Before the Independent Hearing Commissioner
In Wellington

Under	the Resource Management Act 1991 (the Act)
In the matter of	A Notice of Requirement by Wellington City Council to alter Designation 58 (Moa Point Drainage and Sewage Treatment) to provide for the construction, operation and maintenance of the proposed Sludge Minimisation Facility at Moa Point, Wellington

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Statement of evidence of Mathew Gregory Noonan for Wellington City Council

Air Quality (Odour and Dust)

Dated: 18 November 2022

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Contents

Statement of Evidence of Mathew Gregory Noonan

1 Introduction

1.1 My full name is Mathew Gregory Noonan.

1.2 I am a Senior Associate Environmental Scientist at Beca Ltd. I have been employed by Beca since 2009. I am Beca's air quality discipline technical lead.

1.3 This evidence focuses on air quality matters arising from the Notice of Requirement ('**NOR**') lodged by Wellington City Council ('**WCC**') on 3 August 2022. The NOR is to alter Designation 58 (Moa Point Drainage and Sewage Treatment) in the Wellington City District Plan ('**WCDP**') to provide for the construction, operation and maintenance of the proposed Sludge Minimisation Facility ('**SMF**' or '**Project**') at Moa Point, Wellington.

1.4 I have been asked to provide evidence by WCC.

1.5 My involvement with this Project, prior to this hearing, has been as the author of the "Moa Point Sludge Minimisation Facility - Air Quality Assessment" (dated 25 July 2022) ('**Beca Air Quality Report**'), which accompanied the NOR. This report is Appendix F to the NOR Assessment of Environmental Effects ('**AEE**').

2 Qualifications and experience

2.1 I hold bachelor's degrees in Mathematics and Mechanical Engineering, and a Master of Science in Environmental Science from the University of Auckland. I also hold a post Graduate Certificate in Biostatistics from the University of Sydney. I am a member of the Clean Air Society of Australia and New Zealand (CASANZ).

2.2 I have over 22 years of experience as an air quality consultant, primarily assessing the health, environmental and amenity effects of discharges to air from industrial and infrastructure sources. Some of my relevant experience in assessing the effects of discharges to air (odour, combustion sources and dust) from municipal wastewater treatment and storage processes includes the following

a Gisborne Waste Water Treatment Plant ('**WWTP**');

b Mangere WWTP BNR and Biosolids Building Projects;

c St Marys Bay and Masefield Beach Improvement Project (emergency storage pipeline);

d Army Bay WWTP;

e Raglan WWTP;

f Boneo WWTP (Victoria);

g Snell Beach WWTP;

h Kingston WWTP;

i Akaroa WWTP;

j Wellsford WWTP;

k Waiuku WWTP; and

l Christchurch WWTP (assessment of discharges from a biogas boiler).

2.3 I have also undertaken assessments of the odour discharged from industrial wastewater treatment systems including the Fonterra Te Rapa, Te Awamutu, Tirau and Edendale dairy factories.

3 Code of Conduct

3.1 While the NOR is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). Accordingly, I have complied with the Code in the preparation of this evidence and will follow it when presenting evidence at the hearing.

3.2 The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in my evidence to follow.

3.3 Unless I state otherwise, my evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

4 Scope of evidence

4.1 My evidence addresses the following:

a The existing environment;

b Description of the Project;

c The dispersion modelling undertaken;

d Dust effects during construction;

e Odour effects during commissioning;

f Dust effects during operation;

g Odour effects during operation;

h Combustion emissions during operation;

i Odour at the disposal site;

j A summary of effects;

k Consideration of alternatives;

l My recommended mitigation;

m Response to submissions; and

n Response to s42A officer's report.

5 Summary

5.1 The main effects of the SMF that I have assessed in my evidence are odour and dust; both of these could arise during operation as well as construction/commissioning.

Dust during construction

5.2 Dust will be the main contaminant generated during the construction of the SMF. In my opinion, dust would mostly be generated during demolition activities and earthworks in the initial phases of construction. The DHL Express Building and the Cyclotek buildings are the closest commercial receptors to the site where earthworks will occur. Some demolition and construction activities will occur closer to the Cyclotek building. These activities include the removal of the existing pavement, demolition of the AGS Automotive building, and the excavation of foundations for the digestors and process buildings.

5.3 The activities above are unlikely to be significant sources of dust, provided standard dust control procedures[1] are implemented. Therefore, I consider it is unlikely that dust emissions from these construction activities would have any adverse impact on the Cyclotek's operation and the closest residential and commercial receptors.

Odour during commissioning

5.4 The commissioning process will lead to a degree of odour, particularly during the commissioning of the anaerobic digestors. The digestor commissioning period which will occur over approximately a month. In my opinion, the risk of objectionable or offensive odour occurring outside the boundary during commissioning can be minimised through the implementation of mitigation options covered below in my evidence. WCC will submit a Commissioning Odour Management Plan to the GWRC for certification prior to the commissioning of the digestors.[2]

5.5 It is possible odours may, at times, still be observed outside the site boundary during commissioning. However, I would expect any such odour would occur for only short periods and would likely be confined to the immediate vicinity of the site. I consider it unlikely that any adverse odour would be observed at any of the nearby residential properties during commissioning.

Dust during SMF operations

5.6 There is the potential for dust to be generated during the operation of the SMF during handling and truck loadout operations due to its friable nature. However, I consider it highly unlikely that any dust emissions from the SMF would have an adverse impact on the closest residential properties.

5.7 I would also expect that any fugitive dust emissions from the loadout facility would have minimal effects on the air quality surrounding the Cyclotek building.

5.8 In my opinion, the proposed dust mitigation procedures are appropriate. I would expect little dust to be emitted during sludge loadout provided these operations are diligently carried out. I would not expect any fugitive dust which is emitted to be considered offensive or objectionable.

[1] These include methods such as minimizing the areas of exposed surfaces, keeping unsealed surfaces damp and avoiding particularly dusty activities in windy and dry conditions.
[2] McGimpsey EIC, Appendix A, condition 31.1.

Odour during SMF operations

5.9 Wastewater treatment processes are inherently odorous. In my opinion, it would be very unlikely that a WWTP (or SMF) could continually comply with a "no discernible" odour condition (as currently exists in the designation and resource consent conditions for the Moa Point WWTP). The compliance record indicates that odour emitted from the existing Moa Point WWTP and the Inlet Pump Station ('**IPS**') in the past have been discernible outside the site boundary.

5.10 As a result, WCC has proposed the following alternative (to the existing 'no discernible odour' condition for the Moa Point WWTP) odour performance criteria as a consent condition:[3]

> There shall be no noxious, dangerous, offensive or objectionable odour or particulate matter discharged to air to the extent that it causes an adverse effect at or beyond the boundary of the site during commissioning or operation of the SMF.

5.11 A discharge to air resource consent is also required from Greater Wellington Regional Council ('**GWRC**'), and in that context, an identical condition is currently proposed by GWRC.

5.12 I consider the above proposed WCC condition to be appropriate and consistent with the PNRP.[4] The SMF Odour Control Unit ('**OCU**') stack is expected to be the main source of odour emissions. I would expect little fugitive odour to be emitted from the site.

5.13 I have assessed the potential impacts of these discharges from the SMF OCU using dispersion modelling methods as discussed previously in my evidence. The results show that predicted odour concentration from the proposed SMF OCU and Moa Point OCU would not exceed the MfE odour guideline concentrations. Based on these predictions, I consider it unlikely that emissions from the SMF OCU would have an adverse odour effect beyond the site boundary.

5.14 Some odours will be emitted from the building ventilation system. However, I would expect these emissions to be minimal with the proposed use of an activate carbon odour filter. The height of the building vents (approximately 22m above ground level) will also assist in the dispersion of any residual odour. I consider it

[3] McGimpsey EIC, Appendix A, condition 31.4.
[4] Condition a) of the permitted activity 'Rule R35: Gas, water and wastewater processes' is that:
(a) the discharge shall not cause offensive or objectionable odour at the boundary of a sensitive activity; …..

unlikely that any emissions from the building ventilation would be observable outside of the site boundary.

5.15 It is likely that some fugitive odours may, at times, be observable outside the site boundary. However, I expect these odours will be localised to the commercial area which immediately surrounds the site and at a frequency and intensity of odour appropriate to the moderate sensitivity of the land use.

5.16 I consider it is unlikely that any offensive or objectionable odour would occur at any of the nearby sensitive receptors or beyond the site boundary.

5.17 I consider it unlikely that emissions from the proposed combustion sources would have any adverse effects. I have also assessed these discharges using dispersion modelling methods. The results of the modelling indicate that emission from the site would not exceed any of the relevant air quality criteria limits

5.18 In my opinion, provided the proposed mitigation is appropriately designed, operated and maintained, the discharges to air from the SMF will not have adverse impacts on the surrounding environment. I consider the emissions of any odour, combustion gases or dust will not have an adverse effect to the extent that they could be considered offensive or objectionable beyond the boundary of the site.

6 Existing environment

6.1 This section of my evidence discusses the features of the environmental setting of the proposed Project that are most pertinent to the potential air quality effects associated with the Project.

Location

6.2 In **Appendix A** of my evidence (and **Figure 1** below), I have shown an aerial photo of the SMF site ('**the site'**) and surrounding land use. The Moa Point WWTP, IPS and the Aviation Ground Services Automotive Building ('**AGS Building'**) currently occupy the proposed site. The IPS will remain in place but will be incorporated within the SMF building structures and odour control system.[5] I will discuss this later in my evidence. The AGS Automotive Building will be removed during construction of the SMF.[6]

[5] AEE, section 4.4.1.
[6] AEE, section 1.4.1.

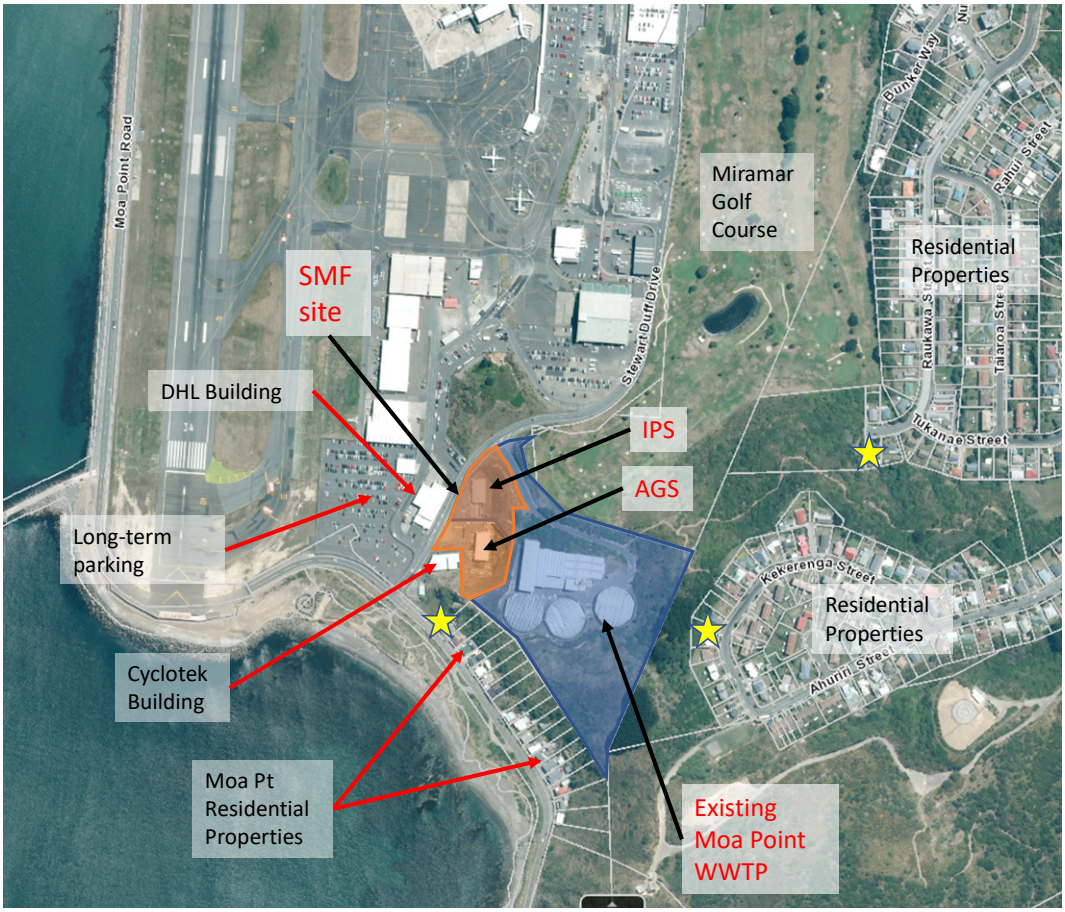

Figure 1: Aerial photo of the SMF site

6.3 The surrounding area has a mixture of airport, commercial, recreational, and residential land uses. Wellington International Airport ('the **Airport**') is the predominant land use in the surrounding area. The Airport's DHL Express Service Point building ('**DHL Building'**) and an uncovered long-term carparking area are located adjacent to the site on the west side of Stewart Duff Drive.

6.4 The Airport terminal buildings are located approximately 570m to the north of the SMF site. I consider it unlikely that the terminal buildings would be impacted by any discharges to air from the proposal due to the intervening distance from the site.

6.5 The Cyclotek plant is located immediately to the south of the proposed SMF. The Cyclotek plant manufactures PET radiopharmaceuticals (tracers) for the New Zealand market[7].

6.6 The closest residential properties are located approximately 65m to the south of site on Moa Point Road, 250m to the east of the site on Kekerenga Street, and

[7] https://www.cyclotek.com/about-us/.

430m to the northeast of the site on Raukawa Street. I have shown the location of the closest dwellings as yellow stars in **Figure 1**.

6.7 The Miramar Links Golf Club ('**Golf Club**') is located to the north of the site. The closest playing green is located approximately 65m from the SMF site boundary. The club rooms are located more than 600m from the site. I consider it highly unlikely that emissions from the site will have any impact at this location due to the intervening distance.

6.8 The Airport's eastern transition Obstacle Limit Surfaces ('**OLS**') extends over the top of the SMF site and the existing Moa Point WWTP[8]. The OLS is intended to keep the airspace free of structures which may restrict the safe operation of aircraft. The OLS restricts the height of SMF structures and also the height of the SMF exhaust stack and vertical discharge velocity. The SMF exhaust stacks and building structure have been designed to comply with the OLS.[9]

Topography

6.9 Hills are located to the northeast, east and south of the SMF site. A steep slope is located on the site's eastern boundary. The slope separates the site from the existing Moa Point WWTP. The elevation of the Moa Point WWTP site is approximately 30m higher than the elevation of the SMF site. At the eastern boundary of the Moa Point WWTP site, the ground rises again by another 50m to residential properties located on Kekerenga Street.

6.10 A hill is located to the south of SMF site and the Cyclotek building. This hill separates the site from the residential properties located along Moa Point Road. The top of the hill is approximately 20-25m higher than the site.

6.11 Another hill also separates the SMF site from nearest golf course playing greens located to the north-east of the site. This hill will be cut back to accommodate the SMF.

6.12 A hill referred to as 'the hillock' is also located to the north of the site within the Airport. WIAL is proposing to level this hillock to enable future development of the Airport.[10] I discuss this WIAL proposed development in paragraphs 6.21 to 6.25.

[8] Wellington District Plan, Designation G2 Wellington International Airport Ltd – Air Space Designation.
[9] McGimpsey EIC, Appendix A, condition 24.1.
[10] I understand that work will be the subject of a joint resource consent application by WCC and WIAL.

6.13 The surrounding terrain can be expected to have significant effect on wind flows and therefore the transportation and dispersion of contaminants discharged to air from the site. The hills to the east of the site can be expected to channel wind in a more north-westerly direction. Due to the difference in elevation between the SMF site and Kekerenga Street, I would also expect site emissions to be channelled away from these properties, particularly during low wind speed when poor dispersion conditions are most likely to occur.

6.14 The intervening hill between the SMF and residential properties located on Moa Point would tend to channel any site emissions away from these properties, particularly during low wind conditions. I would expect surrounding hills to largely contain any fugitive emissions of odour, dust or contaminants from the SMF, minimising any potential exposures at the Moa Point dwellings.

Meteorology

6.15 The main meteorological conditions which influence air contaminant dispersion are wind speed, wind direction and thermal atmospheric conditions. Worst case dispersion conditions will mostly occur during low wind speeds and highly stable atmospheric conditions, typical of cool, calm winters' nights. During these conditions, peak downwind odour and contaminant concentrations will occur. In contrast, odour and other contaminants will be better dispersed and diluted during high wind speed conditions.

6.16 The SMF site is in an exposed coastal location and can therefore be expected to be well ventilated by the frequent moderate to strong winds. There is no meteorological monitoring station at the existing WWTP site. The closest meteorological monitoring station to the site is at the Airport which is located approximately 530m to the northwest of the site. I consider the wind flows recorded at this monitoring station will also be representative of the wind flows at the SMF site.

6.17 In **Appendix B** of my evidence, I have shown a 'windrose' that displays the distribution of 1-hour average wind speeds and wind directions (i.e. direction the wind was coming from) measured at the Airport meteorological station for the years 2016 to 2020. The distribution shows that moderate to high wind speeds occur frequently at the site. For example, speed over 5 m/s, when good dispersion conditions occur, was observed for more than 67% of the time (from various directions). The average wind speed at the site was observed to be 7m/s.

6.18 In contrast, wind speeds less than 1.5m/s, when poor dispersion conditions occur, was observed for only 4.7% of the time. Overall, the wind distribution data indicates that emissions from the SMF site would mostly occur during relatively windy conditions. Air contaminants therefore be expected to quickly disperse and dilute in the receiving environment.

6.19 The windrose in **Appendix B** also shows that the winds are predominantly from the north, and to a lesser extent from the south. There is very little (almost no) easterly or westerly wind shown.

6.20 The windrose indicates that the Kekerenga Street residential area will rarely be downwind of the SMF, and therefore will only rarely be exposed to any emissions from the site. However, the Cyclotek building and western dwelling located on Moa Point Road are located in the predominant downwind direction.

WIAL WLG 2040 Master Plan

6.21 The WIAL 'WLG 2040' masterplan ('**Masterplan**') was published in 2019 which details the proposed development of the Airport over the next 20 years.[11] The proposed developments, if implemented will have an impact on the surrounding land use. Certain aspects of the Masterplan can be authorised using designations which have recently been included in the WCDP.[12] From an air quality perspective, the proposed developments which would be most relevant are:

a The extension of the Airport's operational area over the southern part of the Miramar Golf Course. The playing greens nearest the SMF and Moa Point WWTP north boundaries would be removed.[13]

b The DHL Express Service Point building opposite the SMF site would be removed and replaced by a much larger freight logistics centre ('**Freight Hub**').[14]

c The small hillock located to the north of the SMF site would be levelled to allow for the expansion of the Airport apron.[15]

6.22 My assessment of the effects on air quality has been based on the assumption that the Freight Hub has been built. Overall, the sensitivity of the area to air quality effects is expected to remain unchanged with the development of the

[11] https://www.wellingtonairport.co.nz/documents/3131/FINAL_Master_plan.pdf at page 21.
[12] Wellington City District Plan, Designation G5, Appendix AF; Designation G6, Appendix AG.
[13] Wellington City District Plan, Designation G6, Appendix AG, Figure 2.
[14] Wellington City District Plan, Designation G5, Appendix AF.
[15] Wellington City District Plan, Designation G5, Appendix AF, Conditions 2, 19.

Freight Hub. However, the large Freight Hub building would have a greater effect on air flows and dispersion of emissions from the site when compared to the smaller existing DHL building. Overall, I would expect higher ground level contaminant concentrations to occur once the Freight Hub is constructed due to building downwash effects. These building downwash effects are incorporated into the dispersion modelling assessment I have conducted.

6.23 I have also assumed in my assessment that the hillock has been levelled and has been removed as a terrain feature in the dispersion modelling assessment. However, in my opinion inclusion of the hillock in the modelling would not have any substantial effect on the odour and contaminant concentrations predicted at the nearby onsite receptors, or my conclusions in respect of these receptors.

6.24 **Mr Paul McGimpsey** considers that the Freight Hub is 'likely to be constructed' and the hillock is 'likely to be removed'.[16] As such, these two aspects are included in the receiving environment for the purposes of my air quality assessment.

6.25 My assessment has also been based on the assumption that the existing golf course remains unchanged. Over time, the southern part of the golf course may be converted into the Airport apron (as mentioned in the Masterplan and authorised by WIAL's Designation). However, it is possible that the southern playing green will still be in operation for at least a period when the SMF is operating. Therefore, given the higher sensitivity of the golf course to air quality effects, I have assumed in my assessment that it remains as part of the receiving environment.

Background Air Quality

6.26 Section 5.7 of my Beca Air Quality Report (Appendix F to the AEE) discusses the background air quality. I briefly summarise the main points here in my evidence. The main sources of air contaminants in the vicinity of the SMF site are motor vehicles and aircraft, home heating emissions from solid fuel burners from the residential areas during winter, and sea salt aerosols which will also contribute to ambient particulate matter concentrations.

6.27 Generally, I would expect only comparatively low ambient air contaminant concentrations in the vicinity of the site. Poor ambient air quality is generally experienced during low wind speed conditions. Therefore, the high average wind

[16] McGimpsey EIC, para 6.5.

speeds experienced at the site would also tend to disperse any emitted contaminants.

6.28 I would also expect typical odours associated with the coastline, such as the decomposition of organic material such as seaweed, to be experienced close to the waterfront. I would also expect odour associated with the aviation fuel usage (characteristic kerosine smell) and aircraft operations to be present at times.

Current emissions from the Moa Point WWTP and Inlet Pump Station

6.29 The existing Moa Point WWTP and the associated IPS are also existing sources of odour. Discharges to air from the WWTP are permitted by regional council Consent number WGN080003 [26183]. The consent expires on 11 May 2034. WCC is not seeking any change to this consent as part of the Project.

6.30 Discharges to air from the IPS are permitted by a separate consent – regional council Consent number WGN960094 [1471]. This consent expires on 8 January 2033. The IPS consent would be surrendered should the required NOR and resource consents[17] be granted for the proposed SMF.

6.31 The main sources of odour at the Moa Point WWTP are the discharges from the odour control unit ('**OCU**') stack. All of the WWTP's treatment processes are mechanically vented to the OCU which removes the odour before it is discharged to the atmosphere via a 16.8m exhaust stack.

6.32 Similarly, the main source of odour from the IPS site are the discharges to air from the IPS OCU stack. The top of the IPS exhaust stack is approximately 8m above ground level.[18] The IPS wet well is located outside the IPS building and is not ventilated to the IPS OCU.

6.33 The IPS wet well has in the past been identified as a source of odour during maintenance by the site operator. Fugitive odours (i.e. odours emitted from cracks or gaps, or from small source not vented to the OCU) can at times, also be emitted from both the WWTP and IPS.

6.34 Both the Moa Point and IPS OCUs are three-stage chemical scrubbers. Generally, a high level of odour control can be expected for three-stage chemical scrubbers (i.e >99%). The WWTP and IPS respective consent conditions specify maximum discharge concentration limits for hydrogen sulphide ('**H_2S**') and total

[17] AEE, section 1.4.4.
[18] As measured in site plans provided by WCC.

reduced sulphur ('**TRS**') compounds[19]. H_2S and TRS are commonly used as indicator species for wastewater odours. These contaminants have a 'rotten egg' or '"decayed cabbage" type odour and are generally considered offensive. I consider these consented emission concentration limits to be stringent.

6.35 I have reviewed the annual monitoring reports for the WWTP which have been submitted to GWRC since 2015 as a requirement of the consent conditions. These reports summarise the results of H_2S and TRS emission monitoring conducted at the site. These results show that in recent years, only low concentrations of H_2S and TRS are emitted in the discharged ventilation air. Discharges have generally been compliant with the consent limit since May 2018. Overall, the monitoring suggests that only a low level of wastewater derived odour is emitted from the stacks[20].

6.36 Odour emission testing was conducted at the site in April 2022 by Source Testing New Zealand ltd on behalf of Beca[21]. This testing was used to characterise emissions from the Moa Point OCU in terms of total odour units (OU/m^3)[22], rather than in terms of specific chemical species. The testing provides an indication of the cumulative impact of all odorous compounds which are emitted.

6.37 The odour discharge concentration from the Moa Point OCU was determined to be 994 OU/m^3. However, the laboratory tested odour samples were described as having a moderate "chlorine-type" odour. The chlorine odour can be attributed to the sodium hypochlorite in the OCU's scrubbing fluid, rather than the odour which is generated from the wastewater itself.

6.38 In **Table 1** of my evidence, I have provided estimates of the current odour discharge rate from the Moa Point and the IPS OCU. Since both OCUs use a similar odour control technology, I have assumed the concentration of odour in the discharged air would be similar for both units. The assumed odour discharge concentration is based on the 2022 emission testing.

Table 1. Odour emissions from Moa Point OCU and IPS OCU stacks

Parameter	Moa Point OCU stack	IPS OCU stack
Air discharge rate	17 m^3/s	2.95 m^3/s
Stack height	16.7 m	0.5 m

[19] WGN080003 [26183]) – condition 9, WGN960094 [1471 – condition 11.
[20] On-line monitoring indicate an average control efficiency for H2S of greater than 99.9%.
[21] Moa Point Waste water Treatment Plant – Air discharge monitoring, April 2022. Report prepared for Beca by Source Testing New Zealand Ltd.
[22] 1 OU/m3.is equivalent to odour detection limit under laboratory conditions is equivalent.

Discharge velocity	15 m/s	15 m/s
Maximum H_2S discharge concentration (Consent limit)	0.01 ppm	0.01 ppm
Maximum TRS discharge concentration (Consent limit)	0.05 ppm	0.05 ppm
Odour discharge concentration (Moa Point OCU measured concentration)	994 OU/m^3	994 OU/m^{3*}
Odour discharge rate	16,898 OU/s	2,932 OU/s

6.39 It should be noted the IPS OCU will be decommissioned when the SMF is commissioned. The IPS and IPS wet well will be enclosed by the SMF plant building and vented to the new SMF OCU. [23]

6.40 A register of any odour complaints received is maintained by WCC as consent holder in accordance with the GWRC consent requirements. I have reviewed the complaint record provided by WCC for the period 2008 to 2021. During this period, 118 complaints have been received. However, most complaints were received before 2017. Since 2018, only three odour complaints have been received, which corresponds to approximately 0.6 complaints per year. In my experience, this is a comparatively small number of complaints for a WWTP to receive. The recent complaint records (since 2018) suggests that currently the neighbours only infrequently experience any nuisance odour from the WWTP.

6.41 An analysis of where nuisance odours have been observed is described in Section 5.8.2 of the Beca Air Quality Report (Appendix F to the AEE). Most complaints have, in the past, been received from Moa Point Road residents (40%), users of the Miramar Links Golf Club (37%) and on Stewart Duff Drive (10%).[24]

6.42 In my opinion, the locations where these odours were reported suggests that the IPS and IPS wet well are likely to have been source of some these odour events, due to their proximity to the receptors. Maintenance of the IPS wet well, when the covers are removed, has in the past been identified by the WWTP operators as a likely source of some of these complaints.

6.43 Since 2018, two complaints have been received from Moa Point Road residents and one from a Strathmore Park Resident.

[23] AEE, section 8.3.4.
[24] This also captures complaints to GWRC as regulator.

6.44 I note that only four complaints have been received from Kekerenga Street residents. In my opinion, emissions from the Moa Point OCU stack is likely the source of any odour observed at these residential properties, due to their position on the top of the hill. Therefore, the low number of complaints suggests that the impact that emissions from this OCU stack has on the air quality, at these residential properties, is sufficiently small so as not to have an adverse effect.

6.45 This conclusion is also supported by the results of odour dispersion modelling I have carried out. I discuss the modelled predictions in paragraphs 8.5 to 8.17 of my evidence.

7 Project Description

7.1 The Project is comprehensively described in the AEE and in the evidence of **Mr Chris French.** I understand that the design and layout of the SMF is subject to ongoing refinements and is yet to be finalised. Overall, I do not expect any such refinements would alter my assessment of effects provided the regional consent and designation conditions are complied with. That position should be confirmed by rerunning the dispersion model once the final design and layout is determined.

7.2 From an air quality perspective, the discharges to air from the project will include:

a Odour primarily emitted from the SMF OCU exhaust stack,[25] although other smaller sources of odour will also be present;

b Combustion-related air contaminants emitted from the following:

i The combustion of biogas or natural gas by the two boilers and CHP units located in the Energy Centre;[26]

ii The flaring of any waste biogas not required by the Energy Centre;

iii The energy diesel-fired generator during mains failure and routine testing;

c Fugitive dust from the handling of dried sludge cake product;

d Emissions of dust during the construction of project;

[25] As shown in Appendix C to the AEE, page 2.
[26] As shown in Appendix C to the AEE, page 2.

e Odour generated during the commissioning of the SMF. These include:

i Emissions when the anaerobic digestors are commissioned; and

ii Small fugitive emissions during testing of pipes, vessels etc.

7.3 The potential for adverse air quality effects associated with the Project is primarily related to the discharge of odour and combustion contaminants during operation. I discuss these emissions in more detail in the following paragraphs.

Operational Odour Emissions

7.4 All the SMF sludge treatment processes and storage silos will generate some odours. However, I would expect the final dried sludge product would have little odour and the odour which is emitted would have an earthy/compost character.

7.5 To minimise emissions to air, potential sources of odour will be enclosed and ventilated to the SMF OCU, or the existing Moa Point OCU. The OCUs will remove the emitted odorous compounds that are present in the ventilation air before it is discharged to the atmosphere.

7.6 Secondary containment of any fugitive odour emitted by the SMF treatment processes located in SMF's main dewatering building, export facility building and IPS building will be provided by building structures in which they are located. The plant buildings will be maintained at a slight negative pressure and mechanically vented to activated carbon odour filters located on the roofs of the buildings.

7.7 In **Appendix C** of my evidence, I show an overview of the sludge treatment process and the process units which will be ventilated to the OCUs. I have also summarised the proposed controls in **Table 2** below. The buildings/areas are shown in the evidence of **Mr Chris French**.[27]

Table 2. Summary of the SMF odour control

Building / Area	Process Unit / Area	Odour Control
Pre-treated sludge	Sludge holding and receival tanks	Moa Point OCU (discharges to air permitted by resource consent WGN080003 [26183])
Strain Press Building	Strain Press building	
	Strain Press screening bins	

[27] French EIC, section 7.

Sludge Holding Tank and Pump set	Pre-THP Centrifuge Feed Tank	SMF OCU
Main Dewatering building	Pre-THP Centrifuges	SMF OCU
THP Feed Silos	THP Feed Silos	SMF OCU
Digestors area	Digester spill boxes	SMF OCU
Digestors area	Post-digestion Tanks	SMF OCU
Main dewatering building	Post-digestion Centrifuges	SMF OCU
Return Liquors Sump	Return Liquors Sump	SMF OCU
Main dewatering building	Thermal Dryer Feed Silo	SMF OCU
Sludge Export Facility	Export Silos A and B	SMF OCU (via bagfilter to remove dust)
	Sludge export facility	SMF OCU (via bagfilter to remove dust)
Inlet Pump Station building	Inlet Pump Station	SMF OCU
Anaerobic Digestors	Anaerobic Digestors	Biogas combusted in Energy Centre or by flaring
Main Dewatering Building	THP	Process gases vented to digestors
Main Dewatering Building	Building space (Centrifuges, THP units)	Building ventilation system activated carbon filters
Energy Centre / Thermal Dryer	Building space (CHPs, boilers, thermal dryer)	Building ventilation system activated carbon filters

7.8 The sludge holding and blending tank and strain press will be located at the main Moa Point WWTP and vented to the existing Moa Point OCU. The Project will use the WWTP's existing sludge tanks. These tanks are currently used to store sludge before it is piped to the Carey's Gully sludge dewatering facility ('**SDF**'). The sludge will now pass through the strain press before being piped downhill to the SMF. The sludge storage tanks are currently vented to the Moa Point OCU, and will continue to be so when the SMF is commissioned.

7.9 The strain press will be located in an existing plant building which is also currently vented to the Moa Point OCU. Overall, I would not expect the air flow through the Moa Point OCU, or the odour discharge from the Moa Point OCU to change to any extent from the existing discharges. These discharges to air are authorised by the Moa Point WWTP resource consent (WGN080003 [26183]), subject to conditions.

7.10 The sludge treatment processes and storage silos not located at the main WWTP will be located at the SMF site. These processes and storage silos will be vented

to the SMF OCU. The treatment processes and storage silos will be also maintained at a negative pressure to minimise the emission of fugitive odours. At the design ventilation rates of 12 -20 air changes per hour, I would expect little to no fugitive odour to be emitted from these processes.

7.11 The THP units and anaerobic digestor are enclosed processes and therefore do not discharge to the atmosphere. The waste gases generated by the THP will be piped to the anaerobic digestor which will produce biogas which in term will be combusted by in the SMF Energy Centre.

7.12 The IPS and IPS wet well will also be enclosed within the SMF plant building and also vented to the SMF OCU.

7.13 The SMF OCU will use a bio-trickling filter and activated carbon filter (BTF/AC) control technology. This is a mature odour control technology which is commonly used for wastewater applications. For this technology, I would expect an odour reduction efficiency of greater than 99%[28].

7.14 The manufacturer of the SMF OCU has specified a maximum odour discharge concentration of 500 Odour Units per cubic metre (OU/m^3). Overall, I consider the performance of the proposed SMF OCU to be representative of good industry practice, and able to achieve a high level of odour control. I note that the specified maximum odour discharge concentration for the SMF OCU is approximately half of the odour concentration which was measured in the ventilation air discharged from the Moa Point OCU (i.e. 994 OU/m^3 - refer paragraph 6.36 of my evidence).

7.15 I would expect the odour which is discharged from the SMF OCU to have an “earthy” type odour and therefore be different in character to the “chlorine” type odour emitted from the existing Moa Point OCU.

7.16 The treated ventilation air will be discharged from the 24.2m stack at a velocity of approximately 4.3m/s. The stack discharge parameters have been designed to be compliant with the airport OLS. I have summarised the SMF OCU emission parameters in **Table 3**.

Table 3 Summary of the SMF OCU emission parameters

Discharge parameters	Value
Stack height	24.2 m

[28] SydneyWater, 2022. Technical Specification Odour Control Unit.

Discharge velocity	4.3 m/s
Ventilation air discharge rate	55,800 m^3/hr
Maximum odour discharge concentration (Manufacturer specification)	500 OU/m^3
Maximum odour discharge rate	7,750 OU/s

7.17 Since the treatment processes will be enclosed, I would expect little fugitive odour to be emitted into the building space (i.e. the volume of air enclosed by the building structure). The ventilation air discharged from the building spaces will be treated by activated carbon odour filters before being discharged to at the atmosphere. Provided the odour filters are maintained, I would expect an odour control efficiency of approximately 99%. Therefore, I would expect little odour to be emitted to the atmosphere from the building vent, provided the filters are well-maintained.

7.18 The height of the roof vents above ground level is approximately 22m. I would expect the height of the vents will also provide for a good level of dispersion of any emitted odour.

Combustion Emissions

7.19 The Combined Heat and Power ('**CHP**') units and two boilers located in the Energy Centre Building will burn either biogas generated by the anaerobic digestors, or natural gas provided by the mains supply. The biogas will be comprised of approximately 60% methane and 40% carbon dioxide. However, small quantities of other contaminants will also be present, including odorous compounds such as H_2S.

7.20 The exhaust gases and air contaminants generated from combustion sources located in the Energy Centre Building will be discharged to the atmosphere from a single exhaust stack located on the side of the building. The top of the exhaust stack will be at least 21m above ground level.

7.21 Any waste biogas which cannot be used at the Energy Centre will be combusted in the onsite enclosed flare. Any contaminants from this combustion process will be flared to the atmosphere at a height of at least 7m above ground level. The flare would be expected to have only infrequent use.

7.22 Biogas generation rates will increase over the operational lifetime of the facility. The peak average biogas production rate is expected to be 352 Nm^3/hour when

the plant is operating at capacity. The heating output at this production rate is estimated to be approximately 2.33MW.

7.23 Biogas generation rates will vary. The maximum generation rate is expected to be approximately 528 Nm^3/hour which is approximately 40% higher than the average generation rate. The maximum heating output would be approximately 3.50MW.

7.24 On an industrial scale the combustion sources are comparatively small (in term of heat output).

7.25 The biogas which is used in the Energy Centre will be treated to significantly reduce the siloxane and H_2S content before it is combusted. Treatment will reduce both the odour potential and sulphur content of the biogas. The expected H_2S concentration in the biogas is expected to decrease from approximately 2000 ppm to 50-250 ppm. There will be no emission to air from the biogas treatment process.

7.26 The main contaminant of concern that will be emitted from the combustion processes will be nitrogen oxides (NO_X).

7.27 Estimates of the maximum contaminant emission rates are provided in **Table 4**. These emission rates are based on the estimated maximum biogas generation rate of 528 Nm^3/hour. Predictions have been derived using published emission factors[29]. **Table 4** shows that contaminant emission rates are comparatively small even when maximum biogas combustion rates are occurring.

7.28 Natural gas is a cleaner burning fuel when compared to biogas, as it contains fewer impurities. Therefore, contaminant emissions would be lower than those shown in **Table 4** when natural gas is used instead of biogas.

Table 4. Estimated maximum contaminant emission rates from the combustion of biogas (528 Nm^3/hour)

Parameter	Energy Centre	Biogas Flare
Stack height (m)	21 m	7 m
Discharge velocity (estimated)	4.4 m/s	20 m/s
NOx (g/s)	0.293 g/s	0.0037 g/s
PM_{10} / $PM_{2.5}$ (g/s)	0.020 g/s	0.0014 g/s
SO_2 (g/s)	0.0975 g/s	0.056 g/s

[29] Sulphur dioxide emission rate has been based on the estimated sulphur content of biogas which is assumed to be 250ppm for the treated biogas and 2000ppm for the untreated biogas which is flared.

7.29 Odour compounds will be also present in the biogas (i.e ammonia, hydrogen sulphide, and volatile organic compounds). However, the typical odour destruction efficiencies for biogas fired boilers and enclosed flares can be expected to vary between approximately 98 - 99.95%[30]. Given the expected high destruction efficiency, I consider these combustion sources will be only a minor source of odour. The height of the stack and buoyancy of the hot emission plumes would also assist in the dilution and dispersion of any residual odour after discharge. Therefore, I consider it unlikely that any odour emitted from the biogas fired boilers and enclosed flares to be observable outside the site boundary.

7.30 As part of the Project, the 1.46 MW emergency diesel generator which is currently located in the IPS building will be relocated to the SMF Energy Centre building. The air contaminants and combustion gases from this generator will be discharged from a 21m stack located on the side of the Energy Centre building.

7.31 The IPS generator will operate only during a main failure, or for short periods during routine maintenance. Therefore, emissions from the generator will be infrequent and occur for only a short period of time. During a mains outage, it is likely that the generator would operate for a few hours. The height of the exhaust stack and buoyancy of the emissions will both assist in the dispersion of the emitted contaminants during this period.

8 Atmospheric Dispersion Modelling

8.1 I have used atmospheric dispersion modelling methods to assess the potential air quality impact of odour emitted from the SMF OCU, and the contaminants emitted from the Energy Centre combustion sources and the enclosed flare.

8.2 I have used the CALPUFF (V7.2.1) dispersion model to predict the ground level concentrations of odour and other air contaminants. I have assessed the potential impact of these emissions by comparing the modelled predictions against relevant air quality criteria concentration limits.

8.3 CALPUFF is used widely in New Zealand and overseas for regulatory assessment purposes, particularly when complex terrain may have a significant impact on wind flow and therefore the dispersion of emitted pollutants. Air flows in the vicinity of the SMF are expected to be complex due to the local topography

[30] Rural Industries Research and Development Corporation, 2008. *Assessment of Australian Biogas Flaring Standards.*

and the proximity of the site to the coast. I consider CALPUFF to be an appropriate model for this assessment.

8.4 A one-year three-dimensional meteorological input file was developed for CALPUFF using the CALMET (v6.5) meteorological model. I have compared the CALMET predicted wind flows against those observed at the Airport monitoring station and consider the predictions to be representative of local meteorological conditions.

Predicted Odour Concentrations

8.5 The impacts of odour emissions have been assessed by comparing the predicted ground level odour concentrations against the Ministry for the Environment (**MfE**) odour modelling guideline concentrations[31]. I have reproduced the guidelines in **Table 5**.

8.6 The guidelines have two components: a 1-hour average odour concentration limit (defined in terms OU/m^3) and the percentage of hours that compliance with the concentration limit is required to be achieved. The guidelines are defined in terms of the sensitivity of the receiving environment, which are characterised as high, moderate or low. I have considered residential areas to have a high sensitivity, and the neighbouring commercial areas a moderate sensitivity. I have also considered the golf course's playing greens to have a moderate sensitivity given the low short-term occupancy of this area.

8.7 The MfE recommends using the 99.5 percentile as the baseline percentile for odour assessments but notes that the 99.9 percentile may also be useful in evaluating model results[32]. I consider the 99.5 percentile concentration[33] the most relevant criteria for assessing odour effects. However, for completeness I have also considered the predicted 99.9 percentile concentrations[34]. The 99.9 percentile corresponds to maximum concentration which may occur at any location if maximum emission were to occur during worst case dispersion conditions.

[31] Ministry for the Environment, 2016. *Good Practice Guide for Assessing and Managing Odour*. Wellington: Ministry for the Environment.
[32] Ministry for the Environment, 2002. *Review of Odour Management in New Zealand – Technical Background Report*. Wellington: Ministry for the Environment.
[33] The 99.5 percentile concentration is the 44th highest 1-hour concentration which is predicted to occur at each receptor over a year (i.e. 8760 hours).
[34] The 99.9 percentile concentration is the 9th highest 1-hour concentration which is predicted to occur at each receptor over a year (i.e. 8760 hours). If is considered to be the maximum likely concentration which may occur.

Table 5. MfE recommended odour-modelling guideline values

Sensitivity of the receiving environment	Meteorological Conditions	1-hour Average Odour Concentration limit	Percentage of Compliance
High	Unstable to semi-unstable	1 OU/m^3	99.5% and 99.9%
High	Stable conditions	2 OU/m^3	99.5% and 99.9%
Moderate	All conditions	5 OU/m^3	99.5% and 99.9%
Low	All Conditions	5 – 10 OU/m^3	99.5%

8.8 I have modelled two emission scenarios in my assessment. These scenarios are as follows:

a **Proposed Emissions** – this scenario assumes that discharges of odour from the proposed SMF OCU stack and existing Moa Point OCU stack occur continuously throughout the simulated meteorological year.

b **Existing Emissions** – this scenario assumes that discharges of odour from the existing Moa Point OCU stack and IPS OCU stack occur continuously throughout the simulated meteorological year.

8.9 The modelled odour emission rates for the Moa Point OCU and IPS OCU are shown in **Table 1** of my evidence. The modelled SMF OCU emission rate assumes that maximum odour emission rates are occurring continuously throughout the simulation period. The modelled emission rate is shown in **Table 3** of my evidence and is based on an assumed discharge concentration at the maximum specified limit of 500 OU/m^3.

8.10 I have summarised the maximum 99.5 percentile 1-hour average odour concentrations predicted at nearby receptors in **Table 6**. The maximum 99.9 percentile 1-hour average odour concentrations are shown in **Table 7**.

Table 6. Summary of the predicted 99.5 percentile 1-hour average odour concentrations (OU/m^3) at nearby receptors for the Existing and Proposed emission scenarios

Receptor	Odour Sensitivity	MfE Odour Guideline (OU/m^3)	Existing Emission Scenario (OU/m^3)	Proposed Emission Scenario (OU/m^3)

Moa Point Rd dwellings	High	2.0	0.92	0.67
Kekerenga St dwellings	High	2.0	0.99	1.04
Miramar Golf Course	Moderate	5.0	0.92	0.55
Cyclotek Building	Moderate	5.0	1.61	0.61
Proposed Logistic Centre	Moderate	5.0	1.16	0.51
Maximum outside site boundary*	Moderate - Low	5.0 -10	1.91	2.27

Table 7. Summary of the predicted 99.9 percentile 1-hour average odour concentrations (OU/m^3) at nearby receptors for the Existing and Proposed emission scenarios

Receptor	Odour Sensitivity	MfE Odour Guideline (OU/m^3)	Existing Emission Scenario (OU/m^3)	Proposed Emission Scenario (OU/m^3)
Moa Point Rd dwellings	High	2.0	0.99	0.95
Kekerenga St dwellings	High	2.0	3.67	3.52
Miramar Golf Course	Moderate	5.0	1.66	0.89
Cyclotek Building	Moderate	5.0	1.82	0.75
Proposed Logistic Centre	Moderate	5.0	1.54	0.65
Maximum outside site boundary*	Moderate - Low	5.0 -10	3.86	4.18

8.11 The results show that predicted 99.5 percentile 1-hour average odour concentrations do not exceed the MfE odour guidelines at any of the nearby receptors. The maximum concentration predicted at any Moa Point Road residential properties is 0.67 OU/m^3, or 34% of the MfE odour guideline. Similarly, the maximum odour concentration predicted at any Kekerenga Street residential properties is 1.04 OU/m^3, or 52% of the MfE odour guideline.

8.12 The maximum 99.9 percentile 1-hour odour concentrations are also not predicted to exceed the MfE odour guideline at any of the Moa Point Rd dwellings, Golf Course or in the surrounding commercial areas. The maximum concentration at any dwelling is predicted to be 50% of the MfE odour guideline.

8.13 The 99.9 percentile 1-hour concentration concentrations are predicted to exceed the MfE guide at the Kekerenga Street residential properties located closest to

the SMF site (approximately 12 dwellings). However, the peak concentrations predicted in this area are due to existing emissions from the consented Moa Point OCU. The contribution of emission from the SMF OCU to peak odour concentrations at Kekerenga Street residential properties is predicted to be negligible. The modelling results show that odour which is currently experienced at these dwellings would not change to any extent when the SMF is operating.

8.14 In contrast, emissions from the Moa Point OCU are predicted to have a negligible impact on the odour concentration predicted at the Moa Point Road residential dwellings. At these dwellings, emissions from the SMF OCU are predicted to have the greatest impact.

8.15 I have illustrated this relationship in **Appendix D** of my evidence. The figures in the attachment show the relative contribution of emissions from the SMF OCU and Moa Point OCU on the maximum 1-hour concentrations predicted at the most impacted Moa Point Road and Kekerenga Street dwellings. The attached figures show that there is little cumulative effect from the two OCU discharges.

8.16 The modelling predicts lower, or similar 1-hour average odour concentrations for the proposed emission scenario compared to the existing emission scenario. These results indicate that the impacts of the discharges from the site will not further degrade the existing ambient air quality, and at most locations the air quality will improve.

8.17 Based on the modelling predictions, I have concluded the following;

a It is unlikely that emissions from the SMF OCU would exceed any MfE odour guideline limits and it is therefore unlikely that these emissions would have adverse odour effects.

b Emissions from the SMF OCU will have no discernible impact on the level of odour which is currently experienced at the Kekerenga St residential properties.

c Overall, emissions from the SMF OCU are predicted to have a smaller impact on ambient air quality than the existing discharges from the IPS OCU. These results suggest that proposal will have a positive impact on ambient air quality.

Predicted Combustion Contaminant Concentrations

8.18 I have used dispersion modelling to predict the maximum offsite concentrations of the primary air contaminant of NO_X, SO_2 and fine particulate matter (i.e. PM_{10} and $PM_{2.5}$) which will be emitted during the combustion of the biogas. The potential impact of these discharges has been assessed by comparing predicted ground level concentrations against the relevant National Environmental Standards for Air Quality ('**NESAQ**') and New Zealand Ambient Air Quality Guidelines ('**NZAAQG**'). I have summarised these ambient air assessment criteria concentration limits in **Table 8**.

8.19 In February 2020, the MfE released a consultation document[35] on some proposed amendments to the NESAQ, including new standards for ambient air concentrations of $PM_{2.5}$. The new standards for $PM_{2.5}$ are proposed to be 25 µg/m^3 (24-hour average). The proposed amendments to the NESAQ are in the consultation stage and do not have any regulatory status at present. However, for completeness I have assessed the $PM_{2.5}$ discharges from the SMF against these proposed NESAQ criteria concentration limits.

Table 8. Relevant ambient air assessment criteria for combustion contaminants

Contaminant	Averaging period	Air Quality criteria concentration (µg/m^3)	Number of permitted exceedances per year	Source of Criteria
NO_2	1-hour 24-hours	200 100	9 -	NESAQ AAQG
PM_{10}	24-hours	50	1-	NESAQ
$PM_{2.5}$	24-hours	25	1 to 3	NESAQ (proposed)
SO_2	1-hour 24-hours	350 120	9 -	NESAQ AAQG

8.20 I have assumed maximum emission conditions occur continuously through the simulated year. The modelled emission rates for discharges from the Energy Centre and enclosed building are based on the projected peak biogas production rate of 528 Nm^3/hour.

8.21 I have summarised the maximum ambient contaminant concentrations predicted at nearby receptors in **Table 9**. The predicted cumulative concentration shown in

[35] Ministry for the Environment "Proposed amendments to the National Environmental Standards for Air Quality, Particulate Matter and Mercury Emissions", February 2020.

this table includes the contribution from the proposed SMF emission sources and background sources.

8.22 In my assessment, I have adopted the MfE *Good Practice Guide for Assessing Discharges to Air from Industry* ('**GPG Industry'**) highly conservative screening method to estimate ground level NO_2 concentration. This method, which assumes all the emitted NO_X is emitted as NO_2, will substantially overestimate the NO_2 concentration outside the site. The results of the modelling show that, even if this assumption is made, the predicted NO_2 concentration would still not exceed the air quality criteria limit. The model predictions similarly show that the emission of PM_{10}, $PM_{2.5}$ and SO_2 would also not exceed any of the relevant air quality criteria limits during maximum emission conditions.

8.23 Based on the model predictions, I have concluded that emissions from the proposed combustion sources are highly unlikely to have an adverse air quality effect beyond the site boundary.

Table 9. Summary of maximum predicted ground level contaminant concentrations associated with emission from the Energy Centre and enclosed building

Pollutant	Averaging period	Contribution from SMF (µg/m^3)	Background (µg/m^3)	Cumulative (µg/m^3)	% Air Quality criteria concentration
NO_2	1-hour	82	60	142	71%
	24-hours	23	43	66	66%
PM_{10}	24-hours	1.3	29.3	30.6	61%
$PM_{2.5}$	24-hours	1.3	13.5	14.8	59%
SO_2	1-hour	73	0	73	21%
	24-hours	24	0	24	14%

9 Effects During Construction - Dust

9.1 Dust will be the main contaminant generated during the construction of the SMF. Most of the dust particles generated from construction activities would be larger particle sizes and the primary effects of their emissions would be adverse dust amenity effects such as the soiling of surfaces particularly within residential properties. However, a small proportion of the emission dust would be in the

small sizes, PM_{10} and $PM_{2.5}$, which can be inhaled into the lungs and potentially have adverse health effects.

9.2 In my opinion, dust would mostly be generated during demolition activities and earthworks in the initial phases of construction. However, some dust can also be expected throughout the construction process.

9.3 The site is located in an exposed windy environment. The wind flows measured at the Airport indicate that wind speeds greater than the critical dust pick-up speed of 5 m/s occur for approximately 69% of time. Therefore, there is a high potential for dust to be picked up by the wind from unconsolidated surfaces through the construction period unless good dust controls procedures are maintained. Such stockpiles should also be located away from sensitive receptors.

9.4 The potential impact of dust emissions from construction activities will decrease with increasing separation distance. The Institute of Air Quality Management ('**IAQM**') has published guidance for the assessment of demolition and construction effects[36]. The overall IAQM risk assessment considers there to be a low risk of adverse dust effects for receptors located more than 20-50m from construction projects.

9.5 Different locations have different sensitivities to dust and can be classified as having high, moderate and low sensitivity. The residential properties are classified by the MfE's "*Good Practice Guide for Assessing and Managing Dust"* ('**GPG Dust'**) as having a high sensitivity for dust effects.[37] The closest residential receptors are to the south of the site on Moa Point Road. These residential properties are located more than 80m from the site. Intervening hills also separate the site from these receptors. I would not expect the construction activities to have any adverse effect at these properties as long as appropriate standard dust controls are implemented through the erosion and sediment control plan ('**ESCP**') required to be prepared under the resource consent for earthworks which will contain dust management controls.[38]

9.6 Standard dust control measures for construction activities are discussed in Section 4.6 of the Beca Air Quality Report. The more important mitigation methods, and methods I would expect an ESCP might contain, include:

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[36] Guidance on the assessment of dust from demolition and construction (2014) prepared by Institute of Air Quality Management, London, UK.
[37] Good Practice Guide for Assessing and Managing Odour, Ministry for the Environment, available at: https://environment.govt.nz/assets/Publications/good-practice-guide-odour.pdf, at Table 4.
[38] See also condition 26.1 in McGimpsey EIC, Appendix A.

a Minimising the area of exposed surfaces at any time. Stablishing any exposures areas as soon as practicable.

b Keeping unsealed surfaces, working surfaces and stockpiles damp with water sprays or water carts, particularly during duty wind conditions.

c The use of fogging/mister cannon for dust suppression if required.

d Where practicable, avoiding particularly dusty activities in windy dry conditions.

e Minimising the height of stockpiles and locating them as far as practicable from sensitive land uses. The location of stockpile should also take into account the predominant wind direction.

f Minimising drop heights from the loading of raw materials into stockpile and onto trucks.

g Covering of dusty materials when removed from site.

h Cleaning of any spill of dusty material as possible.

i The use of the dust screens/fences and wind breaks.

j Limiting vehicle speeds on unsealed area. Limiting vehicles movements on unseal areas as far as practical.

k Minimising onsite cutting and crushing operations.

l The of appropriate dust control measures when cutting or grinding paving or masonry.

m The implementation of dust control measures through the construction management plan and/or Erosion and Sediment Management Plan.

n Complaint response procedures.

9.7 The DHL Building (or proposed Freight Hub building) and the Cyclotek buildings are the closest commercial receptors to the site where earthworks will occur. These buildings will be located approximately 50-70m from the planned earthworks. The IAQM method classifies these receptors as having a low risk of experiencing adverse dust effects. Therefore, provided the standard dust control

measures are implemented, I would not expect these buildings to be impacted adversely by the proposed earthworks.

9.8 Cyclotek laboratory services are sensitive to dust contamination. I understand that WCC is in discussions with Cyclotek to identify if additional dust and odour mitigation could be implemented (during construction and operation). WCC has engaged Beca Ltd to assist in the implementation of any additional controls. **Mr French's** evidence details the possible actions, including upgrading the air intake filter units.[39]

9.9 Some demolition and construction activities will occur closer to the Cyclotek building. These activities include the removal of the existing pavement, demolition of the AGS Automotive building, and the excavation of foundations for the digestors and process buildings. However, these activities are unlikely to be significantly sources of dust, provided standard dust control procedures are implemented. Therefore, I consider it is unlikely that emissions from these construction activities would have an adverse impact on the Cyclotek's operation.

9.10 Overall, provided standard dust control procedures are implemented, maintained and monitored, I consider that emissions from the proposed construction activities can be appropriately controlled, and the risk of any adverse dust effects minimised to acceptably low levels.

9.11 WCC has proposed the following designation condition[40] for the control of dust during construction which I consider appropriate (and was supported in the Section 42A Report)[41]:

> "The proposed construction shall be carried out in such a manner that the generation of dust is kept to a practicable minimum. In any case there must be no particulate matter beyond the boundary of the site that has an objectionable or offensive effect as a result of the activities authorised by this designation"

10 Odour Effects During Commissioning

10.1 The commissioning of the plant is expected to occur over an approximately 12-month period. For the last 6 - 9 months of the commissioning period, wet sludge will be used for testing purposes. It is during these periods when odour may be emitted from a variety of sources including hoses, open processes, storage units

[39] French EIC, para 11.10.
[40] McGimpsey EIC, Appendix A, condition 31.5.
[41] Section 42A Report, Appendix 11, condition 24.5.

and pumps during testing. However, these will be comparatively small sources of odour, and any emissions transitory in nature. I would also expect such odour to be localised and generally contained within the site.

10.2 I understand the SMF OCU will be one of the first processes to be commissioned and therefore would be available to provide odour control for the treatment processes as they come online, minimising air emissions.

10.3 The commissioning of the anaerobic digestors is expected to be the primary source of odour (in addition to the other small odour sources). The anaerobic digestors will be seeded with sludge imported from other WWTP anaerobic digestors. When approximately a third full, the digestors will be heated and hydrolysed sludge from the THPs slowly fed to the units.

10.4 During the first 30 days once heating is applied, gases (including CO_2, H_2, and H_2S) and odour will be generated and mixed with the nitrogen gas present in the digestor. These mixed off-gases will be periodically discharged and pressure in the digestor increased. At the end of this period, biogas will be generated. However, for the initial 4 - 5 days, the biogas will have a low methane content and would not be easily combustible.

10.5 It is difficult to accurately quantify what the odour emission rate will be during this period. However, I would not expect the gases to have any adverse health effects at the likely quantities generated, if they were discharged to the atmosphere.

10.6 WCC has proposed to implement odour mitigation during commissioning to minimise the risk of adverse odour effects occurring outside the site boundary. The mitigation methods have yet to be confirmed but identified mitigation options include the following:

a Piping the process gases to the natural gas fired boilers or the enclosed flare for thermal treatment.

b Piping the process gases to the SMF OCU or a temporary OCU.

c Mechanically venting the process gases to the atmosphere from a temporary exhaust stack. The procedure would enhance the dilution and dispersion of the emitted gases.

10.7 In my opinion, the risk of objectionable or offensive odour occurring outside the boundary can be minimised through the implementation of these mitigation

options. As I discussed previously, the odour control efficiency from thermal combustion or by odour treatment technologies can be expected to be over 98%.

10.8 The proposed resource consent condition would require WCC to submit a Commissioning Odour Management Plan ('**COMP'**) to the GWRC for certification prior to the commissioning of the SMF.[42] The plan will detail the proposed odour controls, management practices, monitoring procedures and complaints response procedures. This may include the mitigation options identified above. The proposed designation conditions require that a copy of the certified COMP be provided to WCC's compliance monitoring officer 10 working days prior to the commissioning phase.[43] The proposed designation conditions relating to the COMP were supported in the Section 42A Report.[44]

10.9 The proposed designation conditions would also require the WCC to work with the Community Liaison Committee ('**CLC'**), including providing an opportunity for the CLC to provide feedback on the draft COMP prior to submission to the GWRC.

10.10 I agree with this approach, as it will provide some assurance to the neighbouring residents that appropriate odour management has been implemented at the site prior to work commencing.

10.11 It is possible odours may, at times, still be observed outside the site boundary during commissioning. However, I would expect any such odour would occur for only short periods and would likely be confined to the immediate vicinity of the site. I consider it unlikely that any offensive or objectionable odour would be observed at any of the nearby residential properties or at or beyond the boundary of the site during commissioning.

11 Effects During Operation - Dust

11.1 The dried sludge product would be friable and is a potential source of dust during handling and truck loadout operations. The dust produced by the sludge handling processes will be comprised mainly of the larger particle sizes. The primary air quality concern would be adverse dust effects associated with the deposition onto surfaces (i. e washing on clothes lines and the glass in windows) beyond the site boundary. The properties located closest to the source of dust would be those which would most likely be impacted by any dust emissions.

[42] Proposed Regional Discharge Consent condition.
[43] McGimpsey EIC, Appendix A, conditions 31.1.
[44] Section 42A Report, Appendix 11, conditions 28.1 and 31.1.

11.2 A small proportion of the dust particles will be of the smaller sizes, including PM_{10}, which can be inhaled and have potential health effects. However, I would expect these emissions to be minimal. I would also not expect any emissions of the inhalable particles to exceed any of the relevant ambient air quality criteria concentrations.[45]

11.3 The main sources of dust would be during truck load out of the dried sludge. Loadout operations are expected to occur approximately 17 times per week, or 2 – 3 times per day over 7 days.[46] Consequently, these periods of potential peak dust generation will occur only periodically through the day based on truck movements.

11.4 Dust from the dried sludge loadout operations will be controlled using the following methods (to be implemented through the operational odour management plan required by the consent for discharges to air)[47] :

a Enclosing the export silos and conveyor used to transfer dried sludge cake from the dryer to the expert silos;

b Closing off the truck loadout building with rapid roller doors when loadout operations are occurring;

c Ventilating the export silos and loadout building to a bag filter to remove particulate matter and then to the SMF OCU to remove odour; and

d Covering the loaded dried sludge product prior to transport offsite for disposal.

11.5 The closest residential properties, which can be considered to have high sensitivity to dust, are located approximately 160m from the loadout building and are separated by a hill. Due to the separation distance and intervening terrain, I consider it highly unlikely that any dust emissions from the SMF would have an adverse impact at these dwellings.

11.6 I understand that the Cyclotek laboratory services are sensitive to dust. The potential risk to these laboratory services would be from excess dust entering the

[45] See para 9.1 of my evidence.
[46] AEE, page 55.
[47] Proposed Regional Discharge Consent condition and required to be provided to WCC's Compliance and Monitoring Officer under condition 31.3 of the proposed NOR conditions; McGimpsey EIC, Appendix A, condition 31.3.

building through the ventilation system's intake vents. The ventilation intake air is filtered to removed particulate matter.

11.7 The Cyclotek building is located more than 60m from the loadout facility. Several large buildings also separate the Cyclotek from the loadout facility. These buildings will provide a barrier to any dust emissions. Therefore, I would expect that any fugitive emissions from the loadout facility would have minimal effects on the air quality surrounding the Cyclotek building.

11.8 In my opinion, the proposed dust mitigation procedures are appropriate. I would expect little dust to be emitted during sludge loadout provided they are diligently carried out. I would not expect any fugitive dust which is emitted to be considered offensive or objectionable or have an adverse effect.

11.9 I consider the following designation condition[48] proposed by WCC (and supported in the Section 42A Report)[49] to be appropriate:

> The Requiring Authority must operate the SMF in such a manner that the generation of dust is kept to a practicable minimum. In any case there must be no particulate matter beyond the boundary of The Site that has an objectionable or offensive effect as a result of the activities authorised by this designation

12 Effects During Operation – Odour Emissions

12.1 As set out below, I consider the odour effects during operation will be adequately mitigated and no adverse odour effect experienced outside the site boundary. I also consider that the proposed designation conditions[50] which requires "*There shall be no noxious, dangerous, offensive or objectionable odour or particulate matter discharged to air to the extent that it causes an adverse effect at or beyond the boundary of the site during commissioning or operation of the SMF*" to be appropriate.

12.2 The factors that are used to determine whether a discharge of odour is offensive or objectionable are commonly referred to as the FIDOL factors (i.e. frequency, intensity, duration, offensiveness, and location of the discharge). Different combinations of these factors are significant when assessing adverse effects. For example, frequent low-level discharges may create an adverse odour effect, as may infrequent intense episodes.

[48] McGimpsey EIC, Appendix A, condition 31.5.
[49] Section 42A Report, Appendix 11, condition 31.5.
[50] McGimpsey EIC, Appendix A, condition 31.4. This condition was supported in the Section 42A Report, Appendix 11.

12.3 The FIDOL factors are universally used in New Zealand and overseas to assess odour effects. The MfE *Good Practice Guide for Assessing and Managing Odour*[51] (**GPG Odour**) recommend that the FIDOL factors should be considered when assessing odour effects.[52]

12.4 I note that Condition 3 of the Moa Point WWTP air discharge resource consent (WGN080003 [26183]) and Condition 6 of the WWTP site's designation for Moa Point Drainage and Sewage Treatment[53] both specify there shall be "*no discernible odour resulting from the operations of the wastewater treatment plant at or beyond the site boundary*".

12.5 In my experience, such an odour performance criterion is highly unusual, and I do not consider it practicable when applied to inherently odorous activities such as a wastewater treatment plant. It should be noted that when considered against the FIDOL factors a 'discernible' odour outside the site boundary does not necessarily mean the observed odour also has an adverse effect.

12.6 A 'no discernible odour outside the site boundary' performance standard would be more conservative than the PNRP Permitted Activity rules. For example, Condition a) of the permitted activity 'Rule R35: Gas, water and wastewater processes' is that:

(a) the discharge shall not cause offensive or objectionable odour at the boundary of a sensitive activity; …..

12.7 The nearest "sensitive activity", as defined by the PNRP are the residential properties located on Moa Point Road and Kekerenga Street.

12.8 Wastewater treatment processes are inherently odorous. In my opinion, It would be very unlikely that a WWTP (or SMF) could continually comply with a "no discernible" odour condition. The compliance record indicates that odour emitted from the Moa Point WWTP and the IPS have been discernible outside the site boundary.

12.9 As a result, WCC has proposed the following alternative odour performance criteria as a consent condition:[54]

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[51] Good Practice Guide for Assessing and Managing Odour, Ministry for the Environment, available at: https://environment.govt.nz/assets/Publications/good-practice-guide-odour.pdf.
[52] Good Practice Guide for Assessing and Managing Odour, Ministry for the Environment, available at: https://environment.govt.nz/assets/Publications/good-practice-guide-odour.pdf, at section 3.1.
[53] The existing WWTP site is designated for Moa Point Drainage and Sewage Treatment under the operative Wellington City District Plan (WCDP), with WCC as the requiring authority
[54] McGimpsey EIC, Appendix A, condition 31.4.

> "There shall be no noxious, dangerous, offensive or objectionable odour or particulate matter discharged to air to the extent that it causes an adverse effect at or beyond the boundary of The Site during commissioning or operation of the SMF"

12.10 I consider the above proposed condition to be appropriate and consistent with the PNRP odour performance criteria for wastewater sources. The GWRC has proposed the same condition for the air discharge resource consent condition.

12.11 The location of receptors is required to be considered as part of the FIDOL factors. Different locations have different sensitivities to odour and can be classified as having high, moderate, or low sensitivity. The MfE GPG Odour provides guidance with regards to the sensitivity of different land-use types to odour effects. I have used these classifications to guide my assessment of odour effects from the proposal.

12.12 The Moa Point Road and Kekerenga Street residential areas are considered to be high sensitivity receptors. At these locations, people will potentially be present for 24 hours a day and a high level of air quality amenity could be expected by the residents.

12.13 I consider the golf club playing greens to have a moderate sensitivity to odour. These areas typically have a low occupancy rate, particularly at night, therefore the risk of people being present when high odour emissions and poor dispersion conditions are occurring is relatively small. Similarly, any exposure to an odour would generally only occur during a short period of time while playing on the southern green closest to the SMF site.

12.14 I similarly consider the DHL Building, the Cyclotek Building and the proposed Freight Hub as having a moderate sensitivity to odour in accordance with the MfE GPG Odour recommendations. I consider the Airport apron to have a low sensitivity. These areas are semi-industrial in nature with relatively low occupancy rate. While the Airport terminal will have a higher sensitivity, these buildings are located more than 570m from the site and are therefore highly unlikely to be impacted by emissions from the SMF.

12.15 Under the WIAL WLG 2040 Master Plan, the southern playing greens of the golf course will be removed to accommodate the planned extension of the Airport apron.[55] Therefore, the sensitivity of the receiving environment, to the north and

[55] Wellington City District Plan, Designation G6, Appendix AG, Figure 2.

northeast of the SMF site, is expected to decrease from a moderate to low sensitivity over time.

12.16 As I have discussed in the Paragraph 6.16, the SMF is located in an exposed coastal location where moderate to high wind speed occurs frequently. These wind conditions would be expected to rapidly disperse, and dilute fugitive odours emitted from the site. I would also expect the surrounding hills would also tend to channel any odour away from the high sensitivity residential areas.

12.17 The SMF OCU stack is expected to be the main source of odour emissions. I would expect little fugitive odour to be emitted from the site.

12.18 I have assessed the potential impacts of these discharges from the SMF OCU using dispersion modelling methods as discussed previously in my evidence. The results show that predicted odour concentration from the proposed MSF OCU and Moa Point OCU would not exceed the MfE guideline concentrations. Based on these predictions, I consider it unlikely that emissions from the SMF OCU would have an adverse odour effect beyond the site boundary.

12.19 The odour predicted at the dwellings located on Kekerenga Street are attributed almost solely to emissions from the existing consented Moa Point WWTP OCU. Therefore, the odour which is currently experienced at these dwellings would not be expected to change once the SMF is commissioned. In my opinion, the comparatively small number of complaints which have been received from these residential to date, suggests any odour which is currently experienced is generally acceptable to the community.

12.20 The model predictions also indicate emissions from the SMF OCU and existing Moa Point OCU have a minimal cumulative effect on ambient odour concentrations which occur outside the site boundary. Differences in the character of the odour emitted from the OCUs (i.e. earthy/musty vs chlorine) also make it less likely these emissions would have a cumulative effect.

12.21 Some odours will be emitted from the building ventilation system. However, I would expect these emissions to be minimal. The height of the vent will also assist in the dispersion of any residual odour. I consider it unlikely that any emissions from the building ventilation would be observable outside of the site boundary.

12.22 Wastewater treatment processes are inherently odorous. I therefore consider it likely that fugitive odours may, at times, be observable outside the site boundary. However, these odours are expected to be localised to the commercial area

which immediately surrounds the site and at a frequency and intensity of odour appropriate to the moderate sensitivity of the land use.

12.23 I consider it is unlikely that any offensive or objectionable odour would occur at any of the nearby sensitive receptors. I also consider the effects of the discharges will have a less than minor effect.

12.24 GWRC's independent reviewer for the GWRC discharge consents agreed with my effects conclusion and stated:[56]

> The proposal involves a high level of enclosure, odour capture, odour control and systems monitoring so that there should be no discernible difference in odour from the operation of the SMF compared to existing discharges from the Moa Point WWTP and IPS. On the basis, PDP agrees with Beca's assessment that the effects of the odour discharges to air from the operation are less than minor.

13 Effects During Operation – Combustion Emissions

13.1 The effects associated with the discharges from the biogas-fired CHP units, boilers and flare are primarily health-related. The main contaminants discharged to air will be NO_X, and to lesser extent CO, SO_2 and particulate matter (PM_{10}/$PM_{2.5}$).

13.2 I have the assessed potential impact of these discharges using dispersion modelling methods. The results of the modelling indicate that the ambient concentrations would not exceed any of the relevant health-based air quality criteria limits even if maximum emissions were to occur during worst case dispersion conditions.

13.3 The relocated IPS emergency diesel generator will also be a potential source of air contaminants. However, as I have previously discussed in paragraphs 7.30 and 7.31 of my evidence, I consider it unlikely that emissions from the generator would exceed any of the relevant health guidelines such that there would be an adverse effect outside the site boundary.

13.4 Overall, I consider it unlikely that emissions from the proposed combustion sources would have any adverse effects. Regardless, I would recommend that these combustion sources are inspected and serviced at least once per year to ensure good combustion efficiencies are maintained. I would also expect that

[56] Memorandum from Deborah Ryan to Alisha Vivian, dated 26 October 2022, section 7.

these sources would be maintained in accordance with the manufacturer's specifications.

14 Odour at the Disposal Site

14.1 The sludge from the Moa Point WWTP is currently piped to the Carey's Gully SDF (located at the Southern Landfill Site) for dewatering before it is mixed with municipal solid waste and the placed in the Southern Landfill.

14.2 Adverse odours have in the past been attributed to the operation of Carey's Gully SDF and the landfilling of the sludge. These effects are discussed in the Careys Gully SDF resource consent application decision report (2009)[57]. Submissions received with regards to NOR application from Carl Savage and the Greater Brooklyn Residents Association voice similar concerns about the current operation of the Careys Gully SDF.

14.3 The dried sludge cake product produced by the SMF will generate only a small amount of odour. The sludge cake will be directly deposited in the landfill. It will therefore and not require further processing by the Carey's Gully SDF or mixing with MSW before landfilling. Overall, I consider it unlikely that that disposal of the dried sludge cake from the SMF would have any adverse odour effects and, as a result, there would be a significant reduction in odour at the disposal site. Overall, I would expect the SMF to have a positive air quality effect overall relative to existing sludge disposal operations.

15 Summary of Effects

15.1 In my opinion, provided the proposed mitigation is appropriately designed, operated and maintained, the discharges to air from the plant will not have adverse impacts on the surrounding environment. I consider the emissions of any odour, combustion gases or dust would not have an adverse effect to the extent that they could be considered offensive or objectionable, either at nearby sensitive receptors or at the boundary of the site.

16 Consideration of alternatives

Odour Control

16.1 A range of different wastewater odour control technologies are available. The more common odour control methods are bark biofilters, bio trickling filters ('**BTF**')

[57] File: WGN070230 [26013] [26014] [26015] and SR161775. 30 October 2009. Resource Consent Decision Report.

(and bio-scrubbers), wet chemical scrubbing, and absorption (e.g. activated carbon filtration)[58]. The SMF is proposed to employ a hybrid combination of biological and absorption methods.

16.2 The different technologies have different performance characteristics, including odour reduction efficiency, capital and operational costs, and system resilience. The size of SMF site means that it unable to accommodate wet chemical scrubbing or bark bed biofilter odour units that would be able to meet the required odour control performance criteria.

16.3 The selected SMF OCU odour technology (i.e. BTF + activated carbon) is able to be accommodated on the site. The performance and operation of proposed OCU technology type is also well understood and widely used for wastewater source. I consider the selected technology to be appropriate.

16.4 Relocating the SMF OCU exhaust stack to the existing Moa Point WWTP site has been considered. However, this option is not preferred due to the energy costs required to pipe the ventilation air uphill to the site, and the higher risk of cumulative odour effects associated with emissions from the existing Moa Point OCU.

16.5 The ability to vary the height and discharge velocity of the exhaust stack is limited by the Airport OLS. The proposal has sought to maximise odour dispersion rates within this limitation.

Building Ventilation

16.6 Alternatives to the discharge of building ventilation air though activated carbon filter to the atmosphere include venting buildings to the SMF OCU or discharging the untreated building air.

16.7 Venting the building air to the SMF OCU would require the unit size to be increased in proportion to the increased air flow. The size of the SMF site would make it problematic to incorporate a larger OCU. The energy requirements of the OCU would also increase in response to the higher air flow rates.

16.8 During normal operating conditions I would expect the building ventilation air to have a comparatively low odour concentration and would generally not require any odour treatment. The roof vents will provide an adequate level of dispersion for the emitted odours to mitigate any odour effects of an untreated discharge.

[58] New Zealand Water and Wastes Association, 2000. *Manual for Wastewater Odour Management Second Edition September 2000*.

16.9 However, higher odour emissions may occur during maintenance and repair operation. Although this emission will also be dispersed by the roof vents the activated carbon filters provides additional odour mitigation, which I consider appropriate.

Combustion Emission

16.10 In my opinion there is a no practical alternative other than to the discharge of the biogas combustion gases from an exhaust stack. The height of the stack and discharge velocity is limited by Wellington Airport OLS. Site constraints also limit the location of the stack.

17 Recommended Mitigation Measures

17.1 In my opinion I consider the proposed mitigation appropriate and comprehensive. In Table 10 below I have provided a summary of mitigation proposed. I have also provided additional recommendations. The table also cross references these mitigation option the proposed designation conditions[59]. More specific conditions for resource consent air discharge have been proposed by GWRC. I have indicated in the table where such resource conditions would apply.

Table 10. Summary of proposed and recommended mitigation

Discharge type and stage of development	Proposed and Recommended Mitigation	Condition
Dust -construction	Implementation of standard dust control procedures. These procedures should include monitoring and contingency procedures. I recommended that the dust management procedures are detailed in the construction management plan or Erosion Sediment and Control Plan.	24.5 – dust performance standard 26.1 – ESCP Dust management plan for earthwork 28.1 - 28.3 – Community liaison and Complaint procedures
Dust -construction	I support WCC ongoing consultation with Cyclotek to identify what additional air quality mitigation procedures may be implemented. However, I agree with s42 report that the recommended	

[59] S42A Report, Appendix 11. PROPOSED SMF DESIGNATION CONDITIONS (dated 11 November 2022).

Discharge type and stage of development	Proposed and Recommended Mitigation	Condition
	conditions are in alignment with good practice for managing dust and odour.	
Odour - construction	Venting the IPS to a temporary OCU during construction.	Proposed GWRC resource consent condition
Odour and Dust – commissioning and operation	Performance standard - There shall be no noxious, dangerous, offensive or objectionable odour or particulate matter discharged to air to the extent that it causes an adverse effect at or beyond the boundary of the site during commissioning or operation of the SMF. Requirement of to keep dust emissions to a practicable minimum during operation.	31.4 – Air quality performance standard 31.5 - Dust performance criteria
Odour - commissioning	Development of a Commissioning Odour Management Plan (COMP). A draft COMP to be provided to the neighbours for comment prior to finalisation.	31.1 – COMP plan
Odour - commissioning	Development and implementation of an odour mitigation strategy for the digestors. The odour control methods to be detailed in COMP, and certified by GWRC.	31.1 – COMP plan
Dust - operation	Enclosing the sludge product export silos and load out facility. These sources to a dust control unit to minimise emission to air.	31.3 - Operation and Maintenance Plan (OMP) 31.4 – Dust performance standard
Combustion emission - operation	I recommend the combustion sources are inspected and serviced at least once per year to ensure good combustion efficiencies are maintained. The programme should be included in the site's Operations and Maintenance Plan.	31.3 - Operation and Maintenance Plan (OMP)
Combustion emission - operation	Ensuring the discharges are well dispersed by the exhaust stack. The top of the Energy Centre stack should be 21m above ground level and top of the flare 7m above ground level. Short stack would	Proposed GWRC resource consent condition

Discharge type and stage of development	Proposed and Recommended Mitigation	Condition
	also likely be suitable but were not assessed. Vertical discharge from the stack should not be impeded by rain caps etc.	
Odour – operation	Development of an Operational Odour Management Plan.	31.2 - Operational Odour Management Plan (OOMP)
Odour - operation	Enclosing and vent treatment process and storage silos either the SMF OCU or Moa Point OCU. These components will be maintained at negative pressure during operation to avoid fugitive emissions.	31.2 - OOMP Proposed GWRC resource consent condition
Odour - operation	Maximum odour concentration in the SMF OCU ventilation air should be exceed 500 OU/m3. This should be demonstrated by emission testing.	31.2 – OOMP Proposed GWRC resource consent condition - odour discharge limit and emission testing requirements
Odour - operation	The height of SMF OCU stack should be at least 24m above ground level.	Proposed GWRC resource consent condition
Odour – operation	Monitoring of the performance of the SMF OCU and operational parameters.	31.2 – OOMP 31.3 - OMP Proposed GWRC resource consent condition
Odour - operation	On-line monitoring of the plant performance. I would recommend that system is alarmed to alert operators when operational parameters are outside of the desired range and may generated adverse odours.	Proposed GWRC resource consent condition

Discharge type and stage of development	Proposed and Recommended Mitigation	Condition
Odour – operation	Maintaining the building a slight negative pressure and venting plant building spaces to the activate carbon odour control unit.	Proposed GWRC resource consent condition

18 Response to submissions

18.1 Five submissions have been received which identified air quality concerns. However, I note that none of these submissions opposed the SMF. The submitters were either neutral or supportive of the Project. I will discuss the submissions in the following paragraphs.

Martyn Howells

18.2 The submitter is a resident of 35 Moa Point Road. The submitter is in principle supportive of the proposal but would like the proposed SMF odour conditions to require that there is no "discernible" odour at the boundary, as Condition 6 of the Moa Point WWTP designation. The submitter asserts that such a condition should not need an officer of GWRC (with a calibrated nose) to be recorded.

18.3 I have reproduced the Condition 6 of the site's WWTP's designation below.

> There shall be no discernible odour resulting from the operation of the wastewater treatment plant, at or beyond the boundary of the plant site as designated in the District Plan.
>
> There shall be no discharge into the air of any contaminant from the wastewater treatment plant which has adverse effects at or beyond the site boundary.
>
> Note - not forming part of the Plan: Notwithstanding the above standards, Council reserves the right to use its powers under the relevant statutory powers to protect the amenities of the district.

18.4 The Moa Point WWTP air discharge consent (WGN080003 [26183) has a similar odour performance criterion. I have reproduced Condition 3 below.

> There shall be no discernible odour resulting from the operations of the wastewater treatment plant at or beyond the site boundary.

Note: for the purposes of this condition the site boundary shall be defined as the boundary associated with the legal description Pt Sec 1 SO37180.

18.5 In my experience these "no discernible" odour conditions are highly unusual. My understanding is that they are historical performance conditions which have been applied to the WWTP. The original designation (including these conditions) pre-dates the RMA and was made under the Town and Country Planning Act 1977.

18.6 In considering appropriate conditions for the SMF, the following was taken into account:

a The findings of technical environmental assessments and the professional opinion of our technical expert;

b Recognised industry good practice;

c Effects allowed under relevant operative planning documents; and

d Principles of good conditions, including reasonableness, effectiveness and enforceability.

18.7 The submitter has suggested that a GWRC officer would not be required to monitor compliance. The sensitivity of the population to odour can vary significantly. A GWRC officer would still be required to determine if any observed were discernible to the wider public, and also the source of the odour.

18.8 I consider the proposed consent condition[60] to be appropriate and consistent with standard practice. I do not consider the 'no discernible' condition a practicable condition for a WWTP.

Strathmore Park Residents Association Inc

18.9 The submitter is supportive of the Project but raised concerns over the potential impact of discharges to air during the commissioning phase of the Project.

18.10 My understanding of the submitter's concerns is as follows;

a that odour mitigation would not be implemented, and

b that no contingency measures have been proposed should the proposed mitigation prove insufficient.

[60] McGimpsey EIC, Appendix A, condition 31.4.

18.11 The GWRC's proposed resource consent conditions would require WCC submit a COMP to the GWRC for certification prior to commissioning. The COMP will require the WCC to identifying odour risks and controls minimising this risk. The condition specifically requires the temporary odour control system for biogas during commissioning to be detailed. The proposed designation conditions provide an opportunity for the CLC to provide feedback on the draft COMP prior to submission to the GWRC.[61] I consider the proposed conditions to be appropriate and discharges during commissioning can be effectively managed by the COMP.

18.12 It is also my opinion that effective odour mitigation can be implemented during commissioning such that emissions from the site would not be considered offensive or objectionable. I have listed possible mitigation options in paragraph 10.6 of my evidence. I considered that these methods would be effective in minimising the risk of any odour at nearby residences and consider it unlikely that any additional mitigation would be required.

18.13 It is also important to note that discharges from the digestor during commissioning will only occur over a comparatively short period of time, i.e approximately 30 days. Therefore, any emissions of odour during this period would be of limited duration.

Cyclotek Pharmaceuticals Ltd

18.14 The submitter is neutral but seeks to have adequate conditions imposed to prevent significant impacts to Cyclotek's operation. Listed concerns included odour, air quality and dust.

18.15 As discussed in my main evidence at paragraphs 11.6 - 11.7 and 9.8 - 9.9, provided standard dust control measures are implemented during construction and based on the proposed mitigation describe above I consider it unlikely that Cyclotek would be adversely impacted by emissions during the construction or operation of the SMF.

Carl Savage and the Greater Brooklyn Residents Association

18.16 Both Mr Carl Savage and the Greater Brooklyn Residents Association state in their submissions that they have been subjected to "offensive odours" from the Carey's Gully SDF.

[61] S42A Report, Appendix 11, condition 31.1

18.17 As discussed in paragraphs 14.1 to 14.3 of my evidence, I consider it is unlikely that any offensive or objectionable odour would occur at any of the nearby sensitive receptors to the SDF. Overall I would expect an improvement in the air quality at the Southern Landfill.

18.18 In terms of the expected odours at the SMF, as discussed above in my evidence, I consider the odour effects are unlikely to be offensive or objectionable during commissioning[62] and operation.[63]

19 Response to Section 42A Officer's Report

19.1 I have read the Section 42A Report as it relates to the discharges to air. Overall, I agree with the Section 42A Report's conclusions and recommendations, as stated in section 8.1.1 of the Section 42A Report.

19.2 I agree with the Section 42A Report's conclusion that the proposed odour condition relating to not cause an offensive or objectionable odour to the extent that it causes an adverse effect reflects good practice.[64]

19.3 The Section 42A Report also mentions Cyclotek's concerns around air quality and notes that the recommended conditions are in accordance with good practice for managing effects. The Section 42A Report also notes that any additional mitigation is between WCC and Cyclotek. I agree that the conditions reflect good practice. I recommend WCC continue to discuss the potential air quality risk with Cyclotek and what additional mitigation measures may be able to be implemented, as described above in my evidence at **Table 10.**

19.4 I agree with the Council's Air Quality Expert, Ms Ryan, that the Project would essentially have an odour offset with the proposal to enclose and provide venting of the IPS to the SMF OCU.[65] I also consider the proposal will have a positive air quality effect at the Carey Gully SDF and Southern Landfill site.

19.5 Ms Ryan has recommended proactive odour monitoring should occur during the commissioning of the plant, with actions to taken to investigate and address any observed odours.[66] I agree with Ms Ryan that odour monitoring and contingency procedures should be detailed in the COMP.[67]

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[62] Paragraph 10.11.
[63] Paragraph 12.23.
[64] Section 42A Report, page 10, section 8.1.1.
[65] Section 42A Report, page 10, section 8.1.1.
[66] Section 42A Report, page 10, section 8.1.1.
[67] This is proposed to be addressed in a proposed Regional Discharge Consent condition.

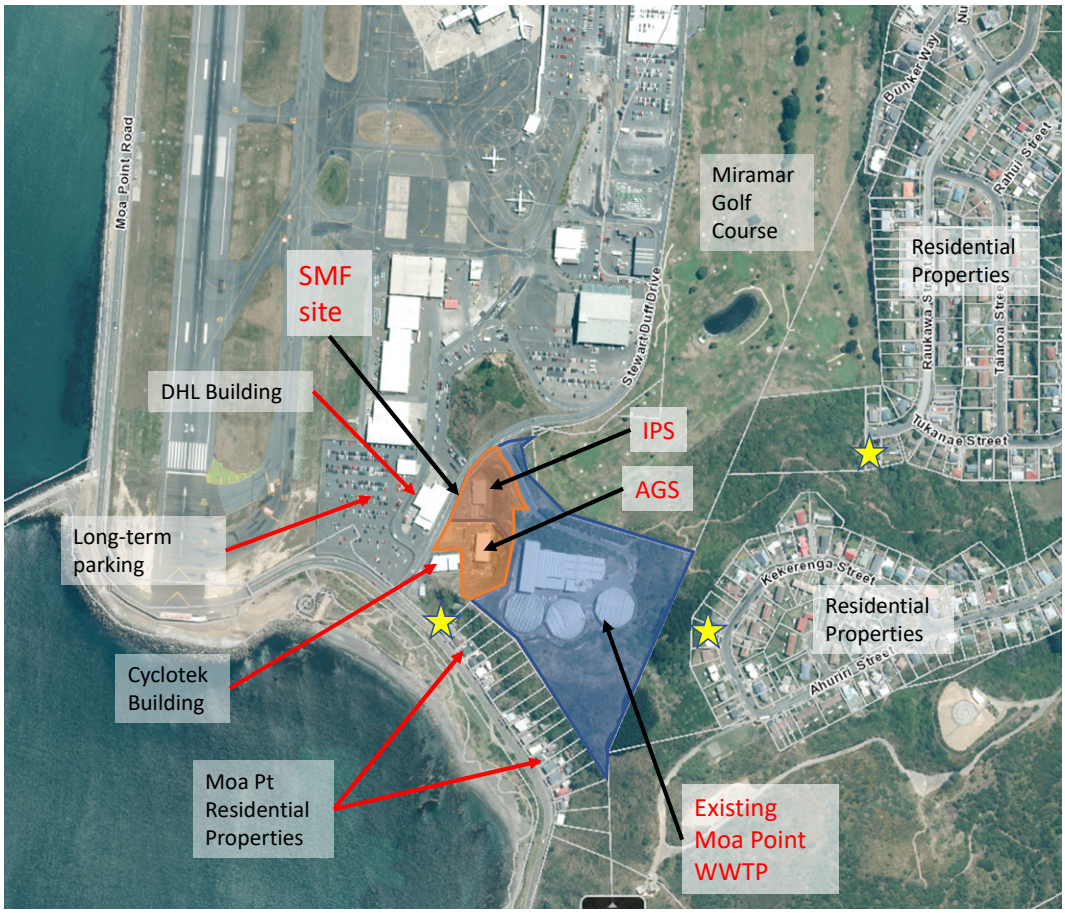
20 Conclusions

20.1 WCC is proposing to develop SMF adjacent to the existing Moa Point WWTP. This activity will generate odour, dust and other air contaminant which has the potential to have adverse effects on the environment. Emissions to air from the SMF will occur during the construction, commissioning, and operation.

20.2 It is my view that provided the proposed mitigation procedures are implemented and maintained the potential air quality effects will be minimal. I would not expect emissions of odour and dust from the site would be considered offensive or objectionable, or discharge from the site to have any adverse health effects.

Mathew Gregory Noonan
18 November 2022

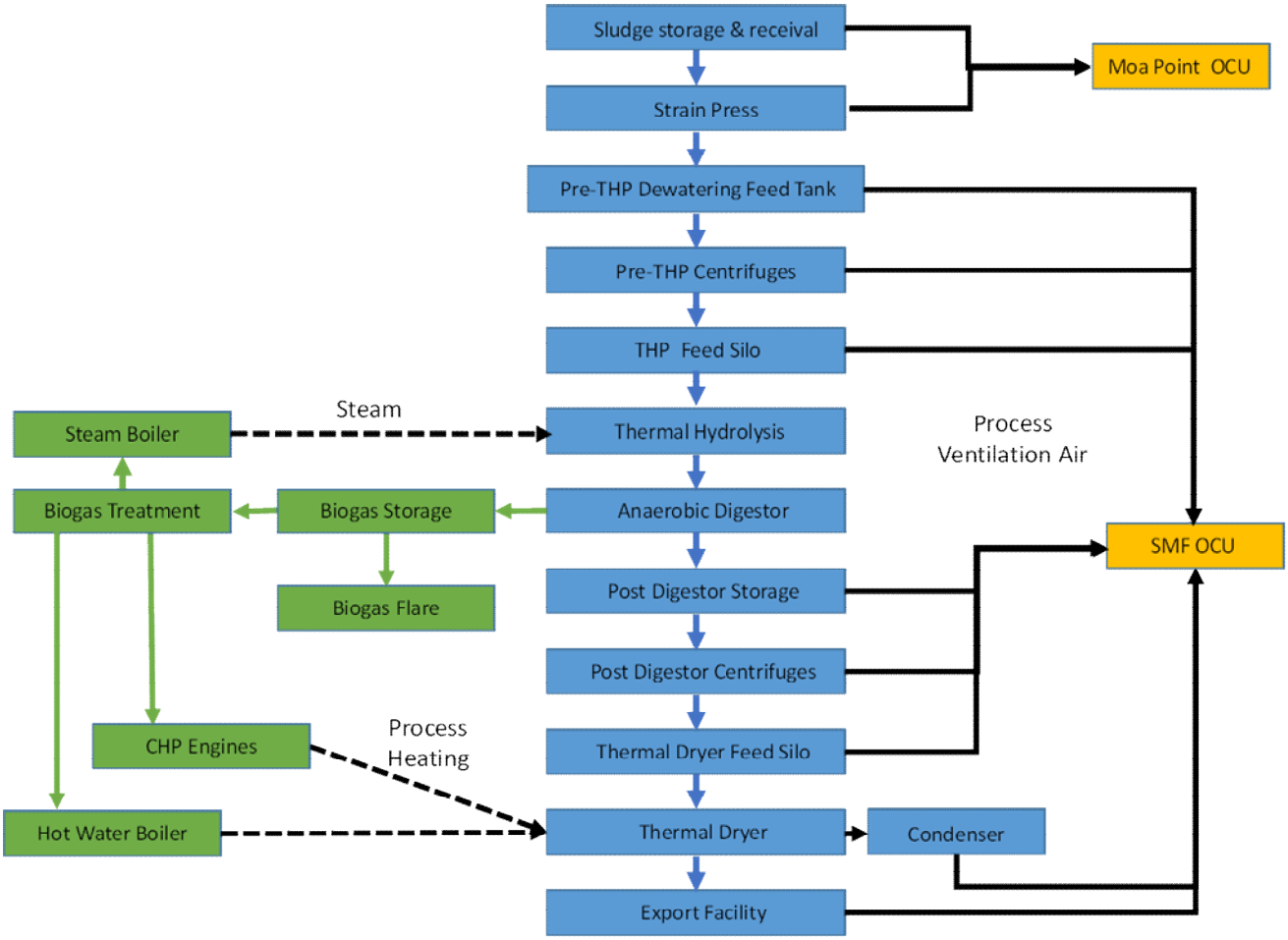
Appendix A Aerial photo of site and surrounding land use



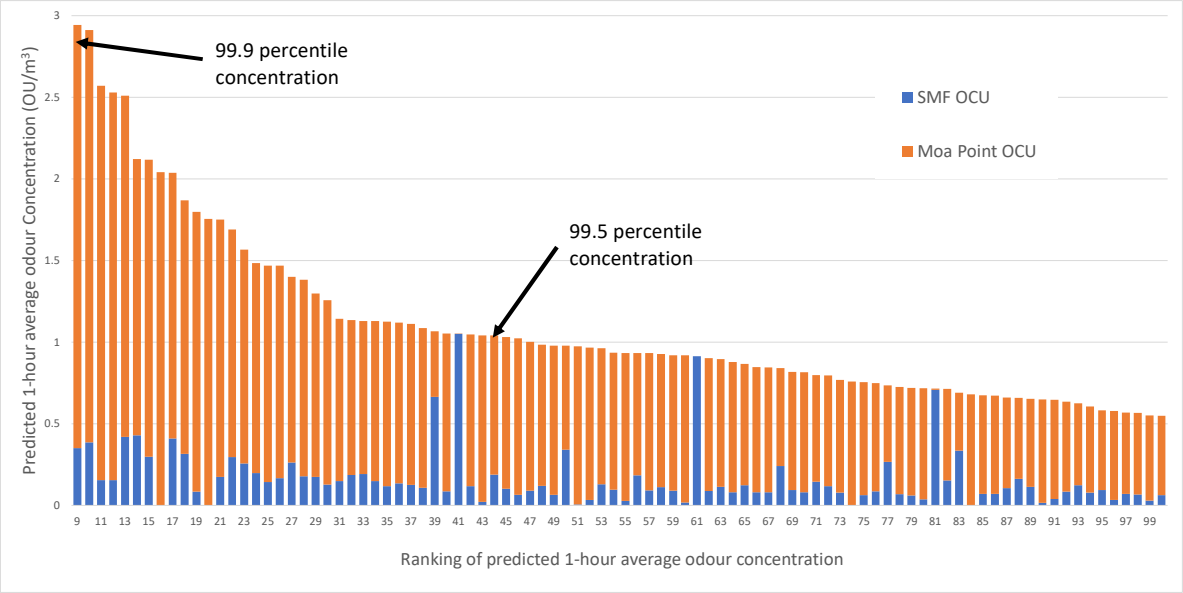
Appendix B Distribution of 1-hour wind speeds and wind directions measured at the Wellington Airport superimposed on an aerial of the site

The windrose “petal” shows the direction from which the wind is coming from.

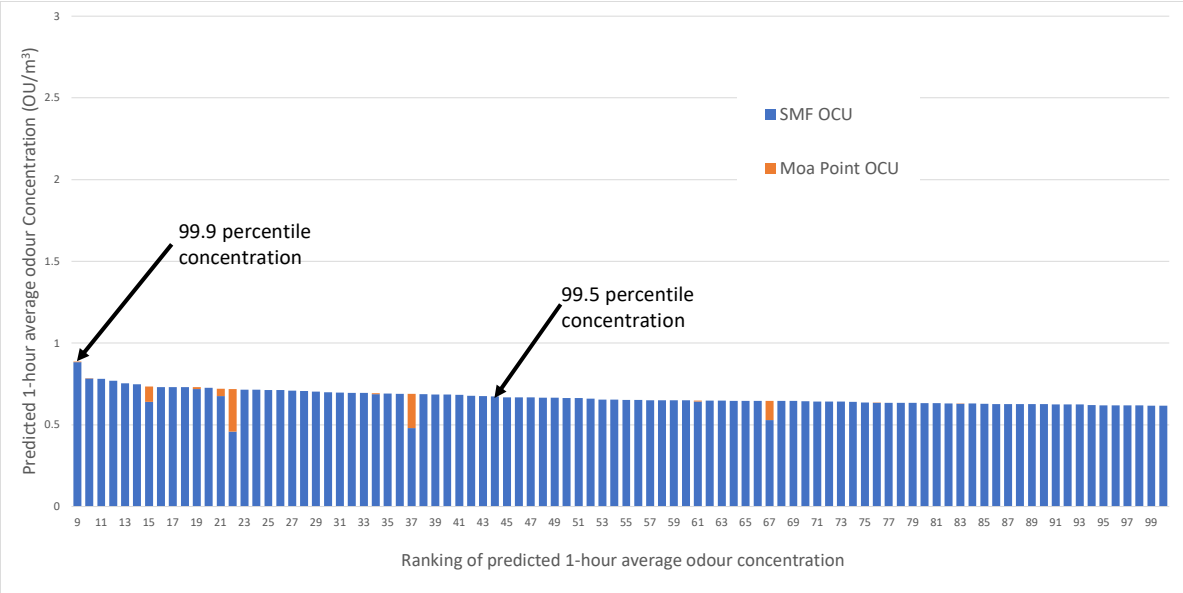
Appendix C Overview of the SMF treatment process and the odour mitigation



Appendix D Relative contribution that emissions from the SMF OCU and Moa Point OCU have on the most impacted dwellings located on Moa Point Road and Kekerenga Street



Relative contribution of emissions from the SMF OCU and Moa Point OCU to the maximum 1-hour average odour predicted at the most impacted Kekerenga Street dwelling



Relative contribution of emissions from the SMF OCU and Moa Point OCU to the maximum 1-hour average odour predicted at the most impacted Moa Point Road dwelling