



CLIENT: Doran Consulting

PROJECT: Environmental Improvement Scheme for
Ward Park, Bangor.

Odour Impact Assessment Report.

LA06/2016/1108/F

Prepared by: Envest

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REPORT CONTROL

Client: Doran Consulting

Project: Environmental Improvement Scheme for Ward Park, Bangor including the removal of sediment from ponds, enlargement of upper pond and island, creation of new pond, introduction of aquatic planting to pond edges, repair work to walls at pond edge and new coping stones provided, upgrade of footpath network, installation of timber boardwalk and decking to ponds, replacement of two existing pedestrian bridges, upgrade of existing inlet structure, replacement and refurbishment of existing bird enclosures, signage, seating, picnic benches, lighting, landscaping and planting (LA06/2016/1108/F).
Odour Management Plan.

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1 Introduction

Envest was commissioned by Doran Consulting to prepare an Odour Impact Risk Assessment and an Odour Management Plan (OMP) in support of a planning application for the Environmental Improvement Scheme for Ward Park, Bangor including the removal of sediment from ponds, enlargement of upper pond and island, creation of newt pond, introduction of aquatic planting to pond edges, repair work to walls at pond edge and new coping stones provided, upgrade of footpath network, installation of timber boardwalk and decking to ponds, replacement of two existing pedestrian bridges, upgrade of existing inlet structure, replacement and refurbishment of existing bird enclosures, signage, seating, picnic benches, lighting, landscaping and planting (LA06/2016/1108/F).

The relevant consultation response received in relation to the proposed development from Ards & North Down Borough Council Environmental Health Department (ANDBC EHD) dated 12th December 2016 stated the following:

ODOUR

It is noted that deposited sediment will be dredged from the ponds. This agitation and removal may release odours from the sediment. In addition, if this dredged material is to be stockpiled, then there is also the risk that nearby residents may be adversely affected by odour.

This Department would therefore also request that further information is submitted to demonstrate how potential odour issues will be addressed.

The proposed scheme will include the necessary civil engineering works to remove silt from the existing ponds along with works to enhance the ecological and landscape value of the park. The existing ponds are heavily silted up and in some locations the depth of water is very restricted. The siltation is having an adverse impact on the birdlife which currently inhabits the ponds and surrounding areas in Ward Park. The park is bordered by a mix of land uses including residential, educational, sports and recreational and primary travel routes to Bangor town centre. The park provides for a key 'Green lung' within an otherwise built up urban context and is used by through passing pedestrians, dog walkers and general recreational users both within the townland of Bangor and further afield. The park also caters for recreational sports activity including football, bowling, athletics, cricket and tennis and occasionally hosts 'one off' concert events. This study focuses upon the areas adjacent to the three main ponds, the area surrounding the memorial and the general pedestrian access and approaches to these areas.

Figure 1 indicates the location of the proposed development with reference to the nearest residential and sensitive receiver locations.

Figure 1: Location of the proposed development with reference to the nearest residential and sensitive receiver locations.



2 Odour Impact Risk Assessment

2.1 Potential Odour Sources.

It has been determined that the sediment has high levels of organic carbon with some mineral oils present. The material is a combination of deposited organic litter, including waste from birds and wildlife, along with interspersed mineral oils. The sediment material is not inert and should be disposed off-site to a licensed facility in accordance with the requirements of the waste hierarchy. Upon removal from site the deposited sediment may be classified as one of the following:

- 17 05 05* *Dredging spoil containing dangerous substances*
- 17 05 06 *Dredging spoil other than those mentioned in 17 05 05*

The laboratory analysis reports are included in the report prepared by Doran Consulting in September 2016 entitled 'POND SEDIMENT REMOVAL FOR ENVIRONMENTAL IMPROVEMENT SCHEME AT WARD PARK, BANGOR'.

The in-situ sediment has a high moisture content and consequently it is unlikely that any licensed waste facility will accept this material prior to dewatering. In preparing the methodology for the removal and disposal of sediment the Contractor will need to consider whether dewatering is best undertaken on-site at Ward Park or off-site at a suitable facility. The sediment shall only be disposed of to a suitably licensed premises.

The gases that are most likely to be emitted from the anaerobic pond sediments when disturbed are carbon dioxide (CO₂), methane (CH₄) and hydrogen sulphide (H₂S). CO₂ and CH₄ are odourless gases. H₂S has a characteristic rotten egg smell which can be detected at low concentrations, but will dilute considerably and disperse quickly when released to atmosphere.

Table 1 shows the locations where sediment was encountered and provides estimates of volume of sediment at various locations within the pond network.

Table 1: Locations and volumes where sediment was encountered.

Location	Volume of Sediment (m ²)
Upper Channel	40 m ²
Upper Pond (South pond)	235 m ²
Middle Pond	1,090 m ²
Lower Pond (north pond)	10 m ²
Total	1,375 m ²

The initial outline programme of works that was developed in 2016 identified the works being conducted in three phases as outlined below. This programme of works is indicative and will need to be verified by the contractor prior to construction.

Table 2: Initial estimated programme of works of sediment removal.

Phase 1b – Upper Pond	Week No.	Duration (weeks)
Removal of silt	13,14	2
Removal of Debris	15	1
Excavation of Existing Island	16	1
Excavation for Increased Pond	17	1
Phase 2a – Middle Pond	Week No.	Duration (weeks)
Removal of silt	57,58,59,60	4
Removal of Debris	59,60	2
Excavation of Existing Island	61,62,63	3
Phase 2a – Lower Pond	Week No.	Duration (weeks)
Removal of silt	62-63	2
Removal of Debris	63	1

2.2 Odour Impact Risk Assessment.

The Odour Impact and Risk Assessment has been prepared with reference to the following good practice guidance;

- Institute of Air Quality Management (IAQM), Guidance on the assessment of odour for planning (Version 1.1, July 2018).

The use of atmospheric dispersion modelling is a common method for the determination of odour impacts from existing or proposed developments. Dispersion modelling can be applied when:

- The sources of odour are clearly identifiable;
- Where the source characteristics are clearly defined (i.e. physical size, emission characteristics such as temperature and efflux velocity are known);
- Odour emission rates can be reasonably determined;
- Odour emission rates are not subject to large variation;
- The area does not have other relevant odour sources that may be difficult to model; and
- The area is suitable for dispersion modelling, i.e. there are no extremes of terrain height, appropriate meteorological data is available, there are no local features that would mean dispersion modelling results are unreliable.

However, at this stage of the development proposal, accurate odour dispersion modelling is not possible because accurate source characteristics such as odour concentrations, area of the emissions, duration of the emissions, emission temperature, efflux velocity, and hence, odour emission rates are unknown. It is most likely that odour emission rates will fluctuate widely during the removal of sediment from ponds.

The IAQM recommends that qualitative risk-based odour assessment is based on the '*source-pathway-receptor*' concept, considering the odour potential of the emission source, the prevailing wind direction relative to the locations and distances of the proposed residential receptors and their sensitivity to the type of odour in question. The following qualitative risk-based odour assessment is based on the approach outlined in the IAQM Guidance.

The scale of exposure (the impact) is determined by the parameters collectively known as the FIDO factors (Frequency, Intensity, Duration and Offensiveness). The magnitude of the effect experienced is determined by the scale of exposure (FIDO) and the sensitivity of the receptor (L, denoting the location, which is often taken to be a surrogate for the sensitivity and incorporates the social and psychological factors that can be expected for a given community).

Table 1: Description of the FIDOL factors and Assessment

FIDOL factor	Description of the FIDOL factors	Impact Assessment
Frequency	How often an individual is exposed to odour?	<ul style="list-style-type: none"> • Once off project. • Temporary exposure period. • Maximum duration 17 weeks. • Odourous gases will only be emitted when sediments are disturbed. • Sediment removal and dewatering will take place during daytime periods only. [May not take place on site].
Intensity	The individual's perception of the strength of the odour	<ul style="list-style-type: none"> • Potential to perceive odour levels as medium to strong odours for a short-term period, when downwind of freshly removed sediments. • Potentially the most intense odours will result during extraction and movement of sediments. • Once extracted and dewatered and stored odour emission will reduce significantly.
Duration	The overall duration that individuals are exposed to an odour over time.	<ul style="list-style-type: none"> • Once off project. • Temporary exposure period. • Maximum duration 17 weeks. • Odours will occur in 'short bursts' during extraction and movement and hence, may be said to give rise to an 'acute' exposure. • H₂S may be emitted but will dilute considerably and disperse quickly when released to atmosphere.
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration / intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score.	<ul style="list-style-type: none"> • Potential to perceive odours as unpleasant and intense strong odours for a short-term period, when downwind of freshly removed sediments. • The gases that are most likely to be emitted from the pond sediments when disturbed are carbon dioxide (CO₂), methane (CH₄) and hydrogen sulphide (H₂S). • CO₂ and CH₄ are odourless gases. • H₂S has a characteristic rotten egg smell which can be detected at low concentrations, but will dilute considerably and quickly when released to atmosphere.
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.	<ul style="list-style-type: none"> • The receptors at Moira Drive in closest proximity to the extracted sediments are not exposed to existing odour sources. • Given the location of receptors in an urban area they may be relatively sensitive to odour effects. • The distance from the excavated sediments to the receptor location will increase dilution and dispersion of an odorous plume as it travels from source to receptor and will reduce the concentration at the receptor, and hence reduce exposure.

The Odour Impact Risk Assessment approach requires an understanding of the prevailing wind direction and wind speeds in the area of the odour source. The prevailing wind direction for the area is predominantly south-westerly as presented in the windrose for Belfast City (2012 – 2016) in Figure 1. Northerly and easterly winds tend to be relatively infrequent. Wind speed characteristics vary between a light breeze to gales.

Figure 1: Five-year Windrose for Belfast City (based on 2012 – 2016 data).

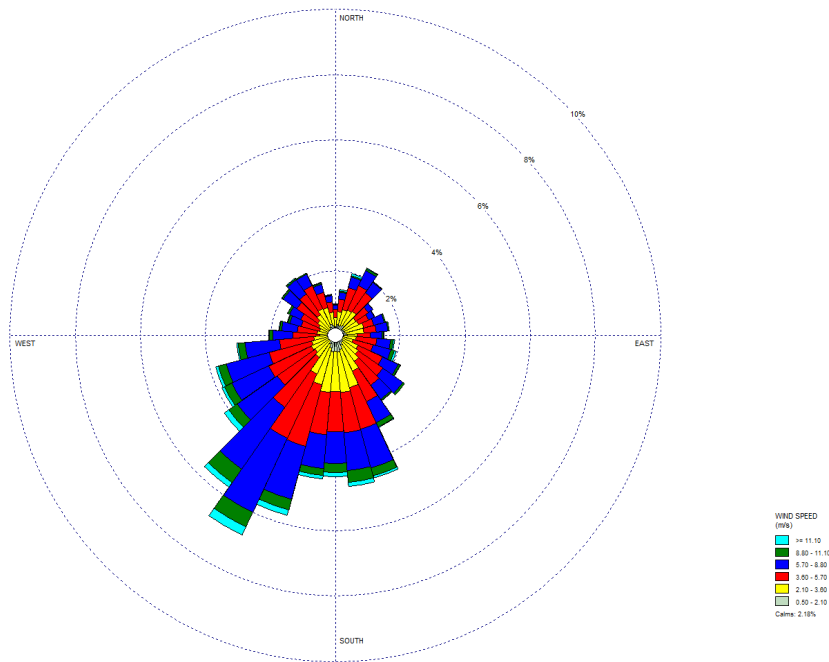


Table 3: Odour 'Risk Assessment' based on the IAQM Guidance methodology at the nearest potentially impacted residential properties.

Receptor details and location	Source Odour Potential	Pathway Effectiveness	Odour Exposure	Receptor Sensitivity	Likely Odour Effect
North of ponds – No. 82 Hamilton Road (~65m north-east of Lower Pond (north pond) & ~80 m north of Upper Channel)	Medium / High	Highly Effective Pathway	Medium Risk	High Sensitivity	Moderate Adverse Effect
South of ponds – No. 1 Castle Cottages (~50m west of Upper Pond (south pond) & ~130 m south-west of Middle Pond)	Medium / High	Highly Effective Pathway	Medium Risk	High Sensitivity	Moderate Adverse Effect
East of ponds – No. 28 Moira Drive (~20m east of Middle Pond)	Medium / High	Highly Effective Pathway	Medium Risk	High Sensitivity	Moderate Adverse Effect
West of ponds – No. 10 Parkmount (~135m west of Middle Pond)	Medium / High	Highly Effective Pathway	Medium Risk	High Sensitivity	Moderate Adverse Effect

This Odour Impact and Risk Assessment based on the IAQM Guidance methodology results in a prediction of the likely odour effect at the nearest sensitive receptor locations as outlined in

Table 3. The Odour 'Risk Assessment' assumes an odour source of medium odour potential due to the fact that the characteristic rotten egg smell of H₂S will dilute considerably and disperse quickly when released to atmosphere. Due to the temporary nature of the works over a maximum of 17 weeks, the predicted the likely odour effect at receptors in the immediate locality of the ponds in Ward Park will be a 'moderate adverse effect'.

The IAQM Guidance methodology suggests that where the overall effect is greater than "slight adverse", the effect is likely to be considered significant. Therefore, due the potential for the impact to be 'significant', this will be over a temporary period during the excavation of sediments. An Odour Management Plan has been detailed.

3 Odour Management Plan (OMP)

An odour management plan is a working document for managing odour issues and should contain a description of foreseeable events which may lead to an odour impact at sensitive receptors. In order to prepare an odour management plan, the following should be considered:

- the activity which produces the odour and the point(s) of odour release
- possible process or control failures or abnormal situations which could lead to an increased level of exposure
- the potential outcome of each failure scenario in respect of the likely odour impact on local sensitive receptors
- the actions which are to be taken to mitigate the effect of the odour release, and details of the persons responsible for the actions on the installation.

This odour management plan contains a description of the actions which will be taken to minimise the potential odour impact during removal and dewatering of sediments.

Given the short-term nature of the proposed works (17 weeks) and the relatively small volume of sediments to be removed (1,375m²) it is most likely that odour impacts would be infrequent and temporary; with a low potential for complaint. If odour impacts and complaints occur regularly then the odour abatement measures needs to be re-evaluated in the light of the degree of impact.

A means of recording odour impacts and complaints and any procedure failures must be put in place by the Contractor.

The recommended odour management plan is outlined in the Table 4.

Where does the odour occur and how is it generated?	Identify the potential release point	Identify possible releases, failures or abnormal situations. Nature/cause of release / failure	Potential outcome of releases or if failure occurs?	What measures have been put in place to prevent or reduce the risk of releases or failure?	What actions are taken and who is responsible if significant odour impact and complaints are reported?
<p>Sediments extracted from bottom of the ponds.</p> <p>Odourous gases such as H₂S potentially released to atmosphere if disturbed sediments are anaerobic and decomposed.</p>	<p>At pond surface and extractor bucket when sediments extracted from the bottom of the ponds and exposed to atmosphere</p>	<p>Escape of odour from surface of ponds when extracted via a mechanical bucket.</p> <p>In terms of odour release, no failures can arise as the sediments will be extracted via a mechanical bucket.</p>	<p>Escape of odour to atmosphere from surface of ponds when extracted via a mechanical bucket.</p> <p>May cause odour to be detected at nearby houses – short-term in duration. During weekday daytime only.</p>	<p>Not applicable. Sediments will be extracted via a mechanical bucket. No abatement at source feasible.</p>	<p>Instigate process containment procedure / shutdown procedure. Inform Project Manager. Advise Env. Health Dept. by telephone immediately.</p>
<p>Sediments stored on site and/or dewatered.</p> <p>Odourous gases such as H₂S potentially released to atmosphere.</p>	<p>From surface of stored / dewatered sediments exposed to atmosphere.</p>	<p>Escape of odour from surface of stored / dewatered sediments. In terms of odour release, stored sediments could be covered by tarpaulin to reduce odour release to atmosphere. This is only feasible if sediments are to be stored on site for longer than 2 days.</p>	<p>Escape of odour to atmosphere from surface of stored / dewatered sediments.</p> <p>May cause odour to be detected at nearby houses – short-term in duration. During weekday daytime only.</p>	<p>Sediments could be covered by tarpaulin to reduce odour release to atmosphere.</p> <p>This is only feasible if sediments are to be stored on site for longer than 2 days.</p>	<p>Instigate process containment procedure / shutdown procedure. Inform Project Manager. Staff will monitor the effectiveness of odour control to ensure that the impacts to the neighbouring properties are minimised. Advise Env. Health Dept. by telephone immediately.</p>

Odour Complaint Records — a written record of complaints of odours should be kept, with the following information recorded for each complaint:

- a. Name of complainant
- b. Location of complainant
- c. Date and time of complaint
- d. Weather conditions prevailing at the time of complaint
- e. Any process operation existing at the time of complaint
- f. Steps taken to remedy any reason which may have contributed to the complaint
- g. Carefully monitor odour incidences and ensure satisfactory resolution.

SIMPLIFIED OLFACTOMETRIC TESTING (“SNIFF-TESTING”)

This protocol ensures a consistent approach to the assessment of odours. This will provide a subjective “snap-shot” assessment of the presence, strength and character of an odour within the Ward Park boundary and/or at the boundary and/or in the area/community surrounding Ward Park. Such a routine assessment can help to build up a picture of the odour impact of the sediment extraction process on the surrounding environment over a period of time. Assessments should be targeted at adverse weather conditions or particularly odorous cycles of an operation to allow “worst case” scenarios to be investigated, and the same methodology should be used to follow up complaints.

During the assessment of odours on and around the proposed composting installation using “sniff testing” the parameters of interest are:

- Detectability / Intensity of the odour
- Extent & persistence of the odour
- Sensitivity of the location where the assessment is being made with regard to receptors,
- Offensiveness of the odour, and
- A note should also be made of any external activities that could impact on the “sniff test” results.

The “sniff test” observation period should be over a standard time, generally 5 minutes at each location. During this time the intensity and extent of the odour can be evaluated.

A general record should be made of the atmospheric conditions prevalent during the assessment, i.e. wind speed, wind direction, rainfall, cloud cover, humidity, etc.

Sample Odour Assessment Report Template:

ODOUR ASSESSMENT REPORT FILE NO.

INSTALLATION/ LOCATION		DATE	
Weather		Wind (strength & direction)	
Temperature (deg. C)		Bar. Pressure (mbar) if known	
Ground condition		General air stability (if known)	
General air quality		Cloud cover/height - Low, high, very high	
Time: start		Time: Finish	

Plan attached showing location & extent of odour Yes/No

COMPLAINT RECEIVED	Yes/No	Date & Time complaint(s) received	
Location of complaint area		Number of complaints which may relate to same source	
Grid Reference (where location is not a property)		Time odour noticed & duration	

TEST LOCATION (and time)	Intensity 1 - 5	Extent 1 - 5	Sensitivity 1 - 5	Offensiveness 1 - 3	Sources within the installation (potential or actual)	External sources (i.e. potentially confounding sources/factors)

Additional comments

Signature:

Persons contacted regarding process:

Action required

4 Conclusions

The potential odour impact has been assessed in accordance with the Institute of Air Quality Management (IAQM), Guidance on the assessment of odour for planning (July 2018). The odour impact assessment has been carried using a worst-case odour risk assessment approach.

Due to the temporary nature of the works over a maximum of 17 weeks, the predicted the likely odour effect at receptors in the immediate locality of the ponds in Ward Park will be a 'moderate adverse effect'.

If odour complaints are received, a method of written complaint record reporting has been outlined.