Tonkin+Taylor

Job No: 1014454
17 July 2020

NCI Packaging (NZ) Ltd
PO Box 14-443
Panmure 1741
Auckland

Attention: Kevin Leonard

Dear Kevin

NCI Packaging, Upper Hutt - Review of odour issues

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by NCI Packaging (NZ) Ltd (NCI Packaging) to provide technical air quality advice in relation to the application for a replacement air discharge consent for the site at 62 Montgomery Crescent, Upper Hutt.

A resource consent application has been lodged and is currently being processed by Greater Wellington Regional Council (GWRC). Submissions have been received, which identify adverse effects of odour as the principal concern. There have been two pre-hearing meetings, which have not been able to resolve the submitters' concerns. A hearing date has not been set.

In the first instance, NCI Packaging has engaged T+T to:

- Review the Assessment of Environmental Effects report, responses to requests for further information and other documentation related the application;
- Carry out a site visit to familiarise with the activities on site and the local environment; and
- Review and provide feedback on the report prepared by NCI Packaging evaluating the practicability of engineering controls for odour.

The purpose of this letter is to set out:

- The key findings of our review in relation to the effects of odour emissions from the site;
- Our comments on NCI Packaging's review of odour control techniques; and
- Recommendations to NCI Packaging for further work that could be undertaken to better understand the effects of the site's odour emissions and/or options to improve odour management.

The work was carried out in accordance with our engagement dated 4 June 2020.

2 Information reviewed

T+T undertook a site visit on Wednesday 10th June. We have also spoken with the GWRC reporting officer (Claire McKevitt) to help us understand the context for this consent application. We have reviewed the following documents:

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- NCI Packaging. Assessment of Environmental Effects of Air Discharges From NCI Packaging Can Manufacturing Facility dated 31 January 2019.
- Request for further information on technical air quality issues, letter from Pattle Delamore Partners Ltd (PDP) dated 16 May 2019.
- Response to request for further information, letter from NCI Packaging dated 28 June 2019.
- Technical review of assessment of environmental effects, letter from PDP dated 16 May 2019.
- Minutes from the Pre-Hearing Meeting held 28 October 2019. Prepared by GWRC dated 4 November 2019.
- Review of January 2020 Odour Complaints, memorandum from NCI Packaging to GWRC dated 28 January 2020.
- Review of Odour Control Techniques report, prepared by NCI Packaging dated 18 June 2020.
- NCI Packaging Adaptive Management Odour Plan dated 29 July 2019.

3 Observations during the site visit

A visit to the site and surrounds was carried out on Wednesday 10th June 2020. The weather during the site visit was clear, with moderate temperatures and low wind speeds. Prior to visiting the site, we went directly to Mountbatten Grove (at approximately 10:50am) and walked around the end of the cul-de-sac for approximately 10 minutes. There were no odours detected during this walkaround.

A screen shot of the site meteorological station data (provided by NCI Packaging) is shown in Figure 3.1. This shows that the wind speeds were around 0.5 m/s from the time of arrival until about 11:45.

A visit to the NCI Packaging site was then undertaken until approximately 12:00pm. Light solvent odours were detectable adjacent to the equipment inside the building, including on the platforms adjacent to the ovens. These odours dissipated within a few meters of the equipment and there was no odour generally within the building.

Following the site visit, we walked along Montgomery Crescent in both directions. As indicated in Figure 3.1, wind speeds were slightly higher at around 0.8 to 1 m/s. Under these light wind conditions, there was a strong influence of buildings with localised “swirling” of light winds. Intermittent, very weak solvent-type odours were observed at two locations along Montgomery Crescent: within the building wake south southwest of the NCI Packaging building and outside the light industrial businesses west of NCI Packaging (outside 68 Montgomery Crescent).

We returned to Mountbatten Grove at about 12:20pm. The only odours detected were a natural conifer tree odour and a light woodsmoke odour (smoke emissions from a domestic chimney were noted at the corner of Totara Park Road and Ferguson Drive).

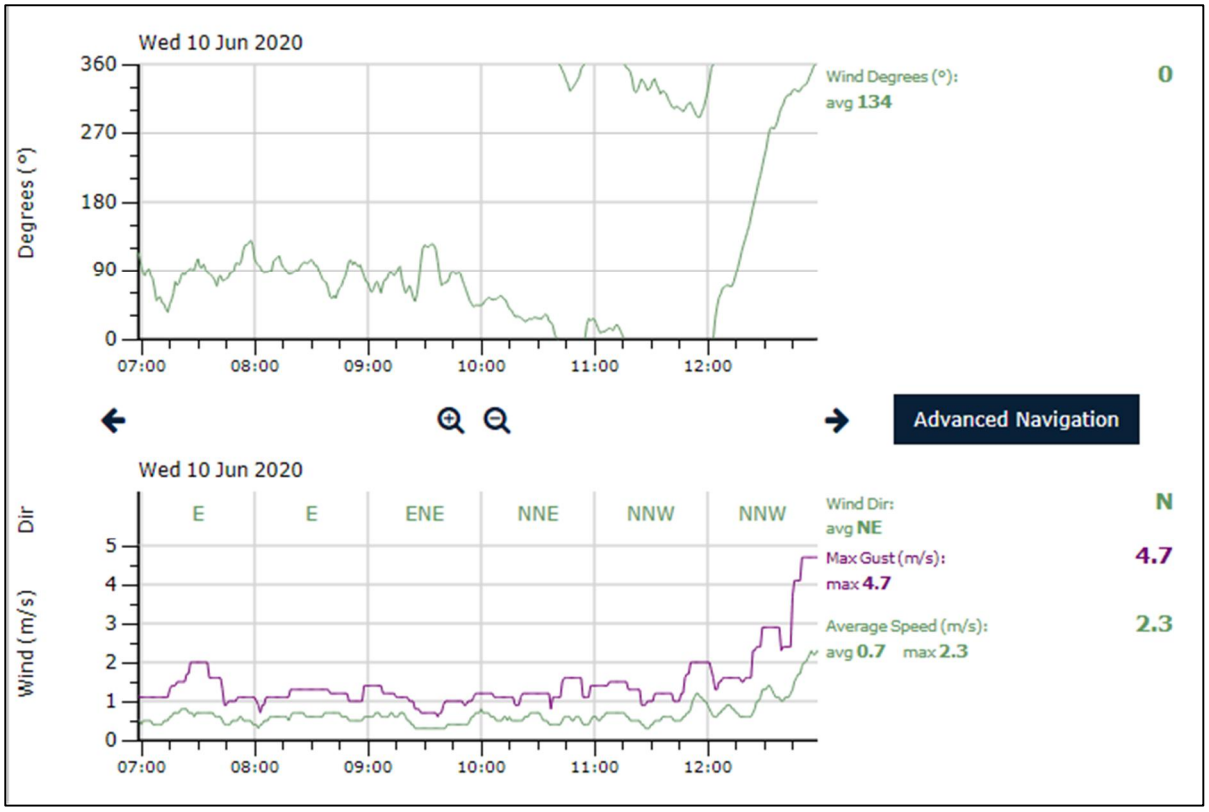

Figure 3.1: On-site met station data for period of site visit (approx. 10:50 am to approx. 12:30 pm)

4 Odour effects of emissions from NCI Packaging

4.1 Introduction

The main sources of information in the AEE and supporting documents to characterise the effects of odours from the NCI Packaging site are:

- Odour emission testing (olfactometry) and odour dispersion modelling; and
- Review of odour complaints.

These are briefly summarised below.

4.2 Odour dispersion modelling

A single round of stack testing for odour was carried out on 5 December 2018, comprising two samples taken from each stack (4 samples in total). The odour modelling was based on the higher of the two measurements.

The olfactometry reports describe the Line 1 samples as having a very strong solvent type odour compared to the Line 2 samples (strong solvent odour).

The odour dispersion modelling results, presented as a concentration contour plot, are reproduced in Figure 4.1. This indicates that odour concentrations at the western end of Mountbatten Grove could approach the odour modelling guideline value of 2 OU/m^3 (99.5th percentile), and would exceed this value in a small area beyond the site boundary. When interpreting the odour modelling results, it is important to note that they are based on the results of a single round of odour stack testing. There is likely to be some variability in the odour emission rates and therefore the location of the contours may not be precise.

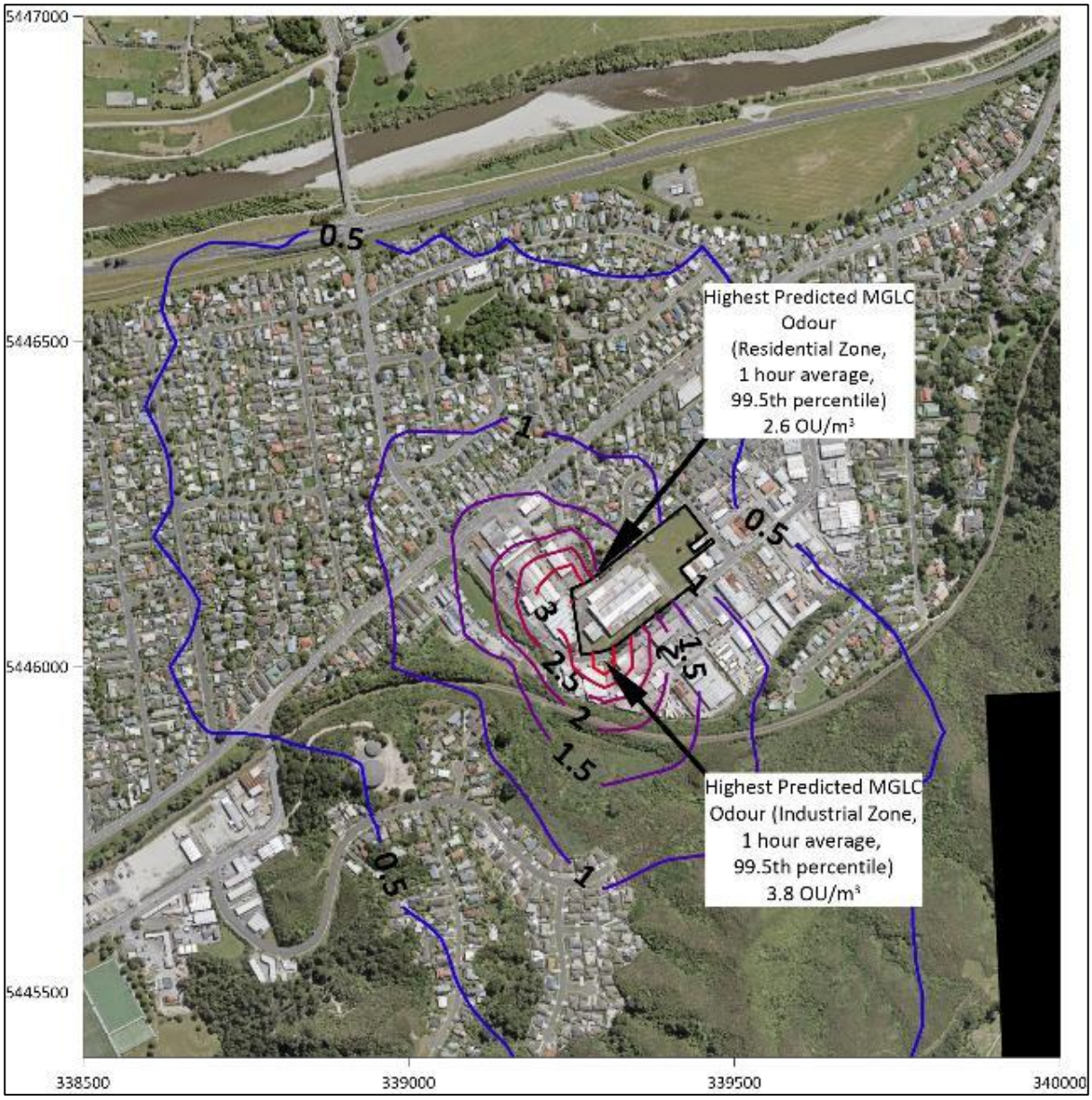

Figure 4.1: Odour modelling predictions (reproduced from Figure 8-1 in the AEE report)

4.3 Odour complaints

An analysis of odour complaints records with respect to complaint location and meteorology is presented in Table 8-1 of the Section 92 response (28 June 2019). There is a relatively small number of complaints received each year and all the odour complaints are recorded from Mountbatten Grove. The meteorological analysis suggests that there are occasions where NCI Packaging is identified by the complainant as the source of solvent type odour when the wind conditions indicate this is unlikely (there are several other potential sources of similar odours within the industrial area). However, at other times NCI Packaging is acknowledged as the likely source of solvent type odour.

A breakdown of the month/year in which odour complaints were received shown in Table 4.1. This shows that most complaints are recorded in the months from November to April. This may reflect that people tend to spend more time outdoors in the warmer months and are therefore more likely to notice odour, or it may be related to the frequency of weather conditions that are less conducive

to the dispersion of odours. It is also possible that the seasonal trend may reflect the influence of odours from the wider industrial area given the presence of other potential odour sources.

Table 4.1: Distribution of odour complaints

Month	Year				Total
	2016	2017	2018	2019	
January	2			3	5
February		2	1		3
March		1		1	2
April	2			1	3
May					0
June					0
Jul		1			1
August		1			1
September					0
October					0
November		3*	1		4
December		3			3
Total	4	11	2	5	22

* Recorded as 4 odour complaints, however 2 complaints were on the same day

4.4 Conclusions with respect to odour effects

Overall, we consider the available information supports a conclusion that current levels of odour emissions from NCI Packaging are causing occasional odour nuisance in a localised area around Mountbatten Grove. The information also suggests that odours are unlikely to be at a frequency, intensity or duration that would be considered offensive or objectionable. These findings are consistent with the conclusions drawn in the PDP technical review (16 May 2019) on behalf of GWRC.

Historical land use planning decisions have enabled sensitive residential activities and industrial activities, including the NCI Packaging facility, to establish in close proximity. Consequently, notwithstanding the conclusion that odour effects are not offensive and objectionable, the amenity expectations of neighbours in the adjoining residential area are not being met. In this context, we consider that the focus for NCI Packaging should be on minimising odour effects to the extent practicable (i.e. to ensure odour controls are the 'best practicable option' (BPO)).

4.5 Recommendations for further evaluation of odour impacts

To identify the BPO to minimise odour impacts, we consider that additional information is needed to characterise odour impacts. The current feedback mechanism to NCI Packaging on the site's odour performance is largely based on odour complaints. We consider that there would be significant benefits in undertaking a programme of proactive odour field observations. This would provide independent verification of the nature and scale of odours in the area and would also assist in confirming the likely source(s) of any observed odours.

Proactive odour monitoring would involve engaging an external party to undertake regular field odour observation surveys around the site. Odour observations do not require specialist expertise

and can be undertaken by anyone who does not work at the site (so they are not desensitised to the site's odours) and is demonstrated to have a "normal" sensitivity to odour. In our experience, this role is often undertaken by a person from the local community (but not the directly affected location) who is available for a brief period (of the order of an hour) at different times of the day (e.g. a retired or home-based person).

We recommend that the field odour monitoring programme be carried out over an extended period (ideally spanning a full 12 months) and include the worst-case months of November to April. A pragmatic approach can be taken to the timing and frequency of field observations, as the purpose would be to inform management, not to develop a statistically valid set of results for comparison against criteria. For example, while there would be a suggested schedule, monitoring would not need to be undertaken on days with favourable conditions for dispersion (e.g. high winds) and the schedule could be modified as more information becomes available.

5 Odour control options

5.1 Review of NCI Packaging report

NCI Packaging has prepared a report describing a range of odour control options and evaluating their appropriateness for the site (Review of Odour Control Techniques, June 2020). The combined emissions from the site (discharged via two stacks) can be characterised as a large volume airflow with low VOC concentrations. Taking these characteristics into account, the relative advantages and disadvantages of the available technologies are well summarised in Section 5 of the technology review report. The report finds that there are four odour control options that warrant more detailed consideration, being:

- **Increased dispersion** – further increasing stack heights to increase the dispersion and dilution of the VOC emissions;
- **Biofiltration** – using micro-organisms to remove VOCs from the extracted air prior to discharge to air;
- **Adsorption** – using a solid adsorbent material such as activated carbon to remove VOCs from the extracted air prior to discharge to air; and
- **Incineration** – thermally oxidising the VOCs in the extracted air.

We agree that these are the most applicable technologies and acknowledge the higher capital and/or operating costs associated with adsorption and incineration.

Overall, we agree with the technology review report that biofiltration is likely to be the most appropriate treatment option, subject to demonstrating its effectiveness. We understand that NCI Packaging will be undertaking a trial of the effectiveness of biofiltration on a sidestream of the emissions from the Line 1 main stack. This is an appropriate gas stream for the trial as it is relatively low temperature so will not need to be cooled before being treated in the biofilter.

One of the challenges with biofiltration is that the treated discharges are released to air at close to ground level and therefore there is relatively little opportunity for dispersion and dilution of residual emissions compared to the current stacks. The effects of residual odour emissions from a biofilter would need to be carefully assessed to ensure that there will be a significant overall benefit in terms of odour impacts.

We provide some further comments in the following sub-sections for consideration, particularly in the event that biofiltration does not prove to achieve an acceptable level of odour reduction.

5.2 Odour emission monitoring

We understand that further odour monitoring will be undertaken as part of the biofilter trial, both to determine the odour removal efficiency of the biofilter and also to characterise the emissions from different aspects of the process. We agree that further odour emissions monitoring will provide useful information and note the following:

- Although the odour emission rates from each stack are likely to be relatively consistent (given the nature of the processes at the site) it would be useful to understand the degree of variability, particularly if there is an ongoing need to rely on dispersion to mitigate odour effects. Repeat test results will also increase confidence in the accuracy of the monitoring results; and
- Understanding the odour concentrations in the different gas streams may allow consideration of localised (targeted) odour controls, if it is found that one or two sources are dominating. This is discussed further in Section 5.4.

5.3 Increasing stack height

Increasing the stack height to improve dispersion has been largely discounted by NCI Packaging, mainly due to concerns about "shifting" the plume and creating odour impacts in locations that do not currently experience any odour. While we accept that these concerns are valid, we consider that a sensitivity analysis of the model predictions to differing stack heights could provide useful information. Further interrogation of the modelling would help to understand the worst-case meteorological conditions for dispersion (particularly related to stability class) and provide useful information as to whether one stack source is contributing disproportionately to ground level impacts. For example, we note that the Line 1 (internal lacquer coating and tinplate sidestripe emissions) main stack is cooler (34°C compared to 90°C) and has a slightly higher odour emission rate compared to the Line 2 stack, so it is likely that it will influence peak ground level odour concentrations to a greater degree. This information would assist with determining priorities for odour control.

5.4 Adsorption and incineration

We agree with the technology review report that adsorption and incineration technologies are not practicable for continuous treatment of the entire volume of exhaust gases at the site. However, depending on the outcome of the biofilter trial and odour emission testing, further consideration could be given to the possible use of adsorption or incineration in a limited or targeted manner that may assist to minimise odour emissions in a more cost-effective manner.

In the case of activated carbon, the costs of implementation mainly relate to the disposal and replacement of activated carbon adsorbent. These costs are directly proportional to the mass load of VOCs. In the case of incineration, as well as a relatively high capital cost, there are ongoing costs for gas to operate a thermal oxidiser (incinerator). The operational cost is directly proportional to the volumetric flow rate of air that needs to be treated. Because of these differences, it may make sense to consider the BPO for treatment of an individual source (and not just the entire quantum of the site's emissions using the same method).

Depending on the outcome of the biofilter trial, we note that further consideration could be given to the use of adsorption or incineration technologies in a more limited or targeted manner, for example:

- Treatment of an individual oven exhaust gas stream with a small afterburner (if it is found that there is a dominant source); or

- Diversion of some or all of the emissions into an adsorbent bed during worst case meteorological conditions for dispersion; or
- Removal of the majority of VOCs using a biofilter and final polishing (suitable for ground level release) using an adsorbent.

6 Adaptive odour management plan

We have reviewed the Adaptive Management Odour Plan (29 July 2019) (AMOP) prepared by NCI Packaging. The purpose of an adaptive management plan is to help manage risk in situations where there is uncertainty, which could be in relation to the magnitude effects and/or the effectiveness of proposed mitigation measures.

An adaptive management approach works best where monitoring is carried out against thresholds that trigger remedial action before the effects become significant, i.e. the purpose is to avoid significant adverse effects. The approach set out in the AMOP effectively relies on complaints to "monitor" odour effects. The AMOP proposes that complaints will be investigated by NCI Packaging and if it is found that there is "a continuous level of objectionable and offensive odour", the plant would be shut down. We consider this approach is problematic because remedial action is only triggered by the occurrence of a significant adverse effect. Ideally, the threshold for considering further options to reduce odour would be set at a level where remedial actions could be taken to avoid a significant adverse effect occurring.

We suggest that the AMOP could be improved by:

- Incorporating proactive odour field observations, as outlined in Section 4.5 for monitoring odour effects; and
- Retaining the current short term "reactive" approach to complaints, but also including a proactive, longer term approach to odour management comprising evaluation of the results of the field odour observations and, depending on the outcomes, using a staged approach to investigating and implementing options to minimise odour emissions/impacts based on a BPO approach.

7 Summary of recommendations

In summary, our recommendations to NCI Packaging are as follows:

- Develop and implement a programme of proactive odour field observations to better characterise the effects of emissions from the site and identify possible other sources;
- Evaluate the results of the biofilter trial (currently underway) including assessing the effects of residual odour emissions;
- Evaluate the results of further odour emission monitoring (currently planned in conjunction with the biofilter trial), including monitoring the emissions from the specific sources to understand their contribution to overall odour emissions; and
- Depending on the evaluation of the biofilter trial results, carry out the following:
  - Sensitivity analysis of dispersion modelling to differing stack heights;
  - Refinement of the AMOP to incorporate field odour observations and a staged approach to investigating and implementing options to minimise odour emissions/impacts.

8 Conclusions

Given that the available information supports a conclusion that current levels of odour emissions from NCI Packaging are unlikely to be at a frequency, intensity or duration that would be considered offensive or objectionable, we consider there is sufficient technical information to proceed to a hearing on the current resource consent application. However, there would be a benefit in waiting until the results of the biofilter trial are known, as this may increase the level of certainty about proposed additional odour mitigation and the need to rely on an adaptive management approach.

9 Applicability

This report has been prepared for the exclusive use of our client NCI Packaging (NZ) Ltd, 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 our client will submit this report as part of an application for resource consent and that Greater Wellington Regional Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

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