Apex Water Limited

Unit B1
570 Mount Wellington Highway
Mount Wellington

Technical assessment of discharges to air from proposed wastewater treatment plant – Auckland Surf Park, Dairy Flat

Report 25387
Report date 18/02/2026

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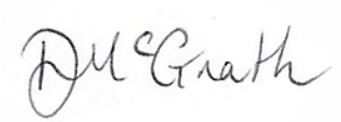

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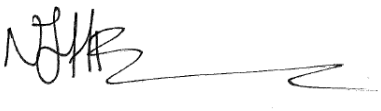

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Document History

No	Version	Amendments made	Issue Date
1	DRAFT	Internal Review	13.11.25
2	DRAFT	Sent to client	14.11.25
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Terms and Abbreviations

Terms & Abbreviations	Explanation
AAQG	Ambient Air Quality Guidelines (MfE)
AB-WWTP	Army Bay Wastewater Treatment Plant
AEE	Assessment of Environmental Effects
AML	Air Matters Ltd
AUP	Operative Auckland Unitary Plan
FIDOL	Frequency, Intensity, Duration, Offensiveness & Location A qualitative approach to evaluate the likelihood of odour giving rise to 'offensive or objectionable odour effects'
GPG	Good Practice Guide for Assessing Discharges to Air from Industry / for Atmospheric Dispersion Modelling
H_2S	Hydrogen Sulphide
IPS	Inlet Pump Station
MBR	Membrane Bioreactors
MfE	Ministry for the Environment (2016)
NESAQ	National Environmental Standards for Air Quality Regulations (2004)
NIWA	National Institute of Water and Atmospheric Research
NZTA	New Zealand Transport Agency (Waka Kotahi)
PM_{10}	Particulate matter with an aerodynamic diameter of ≤ 10µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of ≤ 2.5µm
RMA	Resource Management Act 1991
UV	Ultraviolet
VOC	Volatile Organic Compounds
WAS	Waste Activated Sludge
WWTP	Wastewater Treatment Plant

1. Introduction

1.1 Statement of Qualifications and Experience

Nigel Goodhue

I am a Principal Air Quality Consultant at Air Matters Limited (AML). AML is a consultancy specialising in assessing the effects of activities on air quality for the protection of human health and the environment. I have been employed at AML since June 2022.

My highest qualification is a Master of Science Degree with First Class Honours from the University of Waikato which I gained in 2007. I am a member of the Clean Air Society of Australia and New Zealand (CASANZ).

I have over 10 years direct experience in assessing, managing & consenting air quality. During my employment at AML my experience has included reporting of air quality assessments for a wide range of industrial processes including the effects of odour from municipal wastewater treatment plants.

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Dearbhla McGrath

I have been employed as an air quality consultant at AML since April 2024. I hold a Master of Science Degree with Distinction in Environmental Engineering from Queen's University Belfast, completed in 2021.

I have four years' experience working in the air quality sector, with a focus on air quality and odour assessments that help with consent applications and ongoing compliance. My experience includes odour dispersion modelling (including CALPUFF and AERMOD), FIDOL assessments, odour surveys and the preparation of technical reports for resource consent applications including Assessments of Environmental Effects (AEE). I have supported multiple projects associated with wastewater related odour including package wastewater treatment plants that operate within community settings.

I have completed a series of CASANZ professional development courses, most recently "Understanding and Managing Air Quality", and I regularly attend CASANZ presentations and technical sessions to maintain current knowledge of relevant guidance and good practice.

1.2 Overview of the proposed development

Apex Water Ltd have engaged Air Matters Ltd (AML) to undertake a technical assessment of discharges to air from a proposed Wastewater Treatment Plant (WWTP). AML understands that Apex Water is currently engaged to design a new privately owned WWTP in Dairy Flat, Auckland to serve the proposed Auckland Surf Park Community (ASPC).

In terms of background, resource consent for Stage 1 of the Auckland Surf Park Community (ASPC) was approved under the COVID-19 Fast-track Consenting Act 2020 on 25 June 2024. The consented development is shown below in Figure 2 and comprises of:

- Earthworks and vegetation removal and subsequent extensive re-landscaping of the site focused around the stream (Stream Park);
- The construction and operation of a surf park which included a surfing lagoon, restaurant(s), market space and 70 visitor accommodation units consisting of a lodge and eco-cabins;
- A solar farm;
- A standard data centre;
- Roading including the collector anticipated by the structure plan; and
- Three waters infrastructure. In particular this included the provision of a wastewater disposal field.

The Stage 2 proposal is for the expansion of the ASPC to include a hyperscale artificial intelligence data centre campus, three residential neighbourhoods, a village centre, work-live precinct, industrial precinct, subdivision and ancillary activities including a WWTP.

The Stage 2 proposal also involves variations to the development consented under Stage 1. These changes are described within the Assessment of Environmental Effects prepared by Barker and Associates.

The WWTP will follow a Membrane Aerated Biofilm Reactor (MABR) process (further detail in Section 3).

The assessment will focus on the normal ongoing operation of the proposed WWTP and does not include an assessment of effects during construction or initial WWTP commissioning.

2. Site location and environmental setting

2.1 Site Location

The ASPC will occupy approximately 54 hectares of land between Postman Road to the east and Dairy Flat Highway to the west in the suburb of Dairy Flat. This is approximately 28 km north of central Auckland, 5 km southwest of Silverdale and 10 km northwest of Albany. An outline of the proposed project can be seen below in Figure 2-1 (red outline). At present, the proposed WWTP is to be located to the south of the surf park (blue area).

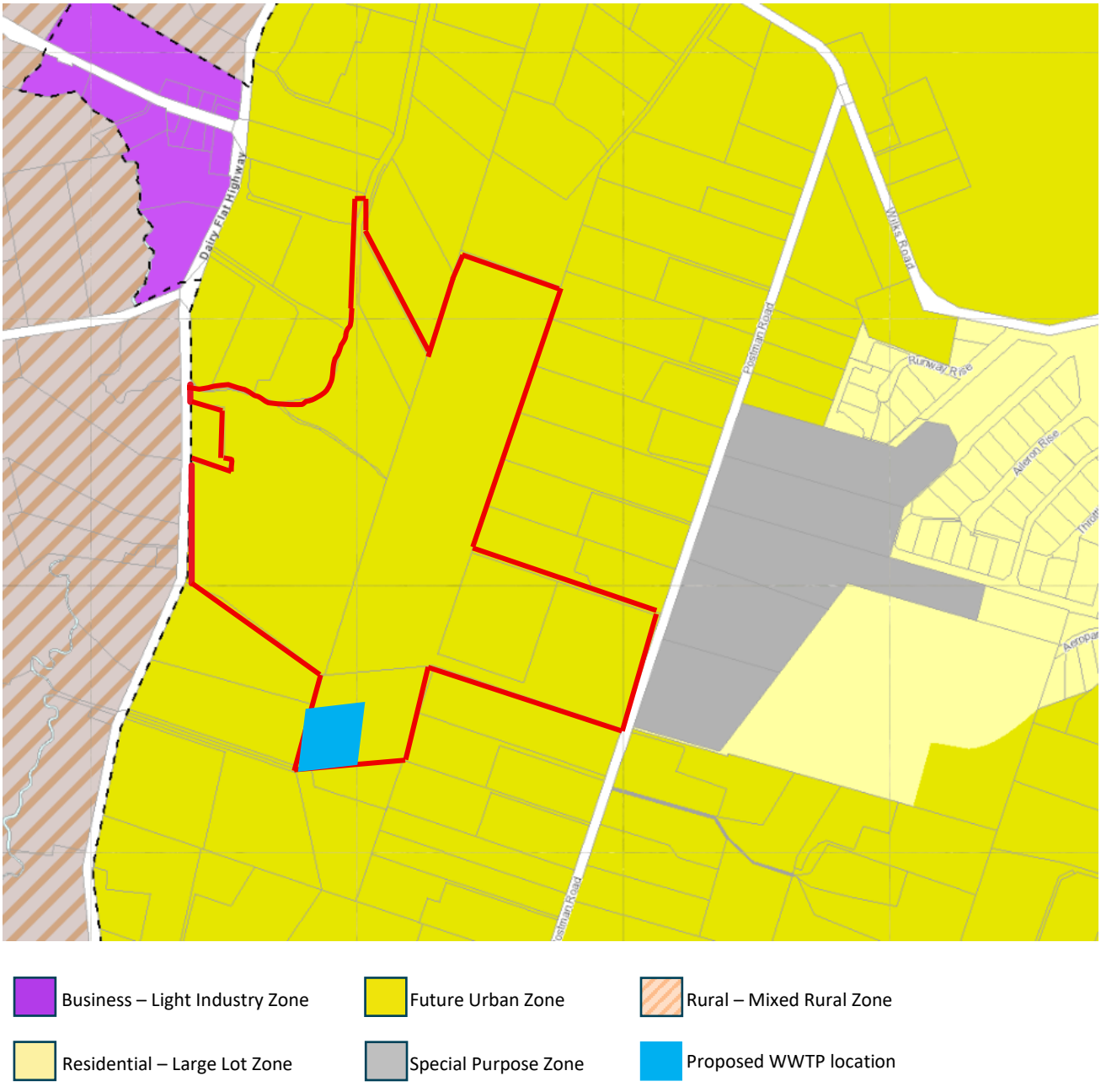

Figure 2-1: Unitary Plan Zones of the site and surrounding areas (Source: Auckland Council GeoMaps 2016)

The ASPC is located in the Future Urban Zone under the Auckland Unitary Plan (Operative in Part) (AUP(OP)) and is part of the Silverdale West Dairy Flat Industrial Area Structure Plan area. The land is currently used for pastoral and agricultural purposes. Existing farm access tracks, a dwelling, and several farm sheds are situated along the western boundary of the site and vehicle access is currently provided from Dairy Flat Highway[1]. The Business Light Industry Zone to the northwest includes panel beating, scaffolding, garden and trucking services. The Special Purpose Zone to the east of the site comprises the North Shore airport and runways.

2.2 Environmental Setting

2.2.1 *Topography*

As seen in Figure 2-3, the topography of the site area is generally gently sloping. Elevations to the west of the site reach 135m beyond Redvale Landfill before flattening out (approximately 58m). Approximately 2.3km east of the site sees a gentle incline to 113m on East Coast Road. inclining gently from the site towards East Coast Road where elevations reach 113m.

2.2.2 *Meteorology*

Auckland has a subtropical climate. Spring tends to be the windiest season across the region, with strong gusts especially common in exposed coastal locations. In contrast, summer and autumn typically see the highest number of light wind days. During the cooler spring and winter months, south-westerly winds are most prevalent, while northeasterly winds are more frequent in summer[2].

Air quality effects and local meteorology are discussed further in Section 6.

[1] McKenzie & Co. (2021) Wastewater Servicing Report. Auckland Surf Park. AW Holdings 2021 Limited Revision D.
[2] NIWA – The Climate and Weather of Auckland (2013)

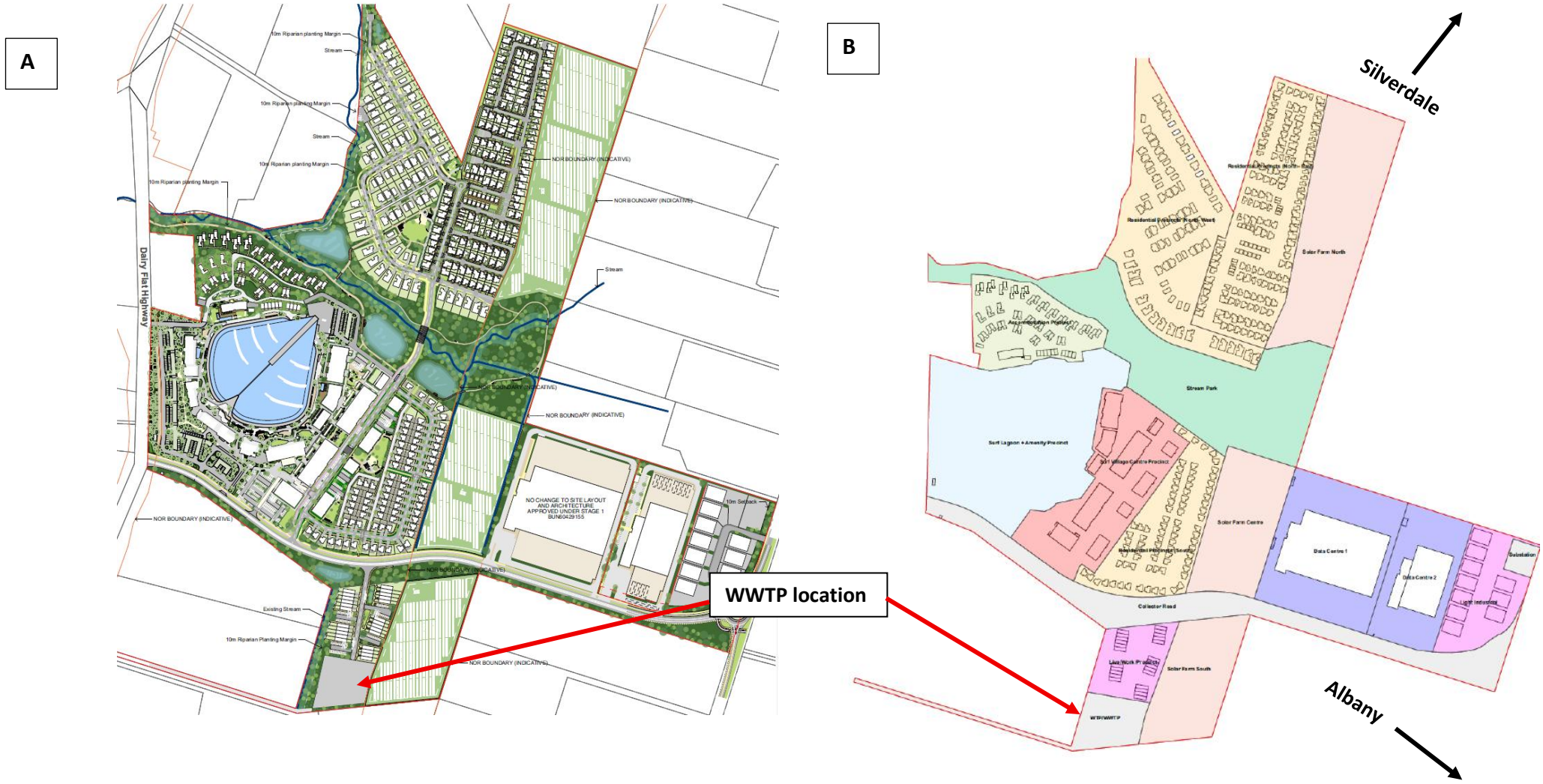

Figure 2-2: Proposed layouts of the Surf Park and location of the WWTP (A) Illustrative masterplan (B) Precinct areas (source: Studio Pacific 2025)

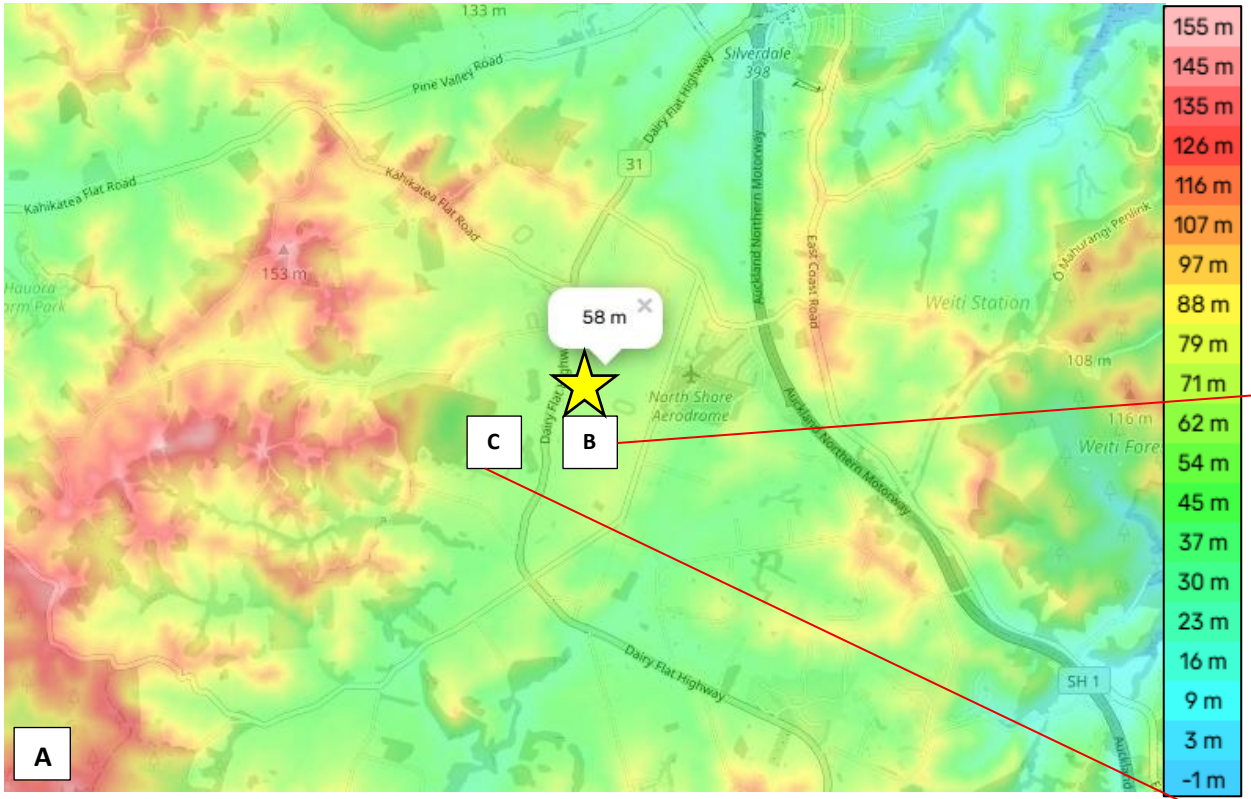

Figure 2-3: (A) Topographic of the wider site area (location marker representing site elevation and star representing approximate site area). (B) Looking towards site, east of Dairy Flat Highway (C) Surrounding land, west of Dairy Flat Highway

3. Proposed WWTP design

3.1 Requirement for an onsite wastewater treatment plant

Wastewater from the wider Hibiscus coast area is currently directed to the Army Bay Waste Water Treatment Plant (AB-WWTP). Watercare, the owner and operator of the AB-WWTP, have advised developers that the AB-WWTP is nearing capacity and that new connections into the system after November 2024 will not be accepted until planned upgrades are completed by 2031. Watercare also does not have the wastewater pipework infrastructure installed in the immediate area, although this is also planned for the future to coincide with the AB-WWTP upgrades.

The ASPC includes that installation and operation of a WWTP to take and treat wastewater from the community. The infrastructure shall be sized to handle, treat and discharge a peak flow of 671 m^3/day.

3.2 Wastewater treatment plant design

APEX's proposed WWTP will treat effluent to a high tertiary standard before discharging it to a range of locations including to land via drip irrigation of an unnamed tributary of the Rangitopuni Stream via land contact. A future wastewater pumping station will also be installed for servicing the development site's wastewater disposal needs once it can link up to the planned future expansion of the Watercare network in the area.

The final design of the WWTP will incorporate treatment processes as generally grouped as the following:

- One million litre sewage receival and balancing tank
- 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 and membrane filtration using a 4-stage Bardenpho process and membrane aerated biofilm reactor;
- 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 secondary treatment process.

As demonstrated in Figure 3-1 (A & B), raw wastewater enters the WWTP via a low pressure sewer network before being transferred to sewage screening. Screened wastewater is then treated through an activated sludge treatment process, including aeration and anoxic stages to remove nutrients. The treated water is then pumped through membranes which separate 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 to continuously reseed the biology at the start of the treatment process. Waste sludge (WAS) 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 treatment plant before being discharged.

The proposed method of discharge is via irrigation to land and discharge to the unnamed tributary of the Rangitopuni Stream (via land contact). The recommended separation distance between treated effluent discharged by trickle feed and sensitive receptors is 50m (based on EPA 'disposal areas for secondary treated effluent by flood irrigation'). At this point the water will have undergone a high level of treatment prior to discharge, no odour is expected to be generated by the treated wastewater.

The site will also include a range of chemicals that are used in the WWTP including acidic acid which can generate odour emission.

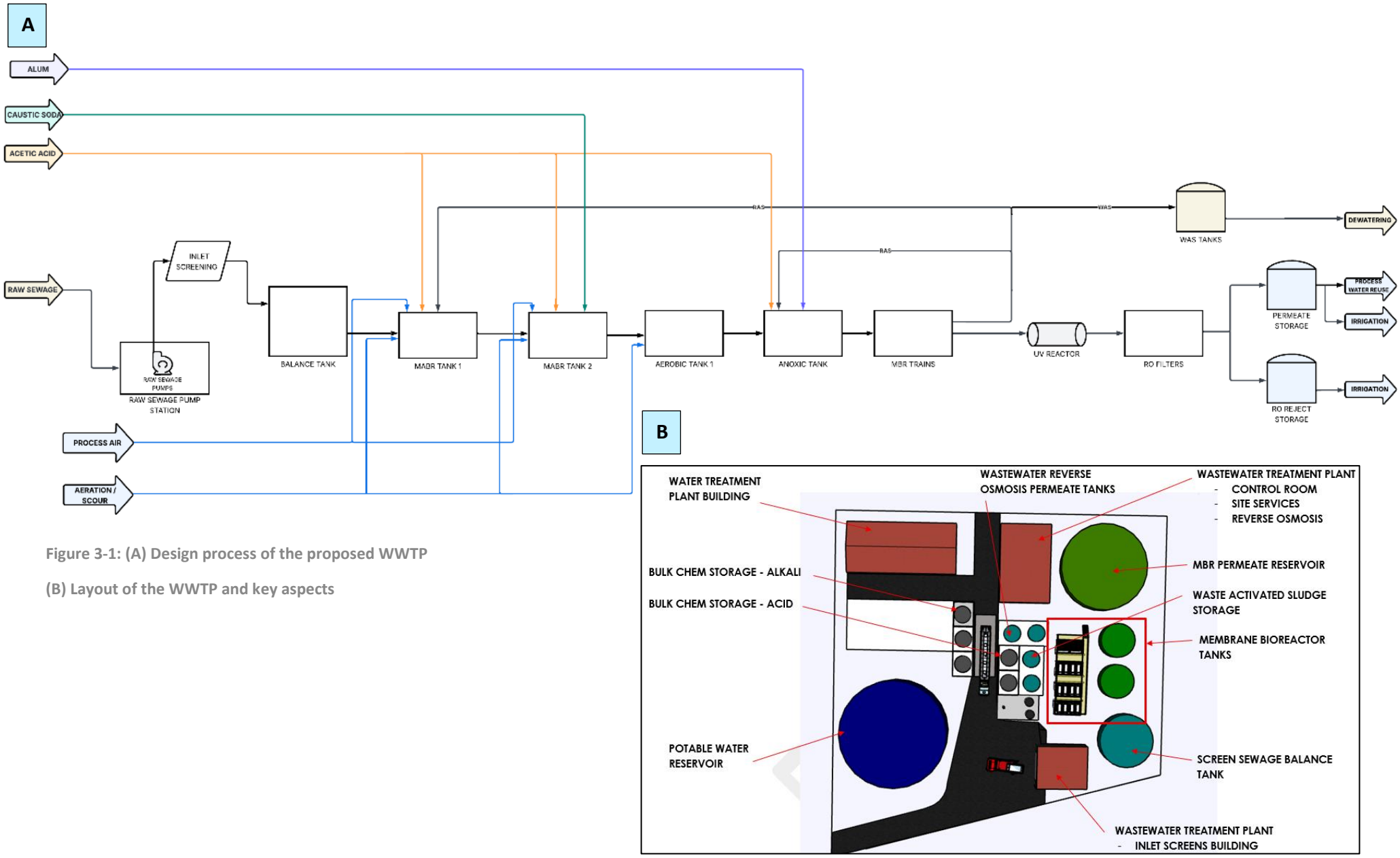

Figure 3-1: (A) Design process of the proposed WWTP

(B) Layout of the WWTP and key aspects

4. Consent requirements

4.1 Resource Management Act (RMA) 1991

Section 15 (1)(c) of the RMA 1991 states that:

''No person may discharge any—

(c) Contaminant from any industrial or trade premises into air; or unless the discharge is expressly allowed by a national environmental standard or other regulations, a rule in a regional plan as well as a rule in a proposed regional plan for the same region (if there is one), or a resource consent.''

4.2 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 waste water from a new subdivision. As such the emissions to air, including odour, is a **Discretionary** activity.

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 (includes 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 A48 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.

4.3 National Environmental Standards

4.3.1 *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.

4.4 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) in order 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.

5. Discharges to air

5.1 Introduction

The primary discharge to air from the wastewater treatment 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 7-1

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 is unlikely to be significantly different from that generated during the wider ASPC development. Furthermore, standard dust mitigations in place during the construction should limit the potential effects. As such, dust generation from the construction or on-going operation the WWTP have not been considered in this assessment.

5.2 Odour generation and mitigation

There are a number of potential odour-generating sources from the WWTP that are summarised in Table 5-1 below along with a description of the proposed mitigation methods.

Table 5-1: Odour generating potential and mitigations for the proposed WWTP

Process	Odour potential	Controls
Raw sewage wet well (balancing tank) and 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, solids storage and balancing tank is to be extracted to an odour control unit (refer Section 3-2) 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.
Secondary treatment (Anoxic 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 real-time Oxidation Reduction Potential monitoring.
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 (Secondary Anoxic tanks)	These tanks receive water from the aerated tanks and provide further nitrite removal. Influent not likely to be odorous.	• Same control as the anoxic balance tanks;
Secondary treatment (Membrane Filtration 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 (WAS) dewatering and storage	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.	• Dewatering process and storage area will be enclosed with the air extracted and treated (refer Section 3-2).

Process	Odour potential	Controls
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	Odour potential is expected to be negligible, as the wastewater contains extremely low organic content (effectively highly treated at this stage)	• N/A
Land disposal fields	The wastewater will have low odour potential (i.e. positive dissolved oxygen concentrations and low organic content) and be distributed into the ground quickly via irrigation to land	• Management of effluent prior to discharge.
Emergency storage tanks	The treatment process shall contain a number of balancing tanks which can operate as emergency storage in the event of process failure. The inlet balance tank (600 m^3) and the permeate tank (1200 m^3) can allow for the accumulation of waste and treated wastewater prior to discharge.	• N/A

5.3 Mitigations

Mitigations employed to minimise the release of odour at the proposed WWTP are described in Table 5-1 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; robust equipment maintenance and, extraction and treatment of potentially odorous air through the odour treatment system, capacity of onsite flow buffering or emergency wastewater storage and treatment of this air.

5.3.1 *Odour extraction*

The active air extraction system is a critical component of the odour management process. It will draw odour-laden air from the processes with the highest potential to generate odour including buffering tank, raw influent screening, solids storage and the sludge dewatering and solids storage. 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.

5.3.2 *Carbon absorption beds*

Treatment/removal of odour is to be provided through extraction of air from the potential odour-generating areas 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.

5.3.3 *Acetic Acid tank*

The findings from the Meremere site odour survey (Appendix A) highlighted that the Acetic Acid tank was a consistent source of low intensity odour at a distance of up to 45 m. For this WWTP Apex Water is proposing to direct the tank overflow through a lute pot (a water seal) and place a carbon filter on the vent to remove any odours.

6. Air quality effects on the existing environment

As in all areas of New Zealand the specific prevailing and strong wind direction in any locality is determined largely by local terrain. As noted in Section 2, the terrain of the site and surrounding areas is generally flat with gentle inclines east and west of the site.

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.

For this assessment, Air Matters obtained computer simulated data from MetService for the site in Dairy Flat (latitude 36.65669, longitude 174.64411). This data covered a three-year period (2022 – 2024). The MetService model combines historical observations into global estimates. Air Matters reviewed this data and deemed it appropriate for use in this assessment.

Figure 6-1(A) below displays a wind rose of this data, which demonstrates the following characteristics:

- The most predominant winds from the southwest 32.2% of the time
- The next most predominant of all winds are from the west (9.3 %) followed by the northeast (7.9%).
- The strongest winds occur from the west-southwest and east-northeast (9+ m/s).
- Calm winds (<0.5 m/s) were reported < 0.5% of the time.
- These predominant wind directions are consistent with previous wind patterns reported for Northern regions of Auckland (NIWA, 2010).

To confirm the suitability of the computer simulated data, they were compared to observed data from a meteorological station located on the Whangaparāoa peninsula (latitude -36.6026842, longitude 174.834581625), approximately 18km northeast of the site. This dataset was also provided by MetService and covers two full years (2023-2024) and is displayed in Figure 6-1 (B).

Calms are typically under-represented in modelled meteorology because numerical models generally avoid assigning true zero-wind conditions unless supported by observations. In this case the low number of calm periods in the computer simulated dataset may have been influenced by the Whangaparāoa observed winds.

The similarity in dominant wind directions and speed distributions indicates that the modelled dataset is suitably representative for use in this assessment. Note the stronger wind speeds in the Whangaparāoa observations is also reflective of the exposed coastal location of the meteorological station positioned on the peninsula.

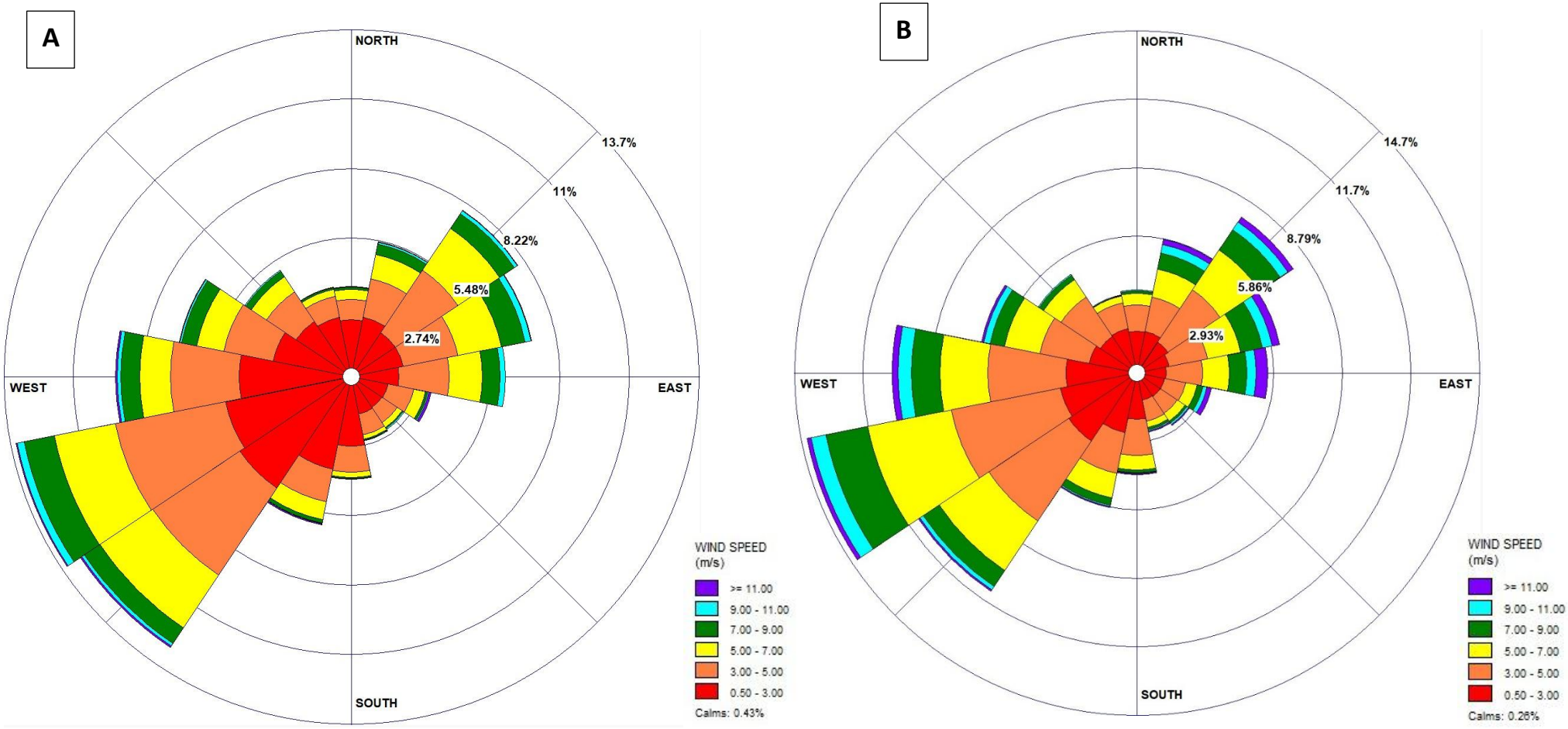

Figure 6-1: (A) Wind rose for the site area in Dairy Flat using computer simulated data (2022 – 2024) and (B) Wind rose for Whangaparāoa peninsula using measured data (2023 – 2024)

6.1 Background Air Quality

To understand the existing air quality in the area surrounding the 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. As noted in Section 2.1, light industry businesses such as panel beaters and scaffolders are located 500m northwest of the site and the Dairy Flat Bakery is located more than 700m north of the proposed WWTP. Given the separation distances, emissions from these sites are unlikely to impact on the same areas as the proposed WWTP.

Construction of the initial development of the ASPC is currently underway and includes large scale civil works. These activities are likely to generate elevated levels of dust emissions, but limited potential for odour.

Immediate surrounding land use to the north, south and west of the development is rural. The Special Purpose Zone (Airports and Airfields Zone) to the east of the site comprises the North Shore airport and runways.

Typical rural odours are likely common but intermittent including stock, silage, burn-offs and fertiliser 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.

In summary the area surrounding the site is expected to have good air quality, characterised by rural odours and possibly occasional dust from construction of the residual development at time. Given the Future Urban zoning of the surrounding land, it is likely that odour associated with rural activities will decrease as more residential development occurs.

6.2 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. When assessing air discharges, 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, 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 6-2 and Table 6-1 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 zoned areas) within close proximity of the WWTP. Receptors R1-25 are located outside of the proposed project boundary while Receptors A to G represent precincts/neighbourhoods within the proposed development, where activities sensitive to odour are likely be undertaken. Further details on these receptors within the development are as follows:

- Precinct A – **Live/Work Precinct** – residential dwellings
- Precinct B - **Residential Precinct South** - residential dwellings
- Precinct C – **Surf Village Centre Precinct** – apartments and childcare
- Precinct D – **Surf Lagoon and Amenity** - apartments, food and drink, hotel
- Precinct E - **Accommodation Precinct** - clubhouse and accommodation
- Precinct F - **Residential Precinct North West** - residential dwellings
- Precinct G - **Residential Precinct North East** - residential dwellings

Existing residential dwellings located within the development site (105 and 89 Lascelles Drive and 1350 Dairy Flat Highway) have not been considered in this assessment to form part of the existing environment as they are to be removed. In regard to the specified separation distance this has been taken from a central location within the WWTP site which is intended to represents the potential odour generation areas (as referenced as 'Centre Point' in Figure 6-2).

Table 6-1: Identified sensitive receptors and approximate distances from proposed WWTP (R1-R25: locations that are outside of the development boundary. A-G: locations within the proposed development boundary)

Receptor ID	Address	Description	Approximate distance* and direction from proposed WWTP (m)
R1	98A Wilks Road	Residential Dwelling	1075m, NE
R2	327 Postman Road	Residential Dwelling	1080m, NE
R3	315 Postman Road	Residential Dwelling	1030m, NE
R4	313 Postman Road	Residential Dwelling	950m, NE
R5	295 Postman Road	Residential Dwelling	820m, NE
R6	293 Postman Road	Residential Dwelling	890m, NE
R7	275 Postman Road	Residential Dwelling	770m, NE
R8	273 Postman Road	Residential Dwelling	730m, E
R9	231 Postman Road	Residential Dwelling	425m, E
R10	207 Postman Road	Residential Dwelling	255m, E
R11	195 Postman Road	Residential Dwelling	285m, SE
R12	**1318 Dairy Flat Highway**	**Residential Dwelling**	**75m, SE**
R13	**1314 Dairy Flat Highway**	**Residential Dwelling**	**95m, SE**
R14	1326 Dairy Flat Highway	Residential Dwelling	230m, W
R15	1338 Dairy Flat Highway	Residential Dwelling	365m, NW
R16	1327 Dairy Flat Highway	Residential Dwelling	510m, NW
R17	1349 Dairy Flat Highway	Residential Dwelling	490m, NW
R18	1355 Dairy Flat Highway	Residential Dwelling	540m, NW
R19	1361 Dairy Flat Highway	Residential Dwelling	575m, NW
R20	1373 Dairy Flat Highway	Residential Dwelling	685m, NW
R21	1368 Dairy Flat Highway	Residential Dwelling	630m, NW
R22	1397 Dairy Flat Highway	Residential Dwelling	920m, NW
R23	Dairy Flat Highway	Residential Dwelling	890m, NW
R24	1414 Dairy Flat Highway	Residential Dwelling	845m, NW
R25	Dairy Flat Highway	Residential Dwelling	735m, N
A	**Proposed neighbourhood**	**Live/Work Precinct**	**40m, N**
B	Proposed neighbourhood	Residential Precinct South	195m, N
C	Proposed neighbourhood	Surf Village Centre Precinct	235m, NW
D	Proposed neighbourhood	Surf Lagoon and Amenity Precinct	340m, NW
E	Proposed neighbourhood	Accommodation Precinct	580m, NW

Receptor ID	Address	Description	Approximate distance* and direction from proposed WWTP (m)
F	Proposed neighbourhood	Residential Precinct North West	600m, N
G	Proposed neighbourhood	Residential Precinct North East	625m, N

Bold = ≤ 200 m (relevance is discussed in Section 7)

**Note: All distances are measured from the 'yellow star' centre point of the WWTP area (seen in Figure 6-2 below) to the closest boundary of the precinct/receptor point.*

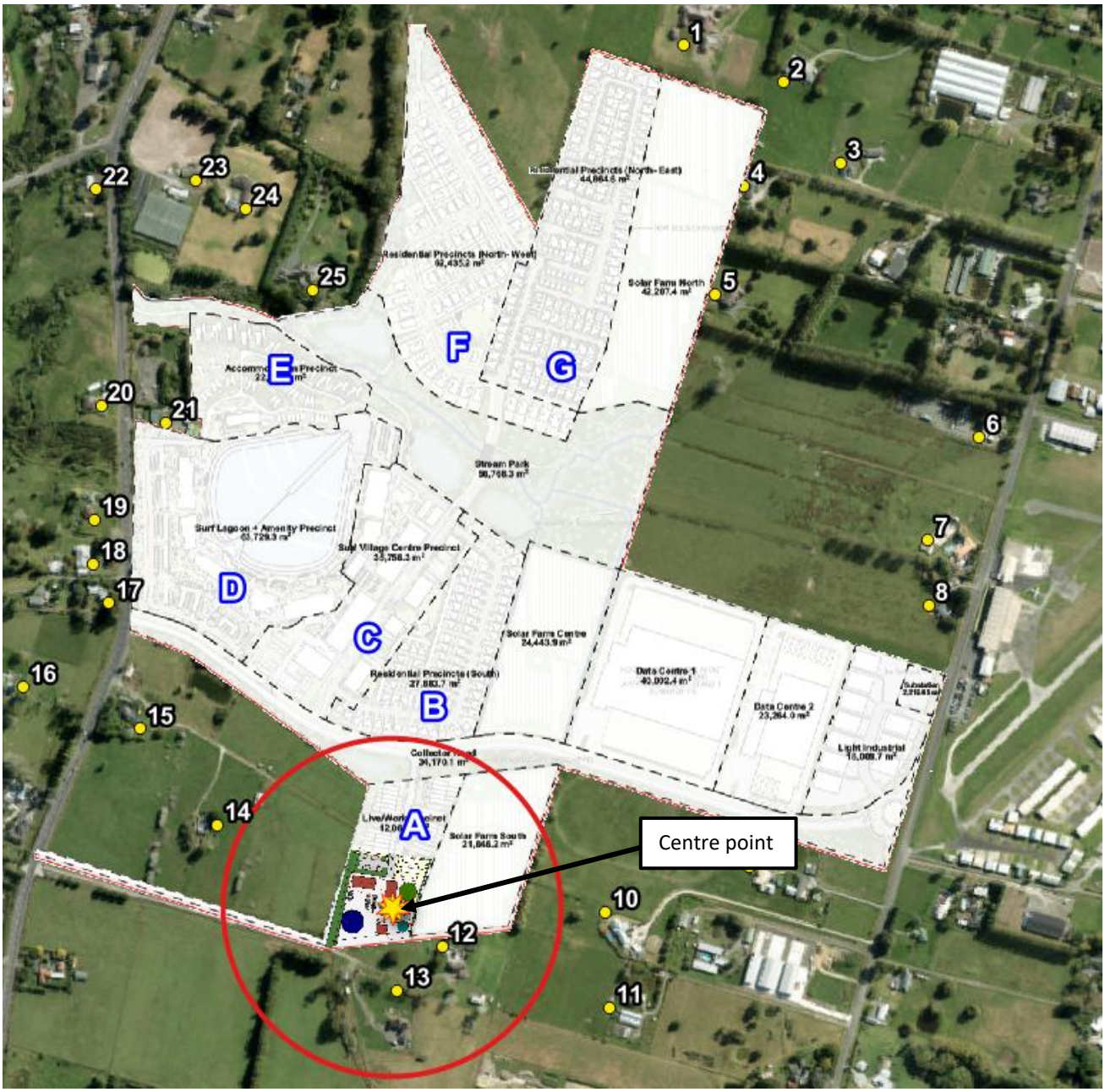

Figure 6-2: Sensitive receptor, precinct and WWTP locations

As noted in Table 6.1, there are 25 sensitive receptor locations outside of the development boundary, numbered 1-25 in Figure 6-2 above. The proposed precinct areas listed in Section 6.2 are labelled A-G and the location of the WWTP is outlined in black and white hatched lines.

A 200m buffer for the proposed WWTP has been adopted for this site (discussed further in section 7.2.1 below). The central location of the 200m buffer was taken from an area within the main odour generating process (yellow star in the Figure above).

7. Assessment of effects

7.1 Potential effects of odour

Odour is perceived 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).

7.2 Screening level Assessment

7.2.1 *Separation distance*

The initial screening assessment is based on the separation distance between sensitive receptors and the proposed 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 (2024) guidelines, a separation distance of 135 m from the WWTP to sensitive receptors would be applicable in this instance based on a mechanical/biological wastewater plant serving a population of 2,000 residents[3]. To provide a buffer for the proposed WWTP, a screening level separation distance of 200m 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 (2024) and is appropriate for this assessment where some properties are on rural / lifestyle blocks. The centre point of the proposed WWTP site has been used to define the onsite location which is reflective of the potential odour generating sources (refer to Figure 6-2).

Taking into account the location of sensitive receptors as described in Table 6-1, two existing receptor dwellings (R12 and R13) and one proposed precinct (A) are within 200m of the proposed WWTP. These locations are shown in bold in Table 6-1 and described below:

- **R12 and R13** represent individual existing dwellings to the southeast outside the proposed ASPC boundary. Separation distances are 75 m (R12) and 95m (R13) from the main odour generating area of the WWTP area.
- **Precinct A** as noted in Section 6.2, represent a number of proposed units/dwellings as part of the ASPC, all located northward of the proposed WWTP. Based on the design, there is expected to be up to 25 'Live/Work units represented by Precinct A within 200m.

7.2.2 *Comparable WWTPs*

Apex Water have designed and commissioned multiple WWTP of similar design and capacity as that proposed for the ASPC Air Matters visited one of these WWTP (commissioned in 2022) located in Meremere that receives and treats municipal wastewater from the township of Meremere. Air Matters undertook an odour survey at the Meremere WWTP on 16 January 2025 with the aim of the survey 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 A) concluded that odour associated with the inlet screening/WAS and acidic 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).

Based on this survey result, it is recommended for the proposed WWTP:

- Use active capture and treatment of air to minimise the release of odour from the balance tank, inlet screening/storage and WAS dewatering/solids storage. (as is currently proposed - refer Section 3.2)
- Store acetic acid to minimise the generation of odour (as is currently proposed - refer Section 5.3.3);

[3] Based on 366 residential and 138 units of accommodation (Auckland Surf Park Stage 2 Masterplan Pack, 2025) with an average occupancy of three persons, the population of the site would be ~1500. This figure has been rounded to 2000 to account for higher occupancies, commercial areas and casual visitors to the surf park who will utilise the facilities.

7.3 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 MfE GPG-Odour (2016) and in summary are:

Table 3 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 discussed in Section 7.3.1 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.

7.3.1 *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 potential underestimate of calmer periods in computer-simulated data, Air Matters considers an increased threshold (3 m/s) is more appropriate for this assessment to define 'low wind speeds'.

The higher risk sensitive receptors are located to the southeast (R12 & R13), and north (A) of the proposed WWTP. Winds from these directions therefore have the potential to result in odorous emissions from the proposed WWTP being dispersed onto these locations. Based on analysis of wind data from the site area, these directions are defined in Table 7-1 with the key points being:

- The maximum percentage of time wind could carry odour from the WWTP towards an individual dwelling outside of the development boundary is 5.0% (all wind conditions) and 2.6% (low wind speeds).
- The maximum percentage of time wind could carry odour from the WWTP towards an individual dwelling within the development boundary is 12.6% (all wind conditions) and 8.0% (low wind speeds).

R12 and R13 represent existing individual dwellings whereas A represents a number of proposed units/dwellings (refer Figure 6-2) and therefore these percentages are based on the maximum frequency that any individual units/dwelling may experience an odour and not the cumulative[4] effects at Location A.

It is possible that odour generated from the proposed WWTP may be detectable to receptor locations within 50m when wind speeds are above the 'low wind speed' threshold.

Table 7-1: Wind direction frequency analysis

Direction (wind blowing from)	% of time (all wind speeds)	% of time (low wind speeds)	Sensitive Receptors within 200m of this direction*
N	3.5%	2.2%	0
NNE	5.4%	2.4%	0
NE	7.9%	2.1%	0
ENE	7.2%	2.1%	0
E	6.1%	1.9%	0
ESE	3.2%	1.5%	0
SE	2.5%	1.5%	0
SSE	2.6%	1.5%	**A**
S	4.1%	2.8%	**A**
SSW	5.9%	3.7%	**A**
SW	12.8%	**5.3%**	0
WSW	**13.4%**	5.1%	0
W	9.3%	4.4%	0
WNW	6.9%	3.1%	0
NW	5.0%	2.6%	**R12 and R13**
NNW	3.6%	2.4%	0

Based on the design of the 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 A) only identified wastewater odours out to 45m from the WWTP relating to the inlet screening/WAS storage which is proposed to be fully mitigated via air extraction and treatment at the ASPC.

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. The frequency of odour events, will be further limited by wind conditions towards high-risk sensitive locations (which occur for a maximum of 5.0% of the time).

[4] When taking into account all wind directions that may blow towards any receptor at location A or B the cumulative percentage increases to 27.9% (all wind speeds) and 14.8% (low wind speeds).

7.3.2 *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 deployed.

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 Table 5-1.

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

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

7.3.3 *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. Duration of wind is covered above and, in summary, acute or chronic odour from the WWTP activities could affect high risk sensitive receptors for up to 5.3% of the time.

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 the duration of any upset or abnormal conditions will be very low.

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.

7.3.4 *Offensiveness*

As described in Section 5.1, odour associated with the processing of wastewater has an elevated potential to be offensive at sensitive locations.

7.3.5 *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 close proximity of the WWTP.

The proposed WWTP has a short separation distance (<200 m) to sensitive residential locations to the north (A) and south-east (R12 and R13). There are receptors located within close proximity of the WWTP that are at risk of being adversely affected by odours if present, in particular Location A (proposed Live/Work Precinct) with some dwellings located within 50m of the WWTP's potential odour generating sources.

The location in relation to sensitive receptors to all other directions is suitable.

7.3.6 *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 (proposed Live/Work Precinct consisting of up to 25 dwellings) and R12 and R13 (existing single dwellings). This conclusion is based on the characteristics of WWTP odours and the small separation distance to residential dwellings.

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.

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.

8. Conclusion

The proposed WWTP is designed to service the ASPC, providing treatment for all facilities from the commencement of operations. The WWTP is designed to extract raw effluent from an existing sewer line and treat it to a high standard before discharging it into disposal fields north of the site.

The proposed WWTP is based on a 4-stage Bardenpho membrane aerated 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 two sensitive receptors to the south and north of the WWTP that could be affected by odours if they cannot be effectively controlled at their source. The identified receptors are existing individual residential dwellings and the proposed residential development representing up to 25 accommodation units.

A detailed FIDOL assessment, in accordance with the MfE GPG-Odour 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 is supported, subject to the proposed mitigations, by odour survey of the Meremere WWTP.

There are a limited number of receptors within 50m of the odour generating areas of the WWTP (approximately 5 individual units in Location A). Detection of odour at these locations may occur even during minor odour release from the operations, as such to ensure the effects remain acceptable, it is imperative that the sites odour control systems are maintained to the highest practical standard.

During abnormal or upset conditions WWTP's can generate elevated chronic odour. Based on the design of plant including the employed redundancies these chronic higher-intensity odours are not expected to occur.

Based on this assessment and the 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.

9. References

Auckland Unitary Plan Operative in part (15 November 2016): Update 11th July 2025, Planning Maps Viewer.

Ministry for Environment (2023): National Direction for Greenhouse Gas Emissions from Industrial Process Heat: Evaluation report under section 32 of the Resource Management Act 1991

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

Ministry for the Environment (2011): Users' Guide to the revised National Environmental Standards for Air Quality. Wellington: Ministry for the Environment.

Ministry for the Environment (2016): Good Practice Guide for Assessing Discharges to Air from Industry. Wellington: Ministry for the Environment.

The National Institute of Water and Atmospheric Research (NIWA) (2013): The Climate and Weather of Auckland

AW Holdings Ltd (2021) Wastewater Servicing Report

AW Holdings Ltd (2022) Auckland Surf Park Community Masterplan (1) and (2)

Appendices

Appendix A Proposed consent conditions

General conditions

1. [Activity to be undertaken in accordance with the plans, including the AEE]

2. Under section 125 of the RMA, this consent lapses five years after the date it is granted unless:

   a. The consent is given effect to; or
   b. The council extends the period after which the consent lapses.

3. Air discharge consent number [XX] expires 10 years after the consent is issued unless it has lapsed, been surrendered or been cancelled at an earlier date pursuant to the RMA.

4. The consent holder must pay the council an initial consent compliance monitoring charge of $[XX] inclusive of GST, plus any further monitoring charge or charges to recover the actual and reasonable costs incurred to ensure compliance with the conditions attached to this consent.

5. Access to the relevant parts of the property must be maintained and be available at all reasonable times to enable the servants or agents of the council to carry out inspections, surveys, investigations, tests, measurements or take samples whilst adhering to the consent holder's health and safety policy.

Limit Conditions: Air Discharges

6. All processes associated with the wastewater treatment plant (WWTP) must be operated, maintained, supervised, monitored and controlled in accordance with the Air Quality Management Plan certified in accordance with Condition [X] to ensure that all emissions authorised by this consent are maintained at the minimum practicable level.

7. Discharges of contaminants into air from the WWTP must not cause:

   a. Odour that are 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 7 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).

Process Conditions

8. Within one month of WWTP commencing treatment, the Consent Holder must provide to the Council a report from suitably qualified and experienced person (SQEP), which verifies that the design and installation of the waste water treatment plant and odour control system (including the odour extraction and treatment system) in accordance with Conditions 1 and 9.

9. Air discharges from the balance tank, 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 3 m above ground level or the apex height of the nearest building within 20 meters, without obstruction of the vertical discharge of air.

Monitoring and Reporting conditions

10. Within 3 months of exercising this resource consent, The consent holder shall:

    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 shall be retained for at least the duration of the resource consent.
    b. Weather data of any period shall be provided to Auckland Council within 5 days of a request.
    c. The weather station shall 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 shall 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).

11. 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 conditions 10 during the incident timeframe
    b. An explanation of the cause of the incident.
    c. Details of remediation action taken.

    Advice Note: Significant discharges

    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.

12. All air quality complaints that are received must be recorded and notified to the council on request. 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.

Air Quality Management Plan

13. Prior to the commissioning of the WWTP, an Air Quality Management Plan (AQMP) must be submitted to the Council for certification, to confirm that the activities undertaken in accordance with the AQMP will achieve the objectives of the plan and compliance with the relevant consent conditions. Any subsequent review of the AQMP must also be submitted to the council for certification. The consent holder must meet the costs of the production, certification, monitoring and review of the AQMP.

    The purpose of the AQMP is to document the monitoring, management and operational procedures, methodologies and contingency plans required to comply with the conditions of this consent. The AQMP may be a sub-section of a wider Environmental Management Plan, and 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. The AQMP 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 waste water treatment plant.
    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;
    f. The procedures for the receipt, recording and handling of air quality complaints received.

14. The AQMP must be reviewed on an annual basis and any subsequent changes to the certified AQMP 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 AQMP are considered to be inconsistent with achieving the provisions of this consent.

Advice Note: Air Quality Management Plan

The council acknowledges that the Air Quality Management Plan is intended to provide flexibility both for the consent holder and the council for the management of the air discharges. Accordingly, the Air Quality Management Plan may need to 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.

Certification of the Air Quality Management Plan by the council relates only to those aspects of the management plan that are relevant under the RMA. The certification does not amount to an approval or acceptance of suitability by the council of any elements of the management plan that relate to other legislation, for example, but not limited to, the Building Act 2004 or the Health and Safety at Work Act 2015.

Appendix B Odour survey

Meremere

Wastewater Treatment Plant

Odour survey – **16 January 2024**

Report 24464
Survey Date 16/1/2025
Report date 17/01/2025

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1. Introduction

Air Matters Ltd carried out an odour survey in the area surrounding Meremere Waste Water Treatment Plant (the Plant) on 16 January 2025. The focus of the survey was to characterise the odour, its sources and the intensity at various downwind locations from the Plant. Below is a summary of the surveyor who undertook the field assessment and the timing and environmental conditions at the time of the survey.

Surveyor Information	
Name:	Nigel Goodhue
Company:	Air Matters Limited

Summary of Conditions	**16 January 2025**
Survey Time Period	15:25 – 16:15
Temperature	24^{0}C (average)
Wind conditions (average over survey)	Light to moderate north/north-easterly (1–3.6 m/s)
Weather conditions	Clear day (full sun)
Plant design	The WWTP follows the same principals as that proposed for the Milldale development, being primary screening, secondary treatment based on the Bardenpho process including membrane filtration and tertiary treatment via UV disinfection. WAS is stored onsite in two tanks and removed from site via tanker. The surveyed WWTP does not employ any active odour extraction and treatment. The proposed Milldale WWTP will be of similar design but in addition incorporates: • WAS will be dewatered onsite through a mechanical process and solids taken offsite for disposal; • Inlet screening and WAS dewatering process will be housed inside a building; • No open top holding tank of waste water after the screening process. • Active extraction of air from the inlet screening and WAS dewater process (including from within the building) will be directed through an odour control unit (carbon scrubbers).
Site activities	The Plant was operational with the secondary and tertiary treatment phase continuously running. The inlet screens were operating intermittently.

Summary of Conditions	16 January 2025
Survey locations (refer Map)	• **A**: Full (10-min) survey downwind in 1 location (~45 meter from Plant); • **B**: 1 x downwind scouting check (10-140 m downwind); • **C**: 4 x (5-min) survey downwind of acetic acid tank at various distances (6,12, 33, 45m); • **D**: 1 x upwind check; • **E-G**: 3 x 5-minute surveys immediately downwind of the different stages off the Plant (membrane filtration | tertiary treatment | inlet screens and solids storage and WAS tanks);

The detail of the survey and outcome are presented in the subsequent sections.

2. Survey Results

16 January 2025

Location Map

Survey locations **A** Average wind direction Odour Generating area

2.1 Results

The table below outlines the results of the survey in terms of the odour character and intensity (DW = downwind).

Location	Distance from nearest odour generating source (m)	Odour detected? (% of time)	Character of detected odour	Intensity
A (DW of Plant – south end)	45	Yes (18%)	Sewage	weak
B (DW odour scouting)	45-140	No	-	-
C (DW of Plant – north end)	6-45m (at 4 locations)	Yes @6m = 100% @12m = 75% @33m = 40% @45m = 40%	Vinegar (acetic acid)	@6m = distinct @12m = weak/distinct @33m = weak @45m = weak
D (Upwind)	Upwind	No	-	-
E (DW of Membrane filtration)	10	No	-	-
F (DW of tertiary treatment)	10	Yes (33%)	Sewage	Weak
G (DW of inlet screens/WAS tanks)	5	Yes (90%)	Sewage	Weak/distinct

2.2 Key results

- An odour consistent with sewage was detected at location A, ~45 meters downwind of the treatment plant. Based on wind direction and the survey undertaken in closer proximity to the Plant (Locations E-G) the observed odour is expected to be generated from the primary treatment stage (wastewater screening)/WAS storage.
- The scouting odour survey along the pond track (Location B) did not detect any odour. Due to the location of the pond and the wind direction, downwind surveys between 40- 140m were not possible on the day of the survey.
- Survey location on the north side detected a vinegar odour which was related to the acetic acid storage tanks. Intensity and frequency of odour was surveyed at various distances downwind and reduced with distance but was still detected ~45 meters downwind of the acetic acid tank.
- A survey of the Plant immediately downwind (5-10m) detected:
    - an intermittent weak earthy sewage odour downwind of the aeration/anoxic tanks (Location F); and
    - a consistent weak to distinct sewage odour was observed at the inlet screening (Location G) and consistent with the downwind survey at Location A.
- An upwind check was completed (Location D) following the downwind survey and no odour was present at this upwind location, establishing that all detected odour during the survey was from the subject site.

2.3 Recommendations relating to Milldale WWTP

During the survey the greatest intensity and frequency odour were detected from the inlet screening/WAS storage processing and the acetic acid tank. These were detected at a distances upto 45 m from the Plant which correlates with the nearest sensitive receptors to the proposed Milldale plant. Additional downwind surveys at distances of 45-140m from the Plant could not be undertaken due the presence of the pond. However, a scouting survey did not detect any odour at a distance of 140m. Based on this survey:

- The inlet screening/storage and WAS dewatering/solids storage should ensure active capture and treatment of air to minimise the release of odour;
- Mitigations should be put in place to minimise the generation of odour from the acetic acid tank.

3. Methodology

The odour survey is carried out as per the process described in Appendix 3 of the *Good Practise Guide for Assessing and Managing Odour, Ministry for the Environment, 2016,* which is based on the German Standard VDI 3882.

A summary of important descriptors used in this assessment are included in Figure 2 below.

The surveyor had their noses calibrated to the screening procedure for panellists detailed as per AS/NZS 4323.3:2001, Section 9.7.2. The surveyor fell outside of the standard detection range for individual threshold however meet the standard for standard deviation.

Figure 3-1: Summary of odour survey descriptor notes used in this assessment

Odour Description Notes

Note 1: Observation Point Sensitivity
1. Remote (no housing, commercial/industrial premises, or public area within 500m of obs point)
2. Low sensitivity (no housing, commercial/industrial premises, or public area within 100m of obs point)
3. Moderate sensitivity (housing, commercial/industrial premises, or public area within 100m of obs point
4. High sensitivity (housing, commercial/industrial premises, or public area within area of obs point)
5. Extra sensitive (complaints arising from residents, business, and users of public areas within the area of obs point)

Note 2: Wind Strength	
0. Calm	Smoke rises straight up
1. Light air	Smoke drifts
2. Light Breeze	Wind felt on face; leaves rustle
3. Gentle breeze	Flags flap: twigs move all the time
4. Moderate breeze	Papers blow: small branches move
5. Fresh breeze	Small trees sway
6. Strong breeze	Large branches move, wind whistles
7. Near gale	Whole trees sway

Note 3: Weather Conditions	
Precipitation	Temperature
1. Dry	1. Cold
2. Rained recently	2. Cool
3. Drizzle	3. Warm
4. Raining	4. Hot
5. Foggy	

Note 4: Scale of intensity	Note 5: General Hedonic Tone
6. Extremely strong	-4 Extremely unpleasant
5. Very strong	-3
4. Strong	-2
3. Distinct	-1
2. Weak	0 Neutral
1. Very weak odour	1
0. No odour	2
	3
	4 Extremely pleasant

Note 6: Odour character descriptions

Code	Descriptor	Code	Descriptor	Code	Descriptor	Code	Descriptor	Code	Descriptor
1	Fragrant	6	Coffee-like	11	Bark-like	16	Garlic, onion	21	Like blood, raw meat
2	Perfumy	7	Spicy	12	Woody, resinous	17	Cooked vegetables	22	Rubbish
3	Sweet	8	Meaty (cooked)	13	Medicinal	18	Chemical	23	Compost
4	Fruity	9	Sea/marine	14	Burnt, smokey	19	Etherish, anaesthetic	24	Silage
5	Bakery (fresh bread)	10	Herbal, green, cut grass	15	Soapy	20	Sour, acrid, vinegar	25	Sickening
Code	Descriptor	Code	Descriptor	Code	Descriptor				
26	Musty, earthy, mouldy	31	Like gasoline, solvent	36	Sulphur smelling				
27	Sharp, pungent, acid	32	Fishy	37	Dead animal				
28	Metallic	33	Putrid, foul, decayed	38	Faecal (like manure)				
29	Tar-like	34	Paint-like	39	Sewer odour				
30	Oily, fatty	35	Rancid	40	Other - describe				

Note 7: Cloud cover			
0	Clear sky	5	
1	Sunny	6	Mostly cloudy
2	Mostly sunny	7	Considerable cloudiness
3		8	Overcast
4	Half the sky covered in cloud	F	Fog/mist

4. Limitations

These odour surveys were carried out on a single day of operations with weather conditions as found on the day. These odour surveys provide a snapshot of the environment on this day and results do not assume that this will be consistent through time.