NSW Best Practice Odour Guideline

Sewerage systems including sewage treatment plants, water recycling facilities, sewage reticulation systems and sewer mining.

April 2010

Draft
Not government policy

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Contents

1. Introduction

1.1 The Purpose of Guideline

This Guideline covers sewerage system infrastructure in urban areas including sewage treatment plants (STP), water recycling facilities, sewage reticulation systems and sewer mining, but not recycled water schemes in commercial buildings.

The primary purpose of sewerage systems is protection of the health and well-being of the community including:

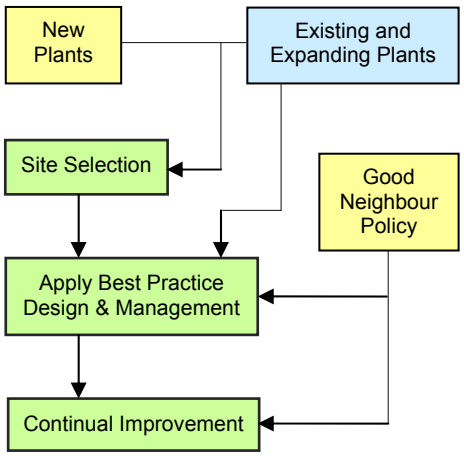
- prevention of disease and nuisance conditions,
- avoidance of contamination of water supplies and navigable waters;
- maintenance of clean water for survival of fish, bathing and recreation;
- sustainability and conservation of water for all uses.

However, odour from STPs has the potential to have a detrimental amenity impact on the adjacent neighbourhood.

This best practice *Guideline* replaces the Department of Planning Circular No. 148 (E3) entitled "*Guidelines for buffer areas around sewage treatment (water pollution control) plants".*

Although the *Guideline* is not legally enforceable, and is not the minimum requirements, it is expected that many public authorities will seek to follow the best practice guidance provided.

Figure 1
The Best Practice Guideline - New, Existing and Expanding Sewerage systems



1.2 Basis of Guideline

The basis of this best practice *Guideline* and the management of STPs odour is ecologically sustainable development (ESD):

Ecologically Sustainable Development Principles

(a) the ***precautionary principle***, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
In the application of the precautionary principle, public and private decisions should be guided by:
  (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
  (ii) an assessment of the risk-weighted consequences of various options,

(b) ***inter-generational equity***, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) ***conservation of biological diversity and ecological integrity***, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) ***improved valuation, pricing and incentive mechanisms***, namely, that environmental factors should be included in the valuation of assets and services, such as:
  (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
  (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
  (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

1.3 Odour generation

Most odour producing gases generated from sewage, wastewater and sludge result from anaerobic (i.e. lack of air, particularly oxygen) biological decomposition of materials in the wastewater.

The sewerage system produces principally gases including hydrogen sulfide (rotten egg gas), ammonia and organic odours (indoles, skatoles, mercaptans).

These gases can be generated in each process of the sewage collection and treatment system unless steps are taken for these to be minimised.

To completely eliminate all odours would require sealed systems at all times. However, this may not be possible as:

- regular maintenance requires covers to be removed at times.
- sewage treatment involves a variable volume stream.
- occasional operating failures also can lead to short term odour problems.
- odours can also be produced in the pipes and pumping stations that carry the sewage from premises to sewage treatment plants and escape through cracks, gaps, and other unnecessary openings.

1.4 Linking the Guidelines with other Government Policy

1.4.1 Pollution Licence

Most STPs require a pollution licence from the Environmental Protection Authority (EPA) which is a statutory body within DECCW. If the sewage treatment plant falls within the definition of 'sewage treatment' in Schedule 1 of the *Protection of the Environment Operations Act 1997* (PoEO Act) and has a capacity of more than 70 kilolitres per day or 2,500 person equivalent, then it is a 'scheduled premises' and requires a pollution licence.

STPs that are non-scheduled activities do not require a pollution licence. They are regulated by local councils, unless the STP is operated by a public authority or where a public authority has been declared the appropriate regulatory authority (in which case the EPA is responsible for it).

1.4.2 Offensive odour

The existing regulatory control of odour is based on the preservation of the amenity of the area, which includes the avoidance of annoyance from offensive odours. The presence of an odour, although subjective in the degree of annoyance perceived, is recognised by the PoEO Act.

Section 129 of the Act establishes the emission of an excessive odour to be an offence.

The term 'annoyance' has been used to reflect the fact that odour impacts are determined by several factors. These include:

- the frequency of the exposure;
- the intensity of the odour;
- the duration of the odour episodes; and
- the offensiveness of the odour.

It should be noted that the emission of offensive odour from licensed premises where scheduled activities are carried on is an offence under the PoEO Act unless the emission is identified in the licence as potentially offensive and was emitted in accordance with the licence, or the only affected persons were engaged in the management or operation of the premises.

There are two factors, either of which may indicate that offensive odour is or has been emitted. These include whether the odour is causing 'harm' to, or 'interfering unreasonably' with the comfort or repose of, any person outside the premises. The DECCW *Technical Framework* explains these factors further.

Harm is where it is established that there was a serious impact on the complainant and is supported by medical evidence or advice. Harm may include physical harm (for example, headaches, asthma or nausea) or psychological harm (for example, stress).

In terms of establishing whether odour has caused 'unreasonable interference with an individual's comfort or repose' involves considering the frequency and duration of odour impacts and the degree to which the complainant's normal activities are affected by the odour impact (for example, sleep interruption, inability to open windows because of odour).

The sampling and analysis methods to determine odour levels are included in *Approved methods for the sampling and analysis of air pollutants in New South Wales*. These are also detailed in the DECCW *Technical notes which accompany the Technical framework.*

1.4.3 DECCW Technical Framework and new and expanding STPs

The DECCW *Technical Framework* details the methods that can be used to estimate the frequency and magnitude of odour impacts for new or expanding STP.

There are three levels of assessment, and these are designed so that the predicted odour impacts are more accurate as the level of assessment becomes higher.

For new or expanding STPs, an odour impact assessment is to be prepared by the proponent to support any application, or EPA licence.

The key principles stated in the DECCW *Technical Framework* are:

1. *"Planning to prevent and minimise odour: at the project planning stage, proponents, planners and environmental regulators should consider the compatibility of a proposal with current and likely future land uses. Careful location and design of new activities and sustainable land-use planning around existing activities will ensure the best environmental outcomes. It is usually more difficult and costly to address odour impacts retrospectively.*

2. *Use of a range of strategies to manage odour: depending on the sources (point or diffuse), nature (frequency, intensity, duration and character) and impacts of the emissions.*

3. *Ongoing environmental improvement: because land use is dynamic, existing activities must be prepared to undertake measures to minimise their odour impacts if conflicts arise. Operators of all developments should adopt a risk management approach. To minimise the potential for odour impacts being experienced after an activity is operational, proponents should ensure that a level of odour assessment appropriate for their development and location, has been undertaken. Contingencies for possible future land-use changes should be built in at the project planning stage."*

Readers are recommended to refer directly to the *Protection of the Environment Operations Act 1997* and the DECCW Technical Framework in relation to the above.

1.5 New STPs and pumping stations

1.5.1 Site Selection

Due to the "industrial" nature of STPs and the potential for unacceptable amenity impacts, best practice is to locate new STPs with other industrial uses in an Industrial Zone or on large lots in a RUI or SP2 (infrastructure) zone.

By selecting such sites and through the adoption of specific odour design criteria (refer to 1.5.2), it could reasonably be expected that the sites would provide an acceptable separation distance with residential or other uses. (Refer to chapter 3 of this *Guideline*)

1.5.2 Engineering design criteria

Best practice for a new STP is to adopt a specific odour criteria to be applied during the engineering design stage of the new STP. Design and site selection are fundamentally related.

This best practice *Guideline* recommends that the odour design criteria to be adopted for a new STP is the achievement of a 2OU odour assessment criteria at the boundary of the Industrial Zone or the Rural or SP2 lot(s). Aerosol drift is also to be designed for.

There are various methods to achieve the odour design criteria for a new STP including:

1. areas likely to emit offensive odours are totally contained with emissions treated prior to release,
2. maximizing the efficiency of the odour handling systems through the reduction of the total volume of air to be managed – for example,
    - containing air as close as possible to the water level,
    - minimising openings and maintaining negative internal pressure.
    - reducing ventilation rate by eliminating requirements associated with routine entry into process spaces.

For new pumping stations best practice is the achievement of a 2OU odour assessment criteria at the boundary of the facility in order to protect the general community and to ensure residents complaints are minimised. Best practice includes:

- designing pump stations either the ultimate population catchment size, or a specific long-term time horizon;
    - designing to ensure that the sulphide generation potential achieves the 2OU odour assessment criteria at the boundary of the facility;
    - undertaking wind direction and strength analysis;
    - adopting new technology that overcomes specific odour problems as the technology becomes available such as discussed in 4.2.

Best practice is also ensuring the latest Australian standards are adopted for the design of a new sewerage system.

1.6 Existing STPs

1.6.1 Maintain existing separation distances

Owners of existing STPs are encouraged to negotiate with the local council to maintain existing separation distances.

This is particularly important when the local council is reviewing it's Local Environmental Plan or proposing to re-zone land.

Where Council is the owner of an existing STP, it is recommended that Council's strategic planner be consulted in this regard.

1.6.2 Reduce existing odour contours

As land use is dynamic, the best practice recommended for existing STPs is to reduce existing odour contours to meet the ambient odour levels in Table 3.1 of DECCW *Technical Framework.* It is recommended that these performance criteria be included in the Odour Management Plan (OMP) of the existing STP. The OEMP would set out strategies for reducing odour to the levels specified.

The current DECCW odour performance criteria are based on a sliding scale relating to the population density of an area, as the response to an odour impact can vary significantly over a given population. The criteria assume that within a densely populated area there will be a greater potential for individuals within the community to be 'annoyed' by a given odour event.

Table 3.1: Odour assessment criteria

Population of affected community	Odour assessment criteria
Rural single residence (_< 2)	7.0
~ 10	6.0
~ 30	5.0
~ 125	4.0
~ 500	3.0
Urban area (>_ 2000) and/or schools and hospitals)	2.0

Source: Department of Environment, Climate Change and Water *Technical framework: assessment and management of odour from stationary sources in NSW November 2006*

In setting these odour performance goals, DECCW consider it to be fair and equitable that the prescribed odour levels are infringed for no more than one percent of the time. That is, compliance is required for 99 percent of the time.

1.7 Expanding STPs

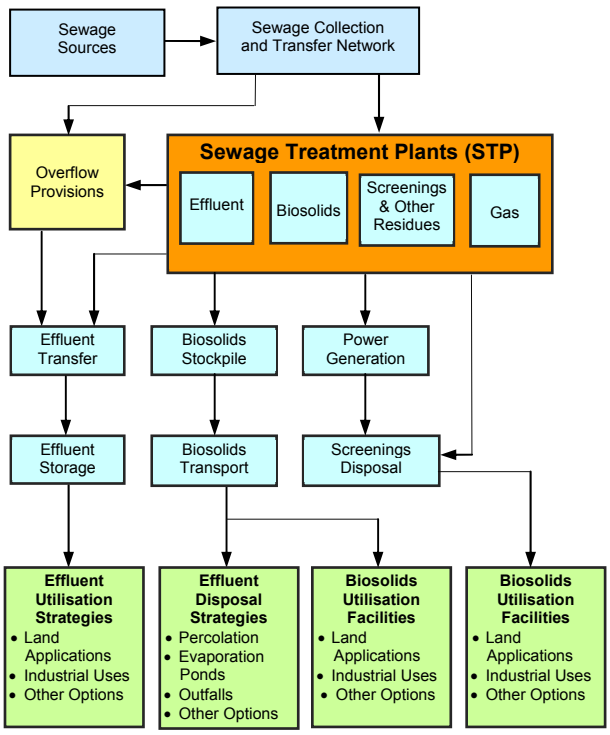
Best practice for a proposed expansion of a STP is the adoption of the same specific odour criteria as for new plant (refer to 1.5.2). This criteria would be applied during the engineering design stage.

1.8 Operation of sewerage systems

Even new STPs may result in odour emissions, due to operational practices. Best practice for both new and existing sewerage systems is the adoption of good operational practices such as an odour management plan (OMP). An OMP would specify odour operational and management standards and practices, and set out strategies and measures for minimising the risks of odour incidents and contingency actions for managing odour issues if they occur. (Refer to chapter 4)

Tura Beach Sewage Treatment Plant

Figure 2
Components of a Sewage System



2. Strategic planning to minimise land use conflict related to odour

2.1 Long term planning for STP sites

Previously STPs were often located on relatively small rural or coastal foreshore lots near to urban areas. Because these STPs tended to be surrounded by farms, traditionally little or no odour management measures were included in the design.

However over time as urban areas expanded and intensified to provide for housing and jobs to meet the demands of growing populations, conflicts occurred because of the odour generated by these STPs.

The following strategic planning best practice is therefore recommended in order to minimise land use conflict related to odour.

2.2 STPs in industrial zones

STPs are "industrial" by nature and have the potential for unacceptable amenity impacts. Best practice is to locate STPs within an industrial zone such as a General Industrial Zone (IN1) or a Heavy Industrial Zone (IN3), the latter of which has the following objectives:

- provide suitable areas for those industries that need to be separated from other land uses.
- encourage employment opportunities.
- minimise any adverse effect of heavy industry on other land uses.

Otherwise, STPs may be located on a large lot(s) in a Rural or SP2 Infrastructure Zone. (Refer to 2.3)

2.3 Planning for STPs in new or existing industrial areas

As suitable land for high impact industrial activity is often a limited resource, the compatibility of proposed rezoning or proposed development in the vicinity of industrial zones or existing STPs must be considered.

This consideration is to include:

- the existing zone and the uses contained within and in the vicinity; and
- whether or not the proposed zoning or development is likely to have a significant impact on the STP or other industries within the industrial zone; and
- any ways in which the proposal may be incompatible with the existing or approved uses; and
- evaluation and comparison of the respective public benefits of the industrial zone and its uses, and the proposal; and
- evaluate any measures proposed to avoid or minimise any incompatibility.

2.2.1 Boundaries of industrial zone

In determining the extent of the boundaries of a new Industrial Zone, it is recommended that the boundaries be large enough to achieve a 2OU assessment criteria at the boundary of the industrial zone.

Odour modelling during the strategic assessment stage will assist to inform the processes of boundary location. Aerosol drift should also b considered. The modelling would include existing population and projected population servicing requirements.

Ensuring that the future capacity of a STP is not constrained is an important design criteria to be considered during site selection.

2.3 STPs on large lots in Rural and SP2 Infrastructure zones

Where a STP is proposed within a Rural or SP2 Infrastructure Zone, it is recommended the size of the lot(s) upon which the proposed STP is to be located should contain odour to 2OU assessment criteria or less at the lot(s) boundary.

Odour modelling would be an important tool to determine the specified assessment criteria.

2.4 Sewerage systems

Sewerage systems not only include STPs but also the associated reticulation systems including pumping stations.

Extended and rapidly expanding sewerage networks and inadequate odour control may produce odour issues and therefore complaints from residents from pumping stations.

The adoption of best practice design and operation criteria, such as those suggested in 1.5.2 and 4.2, and site location to enable rapid emergency response will assist to reduce odour issues.

3 Site selection for a new STP

3.1 Evaluation of site options for a new STP

The establishment of a new STP is a long-term decision, making it critical to ensure that an appropriate site is chosen. In terms of a new STP, the operation and management of the plant on an unsuitable site can be costly and face difficulties in relation to community issues.

It is recognised however, where Industrial Zones are planned to provide a site for a future STP, the zone needs to be within an appropriate distance from the area to be serviced, and on the downward side to avoid pumping. This applies also to STPs planned for large lots within a Rural or SP2 Infrastructure zone.

Appropriate siting is a cost-effective way of dealing with environmental performance issues associated with odour. Conflicts commonly arise when there is a perception that a community's amenity will be affected by odour impacts. Any potential conflicts and possible options for reducing or preventing conflicts during the site selection process should be considered.

The principles of “prudent avoidance" of adverse impacts should be applied during the design options evaluation phase taking into consideration site characteristics and surrounding land uses now, as well as in the future, recognising that land use will change over time.

3.2 Locate new STPs in industrial zones or within a large lots within Rural or SP2 zones

Best practice is that new STPs should be located wherever possible within an Industrial Zone suitable for high impact industrial uses, or within a Rural or SP2 zone on a large lot.

It is recommended that the boundaries of the Industrial Zone or the Rural or SP2 lot(s) be large enough to mitigate odour with potential odour emissions not greater than 2OU odour assessment criteria beyond the zone or Rural or SP2 lot(s) boundaries (note that the STP may be located on more than one lot). Design should also take into consideration potential aerosol drift.

The basis for this requirement is in the ESD definition that states:

> ***(a)*** *improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:*
> *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement.*
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste*

In calculating the setback required from the industrial zone or Rural or SP2 lot(s) boundary, allowance should be made for the possibility of future expansion of the STP on the site. Otherwise the expansion options could be limited by the lack of room for separation.

3.3 Boundary Setback

Where the proposed STP it to be located in an Industrial or SP2 Zone, the results of an odour impact assessment therefore play a key role in determining an appropriate site within an Industrial Zone for a new STP. This applies also to location of a proposed STP on a large Rural or SP2 lot(s).

The purpose is to protect the immediate area outside the boundaries of the Industrial Zone or Rural or SP2 lot(s) from ongoing emissions as well as occasional higher levels of emissions that may occur from time to time due to equipment failure, accidents and abnormal weather conditions.

Determining the distance from the Industrial Zone or Rural or SP2 lot(s) boundary, may be influenced by:

1. ***plant related issues***
   a. scale of the STP
   b. type of treatment
   c. odour mitigation initiatives
   d. management regime
2. ***site related issues***
   a. slope and topography
   b. visibility
   c. climatic conditions
   d. current land uses

Although the odour impact assessment predicts where the 2OU odour assessment criteria is on plan, in practice and as a result of specific climatic conditions induced by the topography, the operation of the STP may need to be adjusted to meet the contour requirement at the Industrial Zone or Rural or SP2 lot boundary.

Operators of STPs have an obligation to the community to manage the STP in a manner that does not have a detrimental impact on current neighbours as well as future land uses in the vicinity.

3.4 Likely future land uses in vicinity

It is wise to seek the views of Council's strategic planners on the likely land uses in the vicinity of the site, having regard to likely future development pressures in the area.

For instance, selecting a site immediately upwind of a planned residential development may not be the most appropriate site to choose. Even where odour assessment modelling predicts a 2OU odour assessment criteria at the boundary of the Industrial or SP2 Zone or Rural lot(s), unforseen events can occur.

3.5 Effects of slope and topography on odour

In determining the setback distance from the Industrial or SP2 Zone or Rural lot(s) boundary to locate a new STP, local topography should be taken into account. For example, where the land is sloping, odour may flow down the slope or along a river due to katabatic drainage. The odour impact assessment land should take this into consideration and the location selected reflect these influences.

On the other hand, the topographic features may inhibit the flow of potential odours from the proposed STP in a particular direction. Similarly, the odour impact assessment land should take this into consideration and the location selected reflect these influences.

3.6 Effect of Climatic conditions

Climatic conditions may also influence the shape of the proposed Industrial Zone or Rural lot, and the site selected to locate a new STP.

There is generally one direction that is the most frequently observed (prevailing wind), and it is therefore important to choose a site where sensitive development or residential land use zones are not directly downwind. However, the wind usually blows from all directions at some time, and the proposed land shape of the Industrial or SP2 Zone or Rural lot(s) should take this into account, in order to ensure achievement of 2OU assessment criteria at the zone boundary.

3.7 Effect of visibility of site

The proposed STP should be able to be landscaped from view, and landscaping can also assist with odour dispersion. It is particularly important to avoid sites that form part of a prominent view shed.

For example hillsides that are readily viewed by residents or passing motorists should be avoided if possible unless screening of the site with vegetation is feasible.

3.8 Other matters

Other issues need to be addressed in determining an appropriate site. These may include:

- topography and the need for gravity feed to reduce costs
- proximity to current and potential users
- minimising clearing of native vegetation
- avoidance of floodprone land or sea level rise hazards

Kingscliff Wastewater Treatment Plant

4. Management of new and existing sewerage systems

4.1 Odour management

There is a responsibility on operators to minimise the detection of odours from a sewerage system through:

- proper operation,
- good management procedures.

4.2 Proper operation

Odour is a primary operation consideration for sewerage systems. Most odour problems occur in the collection system, in the primary treatment facilities, and in solids handling facilities. Odours also occur in the sewage reticulation system where oxygen levels may be depleted.

Control of odours depends on preventing the conditions leading to odour generation.

Preventive operational measures may include:

- maintaining adequate dissolved oxygen concentration in wastewater;
- providing sufficient velocity (not turbulence) to ensure complete mixing, thus preventing organic solids deposition.
- preventing sludge accumulations in tanks or excessive sludge aging through proper mixing, withdrawal rates, and process control parameters;
- ensuring uniform organic loading of biological processes.

In an existing STP where odour problems exist, approaches to solving these problems may include:

- undertaking an audit of the odour sources;
- use of vapour odour control measures such as atmospheric discharge and dilution\masking agents and counteration chemicals\chemical wet scrubbing; activated carbon adsorption; biofiltration; biotrickling filters; air ionization; thermal incineration; or aeration system treatment.
- use of liquid odour control methods such as chemical additions.
- acquiring adversely affected properties to provide adequate separation distance Improvements in management procedures.

The adoption of new technology and on-going discussion with other STP and sewerage system operators will be of benefit.

For instance Gosford City Council has recently identified odour problem locations in their sewage reticulation system. They have introduced a new technology by applying an odour treatment solution that reacts instantly with sulphides in solution to form insoluble iron sulphide, meaning it is not available for release as an odorous or corrosive gas. This solution replaced the use of oxygen injection for the control of sewage septicity. Other methods used elsewhere also control septicity by locking the sulphides into solution and prevent the release of hydrogen sulphide.

For pumping stations odour management is largely related to control of septicity and the provision of ventilation.

Apart from pumping station design which is discussed in 1.5.2, best practice also involves the adoption of new technology to solve persistent operational issues in a sewerage system.

For instance electronic controls have recently been instituted at Hallidays Point for almost every aspect of the Mid Coast County Council STP. These controls allow the site to be operated without the need for constant on-site supervision and many aspects of imminent maintenance are able to be forecast before breakdown and either fixed remotely or on site prior to any serious mishaps occurring.

4.3 Good management procedures

Good management procedures include the adoption of an odour management plan (OMP) for the entire sewerage system. This would specify odour operational and management standards and practices, and set out strategies and measures for minimising the risks of odour incidents and contingency actions for managing odour issues if they occur.

An OMP is based on an environmental management system approach of plan, do, check, and act, with a philosophy of continual

improvement of the system and operations. The OMP usually includes strategies and measures for minimising odour risks and contingency actions for managing odour problems that may arise from the sewerage system.

Specifically, best practice for a new STP is to adopt an odour design criteria to achieve a 2OU assessment criteria at the boundary of land owned or controlled by the plant in a RUI or SP2 zone, or if in an industrial zone – at the boundary of that zone.

For existing STPs the best practice recommended is to reduce existing odour contours to meet the ambient odour levels in Table 3.1 of DECCW *Technical Framework*.

In setting these odour performance goals, DECCW consider it to be fair and equitable that the prescribed odour levels are infringed for no more than one percent of the time. That is, compliance is required for 99 percent of the time.

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

The OMP may also include the requirement for monitoring to allow site management (and local authority inspectors) to audit site operations.

Typical inclusions in an OMP are:

a) identification of all major sources of odour that may be emitted from the sewerage system;
b) pro-active management and response mechanisms for odour emissions, with specific reference to measures to be implemented and actions to be taken to minimise and (where practicable) prevent potential odour impacts on surrounding land uses as a consequence of meteorological conditions, operational failures within the sewerage system, or the mode of operation of the plant;
c) provision for review of odour monitoring data, with comparison of monitoring data with that assumed and predicted in the conditions of this approval, including verification of odour modelling and predictions, as may be relevant;
d) plans for regular maintenance of process equipment to minimise the potential for odour emissions; and
e) a contingency plan should an accident or process failures lead to elevated odour impacts, whether above normal operating conditions or environmental performance goals / limits.

It is recommended that the OMP be regularly reviewed and upgraded.

5. Community consultation

5.1 Good Neighbour Policy

Good relations are built on principles of mutual trust, good neighbourliness and consideration.

It is therefore important for the operators of sewerage systems to have a policy to guide staff in good neighbour procedures and practices.

A good neighbour policy encourages the staff of a sewerage system to:

- communicate and consult with its neighbours
- seek opportunities to explain and interpret its management practices.
- provide detailed information about proposed activities or works in progress.
- actively participate in community forums on issues relating to the sewerage system, its management and community values.
- be responsive to neighbour's concerns and professionally conciliate any issues.
- co-operate with neighbours to resolve concerns.

Open communication allows feedback and provides an opportunity to reduce odour problems before significant conflict occurs. Relatively minor adjustments to the timing of particular processes may be all that's necessary.

It may be possible to also avoid the coincidence of peak odour risk periods or activities with events planned for a neighbouring property by mutually adjusting either the timing of maintenance or production operations.

5.2 Abnormal odour events and Good Neighbour Policy

Even well-managed sewerage systems may emit some odour. Keeping in touch with neighbours can reduce the risk of conflict by helping them understand the treatment process, the steps being taken to reduce potential problems and practical limitations.

Abnormal odour events can occur without warning or may be from planned maintenance. Letting neighbours know about planned maintenance events as early as possible helps reduce annoyance in the community, and should be part of the good neighbour policy. The operation should also inform neighbours about what is being done to remedy the problem and to prevent its recurrence, and how long the problem will take to fix. The level of annoyance may reduce if neighbours see that the operation is genuinely addressing adverse effects in a proactive manner.

Nuisance complaints can often be reduced by simply locating facilities out of sight of neighbours whenever possible. Visual screening provided by trees and other windbreaks can also have the added advantage to help promote vertical air mixing and dilution of the odours. This further reduces the transport of odours to neighbours.

5.3 Complaints Management

It is important for the sewerage system to have a transparent complaints handing procedure. The procedure could be developed in consultation with the community.

Best practice encourages operators of specific parts of a sewerage system such as STPs and pumping stations in proximity to existing residences to maintain a daily log of weather conditions (prevailing wind direction and strength, temperature) and plant activities to assess the cause of any reported conflict incident more accurately.

This is particularly important where there might be many odour sources or an existing history of conflict. If future expansions are proposed, complaints and activity logs can also demonstrate the effectiveness of current management practices in avoiding conflict.

Appendix A – Example of Conditions of Consent

Example – Conditions of Consent

ODOUR MANAGEMENT PLAN

The Proponent (Applicant) shall prepare and implement an Odour Management Plan. The Plan shall include:

1. identification of all major sources of odour that may be emitted from the STPs;
2. pro-active management and response mechanisms for odour emissions, with specific reference to measures to meet the criteria of the 2OU assessment criteria at the boundary of the site or if in an industrial zone, at its boundary, under any conditions but not including rare meteorological conditions or malfunctions within the STP;
3. provision for review of odour monitoring data, with comparison of monitoring data with that assumed and predicted in the conditions of this approval, including verification of odour modelling and predictions, as may be relevant;
4. plans for regular maintenance of process equipment to minimise the potential for odour emissions;
5. a contingency plan should an accident, process malfunction or meteorological condition lead to elevated odour impacts, more than (2) above, and
6. complaints handling procedures during operation related to odour.

COMMUNITY CONSULTATIVE COMMITTEE

The Proponent (Applicant) shall operate a Community Consultative Committee (CCC) for the project (development) to the satisfaction of the Director-General (Council) in general accordance with the *NSW Odour Performance Criteria Guideline – Sewage Treatment Plants including recycled water plants and sewer mining (Department of Planning, 2009 or its latest version)*

Notes:

- *The CCC is an advisory committee. The Department (Council) and other relevant agencies are responsible for ensuring that the Proponent (Applicant) complies with this approval.*
- *In accordance with the Guideline, the Committee should comprise an independent chair and appropriate representation from the Proponent (Applicant), and the general community in the area of the development.*

ACCESS TO INFORMATION

Within 3 months of the approval of any Odour Management Plan required under this approval (or any subsequent revision of the Odour management Plan), the Proponent (Applicant) shall:

1. provide a copy of the Odour Management Plan to the relevant agencies and the CCC;
2. place a copy of the Odour Management Plan on its website; and
3. remove superseded copies of the Odour Management Plan from its website.

During the operation of the STP, the Proponent (Applicant) shall:

1. make a summary of monitoring results required under this approval publicly available on its website; and
2. update these results on a regular basis (at least every 3 months).

Appendix B - Glossary

Anaerobic means in the absence of oxygen.

Biofilter means a biological process that uses micro-organisms to convert odor causing compounds into harmless by-products, i.e., carbon dioxide, water and biomass.

Biosolids treatment facility means a facility for the treatment of biosolids from a sewage treatment plant or from a water recycling facility.

Biotrickling means a process that uses filters that utilize synthetic media on which contaminant degrading bacteria are immobilized as biofilms on the surface of the media. As air flows through the biofilter media bed, the contaminants come in contact with the active biofilms that degrade the odorous compounds. At the same time, a continuous stream of water trickles down through the media to keep the biofilms moist and biologically active.

EPA means NSW Environment Protection Authority

Diffuse source means activities that are generally dominated by fugitive area or volume source emissions of odour, which can be relatively difficult to control, for example, intensive agricultural activities

EPL means Environment Protection Licences issued by the Department of Environment, Climate Change and Water

Katabatic drainage means air drainage that typically occurs at nightime, where rapidly cooling air near the ground becomes denser (and heavier), and slowly sinks. Where the local terrain slopes, this sinking results in the drainage of the air down the slope. As a result, katabatic drainage has a tendency to follow natural drainage lines.

Odour means a sensation resulting from the reception of a stimulus by the olfactory sensory system. The way the human response to an odour is evaluated depends on the particular sensory property that is being measured, including the intensity, detectability, character, and hedonic tone of the odour. The combined effect of these properties is related to the annoyance that may be caused by the odour.

Odour impact assessment means an assessment under the Department of Environment, Climate Change and Water *Technical framework: assessment and management of odour from stationary sources in NSW November 2006*.

Offensive Odour means an odour:
a. That, by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstances:
i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or
b. That is of a strength, nature, duration, character or quality prescribed by the regulations or that is emitted at a time, or in other circumstances, prescribed by the regulations.

OMP means Odour Management Plan. A plan that describes the processes that sewerage system will follow to maximize its compliance and minimize harm to the environment. This plan also helps a plant map its progress toward achieving continual improvements.

OU means odour units; concentration of odorous mixtures in odour units. The number of odour units is the concentration of a sample divided by the odour threshold or the number of dilutions required for the sample to reach the threshold. This threshold is the numerical value equivalent to when 50% of a testing panel correctly detect an odour

PoEO Act means *Protection of the Environment Operations Act 1997*

Point source means activities that involve stack emissions of odour; these can generally be relatively easily controlled using waste-reduction, waste-minimisation and cleaner production principles or conventional emission-control equipment

DECCW means the Department of Environment, Climate Change and Water NSW.
DoP means Department of Planning NSW

Recycled water is water which has been derived from sewerage systems and treated to a standard which is satisfactory for its intended use including toilet flushing, irrigation, clothes washing and numerous industrial processes.

Scheduled Activity means in regulatory terms an activity listed in Schedule 1 of the *Protection of the Environment Operations Act* 1997 and may be licensed by the Department of Environment, Climate Change and Water.

Sensitive development or receptor means a location where people are likely to work or reside; and may include a residential dwelling, school, hospital, office or public recreational area.

Sewage means wastewater and waterborne wastes conveyed in a pipeline (sewer), generated principally by residential and other facilities such as industrial, agricultural, commercial, tourist or recreational facilities About 99 per cent of sewage is water.

Sewer mining means the process of tapping into a sewer (either before or after the sewage treatment plant) and extracting sewage which is then treated and used as recycled water. Some sewer mining by-products may be acceptable for return to the sewerage system.

Sewerage system means a biosolids treatment facility, sewage reticulation system, sewage treatment plant, water recycling facility, or any combination of these.

Sewage reticulation system means a facility for the collection and transfer of sewage to a sewage treatment plant or water recycling facility for treatment, or transfer of the treated water for use or disposal, including associated:

(a) pipelines and tunnels, and
(b) pumping stations, and
(c) dosing facilities, and
(d) odour control works, and
(e) sewage overflow structures, and
(f) vent stacks.

Sewage treatment plant (STP) means a facility for the treatment and disposal of sewage, whether or not the facility supplies recycled water for use as an alternative water supply.

Vent means a vertical pipe used to exhaust pollutants from a process

Water recycling facility means a facility for the treatment of sewage effluent, stormwater or waste water for use as an alternative supply to mains water, groundwater or river water (including sewer mining works), whether the facility stands alone or is associated with other development, and includes associated:

(a) retention structures, and
(b) treatment works, and
(c) irrigation schemes.

Appendix C - References

Department of Environment, Climate Change and Water Technical framework: assessment and management of odour from stationary sources in NSW November 2006

Department of Environment, Climate Change and Water Technical notes: assessment and management of odour from stationary sources in NSW November 2006

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NSW Department of Water and Energy, 2007-08 NSW Performance Monitoring Report.

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National Water Commission, National Performance Report 2007-08 for Urban Water Utilities