Greater Dublin Drainage

Alternative Sites Assessment - Phase Two
Sites Assessment and Route Selection Report

Air Quality and Odour

May 2012

Executive Summary

Air Quality and Odour

A preliminary assessment of the potential Air Quality and Odour impacts associated with locating the proposed Regional WwTP on the nine shortlisted land parcels and their associated sites was undertaken in order to aid in the design process and the emergence of a preferred location for the Regional WwTP. The assessment takes cognisance of the proximity of sensitive receptors, existing ambient air quality and potential sources of odour.

It should be noted that this is not an exercise in presenting a detailed odour model and assessment, due to limited data availability at this stage. Rather, it is presented to allow a high level comparison using a common currency (H_2S) of the potential air quality and odour impacts at each of the nine shortlisted sites applying necessary assumptions and approximations equally to the different options.

In this assessment H_2S has been used as a surrogate for odours associated with Wastewater treatment plants as odours arising from raw wastewater are heavily dominated by hydrogen sulphide, which has a very objectionable odour. Using ADMS 4, short term concentrations of H_2S have been modelled assuming very stable atmospheric conditions (Pasquill Stability Category G) – considered a worst case dispersion scenario

Odour concentrations generally decline with distance from the odour source although the decline is not linear. This assessment employs a simple numerical approach to define the decline of odour with distance from the source by determination of a normalised odour score.

Emissions of hydrogen sulphide (H_2S) were assumed to be emitted from the centre of the site at ground level at a rate of 0.02 g/s. A roughness length of 0.2 m (typical of agricultural areas) was used to define the dispersion site.

The relative decline of H_2S concentration with distance has been determined up to 1000 m from the site boundary (assumed to be 300m from the source) by normalising modelled concentrations to those predicted at the site boundary.

The proposed scheme is not expected to cause any significant air quality or odour emissions impacts, as the facility will be designed so as to limit any such releases to a set boundary limit value in accordance with best practice.

With specific regard to odour, detailed design, and diligent operational phase management will be required in order to minimse the potential for any odour impact to sensitive receptors.

12 Air Quality and Odour

12.1 Introduction

S.I. 787 of 2005, "European Communities (Waste Water) Prevention of Odours and Noise Regulations requires that wastewater treatment plants are so designed, constructed, operated, and maintained as to avoid causing nuisance arising from odours or noise. However, the regulations do not define "nuisance" by any numerical means. A nuisance odour event is generally regarded as interfering with a person's normal activities on a reasonably frequent basis.

Fingal County Council's Odour Control Policy (March 2007) is focused on the prevention of odour nuisance, specifically odours associated with Wastewater Treatment Plants (WwTP).

Therefore, to guard against creating a nuisance, an odour limit that combines a stringent boundary fence standard with very infrequent exceedances of that standard must be adopted. Meeting a stringent standard with very infrequent exceedances of that standard will undoubtedly achieve the requirements of S.I. No. 787.

This assessment will establish the relative magnitude of potential Air Quality and Odour impact to sensitive receptors attributable to each of the nine shortlisted sites under consideration. This study has been compiled in the form of a desk top study comprising Industry Guidance documents, digital mapping, geo-directory data and GIS systems

12.2 Methodology

The potential for Air Quality and Odour impact associated with the proposed WWTW at each of the nine candidate land parcels has been assessed by use of the National Roads Authority document entitled: "*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*" (National Roads Authority, 2011). This guidance is applicable as it pertains to the construction of linear infrastructure such as the pipelines feeding the proposed locations and is amenable to the use of house count/receptor data as gained from the geo-directory and GIS data used herein.

There are no receptors within 300m of the proposed boundary as this was a constraints stage criterion. As such, in order to classify the potential WwTP sites this methodology has been expanded out to 1,000m. The assessment adopted hydrogen sulphide (H2S) as the most prominent indicator of odour in a wastewater treatment plant to be used for modelling purposes. This substance is highly odiferous (odour of rotten eggs) and is commonly used as a reliable indicator for odour intensity.

Odour concentrations generally decline with distance from the odour source although the decline is not linear. This assessment employs a simple numerical approach to define the decline of odour with distance from the source by determination of a normalised odour score.

In this assessment H_2S has been used as a surrogate for odour concentrations as it is often (but not always) the compound associated with odour production from waste

water treatment works. Using ADMS 4[1], short term concentrations of H_2S have been modelled assuming very stable atmospheric conditions (Pasquill Stability Category G)[2].

Emissions of hydrogen sulphide (H_2S) were assumed to be emitted from the centre of the site at ground level at a rate of 0.02 g/s. A roughness length of 0.2 m (typical of agricultural areas) was used to define the dispersion site.

The relative decline of H_2S concentration with distance has been determined up to 1000 m from the site boundary (assumed to be 300m from the source) by normalising modelled concentrations to those predicted at the site boundary.

It must be noted that Pasquill Stability Category G (extremely stable conditions/calm) is a worst case dispersion condition for ground level sources. These conditions only occur for a small percentage of time in this area of Ireland (0.7 % of the time according to data in NRPB-R91, 1979[3]).

This model allows the potential dispersion of an air pollutant or odour emission to be plotted, and as such allows for weighting of the potential receptors that may be impacted, based upon that dispersion.

In Addition EPA documentation from www.EPA.ie has been consulted in order to establish the local ambient air quality climate in the surrounding areas of each of the nine proposed land parcels as per item 12.7 in Table 12.0

The EPA records and a desktop survey of mapping has also been carried out in order to establish the location of any pre-existing licensed waste or intensive agriculture activities in each of the areas which may have a predisposition to odour impact in the area.

12.2.1 Desktop Study

The desktop study used the data as described above to calculate a decreasing H_2S concentration factor rating for all of the nine shortlisted sites. These were then ranked as having the potential for Air quality and Odour impact for both the construction and operational stages of the proposed scheme based on these factorised counts.

12.3 Existing Environment

The existing environment at each of the nine shortlisted sites is largely characterised by the constraints criteria used to establish the sites in the first instance. There are no sensitive receptors within 300m of any of the 9 sites. Some are predominantly rural in

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[1] ADMS 4 is a dispersion model used to model the air quality impact of existing and proposed industrial installations.

[2] Pasquill Stability Category is a method of categorizing the amount of atmospheric turbulence developed by Pasquill in 1961, used in air pollution dispersion modelling. Category represents very stable / calm atmospheric conditions

[3] The first of a series of reports, which gives practical guidance on the estimation of the dispersion of radioactive releases to the atmosphere. It represents the conclusions of a Working Group established in 1977 to review developments in atmospheric dispersion modelling and to propose models for use within the UK. This report NRPB-R91 (Clarke 1979) described the basic formulation of the Gaussian Plume Diffusion model and its application.

locations while others are close to major roads, some are under the flight paths of principal runways of Dublin Airport.

12.4 Predicted Impacts

12.4.1 Operational Phase

During the operational phase there should be no significant sources of dust emission. There will be however, the potential for Air Quality emissions and Odour emissions. In the case of both of these potential emissions the magnitude of potential impact will be influenced by the relative proximity of sensitive receptors.

With regard to Air Quality emissions the proposed facility will be required to operate to standard EPA air Quality limits and as such should not harbour any significant air quality impacts.

With regard to the potential for Odour impact to sensitive receptors, the nature of the proposed scheme would suggest that without rigorous and diligent management there is the potential for a significant odour impact from the facility. Distance separation from the nearest sensitive receptors of a minimum of 300m should serve to dissipate to an extent, any potential odour emissions.

12.4.2 Construction Phase

During the Construction phase an odour impact is not expected. The potential for Air Quality impact will be comprised of the emissions from road lorries and on site construction plant, which would be the same for all nine locations, and the potential for dust generation should the site clearance and earth moving phases of the build occur during dry periods.

12.5 Evaluation

12.5.1 Evaluation of Land Parcels

See Table 12.0 below.

12.5.2 Evaluation of Sites

See Table 12.1 below.

12.6 Mitigation Measures

12.6.1 Operational Phase

An odour limit that combines a stringent boundary fence standard with very infrequent exceedances of that standard will be adopted for the proposed Regional WwTP. Meeting this stringent standard with very infrequent exceedances of that standard will undoubtedly achieve the requirements of S.I. No. 787. Therefore, the operational phase of the proposed scheme is not expected to cause any significant air quality or odour emissions impacts.

To achieve this stringent standard it is proposed that all potential odour generating units will be covered and vented through odour scrubbing / treatment systems prior to emission to atmosphere.

The level of odour treatment required to achieve the stringent boundary fence odour standard will be determined for the preferred site of the Regional WwTP during the EIS Phase of the project. This will include an assessment of baseline air quality data and odour and ambient air quality modelling.

12.6.2   Construction Phase

Mitigating potential construction phase Air quality and Odour impacts involves the management and prevention of particulate releases and the generation of dust. Standard mitigation measures are described in the NRA's Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (National Roads Authority, 2011). Mitigation measures should be incorporated into the Construction Environmental Management Plan (CEMP), which will be developed during the construction stage

Table 12.0: Land Parcels Assessment

	Air Quality and Odour	Annsbrook	Baldurgan	Clonshagh	Cookstown	Cloghran	Newtown-corduff	Rathartan	Saucerstown	Tyrrelstown Little
12.1	Potential for Construction phase Air Quality impact at Sensitive receptors	22 dwellings (H_2S dispersion factor) within 1km	16 dwellings (H_2S dispersion factor) within 1km	23 dwellings (H_2S dispersion factor) within 1km	22 dwellings (H_2S dispersion factor) within 1km	103 dwellings (H_2S dispersion factor) within 1km	32 dwellings (H_2S dispersion factor) within 1km	125 dwellings (H_2S dispersion factor) within 1km	143 dwellings (H_2S dispersion factor) within 1km	24 dwellings (H_2S dispersion factor) within 1km
12.2	Potential for Operational phase Air Quality impact at Sensitive receptors	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points	Facility shall reach appropriate Air quality at standards at emission points
12.3	Potential for Odour impacts at Construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase
12.4	Potential for Odour impacts at operational phase	22 dwellings (H_2S dispersion factor) within 1km	16 dwellings (H_2S dispersion factor) within 1km	23 dwellings (H_2S dispersion factor) within 1km	22 dwellings (H_2S dispersion factor) within 1km	103 dwellings (H_2S dispersion factor) within 1km	32 dwellings (H_2S dispersion factor) within 1km	125 dwellings (H_2S dispersion factor) within 1km	143 dwellings (H_2S dispersion factor) within 1km	24 dwellings (H_2S dispersion factor) within 1km
12.5	Proximity to EPA Waste Licensed facility	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations

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Table 12.0: Land Parcels Assessment (continued)

Air Quality and Odour		Annsbrook	Baldurgan	Clonshagh	Cookstown	Cloghran	Newtown-corduff	Rathartan	Saucerstown	Tyrrelstown Little
12.6	Proximity to EPA IPPC Licensed Intensive Agriculture facility	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations
12.7	EPA Air Quality Zone Classification	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE A Dublin City (Urban Air Quality Classification)	ZONE D Rest of the Country (Rural Air Quality classification	ZONE A Dublin City (Urban Air Quality Classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)
12.8	Wind Rose Assessment	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at >2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Balgriffin is at 1km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Feltrim is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 0.7km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 1km distance
12.9	Construction Phase Impact rating	imperceptible	imperceptible	imperceptible	imperceptible	imperceptible	imperceptible	imperceptible	imperceptible	imperceptible
12.10	Operational Phase Impact rating	imperceptible	imperceptible	imperceptible	imperceptible	Slight	imperceptible	Slight	Slight	imperceptible

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Table 12.1: Candidate Sites Assessment

	Air Quality and Odour	Annsbrook	Baldurgan	Clonshagh	Cookstown	Cloghran	Newtown-corduff	Rathartan	Saucerstown	Tyrrelstown Little
12.1	Potential for Construction phase Air Quality impact at Sensitive receptors	13 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km	15 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km	87 dwellings (H2S dispersion factor) within 1km	19 dwellings (H2S dispersion factor) within 1km	29 dwellings (H2S dispersion factor) within 1km	142 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km
12.2	Potential for Operational phase Air Quality impact at Sensitive receptors	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase	No Odour emission expected at construction phase
12.3	Potential for Odour impacts at operational phase	13 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km	15 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km	87 dwellings (H2S dispersion factor) within 1km	19 dwellings (H2S dispersion factor) within 1km	29 dwellings (H2S dispersion factor) within 1km	142 dwellings (H2S dispersion factor) within 1km	10 dwellings (H2S dispersion factor) within 1km
12.4	Potential for Odour impacts at Construction phase	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations	No EPA waste licensed facilities within 1km of proposed locations
12.5	Proximity to EPA Waste Licensed facility	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations	No EPA IPPC licensed Intensive Agri facilities within 1km of proposed locations

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Table 12.1: Candidate Sites Assessment (continued)

	Air Quality and Odour	Annsbrook	Baldurgan	Clonshagh	Cookstown	Cloghran	Newtown-corduff	Rathartan	Saucerstown	Tyrrelstown Little
12.6	Proximity to EPA IPPC Licensed Intensive Agriculture facility	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE A Dublin City (Urban Air Quality Classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE A Dublin City (Urban Air Quality Classification)	ZONE D Rest of the Country(Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)	ZONE D Rest of the Country(Rural Air Quality classification)	ZONE D Rest of the Country (Rural Air Quality classification)
12.7	EPA Air Quality Zone Classification	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at >2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Balgriffin is at 1km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Feltrim is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 0.7km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 1km distance
12.8	Wind rose Assessment	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at >2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Balgriffin is at 1km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Feltrim is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Lusk is at 2km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 0.7km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: is at >5km distance	Sparse population within 500m in direction of prevailing winds, closest pop centre in this direction: Rush is at 1km distance
12.9	Construction Phase Impact rating	imperceptible	imperceptible	imperceptible	imperceptible	slight	imperceptible	imperceptible	slight	imperceptible
12.10	Operational Phase Impact rating	imperceptible	imperceptible	imperceptible	imperceptible	slight	imperceptible	imperceptible	slight	imperceptible

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