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 CHRISTOPHER JAMES BENDER ON BEHALF OF TASMAN BAY ASPHALT LIMITED (AIR QUALITY)

1. INTRODUCTION

1.1 My full name is Christopher James Bender. I hold the position of Service Leader (Air Quality) at Pattle Delamore Partners Ltd ("PDP") where I have worked since April 2019. I have worked previously as an environmental consultant specialising in air quality matters at Jacobs New Zealand (formerly Sinclair Knight Merz) for ten years. I have also worked as an air quality scientist employed by the North Carolina Division of Air Quality (five years), the United States Environmental Protection Agency[1] (two years), and various environmental consultancies in the United States (five years).

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

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

[1] Independent executive agenda of US federal government.

(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 stop bank (RM201018).

1.3 This evidence addresses the effects of the activities for which consent is sought from discharges to air. It refers collectively to the activities for which consent is sought as the "Proposal" or the "Asphalt Plant".

Qualifications and experience

1.4 I hold a bachelor's degree in Chemistry from Texas A&M University and have undertaken post-graduate study in atmospheric science at North Carolina State University. I am a member of the Clean Air Society of Australia and New Zealand (CASANZ) and am a Certified Air Quality Professional (CAQP) under that body.

1.5 I have experience with the operation of batch and drum mix asphalt plants, other combustion and mineral processing equipment, and prevention and control of particulate matter from fugitive sources such as from industrial and commercial sites, roads, and yards.

1.6 My experience relevant to this project includes:

(a) Preparation of multiple Assessments of Environmental Effects ("AEEs") for asphalt plants including:

(i) Higgins Contractors asphalt manufacturing plants located in Masterton, Porirua, Rotorua, Tauranga, Marsden Point, and Palmerston North; and

(ii) A Fulton Hogan mobile asphalt plant located in Taranaki.

(b) Technical reviews of AEEs for asphalt plants prepared by other consultancies on behalf of Greater Wellington Regional Council including:

(i) Multiple locations for a Downer Group NZ Ltd ("Downer") asphalt plant within the Wellington Region;

(ii) A Fulton Hogan asphalt manufacturing plant located in Belmont Quarry, Lower Hutt; and

(iii) Higgins Contractors asphalt manufacturing plant to be located in Paekakarirki.

Involvement in the project

1.7 I was engaged by the Applicant in August 2020. I undertook a visit to the Proposal site in September 2020. I prepared an initial report assessing the effects of discharges to air of the Asphalt Plant that was included as part of the application for resource consent and Assessment of Environmental Effects (collectively the "Application") lodged with Tasman District Council ("TDC"): *C Bender, Air Discharge Assessment of Effects, W02385800, 28 October 2020* ("Discharge Report"). This evidence statement is intended to be read alongside the Discharge Report.

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

(a) The Application;

(b) The s.42A Recommendation Report and its appendices;

(c) Submissions related to the Application.

Code of Conduct

1.9 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.

Purpose and scope of evidence

1.10 The purpose of my evidence is to address the impacts of discharges to air from the operation of the Asphalt Plant at the Proposal site, specifically the operation of a 130 tonnes per hour asphalt manufacturing plant and associated activities.

1.11 My evidence is structured as follows:

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

(b) A summary of the relevant planning instruments that provide direction on air quality effects (Section 4)

(c) Assessment of air 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 provided in Section 2.

2. SUMMARY

2.1 The Applicant is proposing to establish a hot mix asphalt plant at 272 Bartlett Road. The Applicant has applied to TDC for resource consent to allow discharges to air from the Asphalt Plant. The primary discharges of potential concern from the Asphalt Plant are discharges of contaminants from the Asphalt Plant via a 7.3 metre stack. In addition, the storage, handling, and use of aggregate, and vehicle movements within the unsealed site have the potential to result in discharges of fugitive dust which could have nuisance effects if not adequately managed.

2.2 The site is on the eastern bank of the Waimea River, approximately three kilometres to the west of Richmond. The site has historically operated as an aggregate extraction and rock crushing facility operated by Downer. The surrounding land uses are predominantly agricultural, with the nearest residence being around 700 metres to the east.

2.3 The operation of an asphalt plant from an industrial or trade premise is a discretionary activity requiring resource consent under the Tasman Resource Management Plan ("TRMP").

2.4 I have assessed the discharges from the Proposal in accordance with best practice guidance and consider that the adverse effects of air contaminant discharges from the Asphalt Plant

on the surrounding environment, including horticultural crops, and on human health will be at a less than minor level. I consider that odour will be acceptable.

3. DESCRIPTION OF PROPOSED SITE AND SURROUNDING AREA

3.1 The Asphalt Plant site is approximately three kilometres west of Richmond and is located within the Rural 2 zone under the TRMP. The site is on the eastern bank of the Waimea River and is surrounded by agricultural and viticultural land uses. The nearest residence is approximately 700 metres to the east of the site. The site has historically operated as a rock crushing and aggregate processing site operated by Downer.

3.2 Residences closest to the site were selected for specific assessment as sensitive receptors for the Discharge Report. Figure 1 is a map of the Asphalt Plant site and the nearest eight residential receptors. The nearest residence to the site is at 208 Bartlett Road, which is identified as Receptor 6 in Figure 1, and is approximately 700 metres from the site.

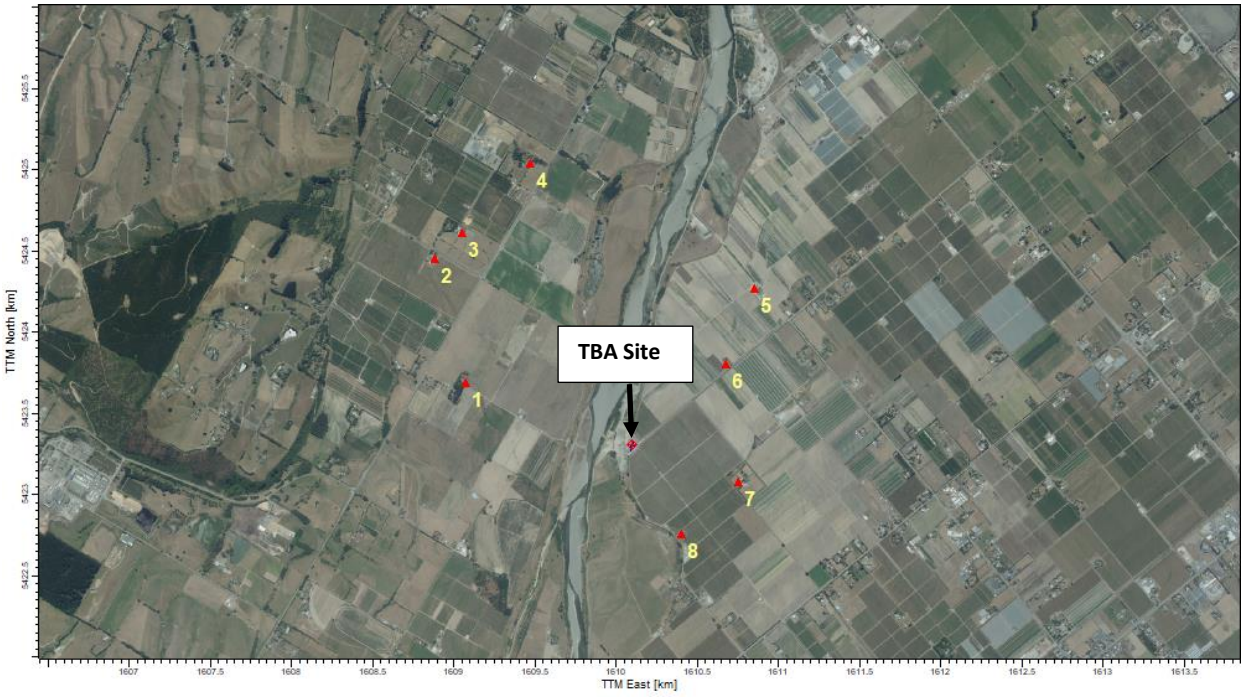

Figure 1 Location of the TBA Site and Sensitive Receptors

3.3 The topography of the site and wider area is relatively flat, and prevailing winds are from the westerly and south-westerly directions. These prevailing winds would tend to disperse discharges from the site toward the east. Temperature inversions occur frequently during calm winter periods, which have the effect of trapping air contaminants within the inversion layer.

Background Air Quality

3.4 As discussed in the Discharge Report, the site is located over 3 kilometres west of the gazetted Richmond Airshed. TDC maintains an ambient air monitoring station at 56 Oxford Street near the Richmond town centre for measuring particulate matter, in particular PM_{10} concentrations, in the Richmond Airshed. The station has recorded exceedances of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 ("NESAQ") for PM_{10} as a 24-hour average[2], resulting in the Airshed being a "polluted airshed" under the NESAQ[3].

3.5 The elevated PM_{10} concentrations in the Richmond Airshed are limited to winter periods and are understood to be largely due to domestic wood burning for home heating. Concentrations of particulate matter in the vicinity of the site will be substantially lower than those measured at the Richmond Airshed ambient air monitoring station because there is a low density of dwellings and therefore are significantly fewer wood-fired domestic heating appliances in the surrounding area. Given the rural nature of the surroundings and the absence of significant sources of particulate matter, the NESAQ for PM_{10} is unlikely to be exceeded in the vicinity of the site.

3.6 To assess the cumulative impact of discharges from the Asphalt Plant with existing contaminant concentrations, I assessed the existing contaminant concentrations (also referred to as background concentrations) as provided in Table 1. I derived the background concentrations using recommendations in Section 5.3 (pp. 61-64) of the MfE's *Good Practice Guide for Assessing Discharges to Air from Industry* (2016). To estimate the $PM_{2.5}$ background concentration, I have assumed a $PM_{2.5}$ to PM_{10} ratio of 50%, which is consistent with assumptions generally applied for rural areas[4].

[2] https://www.lawa.org.nz/explore-data/tasman-region/air-quality/richmond/plunket-aq/
[3] "Polluted airshed" is defined in Reg 17 of the NESAQ and identification as a "polluted airshed" impacts on how a consent authority is to consider a resource consent application for an activity that discharges PM_{10}.
[4] NIWA, *$PM_{2.5}$ in New Zealand – Modelling the current (2018) levels of fine particulate air pollution*, December 2019.

Table 1: Assumed Background Contaminant Concentrations			
Contaminant	**Averaging Period**	**Background Value**	**Source**
PM_{10}	24-hour average	24.7 $\mu g/m^3$	NZTA[1]
	Annual average	18 $\mu g/m^3$	Richmond Monitoring Site
$PM_{2.5}$	24-hour average	12.4 $\mu g/m^3$	NZTA[1,2]
	Annual average	9 $\mu g/m^3$	Richmond Monitoring Site[2]
NO_2	1-hour average	65 $\mu g/m^3$	NZTA[1]
	24-hour average	43 $\mu g/m^3$	NZTA[1]
	Annual average	16 $\mu g/m^3$	NZTA[1]
CO	1-hour average	5 mg/m^3	MfE[3]
	8-hour average	2 mg/m^3	MfE[3]
SO_2	1-hour average	20 $\mu g/m^3$	MfE[3]
	24-hour average	8 $\mu g/m^3$	MfE

Notes:
1. https://www.nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/air-quality-climate/planning-and-assessment/background-air-quality/
2. Background $PM_{2.5}$ concentrations assumed to be 50% of background PM_{10}.
3. MfE *Good Practice Guide for Assessing Discharges to Air from Industry* (2016)].

4. DIRECTION IN RELEVANT PLANNING INSTRUMENTS

4.1 Planning instruments that contain directions relevant to my assessment are:

(a) The NESAQ;

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

(c) The TRMP.

4.2 I note that the National Policy Statement for Freshwater Management 2020 ("NPSFM") also contains provisions relevant to considering the impacts of air discharges on freshwater. This is addressed by Dr Morrisey in his evidence.

4.3 As a national environmental standard, the NESAQ does not provide policy direction that decision-makers need to consider when making decisions on consent applications. However, Regulation 17 of the NESAQ prohibits the granting of air discharge consents when the discharges are likely to increase the concentration of PM_{10} by more than 2.5 $\mu g/m^3$ as a 24-hour average in any part of a "polluted airshed". While the Richmond Airshed is considered polluted under the regulations, the discharges of PM_{10} from the

Proposal will not results in concentrations exceeding 2.5 µg/m3 in the Airshed, and so Regulation 17 of the NESAQ does not restrict granting of the consent.

4.4 The part of the RPS most directly related to air discharges is Part 3 Section 10 Contamination and Waste which addresses industrial discharges to air. The issues raised include the need to advocate appropriate waste minimisation and treatment processes, and cleaner process or treatment technologies. There is also a need to regulate discharges to avoid, remedy or mitigate adverse contaminant effects.

4.5 Objective 10.2 and Policy 10.3 of the RPS requires TDC to seek to avoid, remedy or mitigate adverse effects of the discharge of contaminants to air. I consider the Proposal meets these policies and objectives in that the use of a bag house is best practice for controlling particulate emissions and there are not significant effects of the discharges to air on the surrounding environment.

4.6 The part of the TRMP most directly related to air discharges is Part VI Chapter 34. The key directions or themes in this Chapter are:

(a) Ob 34.1.2; Pol 34.1.3.1: The need to avoid, remedy, or mitigate adverse effects of discharges at the same time as maintaining or enhancing air quality

(b) Pol 34.1.3.2: To allow or regulate contaminant discharges to air in relation to their actual or potential contamination effects, including:

(i) adverse effects on human health;

(ii) adverse effects on amenity values;

(iii) contamination of adjacent sites;

(iv) the production of objectionable, noxious or offensive odours.

(c) Pol 34.1.3.3: 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.

(d) Pol 34.1.3.4: To avoid adverse effects of discharges to air from outdoor burning in parts of Motueka and Richmond urban areas by banning the activity in those areas.

(e) Pol 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.

(f) Pol. 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.

(g) Pol. 34.1.3.11: To manage air quality to meet the NESAQ for ambient air quality, especially in relation to concentrations of PM_{10}.

(h) Pol. 34.1.3.14: To take into account national guidelines for air quality when considering applications to discharge contaminants into the air.

(i) Pol. 34.1.3.16: To take into account potential adverse effects on ambient wintertime PM10 concentrations in the Richmond Airshed of discharges to air that may enter the Richmond Airshed.

4.7 Based on my assessment of effects below I consider that the Asphalt Plant is consistent with the objectives and policies of the TRMP (and the RPS as noted).

5. ASSESSMENT OF EFFECTS

Methodology

5.1 In undertaking the assessment in the Discharge Report, I have relied on professional judgement and recommended good practice, including guidance laid out in the Ministry for the Environment's *Good Practice Guide for Assessing the Effects of Discharges to Air from Industry* (2016) and the *Good Practice Guide for Atmospheric Dispersion Modelling* (2004).

5.2 I have assessed the potential effects on the environment of discharges of contaminants into air from the operation of the Asphalt Plant using atmospheric dispersion modelling

of the air discharges. Dispersion modelling is an internationally accepted method for predicting the concentrations of contaminants downwind from a discharge source.

5.3 I used the CALPUFF dispersion model to predict the highest concentrations of particulate matter and other products of combustion within a five kilometre by five kilometre area centred on the Asphalt Plant. A detailed description of the modelling methodology is provided in the Discharge Report.

5.4 Nelson City Council ("NCC") provided PDP with the CALMET meteorological modelling datasets for use with the CALPUFF dispersion model. Those datasets cover the years 2008 and 2009. Golder Associates developed the CALMET datasets to provide standardised meteorological data for use in dispersion modelling assessments of effects in Tasman and Nelson. I have used this data previously for other sites and consider it to be representative of observed meteorological conditions at the Proposal site and within the wider surrounding area.

5.5 In the modelling I assumed continuous operation of the Asphalt Plant for 10-hours per day at the maximum possible production rate of 130 tonnes per hour for every day of the two-year modelling period. Emission rates of particulate matter and other contaminants were based on conservative assumptions of worst-case (maximum) emissions discharging continuously from the Asphalt Plant.

5.6 Assumptions made in the assessment include:

(a) Emission rates of particulate matter based on the continuous production of 130 tonnes of asphalt per hour over a 10-hour operating period per day. In reality, it is expected that the rate of asphalt production will be around 70 tonnes per hour and only up to a maximum of 400 tonnes per day, and the discharges on a per-hour basis will be proportionally lower than what has been assessed i.e., the emissions when operating at 70 tonnes per hour will be 54% of that assessed.

(b) Continuous operation for 10-hours per day and 365 days per year. This assumption is equivalent to a production rate of 474,500 tonnes of asphalt per year. The actual production rate on annual basis that the Applicant expects is approximately 10,000 tonnes per year, which is just under 2% of

the production volume on which my assessment is based. The Applicant also will not be operating the Asphalt Plant every day.

(c) Additionally, the Applicant will be limited to a maximum of ten truck movements per day for asphalt deliveries from the site, with each truck capable of carrying up to 40 tonnes of asphalt. As noted above, this limits the total daily production of asphalt to 400 tonnes per day, which is 31% of the 1,300 tonnes per day assessed.

Validation of modelling approach

5.7 CALPUFF is recommended for modelling dispersion in areas where complex terrain or coastal meteorological effects are present. As such, it is the predominant model used for assessing the effects of air discharges across New Zealand, although simpler models such as AERMOD may be used in circumstances where complex terrain is not present. CALPUFF has undergone validation studies in its initial development, including tracer studies in which monitoring results were compared with model predictions as a measure of performance. CALPUFF was adopted by the US EPA in 2003 as the preferred model for use in areas of complex terrain and continues to be used and updated on a regular basis. Table 2 presents some examples where that CALPUFF has been used to model discharges from other asphalt plants in New Zealand.

Table 2: Other Examples of CALPUFF Modelling Assessments of Asphalt Plant Discharges to Air

Plant Operator	Regulatory Authority	Location	Date of Assessment
Higgins Contractors	Canterbury Regional Council	Branston St, Christchurch	2015
Fulton Hogan	Greater Wellington Regional Council	Paekakariki	2020
Fulton Hogan	Greater Wellington Regional Council	Belmont (Upper Hutt)	2020
Fulton Hogan	Auckland Council	Reliable Way (Auckland)	2015
Downer	Greater Wellington Regional Council	Transmission Gully (Porirua)	2021
Downer	Greater Wellington Regional Council	Kiwi Point (Wellington)	2020

Results

5.8 The dispersion model predicts the ground level concentrations ("GLCs") of contaminants for each hour of the modelling period. The maximum ground level concentrations ("MGLCs") are the highest contaminant concentrations that are predicted to occur at any time over the two-year modelling period. The model results, which are compared with relevant guideline values and standards are summarised in Table 2 below (also see Table 9 and Table 10 of the Discharge Report). Table 2 presents the highest predicted concentrations at the site boundary as well as at the nearest residential receptor. The results are reported both including and excluding the assessed background concentrations, which are provided in Table 1 of my evidence.

Table 2: Highest Predicted MGLCs (µg/m³) for Contaminants from Proposed Asphalt Manufacturing Plant

Contaminant	Highest Predicted MGLCs (excl background)	Highest Predicted MGLCs (incl background)	Highest Predicted MGLCs at Nearest Residence (excl background)	Highest Predicted MGLCs at Nearest Residence (incl background)	Averaging Period	Evaluation Criteria (µg/m³)
PM_{10}	14.5	39.2	0.8	25.5	24-hour	50 (NES)
	1.5	19.5	0.09	18.1	Annual	20 (NZAAQG)
$PM_{2.5}$	10.2	22.6	0.6	13.0	24-hour	25 (MfE)
	1.0	10	0.06	9.06	Annual	10 (WHO)
NO_2	60	125	7.8	72.8	1-hour	200 (NES)
	23	66	1.3	44.3	24-hour	100 (NZAAQG)
	2.8	18.8	0.2	16.2	Annual	30 (NZAAQG)
CO	142	5,142	18.5	5,019	1-hour	30,000 (NZAAQG)
	117	2,117	6.4	2,006	8-hour	10,000 (NES)
SO_2	<1	<1	<1	<1	1-hour	350 (NZAAQG)
	<1	<1	<1	<1	Annual	120 (NZAAQG)

Conclusion

5.9 The cumulative effects of discharges from the Asphalt Plant stack together with the existing background contaminant concentrations are shown to be well within the relevant assessment criteria for all contaminants and averaging periods.

5.10 I therefore consider that the operation of the Asphalt Plant as proposed will have less than minor effects on human health and the environment, including sensitive ecosystems and crops. In particular, air dispersion modelling for the discharges has predicted the concentrations for key contaminants downwind of the asphalt plant will be well below guidelines and standards for air quality.

6. RECOMMENDATIONS TO AVOID, REMEDY OR MITIGATE ADVERSE EFFECTS

6.1 The use of bag filtration equipment is regarded as the best practicable option for controlling particulate discharges from the Asphalt Plant and provides significantly better reductions in emissions of particulate matter than other pollution controls such as wet scrubbers.

6.2 Discharges from the Asphalt Plant stack have been assessed as being less than minor, therefore having no significant effects on human health, crops, stock, and the surrounding environment. As a result, additional mitigation over and above what has been proposed is not necessary.

6.3 Annual emissions testing of plant discharges will ensure the Asphalt Plant is operating at or below the parameters assessed.

6.4 An air quality management plan ("AQMP") is proposed to be developed for the site which will be subject to approval by TDC prior to commencement of operations. The AQMP will include procedures to control dust from receipt, storage, and handling of aggregates and the unsealed yard. Dust management procedures are the most practicable method to minimise fugitive dust discharges, and it is expected that nuisance levels of dust will be avoided.

6.5 Odour will be minimised by maintaining the temperature of asphalt and bitumen to less than 175°C, odour is included in the AQMP, and an odour complaints procedure is provided for as a condition of consent so that if nuisance events are notified, they can be investigated, and addressed as needed.

7. ISSUES RAISED IN SUBMISSIONS

7.1 Submitters in opposition to the Proposal raised concerns that related to air discharges. In order to respond to these concerns, I have grouped the concerns into nine issues as follows:

(a) Plant location in a rural area

(b) Stack height

(c) Effects of trace compounds

(d) Odour

(e) Plume visibility

(f) Effects on food systems (crops being of particular concern)

(g) Effects on soil quality from deposition

(h) Effects on nearby fish ponds

(i) Emissions from trucks

7.2 I have addressed these matters in a memorandum to the Applicant. Instead of reproducing that analysis, I have included that memorandum at **Attachment A**. I note that the effects at (h) are addressed by Dr Morrisey in further detail.

8. ISSUES RAISED IN S 42A RECOMMENDATION REPORT

8.1 I note that Mr Pigott, in his review of air quality effects in the s.42A Report, considers that the basic assumptions made by PDP in undertaking the assessment of the effects air discharges from the Proposal are realistic and consistent with good practice. Furthermore Mr Pigott states that he agrees with the assessment that the potential adverse health effects of the Proposal are no more than minor, and finds that the Proposal is consistent with the overall objective and policy framework of the TRMP.

8.2 Mr Pigott notes that the stack height is lower than he would expect, but further notes that the use of a bag house, as the best available technology, reduces particulate emission rates significantly. I have addressed the issue of stack height in **Attachment A**, and consider

that given the low level of effects from the discharges as assessed from a 7.3 metre high stack, a higher stack is not warranted.

8.3 Mr Pigott also states that it would be good for the Applicant to provide more detail on the visible nature of the plume, which I have addressed in **Attachment A**.

9. COMMENTS ON RECOMMENDED CONDITIONS

9.1 I have reviewed the recommended conditions contained in Attachment 12 of the s 42A Report and have some comments and suggested changes related to air quality technical aspects. My proposed changes to the recommended conditions have been incorporated into Ms Bayley's evidence.

9.2 Proposed Conditions 3 through to 8 (number per s 42A Report Attachment 12) relate to emission limits for the Asphalt Plant. My comments on these proposed conditions are below.

9.3 Proposed Conditions 4 and 6 require that the emissions testing for PM_{10} be undertaken for both filterable and condensable particulate matter. Filterable particulates are any particulate matter that may be physically captured on a filter during sampling. Condensable particulate matter is made up of a class of organic compounds that are in vapour phase at stack conditions, but which may condense into particulate matter as the stack air is cooled and diluted once discharged into ambient air.

9.4 Condensable particulate matter from combustion sources has not until recently been traditionally measured in New Zealand, and I am aware of few other instances where the measurement of condensable particulate matter is required as a consent condition for an air discharge consent. Given the absence of emissions test data, the formation of condensable particulate matter and its environmental fate are not well understood.

9.5 The emission rates for particulate matter used in the dispersion modelling assessment were based on performance specifications of the bag house provided by the plant manufacturer. The emission concentration for PM_{10} of 20 mg/Nm^3 was converted to a mass emission rate based on the volumetric flow rate of the plant at maximum operating capacity. I understand the 20 mg/Nm^3 specification provided by the manufacturer is for filterable particulate matter only, as condensable particulate matter would not be captured by the bag filter. As such, the emission rates applied for in the Application have been based on

the assumption that any limits on particulate matter in the new consent if granted will be based on filterable particulate.

9.6 I therefore recommend that the concentration-based emission limit for PM_{10} of 20 mg/Nm^3 be restricted to filterable particulate matter alone. I consider that this will provide assurance that the Asphalt Plant is operating within the manufacturer's specifications, and that the bag house is functioning as designed. I note that total emissions of condensable and filterable particulate matter will still be addressed by proposed Condition 6, which stipulates a mass emission rate for total PM_{10}.

9.7 Proposed Condition 6 states that the combined condensable and filterable PM_{10} emission rate shall not exceed 0.62 kg/hr. This value was based on the emission rate that I used in the Discharge Report to assess the effects of the Asphalt Plant. As stated above, this was based on the emissions of filterable particulate matter. The emissions of condensable particulate matter from the Asphalt Plant are not known, and there is limited data available from which to derive a reasonable estimate. However, the USEPA AP-42 emission factors[5] suggest a ratio of around 50% condensable to filterable PM_{10} for asphalt plants with fabric filtration. I therefore recommend that the proposed emission rate for combined PM_{10} be increased to 0.93 kg/hr to accommodate the estimated addition of 0.31 kg/hr of condensable PM_{10}. The increased emission of PM_{10} will result in the predicted MGLCs from the modelling increasing by a corresponding amount of 50%. On this basis, the highest predicted concentrations of PM_{10} as a 24-hour average at the nearest sensitive receptor will increase from 0.8 µg/m^3 to 1.2 µg/m^3, which is 25.5 µg/m^3 including background concentrations. This increase does not change the original conclusions of the assessment of effects, and the effects on human health and the environment will continue to be less than minor.

9.8 Proposed Condition 5 states that the minimum stack exit velocity shall be 20 metres per second. I note that this value was determined for the Asphalt Plant when operating at the maximum production rate of 130 tonnes per hour. The actual operation of the Asphalt Plant will typically be less than this, resulting in a reduced flow of combustion gas through the stack and a corresponding decreased exit velocity.

9.9 Proposed Condition 13 also addresses discharges from the stack and states that the discharges shall be directed vertically and not be impeded by any obstruction that would

[5] USEPA, *AP-42: Compilation of Air Emission Factors, Volume I Chapter 11.1: Hot Mix Asphalt Plants*, April 2004.

decrease the vertical velocity. Provided this condition is met, I consider the discharges will be adequately dispersed and do not consider a minimum velocity to be to be necessary. I therefore recommend that Proposed Condition 5 be removed.

10. CONCLUSION

10.1 The Applicant has applied for consent to discharge contaminants to air from the operation of an asphalt plant at 272 Bartlett Road. I have assessed the effects of the air discharges from the Asphalt Plant according to good practice guidance and consider the discharges have been appropriately characterised and assessed. Provided the Asphalt Plant is operated as described in the Application, I consider that the effects of discharges to air from the Asphalt Plant on the surrounding environment will be less than minor for all contaminants.

10.2 Nuisance effects from dust will be minimised by management practices which will be incorporated in an AQMP, and will have minimal effects on the surrounding environment, including on nearby horticultural land uses.

10.3 Odour from the operation of the Asphalt Plant may be detected on occasion, however the intensity will be low and will be confined to within close proximity to the plant. Nuisance levels of odour are unlikely to be achieved. Users of the Waimea River Park may experience odour when near the Asphalt Plant, however the frequency of this occurring is expected to be low.

Christopher James Bender

Air Quality Service Leader
Pattle Delamore Partners

10 December 2021

Attachment A

PATTLE DELAMORE PARTNERS LTD
Level 4, CSC House
111 Customhouse Quay, Wellington 6011
PO Box 6136, Wellington 6141, New Zealand

Tel +64 4 471 4130
Web www.pdp.co.nz
Auckland Hamilton Tauranga **Wellington**
Christchurch Invercargill

solutions for your environment

memorandum

TO	Jarrod du Plessis	FROM	Chris Bender
	Tasman Bay Asphalt	DATE	9 December 2021
RE	Response to Matters Raised by Submitters		
CLIENT	Asphalt and Construction		

1.0 Introduction

Tasman Bay Asphalt is proposing to establish an asphalt manufacturing plant at 272 Bartlett Road, near Richmond in Tasman District. Tasman Bay Asphalt has applied to Tasman District Council (TDC) for a resource consent to discharge to air from the asphalt plant operation. The application was lodged with TDC on 20 November 2020 and was subsequently limited notified to potentially affected parties.

Submissions were received on the application, some of which were in opposition to the proposal and including due to concerns about effects of discharges to air. Tasman Bay Asphalt requested Pattle Delamore Partners (PDP) to undertake further assessments in response to issues raised about air quality effects in the submissions. This memorandum summarises the issues raised and provides an initial overview of the findings from the additional assessments.

PDP expects that TDC will require more detailed reporting on these matters to accompany evidence to be provided on behalf of Tasman Bay in advance of the scheduled resource consent hearing for the applications.

2.0 Background

The asphalt plant will operate for up to 10 hours per day and produce up to 130 tonnes of asphalt per hour of operation. The plant will typically operate on a 70 tonnes per hour production rate, with an estimated annual production of around 10,000 tonnes per year. The discharges to air from operation of the asphalt plant consist mainly of particulate matter and products of fuel combustion. PDP prepared an assessment the environmental effects (AEE) of the air discharges (October 2020) to support the application for air discharge consent.

The assessment was undertaken according to good practice as described in the Ministry for the Environment (MfE) good practice guides:

- Good Practice Guide for Assessing Discharges to Air from Industry (2016); and,
- Good Practice Guide for Atmospheric Dispersion Modelling (2004).

The good practice measures are designed to ensure that the maximum level of potential effects of the proposal are assessed in order to protect against adverse effects on the environment and human health.

The assessment for Tasman Bay Asphalt demonstrated that the proposed plant and controls will result in a level of effects on the air environment that are less than minor. In particular, air dispersion modelling for the discharges showed concentrations for key contaminants downwind of the asphalt plant will be well below guidelines and standards for air quality and will not exceed air quality standards when considering the assessed background air quality.

PDP undertook the assessments of discharges from the Tasman Bay Asphalt plant using the maximum possible production rate of 130 tonnes per hour for operations over 10 hours per day and 365 days per year. The actual rate of manufacture is expected to be around 70 tonnes per hour, and the total annual production will be around 10,000 tonnes per year. This is around 2% of the total production rate that has been assessed on an annual basis. PDP notes that the proposed operations are proposed to be limited to 10 truckloads leaving the site per day. The maximum load of each truck is 40 tonnes so the maximum production rate is 400 tonnes per day, as compared to 1,300 tonnes per day PDP has assessed.

3.0 Submitter Concerns Regarding Air Quality Effects

Submitters have raised concerns relating to the potential effects of air discharges from the proposed asphalt plant. Matters raised by submitters include:

- Location of the plant in a rural area considered to be inappropriate for the industrial nature of the activity;
- The relatively low stack height and that this will have implications for the predicted levels of particulate matter;
- Trace compounds, which have the potential for adverse effects on the surrounding environment and human health;
- Odour impacts;
- Plume visibility;
- Effects of air discharges on food systems;
- Effects on soil and water quality from deposition; and,
- Effects on nearby fish ponds.

PDP's response to the issues raised in submissions is provided below.

4.0 Additional information in response to submissions

4.1 Proposed Location of Plant

PDP understands that Tasman Bay Asphalt chose the site at 272 Bartlett Road to make use of the ready supply of aggregate at the site, which is sourced from the Waimea River. The site has historically been used by a Downer aggregate processing and crushing plant and is currently occupied by aggregate crushing and sorting equipment. In PDP's view, the operation of an asphalt plant at the site is consistent with historical use of the site including as a source of particulate matter discharges to air.

The nearest industrial zoned land to the site is located within the Richmond airshed, which is currently considered to be a 'polluted' airshed under the National Environmental Standards for Air Quality (NESAQ). The Richmond industrial-zoned area is constrained in its ability for new sources of fine particulate matter (PM_{10}) to obtain consent for air discharges under the NESAQ regulations.

The proposed location for the asphalt plant has advantages, in that it is over three kilometres to the west of the Richmond airshed boundary, so that the discharges will have a negligible contribution of PM_{10} to the polluted airshed. In addition, the proposed site is well separated from residences, which are considered as highly sensitive receptors in the air discharge effects assessment.

Figure 1 provides a location map of the proposed asphalt plant relative to the Richmond Airshed boundary and the locations of the nearest residential receptors to the proposed plant.

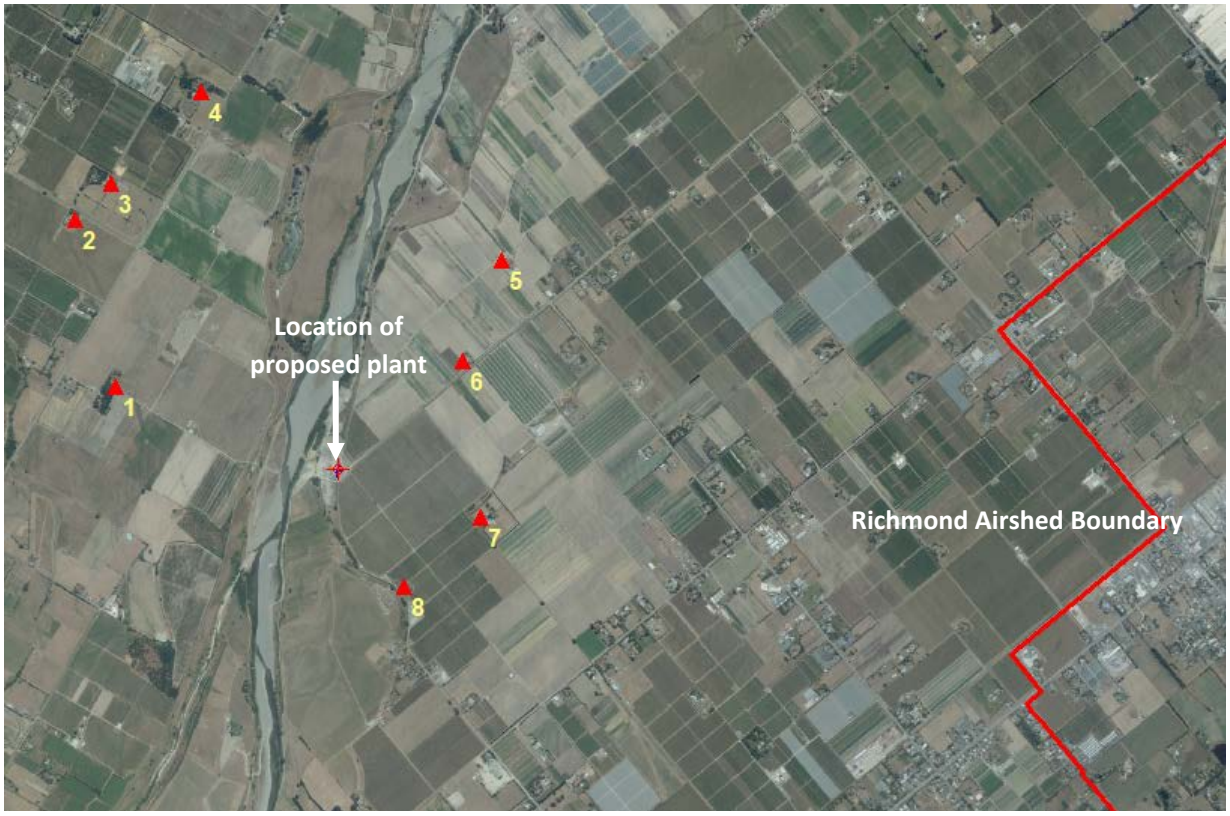

Figure 1 Location of proposed asphalt plant, nearest residences, and Richmond Airshed

4.2 Low Stack Height

The proposed stack height of the asphalt plant is lower than might typically be expected compared to some exiting plants. This lower stack is principally because of the modular and mobile nature of the proposed plant construction. The proposed stack height for the asphalt plant has, however, been assessed using air dispersion modelling with downwash algorithms and has been found to more than meet the relevant assessment criteria for key contaminants, such that a higher stack is not necessary for this proposal. PDP has undertaken further modelling of a wider range of contaminants as part of this additional assessment which demonstrated that downwind concentrations are low for all contaminants of potential concern.

As presented in the AEE, PDP modelled the stack height at 7.3 metres above ground level, which is around 1.5 metres above the height of the baghouse associated with the plant. Concentrations of PM_{10} and $PM_{2.5}$ downwind of the stack were assessed as having effects that are less than minor, in that the contaminants are at very low levels relative to assessment criteria for effects on human health and the environment, including crops.

4.3 Assessment of Trace Compounds

Asphalt plant discharges to air include trace compounds i.e. contaminants in low concentrations, but which have the potential for adverse effects on the surrounding environment and on human health. Trace compounds of potential concern include organic compounds such as dioxins/furans, polycyclic aromatic hydrocarbons (PAHs) and metals. If recycled fuel oil (RFO) is used then trace metals may be present in the fuel at increased levels, which can then impact the concentrations of these contaminants downwind. The Tasman Bay Asphalt plant will use automotive grade diesel fuel, which is the highest grade of diesel fuel available, and burns cleanly with minimal products of incomplete combustion, very low sulphur content and minimal trace metals.

In PDP's experience with previous assessments for asphalt plant discharges, trace compounds are present in very low concentrations compared to the relevant assessment criteria designed to protect for human health. Being a minor component of the air discharge, the effects of trace compounds are not routinely included as part of assessments of effects on air quality undertaken for asphalt plants. Given the concerns raised in submissions about trace compounds and human health and environmental impacts, PDP undertook further assessment to quantify the effects of trace compounds on air quality in the vicinity of the proposed plant. The PDP assessment is based on:

- Published emission factors for trace contaminants derived from the Australian Government National Pollutant Inventory[1], which provide emission rates of contaminants in kilograms per tonne of asphalt produced;
- Published ambient air quality guidelines and other relevant assessment criteria for each contaminant over the relevant averaging periods, including the Ministry for the Environment Ambient Air Guidelines (MfE 2002) and the California Office of Environmental Health Hazard Assessment (OEHHA) Reference Exposure Levels (RELs); and,
- Air dispersion modelling to predict the highest maximum ground level concentrations (MGLCs) for each contaminant of potential concern, for the relevant averaging period.

Table 1 provides the results of the assessment of trace compounds discharged from the proposed asphalt plant when operating at its maximum continuous rating of 130 tonnes per hour, 10 hours per day and 365 days per year. The highest predicted MGLCs are significantly lower than the relevant assessment criteria for all contaminants and averaging periods. In addition, the MGLCs at locations where people may be exposed for the relevant averaging periods will be significantly lower than the predictions in Table 1, which is due to dispersion of the discharge over distance. The annual average predictions are particularly conservative, this is given that the modelling has assumed daily operation of the plant at the maximum rate of production, whereas as discussed above the actual operations will be substantially less on an annual basis. Consequently, PDP considers that the effects of the emissions of trace compounds to be at most less than minor, but for most compounds the effects of contaminants on the environment at the predicted concentrations are considered to be negligible due to the very low concentrations relative to assessment criteria for effects on human health and the environment, including crops.

[1] Environment Australia, *National Pollutant Inventory - Emission Estimation Technique Manual for Hot Mix Asphalt Manufacturing*, June 1999.

Table 1: Highest Predicted MGLCs of Trace Compounds from Proposed Asphalt Plant

Contaminant	Emission Factor (kg/tonne asphalt)	Emission Rate from Proposed Plant (g/s)	Averaging Period	Highest Predicted MGLCs ($\mu g/m^3$)	Assessment Criteria ($\mu g/m^3$)	Source	Highest Predicted offsite MGLCs as percentage of Assessment Criteria
Arsenic	5.5E-07	2.0E-05	annual	0.0002	0.0055	MfE NZAAQG	3.7%
Benzene	6.0E-04	2.2E-02	annual	0.22	3.6	MfE NZAAQG	6.2%
Chromium	6.0E-06	2.2E-04	annual	0.0022	0.11	MfE NZAAQG	2.0%
Dioxins and Furans	2.8E-11	1.0E-09	annual	0.00000001	0.0004	California REL	0.03%
Formaldehyde	1.8E-03	6.5E-02	1-hr	0.67	87[1]	MfE NZAAQG	0.8%
Lead	1.7E-06	6.1E-05	annual	0.00063	0.15[2]	MfE NZAAQG	0.4%
Mercury	3.7E-09	1.3E-07	1-hr	0.0000014	0.6	California REL	0.0002%
	3.7E-09	1.3E-07	annual	0.000029	0.03	California REL	0.0046%
PAHs (as Benzo(a)pyrene)	4.6E-09	1.7E-07	annual	0.0000017	0.0003	MfE NZAAQG	0.6%

Notes:

1. *Corrected from the 30-minute average criterion of 100 $\mu g/m^3$ to an equivalent 1-hour average concentration to enable comparison with dispersion modelling results.*
2. *Corrected from the 3-month average criterion of 0.2 $\mu g/m^3$ to an equivalent annual average concentration to enable comparison with dispersion modelling results.*

4.4 Assessment of Odour Discharges

Hot-mix asphalt production has a characteristic odour that is present during the manufacture and loading of the product. The main source of odour from the proposed plant is the hot-mix drum, with emissions of odorous compounds being discharged through the stack together with products of combustion.

Odour may also be discharged from the bitumen storage tank during refilling when the headspace in the tank is displaced by fresh bitumen, and during truck loadout operations. These events are either infrequent or of short duration and are not expected to contribute significantly to odour effects beyond the site boundaries.

The concentration of odour can be measured in odour units (OU), where 1 OU/m^3 is the concentration where 50% of a panel in a laboratory situation can just detected the odour[2]. That is 1 OU/m^3 would be barely perceptible to most people. An odour concentration of 5 to 10 OU/m^3 would be described as faint odour by most people[3].

Dispersion model outputs in odour units per cubic metre (OU/m^3) are compared to odour modelling guideline values to estimate whether, and where, offensive or objectionable effects might occur.

PDP has undertaken air dispersion modelling of estimated odour emissions to assess the potential odour effects from the proposed asphalt plant. PDP's assessment approach included:

- Reviewing available odour emission rates as measured at asphalt plants operating in New Zealand and limited international data;
- Calculation of the highest predicted concentrations of odour beyond the site boundary and at the nearest sensitive receptors; and,
- Evaluation using odour modelling assessment criteria recommended in the MfE *Good Practice Guide Assessing and Managing Odour* (2016).

4.4.1 Odour Emission Rates

Odour dispersion modelling requires an odour emission rate to represent the odour discharge from the plant. Actual data for the emission rate can be obtained by measurement of both the odour concentration as OU/m^3 and the volumetric flow of the discharge as m^3 per second. The odour emission rate from a stack discharge is then reported as odour units per second (OU/s).

The rate of odour generation during asphalt manufacture is dependent on process specific factors, including the: type of plant, rate of manufacture, and whether the plant is using recycled asphalt product (RAP) to supplement bitumen in the product.

There are no published odour emission factors for asphalt manufacture in either the Australian National Pollution Inventory Emission Estimation Technique Manuals or the US EPA AP-42 emission factors. In the absence of site-specific data for the proposed plant, PDP reviewed available odour emission rate data measured at other continuous drum mix plants in New Zealand. Table 2 summarises the odour emission rate data from the review. One of the sites where PDP obtained odour emissions data was for a Higgins' asphalt plant in Christchurch. The testing consisted of four separate test runs with measured odour emission rates ranging from 8,655 OU/s up to 85,000 OU/s[4]. It is not clear from the test report why the odour discharge emission rates showed such high variability at this plant.

[2] MfE, *Good Practice Guide for Assessing and Managing Odour,* November 2016 (p.44).
[3] Institute of Air Quality Management, *Guidance on the assessment of odour for planning version 1.1,* July 2018
[4] Ron Pilgrim Consulting, *Higgins Contractors Ltd.: Request for further information – CRC151364-CRC151365*, 6 November 2014.

In addition, PDP reviewed a recently published paper[5] that reported odour emissions from asphalt plants in Italy. The paper derived an odour emission factor from the data reviewed, which is based on the asphalt production rate. Table 2 also includes the calculated odour emission rate for the proposed Tasman Bay Asphalt plant operating at 130 tonnes/hour using the published Italian emission factor.

Table 2: Summary of Odour Emission Test Results for Asphalt Manufacture

Source	Production Rate (Tonne/hr)	Odour Emission Rate (OU/s)
Fulton Hogan, Hamilton Plant	50	13,483
	70	14,498
Fulton Hogan, Silverdale Plant	70	7,190
Higgins, Christchurch Plant	80	45,478
		11,369
		8,655
		38,900
		62,000
		85,000
Wesley Vale, Tasmania	180	60,000
Asphalt & Construction emission rate calculated from Davoli et al.	130 (maximum production rate)	50,556
	70 (typical production rate)	27,222

To ensure a conservative estimate of potential odour effects, PDP used an odour emission rate value of 80,000 OU/s, which is the upper end of the range of data provided in Table 2. PDP notes that this rate is higher than the rate calculated for the Asphalt Plant using the available emission factor from Italy.

4.4.2 Odour Assessment Criteria

The Ministry for the Environment's *Good Practice Guide for Assessing and Managing Odour (*MfE 2016) includes odour dispersion modelling guideline values that are designed to avoid adverse effects from offensive or objectionable odour. Table 3 below sets out the MfE recommended odour guideline values to use for odour dispersion modelling assessments depending on the receiving environment sensitivity. The rural nature of the receiving environment around the Tasman Bay site is generally considered to have low sensitivity for odour effects, while the rural residential dwellings are considered to have a moderate to high sensitivity to odour depending on the character and nature of the odour. The guidelines include percentile values that are statistical parameters used in modelling to filter outlying values that are excluded for assessment. The 0.5 percentile generated by the model is the 44th highest hour for one year's data. The 0.5 percentile is recommended for assessing potential "chronic effects" of odour which can occur from low levels of odour that occur on regularly. The 0.1 percentile value is recommended for assessing potential "acute effects", which occur due to high intensity odour that is infrequent. The rationale for these percentiles is described in "Review of Odour Management in New Zealand" Ministry for the Environment, Air Quality Technical Report (2002).

[5] Davoli et al., *Odor Emissions Factors for Bitumen-Related Production Sites*, April 2021.

For this assessment, PDP considers the appropriate assessment criterion to be 1 to 2 OU/m^3 at the nearest sensitive receptors, and 10 OU/m^3 at locations near the plant.

Table 3: Odour Modelling Guideline Values

Sensitivity of the Receiving Environment	Concentration	Percentile
High (worst-case impacts during unstable to semi-unstable conditions)	1 OU/m^3	0.1% and 0.5%
High (worst-case impacts during neutral to stable conditions)	2 OU/m^3	0.1% and 0.5%
Moderate (all conditions)	5 OU/m^3	0.1% and 0.5%
Low (all conditions)	5-10 OU/m^3	0.5%

4.5 Odour Modelling Predictions

Table 4 presents the highest predicted maximum ground level concentrations (MGLCs) of odour as 1-hour average values at the 99.9th and 99.5th percentiles. The 99.5th percentile is the recommended odour modelling guideline value for a low sensitivity receiving environment and is considered applicable to the Rural Zone around the proposed plant. The highest predicted offsite concentrations of odour from the modelling occur at the north-eastern site boundary.

Table 4: 1-hour Average Predicted Odour MGLCs

	MGLC at Site Boundary	MGLC at Nearest Residence
99.9th Percentile	7.9 OU/m^3	1.7 OU/m^3
99.5th Percentile	6.3 OU/m^3	1.3 OU/m^3
Evaluation Criteria	5 to 10 OU/m^3	1 OU/m^3 (unstable conditions) 2 OU/m^3 (Stable and neutral conditions)

Figure 2 is an isopleth diagram of the predicted 1-hour average odour concentrations from the asphalt plant stack at the 99.5th percentile. The figure shows that that odour may be observed at levels above the 5 OU/m^3 level near the site boundary, but this will be restricted to a small area in close proximity of the plant. Odour may be observed at the nearest residence (Receptor ID R6), but at relatively low levels of intensity.

The highest predicted odour concentrations at the nearest residence are between 1 and 2 OU/m^3. At these concentrations an odour may or may not be discernible depending on the sensitivity of the individual, and in any case any odour is expected to be very weak. Odour concentrations between 5 and 10 OU/m^3 occur within a small area near the asphalt plant within agricultural fields, and would likely be discernible, though at a low level of intensity and not at a level likely to result in nuisance. Under certain meteorological conditions, low levels of odour may also be detected by users of the Waimea River Park if these conditions coincide with when the plant is in operation Occurrences of discernible odour at the Park are expected to be rare with analysis indicating that detectable odour from the operation of the plant will occur less than 1% of the time around the Park.

PDP notes that the assumption for the odour emission rate used in the modelling was at the highest end of the range, therefore PDP expects that the maximum odour will be less than the levels predicted in Table 4. Given the conservatism in the predicted odour concentrations, which are within the ranges of the relevant

assessment criteria, PDP considers that any odour will be at acceptable levels considering the nature of the activities undertaken at locations in the vicinity of the plant..

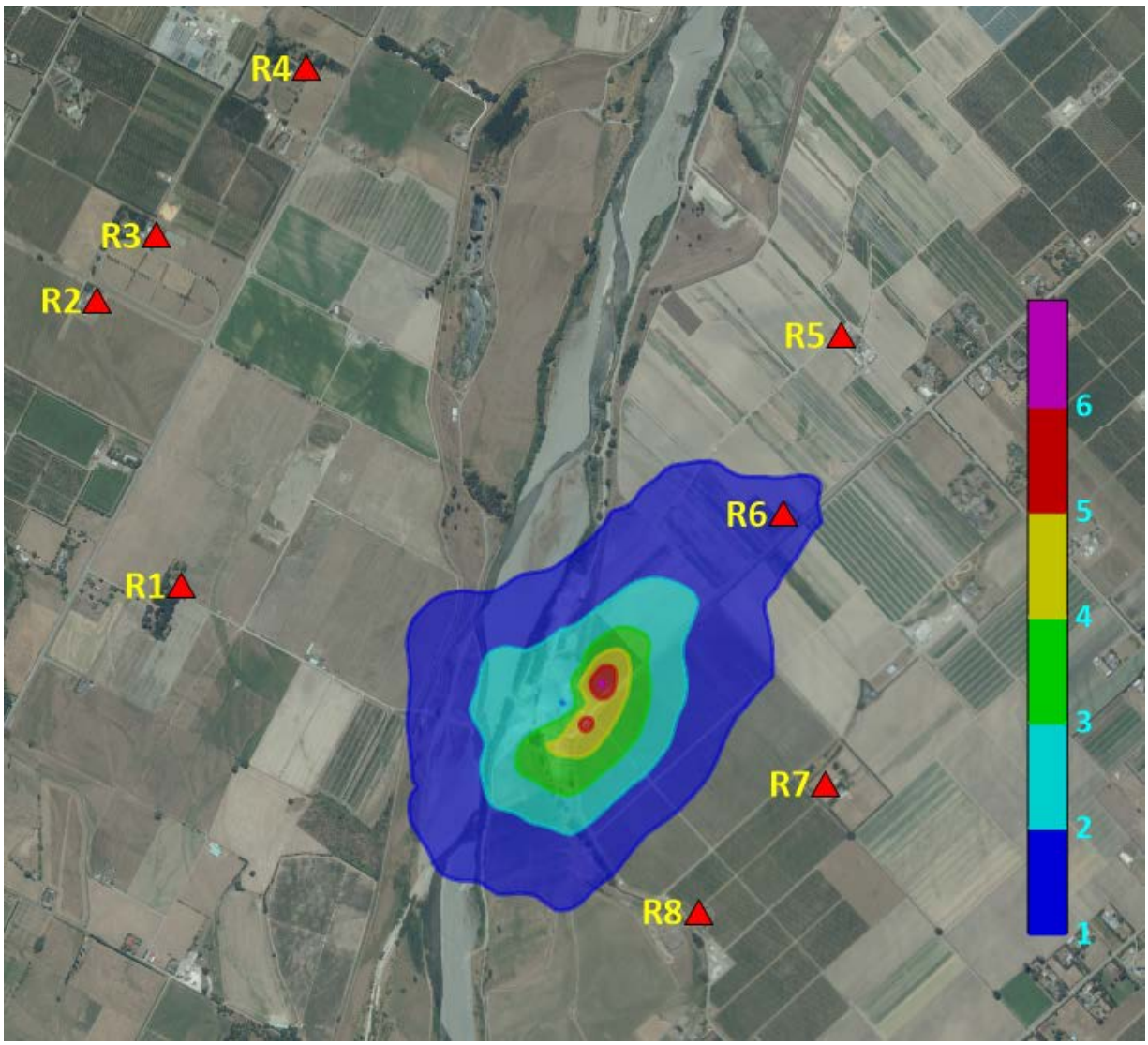

Figure 2 Predicted MGLCs of Odour from the Proposed Asphalt Plant (OU/m^3), 1-hour averages (99.5th percentile)

4.6 Visual Plume

A white steam plume will typically be visible at the stack, particularly during cool weather. The plume dissipates as the steam evaporates. Based on observations of other asphalt plants, dissipation typically occurs within 10 to 20 metres of the stack. The discharge from the Tasman Bay Asphalt plant, which is via a baghouse, will be less visually obvious than plumes from asphalt plants that are fitted with wet scrubbers for emission control.

Particulate matter present in the plume may be faintly visible as the steam dissipates, however, the use of a bag filter for emission control will keep particulate emissions to a minimum. The relatively low stack height will also limit the visual appearance of the steam plume locally.

4.7 Effect of Air Emissions on Crops

4.7.1 Stack Emissions

Several submitters raised concerns regarding the potential effects of discharges of 'toxic gases' from the asphalt plant on crops in the surrounding area. As stated above, emissions from asphalt manufacture consist of products of combustion and volatile organic compounds (VOCs) from bitumen used in asphalt manufacture. The use of automotive diesel as fuel will keep trace contaminants in the discharge to a minimum, and the use of a baghouse is the best available control technology for removing particulate matter from the discharges.

The dispersion modelling assessments provided in the AEE and in this memo have assessed the contaminants including trace compounds emitted from the plant against the relevant criteria as recommended in the MfE good practice guides. The environmental impact assessments of discharges to air of trace compounds are typically based on effects on human health rather than on vegetation. The human health criteria are generally considered to be conservative, and provided that the discharges do not result in offsite concentrations that would result in adverse human health effects, the effects on vegetation can also be presumed to be at an acceptable level.

The MfE critical levels for air contaminants for ecosystem protection include criteria for protecting crops, which are set as annual average criteria. MfE (2002) recommends critical levels for sulphur dioxide (SO_2) and nitrogen dioxide (NO_2)[6], both of which will be discharged from the proposed asphalt plant. The highest predicted annual average MGLCs for both SO_2 and NO_2 from the Tasman Bay plant are significantly below the MfE criteria as shown in Table 5. As noted previously, annual average values predicted by the dispersion modelling are very conservative given the assumption that the asphalt plant will operate daily at the maximum production rate for all operating hours whereas the actual operation will a lower production rate with intermittent operation depending on demand.

Table 5: Highest Predicted MGLCs for Asphalt Plant (including background (i.e. existing levels)

Contaminant	Averaging Period	Peak Modelled MGLC (excluding background)	Peak Modelled MGLC (including background)	Critical Level for Protecting Ecosystems
NO_2	Annual	2.8 µg/m^3	18.8 µg/m^3	30 µg/m^3
SO_2	Annual	<1 µg/m^3	<1 µg/m^3	30 µg/m^3 (for crops)

As discussed above, the discharges to air of contaminants including particulate matter, other products of combustion, and trace contaminants, have been assessed as having "at most less than minor effects" on human health due to the predicted concentrations in air. The effects of the discharges on crops in the surrounding area are likewise expected to be negligible, and the air discharges will not result in impacts on the food production system.

4.7.2 Fugitive Dust

Sources of suspended particulate matter at the site will include dust generated from truck and machinery movements during dry weather and from storage and handling of aggregate. These are referred to as fugitive emissions and are similar in scale and nature to the dust emitted from the rock crushing operations historically undertaken at the site. The fugitive dust is not toxic, being comprised of naturally

[6] MfE, *Ambient Air Guidelines 2002 Update*.

occurring material from locally sourced aggregate. If significant amounts of dust are, however, mobilised from the site activities, then deposition beyond the site boundary could result in adverse effects on nearby vegetation.

The MfE's *Good Practice Guide for Assessing and Managing Dust* (2016) sets a nuisance value for deposited particulate matter of 4 g/m^2/30 day period. For activities with the potential to have fugitive dust emissions, implementation of dust management procedures may be required to prevent the occurrence of nuisance levels of dust.

Tasman Bay Asphalt will adopt management procedures to control dust from receipt, storage, and handling of aggregates, and from yards and roads, which is the most practicable method to minimise fugitive dust discharges. These will be incorporated in an Air Quality Management Plan (AQMP) subject to approval by TDC, and will include:

- Truck and mobile machinery speeds will be restricted to 20 km/h within the site.
- Aggregates with increased risk of dust becoming airborne will be sheltered from prevailing winds.
- Water sprays will be used where necessary to suppress dust from the unsealed yard areas or aggregate storage.
- Any dust complaints received will be investigated promptly by operations staff and the control measures will be reassessed if visible deposited dust from the site is detected in the complaint area.

The current and continued use of the surrounding site for aggregate sorting and crushing will also have potential for dust generation, which should be managed appropriately by a separate dust management plan by Downer. We are not aware of any complaints regarding nuisance dust from the historic operation of the aggregate processing and handling activities at the site. Provided that dust is adequately managed, the additional discharges from the proposed asphalt plant will not add significantly to the dust generated from the site, and cumulative discharges from the proposed asphalt plant together with the rest of the site will not result in more than minor adverse effects beyond the site boundary.

4.8 Effects on Soil Quality from Deposition

The contaminants discharged to air from the asphalt plant are predominantly gaseous in nature and do not readily deposit on surfaces, such as crops or soil. Deposition of contaminant discharges from asphalt plants is not typically assessed given the low levels of particulate matter and trace contaminants discharged. PDP, however, modelled contaminant deposition from the asphalt plant to provide information on the potential for impacts of asphalt plant air discharges on soil.

PDP used the CALPUFF dispersion model with the relevant settings for contaminant deposition. Table 6 presents the results of the deposition modelling for particulate matter as PM_{10}, arsenic, lead, polycyclic aromatic hydrocarbons (PAHs) as Benzo(a)pyrene (BaP) and dioxins/furans.

Table 6 provides the results from the deposition modelling and shows that the deposition rates are several orders of magnitude lower than the relevant assessment annual criteria for soil in rural environments. Assuming that deposited material remains within the top 1 centimetre of the soil layer (a conservative assumption for assessing deposition effects), each year of deposition potentially increases the concentration of all assessed contaminants in the top 1 centimetre of soil by less than 0.0001% of the relevant soil assessment criteria, and therefore the accumulated deposition over time will not result in any adverse effects on the soil quality.

Table 6: Highest Predicted Deposition Rates for Contaminants from Proposed Asphalt Plant			
Contaminant	**Highest Predicted Deposition Rates (annual basis)**	**Annual increase in soil concentration in top 1 cm of soil[3]**	**Assessment Criteria**
PAHs (as BaP)	6.07 E-06 mg/m^2/year	4.67E-07 mg/kg	6 mg/kg (acceptable soil contaminant value)[2]
Dioxins and furans	2.4 E-07 µg/m^2/year	1.85E-11 mg/kg	0.12 µg/kg (acceptable soil contaminant value) [2]
Arsenic	7.26 E-04 mg/m^2/year	5.58E-07 mg/kg	17 mg/kg (acceptable soil contaminant value)[2]
Lead	2.24 E-03 mg/m^2/year	1.72E-04 mg/kg	160 mg/kg (acceptable soil contaminant value)[2]

Notes:

1. *MfE, Good Practice Guide for Assessing and Managing Dust (2016).*
2. *MfE, National environmental standard for assessing and managing contaminants in soil to protect human health (2011) - Soil contaminant values for inorganic and organic compounds (rural residential/lifestyle block with 25% produce).*
3. *Assuming an average soil density of 1.3 g/cm^3*

In summary, the contaminants discharged to air from the proposed asphalt plant will result in concentrations that are protective for human health and effects on other environments and any effects of the discharges on soil and water quality are therefore expected to be negligible.

4.9 Effects on Fish Ponds

Sport Fishing for Youth Trust maintains fish ponds approximately 1.5 kilometres to the north of the proposed asphalt plant site, which are used to provide opportunity for youth in the Nelson/Tasman region with the opportunity to go fishing. The Trust has submitted in opposition to the proposal on the basis that the quality of the experience or of the natural environment may be compromised by the proposal.

PDP notes that the contaminants discharged from the asphalt plant will be very dispersed at a distance of 1.5 kilometres. At the fish ponds, contaminant concentrations and deposition rates will be less than 5% of the maximum predicted concentrations occurring near the Tasman Bay site boundary.

Given that the maximum predicted concentrations and deposition rates are already very low compared with the relevant assessment criteria, the concentrations of contaminants generated from the plant impacting at the fish ponds will be negligible.

4.10 Effects of Increased Truck Movements

Some submitters have raised concern regarding the effects on air quality from the increased traffic associated with the operation of the asphalt plant. I note that the increased traffic to and from the site are not considered part of the site's activities and are not required to be addressed as part of an air discharge consent.

The proposal will include a maximum of 80 truck movements per day to and from the site. Normal operations will be significantly less than this. The increase in truck movements will result in an increase in traffic-related emissions, however, the discharges will qualitatively be similar to the road emissions from existing traffic.

5.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) for Tasman Bay Asphalt as part of a statutory regulatory process under the Resource Management Act 1991. In preparing this memorandum PDP has relied on the information provided by Tasman Bay Asphalt, the plant manufacturer, past case studies/assessments undertaken by PDP and other consultants, and data from other functioning plants. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

Apart from this specific statutory process in relation to Tasman Bay Asphalt, PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

Chris Bender

Service Leader – Air Quality

Reviewed and Approved by

Deb Ryan

Technical Director – Air Quality