

1 November 2021



Collaborations
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Kia ora Gareth,

Request for Further Information

Application Number: CRC220756
Applicant Name: Lyttelton Port Company Limited
Activity Description: To renew CRC940431 - Discharge of coal dust into air

As you are aware, I have been processing the above resource consent application.

The information listed in Attachment 1 to this letter is hereby requested under Section 92 of the Resource Management Act 1991 (the RMA). As this information is required in order to fully understand the potential effects of the proposal, we are unable to further process the application until it has been supplied.

The options available to you under Section 92A(1) of the RMA are summarised below. A response is required by 22 November 2021. You must choose one of these options.

A. Supply the requested information by 22 November 2021

If the information can be easily collated and supplied by this date, please provide it in writing (via email is fine) to me.

B. Agree in a written notice by 22 November 2021 to supply the information requested

Sometimes technical information will take some time to collate or key contacts may not be immediately available. If you need more time to supply the information requested, please advise me in writing when you can provide the information. You can do this via email or letter.

C. Refuse in a written notice by 22 November 2021 to supply the requested information

If you choose not to provide the requested information by the above date, or any date subsequently agreed to by the Canterbury Regional Council, then your application may be declined.

Please contact me via email (lisa.kamali@ecan.govt.nz) or phone (03 367 7392) if you have any questions.

Ngā mihi | Kind Regards,

A handwritten signature in black ink, appearing to read 'Lisa Kamali'.

Lisa Kamali
Senior Consents Planner

cc:
Lyttelton Port Company Limited
Attn To: Kim Kelleher
Private Bag 501
Lyttelton 8841

ATTACHMENT 1

Information Requested under Section 92 of the Resource Management Act 1991

Application Numbers: CRC220756

Date: 01/11/2021

Air Quality

As you will be aware, Council has engaged PDP to review the application. PDP consider further information and clarification is required to facilitate a detailed audit as attached to this letter.

Coastal Water Quality and Ecology

Council's Senior Scientist, Coastal Water Quality and Ecology considers the report on the assessment of effects on marine ecology is thorough, and generally concurs with its conclusions, subject to some additional assessment and clarification as follows:

- i. The report on the assessment of effects on marine avifauna deals with the potential impacts of the coal dust on food supply and foraging ability and mortalities and disturbance associated with machinery and coal ship movements. In the report it acknowledges that it does not address the issue of the health of birds as that is a physiological matter and outside the report writer's area of expertise. Please provide an assessment of the potential effect of the coal dust on the respiratory health of the marine avifauna.

Additionally, Council's Senior Scientist, Coastal Water Quality and Ecology states *"I have no expertise in air quality. However, I am wondering if the proposed trigger values of 100 and 150 µg/m²/hour will result in more permissive short term dust concentrations before mitigation actions are instigated."* Please clarify.

Terrestrial Ecology

Council's Senior Ecologist notes that coal dust may affect plants if in excess of 1.0g/m²/day. Effects have been assessed taking an impact management approach, which entails dust control measures and monitoring. It must be ensured that this impact management will result in negligible or very low-level effects. To be clear on all actual and potential effects and the likely magnitude of these effects, Council's Senior Ecologist requests the following:

- i. Please consider increased port traffic/coal volumes in future and or climate related exacerbations to depositional rates/amounts – i.e. if becomes windier / drier.
- ii. Please consider having an environmental limit reflecting this on a gauge located in north of the site, or some other environmental monitoring indicator.
- iii. Given that the deposition of coal dust is not likely to be linear (i.e. that there are discrete events of coal dust deposition) please explain how a monthly depositional rate is the most effective means to monitor dust deposition.
- iv. A monitoring gauge site should be established to best capture potential effects on high value indigenous vegetation and habitats (i.e., north of site near current gauge site 2, 3, 4) with 1.0g/m²/day limit trigger.

Other comments

Depositional rates may alter if pine trees are harvested/removed. The lower depositional rates may be in part due to the current sheltering /filtering of the pine trees. Depositional rates are much higher in non-residential areas (currently). It is therefore recommended that a monitoring gauge site is established/maintained on west side of Uramau to capture future changes in depositional rates (any changes if/when trees are removed).

The coal dust deposition noted in the AEE for a depositional rate on the pine forest during a 'worst-case' month was 2-6g/m²/month*, with 6g being noted to be approximately one teaspoon. The eastern side of pines of Uramau reserve (facing the site) is c.97,000m² (9ha). If there was enough coal dust to cover this 9.7ha area this depositional rate per meter for the month would equate to between c.190-580kg of coal during a worst-case month. Is this correct?

* The Mitigation and Monitoring document in Section 5.11 of the AEE states: *"The coal dust deposition rate, during a worst-case month, ranges between 2 and 6.5 g/m²".* But then states, *"The highest level of coal deposition in the vicinity of the pine plantation over the entire monitoring period was approximately 19 g/m²/month".* Should the observed 19g/m²/month not be used as upper range for worst-case range and to calculate above depositional rates/accumulation? Also note **Figure 1** below and associated comment.

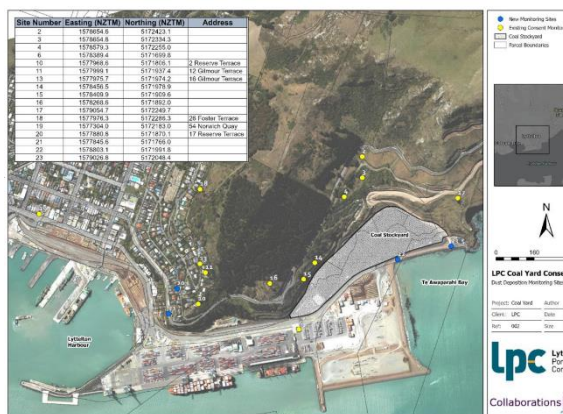


Figure 1.1: Coal dust deposition monitoring locations in surrounding environment.

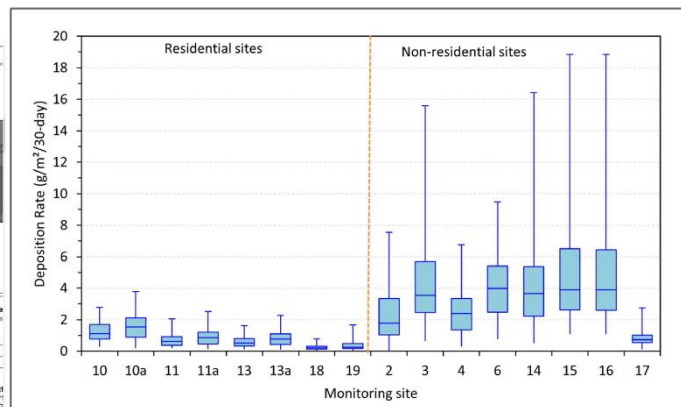


Figure 1.2: Amounts of coal dust deposited per m² per month during summer from 2008-2020.

Figure 1 The data doesn't seem to match what the depositional model (figure 1.3) would predict. Monitoring point 17 is very low. Considering the depositional model prediction for this site this looks like there is an issue with the gauge equipment or perhaps how it is situated.



26 October 2021

• Lisa Kamali
Senior Consents Planner
Environment Canterbury
PO Box 345
CHRISTCHURCH 8140

Dear Lisa,

REVIEW OF THE LYTTELTON PORT COAL STOCKYARD AIR QUALITY ASSESSMENT

1.0 Background

Lyttelton Port Company Limited (LPC) has applied to Canterbury Regional Council (CRC) to renew a consent to discharge contaminants into air from the operation of a coal stockyard located at the north-eastern end of the port in Te Awaparahi Bay, Lyttelton. This application (CRC220756) was lodged with CRC on 20 August 2021 and accepted on the 8th of September 2021.

Dust and particulate matter with a diameter of less than 10 micrometres (PM₁₀) is generated by the handling of the coal at the stockyard which is located approximately 450 metres east of Lyttelton. The effects of the dust and PM₁₀ discharges have been assessed in the report “Coal Stockyard Air Quality Assessment¹” (the Report) prepared by Tonkin and Taylor Ltd (T+T) on behalf of LPC. The CRC has engaged Pattle Delamore Partners (PDP) to review this assessment.

2.0 Scope of Assessment

In an email dated 06 September 2021, ECan and PDP agreed on the scope of the review of the LPC assessment as including:

1. A review of the assessment methodology and its appropriateness;
 - a. Whether the assessment of effects has been made according to generally accepted good practice?
 - i. Dust nuisance
 - ii. Health impacts
 - b. Is the assessment method appropriate for the scale and significance of the potential impacts of the discharge and the receiving environment?
 - c. Can the nuisance assessment approach (FIDOL) can be relied upon, i.e.:
 - i. Dust, meteorological and source apportionment monitoring methods – collection of good quality dust and meteorological data. Correct and useful interpretation of that data.

¹ Coal Stockyard Air Quality Assessment, Tonkin and Taylor Ltd, August 2021. Report number 1014295.

- d. Can the health assessment approach (dispersion modelling) inputs can be relied upon?, i.e.:
 - i. Dispersion model method, setup parameters and conclusions;
 - ii. Dust, meteorological and source apportion monitoring methods – collection of good quality dust and meteorological data. Correct and useful interpretation of that data.
2. A review of the assessment of effects including on air quality and sensitive receptors;
 - a. Have the appropriate sensitive receptors been identified?
 - b. Have applicable sources at the site have been included in the assessment, and assessed properly given their relative contributions to site discharges?
 - c. What are the cumulative effects of the activity given the surrounding discharge environment?
 - d. Whether the conclusions regarding the level of effects are reasonable?
3. A description of whether any further information or details are required (Section 92 matters).

3.0 Initial Review of the Assessment

PDP has reviewed the application and supporting documentation and undertook a site visit, to observe the coal stockyard processes and undertake dust observations in the vicinity of the site on 21 October 2021.

The assessment's conclusions suggest that any adverse effect from operating the coal stockyard will be less than minor. Having undertaken our initial review, it is PDP's opinion that on balance, we think the applicant's conclusions are likely correct. However, to allow PDP to robustly confirm (or otherwise) our initial opinion, we consider that some further information on the matters listed in Section 4 of this letter is required.

4.0 Request for Further Information

We have set out our questions using the headings in the Report as a reference.

Section 5.3.1 Summary of monitoring results: Dust deposition

Question1:

We note that it was not possible to reconcile the 15-day dust deposition results with the 30-day dust deposition results. PDP consider that if the monitoring and sample analysis processes have been followed, then the reconciliation of the results from these two different exposure periods should have been simple and straight forward. This raises questions around the reliability of these monitoring results. Please:

- ✧ Provide an explanation of potential reasons why reconciliation was not possible;
- ✧ Discuss any implications of this on the assessment conclusions which are based on dust deposition results; and
- ✧ Explain how this issue will be overcome for the proposed future dust deposition monitoring programme.

Question 2:

PDP understand that the deposition monitoring measures coal and other dust sources. No information is provided in the Report on the deposition monitoring results for other dust sources. Please provide a comparison between the other source results obtained from the deposition monitoring and the source apportion monitoring.

Section 5.3.3 Spatial pattern of coal dust deposition

Question 3:

Interpolation appears to have been used to generate isopleths of dust deposition rates. Please explain the interpolation method and input data used. Please highlight any key uncertainties with this method and discuss how these may affect the results or conclusions drawn from the results.

Section 5.5 FIDOL: Assessment dust amenity effects

Question 4:

The FIDOL assessment provided is purely qualitative. The site is well served with meteorological and coal stockyard activity data, and PDP considers that this data could have been used to inform the FIDOL assessment. Therefore, please consider this data and provide a quantitative assessment of the frequency and duration of potential impacts. Please also consider recommended buffer distances and revise the assessment of intensity and location to incorporate these factors.

Section 5.6 Discussion and conclusion: Assessment dust amenity effects

Question 5:

From the pre-application consultation process, PDP understands that a door-to-door household survey was to be undertaken in the Lyttelton area that aimed to explore/understand the dust impacts experienced in the area. Please confirm whether the survey was undertaken. If it was not undertaken, please explain how community consultation has been incorporated into the assessment.

If it was undertaken, then:

- ✧ Please provide details of the questions asked, dates of the survey and the number of households surveyed;
- ✧ Please explain why the results of this survey were not presented in the assessment;
- ✧ If possible, please provide a summary of the results of the survey aiming to ground truth the respective elements of the FIDOL assessment, particularly the offensiveness of the dust; and
- ✧ Please compare the overall findings of the survey with the conclusions reached from the FIDOL assessment.

Section 6.1 Methodology: Assessment of effects human health

Question 6:

The key method used by T+T to undertake the assessment of effects human health is to compare monitored ambient air quality data with the relevant health impact assessment guidelines, and this assessment has been carried out in line with expected good practice.

However, there is a significant body of literature that details the health impacts specifically related to coal dust (e.g. NIOSH 2011²). PDP consider that relying solely on the numerical PM₁₀ and PM_{2.5} health impact guidelines may not accurately assess all the potential health impacts specifically related to coal dust.

Therefore, please review the human health impacts of coal dust as detailed in the literature and confirm (or otherwise) the appropriateness of relying on the numerical PM₁₀ and PM_{2.5} health impact guidelines.

²National Institute for Occupational Safety and Health (2011). Coal Mine Dust Exposures and Associated Health Outcomes. <https://www.qld.gov.au/environment/pollution/monitoring/management/emissions>

Section 6.1.1 Ambient monitoring: Assessment of Effects – Human health

Question 7:

T+T has followed good practice for ambient air quality monitoring by co-locating a BAM and nephelometer. The basic comparison of the 24-hour average concentrations measured by the two instruments is encouraging. Having co-located data allows a detailed comparison of data from the two different instruments to be made and facilitates the calculation of a k-factor which when applied to the nephelometer data gives a proxy for BAM equivalent data.

From the pre-application consultation process PDP understood that a site-specific k-factor would be calculated and applied to the nephelometer data. PDP can find no mention of this in the Report. Therefore if it has not been done, please explain why, and discuss the potential implications on the results gained and conclusions drawn from the nephelometer data. Please also, if possible, calculate the k factor and apply that to the nephelometer data and provide an updated set of results and if necessary revised conclusions.

If it has been done, please provide information on the process and the k-factor calculated and show how it has been applied to the data.

Question 8:

In PDP's experience nephelometers sometimes do not respond well to dark or black coloured particles. Confirming the responsiveness of the nephelometers to coal dust is particularly important given they become a key part of the monitoring strategy when coal throughput exceeds 1.75 million tonnes per annum. Please provide evidence that the nephelometers are responding usefully to coal dust. This evidence could include but not be limited to a statement from the equipment manufacture and comparing:

- ✧ BAM and nephelometers 1-hour average concentrations when the monitoring site is down wind of the coal stockyard during windspeeds > 5 m/s;
- ✧ BAM and nephelometers 1-hour average concentrations when the BAM monitoring data shows peak impacts from the coal stockyard; and monitoring site is down wind of the coal stockyard during windspeeds > 5 m/s; and
- ✧ BAM and nephelometers 1-hour average concentrations during 6-hour periods that the source apportionment shows relatively high contribution of coal dust to total dust loading.

6.3.3. Relationship between PM₁₀ and PM_{2.5} BAM concentrations and wind data.

Question 9:

If PDP understands the results correctly, T+T's analysis of the data shows that peak BAM PM₁₀ and PM_{2.5} concentrations occur with windspeeds of about 2 m/s. The peak PM₁₀ concentrations occur when the wind direction is from the coal stock yard, and the peak PM_{2.5} concentrations occur when wind direction is from north of coal stock yard. The peak PM₁₀ concentrations occurring at low windspeeds seems counter intuitive to PDP.

Please provide an explanation of this considering the general rule of thumb that increased potential dust risk occurs with higher windspeeds. Please discuss the potential implications of this unexpected result on the conclusions reached on human health impacts using the ambient air quality monitoring data.

Question 10:

The potential impact of dust discharged from the large unconsolidated area of the Te Awaparahi Bay reclamation is not discussed in any detail. Please consider the impact of this potential source of dust when analysing the relationship between PM₁₀ and PM_{2.5} BAM concentrations and wind data.

Section 6.4 PM₁₀ measurements using nephelometer instruments**Question 11:**

Peak concentrations measured by the nephelometer instruments occur with windspeeds between 2 m/s and 6 m/s. This aligns more with PDP's expectations of the relationship between dust concentrations and windspeed. However, the nephelometer data relationship with wind speed does not align particularly well with that of the BAM. Please explain why this may be the case and discuss the potential implications of this unexpected result on the conclusions reached on human health impacts using the ambient air quality monitoring data.

Question 12:

T+T concluded that the comparison of nephelometer PM₁₀ concentrations measured upwind and downwind of the coal stockyard demonstrates that PM₁₀ concentrations are about the same, i.e. the coal yard is not the significant source of PM₁₀ in the area. The result seems counter intuitive to PDP. Please explore this issue and confirm or revise the relevant conclusions after it has been demonstrated that the nephelometers are responding usefully to coal dust.

Section 6.5 Source apportionment of PM₁₀ and PM_{2.5}**Question 13:**

The source apportionment monitoring is a very useful add on to the coal stockyard ambient air quality monitoring programme, and PDP consider this provides significant value to the assessment. To extract some additional value out of that data set and to further support the conclusions reached by T+T it is requested that the following data analysis be undertaken, and results presented:

- ✧ An analysis of the meteorological conditions that persisted during the periods in which the source apportionment monitoring indicates a relatively high impact of coal dust;
- ✧ A comparison of the meteorological conditions which caused peak coal dust impacts for the source apportionment, BAM and nephelometer data;
- ✧ A comparison of the BAM and nephelometer data for the periods in which the source apportionment monitoring indicates a relatively high impact of coal dust; and
- ✧ A comparison of the coal dust impact as measured by the source apportionment and dust deposition monitoring.

Section 7 mitigation and monitoring, Section 7.1 Existing infrastructure and techniques to manage dust emissions.**Question 14:**

Stockpiles have been calculated as generating 38% of the total dust discharged from the stockyard. In regard to current dust management strategies the following mitigation measures are highlighted as important:

- ✧ Height and slope of stockpiles; and
- ✧ Shape of stockpiles.

However, no details are provided in the assessment or dust management plan on how the stockpiles are designed or built. PDP consider that the stockpiles should be constructed to minimise the surface area to volume ratio and consideration given to the orientation of the graded slopes of the stockpiles relative to the predominant wind direction. Please revise the assessment and/or dust management plan to include the coal stockpile design criteria and method of building stockpiles to minimise dust emissions. PDP consider that a review of and reference to LPC's coal stock yard operational plan would be very helpful.

Coal Stockyard Dust Management Plan

Question 15:

Mitigation Measures (Table 4.1 of the dust management plan (DMP) do not reflect the priority sources suggested by emission calculations (Table 3.1 in main body of the Report). For example, minimal detail is provided on how to reduce emissions from bulldozers which are calculated to generate over half the total dust discharged.

The emission calculations in Table 3.1 also do not appear to reflect the operational experience of dust generation within the coal stockyard with front end loader's practically contributing more than the bulldozers but only accounting for less than 1% of calculated emissions (see also Questions 20 and 21).

Combined Bulldozers and stockpiles have been calculated to discharge over 90% of the dust discharged from the coal stockyard. However the DMP, as it stands, does not target 90% of the dust mitigation methods on these two sources. The mitigation strategy should focus on the key sources identified.

Please revise the mitigation strategy to reflect the key sources of dust, whether that be as calculated in Table 3.1 or any other effective method of prioritising the magnitude of the respective dust sources.

Question 16:

PDP consider the two-tiered (above and below 1.75 million tonnes of coal per annum) mitigation plan a potentially useful approach. The key proposed Tier 2 mitigation actions appear to be introducing the use of fog cannons and using strategically placed nephelometers to provide real-time dust data which will allow proactive dust mitigation to be undertaken. Before agreeing that this plan will be effective, PDP would like to see evidence of the efficacy of fog cannons in reducing coal dust and to have demonstrated the ability of nephelometers to respond to coal dust.

PDP notes that it considers that the results of the trial of the fog cannon should occur as part of this consent application, not at some indeterminate time in the future when coal throughput reaches the trigger value. This would ensure that when throughput reaches the trigger there is no potential for effects. It would also provide LPC with the ability to consider and trial other mitigation measures if the fog cannons do not work as anticipated.

Question 17:

The DMP appears to have been written as a desk top exercise. There is no obvious input or review from the LPC coal stockyard operators or management or third party coal management experts who could review and if needed add value to the DMP. PDP request confirmation that the proposed DMP has considered and where appropriate incorporated the internally (LPC) and externally available expertise and experience in coal stockyard management.

Appendix B Emission calculations

PDP acknowledge the porosity of information on and methods available to calculate dust emissions from coal stockyards. The review of the Report shows that T+T has found and followed the relevant guidance and calculations. In the main PDP considers the emission calculations undertaken are consistent with accepted good practice. However, PDP suggest that there are a number of potentially important actions that need to be considered by T+T to better support its calculations of dust emissions.

Question 18:

It appears that almost no New Zealand specific coal specifications has been used as input into the dust emission calculations. One coal analysis report from 2011 is referenced in the report. In most cases it appears that USEPA defaults have been used when defining the size distribution and moisture content of the coal handled at the LPC coal stock yard. Please obtain and review the relevant coal specification reports for coal handled at Lyttelton and comment on how that data aligns with (or otherwise) the default values provided in the USEPA default. If the New Zealand data is significantly different to the USEPA default values, please comment on the potential implications of this difference on the results of the emission calculations and the conclusions based on these.

Question 19:

In similar bulk landing facilities (like quarries) the action of machine and vehicle wheels on unpaved surfaces is often a key source of dust emissions. The impact of the front-end loaders travelling over coal covered routes dust does not appear to be included in the calculations of dust emissions.

During the site visit the coal stockyard manager indicated that the majority of dust emissions during the formation or loadout of coal stockpiles resulted from front-end loaders rather than bulldozers, especially when particular travel path has become well trafficked.

Please consider, and where needed include, the impact of dust emissions generated by the wheeled actions of front-end loaders during coal load-in or coal load-out.

Question 20:

Table 3.1 in the Report provides a prioritised list of dust sources which are based on the emission calculations detailed in Appendix B. The order of sources provided in Table 3.1 does not align well with the observations made by T+T staff nor with the experience of LPC staff as noted in the Report. For example, PDP find it counter intuitive that despite the action of front-end loader wheels on unpaved surfaces and the distance front end loaders are likely to travel compared to bulldozers, bulldozers produce 25 times more dust than front end loaders. The priority order of dust sources appears to be based solely on a desktop assessment which has not been subject to any qualitative or quantitative ground truthing.

PDP request that LPC attempt (as far as practical) to ground truth at least the relative size of each of the dust sources listed in Table 3.1. This task could be completed by methods including but not limited to:

- ✧ Consultant observations;
- ✧ Coal Stockyard staff observations;
- ✧ Boundary monitoring during similar wind conditions (NE) but during different stockyard dust generating activities including but not limited to;
 - Coal load in;
 - Coal load out;
 - Coal stockpile building; and
 - No coal moving activity – but stockpiles present.

If the ground truthing suggests a significantly different priority order of dust sources, please comment on the potential implications of this difference on the emission and dispersion modelling results and the conclusions based on these.

Appendix C CALMET configuration, Appendix D CALPUFF configuration and Appendix E CALPUFF results.

Appendices C, D and E have been reviewed by PDP. Subject to the responses to the questions on the dust emission sources above, PDP considers it likely there is sufficient information contained in the report to allow us to undertake a detailed review of the modelling. No further information is required on Appendices C, D and E at this stage.

5.0 Closing

Thank you for the opportunity to assist CRC with this review. We trust you will find our feedback helpful. We look forward to the responses from the applicant and we anticipate that this information will allow PDP to robustly confirm (or otherwise) the findings from our initial review of the assessment. If you have any questions or comments about the review, please do not hesitate to contact Andrew Curtis.

6.0 Limitations

This report has been prepared by PDP on the specific instructions of Environment Canterbury for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

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Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by



Andrew Curtis

Technical Director - Air Quality

Reviewed by



Steve Pearce

Technical Director – Environmental Management