

# Memo

To: David Greaves, Enspire

From: Steve White, Enspire

CC: Ella Tennent, Bay of Plenty Regional Council

Date: 14 March 2025

Re: Stella Passage Fast Track Application - Marine Ecology Technical Review

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## Introduction

Port of Tauranga Limited (POTL) have applied for resource consents under Fast Track legislation to allow dredging of Stella Passage and expansion of wharves and port facilities in both the Sulphur Point and Butters Landing areas. This application is supported by technical evaluation and information that covers avifauna, marine mammals and marine ecology in general. Enspire have been tasked with considering the technical information supporting this application and reviewing it with particular emphasis on the approach and whether it represents best practice.

In order to conduct this review, I have read and referred to the following documents:

- Port of Tauranga (2025). Stella Passage Development Fast Track Approvals Act 2024 Substantive Application Report. Draft for Consultation. 251 pp + app.
- Boffa Miskell (2025). Assessment of Effects on Marine Ecological Values. Final Draft – Stage 1 and 2 Stella Passage Development. Report prepared for Port of Tauranga Ltd. 75 pp + app.
- Wildlands (2025). Assessment of Potential Effects on Birds of the Proposed Stella Passage Development for Port of Tauranga. Contract Report No 7339a prepared for Port of Tauranga Ltd. 37 pp + app.
- SLR (2025). Assessment of Effects on Marine Mammals. Stella Passage: Fast Track Approval Application. Report prepared for Port of Tauranga Ltd. 89 pp + app.
- Bryan KR, Douglas E, Pilditch CA and Cussioli MC (2014). Setting water quality limits and monitoring turbidity for the Port of Tauranga. Part A: Preliminary Investigation. Report prepared for the Port of Tauranga. ERI report number: ERI025. 22 pp + app.
- De Lange W (2024). Port of Tauranga Stella Passage Development. Assessment of Effects on Hydrodynamics and Sedimentation. Report prepared for Port of Tauranga Ltd. 39 pp + app.

## Proposal

POTL are proposing to deepen by dredging approximately 10.55 hectares of Stella Passage to a finished depth of approximately 16 metres below chart datum. This would yield approximately 1.5 million cubic metres of

sediment as dredge spoil. In addition, the proposal includes reclamation of approximately 3.58 hectares of the coastal marine area (CMA) either side of Stella Passage to facilitate wharf extensions. Of these wharf extensions, approximately 385 metres of new wharf space would be constructed on the Sulphur Point (western) side of the Passage and approximately 315 metres of wharf extension would be constructed on the Mount Maunganui (eastern) side of the Passage. In addition, it is proposed that there would be some development of new structures in the CMA consisting primarily of wharf piles, mooring poles and jetties and that there would be a subsequent construction and use of additional cranes atop the proposed wharf extensions for port operations.

The development is proposed in two stages with Stage One consisting of approximately 6.1 hectares of dredging within the Stella Passage, reclamation of approximately 0.88 hectares of the CMA on the Sulphur Point side of the Passage, development of a 285 metre long wharf extension at Sulphur Point and the installation of two cranes. The remainder of the dredging of the Stella Passage and the Sulphur Point development, along with all of the Mount Maunganui side development is proposed for Stage Two.

### **Comments on Assessment of Marine Ecological Values**

The assessment follows the guidance and methodology of the Environmental Institute of Australia and New Zealand (EIANZ) guidelines. The assessment provides a full and robust description and evaluation of the marine ecological values within the Stella Passage and the wider area and assigns values to them according to EIANZ guidelines. Further, the assessment considers the potential impacts on those ecological values resulting from the proposed development works, considers the magnitude of effects and the overall level of effects both with and without mitigation. The effects were considered on the scale of the Stella Passage and southern Te Awanui.

The assessment argues that despite the ecological values within the Stella Passage and southern Te Awanui areas being assessed as high, the magnitude of effects resulting from the proposed development are considered to be negligible to low. Most of the effects will be transitory or temporary with demonstrable recovery of biological communities and populations within relatively short timeframes following completion of the development works. The levels of effect are considered to be low to very low even without mitigation actions. Residual effects following mitigation are all considered to be nil. I agree with this evaluation.

### **Avoidance of Effects**

In the application, avoidance of effects centers around the management of turbidity resulting from dredging and dredge spoil dewatering. POTL have installed, and maintain, a network of continuous turbidity monitors within the port area and immediate surrounds. These instruments generate data that allow for reasonable monitoring of water quality conditions and theoretically provide for adaptive management of dredging activity based upon the direct impacts of that activity on turbidity within the water column. The instruments appear to be located in useful positions to enable a sensible level of water quality monitoring associated with the proposed dredging works.

What is not clear about the network of turbidity recording instruments from the documentation provided is whether the data streams generated are available for live monitoring; nor the failure rates for elements within the network or for the network as a whole; nor cleaning and calibration protocols required to ensure accurate data generation. The continuous turbidity recorders utilise optical sensors which will develop bio-fouling films over time which alter the perceived turbidity of the water being monitored. Periodic cleaning of the sensors is required to enable accurate data. The optical sensors are also subject to interference on occasion from debris in the water column which can cause spikes in the data. Both the gradual bio-fouling and spikes caused by debris may need to be filtered out of the data to enable accurate turbidity assessments to be made. Information regarding the reliability and accuracy of the monitoring network and its ability to provide adequate reliable information to achieve the desired turbidity management as proposed would provide certainty that this is practical and achievable as a condition of consent.

The proposed adaptive management approach revolves around turbidity trigger levels at various monitoring stations. These trigger levels are either 6 hour or two week moving average turbidity values and the first trigger levels provoke an investigation into the elevated turbidity values with an associated assessment of the impact of on-going dredging. Breaching the second trigger values provokes a modification to the methodology of operational dredging. A hard environmental limit has also been defined and the breaching of this limit would provoke the cessation of dredging operations. These limits have been set in relation to the effects on ecological values resulting from elevated turbidity and are protective of populations and communities of biota. I am satisfied that these limits are based on defensible information and are appropriate to achieve the avoidance of adverse effects, providing the network of monitoring sensors can be shown to be capable of reliably providing adequate data.

### **Remedy/Mitigation of Effects**

The loss of hard shore habitat beneath existing wharves and the covering or shading of habitat are effects that cannot be avoided under this proposal, however, the construction of new wharf structures, by providing for the same type and area of shade or light environment on a one for one basis, will allow for natural recovery from the disturbance and the assessment considers this to be mitigative. I am satisfied that this approach is appropriate.

### **Summary**

Evaluation of the avifauna and marine mammal aspects of the assessment of effects have been undertaken by other experts and this review has therefore been restricted to the assessment of marine ecological values for the proposal. The overall evaluation of marine ecological values appears to be robust, following established and industry best practice guidelines and methods. Further, there appears to have been a robust consideration of the effects of the proposed development on the existing ecological values and a considered approach to avoidance of effects and the mitigation of effects through natural recovery of marine communities.

Aside from some questions around the technical details relating to the practicalities and reliability of optical turbidity monitoring within the marine environment, the assessment of effects and proposed monitoring

programme is, in my opinion, appropriate and protective of ecological values overall. The provision of the following details would provide certainty regarding the practicality of this monitoring approach:

- the cleaning and maintenance protocols for the turbidity monitoring instruments,
- calibration intervals,
- projected failure rates for network and individual elements with contingency provisions to provide monitoring security,
- information regarding the data processing required to filter anomalous data points, data smoothing protocols and practical reporting limitation and timeframes around the output of the network of monitoring instruments

Providing certainty around the monitoring system would allow Council to have confidence in the feedback process and its ability to influence dredging operations to prevent adverse ecological impacts resulting from the dredging works.

### **Proposed Consent Conditions**

Having reviewed the final draft consent conditions for consultation purposes for both the POTL Stella Passage dredging and structures consents, I am satisfied that the draft conditions will provide much of the desired information regarding the water quality monitoring. The requirement for a Dredge Management Plan combined with the requirements of draft condition 13 of the dredging consent will provide certainty around the practicalities of the proposed turbidity monitoring and the adaptive management feedback from that monitoring.

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14 March 2025

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18/03/2025

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**Re: Review of SLR AEE on marine mammals and draft Conditions**

Dear David,

Thank you for the opportunity to review these documents. I have been asked to provide comment and a high-level review of the assessment and proposed conditions. The three documents that I was asked to review were:

1. SLR (2025) Assessment of Effects on Marine Mammals Stella Passage: Fast Track Approval Application. SLR Project No.: 840.030138.00001. 24 February 2025. Revision: 03 FINAL DRAFT
2. POTL Stella Dredging Conditions – Draft for consultation purposes only. 15 p. [No date]
3. POTL Stella Structures Conditions – Draft for consultation purposes only. 18 p. [No date]

In this review, I have drawn on my own expertise in marine mammals and impact assessments including engagement as a marine mammal expert on many other previous consent applications around New Zealand and Australia for a range of activities. These have included port developments (e.g., wharf redevelopments, harbour dredging), inshore and offshore drilling projects, seismic surveys and mining working on behalf of both applicants and regulators.

I am familiar with this project having previously being involved with an earlier resource consent application and provided technical advice to the Council at that time.

Please note that I am only reviewing the marine mammal elements of these documents and have not provided any comments on any other aspects of the documents.

The three reports are considered separately.

**1. Report # 1 - Assessment of Effects on Marine Mammals Stella Passage: Fast Track Approval Application**

2. I am a marine mammal ecologist but I am not a specialist acoustician or underwater noise propagation modeller and, therefore, I am unable to comment on the specific mechanics of the proposed underwater modelling work. However, I have been involved with the utilisation and interpretation of data from underwater noise models for more than 10 years and so I am able to comment on the general approach, how consistent it is with other models I have worked with, and the appropriateness of the proposed mitigation.
3. The Assessment of Effects (AOE) document is very comprehensive and covers everything that I would expect to see in such an assessment. I cannot comment on the accuracy of the *Project*

*Description* section with respect to what actually appears in the application but it is well written, with useful and clear descriptions of the proposed activities which allow for a complete assessment of potential effects. The *Description of the Existing Environment* for marine mammals is well researched, has an excellent range of relevant and up to date sources, and utilises the best available data for the Harbour region. The defined *Area of Interest* (AOI) is set appropriately given the available data and what we know about the marine mammal species likely to be found in and around the Harbour area. The acoustic monitoring research provides excellent and informative data that is both highly relevant to the application and was undertaken using best practice research methods. Overall, the conclusions of the AOE are appropriate to the marine mammals likely to be in the area including assessments of the frequency and likelihood of them being in the area of the application.

4. The *Assessment of Environmental Effects* is comprehensive and covers all of the potential effects that may pose a risk to marine mammals. In particular, the assessment of underwater noise (the highest risk posed by the project) has been undertaken with state-of-the-art techniques and is well documented with conclusions consistent with the available data. The cumulative effects section is useful but reflects a qualitative rather than quantitative assessment. Unfortunately, this is probably the best that can be achieved from the available data without an unreasonably large investment in significant monitoring and modelling. Even so, if such an approach could be undertaken, then it would likely include large uncertainty and therefore may not be of much help in providing a robust assessment of this issue.
5. The *Recommended Mitigation* sections are well done and laid out clearly. The recommendations for mitigation are generally appropriate to the level of risk posed by the specific risks identified.
6. The key element of mitigation for pile driving (likely to be the highest risk activity for marine mammals) are the proposed shut down zones as laid out in Section 4.2.3.1. The extended shutdown zones for baleen whales and leopard seals (i.e., any reports of them within the harbour will result in a shutdown) are reasonable and appropriate. The proposed 500 m shutdown zone for other species (e.g., bottlenose dolphins, killer whales, common dolphin, false killer whale, pilot whales, beaked whales, fur seals) is also reasonable for these species when aiming to avoid Permanent Threshold Shift (PTS; i.e. permanent physiological damage to hearing) while noting that Very High Frequency Cetaceans (e.g. Hector's dolphins) are not expected to be found within the Harbour. While PTS is well covered by a 500 m shutdown zone, Temporary Threshold Shift (TTS; i.e. permanent physiological damage to hearing) is less well covered with zones of potential risk significantly larger than the 500 m shutdown zone being applied (e.g. HF cetaceans = 1,170 m; OCW = 2,200 m) and even larger for when there are two simultaneous piling sources (e.g., HF cetaceans = 1,460 m; OCW = 2,200 m). In addition, when there are two piling sources operating, then the threshold distance for PTS for OCW is 990 m which is almost double the suggested shutdown zone.
7. It is important to note that many of the thresholds identified above are well above the 500 m shutdown zone being applied for TTS in HF cetaceans and OCW (and PTS in OCW for when two piling sources are operating). The AOE cites some reasons why they have chosen only 500 m mitigation zones for these groups which are plausible but it is important to note that the possible 8,000 pile strikes undertaken during a day will only be able to occur during daylight hours (e.g. restricted to within ~12 hours but slightly more in summer and slightly less in winter) and so it doesn't require a marine mammal to be within the zone for 24 hours only 12 hours. Based on the data in Table 12 for HF cetaceans, dolphins would only have to remain within 510 m of the piling for 200 strikes or 17 minutes (assuming 1 strike every 5 seconds) or within 670 m for 32 minutes (assuming 1 strike every 5 seconds). Noting that in both these cases if dolphins came within 500 m, piling would be shutdown. It is important to note that the proposed 500 m shutdown zone will protect all marine mammals from PTS effects (with the exception of when two piling rigs are



operating simultaneously) but will only provide limited protection to some marine mammals from possible TTS. It may be useful to consider a different sized mitigation zone for when two piling rigs are operating given the significantly higher ranges of potential risk.

8. With respect to behavioural effects from underwater noise, the AOE states that, *“any marine mammal present in Stella Passage during active dredging would be expected to exhibit a low- or moderate-level behavioural change”* and for pile driving, *“The model predicts that strong behavioural responses (e.g. severe startle responses) will be largely limited to within Tauranga Harbour/Te Awanui; hence while effects on marine mammal behaviour outside the harbour are possible, these effects will be of low ecological significance and effects on the migratory behaviour of whales are unlikely.”* Notwithstanding these assessments, there is no mitigation proposed to reduce or eliminate behavioural effects on any marine mammals.
9. As a final comment about piling, the AOE notes that it will, *“...develop mitigation zones that can be implemented by MMOs and piling operators to ensure marine mammals are protected from AUD INJ.”* This is true for all cases with the exception of when two piling rigs are active where the zone for AUD INJ (or PTS zone) reaches out to 990 m for OCW. However, by the applicant setting the shutdown zone at 500 m, it is allowing for the possibility of TTS in the area out to 1,170 m (HF cetaceans) and 2,200 m (OCW) for single rig piling operations and out to 1,460 m (HF cetaceans) and 2,200 m (OCW) for when two piling rigs are operating. It may be useful to review these types of activities and assess whether a single 500 m shutdown zone is appropriate for all piling operations and all species.
10. One additional note is that Section 4.2.3.1 (page 53) states that, *“Noting that in good visibility, observations will be possible over a distance of approximately 3 km.”* In my experience, the range over which an MMO can effectively and robustly monitor an observation zone is 400-600 m. While you can regularly see large marine mammals at distances greater than this, you cannot guarantee you will see everything which is a requirement for this mitigation technique. In my opinion, there is no way that a MMO could reliably monitor an observation zone of 3,000 m for small dolphins or seals. This statement perhaps could apply to large whales when viewed from the bridge of a large ship (which is clearly not relevant to this application) but, even then, I would question if conditions were less than ideal (e.g., Beaufort sea state >4), whether you could consistently and robustly spot whales at 3,000. This is not necessarily directly relevant to the application and mitigation proposed unless the application decides to consider a larger mitigation zone.
11. The appendices are extremely useful and comprehensive and represent a useful addition to the AOE in providing more detail for the work which allows for an open and transparent assessment.
12. The Marine Mammal Management Plan (MMMP) is comprehensive and appears to contain most of the key mitigation actions detailed within the body of the AOE. This is critical as adherence to the MMMP is a specific requirement within the Structures Conditions.
13. One final statement which is important to put things into perspective, is that acoustic monitoring at Stella Passage over 229 days only had detections of dolphins on 6 days. While this highlights the importance of undertaking appropriate mitigation for potentially impactful activities on threatened and protected species, it does highlight that likelihood of marine mammals being in the core area of the activity is very low (i.e., <3% of days) and so potential effects should be assessed accordingly.
14. ***Conclusion: The AOE document is very comprehensive and covers everything that I would expect to see in such an assessment. The methods used are appropriate to the issues being addressed and the acoustic monitoring work represents international best practice. In general, the risk assessment pre- and post-mitigation appear reasonable and consistent with the data. The one***

*possible exception could be the application of a single 500 m shutdown zone which does still allow for potential TTS and/or PTS injuries for some species from some operations.*

#### 15. Report # 2 - Stella Dredging Conditions - Final Draft

16. I have only provided review of the Conditions with potential relevance to marine mammals. Given the AOE assessed dredging as a 'low' likelihood of effect with a 'negligible' magnitude of effect, there are not many conditions of specific relevance to marine mammals.
17. Condition 6.3 is directly relevant to the mitigation proposed in the AOE.
18. Condition 6.5 is a given noting that the Marine Mammal Protection Act Regulations (1992) is a legally binding Act on all parties already. The MMMP also identifies the Marine Mammals Protection Act 1978 as having some relevance but it is not referred to in any Conditions (although it is specifically mentioned in the Conditions for dredging).
19. Table 1 of the AOE states that, "*Retrieve marine debris whilst dredging*" as one of the recommended mitigation actions for dredging. There is no comparable statement in the conditions which could be useful.
20. The MMMP states in Table 1 that with respect to underwater noise from dredging, "*...the recommended controls relating to underwater dredge noise are addressed by several simple consent conditions and are not included as part of this MMMP.*" There isn't much detail of dredging in the MMMP but I am also unclear where the "several simple consent conditions" relating to dredging appear. I may have missed these but it may be useful to review this statement and what it is specifically referring to. Following on from this, there is no condition for dredging that relates to the MMMP. This could be a useful addition i.e., that all dredging operations should adhere to the MMMP. This would provide a useful link between the activity and the MMMP as there are some general statements within the MMMP that could be applied to dredging operations. There are a couple of minor comments relating to dredging in the MMMP which provide useful context (e.g., Section 5, 6.2, 6.3, 7.1).
21. ***Conclusion: There are very few references to marine mammals within the dredging conditions as would be expected given the expected negligible risk posed by the operation. I have identified some statements made in the AOE and MMMP which may be useful to carry forward into the draft conditions to provide some linkage between them and to ensure they are picked up during dredging operations.***

#### 22. Report # 3 - Stella Structures Conditions - Final Draft

23. I have only provided review of the Conditions with potential relevance to marine mammals. The main risk posed by the application comes from piling activities which, when applied with mitigation, is listed as a 'moderate' likelihood of effect and a 'minor' magnitude of effect. Presumably in the absence of any mitigation, this risk would be considerably higher. Given the significant mitigation proposed for piling, it is important that all the undertakings proposed in the AOE and MMMP are carried through into the final conditions.
24. Condition 1(d)(v) provides for the appointment of a marine mammal observation auditor. This is a positive inclusion but I have been unable to find any description of what this role entails in either the Conditions, AOE or MMMP. It would be useful to describe the roles of this position in one of these documents.



25. Condition 6 provides for the review of the final design statement. One thing potentially missing is to ensure that the final design statement is consistent with, and within the bounds of, the activities that were described and assessed in the AOE. Specifically, issues relating to marine mammals include the size of piles and number of strikes per day which are critical components of assessing underwater noise effects on marine mammals. The proposed shutdown zones have been based on the details provided in the AOE and, if the final design statement differs from those provided in the AOE, then the assessment or effect (and associated mitigation) may be different. It may be useful to add a condition that requires the applicant to confirm that final design statement is consistent with, or less than, the details provided and assessed in the AOE. Related to this is the ground truthing of the underwater noise detailed in the MMMP which may lead to changes in the shutdown zone based on the actual measured noise levels from the activity.
26. Condition 7.7 I have not viewed the *Reclamation and Construction Management Plan* associated with the project but note that in Section 3.1 of the AOE, it states a range of controls that will be required during pile driving. It is important that all of the controls listed in Section 3.1 appear in the Reclamation and Construction Management Plan or even, given their importance to mitigation, are appended as a specific Condition on their own. The requirement for bubble curtains for all impact-pile driving is a critical component of mitigating underwater noise for marine mammals and therefore must be applied.
27. Condition 12 is excellent and confirms that the activity must undertake all works in accordance with the MMMP.
28. Condition 12.6 is good. I note that the applicant confirms in the AOE that all vibro-piling should follow the same mitigation procedures as impact-piling. It may be useful to make this explicit in the Conditions for clarification.
29. Condition 12.9 refers to white pointer sharks and turtles. It is good to see these mentioned as potential visitors to the harbour. It is excellent to see them included as species for which the shutdown zone will apply. However, I note that there is no reference to either of them within the AOE including no assessment of possible effect from the activity on either species. I am assuming the marine mammal mitigation zones assessed in the AOE are simply being applied to these other two species. I would also note that only green turtles are specified. It may be more useful to apply this rule to any turtle seen as it can be difficult to distinguish between turtle species at a distance.
30. Condition 12.9 It may be useful to be specific about the MMOZ and the extended MMOZ within this condition as they represent quite different areas.
31. Condition 12.10 Positive to note that piling will only occur during daylight hours unless otherwise approved. Noting that if nighttime piling were to be agreed, there would need to be a careful consideration of the present mitigation approach which relies on visual observation of the shutdown zones.
32. Condition 12.11 'suitable resolution camera system' could provide an alternative to a MMO but it would need to be carefully evaluated against criteria such as field of view and range in providing comparable visual searching to an MMO.
33. Condition 12.15 This is a positive control. One possible addition might be to specify that if a leopard seal present within the harbour is hauled out (e.g. out of the water), then piling can continue so long as it stays out of the water. There is zero risk of underwater noise injury for a hauled-out seal. An additional requirement might be to require constant monitoring of the leopard seal so that as soon as it re-enters the water, piling must stop. Given that leopard seals can haul out in an area for several days, this would allow piling to continue during this time with no risk to the seal. It may be useful to consider a similar statement for fur seals which are hauled out and inside

the shutdown zone allowing piling to continue until the seal re-enters the water. This has been a grey area in some previous projects where seals can be commonly found close to the activity.

- 34. Conclusions:** *There are a wide range of conditions relevant to marine mammals with the Structures document. In general, most of the specific mitigation and other requirements are picked up in the Conditions, most notably, with the requirement to follow the MMMP. I have suggested some additional issues that could be useful to bring forward as Conditions given their importance to the mitigation of effects on marine mammals.*

### 35. Suggested actions

36. I have summarised my main suggestions for possible reconsiderations and/or revisions to the proposed documents below alongside the paragraph number where full details of those suggested changes can be found.

#### **Report # 1 Assessment of Effects**

37. Review basis for 500 m shutdown zone noting that implementing the zone at 500 m will still allow for TTS and/PTS for some species during some activities and during times when two piling rigs may be operating. Consider different shutdown zone for when two piling rigs are operating simultaneously [Paragraphs 6-7, 9].
38. There is no mitigation proposed for potential behavioural effects although the AOE notes that there are likely to be low and/or moderate level behavioural effects for some species [Paragraph 8].

#### **Report # 2 Dredging Conditions**

39. Review details provided in the MMMP and AOE for mitigation and other actions proposed for dredging operations which to do appear to be reflected in the draft Conditions, including a reference to implementing the controls identified in the MMMP [Paragraphs 19-20].

#### **Report # 3 Structures Conditions**

40. Details of the provision and role of a marine mammal auditor should be clarified [Paragraph 24].
41. It would be useful to add a condition that requires the applicant to confirm that the final design statement is consistent with, or less than, the details provided and assessed in the AOE [Paragraph 25].
42. It would be useful to specify in Conditions that ground truthing of the underwater noise must take place and that this may lead to changes in the shutdown zone based on the actual measured noise levels from the activity [Paragraph 25].
43. Ensure that all controls described in the MMMP and *Reclamation and Construction Management Plan* are reflected in specifically in Conditions. In my experience, critical issues that are not specified in Conditions can often be neglected or forgotten during the delivery of the project [Paragraph 26].
44. Vibro-piling should be specified in the Conditions as having the same mitigation requirements as impact-piling where appropriate [Paragraph 28].
45. Turtles and sharks are specified as being included as species for which that shutdown zone applies. This should be specified in Conditions [Paragraph 29].
46. Consider adding additional detail to shutdowns for leopard and fur seals specifically that when they are hauled out of the water, the shutdown rules do not apply [Paragraph 33].

I hope these comments have been useful.

Sincerely yours,



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2/04/2025

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**Re: Review of SLR “Review of Marine Mammal Assessment and Consent Conditions Port of Tauranga, Stella Passage Development, FTA Application”**

Dear David,

Thank you for the opportunity to review these documents. I have provided comment on SLR’s response to my review and also on the revised Condition set. The three documents that I was asked to review were:

1. SLR (2025) Review of Marine Mammal Assessment and Consent Conditions Port of Tauranga, Stella Passage Development, FTA Application. 31 March 2025;
2. SLR (2025) FTA Stella Dredging Conditions - Final Draft - For Consultation DG and LF 21.3.25\_revised\_2025-3-31; and
3. SLR (2025) FTA Stella Structures Conditions - Final Draft - For consultation DG LF 21.3.25\_revised\_2025-3-31.

The three reports are considered together. I follow the format of the SLR Rreport and respond directly to their **Suggested Actions**.

**Suggested Action 1** SLR have acknowledged the issue that some marine mammals will be potentially exposed to both temporary physiological hearing damage (TTS) and/or permanent physiological hearing damage (PTS) if only a 500 m shutdown zone is applied. SLR have provided some explanation as to why they believe that the risk to marine mammals outside of 500 m is acceptable including that most species are rarely found within the area and that *in-situ* underwater noise monitoring will be undertaken when the project starts and appropriate shutdowns will be set based on actual, empirical data.

In response I note:

- In my opinion, no activity should be allowed which has the potential to lead to permanent hearing damage (i.e., PTS) to a marine mammal, even if that risk is low. The impact of such an injury has potentially life-threatening implications for any individuals affected. From my reading of the impact assessment, it is only when two piling rigs are being run simultaneously that the risk of permanent hearing injury becomes a problem and so when a single piling rig is operating this is not an issue. My strong recommendation would be to set a larger shut down zone (e.g., 1,000 m) for when two piling rigs are operating which

would provide complete protection for all species from permanent hearing injury. This could then be adjusted when the actual noise monitoring was undertaken at the start of the project. A 500 m shutdown zone for single piling rigs is sufficient to protect from permanent hearing injury.

- The 500 m shutdown zone provides reasonable protection from temporary hearing damage (i.e., TTS) for many species if there are only a low number of pile strikes within a 24 hour period. However, it still represents a risk for some species outside of this area (e.g., out to 1,170 m (HF cetaceans); 2,200 m (OCW) for single rig piling operations; out to 1,460 m (HF cetaceans) and 2,200 m (OCW) for when two piling rigs are operating)<sup>1</sup>. This means that dolphins could be more than 670 m and 1,700 m and seals could be more than 960 m and 1,700 m outside the shutdown zone and still get hearing damage for single and two piling rig scenarios. While temporary hearing injuries represent less of a risk than permanent hearing injuries, they do still have the potential to create significant problems for marine mammals.
- The argument that dolphins and killer whales are only present in the area rarely (<3% of days) works both ways. It means that if the applicant applies a 500 m shutdown zone, then these species only have a small chance of being affected during 3% of the duration of the project. SLR provide this as an explanation for why they think a shutdown zone which doesn't cover the full range of potential temporary injury is reasonable. I would argue the opposite in fact, that if these species are only present within the area for 3% of the time, then implementing a shutdown zone that actually provides full protection from temporary hearing injuries (e.g. 1200 m for dolphins and killer whales and 2200 m for seals), isn't likely to lead to a significant impact on the project delivery (e.g., there won't be many hours of piling work "lost" to shutdowns) and the applicant should welcome providing full protection from temporary or permanent heading injury. Such an approach would reduce the risk of any hearing related injury to zero for all marine mammals from the operation. I would recommend such an approach.
- Finally, I agree with SLR in that the use of cushion blocks and bubble curtains are likely to reduce the zones over which hearing injuries are likely. However, we won't know how much until the measurements are taken. Furthermore, there are examples of projects where the actual, measured underwater noise levels were significantly louder than was modelled in the impact assessment. If such an approach as I suggested above is accepted (i.e., zero risk adopted for any hearing related injury), then it is critical that the adjusting of the shutdown zones after noise monitoring is done to ensure that the zones are big enough to prevent PTS and TTS.

Overall, I am concerned that by sticking with a single shutdown zone of only 500 m, it is allowing for the potential of both temporary and permanent hearing injuries for marine mammals. Given how rarely it appears marine mammals are found within the project area, there is likely to be little impact on piling operations by setting a large and comprehensive shutdown zone. Another option, might be to set a different shutdown zone size for the different species groups and for single vs. double piling rig operations. I believe that the proposed SLR *Result* to my original concern is inadequate to address the real risk of hearing injury from the project.

**Suggested Action 2** I agree with SLR's statement that any population level consequences (i.e., significant biological impacts) from behavioural disturbance are highly unlikely from the proposed activity. I also note that most piling projects do not specifically mitigate against behavioural impacts although this is slowly changing. Given the rarity of marine mammals within the proposed project area, behavioural impacts are not going to be an issue but they could be for

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<sup>1</sup> Please see paragraphs 6, 7 and 9 of my first review for further details of this issue.

a location where marine mammals are more regularly found or the location is of some biological significance to them. The *SLR Result* is noted and accepted.

**Suggested Action 3** Excellent response. The *SLR Result* is noted and accepted.

**Suggested Action 4** Good response. I would add to the suggested Condition text, "... in full compliance with the certified Marine Mammal Management Plan and relevant Conditions". The *SLR Result* is noted and accepted with the additional suggestion above.

**Suggested Action 5** The *SLR Result* is noted and accepted.

**Suggested Action 6** The *SLR Result* is noted and accepted.

**Suggested Action 7** Excellent response. The *SLR Result* is noted and accepted.

**Suggested Action 8** The *SLR Result* is noted and accepted.

**Suggested Action 9** I note the introduction of placeholder Condition 7.17 with the caveat from Mitchell Daysh. The *SLR Result* is noted and accepted.

**Suggested Action 10** The *SLR Result* is noted and accepted.

**Additional Matter** Condition 12.10 is noted. The *SLR Result* is noted and accepted.

I hope these comments have been useful.

Sincerely yours,



Simon Childerhouse Ph.D.

Principal Marine Scientist – Blue Planet Marine





To: Enspire  
Limited

Date: 6  
March  
2025

Attention:  
David  
Greaves

Job No:  
68059

Copy to:  
Bay of  
Plenty  
Regional  
Council

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## PORT OF TAURANGA STELLA PASSAGE DEVELOPMENT – COMMENTS ON FINAL COASTAL BIRD ASSESSMENTS.

The following comments refer to two reports regarding coastal birds – (1) Wildland Consultants (2025) Assessment of Potential Effects on Birds of the Proposed Stella Passage Development for Port of Tauranga. Wildland Consultants Contract Report no. 7339a. Prepared for Port of Tauranga. 40pp; (2) Wildland Consultants (2025) Avifauna Management Plan for the Port of Tauranga sand storage site, wharf extensions, and wider port environs. Wildland Consultants Contract Report No. 5154f. Prepared for Port of Tauranga Ltd. 71pp.

In addition, a peer review by Dr John Craig has been referred to – John L. Craig (Green Inc Ltd) Independent Review of “Assessment of Potential Effects on Birds of Proposed Port of Tauranga Stella Passage Development” by Wildlands Consultants Limited. February 2025.

My comments are as follows:

The assessment of potential effects is comprehensive, addresses the issues arising from the proposed project and measures in mitigation and avoidance.

The final management proposals regarding both red-billed gull (At Risk species) and little blue penguin (At Risk species) follow ‘standard practice’ and experience elsewhere; both initiatives are a positive outcome of the development and have a high probability of enhancing the local breeding success of both species.

The proposed management of the sand pile area is appropriate. Despite its constructed nature it clearly has high values at times. It is especially important as a known local breeding site for five species of coastal birds, all of conservation concern, and as a high tide roost for

eastern bar-tailed godwit (summer but also over-wintering individuals), South Island pied oystercatcher (summer and winter), red-billed gull (summer) and white-fronted tern (summer) in particular, together with a high diversity of other species in generally smaller numbers. The aim to maintain the sand pile as a high tide roost and as a breeding site is therefore appropriate. It is also equally appropriate to manage the sand pile as a repository for dredged sand from the channel to maintain the Port's operational capability, which in turn provides sand for beach nourishment and therefore enhancement of public amenities. The proposed sand pile management will similarly enhance the local avifaunal values via formal, consistent coastal bird monitoring and sand management protocols. The only recommendation arising is that confirmation is required that dredging, and consequent sand deposition on the sand pile, could occur for four hours either side of low water on the basis that the roost is deserted. It is quite common for birds to linger at roosts after high water until up to half tide falling (i.e. high water + 3 Hours) depending on the circumstances (pers. obs.).

Minor comments – the following minor comments relate to the proposed field methodology outlined in - Section 3. Monitoring : (a) the reference to 5-minute counts is unclear as it is usually employed in terrestrial bird surveys; it would be better to simply count the birds in each sector each survey; (b) caution will be required regarding drone use and the potential to displace birds, especially birds congregated at a roost – drones represent a potential aerial predator and therefore a threat; (c) similarly, caution is advised regarding the wearing of Hi Vis gear close to birds as it may also result in site desertion; (d) equipment should include binoculars AND a spotting scope and, (e) provision of an endoscope would assist with penguin surveys.

Graham Don (Senior Ecology Consultant)  
6 March 2025

19 March 2025

David Greaves  
Enspire Ltd

Dear David,

**RE: REVIEW OF THE PORT OF TAURANGA EXPANSION PROJECT LANDSCAPE ASSESSMENT.**

**Introduction**

1. The Port of Tauranga (PoT) applied for Resource Consent to be processed by direct referral to the Environment Court to expand their operations at the Mount Maunganui (east) and Sulphur Point (west) wharves on both sides of the Stella Passage in 2021. The development included further capital and maintenance dredging of Stella Passage. The PoT are re-applying for consent for the development via the Fast Track Approvals Act 2024. The current Fast Track application is in the pre application consultation phase.
2. I undertook a review of the Landscape and Visual Assessment report for the original PoT expansion application in 2021. I subsequently participated in consultation with stakeholders, site visits and the preparation and presentation of evidence at the Environment Court hearing in February and March 2023.
3. The application was granted consents on a staged basis, subject to further work and monitoring being completed.
4. Further to your correspondence and instructions, I have undertaken a review of the Port of Tauranga Stella Passage Development Landscape Assessment prepared by Brown NZ Ltd, February 2025 (The **Assessment**). I note that the **Assessment** is at a pre-application consultation stage, is marked as a Final Draft and is not yet complete. In particular, the Appendices and photographs are not yet available.
5. The purpose of this Peer Review (The **Review**) is to review the **Assessment** and any other relevant information relating to the potential natural character, landscape and visual effects of the proposal to understand and provide comment on its' completeness for lodgement. This is not a full **Review** of the **Assessment** or its' conclusions, which will be completed once the final **Assessment** and its' appendices are available and lodged.

**The Assessment**

6. The **Assessment** is a comprehensive landscape and natural character effects assessment of the proposal to undertake further development of the Stella Passage, the main working edges and waterway of the PoT.
7. The **Assessment** describes the staged development of the Stella Passage for which consent is sought<sup>1</sup>:

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<sup>1</sup> The description of Stage 1 and Stage 2 of the proposed Stella Passage Development are copied directly from the **Assessment**.

*Stage 1: would see extension of the existing Sulphur Point Container Terminal berths some 285m south of the current terminal berths, accommodating an extra container ship berth and up to two new container cranes, together with associated reclamation and dredging. The new cranes, like those already operating at Sulphur Point, would have A-frame gantries and a maximum height of 110m (when in their 'resting' position). In addition, automated stacking cranes – up to 35m high – would operate within the container terminal, between and straddling its stacked containers.*

*Stage 2: would result in extension of the Sulphur Point Container Terminal berths by another 100m, to a termination point 385m south of the current container berths. Again, two more cranes could be employed in this area, but their height would be limited to a maximum height of 78m. This would require the use of articulated boom cranes that have lower operating and resting positions than A-frame cranes (see overleaf), while a total of 12 to 13 container cranes could then be employed at Sulphur Point overall – four more than in the past.*

8. The application for the staged development of the Stella Passage and the wharves is a refined version of the original application lodged in 2021.
9. Overall the **Assessment** is thorough and follows a methodology which is consistent with best practice guidance on landscape assessment in New Zealand, namely Te Tangi a te Manu, the Aotearoa New Zealand Landscape Assessment Guidelines (2022), as stated in the **Assessment**.
10. The **Assessment** is set out under the following sections<sup>2</sup>:
  1. Introduction
  2. A Project Overview
  3. The Project's Landscape Context
  4. Statutory Considerations
  5. Iwi Management Plans and the Published Histories of Tauranga
  6. The Effects Management Methodology
  7. Biophysical Effects
  8. Perceptual / Associative Landscape and Natural Character Effects
  9. Statutory Evaluation
  10. Conclusions & Recommendations
11. The Assessment finds:
  - The perceived natural character effects on all viewpoints and receiving environments will be of a very low order.

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<sup>2</sup> The section headings are copied directly from the **Assessment**.

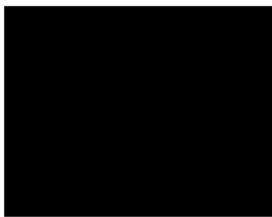
- The landscape effects will generally be of a very low to low order, including visual effects from marae and towards Mauao.
  - One exception is at Whareoa Marae where effects will be moderate for the second stage of development, but less so for stage one.
  - Overall, the project is considered to be acceptable in terms of its landscape and natural character effects, without any screening or other landscape mitigation measures.
12. The effects summary tables are on page 92 of the **Assessment** and are further summarized in the Executive Summary and the Conclusions sections.
  13. While the **Assessment** finds that no screening or mitigation measures are required from a landscape perspective, the ecological recommendations are acknowledged, including the provision of Blue Penguin nesting boxes at Butters Landing, the relocation of the gull and tern colony within the port and the ongoing protection of Te Paritaha and its' kaimoana habitat.
  14. The **Assessment** follows a similar methodology and format to the 2021 Assessment that supported the previous application. A section reviewing Iwi Management Plans and published histories has been added and covers, in some detail, the content of the Tauranga Moana Iwi Management Plan (2016-2026), the Ngāi Te Rangi Iwi Management Plan (1995) and the published histories of Tauranga Moana and Te Awanui. The Iwi Management Plans and Published Histories section provides useful context for understanding the cultural landscape context of the application.
  15. The **Assessment** includes a detailed description and assessment of landscape and natural character effects on local Marae, including those visited during the consultation with the Marae for the 2021 application, at the invitation of Ngāi Te Rangi. An assessment of the landscape and perceived natural character effects on each of the Marae is provided on pages 85-88 of the **Assessment**. For each of the marae (apart from Whareroa) the landscape and perceived natural character effects are assessed to be very low for Stages 1 and 2 of the proposed Stella Passage development.
  16. For the Whareroa Marae the stage one landscape effects are assessed as low and the stage two landscape effects are moderate. The perceived natural character effects are assessed as very low for both stages.
  17. The **Assessment** has described the long history of the development and operation of the PoT and the surrounding industrial area in the context of the original presence and ongoing occupation of the Whareroa Marae. The highest level of landscape effects are assessed in relation to the Marae. It is not clear if the elevated effects of stage two of the development of the Sulphur Point container terminal, including expansion of the wharves to the south and the addition of container cranes has been considered in relation to the potential planting of the coastal edge adjacent to the marae as a potential 'off site' mitigation offering to the Marae. Given that the Marae is assessed as potentially experiencing the highest level of landscape effects from the proposed Stella Passage development, further consideration should be given to the potential mitigation of these effects. Planting along the coastal edge of the Whareroa Marae with indigenous coastal trees, such as Pohutukawa, could be successful in providing further screening of views towards the Stella Passage and the stage two development of the Sulphur Point wharves. It is possible that the Whareroa Marae and Ngāti Kuku may prefer not to impede views in the direction of Te Awanui and the Kaimai Ranges.

18. The tension between the technical expert approach and the Mātauranga Māori approach to the assessment of landscape and natural character effects of the application on the cultural landscape has not been fully resolved, as no Tāngata Whenua voice or feedback is contained within the Assessment. Even though the relevant Iwi management plans and published histories are well summarized, it is the perspective of a technical assessor. It follows that the Marae and Ngāti Kuku may have a different view of the level of effect that stage two of the proposed development could have on the Marae and its' surroundings, particularly given the desire to keep views from the Marae in the direction of Te Awanui and the Kaimai Ranges unimpeded.

#### **Recommendations**

19. It is recommended that the following additional information should be provided within the **Assessment** to ensure that a full understanding of the potential Landscape and Natural Character effects of the proposal is provided<sup>3</sup>:
- Exploration of the opportunity to offer coastal edge tree planting to the Whareroa Marae to screen or integrate future views of the development of the Stella Passage, should that be desirable following engagement with Whareroa Marae and Ngāti Kuku. One side effect of such planting would be to screen views of Te Awanui and the Kaimai Ranges, which may be undesirable for the Marae;
  - Engagement with the marae to understand more fully the potential landscape effects of the Stella Passage development on the local cultural landscape from a Mātauranga Māori perspective.
  - Inclusion of the appendices, photographs and other graphics to illustrate the existing landscape context and the landscape effects of the proposed Stella Passage development and to support the assessment and conclusions. A full review of the Assessment will not be possible until it is completed and the appendices are provided.
20. I hope this review assists your understanding of the **Final Draft Assessment**. I will be happy to discuss and review, as required. Please call me if you have any queries.

Yours sincerely



**BRAD COOMBS**  
FNZILA (Registered)  
Principal  
Isthmus

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<sup>3</sup> In addition to the further recommended information, the following minor typographical errors were noted in the Final Draft **Assessment**:

- i. Section 3.3. Second paragraph. Waihi Bay (assumed this should read Waipu Bay)
- ii. Page 59. Second paragraph, reference to paragraph 39. Paragraphs are not individually numbered in the **Assessment**.



Bay of Plenty Regional Council  
c/o Enspire  
email

Attention: David Greaves

Dear David

### **Stella Passage Development Resource Consent Application: s92 response assessment**

Bay of Plenty Regional Council engaged Tonkin & Taylor Ltd (T+T) to do a review of the completeness of the coastal process information supporting the consent application for the Stella Passage Development to inform any S92 RMA request for additional information or clarification. This letter report sets out the information reviewed and the outcomes of the preliminary assessment undertaken by T+T.

A request of clarification was issued to the applicant on 10 June 2021 and a response received on 17 August 2021. We have reviewed the information supplied and the additional clarification provides useful context to the assessment outcomes. Based on the technical material supplied with the application and the s92 response, we can confirm the coastal process information is complete and believe this information can be relied upon for the consideration of effects on the coastal environment of the proposed development.

Based on my review of the results of the hydrodynamic and morphodynamic modelling (Appendix D2 and D1 respectively) I conclude that:

- Water elevation changes are likely to be negligible both in terms of elevation and timing, and any resulting change would likely have no perceptible effect on coastal processes operating within the harbour.
- Changes in flow are limited to the deepened channel in the Stella Passage with no significant changes beyond the extent of the channel. There are minor changes in flow direction at the transition to the new dredged channel. This means that there are very slight changes from the existing baseline conditions but likely no perceptible impacts on hydrodynamics beyond the immediate work area. Local hydrodynamic changes are unlikely to result in consequent adverse impacts elsewhere.
- The hydrodynamic changes resulting from the proposed channel design are small in relation to the natural dynamics currently operating in the area, so will likely have negligible impacts on structures flanking the channel.
- There are localised changes in sediment transport resulting from the proposed development within the project area with likely negligible impacts outside the project area.

This report has been prepared for the exclusive use of our client Bay of Plenty Regional Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Bay of Plenty Regional Council in undertaking its regulatory functions in connection with the Stella Passage Development Resource Consent Application

Yours sincerely

Richard Reinen-Hamill  
Technical Director: Coastal Engineering

10-Dec-21  
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## Bay of Plenty Regional Council

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### Technical Review of Air Discharge Assessment – Stella Passage



Report 25092  
Report date 20/03/2025

17 Banks Ave, Mount Maunganui  
[airmatters.co.nz](http://airmatters.co.nz)

## 1.1 Overview

Port of Tauranga Limited proposes to extend the Sulphur Point and Mount Maunganui wharves at the Port of Tauranga. This will allow larger vessels to visit the Port and for container ships and bulk carriers to berth further south than present. There are two stages to this development:

Stage 1: 285m wharf extension at Sulphur Point.

Stage 2: Additional 100m wharf extension at Sulphur Point and 315m wharf extension at the Mount Maunganui wharves.

Resource consent is not required for discharges to air as they are permitted under the Resource Management (Marine Pollution) Regulations 1998. Independent of this, Tonkin and Taylor has undertaken an air quality assessment on behalf of the Port of Tauranga (the Applicant) to address local concerns about air quality in the Mount Maunganui Airshed and particularly at Whareroa Marae. This review is based on the 'Stella Passage Development, Air Quality Assessment, Final Draft, February 2025' by Tonkin and Taylor.

## 1.2 Description of the Proposal

The development is outlined in two stages (as noted above). The information provided enables a good understanding of the proposed development.

For clarity, it would be beneficial for the Applicant to note if normal operations will continue at the Cement Tanker/Bulk Liquids berth and the purpose of the mooring dolphins (i.e. berthing of larger ships). In addition to this, confirmation that the minor structures area does not result in additional emissions (i.e. larger vessels berthing in this location).

## 1.3 Nature of Discharges to Air

The main contaminants of concern have been identified.

Minor contaminants including Polycyclic Aromatic Hydrocarbons (PAHs) and Volatile Organic Compounds (VOC) have not been considered but are known to be discharged when fuel oil is combusted. It would be beneficial for some commentary around this and why they have not been considered further in the assessment.

## 1.4 Air Quality Assessment Criteria

The Applicant has used air quality assessment criteria from the following sources:

- The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ).
- Proposed changes to the NESAQ (Ministry for the Environment, 2020) - although it is noted these are unlikely to be formally adopted.
- The Ministry for the Environment Ambient Air Quality Guidelines (AAQG).

These criteria are appropriate. In addition to this, international guidelines from the World Health Organization (WHO) and the Council of the European Union have been used. It is noted that by the Applicant that the WHO guidelines have not yet been formally evaluated by the Ministry for the Environment or Ministry of Health for adoption as New Zealand air quality guidelines or standards. This is supported by the Allied Asphalt Environment Court decision<sup>1</sup> where it accepted the position that it would be premature to adopt the WHO 2021 guidelines as assessment criteria, but that they should be considered to provide a complete assessment.

The Applicant has used appropriate assessment criteria.

## 1.5 Existing Environment

The existing environment has been described using data from ambient monitoring stations in the Mount Maunganui Airshed (MMA) with a focus on the monitoring station at Whareroa Marae. The existing environment has been described adequately and is summarised below.

### 1.5.1 Sulphur Dioxide

Ambient monitoring in the Mount Maunganui Airshed (MMA) shows that SO<sub>2</sub> levels have reduced since the amendment to Annex 6 of MARPOL in 2020. This reduction in SO<sub>2</sub> levels is less evident at the monitoring station located at Whareroa Marae which is most likely due to the three industrial sources immediately surrounding Whareroa Marae which discharge SO<sub>2</sub>.

The Applicant has provided data from monitoring stations in the MMA which show that there have been no exceedances of the New Zealand 1-hour and 24-hour guidelines for SO<sub>2</sub> since 2016. Comparison with the 24-hour WHO guideline shows that there were 5 days in 2024 where the guideline of 40µg/m<sup>3</sup> was exceeded.

The assessment does not include SO<sub>2</sub> data from Whareroa prior to 2016 where there were a number of exceedances of the New Zealand guidelines occurred. However, these were largely attributable to the adjacent industry.

### 1.5.2 Particulate Matter

The MMA is classified as a Polluted Airshed in relation to PM<sub>10</sub>. A comparison with the NESAQ for PM<sub>10</sub> at Whareroa Marae shows that there has been one exceedance of the 50µg/m<sup>3</sup> Standard since 2019.

The PM<sub>2.5</sub> concentrations measured at Whareroa Marae meet both the Proposed NESAQ and WHO 2021 24-hour average guidelines. Annual average PM<sub>2.5</sub> concentrations meet the Proposed NESAQ and the WHO 2021 guidelines. The annual average concentration is elevated when compared to the WHO 2021 guideline.

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<sup>1</sup>  
Decision [2024] NZEnvC 247

### 1.5.3 Nitrogen Dioxide

Monitoring at Whareroa Marae for Nitrogen Dioxide (NO<sub>2</sub>) meets the NESAQ 1-hour average and the AAQG 24-hour average. However, NO<sub>2</sub> levels at measured at Whareroa Marae already exceed the WHO 24-hour and annual average guidelines.

## 1.6 Dispersion Modelling

To assess the effects of discharges to air, air dispersion modelling has been carried out. Modelling has used CALPUFF non-steady state dispersion model in conjunction with CALMET data provided by the BOPRC for 2021. In addition to this, CALMET data has been produced by the Applicant for 2024. The model parameters and CALMET data for 2024 will be assessed for BOPRC by ASG.

### 1.6.1 Model Scenarios

Model scenarios are considered conservative in relation to the emission profiles used for 1-hour, 24-hour and annual average modelling. The model scenarios are appropriate for the assessment, however, further clarification on the following points would be beneficial;

1. The model has been set up with one ship berthed on the Mount Maunganui extension (at the southernmost end of the extension). The Applicant should confirm that the wharf extension on the Mount Maunganui side will only allow for one extra ship to be berthed in comparison with the current set up. In Figure 7-1 it appears that there may be provision for up to two ships.
2. The emission rates used are based on published information for the ships. Details of this information should be provided.

## 1.7 Air Quality Impacts at Whareroa Marae

Both the incremental and cumulative effects have been assessed at Whareroa Marae. Incremental effects are the ground level concentrations predicted by modelling at Whareroa Marae and cumulative effects additionally consider a background concentration.

Cumulative effects have been assessed using a contemporaneous modelling approach where hourly background concentrations are added to hourly model results. This is in line with the MfE Good Practice Guide for Assessing Discharges to Air from Industry 2016 which states *'The best predictive assessment technique is to use hourly, sequential ambient air quality monitoring data that are recorded in the airshed of interest, and then add the hour-by-hour predicted concentrations. These predicted concentrations should be made using meteorological data, recorded at the same time as the recorded air quality data. Where data are available, this approach is recommended'*.

This approach has been undertaken for SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and NO<sub>2</sub> for the years 2021 and 2024. Provided that the model set up and meteorological data generated for 2024 is correct (refer to ASG review), then the assessment appropriately assesses the air quality effects. The assessment is summarised below.



### 1.7.1 Sulphur Dioxide

Advice has been provided in relation to background SO<sub>2</sub> concentrations in the MMA by BOPRC (Technical Note: *SO<sub>2</sub> Background Values for Use in Air Dispersion Modelling in the Mount Maunganui Region*, ASG June 2024). The Technical Note states that it would be appropriate to use the background concentrations in the ASG report combined with the site emissions and emissions from surrounding industry (including Ballance, Waste Management and Lawter) for SO<sub>2</sub>. The appropriateness of this approach for this application will be reviewed by ASG.

The Applicant has not assessed the SO<sub>2</sub> concentrations against the WHO 10-minute guideline of 500µg/m<sup>3</sup>.

### 1.7.2 Particulate

Although the contemporaneous modelling approach is not aligned with guidance from the BOPRC (Technical Note: *TSP, PM<sub>10</sub>, PM<sub>2.5</sub> Background Values for Use in Air Dispersion Modelling in the Bay of Plenty Region* by ASG March 2023) background levels are consistent with those recommended by BOPRC apart from the 24-hour PM<sub>2.5</sub>, which is less.

### 1.7.3 Nitrogen Dioxide

In order to determine cumulative effects of NO<sub>2</sub>, an empirical method has been used. In this instance, as both NO<sub>2</sub> and NO<sub>x</sub> have been measured at Whareroa Marae, a best fit relationship has been used to define a ratio of NO<sub>2</sub>/NO<sub>x</sub> for 1-hour, 24-hour and annual averages. This method is not specifically stated in the MfE Good Practice Guide for Assessing Discharges to Air from Industry 2016, however, the methods noted by the MfE to account for the atmospheric chemistry are more simplistic and result in conservative estimate. The empirical method has been used internationally and is appropriate to use in this instance.

#### 1-hour data

The best fit for 1-hour NO<sub>2</sub>/NO<sub>x</sub> relationship shows:

- Less than 40µg/m<sup>3</sup> of measured NO<sub>x</sub> - the NO<sub>x</sub> to NO<sub>2</sub> ratio is around 1
- Around 60µg/m<sup>3</sup> of measured NO<sub>x</sub> - the NO<sub>x</sub> to NO<sub>2</sub> ratio is around 0.8
- Around 80µg/m<sup>3</sup> of measured NO<sub>x</sub> - the NO<sub>x</sub> to NO<sub>2</sub> ratio is around 0.6
- Above 100µg/m<sup>3</sup> of measured NO<sub>x</sub> - the NO<sub>x</sub> to NO<sub>2</sub> ratio is less than 0.4

The maximum 1-hour measured NO<sub>x</sub> concentration at Whareroa Marae in 2024 was 196µg/m<sup>3</sup>. Based on this, the Applicant has used a ratio of 0.4. The predicted worst-case cumulative NO<sub>2</sub> concentration is below the NESAQ of 200µg/m<sup>3</sup>.

#### 24-hour data

The assessment of 24-hour concentrations has used the relationship between NO<sub>2</sub> and NO<sub>x</sub> at various monitoring locations around Auckland and Whareroa Marae. A linear relationship has been applied to determine a ratio of 0.45. The predicted worst-case cumulative modelled NO<sub>2</sub> concentration is below the

AAQG of  $100\mu\text{g}/\text{m}^3$ . The predicted 4<sup>th</sup> highest worst-case cumulative modelled  $\text{NO}_2$  concentration exceeds the WHO guideline of  $25\mu\text{g}/\text{m}^3$ . It is noted that the background  $\text{NO}_2$  level measured at Whareroa Marae already exceeds the WHO 24-hour guidelines of  $25\mu\text{g}/\text{m}^3$ .

#### Annual data

The assessment of an annual concentration has used the relationship between  $\text{NO}_2$  and  $\text{NO}_x$  measured at Whareroa Marae of 0.58. The predicted annual average cumulative modelled  $\text{NO}_2$  concentration exceeds the WHO guideline of  $10\mu\text{g}/\text{m}^3$ . It is noted that the background  $\text{NO}_2$  level measured at Whareroa Marae already exceeds the WHO annual guideline of  $10\mu\text{g}/\text{m}^3$ .

#### Assessment of short-term averages (less than 24-hour)

The Applicant has used the worst-case background concentration measured at Whareroa Marae for 1-hour and 24-hour assessments. These background concentrations have been used to compare with the modelled concentrations over the same time period. Using this approach means that the hour or day when the maximum concentration was measured at Whareroa Marae does not necessarily coincide with the hour or day when the maximum concentrations are predicted from modelling. A graphical presentation of the measured background and incremental increase on these concentrations would be useful over the year.

#### **1.7.4 Principle Source**

For completeness an assessment which calculates a mass emission ( $\text{kg}/\text{year}$ ) from the ships at the proposed berths should be carried out.

### **1.8 Air Quality Impact Descriptors**

Impact descriptors have been used to summarise the impact of the project on air quality (Institute of Air Quality Management, 2017). These have been developed for annual averaging periods rather than shorter averaging periods which the Applicant has acknowledged.

The impact on the annual average for  $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$  are correctly classified as Negligible when compared to the relevant New Zealand standards/guidelines. The impact on annual average concentrations for  $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$  and  $\text{NO}_2$  when compared to the WHO guidelines does not appear to be correctly classified.

The assessment against shorter averaging periods carried out by the Applicant has not been reviewed as there is no information on the background concentration used for  $\text{SO}_2$ ,  $\text{PM}_{10}$ ,  $\text{PM}_{2.5}$  and  $\text{NO}_2$ .

#### **1.8.1 Sensitive Receptors**

The Applicant has assessed the air quality impacts of the proposed wharf extensions at Whareroa Marae. It is stated that Whareroa Marae is the closest residential (sensitive) receptor so the assumption is made that concentrations at other sensitive receptors further away will be less than those at Whareroa Marae. This is appropriate as the focus of this assessment is on the potential effects at Whareroa Marae. Generally shorter-term averaging periods are applied to all areas where people may be present for that time, e.g. 1-hour and

10-minute average concentrations would apply to the surrounding port and industrial areas. The Applicant may wish to comment on the effects in these areas.

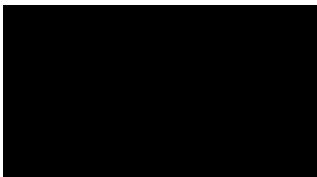
### 1.8.2 *Alternatives / Best Practicable Option*

It is documented by the Applicant that under Annex 6 of MARPOL the requirement to use fuel with a sulphur content of no more than 0.5% w/w (introduced in 2020) has contributed to the reduction of SO<sub>2</sub> levels in the MMA. However, a specific assessment of alternatives and BPO has not been carried out. Although this may not be necessary in this instance where a resource consent is not required, for completeness some discussion around alternatives and BPO would be useful.

## 1.9 Summary of Additional Information

Based on the review of the Stella Passage Development Air Quality Assessment, Final Draft, the Applicant should consider including the following points in the updated version of the assessment;

- Confirmation of any change in activities at the Cement Tanker/Bulk Liquids berth
- Confirmation of any change at the minor structures area that will materially change the discharges to air from the current operations
- Confirm that the Mount Maunganui wharf extension will only allow for one additional ship to be berthed
- Provide some commentary around the discharge of other minor contaminants (e.g. PAHs and VOCs)
- Provide details of the source of the emission rates used for the ships
- Provide an assessed of 10-minute average SO<sub>2</sub> concentrations against the WHO 10-minute guideline of 500µg/m<sup>3</sup>
- Provide an assessment which calculates a mass emission (kg/year) from the ships at the proposed berths. Results can be compared against data from the Mount Maunganui Airshed Emission Inventory 2022
- Review/provide the calculations used for the Air Quality Impact Descriptors
- Provide some assessment of BPO



**Robert Murray**  
Principal Air Quality Consultant

## Limitations

Air Matters Limited has prepared this review with the standard care and diligence expected in the consulting profession. It is intended for use by the Bay of Plenty Regional Council and any third parties explicitly authorised in writing by Air Matters Limited.

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This review was prepared in March 2025, reflecting the conditions and information available at that time. Air Matters Limited is not responsible for any changes that may have occurred after its completion.

The review should be read in its entirety. Air Matters Limited does not accept responsibility for its use in any other context, for any other purpose, or by unauthorised third parties. This review does not constitute legal advice, which should be sought from a qualified legal professional.

# **Technical Review of Air Discharge Assessment - Stella Passage, Port of Tauranga.**

Attention:

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March 2025

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## 1.1 Introduction and Overview

Bay of Plenty Regional Council (BOPRC) have engaged ASG to conduct a review of Tonkin and Taylor Ltd (T&T), February 2025, Air quality Assessment for the development of Stella Passage, prepared for the Port of Tauranga Limited.

Port of Tauranga Limited proposes to extend the Sulphur Point and Mount Maunganui wharves at the Port of Tauranga. This will allow larger vessels to visit the Port and for container ships and bulk carriers to berth further south than present. There are two stages to this development:

Stage 1: 285 m wharf extension at Sulphur Point

Stage 2: Additional 100m wharf extension at Sulphur Point and 315m wharf extension at the Mount Maunganui wharves.

It is understood that Resource consent is not required for discharges to air as they are permitted under the Resource Management Regulations 1998. Independent to this, T&T have undertaken an air quality assessment on behalf of the Port of Tauranga to address local concerns about air quality in the Mount Maunganui Airshed and particularly at the Whareroa Marae.

## 1.2 Scope of Review

ASG was asked to consider the following:

- 1) Does the T&T modelling follow best practice
- 2) Is the model methodology appropriate
- 3) Address any technical matters that may be relevant to the decision making committee.

ASG has specifically focussed on SO<sub>2</sub>, the main pollutant of concern. Other aspects of the review can be found in Report Number 25092, dated 20<sup>th</sup> March 2025, conducted by Air Matters, titled, Technical Review of Air Discharge Assessment.

Each of these points will be discussed below.

## 1.3 Is the Model Methodology Appropriate, and Does it Follow Best Practice

This section is broken up into several sections; Meteorology, Emissions and Source Characteristics, Background, Cumulative impacts, and Model results.

### 1.3.1 Meteorology

Rather than only using the existing already prepared 3-dimensional meteorological data for 2021 for the entire Tauranga region, T&T also developed their own brand new meteorological model for 2024. T&T does not readily provide a reason for doing so, especially since monitoring data from all of the stations is available for 2021, with the exception of NO<sub>2</sub> which is not a priority pollutant compared to SO<sub>2</sub>.

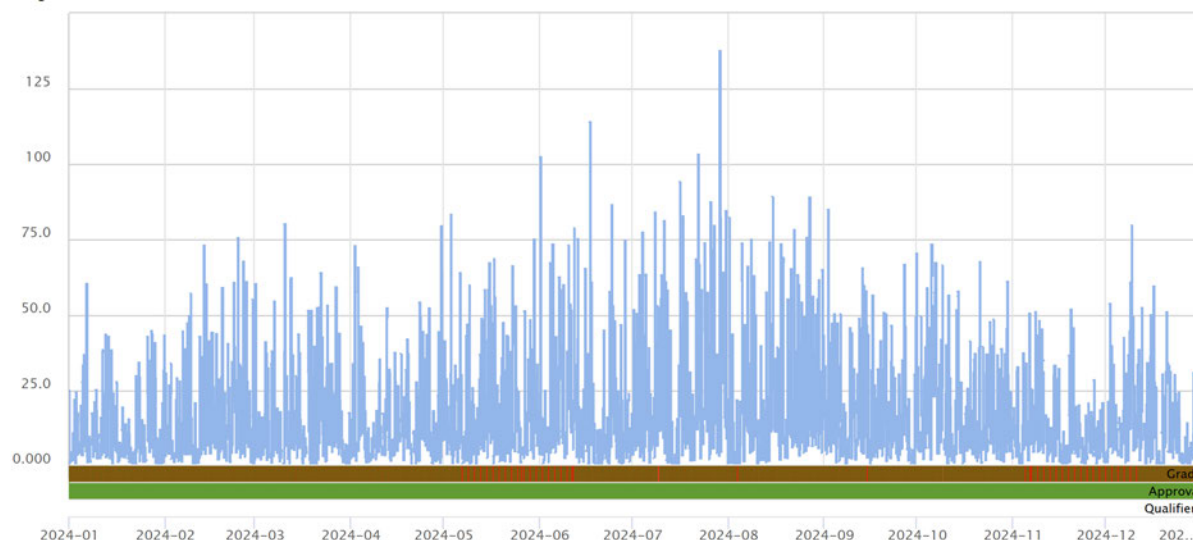
In order to “evaluate the model performance”, and to show that the new 2024 meteorological model was conservative relative to other years of BOP data (2014,2015,2016 and 2021). T&T conducted a modelling analysis of a single ship at Berth 11 and considered its NO<sub>x</sub> impacts at the Whareroa Marae monitor in 2024, the only year with measured NO<sub>x</sub> data. For the other years, of available BOPRC

meteorological data, T&T modelled a single ship in Berth 11 and compared its annual predicted NO<sub>x</sub> concentration to every other year, and rated this as either being higher or lower than a computed annual measured NO<sub>x</sub> value. [Note. No NO<sub>x</sub> data was available at the Whareroa Marae Monitor in any of the other years, so T&T computed some value to represent the measured value for these years. There is no information on how this was done].

T&T concluded that the BOPRC 2021 meteorological data set was significantly lower than their own new 2024 model. ASG disagrees with this highly unusual approach to assessing the 2024 model performance, and does not agree that it shows that the T&T 2024 model is more conservative than any other available year (2014, 2015, 2016 and 2021).

First, the relationship between ‘no-ships’ at Berth 11 and ‘ships’ at Berth 11, is just a difference of 5 µg/m<sup>3</sup> at the Whareroa Marae monitor. This is barely 15% of the average total impact of NO<sub>x</sub> measured at the monitor of 32.8 µg/m<sup>3</sup> (T&T Figure 11-1), and most likely simply reflects the hourly standard deviation, (natural variation in the data). Analysis of the 1-hour NO<sub>x</sub> record from the Whareroa Monitor for 2024, (Figure 1, below) shows significant hourly variation ranging from 0 µg/m<sup>3</sup> to well over 75 µg/m<sup>3</sup>.

Figure 1. Nox annual record from Whareroa Marae Monitor in 2024.



Secondly, there is no measured NO<sub>x</sub> in 2014-2023, so the assumption that each model year is either some percentage higher or lower than measured concentration (T&T Figure 11-2) is an estimate only, not based on real data. Therefore, ASG disagrees with the T&T 2024 model evaluation performance as detailed in Section 7.5.

Best practice requires that detailed meteorological information needs to be provided. Section 5 and Section 6 of the GPG for Atmospheric Dispersion Modelling and the GPG for Industry are quite clear on this, as can be seen by the following sentences:

*When developing a meteorological data set, the representativeness of the data set must be assessed, and demonstrated*

*The reporting must address all input data, which includes, source characteristics, meteorology, terrain, land use, dispersion model switches, process data etc.*

T&T have not provided any information on how they developed their 2024 model or the methodology they followed. There is no evaluation of the model and there is no information on any of the model inputs such as switches, stations used, coordinate locations, missing values, terrain, land use, grid cell resolution, comparison to other years, upper air data, source characteristics, receptors, etc. Therefore, given the lack of information, only the results presented from the (BOPRC fully evaluated) 2021 model are considered valid in this assessment.

### 1.3.2 Emissions and Source Characteristics

ASG agrees on the following emission assumptions, which are consistent with Good Practice

- 1) Assumed most southern location of ships on both new Sulphur Point extension and Mt Maunganui extension.
- 2) Considered Stage 2 for placement of Ship on Sulphur Point Wharf for Stage 1 model.
- 3) Model scenarios which considered a single ship for Stage 1 and Stage 2, then combined ships for Stage 2.
- 4) Considered emissions from the largest bulk liquids tanker that is expected to be accommodated at the new berths for 1-hour average and 24-hour average.
- 5) Considered emissions from an average bulk sized carrier conservatively occupied in the berth continuously for the longer average times.
- 6) Emissions were assumed to be constant 24/7 from the ships, even though they will not be in berth all the time. This is the correct approach for considering potential worst case impacts.
- 7) T&T stated that building downwash due to the ship structure was included.

However, there are several concerns with the emissions and source characteristics, which are not consistent with Good Practice, as follows:

- T&T provided no information on how downwash due to the ships structure was computed and included in the model. This is very important, if the area of downwash is overestimated, then too much of the plume material will be removed that would otherwise be transported downwind and vice versa.
- T&T provided no information on the source characteristics that were assumed for modelling. For instance no information was supplied on stack height, stack exit velocity, stack exit temperature and stack diameter. Any of these source characteristics could significantly alter the impacts of the downwind concentrations of SO<sub>2</sub>.
- The emission rates detailed in Table 7.1 of the assessment were “*estimated based on published information for these ships*”, and yet no reference or any information was provided in the assessment on where these emission rates came from, and how they were calculated.
- The total hotelling emission from Stage 2 modelling (large container at Sulphur Point and a bulk tanker at Mt Maunganui) was 10,860 g/hr (cumulatively). This is just a little higher than a single large cruise ship (8,463 g/hr) that is hotelling during the day at the Port of Tauranga. While, it is well known that cruise ships generally use more power in port than other ships due to ongoing electricity demands. The emissions used in the assessment are not overly conservative, as stated.

- An additional model scenario should have been included which includes manoeuvring and docking into the new berths. These are often the highest emissions, even if they do not last for very long. For a single cruise ship, manoeuvring and docking SO<sub>2</sub> emissions can be almost double that of hotelling only.
- 10-minute emissions should also be considered, and the potential downwind impact. These should be considered in relation to the WHO 10 minute assessment criteria of 500 µg/m<sup>3</sup>

In summary, T&T provided some details on model assumptions, emission rates and model scenarios, but, they did not provide any of the critical information necessary for a technical external review of the assessment. It is a requirement of the GPG for Atmospheric modelling and the GPG for industry that this information be provided and detailed in the reporting. Therefore, T&T have not followed Best Practice with respect to providing source characteristics and downwash information, and therefore ASG does not have the necessary information to determine whether these critical parameters and switches have been assessed reliably.

### 1.3.3 Background

To assess the cumulative effects, T&T has summed the hourly model predictions from ships at the new berths to measured hourly background data for the relevant model year. But T&T have not stated which monitor was used to develop the hourly background file. Therefore, ASG assumes that the Whareroa Marae monitor was used to develop hourly background. It is not clear whether T&T have applied wind direction screening to the hourly background data file or not.

T&T reported the summed background and model predicted concentrations at the location of the Whareroa Marae monitor, but they did not report the model concentrations at the individual sensitive receptors, which, in the case of 5 Taiaho Place is 158m closer to the new berth location on the Stage 2 Mt Maunganui wharf than the Marae monitor. Other residences on Taiaho Place are approximately 84m closer to the new berth than the monitor.

While it is arguable whether T&T should have used the BOPRC hourly background from Rata Street monitor where industry was removed, or to have used the Marae monitor for background is not a key discussion point. ASG is in agreement that at least hourly background data was summed (as per best practice) to the model predictions, but, the SO<sub>2</sub> impact should have been reported at the individual key receptors. This is important as the 1-hour concentration at the Whareroa Marae monitor was 44 µg/m<sup>3</sup> (i.e., 12.5% of the SO<sub>2</sub> criteria of 350 µg/m<sup>3</sup>), and 24-hour was 11.5 µg/m<sup>3</sup> (i.e., 9.5% of the NZ criteria of 120 µg/m<sup>3</sup>, and 29% of the WHO 40 µg/m<sup>3</sup> criteria).

Best Practice requires information and details on the background data that is being used in an assessment. T&T have provided no information on their background file, and it is not even clear what monitoring station was used. Best practice also requires that information on sensitive receptors, i.e., recommendation 53 of the GPG for modelling – states, “*identify the receptor(s) that are most highly impacted and those that are most sensitive*”.

[Note. Hourly contemporaneous background files for SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> have been developed by BOPRC for the modelled year 2021. These files are freely available for modelling purposes within the Tauranga Mount Maunganui airshed].

### 1.3.4 Cumulative Impacts

T&T considered the summing of the hourly background file to the model predictions and reporting this at the location of the Whareroa Marae monitor to be representative of the cumulative impact, and to be representative of the sensitive receptors that are located between the monitor and Stage 2 berth. The concern with this assumption is that it does not take into account the closer locations of the residences on Taiaho Place to the new Stage 2 berth on Mt Maunganui wharf, that are already being impacted by nearby industry due to their closer location to the industry than the Marae monitor. Therefore, another (preferred) way to have modelled Stage 2 is to model industry (all 3 co-located industrial sites) + Stage 2 ship emissions + Background from BOPRC station that excludes industry. This would have given a more reliable estimate of the cumulative impact of Stella Passage on the nearby residences, which are closer to the Stage 2 development than the Whareroa Marae monitor.

### 1.3.5 Model Results

The model results are shown in Section 8 of the T&T air assessment in Table 8-1, and Table 8-2 for the 1-hour and 24-hour SO<sub>2</sub> concentrations at the location of the Whareroa Marae monitor.

#### Stage 1 and Stage 2 individual results as per Table 8-1, Table 8-2.

The 1-hour and 24-hour predicted SO<sub>2</sub> concentrations for the large container at the Sulphur Point wharf (Stage 1) is half that of the bulk container at the Mt Maunganui wharf (Stage 2). The new berth on Sulphur Point wharf is approximately 900m from the Whareroa Marae monitor and has a lower emission rate (4,680 g/hr) than the Stage 2 berth which is approximately 700m from the Whareroa Marae monitor and has a higher emission rate of 6,120 g/hr. These results reflect the larger emission and closer location from the Stage 2 ship, and are therefore in line with expectations.

#### Stage 1 and Stage 2 + background results as per Table 8-3, Table 8-4, Table 8-5.

These tables show the sum of the background and model predictions and show that highest predicted 1-hour and 24-hour concentrations occur when the background values are high. This is a possible outcome and not a surprising result.

These tables also show the combined contribution (when Stage 2 is fully operational and a ship is placed at both new wharves) + background. The maximum combined contribution is almost identical to Stage 2 (ship on Mount Maunganui wharf) alone. The reason for this is that the cumulative impact of both ships impacting a single point at the same time is low. This is a possible outcome and not a surprising result.

In summary, the results reported in Tables 8-1 to 8-5 for 2021 are not unexpected, and they appear reasonable. The impact of Stage 2 fully operational at the Marae monitor is 32% of the 1-hour SO<sub>2</sub> criteria of 350 µg/m<sup>3</sup>, 35% of the 24-hour criteria of 120 µg/m<sup>3</sup> and 72% of the 40 µg/m<sup>3</sup> WHO criteria.

## 1.4 Addressing Technical Matters

ASG has focussed primarily on the main pollutant of concern, SO<sub>2</sub>, and has focussed primarily on the dispersion model results of Section 7, Section 8 and meteorological model performance evaluation of Appendix A. ASG notes that the same modelling methodology was conducted for NO<sub>x</sub> and PM, and therefore this review includes the modelling of these pollutants.

The biggest concern ASG has is the lack of critical information which is necessary to conduct a technical review. This goes against the recommendations in the GPG guides for atmospheric dispersion modelling and Industry which is clear that all information must be provided.

A summary of technical matters is as follows:

- A brand new meteorological model was developed with no evaluation or methods provided. Model results were provided for 2021 and 2024, but only 2021 results were considered in this assessment as the modelled meteorological year is supported by a detailed evaluation. (BOPRC developed the 2021 3-dimensional meteorological data set<sup>1,2</sup> to ensure model transparency and to limit individual consultant model differences down to manageable, easy to change aspects such as source characteristics, rather than difficult differences that can appear in various meteorological data sets that are impossible to understand).
- The choice of model scenarios, ship placement, choice of ships was all done well. The emission rates used for the Stage 1 and Stage 2 ships seem reasonable. However T&T should have considered 10-minute emission rates and also considered emissions during manoeuvring and docking which although won't last long, will produce significantly higher emissions than just hotelling.
- Background effects were considered and hourly background data from what is assumed was the Whareroa Monitor was summed to the model predictions. Summing background onto the model predictions is the recommended approach. However, ASG does not entirely agree with the approach used in the assessment and would have preferred to see a full cumulative assessment that includes; Stage 2 + Background (hourly contemporaneous from Rata Street) + industrial emissions (average), at the locations of the nearby sensitive receptors.
- T&T did not consider the impact at the nearest sensitive receptors for any of the model scenarios. The closest residence, 5 Taiaho Place is 158m closer to the new berth on Mount Maunganui wharf than the Whareroa Marae monitor, where impacts were assessed, and is therefore likely to have a higher impact. In addition, the other residences on Taiaho place are at least 84 m closer to the ship than the Whareroa Marae monitor.

## 1.5 Discussion and Summary

The 1-hour 99.9<sup>th</sup> predicted SO<sub>2</sub> concentration at the Whareroa Marae monitor due to Stage 2 is 44.8 µg/m<sup>3</sup>, the highest 24-hour predicted Stage 2 SO<sub>2</sub> concentration was 11.5 µg/m<sup>3</sup>, the annual concentration has not been reported, but is expected to be low due to the infrequent number of ship visits. These values on their own or combined do not appear significant, but, when considered in conjunction with nearby industry they will all have an additional impact at the nearby sensitive receptors. How much the cumulative impact is at the sensitive receptors is not fully clear from this assessment, but the model results over a full year do show that the new berth placement on the Mount Maunganui side will likely have a greater impact than Stage 1 berth at Sulphur Point, and when Stage 2 is fully operational with ships at both new wharves. This is due to the expected higher emission and closer location of the Stage 2 berth to the sensitive receptors.

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<sup>1</sup> A Meteorological Assessment and Development of a 3-Dimensional Meteorological Model for Air Quality Applications for 4 Regions in the Bay of Plenty for 2021. ASG 2022.

<sup>2</sup> Appendices to support above document. ASG 2022.



However, ASG tends to agree that the Stella Passage development is unlikely to have an adverse effect on residences at Taiaho Place. The new berth shipping emissions will be hot buoyant sources released at elevated levels ( $>40\text{m}$ ), and are subject to structural downwash which is likely to occur in all moderate winds, and light winds in unstable atmospheric conditions. The ships are unlikely to frequent the new berths 100% of the time, and the minimum distance to the nearest sensitive receptor is  $\sim 600\text{ m}$ , i.e., enough distance for dispersion and dilution to occur.

ASG's opinion is partly supported by a study conducted in November 2023, which was a dispersion model assessment to consider the impacts of  $\text{SO}_2$  on ground level concentrations from cruise ships in the Port of Tauranga. The findings of this report are detailed in:

*Technical Note. Simple Modelling Analysis to Assess the Impact of  $\text{SO}_2$ ,  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  on Ground Level Concentrations from Cruise Ships in the Port of Tauranga. ASG. November 2023.*

The results are briefly discussed here as they are relevant to the Stella Passage Assessment and ASG view.

- The introduction of MARPOL low-sulphur fuel (0.5%) in January 2020 led to a significant decline in  $\text{SO}_2$  concentrations at all BOPRC monitors for ships entering and berthing at the Port of Tauranga. This reduction was particularly notable at the Rata Street monitor, the closest to the cruise ship berths and the most relevant for assessing shipping emissions.
- The dispersion of emissions from the Port of Tauranga is strongly influenced by the ENSO Southern Oscillation, including El Niño and La Niña events. Concentrations tend to be higher during La Niña years (e.g., 2021), when summer winds are lighter and onshore, compared to El Niño years (e.g., 2016). These variations are expected to persist in the future, depending on prevailing weather drivers.
- The structure of ships plays a crucial role in initiating plume downwash, particularly in moderate to strong winds and even in light midday winds. Downwash reduces the plume mass that would otherwise be transported downwind, leading to higher concentrations near the ship but significantly lower concentrations further away. This occurs due to enhanced dispersion and the removal of plume mass caused by the downwash process
- The Rata Street monitoring station, located about 400 meters from the cruise ship berths at the Port of Tauranga, showed little difference in measured  $\text{SO}_2$  concentrations between the COVID years (2020 and 2021), when no cruise ships were in port, and 2023, which saw 91 cruise ship visits. This suggests that, post-MARPOL,  $\text{SO}_2$  emissions from cruise ships during hotelling and docking are unlikely to be significant.



Worst-case impacts are likely to occur over short time scales (typically less than one hour), particularly during ship manoeuvring and docking, highlighting the importance of considering a ten-minute averaging period. Additionally, at night, when the atmosphere is calm and stable, downwash is unlikely; however, plume dilution over a 600-meter distance will still help reduce concentrations.

To minimize high emissions from manoeuvring, docking, and poor atmospheric dispersion, ships should enter the Port of Tauranga during daylight hours, particularly between 10 AM and 3 PM, when dispersion conditions are most favourable.



## 1.6 Appendix C - Report Limitations

This Report has been provided by Atmospheric Science Global Limited (ASG) subject to the following limitations:

1. This report has been prepared for the particular purpose outlined in the proposal and no responsibility is accepted for the use of the Report, in whole or in part, in other context or for any other purposes.
2. The scope of ASG services is subject to restrictions and limitations. ASG has not performed a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report.
3. Conditions may exist which were undetectable. Variations in conditions may occur and there may be special conditions pertaining to the site which have not been revealed and which have not therefore been taken into account in the Report.
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