleum-hydrocarbons-2000.
[5] NZ River Maps , river segment 14281150

3.2.2 Comparison against reported stormwater ranges

After retention in the attenuation pond, all indicator contaminants (TSS, TZn, TCu, and TPH) are reduced to within the observed contaminant range reported for Port Otago (SLR 2025). The extent to which the attenuation pond reduces contaminants after the upgradient treatment train, and prior to discharge, remains subject to final design parameters (e.g. lined versus grass lining design).

Compared against the URQIS database, the modelled stormwater concentrations discharged from the attenuation pond, TSS, TZn and TPH are predicted to be near or below the national median levels for industrial sites. Modelled annual average TCu from the attenuation pond exceeds the national URQIS median but is well below the 90th percentile level.

3.2.3 Comparison with ANZG DGVs

For TCu and TZn, comparisons are made against available ANZG guidelines[15] for discussion purposes only. It is noted here, ANZG guideline values are applicable for the dissolved fraction of metal contaminants and are applied after 'reasonable mixing'. Thus, these are not strictly applicable for assessment of point source discharges of the total metal fraction, prior to mixing in the receiving environment. These are referred to for comparison only; if it demonstrated that TZn and TCu are within the DGV, then it is reasonable to assume that the ecological risk is low. If any annual average concentrations exceed the DGV, levels of dilution to achieve the DGV are assessed.

Results from the CLM indicated concentrations of both TZn and TCu exceeded the 95th percentile level of species protection (Table 3-4), even after attenuation pond retention. It is apparent that the paved areas (other than roads) represent the largest sources of key stormwater contaminants from the SLIP operational area contributing to the overall loads and concentrations of TZn and TCu across the site (Table 3-2).

Table 3-5 lists the dilutions required for the modelled SLIP average concentrations (after attenuation pond retention) to meet the ANZG DGVs (95th percentile levels of protection).

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[15] Water Quality Guidelines Home

Table 3-5: Dilutions required to meet NZRM (for TSS) or ANZG (for Cu, Zn) default guideline thresholds.

Source	TSS (g/m^3)	TZn (g/m^3)	TCu (g/m^3)	TPH (g/m^3)
NZRM	No dilution required	-	-	-
ANZG 95th DGV	-	16.5	17.3	No dilution[1]

[1] Available ANZG is for a chronic toxicity threshold only, not a default guideline value. As noted in Section 2.4, TPH may be underestimated.

The modelled annual average concentration of TSS is reduced to levels that are lower than the modelled background levels after attenuation pond retention (Table 3-5). Similarly, the modelled TPH concentration is lower than the ANZG (2018) chronic toxicity threshold of 0.007 mg/L. Noting the assumption in Section 2.4 about the potential underestimation of total TPH loads, however, the modelled concentration is substantially lower than the ANZG threshold. A mid-range reduction factor was applied, thus even if catchment loads increase, and with potentially increased reduction through treatment, the overall concentration (after treatment) will likely remain relatively low.

On the basis of the location of the site, surrounding land use influence, as well as ecological values and sensitivities reported in e3 (2026)[16], a 95th percentile DGV is the appropriate level of species protection (representing a moderately disturbed ecosystem level of species protection. For the 95th percentile level of species protection, which is assumed to apply to the Silver Stream receiving environment, around 16-17 - 12 fold dilution of TZn and TCu, respectively, would be required to comply with the DGV.

Considering the footprint of the SLIP site (0.4 km^2) in the context of the upper catchment area (74.2km^2, Table 2-1), any rainfall in this upper catchment area will significantly contribute to stream flow during rain events. The upper catchment represents a near 200-fold increase in area potentially draining rainfall to overall catchment flow in the Silver Stream catchment. Therefore, any stormwater discharged from the site (anticipated to be during high rain events only, with no discharge occurring for low rain events), the final concentration of site derived stormwater contaminants will also be significantly diluted well beyond the calculated 11-12 fold dilution ratio required to achieve the DGVs listed in Table 3-5.

As noted above, the ANZG DGVs represent chronic toxicity thresholds[17] for contaminants in the dissolved phase, that are applicable after a discharge has undergone 'reasonable mixing' in the receiving environment. For TCu and TZn, although these two contaminants are reduced via the attenuation pond retention, conservatively, a 16-17 fold dilution would be required to ensure compliance with the 95th percentile DGV for these contaminants. It is likely the TZn and TCu consist of particulate-bound as well as dissolved phase metals, but the proportional split was not able to be assessed using

[16] E3 Scientific (2026) Southern Link Inland Port Freshwater Ecological Impact Assessment. Report prepared for Southern Link Property Ltd. March 2026.

[17] Interim acute toxicity guidelines were published for dissolved copper and dissolved zinc in 2025 but require site specific information regarding toxicity modifying factors (temperature, pH, hardness and organic carbon) to derive thresholds. See Acute copper and zinc water quality guideline values for Aotearoa: User guide

the CLM. It is reasonable to assume the likely dissolved fractions of both TZn and TCu will be lower than the total load and total concentrations for the SLIP site listed in Table 3-4. Noting the near 200-fold ratio of the upper catchment area to SLIP site footprint, and contributing rainfall to flow, it is also reasonable to suggest the required dilution factors to comply with the ANZG (2018) 95th percentile DGV can be achieved within the zone of reasonable mixing, once this has been established.

The effect of extending retention time in the attenuation pond has not been assessed in the CLM approach but may further reduce the overall contaminant load (and concentration) further, prior to discharge to the Silver Stream receiving environment. In particular, retention of TSS will be beneficial in reducing the total loads discharged to the receiving environment – thus if TSS is effectively managed and retained within the footprint of the site, by association sediment bound TCu and TZn may effectively be reduced. Dissolved metal fractions, however, may remain in solution and be discharged to the surface after receiving environment even after extended attenuation pond retention.

For other key stormwater contaminants (e.g. nutrients, other metals) appropriate diversion to UPTs/GPTs, perimeter flow paths and to the attenuation pond will also reduce overall loads. As with the CLM assessed contaminants, verification through post-construction monitoring would be required. Assessment of the efficacy of the final treatment train (e.g. UPTs) would be useful to verify key stormwater mitigation pathways that results in results in overall reduced contaminant concentrations. Similarly, field monitoring the Silver Stream receiving environment would be required to validate on site treatment train approach and ensure that key stormwater contaminants (e. metals) are within the 95th percentile DGV after reasonable mixing, and that do not incur adverse effects in the downstream receiving environment.

Contaminants generated via washdown areas will be treated as wastewater and will not be discharged to the stormwater collection system unless in the event of large rain event that may result in an overflow to the stormwater system (in the order of 2% AEP or larger). In this situation, a large proportion of any surface contaminants would already have been diverted to wastewater before the onset of overflow. Any residual wash-down area associated contaminants will be captured by the stormwater catchpits and UPTs and given this will only be in a high rainfall event, concentrations will be likely be significantly diluted.

For other chemicals used on site (e.g. for vehicle repair/maintenance, storage), appropriate chemical handling procedures (including storage and spill kits) is expected to ensure minimal contact or accidental spills to the stormwater collection system would occur.

4 Conclusion

The CLM was applied to calculate a semi-quantitative assessment of key stormwater indicator contaminants from the SLIP site (post-construction). The calculations are based on generic source contaminant yield factors derived from monitoring undertaken across Auckland and supplemented with international literature. At a high level:

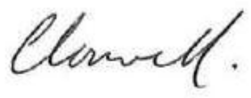
- The paved areas category (excluding roads) are likely to generate the highest sources of key stormwater contaminants (TSS, TZn, TCu, TPH). The paved areas (excluding roads) represents 60% of the total area of the site. The 'industrial' category applied from the CLM has amongst the highest contaminant yields[18] compared to other source areas/categories for key stormwater contaminants (TSS, TCu, TZn). It is noted 60% of the paved area (excluding roads) accounts for the total impervious area of the site but contributes >85% of modelled contaminant loads.
- Targeted stormwater treatment for paved areas (excluding roads) may represent the largest opportunity to reduce discharge of contaminant loads. Reduction in the conceptual treatment train models reductions of >95% TSS, 75% TZn, 74% TCu, and 57% TPH after the conceptual treatment train.
- Reduction of contaminant loads via the retention pond has been an assumed step of the conceptual treatment train that was factored into the modelled annual average loads and concentrations. Depending on the final design, retention of stormwater in the attenuation pond may further reduce key stormwater contaminants by varying degrees[19] after the initial treatment reduction via UPTs.
- Retention time in the attenuation pond will likely further reduce elevated TZn and TCu to reduce the annual average concentrations. Furthermore, the near 200-fold ratio of the upper catchment area (and contributing rainfall) to the SLIP site footprint, and subsequent increase to stream flow will substantially dilute residual stormwater contaminants that may be discharged during higher rainfall events (noting no discharge from the attenuation basin will occur for low rainfall events). This increase in flow in the receiving environment alone will likely ensure receiving environment based DGVs are adhered with in the zone of reasonable mixing.
- Final configuration of the UPT/GPT devices in the overall treatment train, as well as final design of the attenuation pond are to be confirmed in the final design stages. These will further inform the efficacy of the removal of the overall key contaminants and help to refine assumptions set out in this technical memo. For example, given the paved areas (excluding roads) potentially represent the highest contaminant source areas, treatment devices such as UPTs (or other comparable treatments) may provide the most benefit targeting contaminant management across this sub-catchment. Other treatment options such as soak pits for lower source areas (e.g. buildings and associated roofing areas) may be considered, depending on site constraints.
- A robust baseline of the stormwater being discharged from the site post stage 1 construction is recommended for key water quality physico-chemical parameters, as well as key stormwater contaminants. Once established, site specific trigger values and/or tiered response thresholds can

[18] See Table B1 in Appendix B of the CLM user manual (Auckland Council 2010).
[19] See Table C1 (roads and other pave surfaces) in Appendix C of the CLM user manual (Auckland Council 2010).

be established to inform efficacy of the stormwater management and overall treatment train. For example, this might allow refining of the target modules within the UPT's.

Yours sincerely

Stantec New Zealand



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