IN THE MATTER of the Resource Management Act 1991 ("RMA" or "the Act")

AND

IN THE MATTER of applications under section 88 of the Act to the **Tasman District Council** by **Tasman Bay Asphalt Limited** for resource consents for an Asphalt Plant (**RM201000, RM201002, RM201018**)

EVIDENCE OF DR DONALD JAMES MORRISEY ON BEHALF OF TASMAN BAY ASPHALT LIMITED (EFFECTS ON WATER-QUALITY)

1. INTRODUCTION

1.1 My full name is Donald James Morrisey. I have held the position of Senior Coastal Scientist at Cawthron for the last seven years.

1.2 This evidence is given on behalf of Tasman Bay Asphalt Limited (the "Applicant"). The Applicant has applied for (collectively the "Proposal" or "Asphalt Plant"):

(a) Land Use consent to construct and operate an Asphalt Plant and build an acoustic barrier (RM201000);

(b) Discharge Permit to discharge contaminants from an Asphalt Plant to air (RM201002); and

(c) Land Use Consent to undertake earthworks within 10 metres of the toe of the Waimea stopbank (RM201018).

1.3 This evidence addresses the effects of the activities for which consent is sought on water-quality from the discharge of contaminants to air from the Asphalt Plant.

Qualifications and experience

1.4 I have a PhD in Zoology (marine ecology) from Cambridge University (UK), which I obtained in 1986. I also hold a Bachelor of Science (zoology) from Bristol University (UK) and a Post-graduate Diploma in Environmental Monitoring and Assessment from Coventry University (UK).

1.5 As noted, I have held the position of Senior Coastal Scientist at Cawthron for the last seven years. I am part of Cawthron's Healthy Oceans team. Prior to joining Cawthron, I worked as a marine ecologist at the National Institute of Water and Atmosphere ("NIWA") in Hamilton and Nelson, Associated British Ports Marine Environmental Research (Southampton, UK), the University of Sydney and the University of Bristol. Although my position title at Cawthron is Senior Coastal Scientist, I am qualified to give evidence on freshwater effects in the present context because my assessment is based on effects on water quality in relation to established water-quality guidelines, rather than their ecological consequences.

1.6 My technical skills and experience directly relevant to my assessment here include:

(a) Environmental impact assessment and monitoring;

(b) Water and sediment quality impact evaluations; and

(c) Ecological effects of wastewater discharges.

Code of Conduct

1.7 I have read and the Environment Court's Code of Conduct for Expert Witnesses 2014, and I agree to comply with it. I confirm that the issues addressed in this brief of evidence are within by area of expertise, expect where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Involvement in the project

1.8 I was engaged by the Applicant in October 2021. I undertook a site visit on 15 November 2021. I then prepared a report for the Applicant with Olivia Johnston (another scientist in Cawthron's Healthy Oceans team) titled *Potential effects on surface and ground water of a proposed*

asphalt manufacturing plant at 272 Bartlett Road, Tasman District[1] ("Cawthron Report"). When I refer to "we" in this evidence I am referring to myself and Ms Johnston as we undertook the assessment of effects of the Proposal together. The Cawthron Report provides the basis for this evidence and is provided in **Attachment A**.

1.9 In preparing this evidence I have read the following documents:

(a) The Application and Assessment of Environmental Effects (collectively referred to as the "Application").

(b) Bender C 2020. Air discharge assessment of effects. Prepared for Tasman Bay Asphalt. Pattle Delamore Partners Ltd. 34p. plus appendix ("PDP Report").

(c) Bender C 2021. Response to pre-hearing meeting matters and other classifications. Prepared for Tasman Bay Asphalt Ltd. Pattle Delamore Partners Ltd memorandum. 19 October 2021. 5p ("PDP Oct Memo").

(d) Bender C 2021. Response to matters raised by submitters. Prepared for Tasman Bay Asphalt Ltd. Pattle Delamore Partners Ltd memorandum. 29 November 2021. 7p ("PDP Nov Memo").

(e) Mr Bender's draft evidence on the Proposal (including attachments).

(f) The technical, reference documents set out in **Attachment B**.

Purpose and scope of evidence

1.10 The purpose of my evidence is to assess the water-quality effects of the Proposal. Specifically, we used deposition rates for dust and other contaminants derived from the Asphalt Plant to estimate potential loadings to nearby water bodies and resulting changes in concentrations in the water and in the sediment on the bed of those water bodies (where applicable). To do this we used the highest predicted deposition rates provided by Pattle Delamore Partners Ltd ("PDP") in Table 6 of the PDP Nov Memo. This evidence also addresses potential effects of stormwater from the Asphalt Plant site.

1.11 My evidence is structured as follows:

[1] Dated 30 November 2021.

(a) Description of site and surrounding environment (Section 3)

(b) Direction in relevant planning instruments relating to water-quality effects (Section 4)

(c) Assessment of water-quality effects of the Proposal (Section 5)

(d) Recommendations to avoid, remedy or mitigate adverse effects (Section 6)

(e) Comments on issues raised in submissions (Section 7)

(f) Comment on s 42A Recommendation Report (Section 8)

(g) Conclusion (Section 9).

1.12 A summary of my evidence is contained in Section 2.

2. SUMMARY

2.1 The Applicant has sought consent to establish an asphalt manufacturing plant at 272 Bartlett Road, adjacent to the Waimea River, on a site previously used for aggregate processing and crushing. The ground at the site is gravel and there is a collection of ponds approximately 850m north of the Asphalt Plant and on the west (true left) side of the river, managed by the Sport Fishing for Youth Trust and stocked with trout and salmon.

2.2 I have gone through the planning instruments relevant to my assessment of effects on water-quality to identify the provisions relevant to my assessment and to understand the water quality outcomes they seek to achieve.

2.3 The effect of deposition of airborne contaminants on surface water bodies is assessed as negligible, based on predicted deposition rates from the Asphalt Plant. Consequently, and for the same reasons, the risks to groundwater from the deposition of trace contaminants are negligible and probably lower than those to surface water bodies because a portion of them are likely to be adsorbed on to soil particles. Deposition of particulate matter will not have a detectable effect on groundwater or stormwater.

2.4 Estimated inputs of particulates (dust) and contaminants to surface water bodies and groundwater are negligible, so adverse effects are not expected and neither remediation nor mitigation are considered necessary. Any potential adverse effects from a bitumen or

diesel spill will be avoided by adherence to the proposed Emergency and Spill Contingency Plan.

2.5 In response to submitters' concerns about contamination of groundwater and the Waimea River, I consider that the risk of adverse effects on groundwater are negligible because of the methods of storage of diesel and bitumen, the very low solubility of bitumen, and the low predicted rates of airborne contaminants. Potential adverse effects of airborne contaminants on the Waimea River are also expected to be negligible based on estimates of deposition rates of airborne contaminants.

2.6 I agree with the conclusions drawn in the s 42A Report in response to submissions on the risk from contaminants derived from the Asphalt Plan to groundwater and the Waimea River and associated aquifer.

3. DESCRIPTION OF SITE AND SURROUNDING ENVIRONMENT

Site

3.1 The Applicant has sought consent to establish an asphalt manufacturing plant at 272 Bartlett Road, adjacent to the Waimea River and c. 5km west of Richmond town centre. The site of the Asphalt Plant has previously been used for aggregate processing and crushing. The proposed activity and the site are described in the Application. Specific aspects of the Proposal are described in my assessment of effects where needed.

Surrounding environment

3.2 The Asphalt Plan is adjacent to the Waimea River, on the outside of the stopbank on the eastern (true right) bank of the river (as part of the Application, the stopbank is to be remediated to repair parts compromised by past works). The ground at the site is gravel. There is a collection of ponds approximately 850m north of the Asphalt Plant and on the west (true left) side of the river. These were originally created by gravel extraction activities and range in surface area from c. 550m^2 to c. 13,830m^2. The ponds are now managed by the Sport Fishing for Youth Trust ("Trust") and are stocked with trout and salmon by the Trust.

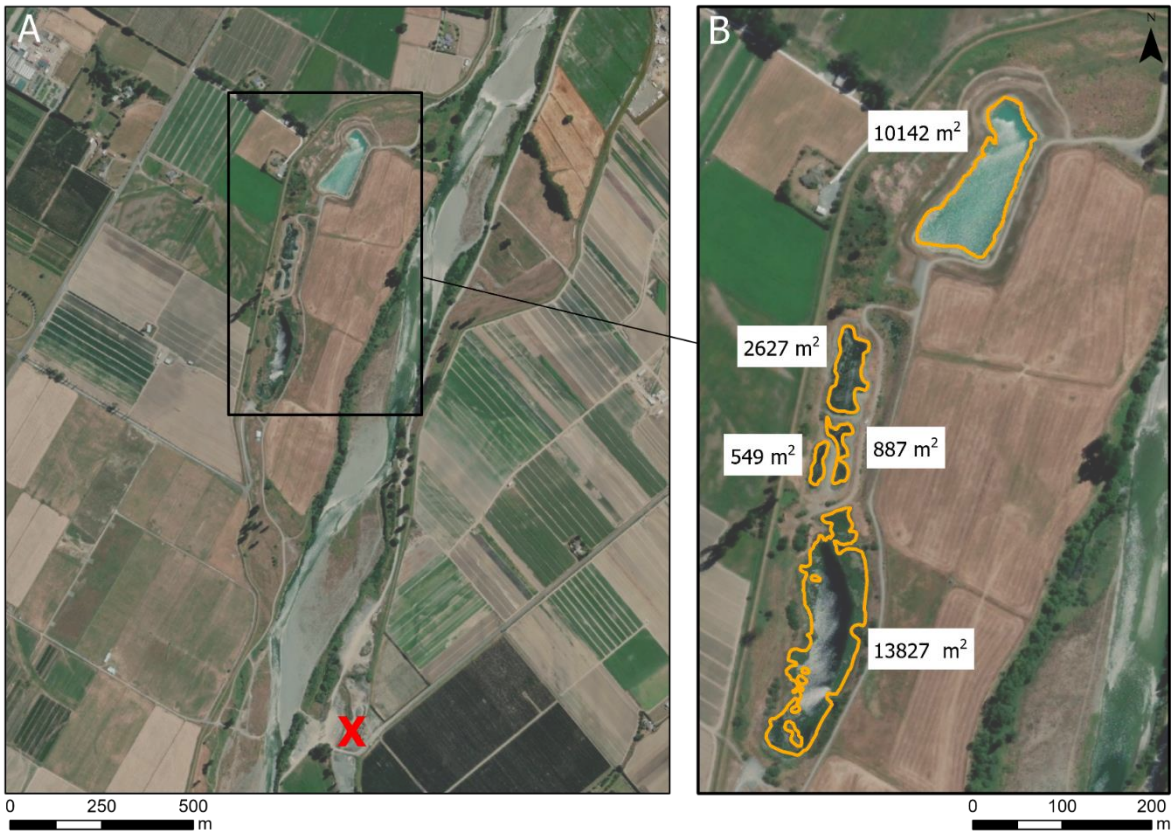

Figure 1. A. Location of proposed asphalt manufacturing plant (red cross) and Sport Fishing for Youth ponds (black rectangle). B. Close up of the Sport Fishing for Youth ponds. The wetland pond (which does not contain trout) is the largest and most southern water body (located c. 850m from the proposed asphalt smokestack), the remaining four trout fishing ponds are located to the north of the wetland pond.

4. DIRECTION IN RELEVANT PLANNING INSTRUMENTS

4.1 The planning instruments relevant to my assessment of effects on water-quality are:

(a) The National Policy Statement for Freshwater Management 2020 ("NPSFM");

(b) The Tasman Regional Policy Statement 2001 ("RPS"); and

(c) The Tasman Resource Management Plan ("TRMP").

4.2 I have gone through these instruments to identify the provisions relevant to my assessment and to understand the water quality outcomes they seek to achieve. A list of the provisions identified as relevant is provided in **Attachment C**.

4.3 The key directions across these documents appear to be:

(a) When making decisions on resource use, the first priority is to ensure the health and well-being of water bodies and freshwater ecosystems.

(b) Fresh water is managed in an integrated way across a catchment and from the 'point of impact' down to receiving environments. This brings cumulative effects into consideration.

(c) Loss of river values is avoided unless the activity impacting those values has a functional need to locate where it is and its effects are avoided where practicable, and then minimised, remedied or mitigated.

(d) Water quality is maintained or improved.

(e) Habitats of indigenous freshwater species are protected, and habitats of trout and salmon are protected insofar as this is consistent with protecting the habitat of indigenous species.

(f) Using design and other management techniques to manage discharges and stormwater.

4.4 Section 3 Part 10 of the RPS and Part 6 Chapter 34 of the TRMP specifically acknowledge and deal with the potential for air discharges to impact fresh water.

5. ASSESSMENT OF EFFECTS

5.1 This assessment considers possible ecological effects of aerial deposition of contaminants from the Asphalt Plant on nearby surface water bodies and groundwater, and possible effects of stormwater from the Asphalt Plant on the Waimea River and groundwater. The surface water bodies considered, in addition to the Waimea River, are the ponds managed by the Trust ("Trust Ponds").

Effects of deposition on water bodies

Overarching approach to, and constraints on, assessment

5.2 The assessment Ms Johnston and I undertook used the information from the PDP Report and the PDP Nov Memo on dispersion and deposition of contaminants from the Asphalt Plant to make our assessments.

5.3 Discharges to air from asphalt plants are described in the PDP Nov Memo. They consist mainly of particulate matter (including mineral dust from the aggregate) and products of combustion associated with the manufacturing process (carbon dioxide, nitrous oxides and

sulphur dioxide). Trace contaminants are also present, including arsenic, chromium, lead, mercury, benzene, dioxins, furans, formaldehyde and polycyclic aromatic hydrocarbons (PAHs). However, only benzo(a)pyrene (BaP), dioxins/furans, arsenic and lead were identified as contaminants of concern in the PDP Nov Memo and are thus also the focus of the water-quality assessment.

5.4 Our assessment of ecological effects on aquatic receiving environments is constrained by the inherent uncertainty of data derived from models, a lack of site-specific monitoring information on existing environmental quality and background concentrations of contaminants, a lack of spatially and temporally explicit predictions of contaminant inputs (i.e., quantitative estimates of deposition rates at the water bodies and at time intervals of less than one year) and a lack of information on the hydrodynamics of the water bodies.

5.5 As a consequence of this uncertainty, the Cawthron Report's assessment was made at a high-level but incorporated conservative, worst-case assumptions to take a cautious approach. Our approach was to make an initial conservative (worst-case) assessment to identify any potential effects. If the likelihood of adverse effects in this worst-case scenario was negligible, we considered that further, more detailed assessment would not be warranted. Reassurance that this approach is appropriate is provided by the fact that the air-dispersion modelling in the PDP Report and subsequent memoranda showed that concentrations of contaminants downwind of the Asphalt Plant will be well below guidelines for protection of human health and, by extension, terrestrial ecological values: see Stevenson et al. 2000[2]. If adverse effects to airborne contaminants are unlikely, so too are effects of exposure to the same contaminants after they have been deposited in water, where additional dilution and dispersion will occur.

Effects on Waimea River

5.6 The Waimea River will have a high potential to disperse and dilute contaminants due to its constant flow, therefore airborne contaminants deposited in the Waimea River will be rapidly dispersed and diluted by river flow. The likelihood of any contaminants reaching ecotoxic concentrations in water or sediments is, therefore, negligible. By negligible I mean that there may be a very slight change from existing baseline conditions, but if there is this

[2] Stevenson C, et al. 2000. Effects of air contaminants on ecosystems and recommended critical levels and critical loads. Prepared for the Ministry for the Environment's Review of the Ambient Air Quality Guidelines. 58 p. plus glossary. Available from: https://environment.govt.nz/assets/Publications/Files/ecosystem-effects-oct00.pdf . Accessed 9 November 2021.

will be barely distinguishable, approximating to the 'no change' situation.[3] Similarly, airborne contaminants deposited on areas of dry riverbed will be dispersed and diluted through rainfall, wind resuspension and flood events.

Effects on Trust Ponds

Concentration estimates

5.7 The Cawthron Report used maximum predicted deposition rates of contaminants (mg/m^2/year) and dust provided in the PDP Nov Memo to estimate maximum possible concentrations of contaminants in the water column and sediments in the Trust Ponds. [4]

5.8 The predicted deposition rate for particulates (dust) includes an estimate of the background concentration[5] in addition to the contribution from the Asphalt Plant. In the absence of information on background concentrations of contaminants other than particulates, the Cawthron Report assumed that these were negligible, given the rural environment of the Trust Ponds. It also assumed that there is no inflow or outflow of water from the ponds (which would dilute or remove contaminants from the ponds, respectively).

5.9 A detailed assessment of concentrations is provided on pages 4-5 of the Cawthron Report

5.10 In summary, we estimated possible maximum concentrations of particulates, the polycyclic aromatic hydrocarbon benzo(a)pyrene, dioxins and furans, arsenic and lead[6] by assuming that the annual depositional load (mg/m^2) was mixed in the surface 1-m depth of the ponds, with no deposition or mixing with deeper layers of water.

5.11 This provides an extremely conservative estimate of concentration because, in reality, particulates would settle by gravity and also be mixed into deeper water layers by the action of wind and thermal currents within the ponds. Other contaminants would similarly be

[3] Definition/explanation from EIANZ 2018: Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

[4] This is a very conservative estimation because the deposition rates are based on the modelled maximum ground level concentrations but, as the PDP Nov Memo points out, contaminant concentrations and deposition rates at the Trust Ponds will be less than 5% of the maximum predicted concentrations.

[5] This estimate is for the Ranzau area and is provided by Waka Kotahi NZ Transport Agency: https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/air-quality-climate/planning-and-assessment/background-air-quality/.

[6] The contaminants for which PDP modelled aerial dispersion.

mixed with deeper layers and would also tend to adsorb[7] to suspended particulate material and be subject to deposition on the bed of the pond by gravity.

5.12 The estimated concentrations were then compared with water-quality guidelines for the protection of aquatic life to assess possible ecotoxic effects. In particular:

(a) ANZG (2018) for the protection of freshwater species; and

(b) ANZECC (2000) for the protection of freshwater aquaculture species.

5.13 Estimated surface water contaminant concentrations are set out in Table 1 below reproduced from pg 4 of the Cawthron Report. These estimates suggest that even under this extreme worst-case scenario, concentrations are well below the guideline values. The fifth column in Table 1 shows that after adding one-year's worth of deposition, none of the contaminants will approach anywhere near (within several orders of magnitude) the guideline concentrations. The estimated time required for the contaminant with the highest concentration (lead) to reach the guideline is more than 400 years (right-hand column of Table 1), even under very conservative assumptions about mixing and dispersion in the water body.

Table 1. Estimated surface water contaminant concentrations based on annual deposition (mg/m^2) and assuming mixing to 1m water depth. PM: particulate matter, BaP: Benzo(a)pyrene, nd: guideline not derived, NA: not applicable, LOP: level of protection. Note that 1L is equivalent to 1mm depth of water over 1m^2. Green shading shows guidelines.

Contaminant	**Predicted deposition rate* (mg/m^2/yr)**	**99% level of freshwater species protection (ANZG 2018) (mg/L)**	**Protection of freshwater aquaculture species (ANZECC 2000) (mg/L)**	**Concentration following mixing (mg/L)**	**Annual increase in concentration as % of guideline**	**Years to exceed a 99% LOP****
PM	5	nd	nd	5×10^{-3}	NA	NA
PAHs (as BaP)	6.07×10^{-6}	1×10^{-4}	nd	6.07×10^{-9}	0.0061	1.65×10^{4}
Dioxins and furans	2.4×10^{-10}	1×10^{-5}	nd	2.4×10^{-13}	2.4×10^{-6}	4.2×10^{7}
Arsenic	7.26×10^{-4}	8×10^{-4}	0.05	7.26×10^{-7}	0.09	1102
Lead	0.002.24	1×10^{-3}	0.007	2.24×10^{-6}	0.22	446

* deposition rate is based on the modelled maximum ground level concentrations from the PDP Nov Memo (values include background levels).
** assumes even mixing, no decay, and all contaminants persisting within the top 1m.

[7] i.e. hold onto the surface of the particular material.

5.14 In an analogous manner, the Cawthron Report estimated possible maximum concentrations of the same suite of contaminants in sediments in the bottom of the Trust Ponds by assuming that the annual deposition load (mg/m^2) was mixed into the top 10 cm of the sediment on the ponds' bed. This was considered a typical depth at which mixing occurs because of the activities of organisms living in the sediment. The estimated concentrations were then compared with sediment-quality guidelines for the protection of aquatic life to assess possible ecotoxic effects, being ANZG (2018) referenced above.

5.15 Estimated concentrations of contaminants in the sediments of the Trust Ponds are set out in Table 2 below which is reproduced from pg 5 of the Cawthron Report. The fourth column in Table 2 shows that after adding one-year's worth of deposition the concentrations of contaminants in the sediments are well below the ANZG (2018) sediment quality default guideline values (by many orders of magnitude). The right-hand column of the table shows that the time required for concentrations to reach guideline values is millions of years.

Table 2. Estimated surface sediment contaminant concentrations at Sport Fishing for Youth ponds (mixed to 10cm depth in the sediment and assuming a dry bulk density for mud of $700kg/m^3$). dw: dry weight, DGV: ANZG (2018) or ANZECC (2000) Default Guideline Value, PM: particulate matter, BaP: Benzo(a)pyrene. Green shading shows guidelines.

Contaminant	Predicted deposition rate* mg m^2/yr	DGV for sediment quality mg/kg (dw)	Concentration following mixing mg/kg (dw)	Annual increase in concentration as % of guideline	Years to exceed DGV**
PAHs (as BaP)	6.07×10^{-6}	0.430	8.67×10^{-8}	2.02×10^{-5}	4.96×10^{6}
Dioxins and furans	2.4×10^{-10}	0.034***	3.43×10^{-12}	1.01×10^{-8}	9.92×10^{9}
Arsenic	7.26×10^{-4}	20	1.04×10^{-5}	5.19×10^{-5}	1.93×10^{6}
Lead	0.00224	50	3.2×10^{-5}	6.4×10^{-5}	1.56×10^{6}

* deposition rate is based on the modelled maximum ground level concentrations from the PDP Nov Memo (values include background levels).
** assumes even mixing, no decay, and all contaminants persisting within the top 10 cm.
*** ANZECC (2000) provided a DGV-equivalent for combined total polychlorinated biphenyls (PCBs) and dioxins. This was revised in ANZG (2018) but presented as 'Total PCBs" (0.034 mg/kg) – this value is used here.

Conclusions on concentration estimates

5.16 These results suggest that concentrations of the potential contaminants of concern will be indistinguishable from background concentrations in the waters and sediments in the Trust Ponds and effects are, therefore, expected to be negligible[8].

5.17 Based on the surface areas of the individual Trust Ponds, the annual inputs of particulate material (dust) to each pond would range from 2.4–69g/year (for the smallest and largest ponds, respectively). This is equivalent to between 1 and 17 teaspoons of particulates per pond per year (1 teaspoon = approximately 4g). Given this small quantity, the likelihood of the Asphalt Plant smokestack causing smothering by deposition of particulates in the water bodies can be assumed to be negligible[9].

Groundwater and stormwater

Bitumen

5.18 Bitumen will be stored on site in double-skinned tankers and the outer skin has a reserve volume sufficient to retain the volume of bitumen in the tank if the inner skin is punctured, reducing the risk of spills. The tankers will be heated to keep the bitumen fluid, but any spillage would solidify once heat is removed and could be cleaned up relatively easily. Because bitumen is transferred by suction, the pipe is not under high pressure and rupture is unlikely. Even if bitumen did penetrate the soil surface, it has very limited solubility, mobility and bioavailability in soil and water. The proposed method of stormwater disposal is direct infiltration through compacted river gravels, and this will maximise the opportunity for adsorption to soil particles and immobilisation of any small amounts of spilled bitumen. Contamination of groundwater or stormwater by bitumen is therefore unlikely and would, in any case, not be expected to cause any adverse ecological effects.

Diesel

5.19 No more than 5,000 litres of diesel (used to heat the bitumen) will be stored on site and will be contained within double-walled tanks. The tanks will be equipped with internal monitoring to warn of leaks. Because of the method of storage, and direct transfer to the bitumen tanker, spillage and subsequent contamination of groundwater and stormwater by

[8] As defined above.
[9] As defined above.

diesel are considered unlikely. We understand that the proposed volume and method of storage of diesel is permitted in accordance with Rule 16.7.2.1 of the TRMP.

Conclusions

5.20 As noted in the Application (paragraph 5.64), an Emergency and Spill Contingency Plan will be provided for the site. The presence of the stopbank will prevent direct runoff of stormwater to the Waimea River. The diesel tank and bitumen storage tankers can be removed from the site in the event of predicted floods that may overtop the river stop banks.

5.21 The effect of deposition of airborne contaminants on surface water bodies is assessed as negligible, based on the highest predicted deposition rates from the Asphalt Plant (see previous sections of this statement). Consequently, and for the same reasons, the risks to groundwater from the deposition of trace contaminants are negligible and probably lower than the risks to surface water bodies because a portion of the contaminants is likely to be adsorbed on to soil particles. Deposition of particulate matter (maximum predicted rate 0.005g/m^2/year: Table 6 of the PDP Nov Memo) will not have a detectable effect on groundwater or stormwater.

5.22 We also note that estimates of deposition rates of particulates (by PDP) did not take into account the effects of an aggregate crushing plant located just upstream of the state highway bridge and approximately the same distance from the Trust Ponds as the Asphalt Plant (but to the north rather than the south). Horticultural operations in the surrounding Waimea Plains presumably provide another background source of contaminants (in the form of dust and agrochemicals) to the ponds, river and groundwater. Contributions of dust and contaminants from the Asphalt Plant are likely to be negligible in relation to these sources.

Conclusions on effects in terms of relevant planning instruments

5.23 In light of the analysis above, and with reference to the outcome sought by the applicable planning instruments discussion in Section 4 of this statement, I consider that:

(a) The health and well-being of water bodies and freshwater ecosystems, including the Waimea River and groundwater, will not be adversely affected by the discharge of airborne contaminants or contaminants in stormwater from the Asphalt Plant because of the small amounts likely to be discharged.

(b) Integrated management of fresh water across catchments will not be compromised because the amounts of contaminants discharged will be negligible in absolute terms and in relation to other catchment sources (including agricultural, industrial and domestic discharges and soil erosion).

(c) River values will not be adversely affected by the discharge of airborne contaminants or contaminants in stormwater from the Asphalt Plant because of the small amounts of contaminants likely to be discharged (earthworks associated with the Asphalt Plant, including restoration of the stopbank, are described are described in the Application and are not expected to adversely affect the Waimea River's values).

(d) Water quality in the Waimea River, Trust Ponds and groundwater is not expected to be adversely affected because of the small amounts of contaminants likely to be discharged.

(e) Habitats of indigenous freshwater species (and trout and salmon) are not expected to be adversely affected because of the small amounts of contaminants likely to be discharged (earthworks associated with the Asphalt Plant, including restoration of the stopbank, are described are described in the Application and are not expected to adversely affect habitats of these species).

(f) Discharges of airborne contaminants are not expected to adversely affect surface water bodies and groundwater because of the small amounts on contaminants discharged. The volume of stormwater generated will be small because of the physical size of the Asphalt Plant and the intention to discharge stormwater direct to the ground rather than to sealed surfaces. The risk of contamination of stormwater and groundwater by diesel and bitumen are small because of the low solubility of bitumen and because the volumes to be held on site are small and storage will be in double-skinned containers. Any residual risk will be managed by adherence to the Emergency and Spill Contingency Plan.

6. RECOMMENDATIONS TO AVOID, REMEDY OR MITIGATE ADVERSE EFFECTS

6.1 Estimated inputs of particulates (dust) and contaminants to surface water bodies and groundwater are negligible, so adverse effects are not expected and neither remediation nor mitigation are considered necessary.

6.2 Any potential adverse effects from a bitumen or diesel spill will be avoided by adherence to the Emergency and Spill Contingency Plan.

7. ISSUES RAISED IN SUBMISSIONS

7.1 I understand that seventy-three submissions were received on the Application. Several submitters raised concerns about adverse effects on fresh water as a result of operation of the Asphalt Plant. The key issues raised were:

(a) Leaching from discharge to ground from the Proposal's operations and of stormwater, particularly given "well-draining river gravels", impacting and contaminating the Waimea River and groundwater sources (the latter providing drinking water sources of local residents).

(b) Adverse effects of air discharges on the Waimea River (and its mauri and wairua) and Trust Ponds resulting in contamination crops).

(c) Unacceptable level of risk associated with storing bitumen and/or diesel next to the Waimea River due to any spill entering the River and/or groundwater causing adverse effects.

7.2 My comments on these issues are set out below.

Leaching

7.3 As discussed above (paragraphs 5.18 to 5.20), the risk of adverse effects on groundwater are expected to be negligible because of the methods of storage of diesel and bitumen, the very low solubility of bitumen, and the low predicted rates of airborne contaminants.

Adverse effects of air discharges

7.4 Potential adverse effects of airborne contaminants on the Waimea River and the Trust Ponds are expected to be negligible based on estimates of deposition rates (see paragraphs 5.6 to 5.17).

Hazardous substances

7.5 Bitumen is not classified by the New Zealand Environmental Risk Management Authority (now the Environmental Protection Agency) as toxic to the environment (Herrington et al. 2006). The predicted water solubility of bitumen is so low that no effects would be expected on aquatic organisms. The only ecotoxicity data for bitumen is a 56-day laboratory plant study where bitumen was shown to have no effect on growth of either beans (*Phaseolus vulgaris*) or corn (*Zea mays*). Contamination of groundwater or stormwater by bitumen is therefore unlikely and would, in any case, not be expected to cause any adverse ecological effects. My understanding is that resource consent is not required for the proposed storage and use of diesel on site. No more than 5,000 litres of diesel (used to heat the bitumen) will be stored on site and will be contained within double-walled tanks. Because of the method of storage, and direct transfer to the bitumen tanker, spillage and subsequent contamination of groundwater and stormwater by diesel are considered unlikely.

7.6 An Emergency and Spill Contingency Plan will be provided for the site. The presence of the stopbank will prevent direct runoff of stormwater to the Waimea River. The diesel tank and bitumen storage tankers can be removed from the site in the event of predicted floods that may overtop the river stop banks.

8. ISSUES RAISED IN S 42A RECOMMENDATION REPORT

8.1 The s 42A Report draws the following conclusions in response to submissions on the risk to groundwater and the Waimea River and associated aquifer from contaminants derived from the Asphalt Plant:

(a) The ground is very free draining and the risk of overland flow from the site is low.

(b) Management of erosion and sediment transport to the river is straightforward.

(c) The largest risk comes from diesel used on site. The application complies with the requirements of permitted activity rule 16.7.2.1 in terms of volume of diesel stored and method of storage (double-skinned tank, which minimises the risk of rupture).

(d) The risk from the activity to urban water supply is less than minor.

8.2 I agree with these conclusions.

9. CONCLUSION

9.1 Contaminant concentrations and loadings were estimated to determine the potential risk of ecotoxic effects to freshwater organisms living in the water and sediments in the Waimea River and the Trust Ponds. Conservative (worst-case) contaminant deposition rates were used to obtain the estimates, which were then compared against relevant guideline values. Results suggest that any potential adverse ecological effects of airborne discharges from the asphalt facilities on the water bodies or on groundwater will be negligible.

9.2 Because of the volumes and method of storage and use, and the physico-chemical properties of bitumen and asphalt, risk of adverse effects on groundwater and stormwater quality from the storage of these materials are considered negligible. The volumes and methods of storage of diesel fuel at the site are permitted under the TRMP and there is a low risk of spillage or leakage. These risks can be adequately managed through an Emergency and Spill Contingency Plan.

Donald James Morrisey
Senior Coastal Scientist, Cawthron Institute

10 December 2021

Attachment A

CAWTHRON

30 November 2021

Jarrod du Plessis
Tasman Bay Asphalt Ltd
PO Box 3518
Richmond 7050

ID: 2194

Dear Jarrod

Potential effects on surface and ground water of a proposed asphalt manufacturing plant at 272 Bartlett Road, Tasman District

Background

Tasman Bay Asphalt Ltd plans to establish an asphalt manufacturing plant at 272 Bartlett Road, adjacent to the Waimea River and c. 5 km west of Richmond town centre[1]. The site of the proposed plant has previously been used for aggregate processing and crushing.

Bitumen will be stored on site in double-skinned tanker trailers and heated (using diesel fuel) to 135–165 °C to keep it sufficiently fluid to pump to the asphalt manufacturing plant. To produce asphalt[2], bitumen is piped from the trailer to the asphalt plant under vacuum. Bitumen and aggregate are mixed in a drum and stored on site in a silo until required. It is typically made to order, loaded onto a truck within an hour or so of production, and taken off site.

Discharges to air from asphalt plants are described in a memorandum[1] from Pattle Delamore Partners Ltd (PDP). They consist mainly of particulate matter (including mineral dust from the aggregate) and products of combustion associated with the manufacturing process (carbon dioxide, nitrous oxides and sulphur dioxide). Trace contaminants are also present, including arsenic, chromium, lead, mercury, benzene, dioxins, furans, formaldehyde and polycyclic aromatic hydrocarbons (PAHs). However, only benzo(a)pyrene [BaP], dioxins/furans, arsenic and lead were identified as contaminants of concern in the PDP memorandum and are thus the focus of this assessment.

Submissions following limited notification of the consent application for the plant identified areas of concern (listed in the Pattle Delamore Partners' memorandum), including:

- trace compounds that have the potential for adverse effects on the surrounding environment and human health
- effects on soil and water quality from deposition.

[1] Based on information in the memorandum *Response to pre-hearing meeting matters and other clarifications* from Pattle Delamore Partners Ltd (8 November 2021).
[2] Information supplied by Jarrod du Plessis (Tasman Bay Asphalt Ltd).

PDP modelled the aerial dispersion of contaminants from the plant and compared their concentrations with guidelines for the protection of human health (see references in the PDP memorandum). They also estimated deposition rates of contaminants and compared the highest predicted rates with guidelines for avoiding nuisance effects from particulates (dust), such as soiling of crops, and adverse effects of toxic contaminants on human health from accumulation in soil. Predicted concentrations of toxic contaminants were well below those at which adverse effects on human health (and, by extension, ecological values: Stevenson et al. 2000[3]) might occur.

Scope of assessment

The Cawthron Institute (Cawthron) was asked to assess possible effects of emissions from the proposed plant on water bodies in the receiving environment. Relevant water bodies that we are aware of are the Waimea River (adjacent to the proposed plant), ponds operated by the Sport Fishing for Youth Trust (c. 850 m from the plant) (see Figure 1 and Appendix), and groundwater.

We have used the information from the PDP report[4] and memorandum on dispersion and deposition of contaminants from the proposed plant to make our assessments. Given the inherent uncertainty of data derived from models, and the lack of empirical (monitoring) data on background concentrations of contaminants, our assessments are made at a high level and incorporate conservative, worst-case assumptions. We emphasise that air-quality modelling is beyond our area of expertise and we are not qualified to provide a critique of the modelling. The methods of assessment and the air-quality and other standards used, appear to be appropriate.

Effects of deposition on water bodies

The Waimea River will have a high potential to disperse and dilute contaminants due to its constant flow. In contrast, the ponds will have much less potential to disperse contaminants[5] (Figure 1) and thus are the focus of this section (ground water is discussed separately in a following section). The contaminants of concern, and their rates of deposition, are limited to those identified in Table 6 of the PDP memorandum (8 November 2021) and listed in Table 1 of this letter. Rates of dust and contaminant deposition provided in the PDP memorandum also include background dust deposition rates (derived from background air-quality data from NZTA: see PDP report for details), and consequently, so have the contaminant concentration estimates/calculations presented here.

[3] Stevenson C, et al. 2000. Effects of air contaminants on ecosystems and recommended critical levels and critical loads. Prepared for the Ministry for the Environment's Review of the Ambient Air Quality Guidelines. 58 p. plus glossary. Available from: https://environment.govt.nz/assets/Publications/Files/ecosystem-effects-oct00.pdf . Accessed 9 November 2021.

[4] Bender C 2020. Air discharge assessment of effects. Prepared for Tasman Bay Asphalt. Pattle Delamore Partners Ltd. 34 p. plus appendix.

[5] We assume the ponds do not flow through to the Waimea River and that sediments are not intermittently removed from the ponds.

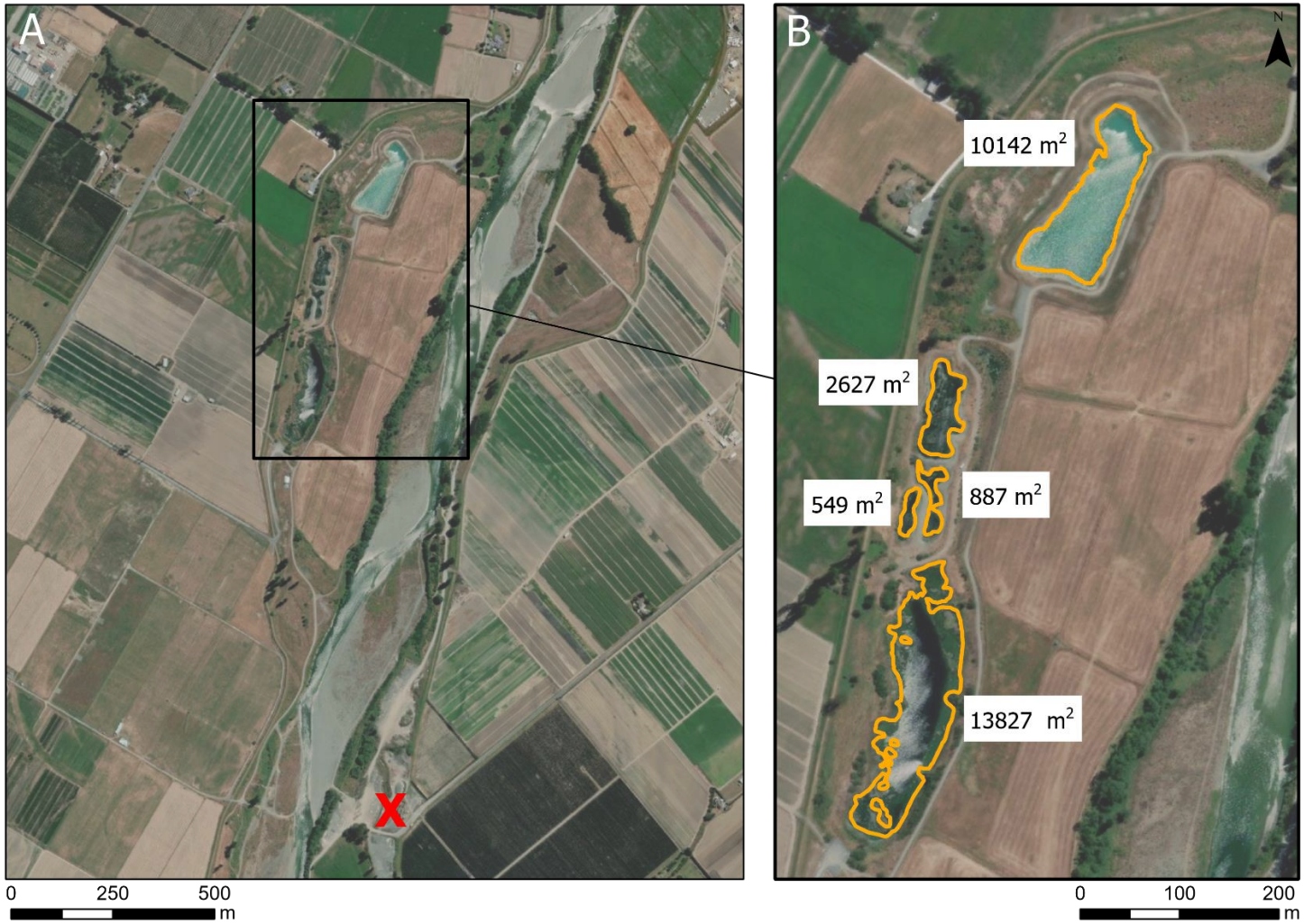

Figure 1. A. Location of proposed asphalt manufacturing plant (red cross) and Sport Fishing for Youth ponds (black rectangle). B. Close up of the Sport Fishing for Youth ponds, showing the surface area of each pond. The wetland pond (which does not contain trout) is the largest and most southern water body (located c. 850 m from the proposed asphalt smokestack), the remaining four trout fishing ponds are located to the north of the wetland pond.

Concentration estimates

Modelled peak annual fluxes to water bodies (used as the predicted deposition rate in Table 1) indicate that even if airborne contaminants[6] were discharged in a single (annual) event and managed to reach the ponds with no air dispersion, they would be quickly diluted to concentrations below guideline values for the protection of aquatic life (the ANZG 2018[7] level of protection [LOP] for 99% of freshwater species, and ANZECC 2000[8] for the protection of freshwater aquaculture species). Calculations show that, even under this extreme worst-case scenario, concentrations are well below the guideline values when dispersed in as little as 1 m depth of surface water (and assuming there is no flow out of the ponds, which would further reduce concentrations).

Table 1. Estimated surface water contaminant concentrations based on annual deposition (mg/m^2) and assuming mixing to 1 m water depth. PM: particulate matter, BaP: Benzo(a)pyrene, nd: guideline not derived, NA: not applicable, LOP: level of protection, MGLC: maximum ground level concentrations. Note that 1 L is equivalent to 1 mm depth of water over 1 m^2.

Contaminant	Predicted deposition rate* (mg/m^2/yr)	99% level of freshwater species protection (ANZG 2018) (mg/L)	Protection of freshwater aquaculture species (ANZECC 2000) (mg/L)	Concentration following mixing (mg/L)	Annual increase in concentration as % of guideline	Years to exceed a 99% LOP**
PM	5	nd	nd	5×10^{-3}	NA	NA
PAHs (as BaP)	6.07×10^{-6}	1×10^{-4}	nd	6.07×10^{-9}	0.0061	1.65×10^{4}
Dioxins and furans	2.4×10^{-10}	1×10^{-5}	nd	2.4×10^{-13}	2.4×10^{-6}	4.2×10^{7}
Arsenic	7.26×10^{-4}	08×10^{-4}	0.05	7.26×10^{-7}	0.09	1102
Lead	0.002.24	1×10^{-3}	0.007	2.24×10^{-6}	0.22	446

* deposition rate is based on the modelled MGLC from the PDP memorandum (values include background levels).
** assumes even mixing, no decay, and all contaminants persisting within the top 1 m of the water column.

Similarly, if we assume direct deposition to the pond bed (mg/m^2, with no dispersion), and mixing (by bioturbation[9]) to 10 cm depth of surficial sediments over a 1-m^2 area, the concentrations of contaminants in the sediments are well below the ANZG (2018) sediment quality default guideline values (DGV: Table 2).

[6] Excluding particulate matter: there are no ANZG (2018) guidelines for particulate matter or suspended solids.
[7] ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.
[8] ANZECC 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
[9] Bioturbation: the reworking of soils and sediments by animals or plants.

Results suggest that concentrations of the potential contaminants of concern will be indistinguishable from background concentrations in the waters and sediments in the Waimea River and the Sport Fishing for Youth ponds[10] and effects are, therefore, expected to be negligible[11].

Table 2. Estimated surface sediment contaminant concentrations at Sport Fishing for Youth ponds (mixed to 10 cm depth in the sediment and assuming a dry bulk density for mud of 700 kg/m^3). dw: dry weight, DGV: Default Guideline Value, MGLC: maximum ground level concentrations, PM: particulate matter, BaP: Benzo(a)pyrene.

Contaminant	Predicted deposition rate* mg m^2/yr	DGV for sediment quality mg/kg (dw)	Concentration following mixing mg/kg (dw)	Annual increase in concentration as % of guideline	Years to exceed DGV**
PAHs (as BaP)	6.07×10^{-6}	0.430	8.67×10^{-8}	2.02×10^{-5}	4.96×10^{6}
Dioxins and furans	2.4×10^{-10}	0.034	3.43×10^{-12}	1.01×10^{-8}	9.92×10^{9}
Arsenic	7.26×10^{-4}	20	1.04×10^{-5}	5.19×10^{-5}	1.93×10^{6}
Lead	0.00224	50	3.2×10^{-5}	6.4×10^{-5}	1.56×10^{6}

* deposition rate is based on the modelled MGLC from the PDP memorandum (values include background levels).
** assumes even mixing, no decay, and all contaminants persisting within the top 10 cm of the sediment profile.

Loading estimates

Loading (i.e., the total mass deposited) and accumulation of contaminants to toxic concentrations over time in surface waters is considered unlikely based on the calculations provided in Table 1. Lead, the contaminant with the highest modelled concentration, would take more than 400 years to reach the 99% LOP (ANZG 2018), based on the worst-case deposition scenario with all contaminants confined to the 1 m surface water layer (Table 1). However, such a scenario is highly unlikely to occur because contaminants will be dispersed and diluted by wind-driven currents and will eventually precipitate out of the surface layer suspension and, in association with particulates, settle on the pond bed. Lead would take even longer to reach the sediment guideline (Table 2).

[10] Background levels of arsenic in particular are naturally high in the Nelson/Tasman region due to their relatively high concentrations in rocks and soils of the northwest Nelson area (Cavenagh J-E, McNeill S, Arienti C 2015. Background soil concentrations of selected trace element and organic contaminants in New Zealand. Prepared for Regional Council Wastes and Contaminated Land Forum, Land Monitoring Forum, Land Managers Group, Ministry for the Environment, and Ministry for Primary Industries. Manaaki Whenua Landcare Research Contract Report No. LC2440. 81 p. plus appendices).

[11] *Very slight change from existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation; AND/OR Having a negligible effect on the known population or range of the element / feature*. (EIANZ 2018: Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition).

Loading estimates based on the surface areas of the individual ponds (Figure 1) suggest that particulate (dust) loading at the facility would range from 2.4–69 g/year (for the smallest and largest ponds, respectively). This is equivalent to between 1 and 17 teaspoons of particulates per pond each year (1 teaspoon = approximately 4 g). Given this small quantity, the likelihood of the smokestack causing smothering by deposition of particulates in the water bodies can be assumed to be negligible.

Any airborne contaminants deposited on areas of dry riverbed would be dispersed and diluted through high-intensity rainfall events, wind resuspension and flood events.

Risks to groundwater and stormwater

Bitumen will be stored on site in double-skinned tankers and the outer skin has a reserve volume sufficient to retain the volume of bitumen in the tank if the inner skin is punctured, reducing the risk of spills. The tankers will be heated to keep the bitumen fluid, but any spillage would solidify once heat is removed and could be cleaned up relatively easily. Because bitumen is transferred by suction, the pipe is not under high pressure and rupture is unlikely. Even if bitumen did penetrate the soil surface, it has very limited solubility, mobility and bioavailability in soil and water. The proposed method of stormwater disposal is direct infiltration through compacted river gravels, and this will maximise the opportunity for adsorption to soil particles and immobilisation of any small amounts of spilled bitumen.

A note by Alistair Jewell (Principal Planner, Tasman District Council) on the Consent Application (amended version 9 April 2021) states that:

> in assessing the application for notification, Council planners identified that the following activities were permitted activities and while forming part of the proposed activity, they do not need resource consent: storage and use of bitumen and diesel on-site, discharge of contaminants (stormwater to land).

As noted, resource consent is not required for the proposed storage and use of bitumen on site. Bitumen is not classified by the New Zealand Environmental Risk Management Authority (now the Environmental Protection Agency) as toxic to the environment (Herrington et al. 2006[12]). Herrington et al. (2006) noted that *the predicted water solubility of bitumen is so low that no effects would be expected on aquatic organisms... The only ecotoxicity data for bitumen is a 56-day laboratory plant study where bitumen was shown to have no effect on growth of either beans (*Phaseolus vulgaris*) or corn (*Zea mays*)*. Contamination of groundwater or stormwater by bitumen is therefore unlikely and would, in any case, not be expected to cause any adverse ecological effects.

Asphalt may be stored on site in a closed hopper but as noted above, is likely to be manufactured to order and shipped within an hour or so of manufacture. Leachate tests on bitumen and asphalt (reported in Herrington et al. 2006) found no volatile organic compounds or trace metals in the leachate. Concentrations of PAHs (primarily naphthalene

[12] Herrington P, Ball G, O'Halloran K. 2006. Aquatic ecotoxicity of cutback bitumen. Land Transport New Zealand Research Report No. 285. 45 p. plus appendix.

and phenanthrene) were below European Union limits for surface waters and were not considered to represent a hazard to aquatic environments.

Chipsealing of roads, etc. uses asphalt mixed with various modifiers, including kerosene or bitumen-based emulsifying agent. Kerosine is classified as ecotoxic in the aquatic environment (Herrington et al. 2006). Emulsifying agents are potentially ecotoxic but are strongly and irreversibly adsorbed to soils, reducing their mobility and ecotoxicity in many receiving environments (Ball et al. 2008[13]). Our understanding is that no emulsifiers or other compounds will be added to the asphalt at the application site[14]. Consequently, any potential effects of these on the environment are not considered in this assessment.

As noted above, resource consent is not required for the proposed storage and use of diesel on site. No more than 5,000 litres of diesel (used to heat the bitumen) will be stored on site and will be contained within double-walled tanks. The tanks will be equipped with internal monitoring to warn of leaks. Because of the method of storage, and direct transfer to the bitumen tanker, spillage and subsequent contamination of groundwater and stormwater by diesel are considered unlikely. We understand that the proposed volume and method of storage of diesel is permitted in accordance with Rule 16.7.2.1 of the Tasman Resource Management Plan.

As noted in the consent application (paragraph 5.64), an Emergency and Spill Contingency Plan will be provided for the site. The presence of the stopbank will prevent direct runoff of stormwater to the Waimea River. The diesel tank and bitumen storage tankers can be removed from the site in the event of predicted floods that may overtop the river stop banks.

As noted above, resource consent is not required for the discharge of stormwater to land. The effect of deposition of airborne contaminants on surface water bodies is assessed as negligible, based on the highest predicted deposition rates from the proposed plant (see previous sections). Consequently, and for the same reasons, the risks to groundwater from the deposition of trace contaminants are negligible and probably lower than those to surface water bodies because a portion of them are likely to be adsorbed on to soil particles. Deposition of particulate matter (maximum predicted rate 0.005 g/m^2/year: Table 6 of the PDP memorandum) will not have a detectable effect on groundwater or stormwater and is likely to be much less than deposition from wind-blown dust derived from surrounding land and the riverbed.

Conclusions

Contaminant concentrations and loadings were estimated to determine the potential risk of ecotoxic effects to freshwater organisms living in the water and sediments in the Waimea River and nearby ponds. Conservative (worst-case) contaminant deposition rates were used to obtain the estimates, which were then compared against relevant guideline values.

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[13] Ball GFA, Herrington PR, Patrick JE 2008. Environmental effects of emulsions. Land Transport New Zealand Research Report No. 343. 42 p. plus appendix.

[14] Confirmed by email from Jarrod du Plessis (Tasman Bay Asphalt Ltd) to Don Morrisey (Cawthron) 11 November 2021.

Results suggest that any potential adverse ecological effects of airborne discharges from the asphalt facilities on the water bodies or on groundwater will be negligible.

We also note that estimates of deposition rates of particulates (by PDP) did not take into account the effects of an aggregate crushing plant located just upstream of the state highway bridge and approximately the same distance from the Sport Fishing for Youth ponds as the proposed asphalt plant (but to the north rather than the south). Horticultural operations in the surrounding Waimea Plains presumably provide another background source of contaminants (in the form of dust and agrochemicals) to the ponds, river and groundwater.

Because of the volumes and method of storage and use, and the physico-chemical properties of bitumen and asphalt, risk of adverse effects on groundwater and stormwater quality from the storage of these materials is considered negligible. The volumes and methods of storage of diesel fuel at the site are permitted under the Tasman Resource Management Plan and there is a low risk of spillage or leakage.

This assessment follows the premise that because the relevant guidelines for the protection of aquatic life are unlikely to be exceeded, any adverse effects are highly unlikely to occur. Following this first tier of investigation, more detailed assessment (including collecting empirical monitoring data, identification and more detailed consideration of sensitive species and habitats: EIANZ 2018) is not warranted. However, we note that the advice provided here is limited by the accuracy of the modelling predictions provided to us, and the specified contaminants of concern that were identified by PDP.

Yours sincerely

Scientist

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Reviewed by

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Appendix. Views of the location of the proposed asphalt plant and the river from the east bank of the Waimea River (top left and top right images, respectively, taken 180 m west of the proposed asphalt plant), and the Sport Fishing for Youth ponds and wetlands (middle and lower images).

Attachment B

ATTACHMENT B

REFERENCES

ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.

ANZECC 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

Herrington P, Ball G, O'Halloran K 2006. Aquatic ecotoxicity of cutback bitumen. Land Transport New Zealand Research Report No.285. 45p. plus appendix.

Attachment C

FILENOTE

RE: TASMAN BAY ASPHALT – PLANNING INSTRUMENT PROVISIONS RELEVANT TO ASSESSMENT OF EFFECTS ON WATER-QUALITY

NATIONAL POLICY STATEMENT FRESHWATER MANAGEMENT 2020	
1.3 – Fundamental concept – Te Mana o te Wai	Concept Framework Hierarchy of obligations: (a) first, the health and well-being of water bodies and freshwater ecosystems (b) second, the health needs of people (such as drinking water) (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.
1.4 – Interpretation	Check for relevant definitions as needed.
1.5 – Application	(1) This National Policy Statement applies to all freshwater (including groundwater) and, to the extent they are affected by freshwater, to receiving environments (which may include estuaries and the wider coastal marine area).
2.1 – Objective	(1) The objective of this National Policy Statement is to ensure that natural and physical resources are managed in a way that prioritises: (a) first, the health and well-being of water bodies and freshwater ecosystems (b) second, the health needs of people (such as drinking water) (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.
Policy 1	Freshwater is managed in a way that gives effect to Te Mana o te Wai.
Policy 3	Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.
Policy 5	Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.
Policy 7	The loss of river extent and values is avoided to the extent practicable
Policy 9	The habitats of indigenous freshwater species are protected.
Policy 10	The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.

Policy 12	The national target (as set out in Appendix 3) for primary contact is achieved.
3.21 – Definitions relating to wetlands and rivers…	Effects management hierarchy – an approach that requires adverse effects are avoided where practicable, etc. etc. etc.
3.24 – Rivers	Regional plans must require that: The loss of river extent and values is avoided, unless the council is satisfied: (a) that there is a functional need for the activity in that location; and (b) the effects of the activity are managed by applying the effects management hierarchy.

TASMAN REGIONAL POLICY STATEMENT	
Section 2 Objective 2	Maintenance of the biological diversity and healthy functioning of land, freshwater, coastal and marine ecosystems.
Section 2 Objective 6	Protection and enhancement of significant natural, heritage and cultural values of resources
Section 3 Objective 6.6	Maintenance and enhancement of flood mitigation, habitat conservation, water quality, recreational and public access values and opportunities of riparian lands.
Section 3 Policy 6.5	The Council will avoid, remedy or mitigate soil damage or loss, sedimentation and other adverse effects of land use activities.
Section 3 Objective 7.1	Maintenance and enhancement of the natural and cultural values, including natural character of fresh waters, including recreational, fisheries, wildlife and other instream values.
Section 3 Objective 7.4	Maintenance and enhancement of the quality of surface waters and groundwaters for all public uses and values.
Section 3 Policy 7.4	The Council will: (i) preserve the natural character of wetlands, rivers and lakes, and (ii) protect and enhance or support the protection and enhancement of natural, recreational, cultural, intrinsic, and instream features and values of wetlands, rivers (including karst rivers), and lakes, in particular those that are of international, national, or regional significance;
Section 3 Objective 8.2	Maintenance and enhancement of natural and other instream values of rivers, lakes and streams.
Section 3 Objective 10.1	Maintenance and enhancement of the quality of soils, water, and air for a range of uses and values where particulate, chemical, or biological contamination pose risks to this quality.
Section 3 Objective 10.2	Avoidance, remedying or mitigation of adverse effects of all contaminants of soils, water, and air.
Section 3 Policy 10.3	The Council will seek to avoid, remedy, or mitigate adverse effects of the discharge of contaminants to air.
Section 3 Policy 10.6	Council will where practicable avoid, remedy or mitigate the adverse effects of diffuse source

	discharges of particulate, chemical, nutrient and microbial contaminants on the quality of soil, water and air resources

TASMAN RESOURCE MANAGEMENT PLAN	
Part 2 Land Chapter 8 Policy 8.2.3.23	To avoid the loss of river extent and values, unless the Council is satisfied that: (a) there is a functional need for the activity in that location; and (b) the effects of the activity are managed by applying the effects management hierarchy.
Part 4 Rivers and Lakes Chapter 27	Chapter relates to activities in the beds of or on the surface of river and lakes, which is not the Asphalt Plan. But still useful direction re water quality outcomes.
Part 4 Rivers and Lakes Chapter 27 Policy 27.1.3.8	To maintain spawning habitat for trout, whitebait species and other native fish.
Part 6 Discharges Chapter 33 Objective 33.1.2.1	The discharge of contaminants in such a way that avoids, remedies or mitigates adverse effects while: (a) maintaining existing water quality; and (b) enhancing water quality where existing quality is degraded for natural and human uses or values.
Part 6 Discharges Chapter 33 Objective 33.1.2.2	The management of land and water use in the Waimea Water Management Zones to maintain, and where it is degraded to improve, water quality to meet the management objectives specified in Schedule 30B.
Part 6 Discharges Chapter 33 Policy 33.1.3.2	To avoid, remedy or mitigate the adverse effects of discharges of contaminants so that both individually and cumulatively with the effects of other contaminant discharges, they enable the relevant water quality classification standards to be complied with.
Part 6 Discharges Chapter 33 Policy 33.1.3.3	To seek to improve water quality where existing water quality is lower than the requirements of any water classification or water conservation order.
Part 6 Discharges Chapter 33 Policy 33.1.3.4	To ensure that water quality is not degraded where the existing water quality is the same or higher than the relevant water classification or any water conservation order.
Part 6 Discharges Chapter 33 Policy 33.1.3.5	To ensure that existing water quality is not degraded after reasonable mixing as a result of any discharge of contaminants into water and to take into account the following criteria when determining what constitutes reasonable mixing: ……
Part 6 Discharges Chapter 33 Policy 33.1.3.6	To take into account the following factors in determining the significance of actual or likely adverse effects on the receiving water of or from contaminant discharges: ……
Part 6 Discharges Chapter 33 Policy 33.1.3.7	To ensure the loss of nutrients and sediment to water is minimised through:

	(a) working with industry and landowners to develop good industry practices that maximise nutrient use efficiency and minimise nutrient run-off and leaching; (b) requiring through conditions on consent or plan rules that activities that discharge nutrients, or take and use water for irrigation, or are land disturbances, are carried out with good industry practice.
Part 6 Discharges Chapter 33 Policy 33.1.3.8	To reduce the risks of existing land use and land use intensification in the Waimea Plains having adverse effects on water quality, especially the effects of nitrate leaching and losses on groundwater quality for drinking, and on the aquatic ecosystems in Neimann, Pearl and O'Connor creeks by: …… read subsections
Part 6 Discharges Chapter 33 Policy 33.1.3.11	To avoid, remedy or mitigate the adverse effects of non-point source contamination arising from land use and discharge activities by a mixture of methods, including regulation of discharge activities, particularly through advocacy of best management practices, and to review the mixture of methods used if environmental monitoring shows that water quality standards are not being maintained.
Part 6 Chapter 33 Objective 33.3.2	Stormwater discharges that avoid, remedy or mitigate the actual and potential adverse effects of downstream stormwater inundation, erosion and water contamination.
Part 6 Chapter 33 Policy 33.3.3.4	To avoid, remedy or mitigate the potential for flooding, erosion and sedimentation arising from stormwater run-off.
Part 6 Chapter 33 Policy 33.3.3.5	To avoid, remedy or mitigate the adverse effects of stormwater on water quality and the potential for contamination
Part 6 Chapter 33 Policy 33.3.3.9	To require the use of low impact design in the management of stormwater discharges in any new development, where practicable.
Part 6 Chapter 33 Policy 33.3.10	To encourage the restoration and rehabilitation of stormwater drainage networks where natural drainage networks have been significantly modified.
Part 6 Discharges Chapter 34 Policy 34.1.3.1	To ensure that any discharges of contaminants to air are undertaken in a way that avoids, remedies or mitigates any adverse effects on the receiving environment or surrounding activities.
Part 6 Discharges Chapter 34 Policy 34.1.3.2	To allow or regulate contaminant discharges to air in relation to their actual or potential contamination effects, including: (a) adverse effects on human health; (b) adverse effects on amenity values; (c) contamination of adjacent sites; (d) degradation of water quality; (e) the production of objectionable, noxious or offensive odours.
Part 6 Discharges Chapter 34 Policy 34.1.3.4	To provide for management of some actual and potential adverse effects of discharges to air -

	particularly odour and dust effects - as ancillary to land use activities, and to take them into account when resource consent applications are being considered.
Part 6 Discharges Chapter 34 Policy 34.1.3.7	To consider other resource management techniques such as buffer areas, separation distances, landscaping or planting requirements, or covenants over the land's title as an alternative means of protecting sensitive areas or activities from the adverse effects of discharges to air.
Part 6 Discharges Chapter 34 Policy 34.1.3.8	To adopt the best practicable option for discharge of contaminants to air associated with activities which are temporary or informal in nature.