Defining Odour Buffers to Wastewater Treatment Plants

Introduction

Odour buffers (figure 1) are an important tool for planning and managing wastewater treatment plants. This information sheet has been prepared to help planners and the community understand how odour buffers are defined, why they change over time and how they are used to support planning and management processes.

Buffer definition

A buffer may be defined as; ‘all the land between the boundary of the area that may potentially be used by an industrial land use (e.g. wastewater treatment plant) and the boundary of the area within which unacceptable adverse impacts due to industrial emissions on the amenity of sensitive land use are possible. This may be represented by the separation distance.’ (EPA, 2005)

Uses of buffers

Odour buffers are used primarily to help determine the potential impact of wastewater treatment plants on sensitive land uses and vice versa. They are a tool to help:

- Minimise the impact of nuisance generating odour on peoples’ amenity which can in turn lead to land use conflict
- Provide investment security and certainty
- Plan for compatible and beneficial land use around treatment plants
- Odour buffers are used to support the following processes:
- Planning infrastructure upgrades to existing plants
- Planning the location of new plants
- Providing input into State and local government
- planning processes e.g. planning strategies and schemes, structure planning, subdivision and development
- Providing a spatial focus for beneficial and compatible land uses including waste recycling and renewable energy uses
- Environmental impact assessment, licencing, and compliance

Figure 1 - A modelled odour buffer to a wastewater treatment plant

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Methods for defining buffers

The Water Corporation has identified buffers for all the wastewater treatment plants it operates in Western Australia. It uses three basic methods for defining odour buffers to treatment plants which are:

Generic buffer

Involves drawing a line with a consistent radius (usually 500 metres) around the operational area of a treatment plant. Distances are based on many years of experience managing odour from treatment plants. This approach is used for most plants in Western Australia, especially those plants servicing smaller urban settlements.

Modelled buffer

Involves the use of a scientific modelling software combined with wind data (figure 2) and other site specific and local data to define odour contours (figure 3). From this an odour buffer is extrapolated. This method is relatively expensive and time consuming and used to define buffers for large plants in the Perth-Peel region and in major regional centres.

Hybrid buffer

Involves the use of a graph to estimate the most appropriate separation distance based on size and location of the plant. The graph is based on scientific odour modelling undertaken at a variety of plants across the State.

Modelled odour buffers

The challenge in defining a buffer is to prevent odour nuisance without being unnecessarily conservative, thus enabling efficient use of the available land around a treatment plant.

The size of a buffer between a treatment plant and odour sensitive land uses depends on several parameters including:

- Capacity of the treatment plant (i.e. equivalent population to be served).
- Type of treatment processes and odour emission rates
- Load on the treatment plant
- Local topography and vegetation
- Local meteorological patterns

The model generates odour contours which depict likely odour concentrations, expressed as odour units (OUs), which can be mapped spatially (figure 2). In the example provided, the 5 OU contour

represents a point at which it can be expected that odours of weak concentration will not be noticeable for 99.9 percent of the time. Depending on the input parameters, the location and shape of the odour contours can vary significantly.

Local meteorological patterns are often determined through data obtained from weather stations. Usually data is sourced from nearby weather stations (i.e. located at airports, agricultural research stations, industrial sites). If these sources are not available, then a weather station needs to be established on the site of the treatment plant and data captured over an extended period.

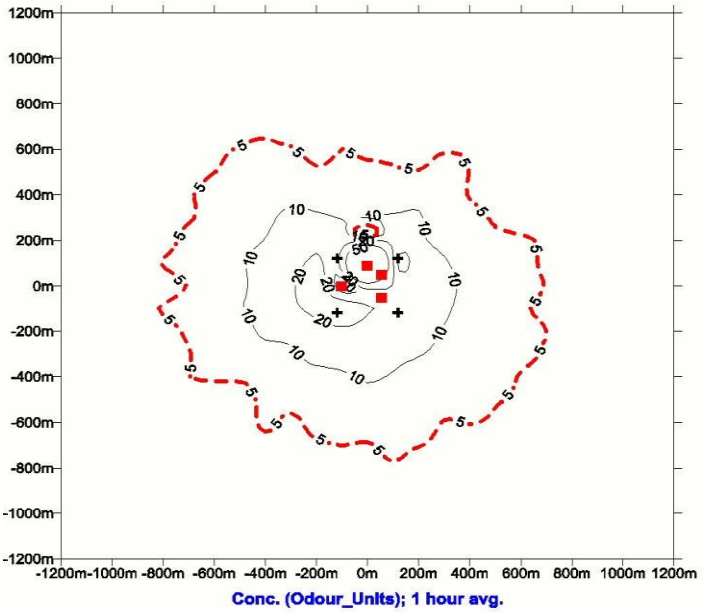

Figure 2 - Odour contours

A key output from the weather data is a wind rose (figure 3). A wind rose enables planners and the community to visually identify the predominant wind direction, speed, and frequency over time. This in turn helps to assess the rate at which odour will disperse. Of particular concern is the direction of light winds as these tend to disperse odour at a slower rate leading to greater risk of impacting on peoples' amenity.

Odour buffers are a useful tool to support the planning and management of wastewater treatment plants and their surrounding areas.

Defining the extent of buffers is dependent on the results of odour modelling and numerous

other factors which can vary over time.

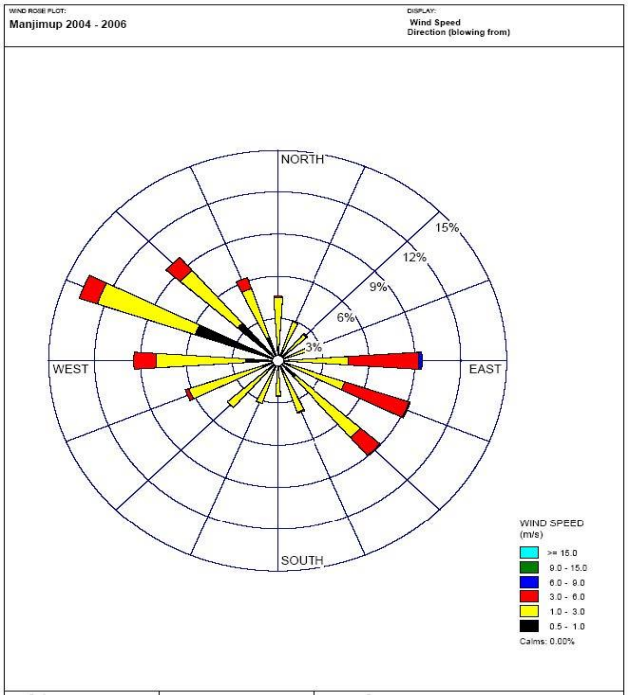

Figure 3 - Wind Rose

In addition, many treatment plants are dynamic; growing and changing so that they can service an increasing population and deliver new products and services (e.g. recycled water, biosolids, biogas). Consequently, buffer lines also need to be dynamic. Odour modelling and buffers are a tool which should be used to support, not replace, good and proper land use planning.

Resources

- Environmental Protection Authority (2005) Separation Distances between Industrial and Sensitive Land Uses. Guidance Statement No. 3.
- Western Australian Planning Commission (WAPC) (2009) Statement of Planning Policy No. 4.1 – State Industrial Buffer
- Water Corporation Land Planning section. Email: landplanning@watercorporation.com.au