Vineway Limited

Technical assessment of discharges to air from proposed wastewater management – Delmore, Ōrewa

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Table of Contents

1. Introduction 5
2. Process description 8
3. Consent requirements 11
4. Discharges to Air 15
5. Existing Environment 20
6. Assessment of effects 25
7. Conclusion 35
8. References 36
Appendix A Proposed Consent Conditions 37

Terms and Abbreviations

Terms & Abbreviations	Explanation
AB-WWTP	Army Bay Wastewater Treatment Plant
H_2S	Hydrogen Sulphide
IPS	Inlet Pump Station
MBR	Membrane Bioreactors
MfE	Ministry for the Environment
RAS	Return Activated Sludge
RO	Reverse Osmosis
UV	Ultraviolet
WAS	Waste Activated Sludge
WWTP	Wastewater Treatment Plant

1. Introduction

1.1 Overview

Vineway Limited have engaged Air Matters Ltd to undertake a technical assessment of discharges to air from a proposed wastewater treatment plant (WWTP) in Wainui/Upper Ōrewa for a new residential subdivision referred to as Delmore. Apex Water Limited has been engaged by Vineway to commence the design of a WWTP which will require an air discharge permit for the release of odour.

Wastewater from the surrounding area is currently directed to the Army Bay Wastewater Treatment Plant (AB-WWTP) which receives municipal waste from the greater Hibiscus Coast area. Watercare, the owner and operator of the AB-WWTP, has advised developers that the AB-WWTP is nearing capacity. New connections into the system after November 2024 may not be accepted[1] until planned upgrades are completed by 2031.

Based on this, Vineway is proposing to install and operate a WWTP to take and treat wastewater from Stage 1 and 2 of the Delmore development. The WWTP will be initially sized to accommodate Stage 1 of the project which encompasses some 475 residential lots. Consideration during this design process has been provided to ensure the treatment infrastructure is modular and it can be scaled to accommodate the future stages of the development should no public wastewater connection become available by this date. Depending on external factors and timing, if the Vineway WWTP is not constructed, wastewater from the site may be collected in a storage tank and transported by road tankers to an offsite treatment facility.

1.2 Site Location

The proposed WWTP is to be located to the north of Russell Road which is situated on the western side of State Highway 1 (SH1) opposite Ōrewa. The proposed site of the WWTP is currently used for farming practices including an implement shed, cattle yards and accessways. Rural pasture surrounds the proposed WWTP site (zoned for Future Urban) as shown in Figure 1-1. The proposed Delmore subdivision which will form part of the environment potentially impacted by odour from the WWTP is located to the north and east of the WWTP as depicted in Figure 1-2.

Further information of the existing environment, including activities potentially sensitive to the effects of degraded air quality is provided in Section 5.4

[1] https://www.watercare.co.nz/home/about-us/latest-news-and-media/plans-to-invest-500m-for-growing-hibiscus-coast-community

Figure 1-1: Proposed location of the WWTP in relation to the existing surrounding residential development (image source: Google Earth (2022).

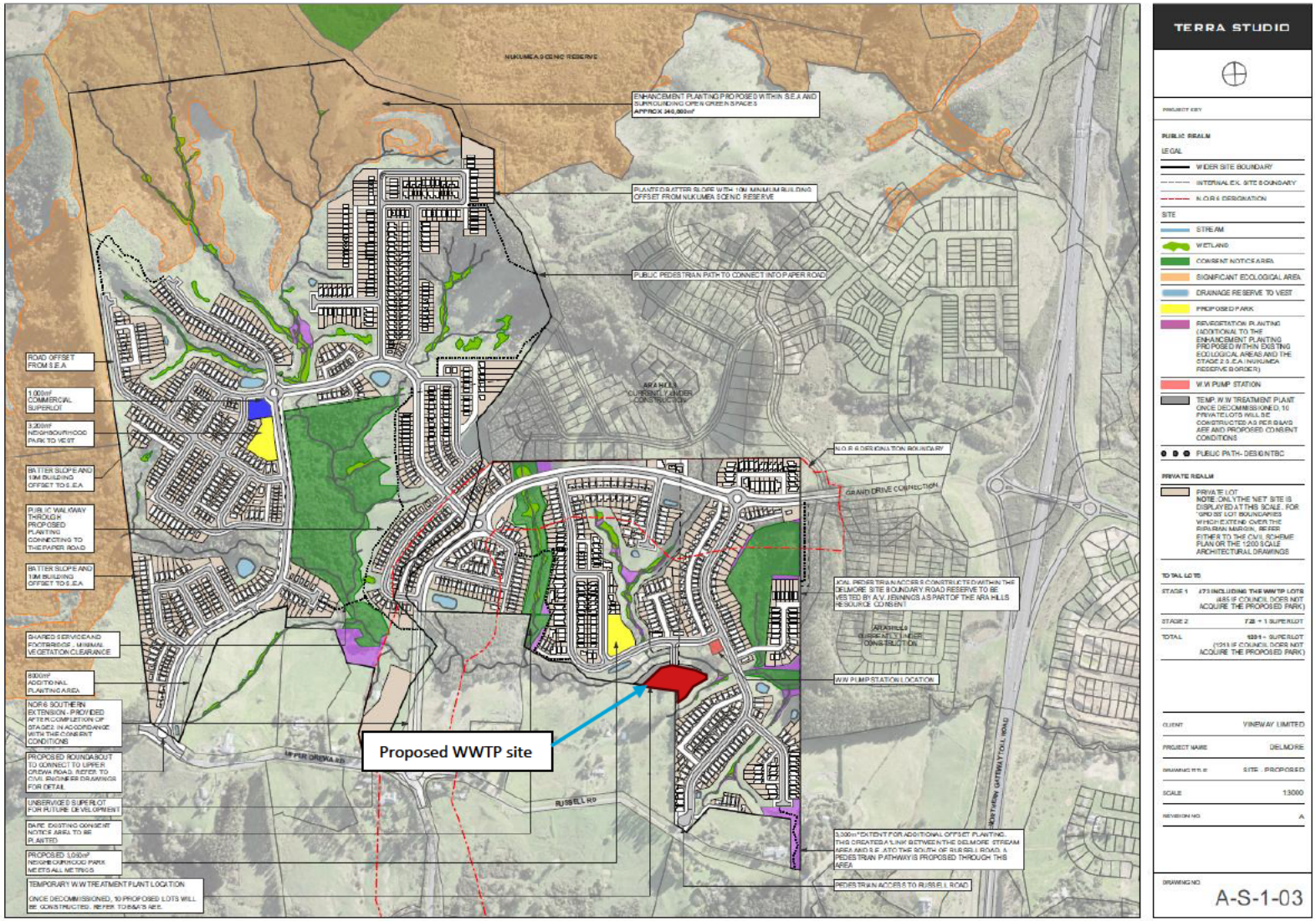

Figure 1-2: Proposed Delmore subdivision in relation to the location of the WWTP.

2. Process description

2.1 Proposed WWTP design

The final design of the WWTP would be expected to incorporate similar treatment processes to those included in the indicative design. These processes can be generally grouped as the following:

- Raw sewage screening – removal of large solid and grit from the raw wastewater, and storage and handling of the solid waste.
- Secondary treatment – biological nutrient removal using a 4-stage Bardenpho membrane aerated biofilm reactor and clarification using a membrane filtration.
- Tertiary treatment - Ultraviolet (UV) disinfection of the treated wastewater and Reverse Osmosis.
- Sludge Handling Facilities – including the thickening, dewatering and storage of the biomass (sludge) generated from the secondary treatment process.

In the proposed design, as demonstrated in Figure 2-1 and 3-1, the raw wastewater enters the WWTP via a wet well flow receival sump before being transferred to sewage screening. After screening wastewater is directed into a balance tank which acts as a buffer protecting or decoupling the treatment processes from peak flows.

Screened wastewater is pumped from the balance tank and treated through membrane biofilter modules including aeration and anoxic stages to remove nutrients. The treated water is then pumped to a membrane filtration unit which separates the suspended biomass (sludge) (produced from the biological processes) from the permeate (the clear, treated wastewater).

Return activated sludge (RAS) is to be directed back into the treatment process for further refining. Waste sludge is then pumped to centrifuges for dewatering to further reduce their volume. The dewatered sludge is then stored in enclosed storage bins before being transported offsite for disposal.

Permeate is disinfected by ultraviolet (UV) light and further clarification is provided through a Reverse Osmosis (RO) treatment plant before being discharged to the environment or disposed of offsite.

2.2 Wastewater disposal

2.2.1 *Onsite wastewater disposal*

Treated wastewater is proposed to be discharged on-site through an infiltration bed and irrigation to vegetated areas.

2.2.2 *Offsite disposal of wastewater*

Offsite disposal of wastewater will be required under specific circumstances.

Treated water including RO rejects – this may occur at a certain time of the year where onsite disposal of the highly-treated wastewater is not possible. This is expected to occur over the summer months.

Untreated wastewater – During the initial build out period, it is possible that raw wastewater will need to be collected in an onsite holding tank and processed offsite.

To enable offsite disposal (either treated or untreated), the wastewater will be piped from the WWTP/holding tank to a proposed filling point at the southern end of the Delmore subdivision (refer Figure 2-1). Wastewater will be pumped to truck and trailer tankers ('tanker units') and carted offsite for disposal. Tanker units will follow a predetermined route to a site that includes Upper Orewa Road and Russell Road. A dedicated entrance/exit will be provided off Russell Road adjacent to the filling point. The tanker units will use a proposed residential cul-de-sac turning area to park while filling.

An overview of the entry and exit point and filling location is provided in Figure 2-1 below. The route will be fully sealed from the intersection with Upper Orewa Road to the filling point entry/exit - an approximate length of 500 meters - with the only exception being Russell Road. Prior to storage in a 1000 m^3 tank the untreated wastewater will be passed through inlet screens (sewage screening) to remove large debris. These inlet screens are equivalent to those proposed for the wastewater treatment plant.

Apex Water, designer of the WWTP, have assessed the volume of wastewater to be disposed offsite and the corresponding number of tanker units required as set out below:

- **Untreated wastewater -** the maximum number of tanker units is expected to be nine per day.
- **Treated water including RO rejects** - the maximum number of tanker units is expected to be 7 per day with an average of 5.4 per day and this is anticipated to occur within the summer period (December to February).

As the tanker units will be using the same entranceway to access and exit, the number of vehicle movements will be equal to double the number of tankers used. The traffic assessment estimates that the majority of the time (99%) there will be up to one truck (two movements) per hour. Even outside of this time, there will, in practice, only ever be a maximum of three truck movements per hour on average. Air Matters has based their assessment on this theoretical maximum of vehicle movements.

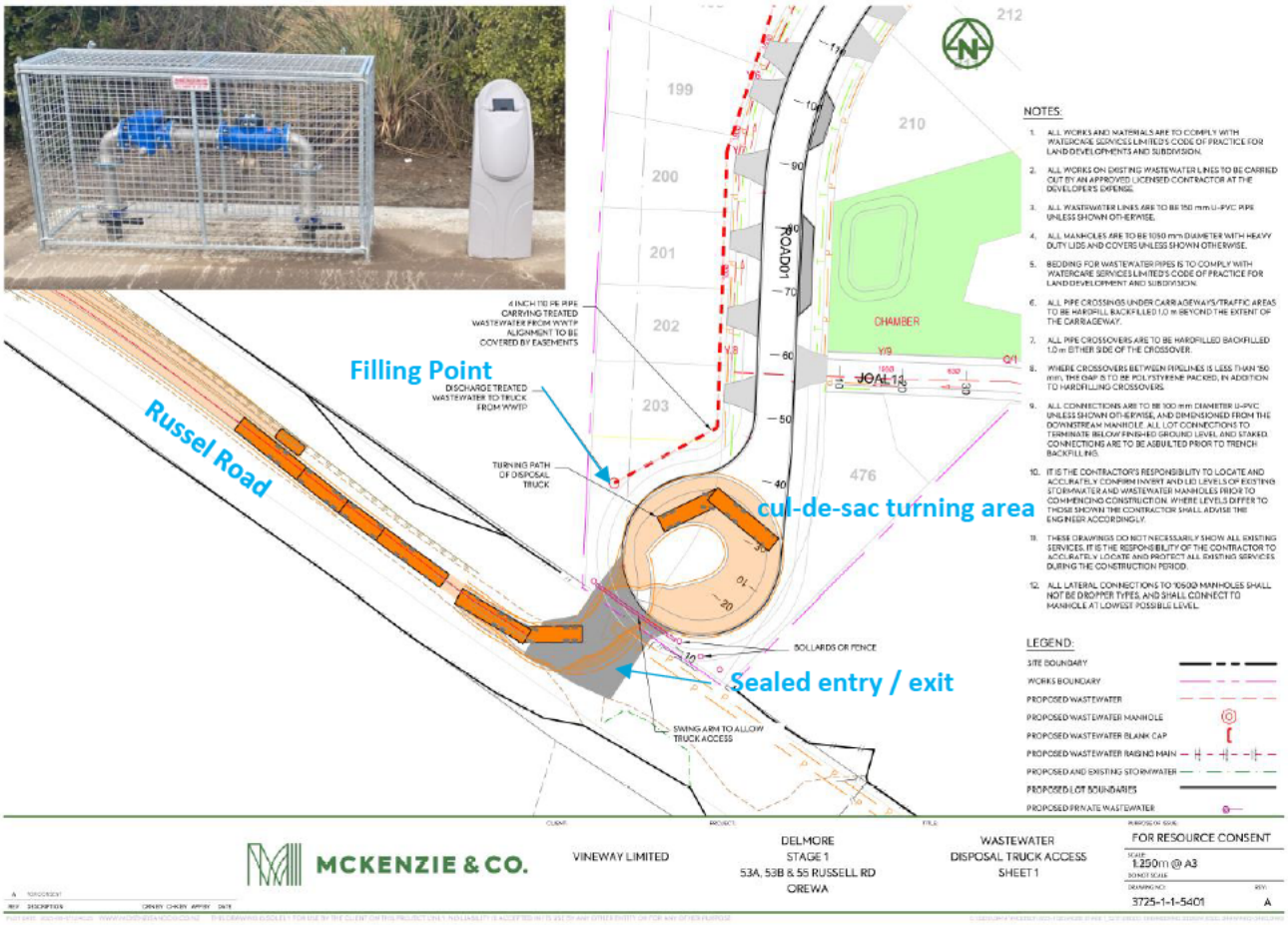

Figure 2-1 Proposed layout of the filling point location and entrance/exit off Russell Road (Air Matters annotations shown in blue).

3. Consent requirements

3.1 Auckland Unitary Plan (AUP)

Table E14.4.1 (Rule A163) of the AUP states that Treatment of municipal wastewater (municipal wastewater treatment plants) is a **Discretionary** Activity in all air quality areas.

The proposed WWTP is designed to accept and treat municipal wastewater from a new subdivision. As such the emissions to air, including odour, is a **Discretionary** activity.

Table E14.4.1 (Rule A166) of the AUP states that a wastewater facility that is for the primary purpose of pumping or transfer or storage of raw or partially treated wastewater is a permitted activity provided it meets the requirement of standards E14.6.1.1 (general standards) and E14.6.1.24 which requires wastewater to be within an enclosed tank of less than 4000m^3; or between 4000m^3 and 10,000m^3 where it is fitted with an effective odour control system such as a bio-filter.

This rule is applicable to the proposed storage and transport of untreated wastewater (refer to Section 2.2.2).

Table E14.4.1 (Rule A48) of the AUP states that Emergency generators used for the purpose of generating electricity for premises during mains power unavailability (including operation for the purpose of generator testing and maintenance) is a Permitted Activity.

The site will include an emergency generator which will meet the intent of Rule 48 and as such is a **Permitted** activity.

No other Rules in the AUP Chapter 14 Air Quality relate to the emissions to air from the operation of the WWTP.

3.2 National Environmental Standards

3.2.1 *National Environmental Standards for Air Quality Regulations 2004*

In 2004, five standards for ambient (outdoor) air quality were introduced in New Zealand under the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004 (NESAQ).

The NESAQ includes specific provisions relating to a consent authorities' ability to grant resource consents for discharges to air of PM_{10} (Regulation 17) and other contaminants (Regulations 20 and 21).

Regulation 17 (PM_{10}) is not relevant to the applicant's site as it is not located in a polluted Airshed and the operation of the WWTP is not likely to generate PM_{10} emissions. Regulation 20 of the NESAQ applies to the discharge of carbon monoxide, oxides of nitrogen, and volatile organic compounds (VOCs). Regulation 20 sets out that an application must be declined if it is likely to cause the concentration of carbon monoxide, oxides of nitrogen or volatile organic compounds in the Airshed to breach its ambient air quality standard and is likely to be a principal source of that gas in the Airshed. Regulation 21 applies to the discharge of sulphur dioxide

and states that an application must be declined if it is likely to cause the concentration of sulphide dioxide in the Airshed to breach its ambient air quality standards.

The operation of the onsite emergency generator will generate carbon monoxide and oxides of nitrogen emissions. However, the ambient air quality standards will not be exceeded as a result of its operation. The discharges to air from the site of SO_2 and VOCs are not relevant.

Therefore, the NESAQ does not restrict the granting of this consent for discharges to air.

3.2.2 *National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat Regulations 2023*

On 27 July 2023 National Environmental Standard for Greenhouse Gas Emissions from Industrial Process Heat (Greenhouse NES) and the associated National Environmental Policy (Greenhouse NEP) were introduced for fossil fuel burning equipment that produces industrial process heat. The objective is to reduce emissions of Greenhouse Gases (GHG) to mitigate climate change and its current and future adverse effects on the environment and the wellbeing of people and communities. The Greenhouse NES outlines the activity status of a GHG emission dependent on the type of fossil fuel used and annual volume of GHG's emitted.

With regards to the proposed WWTP the only potential GHG emissions from the combustion of fossil fuel will be from a diesel-fired back-up electricity generation device. Backup heat devices are specifically excluded from the regulations (Section 10(1)b) and therefore the Greenhouse NES does not need to be considered as part of this assessment.

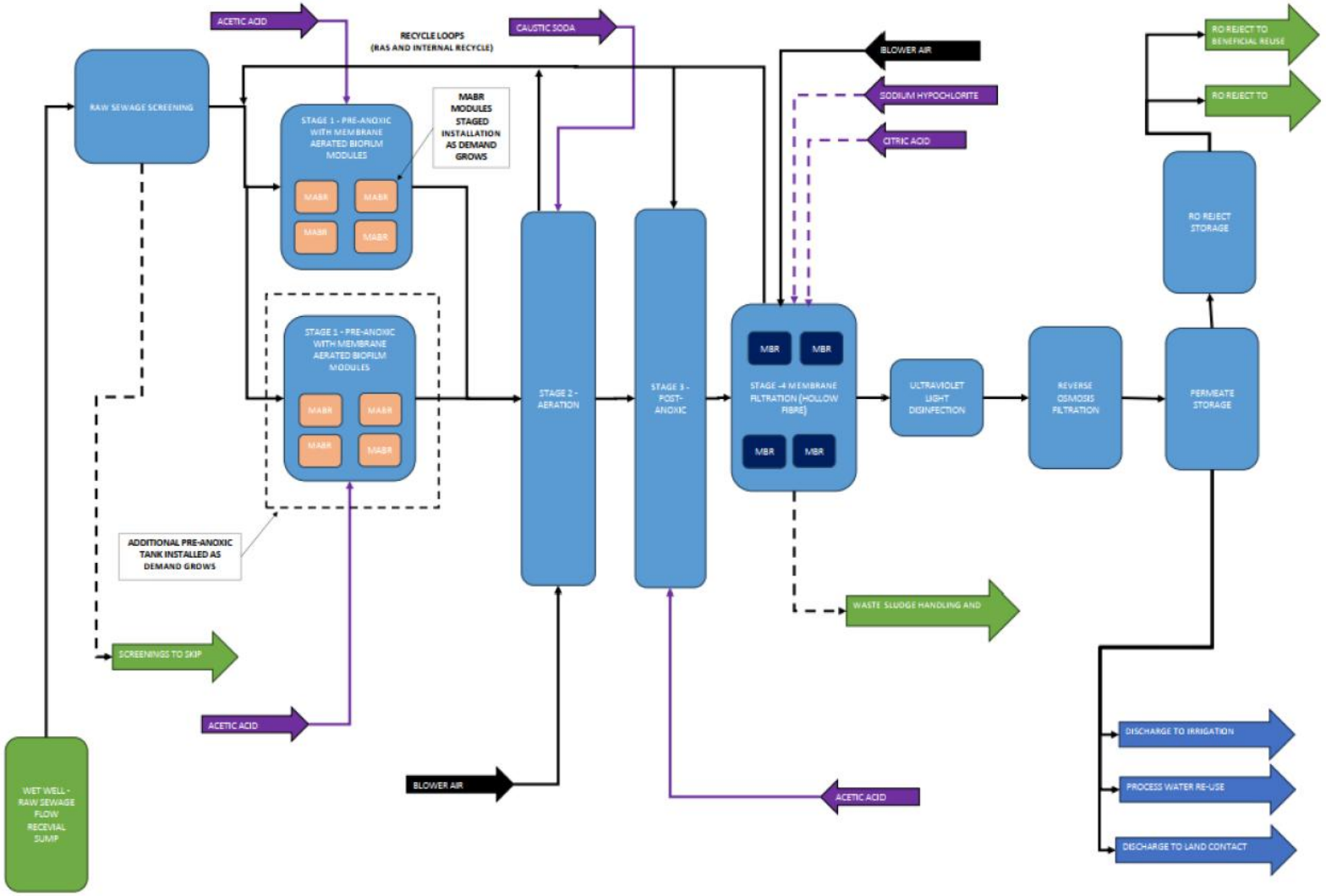

Figure 3-1. Indicative design of the proposed WWTP.

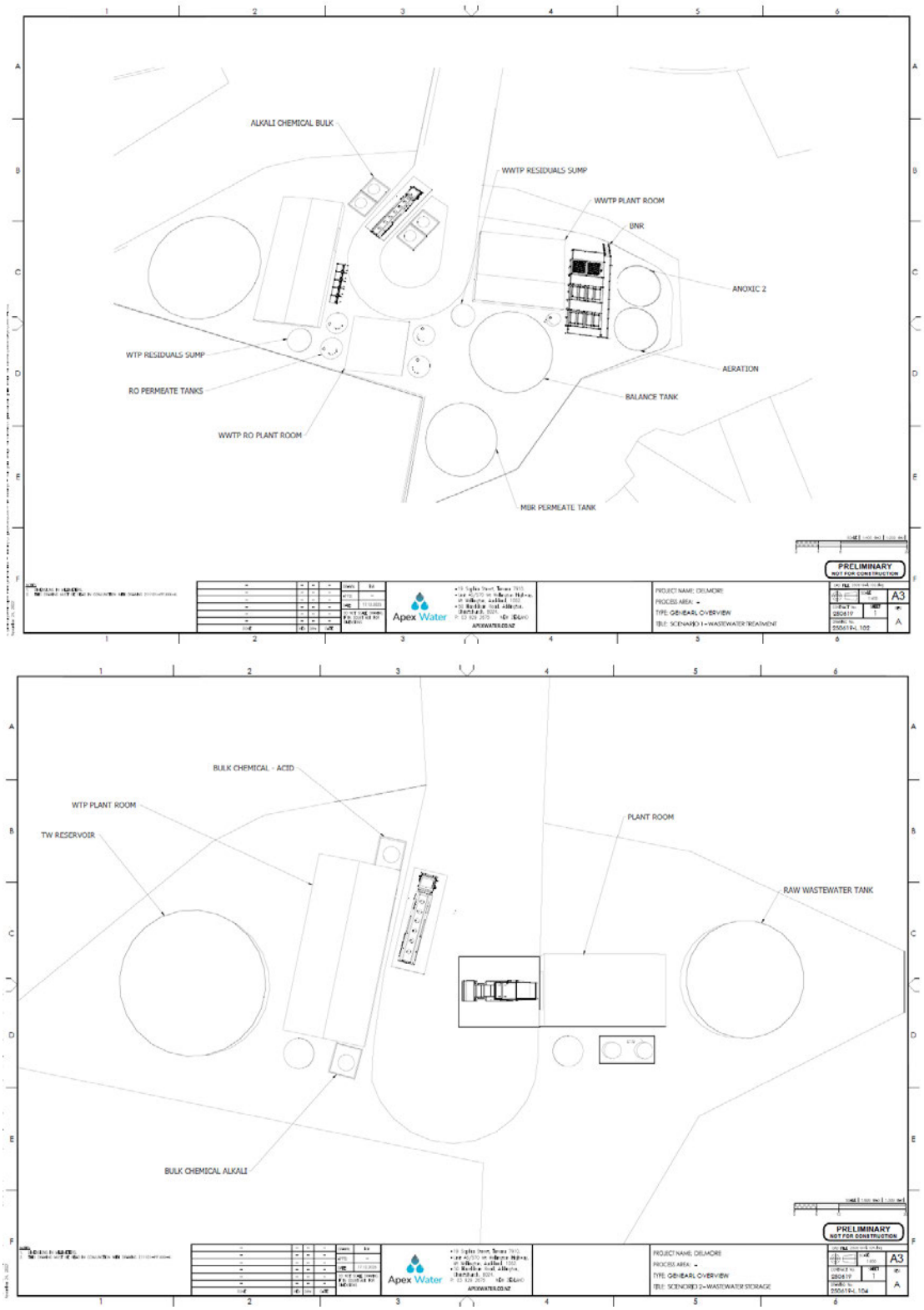

Figure 3-2. TOP: Indicative ground layout of the proposed WWTP. BOTTOM: Indicative ground layout of the proposed untreated wastewater holding and transfer facility.

4. Discharges to Air

The primary discharge to air from the wastewater treatment and transfer process will be odour. WWTP odours have the potential to be generated from the decomposition of organic material (e.g. carbohydrates, fats and proteins) present in the wastewater. High levels of odour may be generated when wastewater (or sludge) becomes oxygen depleted and anaerobic (septic) conditions become present. During anaerobic conditions, highly odorous compounds such as hydrogen sulphide (H_2S) are generated.

Odour generated by processing of wastewater will be made up of a complex range of organic compounds that are able to be detected by human olfaction (sense of smell). Health effects from individual compounds can occur if in elevated concentrations (for example H_2S), however based on Air Matters experience with WWTPs, concentrations of any compounds will be low and not result in any direct potential health effects. Consequently, this assessment is limited to the effects of odour from the proposed WWTP which are described in more detail in Section 6.

Dust may also be generated during the construction of the WWTP resulting in nuisance (soiling) or health related effects (finer dust). The level of dust generated will not be materially different from that generated during the construction of the surrounding residential lots. Standard earthworks dust mitigations, required by the land use consents during the construction of the WWTP should ensure that potential effects are minimised to an acceptable level. Dust generated from additional truck movements during the offsite disposal of wastewater have also been considered in this assessment.

4.1 Odour generation and mitigation

There will be a number of potential odour-generating sources from the management of wastewater which are summarised in Table 4-1 below along with a description of the proposed mitigation methods.

Table 4-1: Odour generating potential and mitigations for the management of wastewater

Process	Odour potential	Controls
Screening	The intake screening process is a potential minor source of odour due to the fresh state of the influent.	• Odorous air from the intake screen and solids storage is to be extracted to an odour control unit (refer Section 2.1). Uncontrolled odour emission should be negligible during normal operations. • Overloading of the screens and unplanned outages, which increase the release of odour, will be managed by having a second set of screens on standby. • As the WWTP has the ability to stop accepting raw wastewater the risk of over loading can be rapidly avoided.
Balance Tank	Potential minor source of odour due to the fresh state of the influent (solids removed)	• The tank is to be sealed and connected to the odour extraction network under negative pressure. • In routine operation this tank will be operated at near 0% level and will be designed with an internal sump.
Secondary treatment (Aerated/aerobic tanks)	The aerobic process is not inherently odorous provided that aerobic conditions are maintained. If anaerobic conditions develop the odour potential may increase. The aerobic tanks are not proposed to be enclosed or have air extracted and mitigation will rely on maintaining aerobic conditions.	• Mixing and aeriation will be automatically controlled based on dissolved oxygen concentrations; • Blowers (supply air) will have a backup emergency power supply; • Replacement blowers available onsite; • Preventative maintenance;
Secondary treatment (Anoxic balance tanks)	Anoxic process is not inherently odorous. The anoxic tanks are not proposed to be enclosed and odour management is based on maintenance of anoxic conditions and avoiding anaerobic conditions.	• Ensure the tank remains in anoxic conditions and avoid anaerobic conditions. This will be achieved by effective mixing of the tank and aerobic control of influent based on time Oxidation Reduction Potential monitoring.

Process	Odour potential	Controls
Secondary treatment (Secondary Anoxic tanks)	These tanks receive water from the aerated tanks and provide further nitrite removal. Influent not likely to be odorous (influent is from the Anoxic Balance tank).	• Same control as the anoxic balance tanks;
Secondary treatment (MBR tanks)	Low potential to generate odour as receiving water is from the Secondary Anoxic tanks	• Wastewater within the membranes is cleaned using air ensuring the process remains aerobic at all times
Sludge dewatering, storage and transporting offsite.	The odour associated with the dewatering plant has the potential to be moderate to high intensity with a character that is considered to be unpleasant. During removal of the skip from the building and transport offsite there is potential for odour to be released.	• Dewatering process and storage area will be enclosed with the air extracted and treated (refer Section 2). • Practical measures such as covering the skip bin with a close-fitting tarpaulin • Low frequency of removal.
UV disinfection	Process is enclosed The wastewater will have low odour potential (i.e. positive dissolved oxygen concentrations and low organic content).	• N/A
Reverse Osmosis	The wastewater will have low odour potential (i.e. positive dissolved oxygen concentrations and low organic content).	• N/A
Onsite Disposal (methodology to be confirmed)	The wastewater will have low odour potential (i.e. positive dissolved oxygen concentrations and low organic content)	• Management of effluent prior to discharge.
Offsite Disposal (treated wastewater)	The wastewater will have low odour potential (i.e. positive dissolved oxygen concentrations and low organic content)	• Management of effluent prior to collection

Process	Odour potential	Controls
Offsite Disposal (untreated wastewater)	Potential minor source of odour due to the fresh state of the influent (solids removed)	• The raw wastewater holding tank is to be sealed and connected to the odour extraction network under negative pressure. • The tank filling point will have an odour control unit capable of back-venting any displaced air during tanker filling.

4.2 Mitigation details

Mitigations employed to minimise the release of odour at the proposed WWTP are described in Table 4-1 and in summary include: ensuring aerobic/anoxic conditions are maintained through the process; process monitoring of key chemical/biological variables including oxygen levels; redundancy of key equipment on site including backup power generation; robust equipment maintenance and, extraction and treatment of potentially odorous air through the odour treatment system.

4.2.1 *Odour extraction*

The active air extraction system is a critical component of the odour management. It will draw odour-laden air from the processes with the highest potential to generate odour including raw influent screening, solids storage, the sludge dewatering and solids storage and the Balance Tank. Once installed and operational this should be checked to demonstrate negative pressure is maintained (under normal wind conditions) to ensure effective air extraction for each process.

The onsite back up electricity generators will supply power in the event of a power failure. Backup generation will be designed to enable operation of key WWTP odour mitigations including blowers, dosing systems and the odour extraction system. The truck filling point will also have an appropriate odour control unit fitted for back venting displaced air.

4.2.2 *Carbon absorption beds*

Treatment/removal of odour is to be provided through extraction of air from the potential odour-generating areas as described in 4.2.1 above and directing the odour-laden air through activated carbon beds. To aid in odour removal the carbon bed will be impregnated with caustic soda. The volume of carbon will be designed to ensure that the airflow velocity through the bed is minimised to maximise odour absorption. Given the sensitivity of the receiving environment, it should be designed to ensure as high removal rates as practical. As moisture can interfere with absorption, preheating of the extracted air flow will occur to reduce humidity levels.

The carbon media will become saturated overtime. Consequently, the media bed will require periodic changes prior to reaching saturation. The WWTP operator will undertake regular testing of the bed saturation.

5. Existing Environment

5.1 Topography

The Delmore development is located approximately 3.7 km from the Ōrewa coast on undulating hill terrain. The site of the WWTP has an elevation of 20 m above-sea-level and is adjacent to an unnamed tributary of Ōrewa River which runs from west to east. Terrian rises to the north, west and south of the WWTP site. To the east, towards SH1 and the site of the current Ara Hill Drive development, the terrain is generally flat.

5.2 Meteorology

Air quality effects, particularly odour, can be exacerbated during certain meteorological conditions. In order to assess the potential air quality effects, it is important to understand local meteorology.

The nearest calibrated Automated Weather Station (AWS) relative to the WWTP site is located in Shakespear Regional Park, Whangaparāoa, approximately 16 km to the east of the proposed WWTP (referred to as SRP-AWS). Air Matters reviewed the data collected at this site during the two-year period 01 Jan 2020 to 31 Dec 2021.

Figure 5-1 shows a wind rose from SRP-AWS (97m above sea level) over the 2-year period and demonstrates the following characteristics:

- The most predominant and strongest winds are from the west (21 % of the time); the second most predominant winds are from the south-west (17 %) followed by the north-east (15.3 %). These predominant wind directions are consistent with previous wind patterns reported for Northern regions of Auckland (NIWA, 2010).
- Calm conditions (<0.5 m/s) occurred for <0.1% which is reflective of the exposed coastal location of the meteorological station positioned on the Whangaparāoa Peninsula. The higher average wind speed of 5.5 m/s again is likely representative of the exposed coastal location.

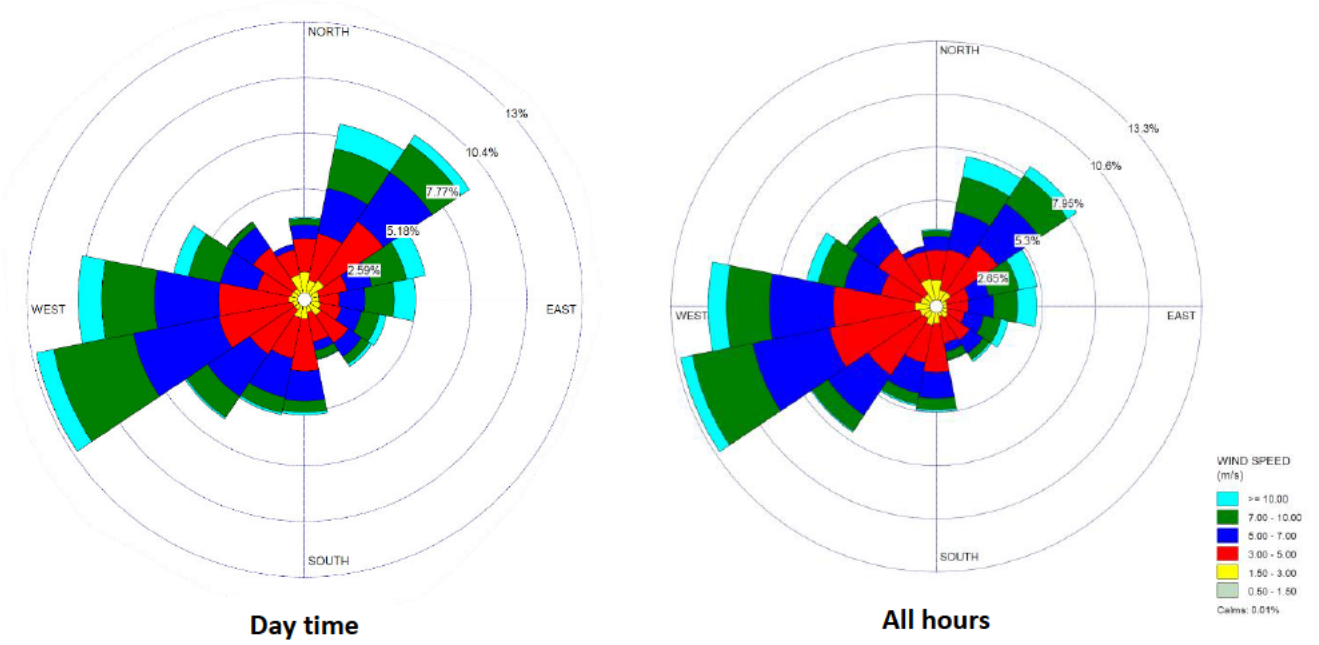

Figure 5-1. Wind Rose 2020-2021 from Shakespear Regional Park, Whangaparāoa. LEFT daytime (6:00-10:00 pm) and RIGHT all hours.

Wind conditions measured at the SRP-AWS are expected to be a good representation of the direction within the wider Ōrewa and Milldale area. Wind strength is likely to be overestimated in the SRP-AWS meteorological record when compared to the proposed site of the WWTP which is 3.7 km inland and located within a slight depression.

Low wind speeds can result in reduced dispersion and exacerbate the effects of odour. A conservative allowance has been made in Section 6 based on the likely over representation of wind speeds at the SRP-AWS. The WWTP is also located in the base of a valley with terrain rising to the north, east and south. The surrounding rolling hills are likely to create air drainage ('down valley flows') during evening periods on calm nights. Due to the limited scale of the valley (height and fetch) these drainage winds are expected to be very limited, and the overarching regional winds are likely to be the dominant influence. Based on the review of this, wind data the SRP-AWS is expected to be appropriate for undertaking an assessment of effects.

5.3 Background air quality

To understand the existing air quality in the area surrounding Delmore WWTP, Air Matters has completed a desktop study using available information and supplemented this with a site visit to review surrounding land use activities.

There are no other known consented air discharges within a one-kilometre radius of the proposed WWTP site. Minor odour emitting activities, such as service stations and fast-food restaurants, are located within the Ōrewa area to the east of the WWTP. Given the separation distances, emissions from these urban activities are unlikely to impact on the same areas as the proposed WWTP.

Based on the land use zoning (Future Urban) residential development will in time encircle the area immediately surrounding the proposed WWTP. This includes the proposed Delmore subdivision (Figure 1-2) and potential future subdivision to the south of the WWTP site.

In the wider area, construction of Ara Hills to the east of the WWTP is currently underway and includes large scale civil works and construction of residential houses. These activities are likely to generate short-term elevated levels of dust emissions, but limited potential for odour.

Immediate surrounding land use is currently rural. Typical rural odours are likely common but intermittent including stock, silage, burn-offs and fertilizer spreading. There is not expected to be any significant additive effect of odour from the WWTP. Rural odours such as silage are the exception to this, however they are likely to be very intermittent or not occurring. These rural areas are zoned for future development including Delmore subdivision and therefore rural related odours are likely to reduce overtime.

In summary the area surrounding the site is expected to currently have good air quality, characterised by intermittent rural odours and dust from construction of nearby residential developments.

5.4 Sensitive activities (Receptors)

When assessing air discharges, the sensitivity of the environment must be taken into account and should be considered as part of any odour assessment. Sensitivity is based on characteristics of the land use, including the time of day and the reason people are at the particular location. Other factors that may determine whether an offensive or objectionable effect from an odour emission is likely to occur are the presence of background odours (Section 5.3), aspects influencing perception, and the mental and physical state of the affected person.

Ministry for the Environment (MfE) (2016) guideline recommends the use of district planning maps as these zones are based on controlling adverse effects on amenity, which aligns with odour effects.

Typical activities that have a high sensitivity to odours include (MfE, 2016):

- Residential properties (including rural residential).
- Hospitals, schools, childcare facilities, rest homes and marae.
- Public outdoor locations (e.g. parks, reserves, sports fields, beaches).
- Tourist, cultural, conservation
- Some commercial and retail businesses

Figure 5-2 and Table 5-1 illustrate the identified sensitive receptors surrounding the WWTP. This is based on zoning from the Auckland Unitary Plan along with specific high-sensitivity activities within low sensitive zones (dwellings in rural areas[2]) within close proximity of the WWTP. An assessment of the receptors immediately surrounding the filling point has been undertaken in Section 6.3.

[2] Zoned as Future Urban in the AUP. Current land use is considered rural for this assessment.

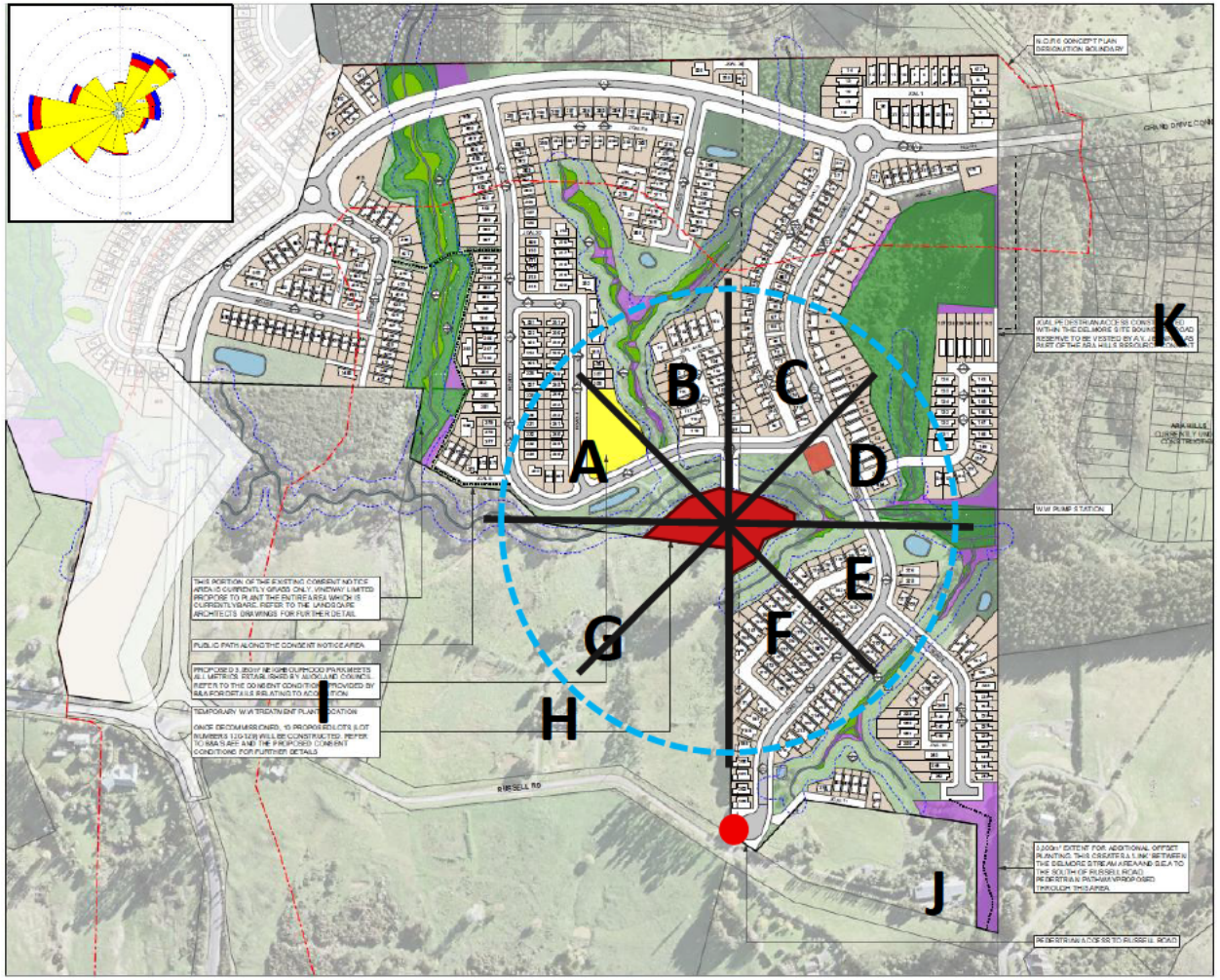

Figure 5-2. Locations of sensitive receptors to potential odour effects (A-K) and detailed in Table 5-1. Blue dashed circle represents a 200m radius from the centre of the proposed WWTP (the relevance of this 200 m distances is discussed in more detail under Section 6). Red box is the maximum extent of the WWTP. Red circle represents the proposed filling point. A windrose illustrating the wind patterns for the area is also included (direction blowing from).

Table 5-1. Receptors sensitive to potential odour effects surrounding the WWTP (refer Figure 5-2 for locations). Bolded locations identify those properties at higher risk to odour effects (discussed further in Section 6).

ID	Area / address	Land Use Zoning	Direction from WWTP	Distance (m)
A	**Proposed Delmore subdivision**	Future Urban+	**West-North**	**95***
B	**Proposed Delmore subdivision**		**North-West**	**75***
C	**Proposed Delmore subdivision**		**North-East**	**75***
D	**Proposed Delmore subdivision**		**East-North**	**125***
E	**Proposed Delmore subdivision**		**East-South**	**70***
F	**Proposed Delmore subdivision**		**South-East**	**70***
G	**35 Russell Rd (House 1)**		**South-West**	**150**
H	35 Russell Rd (House 2)		South-West	220
I	11 Russell Road		South-West	450
J	59 Russell Road		South-East	390
K	Ara Hills subdivision (under construction)		East-North	340*

*Based on nearest dwellings.
+ https://unitaryplanmaps.aucklandcouncil.govt.nz/upviewer/ accessed on 18 January 2025.

Receptor A-H have been identified as Sensitive Receptors located within 200 m of the proposed WWTP site. These are categorised into the following:

- **Receptors A-F:** Residential development forming part of the proposed Delmore subdivision. As there are a range of dwellings within the 200-metre separation zone, the Sensitive Receptors have been categorised into evenly spaced segments based on their direction from the WWTP (refer Figure 5-2). The number in each segment varies between 8 and 60 individual dwellings.
- **Receptors G:** Existing dwelling that does not form part of the proposed Delmore development.

Future development located between the proposed WWTP and Russell Road (in the vicinity of Receptor G&H) is currently zoned as 'Future Urban Zone' (refer Figure 5-2). A potential subdivision of this area has not been considered in this assessment as there is no current consent application for a subdivision. Notwithstanding this the effects on future residential dwellings in this area would likely be of the same nature and scale as for the properties assessed in this report.

6. Assessment of effects

6.1 Potential effects of odour

Odour is perceived by our brains in response to chemicals present in the air we breathe. Humans have a sensitive sense of smell and can detect odour even when chemicals are present in very, very low concentrations. Given that odour is a human perception, it is extremely difficult to measure an odour using a chemical, mechanical or electronic apparatus as is possible for other nuisance effects such as noise and light. At present, assessment by human nose is the most reliable method for determining an odour (MfE, 2016). In the context of undertaking an assessment, odour can be described in two ways:

- Acute - high-intensity and/or highly unpleasant odours occurring infrequently or for short periods (a few minutes to an hour).
- Chronic - low-intensity and/or moderately unpleasant odours occurring frequently or continuously over a long period.

The concept of acute and chronic odour is discussed throughout this assessment.

People have reported effects of odour that include nausea, headaches, retching, difficulty breathing, frustration, annoyance, depression, stress, tearfulness, reduced appetite, being woken in the night, and embarrassment. All of these can contribute to a reduced quality of life for the individuals who are exposed to the odour. People can develop physiological effects from odour even when their exposure is much lower than that typically required to cause direct health effects. This effect is sometimes termed 'odour worry' and is due to effects brought on by stress or the perception that if there is a smell it must be doing physical harm (MfE, 2016).

6.2 WWTP assessment

6.2.1 *Separation distance*

The initial screening assessment is based on the separation distance between sensitive receptors and the WWTP. By having a suitable separation distance, odour emissions can be dispersed and diluted to such an extent that their effects at sensitive locations are minimised to an acceptable level.

Separation distance guidelines are not intended to be used as a pass/fail test, rather as a trigger for more detailed assessment for a particular site. MfE (2016) notes that relevant separation distances should be considered when assessing odorous discharges to air to address unintended or accidental releases, and/or effects that cannot be internalised even with adoption of the best practicable option. Site specific factors which may influence discharge rates and how they are dispersed, for example terrain, are not taken into account in separation distances.

Environment Protection Authority Victoria publishes a 'recommended separation distances for industrial residual air emissions' (EPA Victoria, 2024). In New Zealand these guidelines have been extensively used and are accepted as appropriate separation distances.

In accordance with the EPA Victoria guidelines (2024), a separation distance of ~160 m from the WWTP to sensitive receptors would be applicable in this instance based on a mechanical/biological wastewater plant serving a population of 3,750 residents[3]. To provide a buffer for the proposed WWTP, a screening level separation distance of 200 m has been adopted.

Separation distances have been calculated based on the distance to a neighbouring dwelling (as opposed to the property boundary). This is referred to as Method 2 'the rural method' in EPA Victoria (2013) and is appropriate for this assessment for properties are on rural / lifestyle blocks. A central position within the WWTP has been used to define the onsite location. The extent of the 200 m buffer is detailed on Figure 5-2 (dashed blue circle).

Taking into account the location of sensitive receptors, a number of dwellings are within 200 m of the proposed WWTP. These locations are shown in bold in Table 5-1 and detailed below:

- **Location A-F** represents the proposed Delmore development split into six quadrants. There are ~180 residential dwellings that are located within the 200 m separation distance.
- **Location G** represents an existing dwelling to the south-east of the WWTP. This dwelling is located 150 m from the site of the WWTP and does not form part of the proposed Delmore development.

6.2.2 *Comparable WWTPs*

APEX Water Limited have designed and commissioned multiple WWTP of similar design and capacity as that proposed for Delmore. Air Matters visited one of these WWTP (commissioned in 2022) located in Meremere which receives and treats municipal wastewater from the township of Meremere. Air Matters undertook an odour survey at the Meremere WWTP on 16 January 2025 to ascertain the potential for odour to be generated. The Meremere WWTP does not include the capture and treatment of odour laden air from the inlet screening/storage or WAS dewatering/storage.

The survey findings (Appendix B) concluded that odour associated with the inlet screening/WAS and acetic acid storage was detectable at a distance of 45 m from the WWTP. The intensity of the odour at 45 m was described as 'weak' and the frequency was intermittent (in accordance with the MfE 2016 guidance). Due to the configuration of the WWTP and the adjoining pond, downwind survey locations beyond 45m were not possible. A scouting survey at 140 m (beyond the pond) was undertaken and didn't not detect any odours associated with the WWTP.

Based on this survey results it is recommended for the proposed Delmore WWTP:

- The inlet screening/storage and WAS dewatering/solids storage should include active capture and treatment of air to minimise the release of odour (as is currently proposed - refer Section 2.1).
- The storage of acetic acid should be reviewed and mitigations put in place to minimise the release of odour.

[3] Based on 1,250 dwellings with an average occupancy of three persons.

- It must be noted that these conclusions are based on a single survey which was intended to identify of the sources of odour and to provide a general indication of the distance that odour could be detected from the site.

6.2.3 *FIDOL Assessment*

In New Zealand a recognised qualitative approach to evaluate the likelihood of odour giving rise to 'offensive or objectionable odour effects' is based on an evaluation of the FIDOL factors. The FIDOL factors are described in the Ministry for the Environment's 'Good Practice Guide for Assessing and Managing Odour (2016)' and are listed in Table 6-1 below.

Table 6-1 FIDOL assessment factors (MfE, 2016)

Factor	Description
Frequency	How often an individual is exposed to the odour
Intensity	The strength of the odour
Duration	The length of exposure
Offensiveness	The character relates to the 'hedonic tone' of the odour, which may be pleasant, neutral or unpleasant
Location	The type of land use and nature of human activities in the vicinity of an odour source

These factors have been applied to the potential odour emissions from the proposed WWTP and are discussed below. As noted above, locations within 200 m buffer are the primary focus of the FIDOL assessment, however other locations outside of this zone are also discussed where relevant.

Frequency

Frequency relates to how often odours will be experienced at a receptor. The frequency at which odour could be detected at a receptor will be a combination of the occurrence of the odour emission and certain meteorological conditions, such as wind direction and speed.

Worst-case dispersion conditions for odour emitted from any WWTP typically occur during low wind speed (<1.5 m/s) and highly stable atmospheric conditions. A threshold of 1.5 meters per second (~5 km/h) is often employed, however given the under-estimate of calmer periods from the SRP-AWS, Air Matters considers an increased threshold (3 m/s) is more appropriate for this assessment to define 'low wind speed'.

The higher risk sensitive receptors surround the proposed WWTP and therefore winds from all directions have the potential to result in odorous emissions being dispersed onto these locations. Based on analysis of data from the SRP-AWS winds, the wind conditions that will affect the specific receptors are defined in Table 6-2 below.

The maximum percentage of time wind could carry odour from the proposed WWTP towards a sensitive receptor location is **21% (all wind conditions)** and **2.4% (low wind speeds).** Receptors A-F represent a number of dwellings (refer Figure 5-2) and therefore these percentages are based on a **maximum** frequency that this

'group' of dwelling may experience an odour. The actual frequency of odour experienced at an individual dwelling within each segment is likely to be lower.

Table 6-2. Wind direction frequency analysis for the Delmore subdivision.

Wind Direction (blowing from)	% of time (all wind speeds) *	% of time (low wind speeds)	Sensitive Receptors in downwind direction (within 200m)
NNE (0-45°)	9.1	**2.4**	G
ENE (45-90°)	15.3	1.6	-
ESE (90-135°)	8.8	1.1	A
SSE (135-180°)	6.4	1.2	B
SSW (180-225°)	9.1	1.6	C
WSW (225-270°)	17.2	1.6	D
WNW (270-315°)	**21.0**	1.9	E
NEN (315-360°)	9.9	1.7	F

*Balance of time (3.2%) is missing from the record.

Based on the design of the replacement WWTP, odours that would be capable of being offensive at the boundary are not expected to be emitted under normal operations. Potentially higher odour emitting events will be limited to infrequent upset and abnormal operations (acute events) which are discussed in more details in the following section 'Intensity' and 'Duration'.

To support this, the odour survey carried out at the equivalent Meremere WWTP (Appendix B) identified wastewater odours at 45m from the WWTP relating to the inlet screening/WAS storage which is proposed to be fully mitigated via air extraction and treatment.

The expected absence of chronic odour and rare occurrence of acute odour generating events at the WWTP will limit the potential for offsite odour at Sensitive Receptors. Frequency of any odour events will be further limited by wind conditions towards high-risk sensitive locations (which may occur for a maximum of 21% of the time).

Intensity

The intensity of odour at a receptor depends on emission strength at the source and the separation distance between the source and receptor.

Odour associated with the operation of a WWTP can have a strong intensity. For the proposed WWTP under normal operations it is expected that odour would have no discernible intensity at the boundary based on the small scale of the plant and the extensive mitigation methods employed.

Abnormal acute discharges, if to occur, would be a cause of increased odour intensity, for example if wastewater were to turn anaerobic following WWTP failure. Abnormal discharges that result in unacceptable odours, are not expected to occur based on the mitigations in place as described in Section 4-1.

The proposed WWTP has the potential to create elevated intensity odours under abnormal conditions, however these are not expected to occur based on the proposed mitigations and management practices.

Duration

The duration that a receptor may be exposed to odour depends on the amount of time the wind blows in a specific direction, along with the duration that the odorous activity occurs. Wastewater treatment plants may have extended and more consistent elevated odour during plant failures and emergency situations. During these upset or unanticipated events, the increased odour may last for periods of hours to days. However, based on the mitigations employed including the provision for back-up emergency generation (refer Section 4.1) the duration of any upset or abnormal conditions will be very limited.

The duration of rare odour generating events during upset or abnormal conditions has the potential to last for periods of minutes to hours. Duration of the effects on nearby sensitive receptors will be further limited by the wind direction (refer Frequency).

Offensiveness

As described in Section 4, odour associated with the processing of wastewater has an elevated potential to be offensive at sensitive locations.

Location

Location is possibly the most important of the factors, due to the fact that even if odours are generated there is little potential for effect if there are no sensitive receptors located downwind of the source. There are a number of existing and proposed sensitive receptors located within close proximity (200 m) of the WWTP that may be affected by odours, if present.

The proposed WWTP has a short separation distance to existing and proposed sensitive residential locations located around the WWTP. Any odour generated from the WWTP has the potential to affect these receptors.

FIDOL Conclusion

Taking into account the Offensiveness and Location, Air Matters considers that odours from the WWTP have the potential to result in offensive or objectionable effects at sensitive locations A-G. This conclusion is based on the characteristics of WWTP odours and the small separation distance, in particular, to residential dwellings in a predominant down wind direction.

The frequency, intensity and duration of emitted odour is expected to be very low based on the design of the proposed WWTP and employed mitigation measures. Based on this, the odour experienced at any sensitive receptors is considered to be acceptable. This is supported by the odour survey undertaken at the Meremere WWTP.

6.3 Offsite wastewater disposal

6.3.1 *Treated wastewater removal*

Air Matters have considered the effects on odour from pumping treated wastewater into the tanker units and transporting offsite. The wastewater that requires transporting offsite (treated and Reverse Osmosis reject stream) will be highly treated (processed through secondary and tertiary treatment) and will therefore not have the potential to generate odour during the tanker unit filling.

6.3.2 *Untreated wastewater removal*

Under the tanker filling of untreated wastewater there is increased potential to cause odour effects on the surrounding allotments, which are located in close proximity. This is based on the frequency, duration and potential intensity of odour being generated. A moderate risk of odour may also exist from the storage of the untreated wastewater, dependant on a number of factors such as holding time.

To mitigate this risk to an acceptable level, best practice controls should be undertaken, including:

- The air that is displaced from the tankers during filling should be directed through an odour control system. This would require a detailed design specific to this application.
- The air in the head space of the screens, the screens building and the screened sewage tank are continuously abstracted and passed through an odour control unit for treatment prior before being discharged. This would also require a detailed design specific to this application.

Given the close proximity of the allotments to the filling location, and the need to conduct the detailed design, it is also recommended that targeted monitoring of the odour is carried out, post-commissioning, to demonstrate that effects are appropriately mitigated. This could be in the form of odour surveys or short-term gas monitoring.

6.3.3 *Heavy vehicle effects (non-odour related)*

The removal of both untreated and treated wastewater will require additional heavy vehicle movements from the proposed filling site on Russell Road. The number of truck movements is discussed in Section 2.2.2 and in summary, the treated wastewater would be more concentrated over the summer months at a peak of 14 movements per day and for untreated wastewater would occur year-round with peak vehicle movements of 18 per day.

Table 6-3 below outlines the non-odour related potential effects related to the additional truck movements.

Table 6-3: Assessment of potential non-odour related effects as a result of the additional offsite wastewater disposal

Potential effect	Assessment
Particulate emissions (dust) from vehicle movements	The entrance and exit off Russell Road and the turning circle will be fully sealed (refer Figure 2-1), avoiding the potential generation of dust for the proposed allotments adjacent to the filling station. Monitoring of soil tracking on these sealed surfaces should be

Potential effect	Assessment
	undertaken when transportation is underway. If excessive tracking is observed, then practical measures such as road sweeping or wheel washing should be employed. The unsealed section of Russell Road, extending from the Orewa Road intersection to the filling station entrance/exit, is approximately 500 m. There are a several existing and proposed dwellings within close proximity (<50 m) of this unsealed section. Permitted Activity Rule (A95) and Standard (E14.6.1.1) of the Auckland Unitary Plan specifically provides for the discharge of contaminants to air from unsealed roads, provided: 1. The discharge must not cause, or be likely to cause, adverse effects on human health, property or ecosystems beyond the boundary of the premises where the activity takes place. 2. The discharge must not cause noxious, dangerous, offensive or objectionable odour, dust, particulate, smoke or ash beyond the boundary of the premises where the activity takes place. 3. There must be no dangerous, offensive or objectionable visible emissions The Permitted Activity Standard notes when making a determination of adverse effects in relation to odour and dust, the FIDOL factors (frequency, intensity, duration, offensiveness and location) should be used. This has been undertaken below: The **frequency** and **duration** of dust exposure will be limited to three additional heavy vehicle movements per hour on average and the potential effects on any sensitive receptors will be further limited by the wind direction. Winds from the South, which would carry dust directly towards the proposed allotment and existing dwellings is limited to 9.1% of the time **Intensity** of any generated dust has the potential to be high. This is based on the unsealed nature of the road and entrainment of dust from heavy vehicles. This can be mitigated by practical steps such as lowering vehicle speeds, ensuring the gravel road surface is in good repair and water suppression. The source of dust is from an unsealed rural road and dust is currently being generated by existing traffic. Based on this, road dust is considered to have a low **offensiveness** for the existing rural dwellings. Any dust effecting the proposed allotments, which are of residential (urban) nature, is likely to be of a moderate offensiveness. In terms of **location,** the assessed receptors are residential dwellings which are classified as having a high sensitivity to dust effects[4]. A number of the dwellings are within 50 m of the road which could result in increased effects due to the short separation distance. In conclusion, the proposed activity has the potential to increase the frequency and intensity of dust experienced at the existing houses and proposed allotments adjoining Russell Road. Due to the potential elevated risk, specific controls for the unsealed section of Russell Road, over the duration of the activity have been recommended and include:

[4] Ministry for the Environment (2016). Good practice guide for assessing and managing dust.

Potential effect	Assessment
	• Limit of vehicle speeds (particularly the tanker units associated with the wastewater removal) to 20km per hour[5] while traversing on the unsealed section of Russell Road. • Undertake an inspection of the roadway and replenish the surface layer with gravel if a high proportion of fine (dust-generating) material is present. Given the treated wastewater removal is likely to occur over summer, this inspection should be undertaken in the late spring period and for the untreated wastewater disposal it should be undertaken periodically. • Monitoring the sealed entrance/exit and cul-de-sac for any soil tracking and mitigated (swept) if required. If in the event that the activity generates unacceptable levels of dust for the adjoining properties, active dust suppression through a watering cart and/or dust suppression could also be employed on a regular (daily) basis over the transport period.
Vehicle emissions	Emissions from traffic are not regulated under the Resource Management Act. However, based on the limited tanker unit movements (maximum of 3 vehicle movements per hour averaged over a day) there are not anticipated to be any objectionable or offensive effects from vehicle emissions at surrounding residential areas. Practical mitigations such as turning off the vehicle's engine while the filling process is occurring will eliminate potential effects on the proposed allotments. This is particularly relevant for the allotment located immediately adjacent to the filling location (i.e. Lot 203 in Figure 2-1)

6.4 Dust effects from bulk earth works

Consultation with the neighbours revealed concerns about dust that could be generated during construction of the development. Air Matters understand that the bulk earthworks will be managed using standard, best practice dust mitigations and recommend these best practice dust mitigations should be incorporated into the development's wider Construction Air Quality Management Plan (CAQMP) and include measures to be adopted to avoid, as far as practicable, offensive or objectionable dust, arising from construction activities beyond the boundary of the project site.

To achieve this, the CAQMP should address the following (as adopted from the Ministry for the Environment's Good Practice Guide for Assessing and Managing Dust (2016)):

a. *Description of the works, anticipated equipment/processes, and durations.*
b. *Periods of time when emissions of dust might arise from construction activities.*
c. *Identification of sensitive land uses likely to be adversely affected by emissions of dust from construction activities.*
d. *Methods for mitigating dust that may arise from the construction site, potentially including but not limited to:*
    - *Controlling vehicle speeds*

- *the use of vacuum sweeping (hard paved areas)*
- *water suppression*
- *restabilising ground cover on exposed earth by way of revegetation or geotechnical cloth (or similar) and*
- *wheel washes for vehicles at exit points.*

e. *Methods for undertaking and reporting on the results of daily inspections of construction activities that might give rise to dust.*

f. *Procedures for maintaining contact with stakeholders, notification of proposed construction activities and handling complaints about dust or other air quality matters.*

g. *Identification of contingency measures to address verified effects on neighbouring property in the event of a process malfunction or accidental dust discharge.*

h. *Contact numbers for key construction staff responsible for managing air quality during construction.*

Further information on appropriate mitigations for dust management from construction activities in the Auckland Region is provided in: Auckland Council (2016): Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.

The response above recommends matters that should be addressed in a Construction Air Quality Management Plan to control dust levels during the development's construction (including the WWTP construction). Specific measures (in particular c, d, f & g listed above) will ensure that neighbouring properties, sensitive to dust effects, are identified and appropriate controls put in place.

The submission raised potential impacts on rainwater collected from house roofing. Larger fractions of dust (referred to as deposited dust) are associated with deposition onto roofs with the potential to flush into rainwater tanks. The mitigations recommended above should ensure that deposited dust is keep to a practical minimum during construction.

7. Conclusion

The proposed WWTP is intended as a temporary solution to service up to 1,213 residential dwellings as part of the Delmore development. The WWTP is designed to receive municipal wastewater from the development and treat it to a high standard before onsite disposal.

The proposed WWTP is based on a 4-stage Bardenpho membrane biofilm reactor treatment principle and includes primary, secondary and tertiary treatment stages. Mitigations to minimise odour will include ensuring aerobic/anoxic conditions are maintained, process monitoring of key chemical/biological variables including oxygen levels, redundancy of key equipment on site, robust equipment maintenance and, extraction and treatment of potentially odorous air through the odour treatment system. Based on the employed mitigations the treatment plant is considered to meet the best practical option for eliminating and minimising odour.

A screening level assessment that considered the appropriate separation distances and the type of surrounding land use was undertaken. This assessment identified a range of sensitive receptors surrounding the WWTP that could be affected by odours if they cannot be effectively controlled at their source. The identified receptors are an existing residential dwelling to the south-west and the proposed Delmore residential development in all other directions representing up to 180 dwellings.

A detailed FIDOL assessment, in accordance with the MfE GPD-Odour (2016) was undertaken focusing on the sensitive receptors. In summary, it was identified that during times of odour generation these receptors could experience an elevated exposure to odour due to their position to the prevailing wind direction and small separation distance. However based on the modern plant design and odour mitigations employed, the generation of odour from the WWTP, beyond the site boundary, is not expected to occur. This was supported by the odour survey at the Meremere WWTP.

During abnormal or upset conditions WWTP's can generated elevated acute odour. The WWTP design will incorporate best practical options (BPO) for minimising the generation of acute high intensity odour events. A focus on meeting BPO should continue throughout the detailed WWTP design phases.

Based on this assessment and the provided design of the WWTP, the potential effects on amenity values on the surrounding land use are considered to be acceptable and remain less than minor for the duration of the consent. A set of proposed consent conditions have been included to ensure any effects can continue to be controlled to an acceptable level.

Removal of treated and untreated wastewater, using tanker trucks, may be required to service the proposed subdivision. Air Matters have assessed the potential air quality effects of these activities. In conclusion, there are not anticipated to be emissions of odour and dust that result in unacceptable effects on the surrounding area. This conclusion is based on a number of mitigations being in place to minimise the generation of dust and odour during the offsite removal.

8. References

Ministry for the Environment (2004): Good practice guide for atmospheric dispersion modelling. Wellington: Ministry for the Environment.

Ministry for the Environment. (2016): Good Practice Guide for Assessing and Managing Odour. Wellington: Ministry for the Environment.

Victoria Environmental Protection Agency (2024): 1518: Recommended Separation Distances for Industrial Residual Air Emissions – Guideline.

Appendix A Proposed Consent Conditions

Odour Management Plan

1. The consent holder must prepare and submit to Auckland Council a Final OMP for certification. The OMP must incorporate a series of monitoring, management and operational procedures, methodologies and contingency plans, and together shall accurately record all information required to comply with the conditions of this consent.

2. The OMP must be in general accordance with the Draft OMP provided under Condition XX and must include the following:

   (a) Identification of all point sources for discharges of contaminants into air, including a map and schematic diagram showing the location of each source;

   (b) Procedures to minimise discharges of contaminants into air (including odour), including details of the inspection, maintenance, monitoring and contingency procedures in place for the wastewater treatment plant and the trucking of untreated wastewater off-site;

   (c) The operating parameters of odour control equipment and the frequency and scope of the regular checks to be performed on emissions control equipment; including testing of the carbon bed saturation;

   (d) Procedures for the monitoring of odour, including details of inspection procedures, recording requirements and contingency measures;

   (e) The identification of staff responsibilities; and

   (f) The procedures for the receipt, recording and handling of air quality complaints received.

3. The OMP must be reviewed on an annual basis and any subsequent changes to the certified OMP must be submitted to the council for certification prior to implementation. The council will advise the Consent Holder in writing if any aspects of the OMP are considered to be inconsistent with achieving the provisions of this consent.

   Advice Note: The council acknowledges that the OMP is intended to provide flexibility both for the consent holder and the council for the management of the air discharges. Accordingly, the OMP will be reviewed over time. Any reviews should be in accordance with the stated objectives of the management plan and limited to the scope of this consent.

Construction Air Quality Management Plan

4. The consent holder must prepare and submit to Auckland Council a final Construction Air Quality Management Plan (CAQMP) for certification. The CAQMP should address the following (as adopted from the Ministry for the Environment's Good Practice Guide for Assessing and Managing Dust (2016)):

   a. Description of the works, anticipated equipment/processes, and durations.

   b. Periods of time when emissions of dust might arise from construction activities.

   c. Identification of sensitive land uses likely to be adversely affected by emissions of dust from construction activities.

   d. Methods for mitigating dust that may arise from the construction site, potentially including but not limited to:

   - *Controlling vehicle speeds*

- *the use of vacuum sweeping (hard paved areas)*
- *water suppression*
- *restabilising ground cover on exposed earth by way of revegetation or geotechnical cloth (or similar) and*
- *wheel washes for vehicles at exit points.*

e. Methods for undertaking and reporting on the results of daily inspections of construction activities that might give rise to dust.

f. Procedures for maintaining contact with stakeholders, notification of proposed construction activities and handling complaints about dust or other air quality matters.

g. Identification of contingency measures to address verified effects on neighbouring property in the event of a process malfunction or accidental dust discharge.

h. Contact numbers for key construction staff responsible for managing air quality during construction.

Air Discharges Limits

5. All processes associated with the management of wastewater must be operated, maintained, supervised, monitored and controlled in accordance with the OMP in accordance with Condition 1 - 2 to ensure that all emissions authorised by this consent are maintained at the minimum practicable level.

6. Discharges of contaminants into air from the site must not cause:

   (a) Odour that is noxious, dangerous, offensive or objectionable effect beyond the boundary of the Site, in the opinion of an enforcement officer.

   (b) Visible emissions (other than water vapour/steam or heat haze) that cause a dangerous, offensive or objectionable effect, in the opinion of an enforcement officer.

Advice Note: Air discharge limits

Condition 6 is to be assessed by suitably trained council enforcement officers in accordance with the procedures outlined in the Good Practice Guides for Odour (Ministry for the Environment, 2016), including consideration of the FIDOL factors (frequency, intensity, duration, offensiveness and location) for amenity effects (dust, odour and visible emissions).

Untreated Wastewater to be Taken Off-Site

7. The consent holder must design and construct an odour control system for air that is displaced from the tankers during filling. The odour control system must be designed so that the discharge will not cause odour that is noxious, dangerous, offensive or objectionable to any residential dwellings.

8. The consent holder must design and construct an odour control system for vented emissions from the holding tank. The odour control system must be designed so that the discharge will not cause odour that is noxious, dangerous, offensive or objectionable to any residential dwellings.

9. Within one month of the installation of the odour control systems, the Consent Holder must provide to the Council a report from an appropriately qualified person, which verifies that the design and installation of the odour control system has been undertaken in accordance with Conditions 7 and 8.

10. Measures (7) and (8) must be incorporated into the Odour Management Plan.

Wastewater Treatment Plant

11. Air discharges from solids screening and storage and sludge dewatering and storage must be extracted to an emission control system (including an activated carbon scrubber) and discharged from a stack at least 3m above ground level or the apex height of the nearest building within 20 metres, without obstruction of the vertical discharge of air.

12. Within one month of the WWTP commencing treatment, the Consent Holder must provide to the Council a report from a SQEP, which verifies that the design and installation of the WWTP and odour control system (including the odour extraction and treatment system) has been undertaken in accordance with Condition 11.

Monitoring and Reporting Conditions

13. Within 3 months of exercising this resource consent, The consent holder must:

    (a) Operate and maintain a weather station on the site to measure and record the air temperature, wind direction and wind velocity on a continuous basis (at no less than 10-minute intervals). The weather data must be retained for at least the duration of the resource consent.

    (b) Weather data of any period must be provided to Auckland Council within 5 days of a request.

    (c) The weather station must be located on the site in a location which, as far as is practicable, is unaffected by surrounding structures or vegetation or other features for the purpose of ensuring the most accurate measurements as practicable on the site.

    (d) The weather station must be installed and operated in accordance with AS/NZS 3580.14:2014 (Methods for sampling and analysis of ambient air - Meteorological monitoring for ambient air quality monitoring applications).

14. The Council must be notified as soon as practicable in the event of any significant discharge to air, which results or has the potential to result in a breach of air quality conditions or adverse effects on the environment. The following information must be supplied:

    (a) Details of the nature of the discharge including any wind conditions as recorded under condition 13 during the incident timeframe.

    (b) An explanation of the cause of the incident.

    (c) Details of remediation action taken.

    Advice Note: Significant discharges to be notified to council in accordance with this condition include abnormal discharges arising from unexpected failures of the WWTP (including emission control systems). An email to monitoring@aucklandcouncil.govt.nz should be sent detailing the nature of the issue and what contingency measures are to be implemented to minimise potential air quality effects.

15. All air quality complaints that are received must be recorded and if requested by Council, provided to Council within one working day of the complaint. The recorded complaint details must include:

    (a) The date, time, location and nature of the complaint.

    (b) The name, phone number and address of the complainant, unless the complainant elects not to supply these details.

(c) Weather conditions, including wind speed and direction, at time of the complaint.

(d) Any remedial actions undertaken.