



MAXI DEVELOPMENTS LTD
RESIDENTIAL DEVELOPMENT AT BRYN MORFA
ODOUR RISK ASSESSMENT

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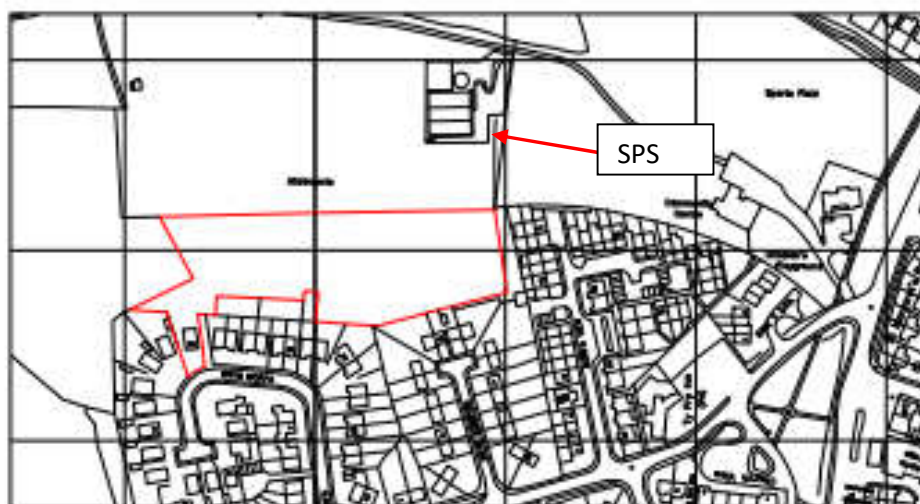
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1.0 INTRODUCTION

1.1 Egniol were commissioned by Cadnant Planning acting on behalf of Maxi Developments to undertake an odour risk assessment study in relation to a proposed residential development at Bryn Morfa in Bodelwyddan, Denbighshire, LL18 (The Site).

1.2 The site location plan is shown below.



PROPOSED SITE LAYOUT scale 1:1250

1.3 The development will comprise of the demolition of one dwelling and erection of 28 dwellings including the creation of a new vehicular access, internal access road and associated works.

1.4 This development will be seen in the context of and adjacent to the established residential area of Bodelwyddan to the west and south, as well as the Bodelwyddan allotments and a Sewage Pumping Station (SPS), both to the east of the Site. Beyond these, is agricultural land.

1.5 The pre-application advice from the County Council's Environmental Health Officer (EHO) Philip Caldwell indicated that *'One issue I wish to bring to your attention is an on-going odour issue due to emissions from a pet food factory approx. 500meters south west of the proposed housing site. A chimney and abatement equipment is in the process of being installed at the factory however the odour from the factory can still affect the village. It is possible that the sniff tests for the sewage treatment works will be overwhelmed by the odour from the factory if the wind is in the right direction. I would ask that any sniff tests carried out while there is interfering odour from the pet food factory affecting the site for a significant period are discounted'*. (by email 25.06.19).

1.6 The specific objectives of the study are to:

- To identify local activities which are potential sources of odour impact on this site;
- To assess the typical odour conditions on the development site;
- To assess the level of odour exposure taking into account adverse weather conditions and intermittent effects from various local sources.

Authority Statement

- 1.7 The risk assessment study was carried by Anna Cole, a principal environmental scientist at Egniol Consulting. Anna is an experienced environmental practitioner and a Member of the Chartered Institute of Waste Management. Anna undertakes regular environmental risk assessments of air quality issues in relation to planning and environmental permit applications for industrial developments, waste management activities and infrastructure projects, and in response to non-compliance with regulatory conditions.

2.0 ODOUR RISK ASSESSMENT APPROACH

- 2.1 This odour assessment study used a risk-based approach which is based on the site-specific presence of Sources, Pathways and Receptors and relationship between them, which could lead to odour effects/nuisance at the receptor location. This approach takes into account the sensitivity of odour Receptors, the nature of odour emissions, the prevailing wind directions and distances of the proposed residential receptors. This risk-based assessment approach was developed by the Institute of Air Quality Management (IAQM) for planning purposes in their Guidance on the Assessment of Odour for Planning (2014).
- 2.2 In order to understand the odour conditions on site we carried out odour surveys at the site and the local area. We used a sniff testing approach, an odour assessment method which uses the human nose as an analytical tool to assess the odour level, duration and offensiveness. This approach gives an estimate of odour exposure and thus is a reference method for assessing a loss of amenity. It is commonly used by both industrial operators and environmental regulators to ascertain odour conditions on site and when assessing odour complaints.
- 2.3 Odour surveys were carried out using sniff testing procedure in the Environment Agency's Horizontal Guidance H4 Odour Management.
- 2.4 Other factors such as prevailing wind conditions and distance to local odour receptors were taken into account for assessment of odour effects.

3.0 CONCEPTUAL SITE MODEL

The Site

- 3.1 As stated earlier the development site will be a housing scheme which in terms of potential odour nuisance, will be a High Sensitivity Receptor. The local risk factors that affect the potential odour impact on this Receptor are, local sourced of odorous releases and the prevailing wind conditions as the pathway for these releases to reach the Receptor.
- 3.2 A conceptual site model for the Site is summarised below. The assessment parameters were set up in line with IAQM Guidance (ref Table 8 in Appendix 1).

Odour Source (within 500m)	Pathway	Receptor
<p>Sewage Pumping Station – Welsh Water asset no.1069</p> <p>Small Odour Potential due to absence of source of emissions to air during normal operation*. Three overground chambers to receive stormwater overflow. Risks of sewage overflowing and blockages are unknown.</p>	<p>SPS is adjacent to the Receptor (36m to the east of the Receptor)</p> <p>Highly Effective Pathway</p>	<p>Bryn Morfa Housing Scheme comprising 28 residential dwellings.</p> <p>High Sensitivity Receptor in terms of odour nuisance.</p>
<p>The Real Petfood Company</p> <p>Medium Odour Potential due to large scale operation and inherent nature of the process emissions to air. The emissions release point has been increased in height (a taller chimney installed in 2019).</p>	<p>The company is situated c.500 SW from the Receptor.</p> <p>Moderately Effective to Ineffective Pathway due to high frequency of wind from SW which albeit is mitigated by atmospheric dispersion from an elevated release point over the separation distance between the Source and the Receptor.</p>	

*A Sewage Pumping Station (SPS) receives sewage and stormwater into a large underground tank from a group of buildings/settlement. The sewage is stored in the tank until it reaches a predetermined level for a pump to kick in to pressurise the sewage so that it could move out of the tank upgradient to a point where it can travel under gravity to the main sewer. Operation of a SPS is an unmanned operation.

Meteorological Conditions

- 3.3 The meteorological conditions that are pertinent to odour dispersion are mainly the prevailing wind conditions (wind speed and direction, calm wind). Other specific weather conditions which are potential risk factors are adverse weather conditions such as ‘atmospheric gloom’ a stable atmospheric condition with low wind speed, which develops during the colder part of the year and gives

poor dispersion of odour. Under such conditions the receptors close to the source in all directions are affected. When conditions are not calm, it will be the downwind receptors that are affected. Overall the local receptors that are downwind from the source during prevailing wind direction tend to be at higher risk of odour exposure.

- 3.4 The regional wind pattern for North Wales is dominated by winds from westerly and south-westerly directions which are associated with low pressure systems from North Atlantic. Under these conditions dispersion of odour would occur in the downwind direction (East and North-East). The frequency of winds from other directions is relatively low. Episodes of low wind speed or no wind are important considerations in assessment of exposure to odours by the receptors which are situated close to the source of odour. Wind condition when the wind speed is less 1.5m/s, are infrequent.

Odour Surveys

- 3.5 In order to assess the baseline odour conditions at the development site, we carried out tree odour surveys at the site and the local area. The surveys were carried out using sniff testing method, as per H4 Odour Guidance.
- 3.6 The initial odour survey was carried out on 12th September 2019. At the time of the survey the weather conditions were dry and moderate breeze (13-16mph) from South-West. Under this wind direction, the Receptor is situated downwind from the Source of odour at the Real Petfood Company and upwind from the adjacent SPS. The Site was walked over slowly; odours noted were variable from none to slight when a slight flux of odour was occasionally detected.
- 3.7 The second survey was carried out on 20th September 2019 when the weather conditions were dry with light wind from East –South East. This survey aimed to assess odour conditions on site during the wind direction from the adjacent SPS. During this wind condition, no or very faint odours were detected at reference points R1-R5 (see location Plan and survey data in Appendix 2).
- 3.8 The third survey was carried out on 2nd October to assess the odour conditions on site during calm weather. Again, the five reference points were assessed in terms of odour levels and odour character. Overall, no characteristic odours were detected in any reference points. In addition, we enquired about the general odour condition from several local residents in the village. They made comments about periodic odours from the petfood factory and had aspirations to see a positive effect following a recent installation of the taller chimney. Regarding the odours from the SPS, none of the interviewed residents seem to have any issues with the odour.
- 3.9 Odour survey reports are enclosed in Appendix 2.

4.0 ODOUR RISK ASSESSMENT

- 4.1 Having developed a conceptual site model for odour risk assessment, above, and assessed the current odour conditions on site which are likely to be experienced by the future residents, it is possible to estimate the risk of odour exposure i.e. impact at this Receptor location.
- 4.2 The IAQM Guidance provides a means of qualitative odour risk assessment various types of development proposals. The key elements of the method are reproduced in Appendix 1. The assessment results are summarised below.

Sewage Pumping Station

Step 1: Small Odour Potential x Highly Effective Pathway = Low Risk of odour impact at the Site

Step 2: Low Risk of odour exposure x High Sensitivity Receptor = Slight Adverse Magnitude of odour impact

The Real Petfood Company

Step 1: Medium Odour Potential x Moderately Effective Pathway = Low Risk of odour impact at the Site

Step 2: Low Risk of odour exposure x High Sensitivity Receptor = Slight Adverse Magnitude of odour impact

- 4.3 A cumulative effect of these two odour sources is unlikely to increase the overall magnitude of odour effect on Site. This is due to their locations in the opposite directions from the Site and the resultant effects of atmospheric dispersion from either direction.
- 4.4 In other situations when the wind direction results in dispersion of the odours from both sources away from the Site (e.g. southerly or northerly wind direction) or during calm wind condition, the resultant odour effect at the Site is estimated to be Slight Adverse or lesser.
- 4.5 The overall estimated odour effect from the adjacent SPS and the Pet Food production company is estimated to be Slight Adverse. The odour conditions observed at the Site on three occasions, point out towards an 'Negligible' and on occasional 'Slight Adverse' conclusion. In terms of significance, the overall effects are insignificant according to the IAQM Guidance, *"where the overall effect is greater than 'slight adverse', the effect is likely to be considered significant."*

5.0 CONCLUSIONS

- 5.1 The proposed housing scheme at Bryn Morfa will be situated on a green field between the residential area of Bodelwyddan village and the adjacent Sewage and Stormwater Pumping Station. As a Receptor to odour the future residents of this residential site, will be Highly sensitive to adverse odour effects. At this location the housing scheme will have no set back buffer from this potentially odorous waste management activity.
- 5.2 The other local odour source is the petfood factory situated c.500m from the Site. The factory although a known source of offensive odours has been fitted with a taller chimney to improve dispersion of the process air.
- 5.3 Other factors which affect the odour conditions on Site and the local area, are the prevailing wind direction from the south-west sector and the periods of low or calm wind which are important consideration for odour emissions from the nearby sources.
- 5.4 The background odour situation was surveyed at the site and adjacent area, on three separate occasions under different weather conditions. The potential risk of odour nuisance at the Site was assessed using a reference methodology developed by the Institute of Air Quality Management (IAQM) for planning purposes in their Guidance on the Assessment of Odour for Planning (2014).
- 5.5 The two assessed local sources of odour are shown to have Negligible to Slight Adverse odour effects for the future residents of the Site and as such be classified as Insignificant.

APPENDICES

APPENDIX 1 Qualitative Risk Assessment Approach (source: IAQM Guidance on the Assessment of Odour for Planning 2014)

STEP 1 Odour Risk Assessment

Table 8: Examples of risk factors for odour source, pathway and receptor sensitivity

Source Odour Potential	Pathway Effectiveness	Receptor
<p>Factors affecting the source odour potential include:</p> <ul style="list-style-type: none"> the magnitude of the odour release (taking into account odour-control measures) how inherently odorous the compounds are; the unpleasantness of the odour. 	<p>Factors affecting the odour flux to the receptor are:</p> <ul style="list-style-type: none"> distance from source to receptor the frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind) the effectiveness of any mitigation/ control in reducing flux to the receptor the effectiveness of dispersion/dilution in reducing the odour flux to the receptor topography and terrain 	<p>For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:</p>
<p>Large Source Odour Potential Magnitude – Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m₃ per year; area sources of thousands of m₂. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness – processes classed as “Most offensive” in Table 5; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.</p>	<p>Highly Effective Pathway for Odour Flux to Receptor Distance – receptor is adjacent to the source/site; distance well below any official set-back distances. Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution – open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.</p>	<p>High Sensitivity Receptor Surrounding land where users` can reasonably expect enjoyment of a high level of amenity; and the people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.</p>
<p>Medium Source Odour Potential Magnitude – smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m₃ per year; area sources of hundreds of m₂. The compounds involved are moderately odorous. Unpleasantness – processes classed in H4 as “Moderately offensive”; or (where known)</p>	<p>Moderately Effective Pathway for Odour Flux to Receptor Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated but compromised by building effects.</p>	<p>Medium Sensitivity Receptor Surrounding land where:</p> <ul style="list-style-type: none"> users` would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or people wouldn't reasonably be expected to be present here

Source Odour Potential	Pathway Effectiveness	Receptor
odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control – some mitigation measures in place, but significant residual odour remains.		continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m ₃ per year; area sources of tens m ₂ . The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness – processes classed as “Less offensive” in H4; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.	Ineffective Pathway for Odour Flux to Receptor Distance – receptor is remote from the source; distance exceeds any official set-back distances. Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/dilution – releases are from high level (e.g. stacks, or roof vents >3m above ridge height) and are not compromised by surrounding buildings	Low Sensitivity Receptor – surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.
Notes: Minimum “setback” distances may be defined for some odorous activities: for example, standard setback distances for livestock housing units are a popular tool for odour regulation in Australia and New Zealand, Europe and the United States.		

STEP 2 Odour Risk Assessment

Table 9: Risk of odour exposure (impact) at the specific receptor location Source Odour Potential

		Source Odour Potential		
		Small	Medium	Large
Pathway Effectiveness	Highly effective pathway	Low Risk	Medium Risk	High Risk
	Moderately effective pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

Table 10: Likely magnitude of odour effect at the specific receptor location

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High Risk of Odour Exposure	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk of Odour Exposure	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk of Odour Exposure	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk of Odour Exposure	Negligible Effect	Negligible Effect	Negligible Effect

APPENDIX 2 Odour Survey Reports – Bryn Morfa Development Site

Survey 1: 12th September 2019

Ref point	Odour Intensity Level	Constant (C) or Intermittent (I)	Odour Character	Comments
1	0-2	I	mixed	Fluxes of faint odour of mixed character (kitchen, fatty, processed food, garbage etc)
2	0-2	I	mixed	
3	0-1	I	mixed	
4	0-2	I	mixed	
5	0-1	I	mixed	

Survey 2: 20th September 2019

Ref point	Odour Intensity Level	Constant (C) or Intermittent (I)	Odour Character	Comments
1	0-1	C	n/a	No odour or very faint odour
2	0-1	C	n/a	
3	0-1	C	n/a	
4	0-1	C	n/a	
5	0-1	C	n/a	

Survey 3: 2nd October 2019

Ref point	Odour Intensity Level	Constant (C) or Intermittent (I)	Odour Character	Comments
1	0-1	C	n/a	No odour or very faint odour
2	0-1	C	n/a	
3	0-1	C	n/a	
4	0-1	C	n/a	
5	0-1	C	n/a	

VDI 394034 Odour intensity scale

Odour Strength	Odour Intensity Level	Comments
No odour/not perceptible	0	No odour when compared to the clean site
<i>The Odour Detection Threshold (ODT) of 1 ouE.m-3 is somewhere between 0 and 1</i>		
Slight/very weak	1	There is probably some doubt as to whether the odour is actually present
Slight/weak	2	The odour is present but cannot be described using precise words or terms
Distinct	3	The odour character is barely recognisable
<i>VDI 3940 says that the recognition threshold intensity is generally 3-10 times higher than the ODT (i.e. 3-10 ouE.m-3)</i>		
Strong	4	The odour character is easily recognisable
Very strong	5	The odour is offensive. Exposure to this level would be considered undesirable
Extremely strong	6	The odour is offensive. An instinctive reaction would be to mitigate against further exposure

Bryn Morfa Development Site – Odour Survey Reference Points

