Final - Technical Advice on Wastewater Performance Standards

Discharges to Air

Taumata Arowai

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→ The Power of Commitment

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Abbreviations and Acronyms

Table 1 Abbreviations and Acronyms

BAT	Best Available Technology
BREF	Best Available Techniques Reference Documents
BPM	Best Practicable Means
BMPP	Best Management Practice Plan
BPO	Best Practicable Option
$cBOD_5$	The carbonaceous Biochemical Oxygen Demand during a 5-day period
CO	Carbon monoxide
COP	Code of Practice
DEFRA	Department for Environment Food and Rural Affairs (United Kingdom)
DETSI	Department of Environment, Tourism, Science and Innovation (Queensland)
EPA SA	South Australian Environmental Protection Authority
EPP	Environmental Protection Policy (Queensland)
EU	European Union
FIDOL	Frequency, Intensity, Duration, Offensiveness, and Location
GHG	Greenhouse Gas
H_2S	Hydrogen sulphide
IAQM	British Institute of Air Quality Management
IED	Industrial Emissions Directive (Germany)
$\mu g/m^3$	Micrograms per cubic metre of air
MfE	Ministry for the Environment
MPR	Minimum Performance Requirements
NAICS	North American Industry Classification System
NESAQ	National Environmental Standards for Air Quality
NES-IGHG	National Environmental Standards for Greenhouse Gases from Industrial Heat Processes
NO_2	Nitrogen dioxide
NSW	New South Wales, Australia
NSW EPA	New South Wales Environmental Protection Authority
NZ	New Zealand
NZWWA	New Zealand Water and Wastes Association
O_3	Ozone
OIP	Odour Improvement Plan
OMP	Odour Management Plan
ORA	Odour Risk Assessment
ORC	Odour Risk Classification
PPB	Parts per Billion
PE	Population Equivalent
PM_{10}	Particulate matter less than 10 micrometres in size

BAT	Best Available Technology
QLD	Queensland, Australia
RBOMP	Risk Based Odour Management Plan
RMA	Resource Management Act 1991
SA	South Australia, Australia
SEPA	Scottish Environmental Protection Agency
SO_2	Sulphur dioxide
SQEP	Suitably Qualified and Experienced Person
TAS	Tasmania, Australia
UK	United Kingdom
VIC	Victoria, Australia
VOC	Volatile Organic Compounds
WEPS	Wastewater Environmental Performance Standards
WWTP	Wastewater Treatment Plant

Glossary of terms

Table 2 Glossary of terms

Term	Definition	Source
Advance Odour Controls	Additional odour controls to be implemented with regards to the Odour Risk Classification (ORC) through the odour improvement plan when a nuisance odour exists. The primary odour controls are to be implemented in conjunction with the advanced odour control.	
Best Practicable Option (BPO)	The Resource Management Act (RMA) definition for BPO has been adopted in relation to a discharge of a contaminant, meaning the best method, as determined by a SQEP, for preventing or minimising the adverse effects on the environment having regard, among other things, to— – the nature of the discharges or emissions and the sensitivity of the receiving environment to adverse effects; and – the financial implications, and the effects on the environment, of that option when compared with other options; and – the current state of technical knowledge and the likelihood that the option can be successfully applied.	New Zealand Resource Management Act 1991
Odour	Odour is classified as a sensory response to airborne contaminants.	Adapted from the New Zealand Resource Management Act 1991
Odorous Process	Defined only with refence to the categorisation of wastewater treatment plant (WWTP) with regards to the ORC. An odorous process is the following: – Preliminary treatment processes – Primary treatment processes – Secondary treatment processes, including aeration and facultative ponds and bioreactors – Sludge and biosolids handling, management and processing – Odour control units – Septage receival Onsite storage, conveyance and pumping of untreated wastewater, sludge, biosolids and associated material (such as screenings, centrate etc)	
Population Equivalent (PE)	One PE (Population Equivalent) served by a wastewater plant represents the organic biodegradable load produced by one person in one day. In this case defined to be 85g per person.	Consistent with loading expressed in Regulation 58 of the Water Services (Wastewater Environmental Performance Standards Regulations 2025) (WEPS 2025).
Primary Odour Controls	The minimum odour controls that are implemented with respect to the ORC.	
Sensitive Activity	Defined only with refence to the categorisation of a WWTP with regards to the ORC. A sensitive activity is the following: – Dwellings (urban and rural) – Residential zoned areas – Care centres – Hospitals – Health facilities – Education facilities – Marae – Built community facility, including sports clubrooms and stadiums	Adapted from the Auckland Unitary Plan Operative in Part.

Term	Definition	Source
	– Areas of high cultural value (as defined in district plans) – Visitor accommodation – Excludes all activities located in an industrial zoned area – Excludes all properties which have provided written approval, or equivalent The list of ORC sensitive activities excludes the following: – Outdoor recreational areas – including open sports playing fields, reserves and golf courses – Commercial areas – 'Curtilage' which would be roads/sheds/gardens etc associated with a location	
Sensitive Receptors	Location where receptors can be expected to have a high sensitivity to odour nuisance. This includes all of the 'sensitive activities' identified in the standard but may also include other locations. The definition of a sensitive receptor is to be guided by the Ministry for the Environments (2016) 'Good Practice Guide for Assessing and Managing Odour' (GPG Odour) or subsequent equivalent resources.	Adapted from the Ministry for the Environments (2016) 'Good Practice Guide for Assessing and Managing Odour' (GPG Odour) definitions for sensitive activities.
Significant Upgrades of WWTP	Significant upgrades of WWTPs are classified as when there is a substantial change to the treatment process or an increase in the capacity/PE served, which would have an impact on the generation of odours or the discharge of how contaminants are emitted to the atmosphere.	
Suitably Qualified and Experienced Person (SQEP)	A SQEP is defined to be practitioner or other person who the relevant consent authority determines: – Holds a relevant tertiary qualification related the practices of wastewater treatment or reduction of odour emissions. – Has at least 10 years' experience working in wastewater treatment and the reduction of odour emissions. – Can provide an independent review and recommendations relating to the discharge of any odour from wastewater treatment processes.	Adapted from the Ministry for the Environment's (2012) Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
Treatment Capacity	Defined only with reference to the categorisation of a wastewater treatment plant (WWTP) ORC. Is defined to be the maximum monthly average PE serviced by the WWTP projected to occur at the end of the 35-year consent period.	

1. Introduction

1.1 Purpose of this report

The purpose of this report is to provide technical advice to support the Water Services Authority - Taumata Arowai (Taumata Arowai) in the development of Tranche 2 of the Wastewater Environmental Performance Standards (WEPS) for discharges to air from municipal wastewater treatment plants (WWTP).

The report examines the regulatory approaches used in Aotearoa New Zealand, and internationally, and examines options for managing air discharges in accordance with the WEPS framework.

The discharge of odorous compounds generated from the onsite treatment, storage and conveyance of wastewater and biosolids is the primary concern regarding air quality. These discharges can have an adverse odour nuisance effect on the surrounding community unless appropriately mitigated.

This report provides recommendations for the development of the WEPS for air discharges. The recommendations have been assessed against existing WWTP air discharge resource consents to assess their consistency and proportionality to the risk posed by the discharges to air.

The report is not intended to be directly used as public facing material as part of the Taumata Arowai consultation process for Tranche 2 of the Wastewater Environmental Performance Standards but rather a technical document to inform the consultation materials. The language and presentation style of this document is therefore aligned with this purpose.

1.2 Scope of Work

This report provides technical advice to support the development of WEPS for discharges to air. It follows a staged process that defines the issues concerning discharges to air from WWTP, reviews of current regulatory approaches, reviews of the available evidence such as current consent conditions for existing and assesses whether a national discharge to air standard is warranted.

Potential regulatory and technical approaches are then developed and tested through a risk-based framework, including feasibility testing against available WWTP data and receiving environment information. The outcomes of this assessment are used to develop a recommended the WEPS framework for stakeholder consultation by Taumata Arowai.

The scope of the work focuses on the discharge of odorous compounds. Other contaminants are also discharged from WWTP. However, from an environmental and health perspective these are of secondary importance.

1.3 Limitations

This report: has been prepared by GHD and its subconsultants, Beca and Stantec, for Taumata Arowai and may only be used and relied on by Taumata Arowai for the purpose agreed between GHD and Taumata Arowai as set out in section 1.1 of this report.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD and its subconsultants have no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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GHD and its subconsultants have prepared this report on the basis of information provided by Taumata Arowai and others who provided information to GHD and its' subconsultants (including Government authorities), which GHD and its subconsultants have not independently verified or checked beyond the agreed scope of work. GHD and its subconsultants do not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions

This report has been prepared on the basis of the following general assumptions:

– The information contained in the National Consents Database of wastewater consents, developed by Taumata Arowai, is a reflection of the number, location, type and discharge point of publicly operated wastewater treatment plants in New Zealand. This database has been updated by Taumata Arowai with the best available information, as part of Tranche 1 and to support Tranche 2 of the WEPS, to inform the recommendations provided within this report. However, it requires verification and validation and as some information is known to be inaccurate. Information, values and analysis contained in this report which has leveraged the database is therefore subject to change following verification and validation of the database.
– GHD and its subconsultants have assumed that the intent of the discharge Standards is to protect against a variety of potential effects in the receiving environment and to adequately protect public health.

More specific assumptions related to each task outlined in the Consultancy Services Order (CSO) and associated RFP Response document are provided in the respective sections.

1.5 Precautionary Approach

As for the Tranche 1, the 2025 WEPS, a precautionary approach has been applied to this technical work and the development of the WEPS framework proposed in this document, addressing both environmental and public health aspects.

The precautionary approach applied recognises that, instead of odour criteria limits being set, a risk-based framework was developed to propose odour control and management requirements that were proportionate to the level of control required under existing resource consent conditions and appropriate to the assessed level of odour risk at WWTPs.

2. Basis for the Discharge to Air standard

2.1 Basis for a WEPS

2.1.1 Sources of Air Discharges

Municipal WWTPs can discharge a range of different contaminants to air, including the following:

Greenhouse gases (GHGs),

– Contaminants generated from physical, chemical, and biological processes,
– Bioaerosols,
– Pollutants generated from onsite combustion sources (including biogas flares and engines), and
– Dust from the handling of dried biosolids.

The primary air quality concerns are the discharge of odour compounds. These compounds are mostly generated from the breakdown of organic matter in the wastewater or the biosolids produced from the treatment processes. High levels of odour may also be emitted from other sources such as from the thermal and solar drying of biosolids, and to a lesser extent the combustion of biogas.

The odour emitted from WWTPs is a complex mixture of different odorous compounds. Compounds may include hydrogen sulphide (H_2S), ammonia, and other volatile organic compounds (VOCs). The rate of emission and the chemical composition of odour changes between treatment processes and with changes in operating conditions.

2.1.2 The Role of a WEPS

The emission of odorous compounds from WWTPs can have adverse nuisance effects unless appropriate mitigation is implemented and maintained. There are examples of New Zealand WWTPs where the discharge of odour from WWTPs have had significant and persistent impacts on the surrounding community. These discharges are often associated with abnormal operating conditions or plant malfunctions.

Currently discharges to air from WWTPs are regulated through regional plans. There is some variability between regions as to the regulatory status of the discharges and discharge conditions.

A consistent national framework would provide clear expectations for odour performance and management, improving regulatory certainty and ensuring a more uniform level of protection for communities. It would also help wastewater operators address odour issues proactively, support infrastructure planning, and reduce inconsistencies that can arise where different jurisdictions apply different odour criteria or assessment approaches.

2.2 Discharges to air as applied to the WEPS

2.2.1 Definition of Discharge to Air

2.2.1.1 Activities included

It is proposed that the WEPS framework covers the discharge to air of odorous compounds associated with the operation of a WWTP. The proposed WEPS framework includes the following:

– Discharge of odour from the onsite storage and treatment of wastewater, sludge or biosolids
– Discharges of odour from any onsite odour control facilities
– Discharges of odour from the production, storage and combustion of biogas
– Discharge of odour from onsite sludge processing, including thermal drying, pyrolysis, incineration and solar drying processes

The standard applies only to the wastewater treatment activities which occur within the legal boundary of a WWTP site.

2.2.1.2 Definition of Odour

The RMA does not explicitly define 'odour'. Instead, the RMA treats odour as a sensory response to airborne contaminants. It is suggested that this WEPS framework also adopts the RMA approach to defining odour.

It is common in resource consents for the discharge contaminants to air to consider odour in terms of offensive or objectionable effects.

2.2.2 Exclusions from the definition of Discharge to Air

The standard excludes the following activities:

- Discharges to air from the sewer networks including pumps stations and pipelines
- Discharges to air from industrial and non-municipal WWTPs
- Discharges to air from the disposal of biosolids and treated wastewater to land[1]
- Discharges to air from the disposal of treated wastewater to water[2]
- Discharges to air of combustion related contaminants emitted from auxiliary sources, including generators, thermal dryer, Combined Heat and Power units, incinerators and biogas flares.
- Discharges to air of greenhouse gases
- Discharges to air from unplanned emergency release scenarios
- Discharge of dust (particulate matter) from biosolids handling
- Discharges of VOCs, ammonia and hydrogen sulphide from a health effect perspective
- Discharge of bioaerosols

The discharge of the contaminants that are generated as a by-product of incomplete combustion (e.g. PM_{10}, NO_2, SO_2, CO) are considered to be more appropriately regulated through regional plans and the National Environmental Standards for Air Quality (NESAQ)[3]. There are also wider regional considerations for these contaminants, including the status of the receiving airshed under the NESAQ in which the source is located.

Currently there is variation between the regulatory status of combustion sources between regions. It is therefore possible that including these emissions in the WEPS framework could create inconsistency in the regulatory status for comparable emission sources depending on whether they are located at a WWTP or another property in the region.

The emission of greenhouse gases from the combustion of fossil fuel for processing are regulated through the National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat (2023)[4] (NES-IGHG). However, any odour generated from the operation of these combustion sources is considered within the scope of the WEPS framework.

The discharge of dust, bioaerosol and other contaminants released during the treatment process generally have little effect on air quality outside the site boundary. These air contaminants would also be subject to the RMA. Additionally, bioaerosol are primarily an occupational health and safety consideration and regulated accordingly.

[1] These discharges are regulated through the Water Services (Wastewater Environmental Performance Standards) Regulations 2025
[2] These discharges are regulated through the Water Services (Wastewater Environmental Performance Standards) Regulations 2025
[3] Resource Management (National Environmental Standards for Air Quality) Regulations 2004
[4] Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023

3. Information Review

3.1 Overview

A desktop literature review was undertaken to inform the development of the proposed framework for odour discharge standards from municipal WWTPs, with a structured focus on both New Zealand and international regulatory contexts. Nationally and internationally the regulatory controls for WWTP emissions tend to be the same as those which also apply to other industrial discharges.

The review first examined existing consents for WWTPs across New Zealand to characterise how odour limits, assessment criteria, and compliance conditions are currently defined and implemented in practice.

Within New Zealand, the review examined regional plan provisions to understand how odour is currently managed at the national and regional level and their practical application. Consideration was also given to the regulatory status of WWTPs in New Zealand, and the role of industry bodies such as Water New Zealand in shaping best practice and providing technical guidance. This component of the review enabled identification of common approaches, inconsistencies between regions, and identification of gaps to address in the proposed framework.

To provide context and benchmarking, the literature review was extended to include international regulations and standards from comparable jurisdictions. This included a review of regulatory and guidance frameworks in Australia, United Kingdom (UK) and Germany/European Union (EU), with emphasis on odour criteria, modelling and assessment methodologies, and compliance thresholds.

In addition, industry-led guidance from major utilities such as Sydney Water and Melbourne Water were examined to capture practical, operationally driven approaches to odour management. The findings from these jurisdictions were used to identify transferable methodologies that could inform a fit-for-purpose framework for New Zealand.

This comparative approach ensures that the proposed framework is grounded in both local context and international good practice, while remaining pragmatic and implementable.

3.2 Odour Management Regulatory Review

3.2.1 Review of New Zealand WWTP Consents

The distribution of municipal WWTPs in NZ with respect to the population they serve is shown in Figure 1. The distribution has been derived from the Taumata Arowai consent database.

The distribution of consented WWTPs in NZ is strongly skewed toward small facilities, reflecting the country's dispersed population and large number of small communities. The majority of WWTPs in NZ are comparatively small: 155 plants serve a population of less than 1,000, of which 29 plants serve a population less than 100, 89 plants serve a population between 101 and 500, and a further 37 serve a population between 1,000 and 5,000. In total, 249 WWTPs—around 76% of all facilities—serve populations under 5,000, highlighting the predominance of smaller WWTPs across the country.

At the other end of scale, 11 WWTPs serve population of 50,000 to 100,000 people and just six serve populations of more than 100,000 people. The Mangere WWTP serves the largest population of approximately 1.42 million. The Christchurch WWTP serves the next largest population of approximately 355,000.

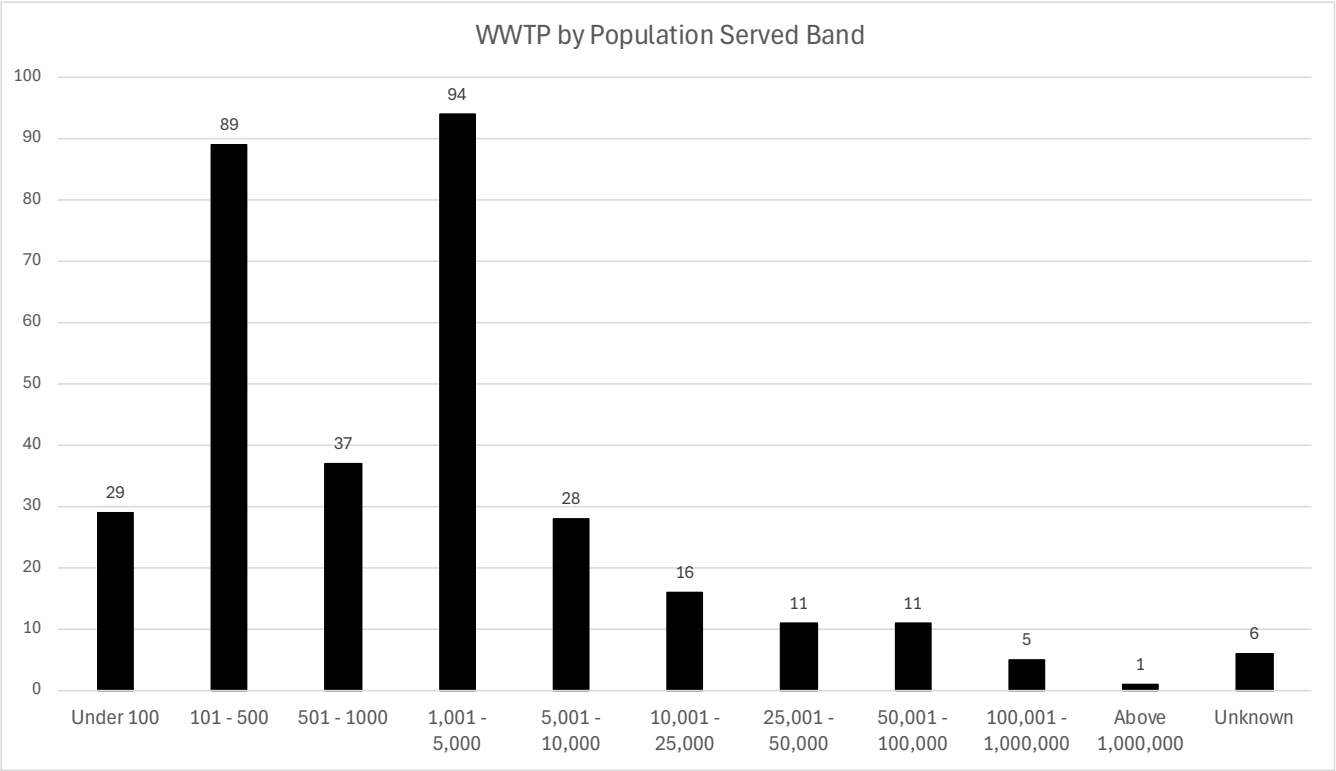


Figure 1 Distribution of WWTP with regards to population served (Source of data: Taumata Arowai)

3.2.2 Existing Discharge to Air Consents in New Zealand

Current consent conditions for existing WWTPs typically rely on more qualitative performance standards to manage odour effects. A common requirement is a general condition stating that there shall be no noxious, dangerous, offensive, or objectionable odour that results in an adverse effect at or beyond the site boundary.

This approach reflects a nuisance effects-based framework, where compliance is not determined by numerical emission or ambient air concentration limits but by whether an odour causes unacceptable effects on surrounding receptors. As a result, the focus is on maintaining appropriate operational practices and ensuring that discharges do not give rise to community complaints or environmental harm, rather than meeting fixed quantitative thresholds.

These conditions are often supported by requirements to implement odour management plans and maintain key treatment processes to minimise emissions.

Common consent conditions for existing WWTPs generally include:

– routine monitoring and reporting,
– maintenance of treatment infrastructure,
– incident notification, and
– complaint response procedures.

Operators are typically required to demonstrate ongoing compliance through inspections and record keeping, and to take corrective actions where issues arise.

Consent requirements tend to increase with the size of the facility and the perceived odour risk of the discharges. However, there can be some variation in consent conditions between regions and sites.

Assessment of compliance with these conditions is usually undertaken by the regulator, often in response to complaints or observations. Most regulators apply the FIDOL framework—considering Frequency, Intensity, Duration, Offensiveness, and Location—to evaluate whether an odour event constitutes a breach of consent conditions. This framework provides a structured yet flexible method for interpreting nuisance effects in real-world contexts, allowing regulators to account for variability in odour perception and local sensitivity.

Consequently, existing WWTP consent regimes tend to emphasize qualitative judgement and regulatory discretion, supported by good management practices, rather than prescriptive or numeric performance criteria.

While most existing WWTP consents rely on qualitative odour controls, more prescriptive or quantitative requirements have been incorporated a small number of consents. Emission performance standards—such as limits on contaminant emission rates or discharge concentrations are uncommon, with only a few examples (e.g., the Moa Point WWTP odour control unit) incorporating defined emission criteria. However, conditions which required the monitoring of an odour control unit's operating parameters are more common. For example, the requirement to measure the pH, temperature, flow rate and pressure drop for biofilter odour control units is not uncommon in consent conditions.

Quantitative ambient air quality monitoring standards are seldom required, reflecting the general preference for effects-based, rather than measurement-based, compliance approaches. The lack of monitoring requirements also reflects the technical limitations associated with using instrumental methods to monitor ambient odour concentrations.

Other less common consent conditions include requirements for community odour surveys, which have been applied at selected plants such as Rosedale, Chapel Street, and Porirua WWTPs to better understand and track nuisance effects from a receptor perspective. Some larger plants also require community consultation or 'odour panels' in their consent conditions, largely due to the need to mitigate existing odour issues. Spatial controls, such as odour buffer distances (for example, a 100 m setback for pressure valve discharges under the Canterbury Air Regional Plan unless odour control devices are installed), may also be specified but are not widely applied to existing sites.

In some cases, legacy conditions persist that reflect earlier regulatory approaches or historical design expectations, very rarely, prescriptive design requirements for odour control systems are included in consent conditions (as seen at Rosedale WWTP). Overall, these rarer conditions illustrate that while more stringent or technical controls do exist, they are the exception rather than the norm for existing WWTP consent frameworks in New Zealand.

3.2.3 New Zealand Regulations, Standards and Guidelines

There are no national odour emission standards or limits specifically for WWTPs in New Zealand. Instead, odour is primarily managed through the RMA framework, with controls implemented via regional and district plans, resource consent conditions, and nuisance provisions.

Key aspects of the current approach

– Odour discharges to air are regulated as discharges of airborne contaminants under the RMA. Regional councils (or unitary authorities) determine whether a WWTP discharge to air is permitted or requires resource consent.
– The principal assessment benchmark is typically whether an odour causes "offensive or objectionable" effects at or beyond the site boundary, rather than compliance with a national odour limit. It is usually insufficient for an odour discharge simply to be "detected" at or beyond the boundary of a site, for an odour to be considered to have caused an adverse effect.

3.2.3.1 Regional Plans

The regulatory status of discharges to air from municipal WWTPs varies between regions. Typically, discharges are either a discretionary or permitted activity.

No quantitative odour emission limits or ambient concentration limits are defined for odour in any of New Zealand's regional plans. However, several regional plans reference the national Ambient Air Quality Guidelines[5] which incorporate a 1-hour average odour nuisance concentration limit of 7 µg/m^3 (5 ppb) for H_2S, one of the principle odorous compounds emitted from WWTP. Others also refer to guidance in the GPG Odour.

[5] Ministry for the Environment, 2002, *Ambient Air Quality Guidelines: 2002 Update*, Ministry for the Environment, Wellington: New Zealand.

Over the last decade, councils have increasingly required:

– Odour Management Plans (OMPs);
– Complaint response procedures;
– Monitoring and maintenance programmes;
– Contingency measures for plant failures; and
– Regular review of odour mitigation systems such as biofilters and scrubbers.

The OMP has become almost as important as the numerical or qualitative assessment itself because it demonstrates how odour risks will be proactively managed.

The New Zealand's regulatory system remains fundamentally effects-based rather than standards-based.

3.2.3.2 Nationals Environmental Standard for Air Quality

The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NESAQ) was introduced under the RMA in 2004. The standard sets ambient air quality concentrations for five common air quality contaminants (PM_{10}, NO_2, CO, SO_2, and O_3) to provide the minimum baseline of human health protection across the county. The NESAQ does not define any ambient odour-based air quality limits.

3.2.3.3 Ambient Air Quality Guidelines

The MfE published updated national Ambient Air Quality Guidelines in 2002. The guidelines do not by themselves have any regulatory status but are referred to in some regional plans (e.g. the Canterbury Air Regional Plan) or have formed the basis of regional air quality targets or guidelines (e.g. Waikato Regional Ambient Air Quality Guidelines). The only odour based ambient air quality guideline is the 1-hour average concentration limit of 7 $\mu g/m^3$ (5ppb) for H_2S. However, the guideline acknowledged that alternative approaches to assessing potential odour may be more appropriate.

3.2.3.4 Guidance Documents

3.2.3.4.1 Ministry for the Environment's '*Good Practice Guide for Assessing and Managing Odour*' (2016)

The GPG Odour has generally been adopted as the main reference document for the assessment of odour effects in New Zealand. The guide is not a regulatory standard but is the primary technical guidance document used by regulators and practitioners when assessing WWTP odour effects.

The guide recommends an effects-based approach that considers both the nature of the odour source and the sensitivity of the receiving environment. Potential effects are evaluated through the FIDOL factor framework. The FIDOL factors are defined below.

– Frequency of odour events
– Intensity' of odour
– Duration of each odour event
– Offensiveness' or intrinsic character of the odour, also called the hedonic tone
– Location' of the odour, in particular the sensitivity of the receiving environment.

The GPG Odour provides recommendations for how the discharge of odour may be assessed depending on whether the discharges are from an existing facility or a new or modified facility.

Discharges from existing facilities are to be assessed largely on historical performance, taking into consideration the site's complaint and compliance history and the results of any odour diaries, community surveys, odour field observations.

The GPG Odour notes that odour dispersion modelling may potentially be useful for new activities, or proposed modifications to existing activities where discharges are continuous or semi continuous, and reliable odour emission data is available. The GPG Odour provides recommended 1-hour average odour-modelling guideline values. However, these concentrations limits are not intended to be used as a simple pass-or-fail test for assessing if an odour nuisance effect will occur.

The odour-modelling guideline values do not have any regulatory status but are commonly used as performance criteria for air quality assessment submitted in support of resource consent applications.

The guide also promotes the use of OMPs, monitoring programmes, complaint response procedures and operational controls as part of a broader odour management framework, recognising that effective odour control requires both good plant design and ongoing operational management.

3.2.3.4.2 Water New Zealand '*Good Practice Guide for Waste Stabilisation Ponds: Design and Operation' (2017)*

The Water New Zealand '*Good Practice Guide for Waste Stabilisation Ponds: Design and Operation' (2017)* (GPG Waste Stabilisation Ponds) provides guidance for the design and operation of waste stabilisation ponds. The guide recognises that odour issues are commonly associated with anaerobic conditions, excessive organic loading, sludge accumulation, pond short-circuiting and poor hydraulic performance. The guide emphases the need for good design and operation to minimise the risk of adverse odours.

The GPG Waste Stabilisation Ponds includes recommended minimum setback distances between waste stabilisation ponds and sensitive land uses to reduce the potential for adverse effects, including odour nuisance. The guide notes that the Ministry of Works Guidelines for Oxidation Ponds (1974) recommended buffer distance of;

"300m from built-up areas or 150m from isolated dwellings. For populations of less than 1,000 persons these restrictions may be reduced provided that there is adequate natural screening (by trees or landscaping) and that the prevailing wind blows away from any housing area"

has generally been shown to be appropriate but each site should be considered on its own merits. Having mechanised aeration, for example, will reduce the risk of odour problems.

3.2.3.4.3 New Zealand Water and Wastes Association (NZWWA) '*Manual for Wastewater Odour Management*' (2000)

The NZWWA '*Manual for Wastewater Odour Management'* (2000) provides a framework for identifying odour-generating sources, understanding the processes that lead to odour formation, and evaluating the potential for odour impacts on surrounding communities.

The manual describes methods for odour sampling and measurement, assessment of odour emission rates, community complaint investigations, and the application of atmospheric dispersion modelling to predict off-site odour effects. The manual also discusses the regulatory context (at the time of publication) for odour management in New Zealand and provides guidance on assessing the significance of odour effects at sensitive receptors.

It also outlines recognised odour control techniques, including process optimisation, containment of odorous sources, chemical treatment, biofiltration, scrubbers, and buffer distances, and recommends a proactive approach to odour management through monitoring and operational controls.

The manual has not been updated since 2000. Some of content is now dated, such as the regulatory and assessment methodology sections, which are better covered by the GPG Odour.

3.2.4 International Regulations and Standards

A review of international odour regulations and guidance has been undertaken. The review examined regulatory frameworks, assessment criteria, and odour management approaches adopted in selected Australian jurisdictions, including Tasmania (TAS), Victoria (VIC), New South Wales (NSW), Queensland (QLD), and South Australia (SA). Guidance and regulatory requirements from the United Kingdom (England and Wales, and Scotland) and Germany, as a leading European example, were also reviewed.

These jurisdictions were selected due to their well-established approaches to odour assessment, nuisance management, and environmental regulation.

The findings of this review have informed the development of an internationally aligned framework for odour management, incorporating best-practice regulatory principles and assessment methodologies from leading international jurisdictions.

3.2.4.1 Australia

Based on the current regulatory direction across Australian jurisdictions, odour management is increasingly being framed as a risk- and outcomes-based environmental issue rather than one relying solely on compliance with dispersion modelling criteria. While odour modelling remains an important assessment tool during the planning and licensing of WWTPs, more recent odour management requirements now place greater emphasis on demonstrating that operators have identified odour risks, implemented best-practice controls, and are effectively managing community impacts through monitoring, complaint response, adaptive management and continuous improvement.

Jurisdictions such as Victoria and Queensland have embedded general environmental duty and risk-based environmental management principles within their legislation, while New South Wales, South Australia and Tasmania increasingly consider a broader weight-of-evidence approach that incorporates operational controls, performance monitoring and community amenity outcomes alongside modelling predictions. This reflects a national trend away from prescriptive reliance on modelled odour criteria as the sole measure of compliance, towards a more holistic assessment of odour risk and the actual performance of odour management systems. A summary of the Australian odour legislation is presented in Table 3.

Some EPAs have adopted a screening approach for assessment of potential for discharges to have an odour (or dust) nuisance effect based on the separation distance between the source of the air emission and nearby sensitive activities. The risk of an adverse nuisance effect to occur is assumed to be minimal at distances further from an emission source than the minimum separation distances published by the EPAs.

Minimum separation distances have been published for WWTPs serving populations of up to 20,000. The separation distance varies depending on the type of plant (e.g. tank-based system compared to pondage system) and the population served. The published separation distances do account for site specific factors, such as odour controls implemented, site operation or the surround topography and meteorology.

Table 3 Summary of Australian Odour Legislation per State

State	Approach	Notes on application use	Key references
New South Wales (NSW)	Odour Modelling	The NSW Environmental Protection Authority (EPA) provides odour impact assessment criteria (odour units at specified percentiles using dispersion modelling) that are: – Adjusted odour impact for population sensitivity – Adjusted percentiles based on presence of site-specific data – Used to assess acceptability of predicted impacts – For WWTPs, these criteria function as screening and decision-support tools, not automatic compliance thresholds. – The uncertainty in modelling is acknowledged in the DRAFT Approved Methods requiring a higher level of analysis to understand this uncertainty.	NSW EPA – Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2022) NSW EPA – Technical framework: Assessment and managing odour from stationary sources in NSW (2006) DRAFT Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2026)
Queensland (QLD)	Odour Modelling	The Department of Environment, Tourism, Science and Innovation (DETSI) provides guidance on odour impact from developments, which provides dispersion modelling guideline levels, but are not intended to be pass/fail criteria. DETSI also governs odour from prescribed activities, including environmentally relevant activities (ERAs) From the ERA 63, model air discharge condition for WWTPs, ”Odours or airborne contaminants from the activity must not cause environmental nuisance to any sensitive place or commercial place.” Under the Environmental Protection Policy (EPP) (Air), best practice environmental technology to minimise odours in a manner consistent with the management hierarchy is required. Screening assessment based on recommended buffer distance and complaint history. Dispersion modelling is identified as an assessment tool, but other methods are also recognised (complaint history, odour surveys, odour diaries). The weighting given to dispersion modelling varies between existing and new facilities. EPP (Air) gives odour based ground level concentrations for specific chemical contaminants (e.g. H_2S) but not for complex mixtures of odour.	DETSI – Odour Impact Assessment from Developments (2024) ERA63 – Sewage Treatment – Model Operating Conditions (2025) DETSI – Application requirements for activities with impacts to air Brisbane City Plan Environmental Protection (Air) Policy 2019

State	Approach	Notes on application use	Key references
Victoria (VIC)	Risk and performance-based approach	Environmental Performance Standard for odour is qualitative The State Environment Protection Policy (Air Quality Management) (SEPP(AQM) removed dispersion model based standard 'Design Criteria' concentration limits in 2021) Compliance is judged on whether odour is offensive and risks are reduced so far as reasonably practicable. A risk-based approach is used: source – pathway – receiving environment method.	EPA Victoria – Guidance for Assessing Odour (2022); EPA Victoria - Guideline for assessing and minimising air pollution in Victoria (2025) Environment Protection Act 2017 – Environmental Performance standard EPA Victoria - Separation distance guideline (2024)
Tasmania (TAS)	Performance-based approach (Odour Modelling)	Odour criteria embedded in policy schedules, used directly in dispersion modelling for wastewater facilities. Limits: 2 OU, 99.9th percentile, assessed at the boundary.	EPA Tasmania – Environment Protection Policy (Air Quality) 2004; ADM Guidelines
South Australia (SA)	Risk-based approach	Odour requirements in Air Policy (2016), 99.9% 3-minute assessment at the location of affect (not at boundary). Sliding scale of odour depending on population. The key test is whether odour emissions unreasonably interfere with the amenity or enjoyment of an area. – Best Available Technology Economically Achievable (BATEA) approach. – Modelling and monitoring used as an evaluation tool. – Evaluation Distance dependent on EP of plant (odour) – used as an initial screening method	SA Environment Protection (Air Quality) Policy 2016 EPA SA Ambient Air Quality Assessment (2016) EPA SA Evaluation distance for effective air quality and noise management (2023)

3.2.4.2 Scotland

In Scotland, odour regulation for WWTPs is primarily based on the prevention of statutory nuisance rather than compliance with prescribed odour concentration limits. For most WWTPs, responsibility for regulating and investigating odour complaints sits with local authorities under environmental health legislation, which assesses whether odour emissions unreasonably interfere with the use and enjoyment of neighbouring properties.

As a result, the regulatory focus is generally on demonstrating effective odour risk management, operational controls, complaint response procedures, and mitigation measures rather than achieving specific modelled odour criteria. While odour modelling and assessment tools may be used to support planning applications or investigations, regulatory decisions are typically centred on evidence of actual nuisance impacts and the effectiveness of measures implemented to minimise odour emissions to surrounding communities.

Scotland has published specific regulations for WWTPs. The Sewerage Nuisance Code of Practice (Scotland) Order (2006) (Scottish Sewerage Nuisance COP) has regulatory status and could provide a template for the WEPS. Key components of the Scottish Sewerage Nuisance COP are:

– Complaint registers and administration
– OMPs for all WWTP that serve populations greater than 500
– Odour improvement plans (OIPs) at sites where an odour nuisance effect occurs
– Application of best practicable means (BPM) (comparable to BPO under the RMA)

The Scottish Sewerage Nuisance COP also specifies an odour control hierarchy of control and odour removal efficiency criteria for the odour abatement equipment.

Table 4 Summary of Scottish Odour Regulations and Guidelines

Legislation/Guideline	Overview
The Sewerage Nuisance Code of Practice (Scotland) Order 2006	– Scottish Sewerage Nuisance COP has regulatory status – The objective of this COP is to apply the best practicable means (BPM) for assessing, controlling and minimising odour nuisance. – The Scottish Sewerage Nuisance COP applies to all new and existing WWTPs (does not apply to networks). – Requires: • Baseline Controls • OMP – scope defined • OIP – if odour nuisance exists – scope defined • Complaint administration – No OMP is required for WWTPs of less than 500 PE – When developing new and significantly upgraded WWTPs a detailed review of the proposed design is to be undertaken including a justification for the selection of process technology and controls at the planning and design stage – In most instances odour control units are required to achieve a minimum odour removal efficiency of 95%.
Code of Practice on Assessment and Control of Odour Nuisance from Wastewater Treatment Works (2005)	– Voluntary code of practice – Provides more guidance in the implementation of the Sewerage Nuisance (Code of Practice) – Outlines best practices – BPM, OMP, complaint response
Odour management and monitoring in Scottish wastewater treatment plants (2016) (CREW – Scotland's Centre of Expertise for Waters)	– Good practice guide for odour control, management and monitoring – Odour risk assessed using an odour risk matrix – Guidance on stakeholder and community engagement
Scottish Environment Protection Agency (SEPA) Odour guidance (2025)	– Guidance for licensed and unlicensed activities – Guidance for assessment, implementation and monitoring

3.2.4.3 England and Wales

The regulators are slightly different in the four countries, England, Wales, Northern Ireland, and Scotland, which make up the United Kingdom, but the regulations are substantially the same. In England and Wales, odour regulation for WWTPs is primarily based on the prevention of statutory nuisance rather than compliance with prescribed odour limits. For most WWTPs, local authorities are the primary regulators, investigating odour complaints and determining whether emissions constitute a nuisance that unreasonably affects nearby residents and businesses.

The Environment Agency (in England) and Natural Resources Wales generally only regulate odour where activities are subject to environmental permitting, such as certain sludge treatment, waste management, or other licensed operations.

The Environment Agency most recent odour guidance was published in 2025 (replacing the previous 2011 guidance “H4 odour management - how to comply with your environmental permit”). The updated guidance shifts the regulatory compliance away from numeric odour limits (including dispersion modelling), focusing instead on demonstrating "Best Available Techniques" (BAT) and strict "appropriate measures" to prevent or minimize off-site odour pollution. An OMP is also required to be prepared and maintained. The OMP must include or refer to a site odour risk assessment. If the Environment Agency considers that your activity presents a high risk of causing odour pollution, you must submit your OMP with your permit application for approval.

The British Institute of Air Quality Management (IAQM) has also published a guideline to address the specific topic of odour assessment applicable for planning purposes (‘Guidance on the assessment of odour for planning’). The IAQM guidance gives a risk-based framework for evaluating odour impacts in UK planning. The methodology requires assessing the source-pathway-receptor linkage when assessing odour effects. This assessment may be qualitative in nature; however this is dependent on the judgment of the assessor. The IAQM identifies a range of assessment tools which may be used in the assessment of effects, including reference to the UK dispersion modelling criteria. The IAQM risk-based approach has been used in New Zealand to support resource consent applications.

Table 5 Summary of relevant English and Welsh Odour Regulations and Guidelines

Legislation/Guideline	Overview
Guidance on the assessment of odour for planning (2018) - IAQM (2026 draft prepared for consultation)	– Good practice guide for assessing odour – Review of assessment methodology • Odour modelling (and odour concentration criteria guidelines) • Risk based assessments – considering odour risk in terms of the Source-Pathway- Receptor • Monitoring – OMPs
Odour management: comply with your environmental permit. Environment Agency 2025 (England and Wales)	– Applies to facilities which are regulated by the Environment Agency (EA) - and require an environment permit – most WWTPs are not regulated by the EA – Replaced the previous H4 Odour Management guidance which were considered to be too prescriptive. – Numeric benchmarks and prescribed methodologies are absent. – Change to: • Site specific risk management • Operator competence and behaviour • Demonstrable effectiveness of controls over time – Odour modelling and performance odour concentration have been largely dropped but may be used as supporting evidence for: • New developments in sensitive locations • High risk or complex sites • Situations where impacts are disputed – OMP is now central to odour compliance – Increasing weight on complaints – Implementing Best Available Technology (BAT)

3.2.4.4 Germany / European Union

Odour regulation in the EU is largely decentralised and various between member states. At the European level, odour emission management falls within EU policies on air quality and integrated pollution prevention and control, particularly under the Industrial Emissions Directive (IED). IED is the primary EU legislation regulating odour. It requires industrial, agricultural, and waste-management installations to obtain permits to operate. These permits require operators to use BAT to minimise pollution. Sector-specific Best Available Techniques Reference Documents (BREFs) dictate the standard practices for industries, including wastewater treatment.

The Technical Instructions on Air Quality Control (TA Luft) is a foundational German environmental regulation that went into force in 2021 and serves as a primary tool for implementing BAT. The TA Luft introduced new, nationwide regulations specifically designed to protect residents and local communities from industrial odour nuisance. The regulation specified quantitative ambient air odour performance criteria which specifies the maximum number of 'odour hours' which can occur in a residential area and non-residential area. Compliance with criteria demonstrated using either dispersion modelling predictions or odour field observations. The field observations are to be conducted in accordance with the EN 16841. Prior to be incorporated into the TA Luft (2021) the modelling and observation performance criteria were published as guidelines[6].

Table 6 Summary of relevant German regulations

Legislation/Guideline	Overview
Technical Instructions on Air Quality Control – TA Luft, (2021) (Germany) – Appendix 7	– Based on effects – Based on an 'odour hours' concept – Allowed frequency occurrence of odour hours – 10% of time in residential and 15% in commercial and industrial areas – Compliance through either • Dispersion modelling • Field odour observations (Grid measurement - EN 16841 Part 1)
Best Available Techniques (BAT) Reference Document for Common Wastewater and Waste Gas Treatment/Management Systems in the Chemical Sector (2016)	– BAT - reference for setting permit conditions for installations covered by Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control)
EN 12255-9:2023 (E) Wastewater treatment plants - Part 9: Odour control and ventilation	– Design principles and performance requirements for odour control and associated ventilation for wastewater treatment plants – Emphasises early planning – Source identification admeasurement – Guidance on operation parameter for odour control
EN 16841 Part 1 and 2	– Method for the determination of the level of odour exposure in ambient air based on odour field observations. – Based on the VDI field odour observation method

3.2.5 Industrial Guidance and Standards

Most of the larger water utilities in Australia have published engineering design and performance technical standards for odour control units. The technical standards typically specify maximum odour and contaminant (e.g. H_2S and mercaptan) discharge concentrations, minimum odour removal rates, and discharge parameter (e.g. stack height and discharge velocity).

[6] Guideline on Odour in Ambient Air (GOAA) Feb. 2008 with supplement of 10 Sept. 2008

3.3 Review Findings

3.3.1 Summary of approaches

The emission of odour from WWTPs have generally been regulated as industrial emission sources. The Scottish Sewerage Nuisance COP (2006) is the only regulation identified in the literature which applied specifically to emissions of odour from WWTPs.

The approaches used by regulators to manage odour from industrial sources are summarised in Table 7. These approaches can be broadly categorised into those based on environmental performance, minimum engineering design and odour control, odour management systems, peer reviews, historical performance, and locational factors.

A summary of the some of the strengths and limitations of the different approaches are provided in Table 8 to Table 9. A more detailed discussion of dispersion modelling and OMP are provided in Sections 3.3.2 and 3.3.3.

Table 7 Summary of approaches to odour management and control

	Approaches
Environmental Effects	Odour dispersion modelling concentration limits
	Ambient air concentration limit
	Field observation odour standards (e.g. DIN EN 16841)
Engineering / Design	Minimum engineering design requirements
	Minimum odour control requirements
	Best Practical Option (BPO)/ Best Practical Means (BPM)
	Best Available Technology (BAT)
	Minimum emission performance standards for odour control devices
Management Plans	Odour Management Plan (OMP)
	Risk Based Odour Management Plan (RBOMP)
	Odour Improvement Plan (OIP)
Peer Review	Suitably Qualified Experienced Professional (SQEP)
Historical Performance	Complaints / Infringement Notices
Location	Minimum Separation Distances to sensitive receptors

Table 8 Summary of environmental performance approaches to odour control

Approach	Advantage	Limitation	Commentary
Odour dispersion modelling concentration limits	– Quantitative measure of performance. – Clear Pass/ fail test in assessment of odour effects. – Enables assessment of future impacts before construction or upgrades. – Relatively cost effective (compared to field observations). – Can be used to identify the main emission sources.	– High level of uncertainty associated with the modelling – Modelled emission rates often rely on limited sampling or generic emission factors, reducing confidence. There are very few sample and analysis providers in NZ. – Dispersion models predict only concentration not perceived nuisance – Different assumptions can lead to materially different outcomes, affecting regulatory certainty – Requires specialist expertise, software, and quality meteorological data both in those providing the assessment and those reviewing the assessment – Over reliance on modelling can lead to: – Compliance “on paper” but ongoing nuisance issues – Under-emphasis on operational management and mitigation measures – Model predictions do not account for site-specific context (e.g. community or individual tolerance)	– Modelling predictions incorporates a high level of uncertainty and assumption – Compliance with a modelling-based odour criterion does not mean that emissions would not have an odour nuisance effect – There has been a tendency for regulators to move away from relying solely on odour modelling – Risk that operator will focus on demonstrating compliance with an odour modelling standard rather than odour management – Useful as an assessment tool when used in conjunction with other methods – Most useful for new sources or for comparative assessment of changes at an existing site
Ambient air concentration limit	– Provides a quantitative measure of concentration in the air. – Measured concentrations can be compared against performance standard – providing a clear pass/fail test.	– Instrumental monitoring can be costly to in install and maintain. At the low range needed for ambient monitoring, sensors are cross-sensitive to other substances leading to false positives. – Point sampling can provide only a limited spatial understanding of odour – Typical instrumental gas monitors only monitor a single chemical compound, typically H_2S for WWTPs, as indicator of odour. – Instrumental ‘electronic’ noses (multi-array sensors) have several technical limitations and are not currently considered a “mature” technology.	– Difficult to accurately assess the odour effect with existing monitoring technology – Little ambient air monitoring has occurred at NZ for WWTPs which is consistent with international experience – Some WWTPs in Europe, Australia and the Middle East are starting to include field monitoring, however only from an operational viewpoint and not for regulatory purposes.
Field odour observations	– Alignment with real-world odour nuisance. – There is international experience in implementing this method and standard methodology.	– Odour field observations are still subjective, and results will vary between observers. – Require an extensive monitoring programme to give statistical reliable information (EN 16841 Part 1). This would be costly to implement and require trained observers.	– Field observations provide the closest link to actual nuisance, but their subjectivity and cost to implement would be a limitation on using them as a performance standard in NZ. – Odour field observations programmes have most commonly been undertaken in NZ to support consent applications or when odour issues have arisen.

Table 9 Summary of minimum engineering design and control approaches to odour control

Approach	Advantage	Limitation	Commentary
Minimum engineering design requirements	– Embedding proven physical controls at sources reduces odour generation before it occurs. – Establishes minimum expectations for plant design. – Easier to verify compliance through design review and inspection. – Promotes the consideration of odour control at design stage.	– Prescriptive requirements may not reflect local conditions, scale, or risk. – Compliance with design standards does not necessarily ensure no off-site odour effects. – May impose greater controls than are necessary, leading to increased costs.	– Provides a baseline for odour control. – However, could be overly prescriptive and insufficiently outcome-focused. – There would also be technical limitations in demonstrating compliance with an olfactory based odour emission performance standard. – Wording of some engineering design requirements in discharge consents restricts the use of new, more efficient technologies.
Minimum odour control requirements	– Ensures that minimum odour controls are implemented at sites for high-risk sources – Targets odour at the source (most effective control point) – Improves regulatory certainty and enforceability – Supports good industry practice and risk reduction	– Prescriptive requirements may not reflect local conditions, scale, or risk. – Even with best-practice, odours may still occur. – Operators may aim to meet minimum requirements only. – Potentially high capital and operational costs – May impose significant capital and operational costs on low risk sites. – Emission testing would be required to demonstrate emission standard compliance, which may be an ongoing cost.	
Best Practical Option (BPO)/ Best Practical Means (BPM)	– Enables site-specific solutions that consider scale, sensitivity, and local conditions. – Recognises economic costs – Encourages ongoing review and upgrading of odour controls. – Widely recognised in NZ and UK frameworks.	– Potential for inconsistent application and challenging to enforce. – Lack of fixed limits or prescriptive requirements can make it harder to define clear compliance thresholds. – Risk of under-control if cost weighting dominates.	– Provides an adaptable and pragmatic framework, well suited to the variability of wastewater systems. – They are most effective when combined with clear outcome expectations (e.g., no offensive odour beyond boundary) and supporting tools. – Encourages good practices to be followed.
Best Available Technology (BAT) (Economically Achievable, EA)	– Aligns with international frameworks (EU and UK) – Aligns with some parts of Australia (SA) – Encourages continuous technological improvement	– Potentially high capital and operational costs – Can be overly prescriptive in practice (favouring established technologies) – Potential to lead to over-engineered solutions – Unlike BPO/BPM, cost is not considered	– Provides a high-performance, technology-driven standard – Cost, complexity, and technology focus means they are most effective when combined with site-specific, outcome-based measures to ensure both technical excellence and real-world effectiveness.

Table 10 Summary of odour management approaches to odour control

Approach	Advantage	Limitation	Commentary
Odour Management Plan (OMP)	– OMPs provide comprehensive, tailored approaches to managing odour. – Strong focus on operational control and continuous improvement. – Supports proactive risk management. – Improves regulatory transparency and accountability.	– Outcomes depend heavily on how well the OMP is developed and implemented. – Can become a 'paper exercise' without enforcement. – Requires ongoing resourcing and commitment.	– Provides a flexible, operationally focused framework that is highly effective at managing real-world odour risks over time. – They are best used alongside performance-based standards and/or minimum control requirements to ensure both accountability and measurable outcomes.
Risk Based Odour Management Plan (RBOMP)	– RBOMPs prioritise effort where odour risk is highest – More proactive than OMPs – Improves control of complex and variable odour sources. – Typically includes more rigorous monitoring, performance indicators, trigger levels, and response protocols, improving transparency and regulatory confidence.	– Significantly higher complexity and costs. – Effectiveness depends on accurate identification and ranking of risk. – Less clear compliance benchmarks. – Risk of administrative burden over practical outcomes. – Requires strong regulatory capability.	– Provides a more targeted and detailed approach to managing odour when compared to standard OMPs. Helps focused effort where there is greatest risk of odour nuisance. – Approach introduces greater complexity and cost. – Consistent with the Vic EPA approach to odour management.
Odour Improvement Plan (OIP)	– Directly outcome-focused and problem driven. – Clear pathway to improvement. – Flexible and site-specific. – Encourages continuous regulatory tools.	– Reactive rather than preventative. – Potential delay in achieving outcomes – Regulatory burden and oversight required – Difficult to assess when the OIP has achieved success – Potential for incremental rather than optimal solutions	– Provides a practical, enforceable mechanism to address existing odour issues – Reactive nature and reliance on implementation quality mean they are best used alongside proactive measures (e.g., design requirements, OMPs, or RBOMPs).

Table 11 Summary of other approaches to odour control

Approach	Advantage	Limitation	Commentary
Suitably Qualified & Experienced Professional (SQEP)	– Independent expert review. – Can provide proactive risk reduction – identification of issues and assessment of BPO/BAT option at the start rather than when they occur. – Provides technical support for the regulator and operators. – Has been adopted in other NZ standards. An example is the National Environmental NES-IGHG.	– Could be onerous if applied uniformly to all facilities (e.g. low-risk facilities).	– There could be a useful role for SQEPs as a reviewer. – Provision for a SQEP would be consistent with other local and international standards – Would allow for site specific factors to be considered without overly complicating the standard.
Complaints / Infringement Notices	– Outcome-focused and practical – Simple to implement – Encourages active odour management	– Nuisance effects are subjective. Odour complaints can only be indicative of whether an odour nuisance effect is present or not – Complaints, in and of themselves, can be vexatious and therefore misleading.	– Complaint records or infringement notices could be used as indicators of whether additional odour control is required (e.g. OIP).
Minimum Separation Distances	– Simple, preventative risk management tool – Highly practical and easy to implement. – Supports long-term planning certainty. – Widely used by Australian EPAs as a simple screening method.	– Published separation distances are generic and do not account for site specific factors. – Published separation distances are usually conservative. – Not adaptable to operational or technological improvements. – Difficult to apply to existing facilities/infrastructure. – The basis of published separation distances is often uncertain.	– Provides a simple planning-friendly tool for managing odour risk. – More suitable when applied to new facilities. – Separation distance would need to be considered alongside other factors. – Uncertainty in what happens if the separation distance cannot be met or a change of surrounding land use occurs.

3.3.2 Odour Dispersion Modelling

Odour dispersion modelling has in the past been widely used for the assessment of odour nuisance effect. A summary of the status of dispersion modelling in different jurisdictions is presented in Table 8.

Table 12 Status of dispersion modelling in different jurisdictions

Country	Regulatory Limit	Guideline	Tool	Commentary
New Zealand		☑		MfE's Good Practice Guide for Odour contains concentration guideline limits – not intended as "pass or fail" test. Only for new plants or comparative analysis when changes are occurring to an existing plant.
Australia				
NSW	☑			Assessment criteria based dependent on population densities. Draft update published in 2026.
Victoria			☑	Moved away from odour modelling in 2022 (regulatory limits no longer defined). Modelling alone is not sufficient for an assessment of effect.
Queensland		☑		Existing Plants: Greater weighting on complaints data than modelling for existing plants with modifications. New Plants: Odour dispersion modelling suggested to provide framework to estimate impacts and opportunities for reductions.
Tasmania	☑			Odour modelling criteria are defined in Environment Protection Policy (Air Quality) 2004.
South Australia	☑			Odour modelling criteria are defined in the Environment Protection (Air Quality) Policy 2016.
Western Australia			☑	No odour criteria is defined. Modelling only used for comparative assessment.
UK + Germany				
UK		☑	☑	Used for odour nuisance assessment – local councils. Environment Agency only consider odour modelling as tool to assist in the development of odour management plans
Germany	☑			Modelling or odour field observation are used to assess. emissions against ambient air performance criteria.

Recently regulators have tended to move away from relying on dispersion modelling predictions as the only means of assessing odour effects. This has been due to the limitations of odour modelling, including:

– the uncertainty associated with accurately characterising odour emissions
– the cost associated with odour sampling and testing
– the predictive limitations of the model

Some regulators also considered there had been an over-emphasis of showing compliance against a numerical odour concentration limit rather than considering wider odour management and risk mitigation. In New Zealand, modelling is most often used in conjunction with other odour assessment methods.

The GPG Odour provides guidance for when odour modelling may be appropriate, recommending it is most appropriately used for new or modified emission sources.

There are no standards for odour. However, odour dispersion modelling guidelines are recommended in the GPG Odour. The guidelines are threshold concentrations, against which 1-hour average dispersion model results are compared.

However, the GPG Odour states that odour-modelling guideline values should not be interpreted as a 'pass or fail' test. Predicted guideline value breaches do not necessarily mean that adverse odour effects will occur. However, they have tended to be interpreted as indicator of whether a discharge will have an adverse effect.

The modelling guidelines have two components: 1-hour average odour concentration limits (defined in terms of OU/m^3) and the percentage of hours compliance with the concentration limit that is required to be achieved. The guidelines are defined in terms of the sensitivity of the receiving environment (classified as Low, Moderate and, High).

The MfE recommends using the 99.5 percentile concentration as the baseline but notes that the 99.9 percentile may also be useful in evaluating model results. The MfE guidance references international studies that show that the 99.5 percentile concentration provides a more robust assessment criteria for continuous or semi continuous emission sources, such as WWTPs[7]. Typically, resource consent applications have used the 99.5 concentration.

Other international regulators have published different odour modelling criteria. Although it is difficult to make direct comparisons, due to the form of the criteria, the MfE criteria are generally comparable or more conservative than those promulgated by other regulators.

3.3.3 Odour Management Plans

Odour management plans are widely required by regulators for large industrial sources, including WWTPs, and common included as resource consent conditions.

A summary of the requirements of OMPs across the UK (Scotland's Code of Practice and Department of Environment, Food and Rural Affairs, Department for Environment Food and Rural Affairs (DEFRA)), Ontario and the GPG Odour are presented in Table 13 for comparison.

[7] Ministry for the Environment, 2002. *Review of Odour Management in New Zealand – Technical Background Report*, p128.

Table 13 Summary of local and international requirements of an OMP

Region	Scottish Code of Practice	DEFRA	Ontario	MfE Good Practice Guide for Odour
Commentary	Required for all WWTPs serving a population of more than 500.	OMP required if you carry out any high-risk activities including WWTP activities (mechanical biological treatment, waste sludge treatment, anaerobic digestion)	OMP (BMPP – best management practice plan) is required when: – Screening shows insufficient setback distance to receptors, or – The facility involves prescribed odorous activities (North American Industry Classification System (NAICS) based triggers).	OMPs are generally required for large odorous sources. However, an OMP may also be required as a regional plan rule condition.
Requirements	1. Summary of Site, WWTP, odour sources and locations of receptors 2. Details of site management responsibilities and procedures for: a. Reporting faults, b. Identifying maintenance needs, c. Replenishing consumables d. Complaints procedures 3. Odour critical plant operations and management procedures (correct use of plan, process, materials, checks on plant performance, maintenance and inspection) 4. Operative training 5. Maintenance and inspection of plant (routine and emergency) 6. Spillage management procedures 7. Record keeping (format, responsibilities and locations of records) 8. Emergency breakdown and incident response planning (including responsibilities and	1. Measures taken to control odour (raw materials, intermediate products, processes, releases, containment, abatement, enhanced dispersion, impact mitigation) 2. Measures taken to address identified risks 3. Must also identify: a. Auditable records b. Relevant performance standards c. Monitoring d. How you will interpret monitoring results e. How you will document your decisions 4. Must avoid tentative statements 5. Receptors at risk from your site (within 500m for waste treatment) 6. Inventory of odorous sources on site 7. Odour incident reports 8. Odour incident response planning 9. Reviewed annually and review and approval process	1. Identify each source of odour and the process associated with the odour, site/ process location and the cause of odour. Identify potential causes for significant changes in odour emissions; 2. Ensure any BMPs developed are consistent with any established Environmental Compliance Approval (ECA) terms and conditions or specific regulatory or approval requirements; 3. Incorporate measures and procedures to prevent or minimize the discharge of odour; Continually evaluate odour sources and effectiveness of existing BMPs. 4. Revise BMPP to include any new or additional sources with appropriate actions and BMPs, including schedule of implementation and any associated maintenance, frequency or inspection requirements and/or employee training; and 5. Keep a copy at the facility for review or inspection 6. The BMPP must be dated, signed and sealed by a licensed engineering practitioner 7. The best management practices plan for odour and the odour control	1. Key Personnel and Contact Details 2. Complaints 3. Process Description and Method of Operation 4. Methods of Mitigation and Operating Procedures 5. Monitoring 6. Staff Training 7. System Review and Reporting Procedures

Region	Scottish Code of Practice	DEFRA	Ontario	MfE Good Practice Guide for Odour
	mechanisms for liaison with local authority		report must be reviewed at least once in every 10-year period by a licensed engineering practitioner.	

4. Discharge to Air WEPS Framework

4.1 Approaches considered

A range of possible standard frameworks were identified in the literature review. These included frameworks orientated around:

– Dispersion modelling criteria and limits
– Ambient air odour concentration limits, assessed through instrumental monitoring and/or field observations
– Minimum odour control and/or engineering requirements
– Odour emission performance limits
– Odour control and management procedures implemented through odour management plans

Based on consideration of the strengths and limitations of the approaches a WEPS framework has been proposed based on the implementation and maintenance of good odour control practices through odour management plans and odour improvement plans where a nuisance effect exist.

The Scottish Sewerage Nuisance COP with reference to the MfE GPG has, to some extent, served as a model for the proposed WEPS framework. However, there are differences between the requirements of these two frameworks particularly with regards to the consideration of odour risk.

The decision to follow this development pathway was based on the following considerations:

– Odour nuisance risk is considered best minimised proactively through the implementation and maintenance of odour management and controls.
– The appropriateness of different odour controls will vary between WWTP sites. The WEPS framework therefore needs to be flexible to accommodate different sizes and types of WWTPs and the environmental context in which they are located. Odour management plans have this flexibility as they are developed for site specific conditions and can have more stringent inclusion requirements as the risk increases.
– The proposed WEPS framework is generally consistent with existing air discharge resource consent conditions. WWTP operators and consenting authorities will be familiar with these conditions, though some current consent conditions will be, more appropriately, moved into OMPs rather than as a consent condition.
– The focus on implementation of good odour management and control procedures is consistent with that adopted internationally by other regulatory authorities.
– There are technical limitations specifying a WEPS framework based on either dispersion modelling performance criteria concentrations or an ambient odour monitoring limits (including instrumental monitoring and field observations). By themselves they are not considered to be sufficiently robust to form a basis of a standard. They focus on monitoring environmental performance outcome rather than minimising the risk of an odour nuisance occurring. There are also limitations in the New Zealand market for odour sampling and analysis which would be required should dispersion modelling become a regulatory requirement.
– Prescribing specific odour control technologies or emission performance requirements were considered to be too rigid and prescriptive and may impose additional costs to the operator, which is not justified by the environmental outcomes, or would require the implementation of odour control measures which are not suited to site conditions. Instead, a focus has been placed on operators implementing best practical option (BPO), particularly for new WWTPs and when significant plant upgrades occur as a means of gradually improving odour control over time. Odour control and emission criteria are more appropriately considered on a site—by—site basis.

4.2 Premise of the WEPS framework

The objective of the proposed WEPS framework is to:

– Set consistent standard and level of performance expectations across the country to clarify requirements and streamline consenting processes
– Apply to both existing and new WWTPs.
– Reduce the likelihood of nuisance odour being experienced beyond the site boundary of WWTPs through the implementation of minimum odour control and management practices.
– Provide a structured process for implementation of additional odour controls at site where odour nuisance issues occur.
– Promote the continual improvement of odour control measures and management practices over time through the application of the Best Practicable Option (BPO).
– Provide confidence that appropriate odour controls and management practices have been implemented through an independent review process.
– Align odour control and management requirements with the odour risk presented by the WWTP.

4.3 Summary of Feasibility Testing

The WEPS that was initially developed was tested against a range of existing and planned WWTPs. This initial WEPS, pre-feasibility testing, is presented in Appendix A. The WWTPs considered were chosen to be broadly representative of the types and sizes of WWTPs located in New Zealand and their familiarity to the research team. Some were chosen as they were known to challenge the proposed WEPS (e.g. changes in design capacity and surrounding land use and historical odour issues).

The information used for the feasibility testing was derived from publicly available information.

The findings of the testing were incorporated back into the proposed framework. The feasibility testing of the proposed WEPS considered:

– The classification of existing WWTPs according to their potential odour risk.
– Whether the proposed odour control and management requirements were proportionate to the level of control required under existing resource consent conditions and appropriate to the assessed level of odour risk.

Feeback was also received from Taumata Arowai during the development of the standard. As a result of the feasibility assessment and stakeholder feedback, several refinements were made to the proposed standard.

These refinements improved the proportionality, clarity, and practical applicability of the proposed standard across a range of WWTP sizes and operating contexts.

A summary of the feasibility testing is provided in Appendix B.

5. Recommended WEPS Framework for Consultation

The proposed standard's framework is shown in Figure 2. The framework incorporates the following elements:

– Minimum performance requirements applicable for all WWTP sites, irrespective of the population served.
– Classification of WWTPs according to their potential odour risk through an odour risk classification (ORC) system. The ORC is a measure of the odour risk potential of the facility and proximity of sensitive activities.
– Implementation of odour mitigation measures that are proportionate to the WWTP's ORC through an OMP.
– Completion of an odour risk assessment (ORA) for WWTPs where higher-risk emission sources may have the potential to cause, or currently causing, odour nuisance effect beyond the site boundary. The ORA is intended to identify events that may give rise to odour nuisance and to support the development of appropriate mitigation and management measures to minimise these risks.
– Application of the BPO for new WWTPs and during significant upgrades to existing WWTPs. It is anticipated that BPO can be more readily incorporated in new WWTPs and during the upgrade of existing plants compared within existing operations. BPO would consider the containment and abatement of odour sources, and performance monitoring.
– Where odour nuisance issues exist, implementation of additional odour mitigation measures through an odour improvement plan (OIP). A WWTP cannot be considered a Very Low risk if it has verified existing odour issues.
– Independent review by a Suitably Qualified and Experienced Person (SQEP) of the proposed mitigation measures at WWTPs with a higher risk for odour nuisance effects (as detailed in the ORA, OMP and OIP).

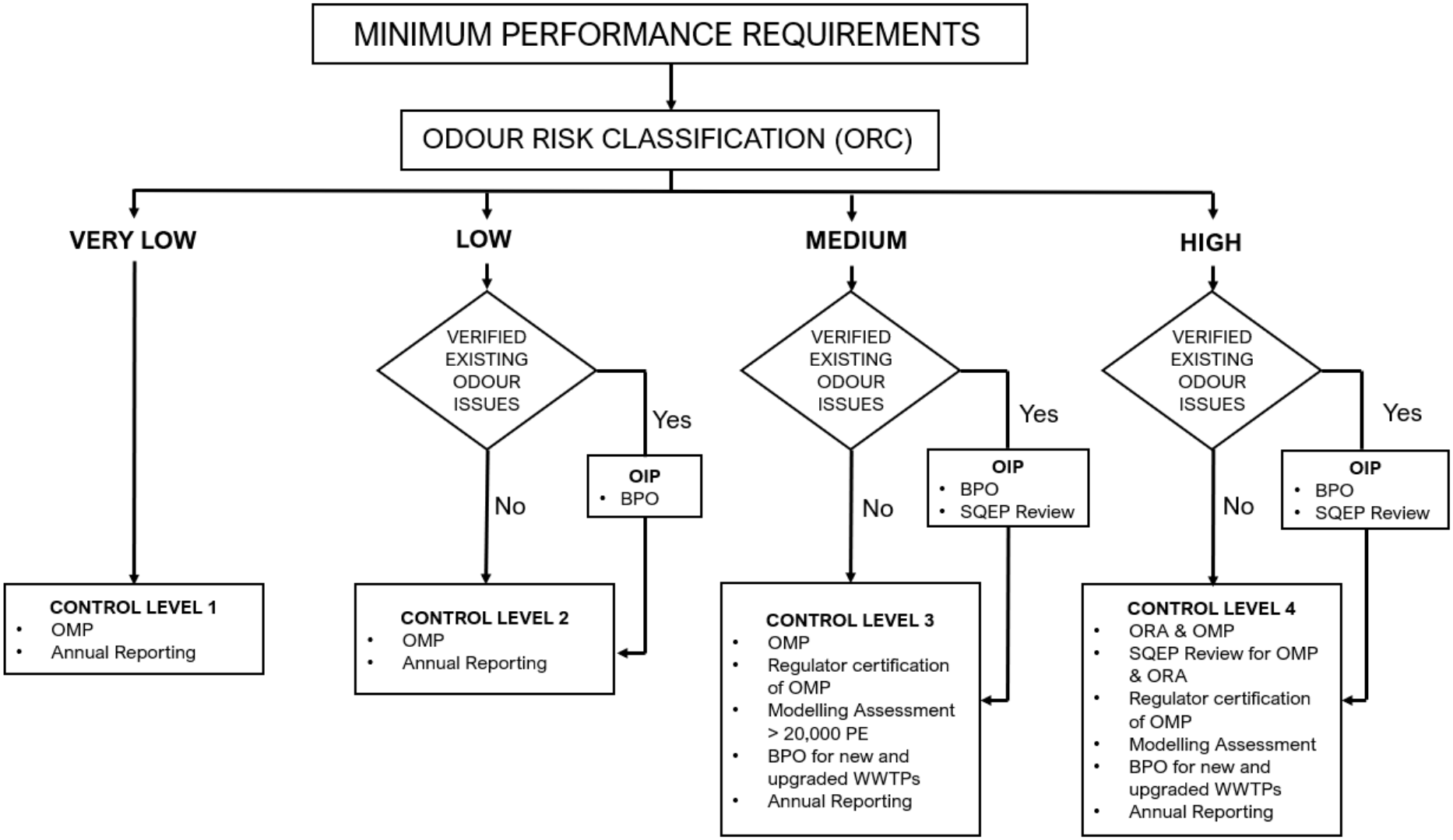


Figure 2 *Overview of the proposed WEPS framework*

5.1 What the standard does not include

The proposed standard does not specify the following:

– Quantitative emission performance limits, including maximum contaminant discharge rates, discharge concentrations, or odour removal efficacies for odour control units (OCU). Such performance criteria are influenced by the odour treatment technology employed and are therefore best determined on a site-by site basis where required. These can, however, be included in the monitoring section of the OMP for higher risk sites.
– Quantitative ambient odour performance limits, such as ambient air concentrations limits for specific odorous compound (e.g. H_2S) or standardised field odour assessment criteria (such as those adopted in Germany). As discussed in section 4.1, these approaches are associated with technical limitations, uncertainties and significant implementation costs. These can, however, be included in the monitoring section of the OMP for higher risk sites if deemed appropriate.
– Prescriptive minimum odour control requirements or specific odour control technologies. The proposed standard has been structured on the basis that appropriate odour controls will be identified and implemented through the application of the BPO.

5.2 Minimum Performance Requirements (MPRs)

5.2.1 Purpose of the MPRs

The MPRs establish the baseline odour performance requirements that apply to all WWTP.

5.2.2 Overview of the MPRs

The proposed MPRs are presented in Table 14. The MPRs reflect standard conditions commonly incorporated into the resource consents.

MPR1 specifies the expected environmental odour performance standard applicable to emissions from all WWTPs. The assessment of whether an odour is objectionable or offensive is to be based on the FIDOL factors (Frequency, Intensity, Duration, Offensiveness, and Location) and therefore may vary depending on the surrounding land use and expected amenity values.

Table 14 Proposed minimum performance requirement

No.	Requirement	Typical Condition
MPR1	Environmental performance criteria for odour nuisance. The criteria have been expanded to include odour potential from dust which may result from the handling of dried biosolids	Beyond the boundary of the site, there shall be no odour or dust caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, offensive or objectionable.
MPR2	Requirement to prepare an OMP	The consent holder shall prepare an OMP in accordance with the requirement of the standard. The purpose of the OMP is to set out the operational procedures and mitigation measures necessary to comply with the Minimum Performance Requirements MPR1 and minimise emissions of odour from the WWTP.
MPR3	Requirement to operate the facility in accordance with the OMP	The consent holder shall operate and undertake activities at the site in accordance with the Odour Management Plan at all times.
MPR4	Maintenance of an odour complaint register. It is expected that the complaint register would be implemented as part of the OMP.	A record of any complaints relating to the odour shall be maintained, and include: a. the location where the odour was detected by the complainant; b. the date and time when the odour was detected;

No.	Requirement	Typical Condition
	The complaint register would also be used for reporting purposes and verified complaint as trigger to determine if an OIP is required.	c. a description of the wind speed and wind direction when the odour was detected by the complainant; d. the most likely cause of the odour detected; and e. any corrective action undertaken to avoid, remedy or mitigate the odour detected by the complainant Records demonstrating compliance with the above condition shall be provided to the consenting authority on request and shall be summarised as part of the Annual Environmental Report. Records shall be kept for a period of at least 10 years.
MPR5	Requirement to ensure all odour control equipment is operational and well maintained.	No part of the process shall be operated without the associated emissions control equipment being operational and functioning correctly, as evidenced through an explicit inspection and maintenance programme and record.
MPR6	Requirement to minimise fugitive emissions	All processing equipment, buildings, ducting and emissions control equipment shall be maintained in good condition and as far as practicable be free from leaks in order to prevent the escape of fugitive emissions.
MPR7	Requirement for a walkover to occur according to the OMP requirements.	At a minimum a walkover inspection of the WWTP site shall be undertaken at a frequency detailed in the Odour Management Plan to identify any odours that may be originating from the site. The results shall be recorded and any odour potentially detectable off-site investigated immediately. Where necessary, remedial action shall be undertaken as soon as practicable.
MRP8	Requirement for staff training	Staff at all levels having duties related to the management, operation, maintenance or repair of odour critical processes and plant shall be appropriately trained and competent and have documented training records.

5.3 Odour Risk Classification (ORC)

5.3.1 Purpose of the ORC

The ORC categorises WWTPs in terms of their potential risk to generate an odour nuisance effect. The level of control and odour management required by the proposed standard varies with respect to the odour risk. A description of the ORC levels is provided in Table 15.

The ‘Very Low’ and ‘Low Risk’ ORC categories are intended to recognise that small WWTPs generally have a lower potential to generate odour nuisance effects due to their physical size and lower organic loading. The ORC categories have also taken into account the distribution of existing WWTPs in New Zealand, where a large proportion of facilities are comparatively small. Based on the Taumata Arowai consent database, approximately 47% of all municipal WWTPs serve populations of less than 1,000 people, while 18% of all municipal WWTPs serve fewer than 100 people. The Very Low and Low Risk categories therefore provide a practical and proportionate framework for managing odour risks of a substantial proportion of New Zealand's wastewater treatment facilities without imposing unnecessarily onerous requirements.

Table 15 Odour risk classification (ORC) descriptions

Risk	Description
Very Low Risk	Very small WWTPs serving a population (or population equivalent (PE)) of less than 100 for which there is very small risk of odour nuisance effect occurring.
Low Risk	WWTPs for which there is low risk of nuisance odour being experienced due to their relatively small size and the separation distance to nearby sensitive activities.
Medium Risk	There is some risk an odour nuisance due to the increase in the size of the WWTP or the proximity of sensitive activities. However, during normal operating conditions this risk is still expected to be relatively low provided standard odour management practices are observed.
High Risk	There is higher risk that a nuisance odour could occur due to the size of the facility, the proximity of sensitive activities and the treatment processes which are occurring onsite.

5.3.2 ORC Definitions

5.3.2.1 ORC Odorous Processes

With regards to the classification of WWTPs in term of the ORC, an “odorous process” is defined to be any of the following:

– Preliminary treatment processes
– Primary treatment processes
– Secondary treatment processes, including aeration and facultative ponds and bioreactors
– Biosolids and sludge management and processing
– Odour control units
– Septage receival
– Onsite storage and pumping of untreated wastewater, sludge, biosolids and associated products (screenings, centrate etc).

Some operations at WWTPs generate little or no odour and could be located closer to sensitive activities without there being any substantial increase in the risk of odour nuisance. In terms of the ORC, these operations are defined to be “non-odorous” when determining the separation distance to sensitive activities.

Non odorous processes are defined to be the following:

– Tertiary treatment processes, excluding advanced biological processes
– Storage of treated wastewater prior to discharge
– Auxiliary buildings and facilities such as workshops and control rooms
– Chemical storage

5.3.2.2 ORC Sensitive Activities

“Sensitive activities” in the proposed standard is defined only for purposes of classifying WWTPs in terms of the ORC. An activity may be considered a “sensitive activity” only if it is legally established activity or an activity which has been consented.

Sensitive activities in the standard are defined to be the following:

– Dwellings (urban and rural)
– Residential zoned areas
– Care centres
– Hospitals
– Health facilities
– Education facilities
– Marae
– Built community facility, including sports clubrooms and stadiums
– Areas of high cultural value (as defined in district plans)
– Visitor accommodation
– Excludes all activities located in an industrial zoned area
– Excludes all properties for which written approval has been provided, or equivalent.

Sensitive activities are primarily considered locations where people may be present during the day and night, where a higher level of air quality amenity could be expected.

Lower air quality amenity is expected in industrial and business zoned areas. Therefore, no activities in industrial and business zoned areas are assessed to be sensitive activities, including activities which would otherwise be assessed as sensitive activities (e.g. dwellings occurring in industrial or business zones).

The list of ORC sensitive activities excludes the following:

– Outdoor recreational areas – including open sports playing fields, reserves and golf courses,
– Commercial areas,
– 'Curtilage' which would be roads/sheds/gardens etc associated with a location.

5.3.2.3 Distance to a Sensitive Activity

The distance between any of the 'odorous processes' (as defined by the WEPS) and 'sensitive activities' used to assess the ORC is the smaller distance of the following:

a. The minimum distance from the edge of the odorous process and
   i. the façade of a dwellings and accommodation located on rural zoned properties or in public reserves or
   ii. the facade of built community facilities
b. The minimum distance from the edge of the odorous process and the legal property boundary of 'sensitive activities' for sensitive activities other than those identified in a) existing at the time of consent.

5.3.3 ORC Categorisation

The proposed ORC categorisation is shown in Table 16. The ORC is based on the unmitigated odour potential of the WWTP and the separation distance between odour generating treatment processes and sensitive activities. The odour potential is assumed to vary according to the treatment capacity of the plant and the type of treatment process employed.

– Treatment capacity is defined in terms of maximum monthly average PE which is predicted to occur in any 12-month period.
– The plant treatment capacity the projected treatment capacity at end of the 35-year period.

Table 16 Odour risk classification (ORC) categories

Risk		Condition
Very Low Risk	1	New or existing WWTPs serving a population of less than or equal to 100 PE and has no history of verified odour complaints.
Low Risk	1	New or existing WWTPs serving a population of less than or equal to 100 PE, with verified existing odour issues.
	Or	
	2	New or existing WWTPs serving a population of 100 to 500 PE.
	Or	
	3	New or existing WWTPs serving a population of 501 to 1,000 PE, and No sensitive activities within 150m of the WWTPs odorous processes, and Domestic and service trade wastes only, or only a small amount of industrial waste.
Medium Risk	1	All new or existing WWTPs are classified being Medium Risk unless they are defined to be Very Low, Low or High Risk.
High Risk	1	New or existing WWTPs serving a population of >400,000 PE
	Or	
	2	New or existing WWTPs serving a population of >100,000 PE, and Sensitive activities within 500m of the WWTPs odorous processes.
	Or	
	3	New or existing WWTPs serving a population of >50,0000 to 100,000 PE, and Sensitive activities within 400m of the WWTPs odorous processes, and Uncovered preliminary treatment, primary treatment or the following sludge and biosolids processing operations: – Thermal drying

Risk		Condition
		– Anaerobic digestion – Composting – Solar drying – Sludge pyrolysis
	Or	
	4	New or existing WWTPs serving a population of greater than >30,000, and Sensitive activities within 300m of the WWTPs odorous processes
	Or	
	5	New WWTP serving a population of greater than 15,000 PE and Sensitive activities within 200m of the WWTPs odorous processes

5.3.4 Changes to the ORC over the consent period

A WWTP's ORC classification may change during the consent period in response to changes in the plant operations or the surrounding land use. The ORC should be calculated based on the PE projected at the end of the 35 years consent period. Any changes in the ORC classification will also trigger a corresponding change in the minimum odour control measures required to be implemented.

The ORC may change over the consent period in response to:

– Changes in the treatment capacity of the facility, or
– Changes to the treatment processes (such as inclusion of more high-risk odour sources), or
– Changes in the location of onsite 'odorous processes' if this changes the separation distance to sensitive receptors which were present or planned at the time of consenting.

5.3.4.1 Changes in Land Use

Over time, changes in planned land use (through distinct plan zoning amendments) may result in new sensitive activities being located closer to a WWTP than those that existed or were anticipated at the time that the consent was granted. These changes may have reserve sensitivity effects.

To account for unforeseen changes in land use which may impose unreasonable odour control requirements and associated costs on operators, it is intended that:

– The ORC is determined at the time of the consent being granted based on existing and consented 'Sensitive Activities' only.
– The ORC may change over the consent period only if new 'Sensitive Activity' were to be located closer to a WWTP's odorous process if that activity would have been permitted by the district plan rules (or any future regulatory instrument that replaces a district plan) operative at the time the consent was granted.
– The ORC must be reviewed, to take into account any new 'Sensitive Activities', at the time the OMP is reviewed by the operator, however only if new 'Sensitive Activities' would have been permitted by the district plan rules (or any future regulatory instrument that replaces a district plan) operative at the time the consent was granted.

Notwithstanding the above, the consent holder will still need to comply with MPR1 (see Table 14).

5.3.4.2 Timeframe for Implementing Changes Triggered by a Change in ORC

Any changes to odour control requirements arising from changes to the WWTP shall be implemented prior to those changes becoming operational.

Any changes to the ORC and odour control requirements arising from changes to surrounding 'Sensitive Activities' must be implemented within 12 months, or within an alternative timeframe agreed with the consenting authority.

5.4 Odour Control Requirements

The ORC odour control requirements are shown in Table 17. The controls listed in the table are defined to be the 'Primary Odour Controls'.

Where an odour nuisance issue is determined to exist, additional 'Advanced Odour Controls' are to be implemented through an OIP. The 'Advanced Odour Controls' are defined in Table 18.

Table 17 Primary Odour Controls per ORC Category

Requirement	Very Low Risk ORC Control Level 1	Low Risk ORC Control Level 2	Medium Risk ORC Control Level 3	High Risk ORC Control Level 4
Verification of existing odour issues assessment	Yes	Yes	Yes	Yes
Odour Management Plan (OMP)	OMP Level 1	OMP Level 2	OMP Level 3	OMP Level 4
Independent Suitably Qualified Experienced Person (SQEP) review of OMP	No	No	No	Yes
Requirement to adopt Best Practicable Option (BPO)	No	No	New Plants & Significant upgrades only	New Plant & Significant upgrades only
Odour risk assessment (ORA) to inform OMP	No	No	No	Yes
Independent Suitably Qualified Experienced Person (SQEP) review of ORA	No	No	No	Yes
Modelling assessment to support the proposed mitigation (modelling used as tool to show expected changes, not a performance standard)	No	No	New Plants & significant upgrades (>20,000 PE)	New Plants & significant upgrades
Submission of an annual report to the consenting authority for comment and approval	Yes	Yes	Yes	Yes

Table 18 Advanced Odour Controls with regard to ORC

Requirement	Very Low Risk	Low Risk ORC	Medium Risk ORC	High Risk ORC
Odour Improvement Plan (OIP)	Yes	Yes	Yes	Yes
Best Practicable Option (BPO)	Yes	Yes	Yes	Yes
Independent Suitably Qualified Experienced Person (SQEP) review of OIP	No	No	Yes	Yes

5.5 Odour Management Plans (OMP)

5.5.1 Purpose of the OMP

The OMP is intended to form the foundation of the proposed standard.

The purpose of the OMP is to document the on-site sources of odour and to set out operational procedures and mitigation measures necessary to comply with the Minimum Performance Requirements MPR1 and to minimise emissions of odour beyond the site boundary of the WWTP.

The consent holder shall operate and undertake activities at the site in accordance with the Odour Management Plan at all times, as required by MPR3.

5.5.2 OMP Overview

Under the proposed standard, all WWTPs would require an OMP. However, the level of detail provided in the OMP would vary in proportion to the WWTP ORC category.

The format of the OMP should provide sufficient detail to allow operators and staff to clearly understand the operational procedures for both normal and abnormal operating conditions.

The OMP would is to be approved by the consenting authority for WWTPs classified as having a Medium or High-Risk ORC.

An ORA is to be undertaken for WWTPs classified as having a High-Risk ORC. The mitigation identified in the ORA to incorporated into the OMP.

A SQEP is required to review the OMP and any associated ORA for all WWTPs classified as having a High-Risk ORC. The role of the SQEP is to provide an independent assessment of whether odour risk have been appropriately identified, and whether suitable mitigation and monitoring measures have been implemented. The role of the SQEP is detailed in Section 5.9.2.2 .

5.5.3 OMP Framework

The proposed OMP framework has been derived from the MfE's GPG Odour recommendations, existing consent requirements, and guidance published by international regulatory authorities. The proposed OMP framework reflects current industry practice in odour management, including a focus on proactive identification of odour risks, the implementation of practical mitigation measures, and the establishment of clear monitoring, response, and continuous improvement processes.

The expectation is the requirements and detail of the OMP would be proportionate to level of odour risk (i.e. ORC). The proposed OMP requirements for each ORC category are presented in Table 19. The level of information required for each OMP requirement is indicated in Appendix C and is tailored based on relative scale and risk of the WWTP.

Table 19 Odour Management Plans Requirements

OMP Level 1 & 2* (Very Low ORC and Low Risk ORC)	OMP Level 3 (Medium Risk ORC)	OMP Level 4 (High Risk ORC)
1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: 6. Inspections and maintenance procedures 7. Emission and operational performance criteria and how these criteria will be monitored 8. Odour monitoring procedures 9. Complaint investigation and resolution procedures 10. Contingency procedures for resolving plant malfunctions 11. Staff training requirements 12. OMP review and reporting requirements	1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: 6. Inspections and maintenance procedures 7. Emission and operational performance criteria and how these criteria will be monitored 8. Odour monitoring procedures 9. Complaint investigation and resolution procedures 10. Contingency procedures for resolving plant malfunctions 11. Staff training requirements 12. OMP review and reporting requirements 13. Submitted to consenting authority for approval The operator must provide a report showing that BPO has been adopted for: – the odour control for new WWTPs and – WWTPs where significant upgrades have occurred.	1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: 6. Inspections and maintenance procedures 7. Emission and operational performance criteria and how these criteria will be monitored 8. Odour monitoring procedures 9. Complaint investigation and resolution procedures 10. Contingency procedures for resolving plant malfunctions 11. Staff training requirements 12. OMP review and reporting requirements 13. Review of OMP (and ORA) by a SQEP 14. Submitted to consenting authority for approval The operator must provide a report showing that BPO has been adopted for: – the odour control for new WWTPs and – WWTPs where significant upgrades have occurred. An odour risk assessment is to be prepared in support of the proposed odour mitigation in the OMP.

* Further detail on OMP Level 1 & 2 requirements are explained in Appendix C

5.6 Odour Risk Assessment (ORA)

5.6.1 Purpose of the ORA

An Odour Risk Assessment (ORA) is to be prepared for each WWTP classified as having a High-Risk ORC. For these WWTPs, the risk of adverse odour effect is high and additional consideration as to how these risks will be minimised is required.

The purposes ORA is to identify odour risks, characterise the implication of these risks, and determine how they will be monitored and mitigated. The ORA is to inform the OMP.

This section sets out minimum requirements for an ORA for inclusion in the WEPS. Recommended guidance material is developed to support the WEPS.

5.6.2 ORA Framework

The requirements of the ORA are:

– Identify odour risks associated with both normal and abnormal operating conditions.
– Characterise the likelihood and consequence of each identified risk.
– Identify the measures that will be implemented to mitigate each risk.
– Identify how each risk will be monitored.
– Characterise the likelihood and the consequence of the residual risk following the implementation of the mitigation measures.
– Identify contingency measures to be implemented if the mitigation measures prove ineffective.
– Demonstrate how BPO has been applied.

As a minimum, the ORA shall consider potential discharges to air from the following processes:

– Preliminary treatment.
– Primary treatment.
– Secondary treatment.
– Sludge and biosolids management, storage and processing, and
– Septage reception.

Dispersion modelling may be used to inform the ORA regarding the potential off-site odour risk associated with different emissions sources.

The ORA is to be reviewed by an independent SQEP. The role of the SQEP is detailed in Section 5.9.2.2 .

5.7 Odour Dispersion Modelling

5.7.1 Purpose of odour modelling

Odour dispersion modelling is to be undertaken to provide supporting evidence that the odour mitigation detailed in the OMP is appropriate and emissions from the WWTP would comply with the Minimum Performance Criteria MPR1

Odour dispersion modelling is to be undertaken for the following WWTP:

– New WWTPs classified as High-Risk or Medium-Risk ORC facilities with a design treatment capacity greater than 20,000 PE.
– Existing WWTPs classified as High-Risk or Medium-Risk ORC facilities with a design treatment capacity greater than 20,000 PE that are undergoing a significant upgrade.

However, odour dispersion modelling has recognised limitations. Accordingly, an odour dispersion modelling concentration limit standard has not been proposed.

5.7.2 Odour Modelling Framework

The modelling shall be undertaken in general accordance with the guidance provided by the MfE (2004) 'Good Practice Guide for Atmospheric Dispersion Modelling' (GPG Modelling).

Odour emissions from the WWTP shall be simulated using at least one year of representative meteorological data.

The 99.5 percentile, 1-hour average odour concentrations, expressed in odour units (OU), shall be predicted at locations beyond the site boundary and at all nearby sensitive activities.

The predicted 99.5 percentile concentrations shall be compared with the GPG Odour 'Recommended odour-modelling guideline values. The 'Recommended odour-modelling guideline values' are not a performance standard.

Emission from existing operation and proposed operation are to be modelled.

Emission conditions are to be peak operating conditions.

Odour emission rates are to be conservatively derived.

The modelling methodology and results shall be documented and provided to the consenting authority. As a minimum, the following information shall be included:

– The location of the modelled emissions sources
– Details of the modelled odour emission rates and the basis on which those emission rates were derived.
– Details of the meteorological inputs used in the modelling assessment.
– Details of how any building structures and topographical effects were incorporated into the modelling.
– The location of the sensitive receptors included in the assessment.
– The predicted 99.5 percentile, 1-hour average odour concentrations at each of these sensitive receptors for the proposed WWTP and the existing WWTP at sites where a significant change in operations has been proposed
– The predicted change in the 99.5 percentile, 1-hour average odour concentrations at each of these sensitive receptors between proposed and existing conditions.
– Identify sensitive receptors where the predicted odour concentrations exceed the MfE GPG Odour 'Recommended odour-modelling guideline values.
– Evaluation of the odour risk at sensitive activities where the predicted odour concentrations exceed the GPG Odour recommended odour-modelling guideline values.

5.8 Odour Improvement Plan (OIP)

5.8.1 Purpose of the OIP

The purpose of the Odour Improvement Plan (OIP) is to:

– Provide a structured process for the implementation of additional odour mitigation measures where reasonable evidence suggests that odour nuisance issues are occurring from site operations.
– Establish clear implementation timeframes and expected environmental outcomes.
– Support the application of the BPO.
– Supplement the proposed standards 'Primary Odour Controls' requirements set out in section 5.4.

It is not intended for an Odour Improvement Plan (OIP) to be triggered as a consequence of odour generated from events that are:

– Planned operational maintenance activities of limited duration when appropriate consideration has been given to odour management, or
– Short duration unscheduled maintenance operations, or
– One-off or infrequent unverified odour complaints are received by the operator, asset owner or consenting authority.

5.8.2 When an OIP is Initiated

The OIP shall be initiated under any of the following circumstances:

a. An abatement notice has been issued, or
b. A consenting authority determines community amenity is being significantly affected by the WWTP taking into account FIDOL factors, or
c. Three or more complaints, as verified by a consenting authority officer taking into account FIDOL factors, have been received within a 90-day period that are not associated with events identified in section 5.8.1, or
d. Eight or more complaints, as verified by a consenting authority officer taking into account FIDOL factors, are received within any 12-month period that are not associated with events identified in section 5.8.1, or
e. Prior to the granting of a consent when any of the above conditions (i.e. a), b), c), and d) have occurred in the past 12-month period.

5.8.3 OIP Framework

The OIP shall be implemented through a staged process comprising:

1. An initial investigation,
2. Evaluation of options and preparation of the OIP,
3. Implementation of the OIP, and
4. Post-implementation review.

The proposed implementation timeframes for each stage of the OIP shall be submitted to the consenting authority for review and approval. BPO principles shall be applied throughout the development, implementation, and review of the OIP to ensure that odour management measures are effective, proportionate, and practicable.

The completed OIP, including proposed mitigation measures, performance objectives, and implementation schedules, shall be submitted to the consenting authority for approval

OIPs prepared for Medium-Risk and High-Risk WWTPs shall undergo independent technical review by a SQEP, to verify the adequacy of the assessment, proposed controls, and implementation strategy

A summary of the proposed OIP stages is provided in Table 20.

Table 20 Stages of the OIP

Stage	Description
Initiation	The consenting authority verifies odour discharge as having an offensive or objectionable effect beyond the site boundary.
1. Initial Investigation	– Preliminary investigation by the operator to identify source(s) and cause(s) of the odour nuisance. – Findings of the preliminary investigation shall be submitted to the consenting authority within a month of the initiation of the OIP process.
2. OIP Development	– A further detailed evaluation of the odour control options shall be undertaken by the operator. – Based on the evaluation of mitigation measures an OIP shall be developed. The OIP will: • Detail what additional mitigation measures shall be implemented. • How the performance of the proposed additional mitigation measures will be monitored. • Timeframes for the implementation of the OIP shall be provided. • Demonstration that the OIP is representative of the BPO. • Demonstration that implementation of the OIP will mitigate existing odour nuisance effects. – The operator will provide a timeframe for the development and submission of the OIP to the consenting authority for approval at the start of Stage 2. – For WWTPs classified as having a Medium or High-Risk ORC rating, the OIP shall be independently reviewed by a SQEP. The review is to be provided to the consenting authority with the OIP. Any differences of opinion are to be identified and reasons provided. – The OIP shall be submitted to the consenting authority for approval.
3. Implementation of the OIP	– Once approved, the OIP shall be implemented. – Any delays in the timeframe of the implementation of the OIP are to be provided to the consenting authority with reasons provided.
4. Post Implementation	– Provide confirmation to the consenting authority when the OIP has been implemented, and design odour performance criteria have been achieved. – An updated OMP is to be provided to the consenting authority for approval.

5.9 Suitably Qualified and Experienced Person (SQEP)

A SQEP is defined as a practitioner or other person whom the relevant consent authority determines:

– Holds a relevant tertiary qualification related to wastewater treatment and/or associated odour emissions.
– Has at least 10 years' experience working in wastewater treatment and the reduction of odour emissions.
– Can provide an independent review and recommendations relating to the discharge of any odour from wastewater treatment processes.

Further guidance may be required to support its application and to ensure alignment with the Tranche 1 standard.

5.9.1 When is SQEP Required

An independent review by a SQEP is required in the following circumstances:

– Medium-Risk ORC: Review of the OIP, where one is required.
– High-Risk ORC: Review of the OMP, ORA and OIP, where one is required.

The applicant shall provide the consent authority with the SQEP's recommendations and reasons, as part of the consent application.

5.9.2 Roles and Responsibilities of the SQEP

5.9.2.1 SQEP Responsibilities for the Odour Management Plan (OMP)

For High-Risk ORC WWTPs, the OMP must be reviewed by a SQEP who is independent of the WWTP operator and did not prepare the OMP and:

- Assess whether all significant odour sources have been identified.
- Confirm that potential odour-sensitive receptors and activities have been appropriately considered.
- Evaluate whether the proposed odour mitigation measures are suitable and proportionate to the odour risk.
- Review the adequacy of operational controls, maintenance procedures, monitoring programmes, complaint response procedures, and contingency measures.
- Confirm that the OMP provides sufficient detail for managing odour during normal and abnormal operating conditions.
- Provide recommendations for any additional controls, monitoring, or management measures required.
- Provide an independent opinion on whether the OMP is likely to minimise the risk of offensive or objectionable odour beyond the site boundary.

5.9.2.2 SQEP Responsibilities for the Odour Risk Assessment (ORA)

For High-Risk ORC WWTPs, the ORA must be reviewed by a SQEP who is independent of the WWTP operator and did not prepare the ORA and:

- Review the completeness of the ORA and identify any gaps or deficiencies.
- Assess whether odour risks associated with both normal and abnormal operating conditions have been reasonably identified.
- Evaluate the likelihood and consequence ratings assigned to identified odour risks.
- Assess the adequacy of proposed mitigation measures and monitoring procedures.
- Review residual risk assessments following implementation of mitigation measures.
- Assess whether contingency measures are appropriate should primary controls prove ineffective.
- Review any supporting odour dispersion modelling used to inform the assessment.
- Assess whether the proposed controls are sufficient to minimise the risk of adverse odour effects beyond the site boundary.
- Confirm whether the assessment appropriately demonstrates the application of Best Practicable Option (BPO) for new WWTPs and existing WWTPs undergoing significant upgrades.
- Identify any additional controls or procedures required to reduce odour risk.

5.9.2.3 SQEP Responsibilities for the Odour Improvement Plan (OIP)

For Medium-Risk and High-Risk ORC WWTPs, where an OIP is required, a SQEP who is independent of the WWTP operator and did not prepare the OIP must:

- Review the OIP before submission to the consenting authority.
- Assess the adequacy of the investigation into the causes of the odour nuisance.
- Evaluate whether the proposed mitigation measures are technically appropriate and represent a reasonable response to the identified odour issues.
- Assess whether the proposed actions reflect the Best Practicable Option (BPO).
- Review the proposed implementation programme and timeframes.
- Assess the adequacy of performance monitoring and verification measures.
- Confirm whether the proposed OIP is likely to remedy or substantially reduce the identified odour nuisance effects.
- Provide recommendations on any additional mitigation measures, monitoring requirements, or implementation actions.

– Document any areas of disagreement between the SQEP and the operator, including supporting reasons, for submission to the consenting authority.

5.10 Reporting Requirements

An annual report is to be prepared and submitted to the consenting authority. The following shall be reported:

– Detail of any odour complaint received and follow up enquiries.
– Detail of any infringement and abatement notices.
– Detail of any part of the OMP that requires reporting, including any monitoring carried out.
– Detail of the progress of any OIP.
– Any non-compliance with the MPR.
– Any change of the WWTP ORC and actions taken.

References

Brinkmann et al, 2016, *Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector*; EUR 28112 EN; doi:10.2791/37535

Bull et al, 2018, *IAQM Guidance on the assessment of odour for planning – version 1.1*, Institute of Air Quality Management, London

Brisbane City Council, 2014, *Brisbane City Plan 2014*, Version 36 effective 12 June 2026, Government Gazette No. 47 on 30 June 2014.

Centre of Expertise for Waters (CREW), 2016. Odour management and monitoring in Scottish waste water treatment plants.

Environment Agency 2025, *Odour management: comply with your environmental permit,* Bristol, United Kingdom

EPA South Australia, 2016, *Ambient air quality assessment,* Adelaide: EPA South Australia

EPA South Australia, 2023, *Evaluation distance for effective air quality and noise management,* Adelaide: EPA South Australia

EPA Tasmania, 2004, *Environment Protection Policy (Air Quality) 2004*, Hobart: EPA Tasmania

EPA Tasmania, 2020, *Air Dispersion Modelling Guidelines*, Hobart: EPA Tasmania

EPA Victoria, 2022, *Guidance for assessing odour*, Publication 1883, Carlton: EPA Victoria.

EPA Victoria, 2024, *Separation distance guideline*, Publication 1949, Melbourne: EPA Victoria

EPA Victoria, 2025, *Guideline for assessing and minimising air pollution in Victoria*, EPA Publication 1961.2, Melbourne: EPA Victoria.

European Committee for Standardization 2016, *EN 16841-1 Ambient air - Determination of odour in ambient air by using field inspection - Part 1: Grid method*, Brussels

European Committee for Standardization 2016, *EN 16841-2 Ambient air - Determination of odour in ambient air by using field inspection - Part 2: Plume method*, Brussels

European Committee for Standardization 2023, *EN 12255-9:2023 (E) Wastewater treatment plants - Part 9: Odour control and ventilation*, Brussels

German Federal Government 2021, *Technical Instructions on Air Quality Control – TA Luft*, Appendix 7, Berlin, Germany

Government of South Australia, 2016, *Environment Protection (Air Quality) Policy 2016,* Version 18.5.2023

Ministry for the Environment, 2004, *Good Practice Guide for Atmospheric Dispersion Modelling*, Wellington: Ministry for the Environment.

Ministry for the Environment, 2012, *Users' Guide: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health,* Wellington: Ministry for the Environment.

Ministry for the Environment, 2016, *Good Practice Guide for Assessing and Managing Odour*, Wellington: Ministry for the Environment.

Ministry for the Environment, 2002*. Review of Odour Management in New Zealand – Technical Background Report*

Ministry of the Environment, Conservation, and Parks 2017, *Best management practices for industrial sources of odour,* Toronto, Ontario

New South Wales Department of Environment and Conservation, 2006, *Technical Framework: Assessment and management of odour from stationary sources in NSW*, Sydney: Department of Environment and Conservation.

New South Wales Environment Protection Authority, 2022, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, Parramatta: NSW Environment Protection Authority.

New South Wales Environment Protection Authority, 2026, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales: DRAFT FOR CONSULTATION*, Parramatta: NSW Environment Protection Authority.

New Zealand Government 2004*, Resource Management (National Environmental Standards for Air Quality) Regulations 2004*, Wellington: Ministry for the Environment.

New Zealand Government 2023, *Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023*, Wellington: Ministry for the Environment.

New Zealand Government, 2025, Water Services: Wastewater Environmental Performance Standards Regulations, Wellington.

New Zealand Water and Wastes Association Inc, 2000, *Manual for Wastewater Odour Management,* Wellington: New Zealand Water and Wastes Association Inc.

Queensland Department of Environment, Science and Innovation, 2024, *Guideline: Odour Impact Assessment from Developments*, Version 3.0, ESR/2024/6828, ABN 46 640 294 485.

Queensland Department of Environment, Science and Innovation, 2025, *Guideline: Application requirements for activities with impacts to air*, Version 5.05, Section 125 of the Environmental Protection Act 1994, ESR/2015/1840, ABN 46 640 294 485.

Queensland Department of Environment, Tourism, Science and Innovation, 2025, *Environmental Authority Conditions - ERA 63 – Sewage Treatment Model Conditions*, ESR/2015/1668, ABN 46 640 294 485.

Queensland Government, 2019, *Environmental Protection (Air) Policy 2019*, Subordinate Legislation 2019 No. 153 made under the Environmental Protection Act 1994.

Quinn, B., McLelland, I., Broomfield, M., Gibson, N., del Vento, S. 2016. *Odour management and monitoring in Scottish waste water treatment plants.* CRW2015/06.

Scottish Executive Environment Group, 2005, *Code of Practice on Assessment and Control of Odour Nuisance from Waste Water Treatment Works*, Edinburgh: Scottish Executive Environment Group.

Scottish Government, 2006, *The Sewerage Nuisance (Code of Practice) (Scotland) Order 2006*, Scottish Statutory Instruments 2006 No. 155, Edinburgh.

Water New Zealand, 2017, *Good Practice Guide for Waste Stabilisation Ponds: Design and Operation*, Wellington: Water New Zealand.

Appendices

Appendix A

Initially Proposed WEPS

A-1 Overview of the Initially Proposed WEPS

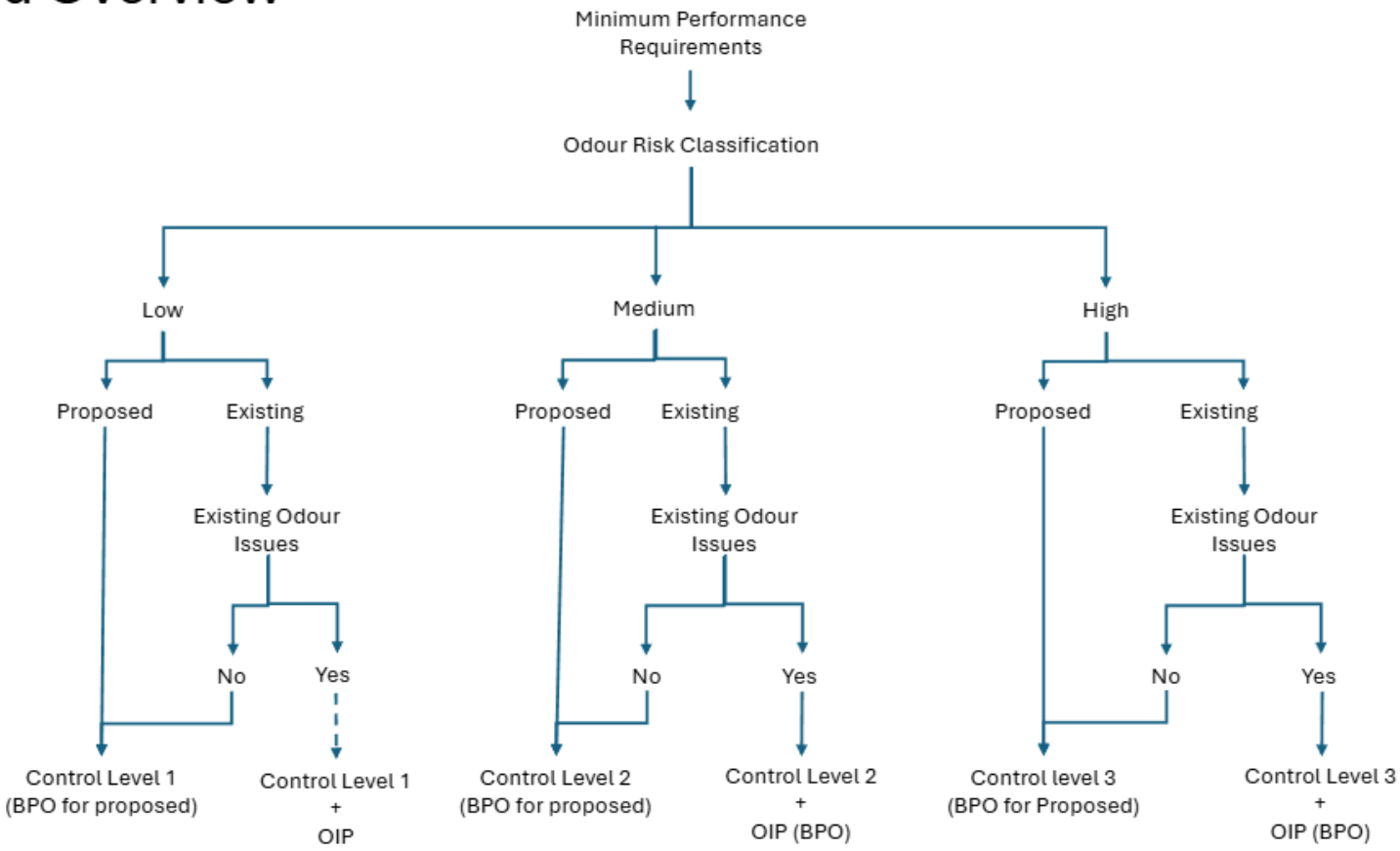
Overview of Possible Standard

- Minimum performance criteria – conditions which would apply to all sites
- Odour control and assessment requirements based on an "odour risk"
  - 'Odour risk' a function of 'Odour Potential' and the 'Sensitivity of the Receiving Environment' - as defined by the standard
- Differentiation between
  - existing plants and
  - new plants and existing plants where a significant changes occurs
- Require improvements to be implemented at sites where odour is an issue through the Odour Improvement Plan (OIP)

- Reviews by Suitably Qualified Experienced Person (SQEP) where there is a high risk
- Requirement to implement Best Practicable Option (BPO)
  - At design stage for new plants and when significant upgrades occur
  - Through the OIP when an odour nuisance effect exists

A-2 Initially Proposed WEPS

Standard Overview



A-3 Minimum Performance Requirements of the Initial Proposed WEPS

Minimum Performance Requirements for all sites

Requirement	Typical Condition
Environmental performance criteria for odour nuisance	There shall be no discharge of odour, in the opinion of an enforcement officer, as a result of exercising this consent that is offensive or objectionable beyond the site boundary.
Formalized complaint odour complaint register	A record of any complaints relating to the odour shall be maintained, and shall include: the location where the odour was detected by the complainant; a) the date and time when the odour was detected; b) a description of the wind speed and wind direction when the odour was detected by the complainant; c) the most likely cause of the odour detected; and d) any corrective action undertaken by to avoid, remedy or mitigate the odour detected by the complainant Records demonstrating compliance with the above condition shall be provided to the regulator on request and shall be summarised as part of the Annual Environmental Report. Records shall be keep for a period of at least 10 years
Requirement to ensure all emission control equipment and ventilation systems which service the emission control equipment are operational and appropriately maintained	A standard consent condition
Requirement to prepare an OMP	The consent holder shall prepare an Odour Management Plan in accordance to the standard
Requirement to operate the facility in accordance with the OMP	The consent holder shall operate and undertake activities at the site in accordance with the Odour Management Plan

A-4 ORC Definitions of the Initial Proposed WEPS

Odour Risk Classification

1. Risk Category Descriptions

Risk	Description
Low Risk	WWTP where there is expected to be a low risk of nuisance odour being experienced due to • Relatively small size of the facility • The separation distance to sensitive receptors • The odour potential of received wastewater
Medium Risk	There is some risk an odour could potentially be observed due to the scale or surroundings of the WWTP. However, during normal operating conditions this risk is still expected to be low provided standard odour management practices are observed.
High Risk	There is higher risk that a nuisance odour could occur due to the size of the facility, the proximity of sensitivity and the treatment processes which are occurring onsite.

2. Risk Category May Change – triggering a changes in odour control requirement

1. The odour risk may change over the operational period of the site due to
   - changes in the sensitivity of the receiving environment and/or
   - operational changes
2. The odour risk is to be reviewed on an annual basis which may requiring an update of the OMP and controls

A-5 ORC Categorisation Definitions of the Initial Proposed WEPS

Odour Risk Classification (working model for classification)

Risk		Condition
Medium Risk	1	All WWTPs are classified being medium risk unless they are defined to be low or high risk,
Low Risk	1	Operating within the design treatment capacity of the plant, and <500 PE
	2	Operating within the design treatment capacity of the plant, and <2000 PE, and No sensitive receptors within 150m of the WWTPs odorous processes, and Domestic and service trade wastes only, or only a small amount of industrial waste
High Risk	1	>100,000 PE, and Sensitive receptors within 500m of the WWTPs odorous processes
	2	>50,000 PE, and Sensitive receptors within 400m of the WWTPs odorous processes, and Uncovered preliminary treatment, primary treatment or the following sludge processing operations: • Thermal drying • Anaerobic digestion • Composting • Solar drying • Sludge pyrolysis
	3	>50,000 PE, and Residential area within 500m of the WWTPs odorous processes, and Treatment process could have a persistent odour nuisance effect if upset conditions were to occur due to extended recovery times (e.g. aerobic treatment ponds)
	4	>400,000 PE

Note:
WEPS (58)(1)(b) defines ***'small wastewater treatment plant'****:*

1. *the plant services wastewater from no more than 1,000 people; and*
2. *the plant does not service a significant volume of industrial and trade waste.*

Odour Improvement Plan (OIP)

Purpose

- Implementation of additional controls when there is an existing odour nuisance
- Control implemented in a structured manner with clear time frame
- An OIP is in addition of the Primary Controls

OIP Triggers

- If a regulator has determined that odour nuisance effect is occurring
- The regulator will prepare a report detailing the basis for an OIP to be implemented
- A regulator must undertake an assessment of whether an OIP is required when more than 10 verified complaints are received in any 12 months.

Overview

- A staged process
- Defined timeframes for each phase
- Regulator approval required at each stage
- Requires the implementation of BPO
- OIP for High Risk sites to be reviewed by SQEP

Stage 1 – Initial Evaluation

- Preliminary investigation by the operator to identify sources and causes of odour nuisance
- Timeframe for the completion of the investigation to be provided to the regulator for approval (within a month of OIP request?)
- Findings of the investigation are to be provided to the regulator

Stage 2 – Development of the OIP

- Based on Stage 1 a further detailed evaluation of the control options is to be undertaken.
- Based on the evaluation study a recommended OIP is to be developed. The OIP will:
  - Demonstrate the selection of the proposed control option is applying BPO
  - Demonstrate how the OIP will mitigate existing odour nuisance effects (can be modelling)
  - Provide a time frame for the implementation of the OIP
- For High Risk WWTPs the OIP is to be reviewed by SQEP.
- The OIP will be submitted to the regulator for approval.

Stage 3 – Post implementation of the OIP

- Provide confirmation to the regulator that the OIP has been implemented and design odour performance criteria have been achieved
- Updated OMP to be provided to regulator

A-6 Odour Management Requirements of the Initial Proposed WEPS

Odour Management Requirements

Primary Odour Risk Based Controls

Requirement	Lower Risk	Moderate Risk	Higher Risk
Odour Management Plan (OMP)	OMP (level 1)	OMP (level 2)	OMP (level 3) (Risk Based OMP)
Suitably Qualified Experienced Person (SQEP) Design Treatment Capacity Review (i.e. confirm the plant is not being overloaded)	Yes	No	No
Suitably Qualified Experienced Person (SQEP) review of OMP	No	No	Yes
Minimum operational/engineering requirements/meteorological monitoring etc	TBC	TBC	TBC
Requirement to adopt Best Practicable Option (BPO)	No	New Plants & significant upgrades only	New Plant & significant upgrades only
Odour risk assessment to inform OMP	No	No	Yes
Modelling assessment to support the proposed mitigation (modelling used as tool to show expected changes, not a performance standard)	No	New Plants & significant upgrades only (>20,000 PE)	New Plants & significant upgrades only
Submission of an annual report to regulator	Yes	Yes	Yes

In case where the Primary Controls have been implemented but odour nuisance exists

Requirement	Lower Risk	Moderate Risk	Higher Risk
Odour Improvement Plan (OIP)	Yes	Yes	Yes
Best Practicable Option (BPO)	Yes	Yes	Yes
Suitably Qualified Experienced Person review of OIP	No	Yes	Yes

A-7 Odour Management Plans of the Initial Proposed WEPS

Odour Management Plans wrt Odour Risk

OMP Level 1 (Low Risk)	OMP Level 2 (Medium Risk)	OMP Level 3 (High Risk)
1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: • Inspections and maintenance procedures • Emission and operational performance criteria and how these criteria will be monitored 6. Odour monitoring procedures 7. Complaint investigation and resolution procedures 8. Contingency procedures for resolving plant malfunctions 9. Staff training requirements 10. OMP review and reporting requirements	1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: • Inspections and maintenance procedures • Emission and operational performance criteria and how these criteria will be monitored 6. Odour monitoring procedures 7. Complaint investigation and resolution procedures 8. Contingency procedures for resolving plant malfunctions 9. Staff training requirements 10. OMP review and reporting requirements 11. Submitted to regulatory authority for certification The operator must provide a report showing that BPO has been adopted for: • the odour control for new WWTPs and • WWTP where significant upgrades have occurred.	1. Key personnel responsibilities and contact details 2. Site location and sensitive receptors 3. Process description 4. Identify sources of odour and how these emissions are to be mitigated 5. Description of odour mitigation methods including detail of the following: • Inspections and maintenance procedures • Emission and operational performance criteria and how these criteria will be monitored 6. Odour monitoring procedures 7. Complaint investigation and resolution procedures 8. Contingency procedures for resolving plant malfunctions 9. Staff training requirements 10. OMP review and reporting requirements 11. Review of OMP (and risk assessment) by a SQEP. 12. Submitted to regulatory authority for certification The operator must provide a report showing that BPO has been adopted for: • the odour control for new WWTPs and • WWTP where significant upgrades have occurred. An odour risk assessment is to be prepared in support of the proposed odour mitigation in the OMP.

Appendix B

Feasibility Testing

B-1 Summary of changes feasibility testing

Changes made in response to the feasibility testing and through consultation with Taumata Arowai included the following.

– Introduction of a “Very Low” odour risk category for WWTPs serving populations of fewer than 100 people. A decision was made that an OMP was still appropriate for the “Very Low” risk WWTP, but the requirements within the OMP would be less than that of a “Low” risk WWTP.
– Revision of the population threshold for the “Low” odour risk category condition. Reduction of the ORC threshold from populations of 2,000 to 1,000 to better align with the Tranche 1 standard and classifications for small treatment plants.
– Refinement of the criteria for the “High” odour risk category conditions. The conditions were expanded to include new WWTPs of capacity >15,000 PE and located close to sensitive activities. A separate condition for WWTP >30,000 PE with oxidation ponds was removed.
– Refinement of the definition of “sensitive activities” used within the risk classification framework. Additional activities were included (e.g. structured public amenity areas).
– Establishment of defined trigger conditions requiring the preparation of an odour improvement plan. The number of council officer verified complaints which would trigger an OIP was defined.
– Introduction of an odour dispersion modelling requirement for new WWTPs and for existing WWTPs undergoing significant modification which service populations >20,000.
– The condition requiring WWTPs to demonstrate that sufficient treatment capacity for the projected flow was removed. This condition was considered too ambiguous to be useful.
– The role of the Suitably Qualified and Experienced Person was also refined.

B-2 ORC Categorisation

B-2-1 Very Low ORC Risk WWTP

WWTP	Region	Population Served (TA Database)	Distance to closest Sensitive Activity	Risk Category	Treatment Process
Waipātiki Beach	Hawke's Bay	80	430m	Very Low	Recirculation tank, packed bed reactor and treated effluent storage tanks.
Burkes Pass	Canterbury	43 (60 during holidays)	180m	Very Low	Oxidation pond, with mechanical aeration
Maramarua	Waikato	22	30m	Very Low	a System of septic tanks, followed by a re-circulating media system
Lake Roxborough Village	Otago	82	380m	Very Low	Oxidation pond, with mechanical aeration

B-2-2 Low ORC Risk WWTP

WWTP	Region	Population Served (TA Database)	Distance to closest Sensitive Activity	Risk Category	Treatment Process
Seddon	Marlborough	685	250m	Low	Oxidation pond, plus multiple ponds in series
Havelock	Marlborough	571 (outdated number?)	400m	Low	Oxidation pond, plus maturation ponds with mechanical aeration
Takapau	Hawkes Bay	534	480m	Low	Oxidation pond, with mechanical aeration
Warrington	Otago	425	550m	Low	Oxidation pond, with mechanical aeration
Omarama	Canterbury	297	400m	Low	Oxidation ponds with mechanical aeration, discharge to land
Kingseat	Auckland	120	13m (very close)	Low	Small tank based WWTP close to houses

B-2-3 Medium ORC Risk WWTP

WWTP	Region	Population Served (TA Database)	Distance to closest Sensitive Activity	Risk Category	Treatment Process	Notes
Raglan	Waikato	4,850	220m	Medium	Conversion from oxidation ponds to MABR/MBR with aerated pond overflow capacity	Seasonal variation in population served. Future population of over 8,000 in 2055
Army Bay	Auckland	63,000 (future upgrade 180,000)	660m	Medium	DAF, SBR, centrifuge	WWTP located adjacent to a large public reserve Under the standard the open reserve area would not be considered in the determination of the ORC
Waiuku	Auckland	9,540	440m (180m on industrial land)	Medium	Aeration and maturation ponds	Only complaint received has been from Waiuku township
Kingston	Otago	800 - 3,600*	360m (consented residential) 70m (future residential)	Low - Medium	Developing over time from a Baxter plants+ oxidation ponds to 1-3 SBRs	New plant – being developed in stages (Stage 0 – 800 PE; Stage 3 – 3,600 PE) Future receptors much closer than existing Unconsented residential area – under 100m
Ahipara	Northland	500 Consent (2013) – 2,600PE	132m (rural) 300m (from residential)	Medium	Oxidation pond and artificial wetlands	
Geraldine	Canterbury	2,300 (approx.)	365m	Medium	Oxidation pond	
Coromandel Town	Waikato	2,205	130m	Medium	Oxidation pond, with mechanical aeration, maturation ponds	1,100 m³/day
Maungawhai	Northland	1,100	150m	Medium	SBR	Complaints received. Discharge to Land
Patea	Taranaki	1,400	300m	Medium	Oxidation pond, plus multiple ponds in series	
Te Kauwhata	Waikato	1,700 (old) 6,400 (new)	60 - 200m	Medium	MBR, ponds, wetland	Being reconsented
Pukekohe	Waikato	60,000	350m (rural)	Medium	MBR, maturation ponds in series, UV treatment geobags	New modern plant

B-2-4 High ORC Risk WWTPs

WWTP	Region	Population Served (TA Database)	Distance to closest Sensitive Activity	Risk Category	Treatment Process	Notes
Mangere	Auckland	1,424,000	480m	High	Activated sludge Anaerobic digestion	Largest WWTP in NZ
Bromley (Christchurch)	Canterbury	355,400	140m	High		
Seaview	Wellington	163,400	400m (holiday park) 500m (residential area)	High	Activated sludge Thermal sludge drying	Significant odour issues High risk classification triggered by holiday park
New Plymouth	Taranaki	62,000	450m (golf club room approximately 350m)	High	Band screens, grit trap, activated sludge reactors bioreactors, clarifiers, thermal drying	Discharge consent only required for sludge management (thermal dryer) High risk classification triggered by thermal drying
Gisborne	Gisborne	35,000	290m (residential area) 65m (on industrial land)	High (change in ORC from medium)	Inlet screens, biological trickling filter (BTF). Upgrade to include lamella clarifier tanks, a sludge storage, handling and dewatering facility and an UV disinfection plant	WWTP located in close proximity to dwelling are also located in an industrial zone area. Under the standard these dwellings would not be considered in the determination of the ORC Prior to the upgrade complaint were infrequently received (<1 per year on average) and not in any high sensitivity locations. Marginal 'High' classification ORC does not consider recreational area
Chapel Street	Bay of Plenty	66,000	300m (10m to shops)	High	Activated sludge Anaerobic digestor	Shops have in the past been impacted by odour (one source was the biofilters) Shops do not impact ORC classification

B-3 Full Assessments of WWTP

B-3-1 Seaview WTTP

The WEPS framework aligns largely with the existing consent conditions for the Seaview WWTP with a few differences. These differences include requirement for an OIP and SQEP review of the OMP, ORA and OIP assessment. The current consent conditions require pathogen monitoring which is not required under the proposed WEPS.

Seaview WWTP (Wellington)

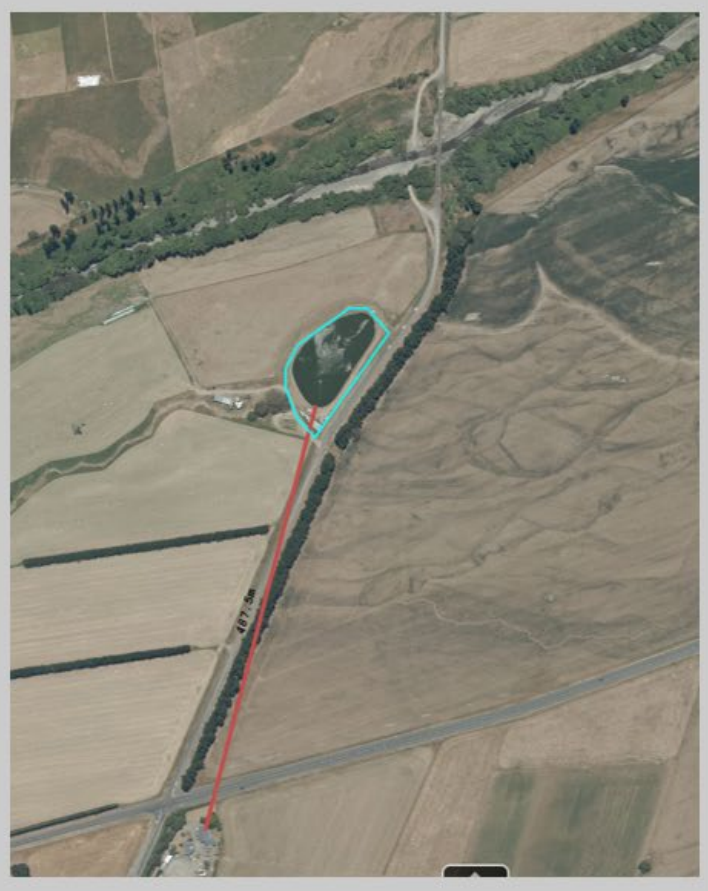
Treatment process	Activated Sludge, Thermal Sludge Drying Failures – resulted in non-compliance notices and **331** complaints (2024/25) Failure associated with biofilter, reactor (overloaded), and dryer malfunction A number of complaint came from people using the adjacent carpark
Population Served (PE)	163,400
Distance to Receptor	400m (holiday park) 500m (residential area)
Odour Risk Categorisation (ORC)	High
Proposed Std Requirements	• OMP Level 4 (SQEP Review of OMP) • ORA (SQEP Review of OMA) • Dispersion modelling • Submission of an annual report to regulator • OIP triggered / SQEP review / Best Practicable Option (BPO)
Current Discharge to Air Consent	Yes (WGN950162(01)) – granted 1996

Current Consent Conditions	• No offensive or objection odour or dust outside the boundary
	• BPO to apply to the treatment of all discharges to air
	• Risk assessment to be undertaken
	  • Risk assessment to include dispersion modelling
	  • Modelling to use 2 OU criteria to assess odour nuisance compliance
	  • Health assessment of VOC
	  • Evidence of redundancy in operators
	  • Identify contingency measures
	  • Evidence of control over the emission of pathogens
	• Environmental Management plan
	• Biofilter design and monitoring requirements
	• Initial pathogen monitoring programme (first 6 months)
	• Sludge dryer emission testing (PM, VOCs)
	• Combustion appliance emission testing
	• Complaint register

B-3-2 Takapau WWTP

The WEPS framework aligns with the existing consent conditions for the Takapau WWTP.

Takapau WWTP (Hawkes Bay)	
Treatment process	Covered mechanical screening - oxidation pond, with mechanical aeration – wetland
Population Served (PE)	Projected PE: 790 (in 2028) 1093 (in 2048)
Distance to Receptor	490m
Odour Risk Categorisation (ORC)	Low (Medium in 2048 , PE>1000 - marginal)
Proposed Std Requirements	• OMP Level 2 • Submission of an annual report to regulator
Current Discharge to Air Consent	Yes (AUTH-127079-01)
Current Consent Conditions	• No objectionable or offensive odour • Operation and Management Plan • Weather station (for land application) • Complaint register • Annual report (complaints)



B-3-3 Coromandel WWTP

The WEPS framework aligns with the existing consent conditions for the Coromandel WWTP.

Coromandel WWTP (Waikato)	
Treatment process	Oxidation pond, with mechanical aeration, maturation ponds 1,100 m^3/day
Population Served (PE)	2,205
Distance to Receptor	130m
Odour Risk Categorisation (ORC)	Medium
Proposed Std Requirements	• OMP Level 3 (regulator certification) • Submission of an annual report to regulator
Current Discharge Consent	Yes (Water discharge consent which includes odour requirements)
Current Consent Conditions	• No objectionable odour at or beyond site boundary • Management Plan (contingency measures for unusual events) • Annual reporting (against consent conditions) • Odour complaints register

B-3-4 Cardrona WWTP

The WEPS framework aligns with the existing consent conditions for the Cardrona WWTP.

Cardrona WWTP (Otago)	
Treatment process	SBR and UV treatment
Population Served (PE)	2,205 Seasonal (ski fields)
Distance to Receptor	520m
Odour Risk Categorisation (ORC)	Medium (based on PE> 1000) (Low may be more appropriate – raise the PE limit?)
Proposed Std Requirements	• OMP Level 3 (regulator certification) • Requirement to adopt Best Practicable Option (BPO) – requirement for a new WWTP • Submission of an annual report to regulator
Current Discharge Consent	Yes (Water discharge consent which includes odour requirements air discharges a permitted activity)
Current Consent Conditions	• No objectionable odour at or beyond site boundary • Management Plan (odour mitigation, complaints responses, contingency).

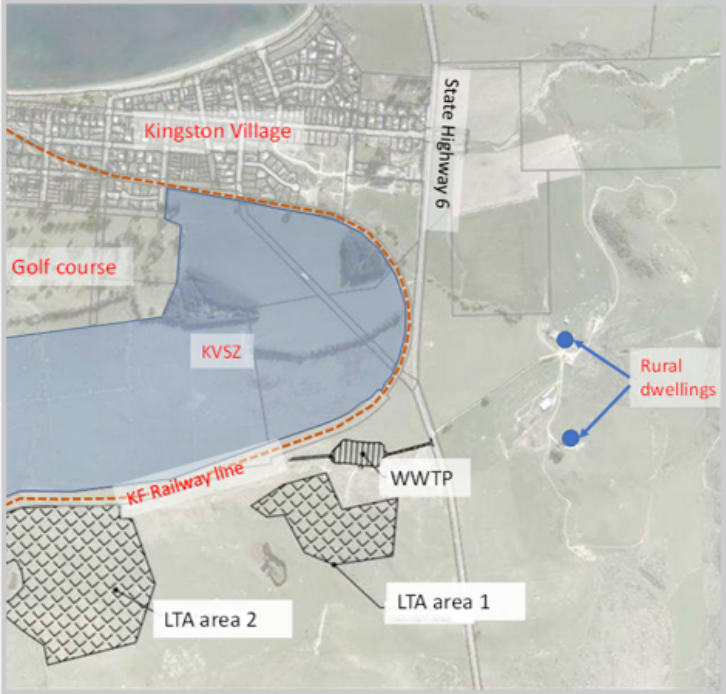
B-3-5 Kingston WWTP

The WEPS framework aligns largely with the existing consent conditions for the Kingston WWTP with a few differences. These differences include requirement for BPO requirements and the SQEP review of the OMP, ORA and OIP assessment.

Kingston WWTP (Otago) – new plant	
Treatment process	Phase 0 : Screen – FAST plant + oxidation pond - Disc Filter – UV treatment Phases 1 - 3: Screen – SBRs – Disc Filter – UV treatment Inlet works vented to OCU Expectation received wastewater will be septic and odorous during Phase 0 Disposal to land – not included in standard
Population Served (PE)	Phase 0: up to 800 Phases 1 – 3: 800 to 3600
Distance to Receptor	Existing dwellings – 550m Kingston Flyer rail line – 50m Kingston Village Special Zone – 70m Kingston Village Special Zone stage 1 consented – 360m
Odour Risk Categorisation (ORC)	Phase 0: Low (<1000 PE, 360m to nearest consented development) Phase 1-3: Medium (>1000 PE, 70m to nearest future development)

Proposed Std Requirements	**Changing requirement over consent period**
	• Phase 0: OMP Level 2
	• Phase 1-3: OMP Level 3 (OMP certification by regulator)
	• Minimum operational/engineering requirements
	  ◦ Phase 0: (covering of the inlet screen)
	  ◦ Phase 1 – 3 (Containment and venting inlet works to OCU
	  ◦ Phase 1 – 3 : Requirement to implement BPO (new plant)
	• Submission of an annual report to regulator

Current Discharge to Air Consent	Yes (RM25.202.01)
Current Consent Conditions	• "There must be no noxious, dangerous, offensive or objectionable odour that, in the opinion of an authorised officer of the Otago Regional Council, causes an adverse effect at or beyond the boundary of the site." • OMP • Complaint record and response requirements



B-3-6 Pukekohe WWTP

The WEPS framework aligns largely with the existing consent conditions for the Pukekohe WWTP with a few differences. These differences include requirement for BPO requirements, dispersion modelling assessment and the SQEP review of the OMP, ORA and OIP assessment. The current consent conditions requires community engagement, which the WEPS does not require.

Pukekohe WWTP (Waikato) – Upgraded Plant	
Treatment process	Primary screens, grit removal, activated sludge reactors, MBR, UV treatment, biofilter, sludge ponds, geobags, wetlands and septage disposal facility Daily odour walkovers Inlet work vented to odour control unit
Population Served (PE)	Up to 60,000
Distance to Receptor	350m (rural dwelling)
Odour Risk Categorisation (ORC)	Medium (over 30,000 PE but no sensitive receptors within 300m)
Proposed Std Requirements	• OMP Level 3 (regulator certification) • Requirement to adopt Best Practicable Option (BPO) • Dispersion modelling (as significant upgrade >20,000 PE) • Submission of an annual report to regulator
Current Discharge to Air Consent	Yes

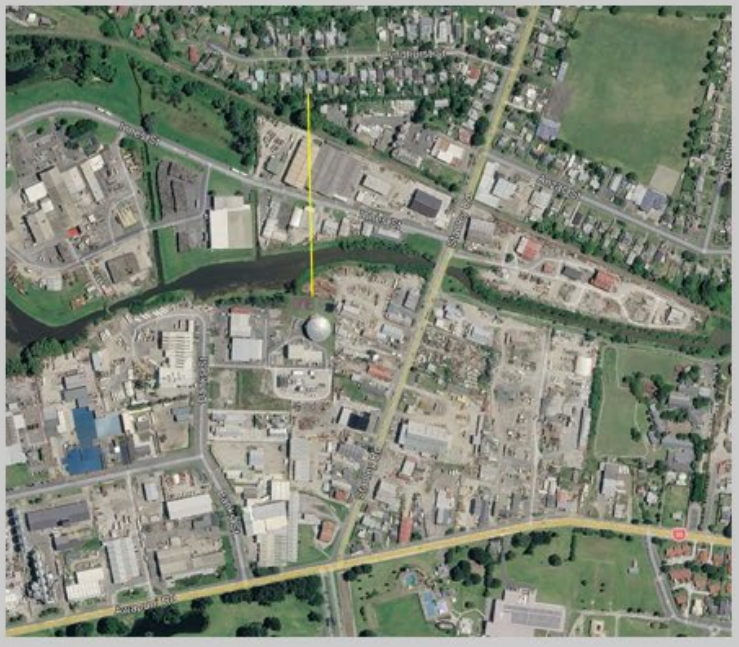
Current Consent Conditions	• Odour Management Plan (OMP)
	  • (reviewed every 5 years or as required any significant changes plant operation, maintenance or management)
	  • Submitted to Council
	  • Requirement to operate a meteorological monitoring station
	• Complaints register
	• Operations Management Plan (includes Odour Management Plan)
	• Community Liaison Group (including review of complaints register and OMP)
	• Monitoring and Technology Review Report every 5 years
	• Operation, management and maintenance of the Pukekohe WWTP shall not result in noxious, dangerous, offensive, or objectionable odour to the extent that it causes an adverse effect at or beyond the boundary of the site

B-3-7 Gisborne WWTP

The WEPS framework largely aligns with the existing consent conditions for the Gisborne WWTP with a few differences. These differences include requirement for dispersion modelling assessment and the SQEP review of the OMP, ORA and OIP assessment. The current consent conditions require odour surveys which the WEPS does not require.

Gisborne WWTP (Gisborne)	
Treatment process	Stage 1: Inlet work + BTF (enclosed and vented to a biofilter odour control unit) Upgraded to Stage 2: addition of two lamella clarifier tanks, tertiary filters, UV disinfection plant; sludge storage tanks; sludge handling and dewatering facility; an additional odour control unit (e.g. BTF)
Population Served (PE)	35,000
Distance to Receptor	290m (residential area) 65m (on industrial land)
Odour Risk Categorisation (ORC)	High (>30,000, receptor within 300m) – only just
Proposed Std Requirements	• OMP Level 4 (SQEP Review of OMP, regulator certification)) • ORA (SQEP Review of ORA) • Dispersion modelling (significant upgrade of plant) (no modelling occurred for AQ assessment) • Requirement to adopt Best Practicable Option (BPO) • Submission of an annual report to regulator
Current Discharge to Air Consent	Yes DA-2008-103680-00

Current Consent Conditions	• No offensive or objectionable odour
	• BPO shall be adopted to avoid or mitigate any potential adverse effects
	• Only suitably qualified and experienced personnel are to be used for investigation, operation and monitoring of the WWTP.
	• Complaints register
	• OMP
	• Odour control unit (BTF) performance specifications
	  • odour concentration reduction efficiency of at least 90%; and
	  • hydrogen sulphide concentration reduction efficiency of at least 95%
	  • Minimum stack height
	  • SQEP to confirm system is working
	• Community odour survey (only apply to the original Stage 1 plant)
	• Walk over once per month



B-3-8 New Plymouth WWTP

The New Plymouth WWTP only has a consent for its sludge management; accordingly the current consent conditions only relate to these activities. The proposed WEPS framework would require similar consent conditions but applicable to all activities at the WWTP.

New Plymouth WWTP (Taranaki)

Treatment process	Band screens, grit trap, activated sludge reactors bioreactors, clarifiers, sludge thickeners and thermal dryer. Thermal dryer vented to biofilter. Dryer odour risk - associated with either OCU failure or dryer malfunction and retention of sludge
Population Served (PE)	78,000
Distance to Receptor	450m dwelling 350m to golf club rooms Golf course adjacent to site – note considered in ORC
Odour Risk Categorisation (ORC)	Medium if only dwelling considered in ORC High if golf club rooms considered as sensitive activity
Proposed Std Requirements	If assessed High Risk ORC based on golf course club room • OMP Level 4 (SQEP Review of OMP, regulator certification)) • ORA (SQEP Review of ORA) • Dispersion modelling (significant upgrade of plant) (no modelling occurred for AQ assessment thermal dryer upgrade) • Requirement to adopt Best Practicable Option (BPO) • Submission of an annual report to regulator
Current Discharge to Air Consent	Yes Only the sludge management requires a consent provided emissions from other operation meet permitted activity status
Current Consent Conditions	• Consent only applies to the thermal dryer and sludge management • No offensive or objection odour beyond the site boundary • Discharges are maintained at practicable minimum • Biofilter are maintained • Contingency plan prepared • Sludge lagoon operational plan to be prepared prior to desludging occurring

Appendix C

OMP Requirements by ORC

Item	Requirements			
	Very Low ORC	**Low ORC**	**Medium ORC**	**High ORC**
Key personnel responsibilities and contact details	Details of site management responsibilities and procedures for: – Reporting faults, – Identifying maintenance needs, – Replenishing consumables, and – Complaints procedures.			
Site location and sensitive receptors	Identification of sensitive activities at risk from emissions from the site			
	At the boundary of the site.	Within 150 m of the odorous process on site.	Within 300 m of the odorous process on site.	Within 500 m of the odorous process on site.
Process description	A general description of the activities undertaken on site, whether they are considered and odour generating activities or not, to be undertaken on site.			
Identify sources of odour and how these emissions are to be mitigated	Identify each source of odour and the process associated with the odour, site/ process location and the cause of odour. Identify potential causes for significant changes in odour emissions.			
Description of odour mitigation methods including detail of the following: **Inspections and maintenance procedures** **Emission and operational performance criteria and how these criteria will be monitored**	Odour critical plant operations and management procedures (correct use of plan, process, materials, checks on plant performance, maintenance and inspection). Details and reporting on equipment maintenance programmes, including measures to minimise failure			
	Not required	This may include: – Ensuring covers/hatches are closed. – Ensuring stored odorous material is removed from site with appropriate regularity. – Ensuring scum layers are absent or not overly odorous.	May include: – Ensuring processes that are intended to be aerated have a positive ORP – Listing differential pressure targets for covered/extracted equipment/buildings, monitoring frequency and what would be done if these are not met. – Listing odour control equipment discharge operating levels and how they will be measured and what will be done if these are not met. – Triggers for media replacement for odour control facilities.	As per medium, however the number of areas to be inspected / monitored would increase.

Item	Requirements			
	Very Low ORC	Low ORC	Medium ORC	High ORC
Odour Risk Assessment (ORA)	Not required	Not required	Not required	Required
Odour Risk Assessment Review requirements				Independently reviewed by a SQEP
Odour monitoring procedures	Site walkover every two weeks.	Site walkover every week.	Site walkover every week. Including monthly summer spot checks of differential pressure, odour control facility flow or hydrogen sulphide, ammonia, dimethyl sulphide, mercaptans, volatile organic compounds on the inlet and outlet of the odour control facility.	Daily site walkover. Including continuously monitoring differential pressure from main covered and extracted odorous processes, flow to odour control facilities, hydrogen sulphide discharge from odour control facilities with alarms. Quarterly to yearly field observations.
Complaint investigation and resolution procedures	Include a register and a procedure relating to how odour complaints are received, escalated and resolved.	Include a register and a procedure relating to how odour complaints are received, escalated and resolved.	Include a register and a procedure relating to how odour complaints are received, escalated and resolved.	Include a register and a procedure relating to how odour complaints are received, escalated and resolved to be reviewed by independent SQEP.
Contingency procedures for resolving plant malfunctions	Not required.	Not required.	Required.	Required.
Staff training requirements	All new staff are to be trained in the OMP with records kept.	All new staff are to be trained in the OMP with records kept.	All new staff are to be trained in the OMP with records kept.	All new staff are to be trained in the OMP with records kept. Training to be updated every 5 years.
OMP review requirements	Every 5 years.	Every 5 years.	Every 2 years.	Every 1 year.
OMP reporting requirements	Reporting every year on complaints received only	Reporting every year on complaints received only	Reporting every year on complaints received and methods undertaken to resolve odour complaints	Reporting every year on complaints received and methods undertaken to resolve odour complaints Reporting on compliance with the OMP.
Submitted to consenting authority for certification	Not required.	Not required.	Required.	Required.

Item	Requirements			
	Very Low ORC	Low ORC	Medium ORC	High ORC
Review of OMP (and ORA) by a SQEP	Not required.	Not required.	Not required.	Required.

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