ENVIRONMENT COURT OF NEW ZEALAND
WELLINGTON REGISTRY

I MUA I TE KOOTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA

ENV-2023-WLG-000005

Under	the Resource Management Act 1991
In the matter of	the direct referral of applications for resource consent and notices of requirement under sections 87G and 198E of the Act for the Ōtaki to North of Levin Project
By	Waka Kotahi NZ Transport Agency

STATEMENT OF EVIDENCE OF NICHOLAS JOHN KEENAN ON BEHALF OF WAKA KOTAHI NZ TRANSPORT AGENCY

STORMWATER MANAGEMENT DESIGN

Dated: 4 July 2023

BUDDLE FINDLAY

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Wellington

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INTRODUCTION

1. My full name is **Nicholas John Keenan.**

2. I am a Senior Civil Engineer for Stantec, where I have worked for 16 years in the Water Group.

3. I specialise in stormwater infrastructure implementation, hydraulic modelling and flood risk, and rivers engineering. I generally work within a project team providing drainage and stormwater technical design for roading and infrastructure projects. I have been involved with Waka Kotahi NZ Transport Agency (**Waka Kotahi**) state highway safety improvement and upgrade projects on the Kapiti Coast, Wellington, Wairarapa, Whanganui, Rotorua, Canterbury and Otago since 2006.

4. I prepared the Stormwater Management Design Technical Assessment (**Stormwater Report**), which was appendix 4.2 to the Design and Construction Report (**DCR**) prepared for the Ōtaki to north of Levin highway Project (**Ō2NL Project** or **Project**).

5. The DCR was included in Volume II of the Assessment of Environmental Effects (**AEE**), which accompanied the application for resource consents and notices of requirement for designations (**NoRs**) lodged with Manawatū-Whanganui Regional Council (**Horizons**), Greater Wellington Regional Council (**GWRC**), Horowhenua District Council (**HDC**) and Kāpiti Coast District Council (**KCDC**) in November 2022 in respect of the Ō2NL Project.

6. My qualifications and experience are set out at paragraphs 13 to 16 of Appendix 4.2 to the DCR (Appendix 4 to Volume II of the AEE).

7. In preparing the Stormwater Report and my evidence:

   (a) I have been involved in matters related to the Project since January 2021.

   (b) I am familiar with the area that is covered by the Ō2NL Project and have been involved with developing the Project's stormwater management design – focussing on stormwater discharge management and treatment from the road surface.

   (c) I have had primary responsibility for the development of a consent stormwater management design (Concept Design) for the indicative

alignment to assist the effects assessment process as is reported in the various technical assessment reports and evidence. The Concept Design provides a feasible consent level design for the management of carriageway drainage and stormwater management (treatment and detention). The Concept Design is shown in the drawings and plans provided in Volume III - Drawings.

(d) I have driven over the Project Area regularly in the past and that was helpful in understanding the terrain, landscape and urban communities. For Concept Design, all work was conducted as desktop assessment with field investigation inputs. Project work was related to design aspects including geotechnical information, topography, rainfall data, road geometrics, urban/rural boundaries and stream catchments.

(e) The Concept Design is based on the alignment and footprint of the Project carriageway area and side channel provisions in relation to topography (ie: runoff catchments and receiving waterway).

8. Since the consent applications and NoRs were lodged:

(a) I assisted with the response to questions in the section 92 further information requests from the Councils related to stormwater design.

(b) I have assisted with responses to submitters who have raised stormwater concerns.

9. I have had discussions with my counterpart expert for HDC and KCDC, Ms Justine Bennett about the Stormwater Report and concerns they might have with it or the Project's stormwater approach more generally.

Code of conduct

10. I confirm that I have read the Code of Conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023. This evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Purpose and scope of the evidence

11. The Stormwater Report describes how the stormwater from the Ō2NL Project can be managed and includes details of the:

(a) anticipated hydrology runoff volumes and discharges;

(b) approach to and design of water quality treatment; and

(c) anticipated character of final discharge into the receiving environment.

12. My evidence does not repeat in detail the matters discussed in the Stormwater Report. Rather, in this evidence I:

(a) present the key findings of the Stormwater Report in an executive summary, updated to reflect the additional work carried out since lodgement;

(b) provide a more detailed description of the additional work carried out, information obtained, and discussions held since lodgement, and the implications for my assessment;

(c) comment on the issues raised in submissions received in respect of the Project; and

(d) comment on the section 87F/198D reports prepared by Horizons, GWRC, HDC and KCDC (**council reports**).

EXECUTIVE SUMMARY

13. The Concept Design, is based on:

(a) compliance with industry guidelines and standards for stormwater management from highways, including council policies and objectives;

(b) engineering and scientific inputs from other project disciplines;

(c) site investigations;

(d) topographical surveys; and

(e) aerial photographs.

14. The Project spans two regional councils (GWRC and Horizons) and two district councils (HDC and KCDC). The policies and objectives in the relevant planning instruments related to stormwater runoff from the highway are intended to minimise the impacts of the Project on the upstream and downstream environment (both natural and built environments).

15. The approach that has been taken with the Concept Design is to apply industry best practice stormwater effects mitigation strategies to the road

design, in a conservative manner, to ensure effects are minimised. For stormwater runoff from the Project this means attenuation of peak discharge with large basins and a robust contaminant capture and treatment regime using swales, planting and constructed wetlands throughout the Project length.

16. The Concept Design has been developed to consider and avoid, remedy or mitigate the potential stormwater effects on the receiving environment, including cumulative effects, based on understandings captured in current New Zealand industry best practice. The Concept Design:

    (a) Provides stormwater runoff treatment over approximately 95% of road surface area in the Project.

    (b) Provides a treatment train approach that can capture and treat 75-90% of total suspended solids, oils and soluble metals (copper and zinc) from road runoff, for 90% of storm events. The treatment train includes vegetated batter slopes, treatment swales and constructed wetlands before discharge into the receiving environment.

    (c) Manages flood risk through attenuation basins sized to decrease proposed road surface discharge rates from the road to preconstruction rates. The basins will accommodate storms (up to the 1%AEP, 24-hour duration event with allowance for future climate) including climate change, to buffer downstream flood risk impacts and receiving environments from an increase in peak flows and downstream flood levels. Ground soakage disposal will be used where feasible.

    (d) Manages 90% of storm events in terms of water quality and 99% of storms in terms of water quantity (accounting in all instances for climate change). Exceedance events are relegated to the largest 10% of storms in terms of water quality but effectively still treat the “first flush” portion of even those events. In terms of water quantity, exceedance events are 1% of storms and the design will manage the first part of such an event before activating emergency bypass facilities which are designed to minimise erosion effects on the environment.

17. The Concept Design will deliver an asset that is functional and maintainable over proposed the long term. Blockage and malfunction of the stormwater management facilities can still occur, but this risk can be managed with normal maintenance activities and built-in bypass and overflow components

which will be included in the facilities. The stormwater facilities will have safe access for monitoring and maintenance equipment.

18. The proposed Concept Design has been developed in consultation with iwi partners (as described in the cultural and environmental design framework (**CEDF**) (Appendix Three to Volume II) and consists of highly functional facilities that align with iwi values, with benefits including a natural aesthetic, improved amenity, and potential opportunities for community recreational involvement.

WORK SINCE LODGEMENT

19. Since the application was lodged, I have been involved in further work related to stormwater management as set out below.

Response to section 92 requests for further information

20. I assisted with the response to further information requests from the Councils related to stormwater management. In particular, the section 92 summary table provided by Waka Kotahi in response to the Councils' requests (December 2022), item numbers:

    (a) 49: use of infiltration clarification in the design.

    (b) 50: clarified areas where the road surface will not receive full stormwater treatment.

    (c) 51: clarified pond facility footprint area and polygons in general arrangement drawings.

    (d) 52: clarified the inclusion of batter slopes and internal earthworks inside pond polygons.

    (e) 54: clarified the design process and sizing methodology for the constructed wetlands.

    (f) 55: clarified role of swales in the treatment train process within the design.

    (g) 57: Clarified the lining of forebays in the typical treatment facility.

    (h) 58: clarified the “online” nature of the forebay and regime of all storms.

    (i) 59: clarified the role of infiltration areas and the prior attenuation of flood flows.

(j) 60: clarified the typical design of a stormwater treatment facility and separation of forebay, constructed wetland and attenuation pond into discrete areas.

Engagement

21. I have also been involved, as required, in ongoing post-lodgement engagement with the Councils, subject matter experts, Waka Kotahi, contractors and stakeholders. Since the NoR and consent applications were lodged, this has included:

    (a) Discussions with Ms Justine Bennett, the stormwater expert engaged by HDC and KCDC to assess stormwater water quality impacts. Ms Bennett discussed a number of points, and our communications are attached in **Appendix A**. Most relevantly, Ms Bennett notes:

        (i) The treatment train is the best practice approach;

        (ii) The monitoring and design guidance suggested regarding performance is the best practice process; and

        (iii) The design event (1:100 AEP with climate change) is appropriate for forecasting the effects of climate change on the Project; and

    (b) Discussions with representatives of the Wellington Transport Alliance (WTA) to understand existing and proposed operations and maintenance plans in the Wellington Region's highway network.

COMMENTS ON SUBMISSIONS

Mr John Bent, Palmerston North

22. Mr Bent was conditionally supportive. Issues raised were:

    (a) Increased runoff from hard sealed areas. In my opinion, this is appropriately accounted for through the provision of swales and attenuation ponds within the Project design.

    (b) Increased litter, oils, plastics, not being captured within the stormwater treatment facility areas by screens, grills and structures. Floating and non-biodegradable litter and oils will be partially trapped in the planting, and within the pond basins. The main mechanism for removal of litter is manual removal during regular and routine maintenance (including gardening and vegetation inspection). Additionally, detailed design of

forebays will include standard baffles and screens to trap gross litter (floating litter and lighter-than-water oils and hydrocarbons) and prevent this from entering the constructed wetland (Condition RSW1).

COMMENTS ON THE COUNCIL REPORTS

KCDC / HDC – Justine Bennett

23. Justine Bennett and I discussed the Concept Design on 29 March 2023 with regards to stormwater management. Ms Bennett's technical report accepts that the proposed treatment train approach to stormwater discharge quality follows industry good practice, especially because the Concept Design is based on Auckland Council Guidance Document (**GD01**) Stormwater Management Devices in the Auckland Region (2017).

24. Ms Bennett recommended that consent condition RSW1 should reference GD01 rather than Waka Kotahi NZ Transport Agency 'Stormwater Treatment Standard for State Highway Infrastructure' dated May 2010 (**Waka Kotahi 2010**).

25. Regarding design standards and guidelines for stormwater management, three documents are relevant to the Project for different reasons:

    (a) Waka Kotahi 2010 is the asset owner's standard and provides detailed guidance for design, implementation and operation of stormwater management for highways;

    (b) GD01 2017 is well established as NZ best practice guidance document for stormwater treatment facilities such as constructed wetlands and swales; and

    (c) Water Sensitive Design for Stormwater: Wellington Water, (2019) (**Wellington Water 2019**) is guidance that is more locally applicable to the Wellington and Manawatū Regions (and, as below, is supported by Mr Stuart Farrant).

26. Generally, these standards and guidelines have improved over time and build on common fundamentals and developing experience. For upcoming detailed design phases, in my opinion, the Wellington Water 2019 document is the most applicable and provides appropriate design, construction and operational guidelines. In addition, in my opinion, the Waka Kotahi 2010 document should also be referenced because it contains a state highway

focus, i.e.: a linear infrastructure that has operations and maintenance implications for stormwater management devices in a high hazard, transport, setting. Also, the standard represents Waka Kotahi ownership of the asset and implementation of their Environmental Plan 2008 in a practical and economic manner. Therefore, both Wellington Water 2019 and Waka Kotahi 2010 are referenced in consent Condition RSW1.

Performance Controls – Monitoring and Maintenance

27. Ms Bennett is concerned that monitoring of device performance and maintenance were not specifically proposed in the consent conditions. Another concern was that ongoing maintenance may not be adaptive over time and in response to performance.

28. Operational maintenance is included in Waka Kotahi 2010 and Wellington Water 2019. In the same way as other Waka Kotahi assets, design life of the Project's stormwater facilities is expected to be 100 years and will involve long term Waka Kotahi operations and maintenance contracts to ensure continuing maintenance.

29. Currently, similar operations and maintenance contracts cover other Wellington region stormwater facilities in state highway corridors on the Kapiti Coast. This was confirmed at my meeting with the Wellington Transport Alliance (30 May 2023). The Wellington Transport Alliance manages and maintains the highway corridor from MacKay's Crossing to SH57 and will shortly take over Peka Peka to Ōtaki.

30. The proposed Ō2NL highway corridor will include 19 stormwater treatment facilities – each incorporating a swale (or drainage system such as catchpits, pipelines or channels), forebay, constructed wetland and flood attenuation volume.

31. Ms Bennett suggests that ongoing monitoring of discharges into the stormwater treatment train is required[1] to ensure stormwater treatment performance is achieved. Given the substantial number of proposed and operational constructed stormwater wetlands along the state highway corridor, and the resilience of stormwater wetlands to a range of states and flows, I consider that a monitoring regime based on a visual assessment of the stormwater management facilities and components is practical and

[1] See paragraphs 58 and 59 of Appendix 5 of Ms Helen Anderson's s 198D report.

appropriate (this is consistent with the evidence of Mr Keith Hamill, and his Technical Assessment H regarding monitoring).

32. Adaptative management approaches to operational stormwater management are adopted by the contractor based on visual monitoring and recording, as discussed above.

Verification of Design – Council Review

33. Another concern expressed by Ms Bennett[2] is the lack of opportunity for HDC and KCDC to verify that the proposed stormwater management facilities are actually designed and built as stated in the Concept Design; and perform as expected by the relevant design guidelines – "the regulatory authorities should be supplied with an opportunity to approve the design, receive and check the As-Builts and review an operation and maintenance plan for the stormwater systems."

    (a) Condition RGA6 has been amended to require as-builts to be prepared by a SQP. The as-builts will be provided to the Councils for their information. Therefore, I do not consider it necessary that consent condition RSW2 include a "peer review" type check by Councils. Further, Waka Kotahi P46 Stormwater Specification 2016 (which is used for contract purposes) incorporates local authority standards and guidelines (and is contained in condition RSW1).

    (b) Waka Kotahi 2010 encourages continuous improvement in environmental outcomes, and seeks to avoid adverse effects on sensitive receiving environments while complying with regional plan requirements and discharge permit conditions.

Emergency Spill Management – Design Details

34. A third concern raised by Ms Bennett was the absence of spill management references in the Concept Design. This would be from an accident such as a milk/petrol/chemical tanker overturning and leaking contents into the roadside drainage, or from an accident that requires application of a volume of firefighting foams and fire retardants which would also drain into the roadside drainage.

[2] Paragraphs 60, 61 of Appendix 5 of Ms Helen Anderson's 198D report.

35. The Project will reduce the risk and effect of a potential spill by:

    (a) Incorporating an inherently safe road (including geometrics, widths, wire rope barriers, dual carriageway, high grip surfacings) so the likelihood of an event is low;

    (b) Having larger runoff area (shoulders and lanes) offering better containment opportunities and a reduced consequence of a spill; and

    (c) Includes a modern stormwater system (that does not exist on the current SH1) that is designed to accommodate significant rain events that exceed volumes generated in these types of spill incidents. The stormwater system can absorb spills into the swale soil or forebay (see condition RSW1) prior to capture and removal – minimising the likelihood of a spill release into the receiving environment.

36. I consider that emergency spills are best contained in roadside swales or forebays by on-site emergency services and contractors, rather than specified now through consent condition when the circumstances of any particular accident / emergency are unknown. The performance of these measures is dependent upon timing, equipment and materials, action and training, and priorities in an emergency. Overall, the Project gives the environment a high level of protection against spill incidents.

Floating Litter – Design Details

37. A fourth concern raised by Ms Bennett was the absence of design details to capture and hold floating litter such as plastic. Contaminants, like plastic, which float with water currents, do not degrade quickly, and are not absorbed into the roots of riparian plants. Ms Bennett is concerned that this will result in accumulations of litter.

38. While the Waka Kotahi 2010 and Wellington Water 2019 guidelines do not comment on plastic specifically, they do include it as a gross litter contaminant to be managed through pre-treatment devices such as catchpits and forebays. Forebays are included in the Concept Design for this purpose, but I consider that detailed design would also include standard inter-pond pipelines, baffles and screens to contain plastics inside the forebay volume (as required by condition RSW1).

39. Additionally, plastic will be recovered from the swales and forebays as part of regular maintenance.

Unlined Swales and Forebays over Highly Permeable Soils

40. A fifth concern raised by Ms Bennett related to the risk of contaminants in road runoff infiltrating to the groundwater table through unlined swales and forebays over highly permeable land.

41. Swales along the Project length will generally be unlined. This provides opportunity for rainfall to seep into the groundwater as nature would intend, and this aligns with Iwi expectations.

42. The potential effects of contaminants from the new highway affecting groundwater are discussed in detail in paragraphs 214-222 of Technical Assessment G (Hydrogeology & Groundwater). The conclusion of that assessment (paragraph 222) was that "Consequently, the O2NL Project is likely to result in a small improvement in the quality of both surface runoff and groundwater." Any potential risk of contamination is 'managed' by the comment in paragraph 203 which states:

> *As discussed, a concept design for the Project has been developed to establish an umbrella of potential effects under which the final design must be in general accordance with. The final design will need to meet the minimum specifications required by various conditions including those in:*
>
> *(a) NZTA P46 Stormwater Specification (2016), and the Agency's Stormwater Treatment Standard for State Highway Infrastructure' (2010) required by condition RSW1; ... .*

43. With reference to Technical Assessment H (Water Quality) Mr Keith Hamill notes that a system of unlined swales and treatment facilities along the Project has a net positive outcome when compared with the vehicle usage on the existing road network that the Project will replace. Even in high infiltration soil areas, unlined swales will provide partial treatment through soil filtering, settlement and biological uptake before filtering through natural soils into the groundwater table. The lateral movement of stormwater is expected to occur, and this water would be fully treated before discharge to the receiving environment or to dedicated soakage fields.

44. Given the positive benefits of the stormwater system, including unlined swales, the effect of rainfall runoff from the Project entering the groundwater table is in my opinion low, and an improvement compared to the same effect from the existing highway network in the region.

GWRC/MWRC – Stuart Farrant

Overall Concept Design Comments

45. In my opinion, Mr Farrant has downplayed the performance of swales in the overall stormwater management system of the Project. The base width of the swale is designed to pass water at a shallow depth and slow velocity, and to bio-filtrate through the topsoil and root mass of the vegetation lining; based on the flow rate of the design event (10mm/hr rainfall intensity for water quality design). This will lengthen water travel times and provide as much opportunity as possible for sedimentation, filtration and uptake of contaminants. As such, the swales and their shallow gradients offer a vital component of the treatment train.

46. Mr Farrant is happy with the Concept Design approach and the standard of design, but is concerned that the conceptual design may not be followed through into a future detailed design that delivers treatment performance. However, Condition RGA1 requires the Project to be undertaken in general accordance with the Stormwater: Drainage Layout Plans and Stormwater: Catchment Plans and conditions RSW1 and 2 require stormwater design system to be built to guidelines and for as-builts to be provided for all stormwater structures.

47. Mr Farrant requested further information about where the untreated 5.4% of Project length is located, and whether it is near sensitive receiving water bodies.

48. The summary table below (Table 1) indicates the sections of the Project where the road surface is partially treated or untreated. The road is considered treated if runoff passes through engineered facilities as part of the Project (i.e.: swales, constructed wetlands). Chainage relates to the Project location, and “half road” means only one half of the road width is a non-treated section.

Table 1 Partially treated or untreated sections of Ō2NL

Table NK .1	Partially Treated or Untreated sections of O2NL road corridor				
ID	Start Chainage (m)	End Chainage (m)	Section Length (m)	Full road = 1, Half road width = 0.5	Effective Road length (m)
Transition1	9950	10150	200	1	200
Bridge 2	22420	22540	120	1	120
Bridge 3	23800	23850	50	1	50
Bridge 4	26150	26400	250	1	250
Bridge 5	30000	30150	150	0.5	75
Bridge 6	30200	30350	150	1	150
Cut 7	31200	31600	400	0.5	200
Cut 8	32650	33250	600	0.5	300
			Total untreated		**1,345**
				total Project length	**24,950**
				non treated	**5.40%**

49. The portions of the road are described as follows:

(a) (ID 1) 200m length of road at the northern transition area where the Project will merge into existing SH1 and existing roadside drainage. The existing drainages are grass lined drainage ditches which will provide a partial treatment but not to the standard of the rest of the Project. There is no land or corridor width provision set aside to capture and treat this formally or economically. The receiving environment was not considered to be sensitive.

(b) (ID's 2,3,4,5,6) The bridge lengths and short approach lengths that are down-gradient of the nearest stormwater management facility that can be placed out of the river floodplain and elevated compared to bridge deck level. Runoff will be captured on the bridge deck and drained to one end onto the stream bank - away from the abutment. These bridge end release points will be managed to prevent localised scouring and erosion. Short approach lengths over embankments above floodplains will be provided with grass lined sheet-flow runoff slopes to prevent concentrated flows and provide partial treatment through grass filtering. Each short location is considered to generate a small contaminant load.

(c) (ID's 7,8) The sections of road where the topography (large cut-slopes) prevent the widths needed for economical treatment swales, and/or there is no suitable area for a treatment facility adjacent to the road formation (also due to steep topography or property constraints). To

minimise earthworks volumes, drainage width will be minimised in these cases, and channels lined with concrete and the outlet locations stabilised against scour and erosion. The receiving environment in these situations are farming-type drainage channels - lined with informal grass - and extend for some length, before merging with larger rivers downstream. These receiving environments will therefore receive informal, partial treatment, through unlined channels before reaching larger rivers or the coast.

50. In my opinion, none of these specific areas on their own amount to a significant environmental threat, due to the relatively short lengths of untreated road and this is partly offset by informal treatment through existing "farm-type" open channels or grass-lined embankments that allow sheet flow. Environmental effects on groundwater and water quality from the wider highway network are actually improved by the Project's drainage - as concluded in Technical Assessment G (Hydrogeology & Groundwater) and Technical Assessment H (Water Quality).

Unlined Swales over Contaminated Land and High Permeability Land

51. As noted above, Mr Farrant accepts that unlined swales are generally appropriate, except over contaminated land and highly permeable soils or sensitive groundwater recharge areas. In my opinion, lined swales over contaminated land areas can be incorporated into the design, at the detailed design stage, without serious issues. This is required by condition RSW1.

52. My position that the use of lined swales over groundwater recharge areas is not required, is made in previous paragraphs.

53. Mr Farrant notes that constructed wetlands in high permeability soil areas may need all the runoff they can get in times of dry weather, and that lined swales through high permeability soils areas will be important. In my opinion, wetlands will receive direct rainfall and some extra runoff from unlined swales, and perform as other constructed wetlands in Kapiti. Careful selection of plants and final detailed design levels in ponds will ensure the best chance of wetland planting survival.

Planting

54. Mr Farrant does not agree with the planting species list proposed. I consider this a matter that can be addressed during detailed design and with ecological input as required.

Infiltration Sites

55. Mr Farrant identifies that infiltration sites should be assessed for soils contamination, and not sited in contaminated soils. I consider this a detailed design issue that would be resolved with a contaminated soils investigation at the proposed soakage fields. If contamination is found, localised remediation measures could be carried out or a more suitable site would be selected.

Overall Comments by Mr Farrant

56. Mr Farrant makes a number of other comments, these include:

    (a) Further details of constructed wetlands' bed levels, pond shapes and levels against topography are requested in detailed design.

    (b) A water balance exercise is recommended to prove that unlined swales will not impact long-term viability of constructed wetlands' plant life.

    (c) Fish barriers between constructed wetland and natural waterbodies is requested.

57. I consider these will be satisfied during the detailed design stage and fish barriers are addressed by **Dr Alex James**.

Suggested Conditions

58. Mr Farrant has suggested Waka Kotahi provide detailed design plans for all operational stormwater management (**OSM**) devices prior to construction for verification by GWRC and Horizons for alignment with Wellington Water 2019. As set out above, Condition RGA6 has been recommended to require quality assurance by a suitably qualified person.

59. Mr Farrant also suggests Waka Kotahi provide operations and maintenance Plans for all OSM devices prior to construction. In my opinion, and as discussed above in the response to the technical reporting of Ms Bennett, such conditions are unnecessary.

Nicholas John Keenan

4 July 2023

APPENDIX A – SUMMARY OF COMMUNICATIONS WITH MS JUSTINE BENNETT

From: Justine Bennett <Justine.Bennett@ghd.com>
Sent: Saturday, April 1, 2023 7:01 PM
To: Keenan, Nick <Nick.Keenan@stantec.com>; Stu Farrant <stu.farrant@morphum.com>
Subject: FW: ON2L s198 Reporting - Water Quality

Hello both.

One more question:

Condition RSW1 States:

Operational stormwater standards

a) Operational stormwater run-off from the Project must be treated in dedicated stormwater management devices before discharging to the receiving environment in general accordance with the Waka Kotahi NZ Transport Agency '*Stormwater Treatment Standard for State Highway Infrastructure*' dated May 2010.

How does this standard compare with Auckland Council's GD01 with respect to the design of devices to optimize the removal of TSS and other contaminants of concern ? Do you consider it to be an equivalently effective best practice standard ?

Regards

Justine

From: Justine Bennett
Sent: Wednesday, 29 March 2023 10:45 am
To: Keenan, Nick <nick.keenan@stantec.com>
Cc: Helen Anderson <Helen.Anderson@ghd.com>
Subject: ON2L s198 Reporting - Water Quality

Hello Nick

Thank you for you time today. As promised please see below summary of the key points discussed:

1. Design basis – treatment train – solid best practice approach
2. Wetlands mainly towards southern end.
3. Challenges – 25km road – topographic challenge at south end led to a narrower corridor and a bit more need for traditional drainage kerb and channel and pipes to a pond ie : less treatment train (over approx 5km length)
4. Relying on treatment rather than soakage BUT in gravel soils we have proposed treatment before soakage to ground. TSS removal will reduce the risk of clogging and disposal field located outside compaction zones.
5. Building in the flood plain – we have modelled flood plains and avoided putting wetlands and ponds in an established flood plain.
6. 10% untreated – Actually closer to 95% treatment expected post detailed design. That current 10% is related to very constrained areas such as runoff from bridge decks, roundabouts and transition points to existing roading areas where we cannot extend the swales far enough. Some discharges are direct to streams without treatment. It wasn't economic to treat everything
7. Lake Horowhenua – GW fed and we will discharge to ground but it will be treated via the Treatment Train before it goes to ground.
8. Treatment outcomes stated – how will you monitor performance to achieve those ?
9. Spills and fires in operation- are not directly addressed. Just part of treatment swale and ponds. Not so much around constrained areas. Containment not in valved but there is sufficient volume . May be an issue on rainy day if forebay is already full.
10. O&M- yes a manual will be required. Similar to others will be implemented under NOC contracts
11. As builts – yes will be produced and could be provided to councils
12. Design approvals – no hold points or council approvals required at this stage
13. Performance monitoring– currently relying of best practice process and design guidance, and treatment train robustness. Actual performance monitoring could be added as part of operational phase
14. Swale and wetland plant survival – visual inspections and checks. Contractor requirements for establishment and also then for O&M . Similar also required for pipes etc.
15. Ponds to contain 100 year 24 hour event so quite large – will cope with CC.
16. Litter and plastic –Will need to be caught in ponds and then need clearing regularly.

Thanks again for your time. I trust this is s fair reflection of our conversation.

Regards

Justine