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LAND EAST OF BASINGSTOKE - ODOUR ASSESSMENT REPORT

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26/09/2014

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Executive Summary

SCOPE

WSP UK has been commissioned by Hampshire County Council (HCC) to undertake an odour assessment to support the site allocation and prospective planning application for a mixed use development in the emerging Basingstoke & Deane Borough Council Local Plan, referred herein as *Land to the east of Basingstoke*.

This report presents the findings of the assessment which addressed the potential odour impacts on the Proposed Development resulting from the operation of the existing Sewage Treatment Works (STW) located to the east of the Application Site, operated by Thames Water (TW).

Information on the type, source and emission data associated with the STW were identified and provided by TW, and the likely nuisance level at the proposed exposure locations predicted by using odour dispersion modelling.

METHODS

The assessment of the potential odour nuisance levels at the Application site was completed by WSP UK following the UK Environment Agency guidelines, UK Water Industry Research (UKWIR) findings, and the 2014 Institute of Air Quality Management (IAQM) guidance.

The dispersion modelling was conducted using the US EPA AERMOD dispersion model. The model was run in accordance with recent guidance issued by the US EPA and Environment Agency. The meteorological data used by the model to simulate the dispersion and dilution effects generated by the atmosphere were obtained from Odiham recording station for the years 2013 to 2009, which is located approximately 8.7km to the southeast of the site. Data describing the topography of the local area was obtained from Ordnance Survey. The locations of the odour sources at the STW were provided by TW.

FINDINGS

Odour exposure levels predicted at the areas of residential land and school location are encompassed within the $C_{98\ 1\ \text{hour}} = 1.5$ and $4\ \text{OU}_E/\text{m}^3$ odour exposure levels.

RECOMMENDATIONS

It is recommended that the location of the proposed school within the Master Plan Options be reconsidered to position the school below the $C_{98\ 1\ \text{hour}} = 1.5\ \text{OU}_E/\text{m}^3$ odour exposure level.

Subject to the above, Master Plan Option B is within acceptable odour exposure limits but it is recommended that Master Plan Option A be amended to position all residential parcels below the $C_{98\ 1\ \text{hour}} = 1.5\ \text{OU}_E/\text{m}^3$ odour exposure level.

CONCLUSIONS

With the recommended mitigation measures in place, the Proposed Development will not be significantly affected by the nearby STW odour emissions and comply with European and National odour legislation and guidance, and local planning policy.

1 Introduction

1.1 Scope

1.1.1 WSP UK Ltd (WSP) has been commissioned by Hampshire County Council (HCC) to undertake an odour assessment to support the site allocation and prospective planning application for a mixed use development at Land East of Basingstoke, hereafter referred to as the Proposed Development or Site Allocation.

1.1.2 The Proposed Development comprises an initial developable area that would accommodate approximately 450 dwellings, the reservation of land for a primary school, and associated social and physical infrastructure in the Local Plan up to 2029. It is also noted in Basingstoke's current Revised Pre-Submission Local Plan that the development of a further 450 dwellings may be delivered beyond 2029, taking the total residential dwellings to approximately 900.

1.1.3 This study assesses the level of odour nuisance future residents and users of the Proposed Development would be subject to, due to odour releases associated with the operation of Sewage Treatment Works (STW), located in the vicinity and to the east of the Application Site. Two different indicative Master Plan options are analysed, (Options A and B), which were submitted in response to the statutory public consultation on the Pre-Submission Local Plan in October 2013.

1.1.4 The specific objectives of the odour assessment were as follows:

- a) To identify activities associated with the current STW operations conducted at the site which have the potential to generate odour and to estimate the odour emissions released from such operations;
- b) To assess the potential impact of odour from the STW upon the Proposed Development and determine any areas where odour annoyance may occur; and
- c) To identify potential odour mitigation measures that could be applied at the STW to reduce the risk of adverse odour impacts across the Application Site.

1.1.5 It is noted that an agreement with Thames Water (TW, the operator of the STW site) was reached so that the identification of activities associated with the current STW operations and the mapping of odour emissions released from such operations was not undertaken by WSP UK. Emission data were directly provided by TW and used in the modelling work undertaken.

1.1.6 This report presents the findings of the odour assessment carried out highlighting the odour exposure levels that are likely to occur around the STW and at the Proposed Development.

1.2 Structure

1.2.1 This report is arranged in the following manner:

- Section 2 provides relevant legislation, policy and guidance of relevance to the assessment;
- Section 3 provides general information on exposure limits and significance criteria;
- Section 4 provides the methodology followed in this study, including some information about AERMOD, the dispersion model used for this study, and details the modelling parameters and procedures, as well as the steps followed in determining the odour exposure significance for the Proposed Development;
- Section 5 presents and discusses the results of the modelling exercise; and

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- Section 6 provides the study conclusions.

2 Relevant Legislation, Planning Policy, and Guidance

2.1 Legislative Framework

2.1.1 The applicable legislative framework is summarised as follows:

Environmental Protection Act 1990

2.1.2 Section 79, subsection (1)(d) of the Environmental Protection Act 1990 (Ref. 1) gives the following definitions of statutory nuisance relevant to odour:

- *‘Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance’*

2.1.3 Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

Environmental Permitting (England and Wales) Regulations (Amendment) 2012

2.1.4 The Environmental Permitting (EP) (Ref. 2) regime aims to protect the environment while simplifying the regulatory system and minimising the administrative burden on the regulators (either the local authority or the EA) and the operators of the facilities regulated under the regime. These Regulations set out what facilities need to have an environmental permit in order to operate and prevent/minimise harm to the environment.

2.2 Planning Policy

3.1.1 The applicable planning policy is summarised as follows:

National Planning Policy Framework

2.2.1 The National Planning Policy Framework (NPPF) (Ref. 3) sets out the Governments planning policies for England and how these are expected to be applied. It promotes sustainable development and opportunities for local communities to engage in plan making at a neighbourhood level. The core underpinning principle of the framework is the presumption in favour of sustainable development, defined as: *‘Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’* One of the 12 core planning principles in the NPPF is that planning should *‘contribute to conserving and enhancing the natural environment and reducing pollution.’*

2.2.2 Pollution is defined as:

- *“Anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam, odour, noise and light”.*

2.2.3 With regards to odour and air quality, the following extracts from the NPPF are considered most relevant:

- Paragraph 109 states *‘The planning system should contribute to and enhance the natural and local environment by:...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water, or noise pollution..’;*

- Paragraph 110 states *'In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity value, where consistent with other policies in this Framework.'*;
- Paragraph 122 states *'...local planning authorities should focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities'*; and
- Paragraph 203 states *'Local Planning authorities should consider where otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.'*

Local Planning Policy

Basingstoke and Deane Local Plan (Revised Pre-Submission Draft Document) 2011-2029 (April 2014)

- 2.2.4 Policy SS3.9 of the Basingstoke and Deane Local Plan (Revised Pre-Submission Draft Document) (April 2014) (Ref .4) makes specific reference to the Site Allocation and states:
- 'In light of the nearby incinerator and sewage treatment works ensure acceptable noise and odour standards can be met within homes and amenity areas, through the avoidance of noise sensitive areas and the preparation of comprehensive noise and odour impact assessments (in consultation with the utility provider) which inform layout decisions on this and the adjoining Redlands site'.
- 2.2.5 Furthermore, the Local Plan makes reference to odour (in the form of sewage related activities) in the air quality section. The document states:
- 'Concerns surrounding air quality and its potential impact on health primarily stem from situations where proposed development would be located near busy and congested roads. However, it also relates to situations where odour is associated with particular commercial, industrial, agricultural or sewage related activities which may affect quality of life'.

2.3 Guidance

- 2.3.1 The following guidance document and publications have been used in this assessment:

Environment Agency Guidance – H4 Odour Management

- 2.3.2 The Environment Agency have published technical guidance for the assessment of odour issues, Guidance H4 Odour Management (2011) (Ref. 5). This guidance, referred to in this report as H4, provides benchmarks against which predicted odour concentrations can be assessed. It also provides guidance for use in modelling emissions of odour and in undertaking qualitative 'sniff test' assessments.

Integrated Pollution Prevention Control – Draft Horizontal H4 Guidance for Odour

- 2.3.3 A combined draft guidance document, Draft Horizontal H4 Guidance for Odour (2002) (Ref. 6) produced by the Environment Agency, Environment and Heritage Service and the Scottish Environmental Protection Agency (SEPA) for the assessment of odour issues has been used in this assessment. This guidance provides similar technical guidance to that provided in the H4 guidance above.

Defra's 2006 'Code of Practice on Odour Nuisance from a Sewage Treatment Works'

- 2.3.4 This document (Ref. 7) provides guidance to local authorities, operators of sewage treatment works and other interested parties on the statutory nuisance regime, good practice measures for managing odour nuisance from sewage treatment works and good practice for assessing odour and managing and responding to complaints.

Odour Guidance for Local Authorities

- 2.3.5 The primary aim of this Guide (Ref. 8) is to provide a toolkit for local authorities to assist them in providing a consistent, effective and fair approach to their regulatory duties with regard to odours. This must be done in a transparent manner, and both industry and the public should be kept informed. In particular, they are entitled to know what measures have been taken and agreed, and the rationale for such measures. This is particularly important in the context of controlling odours, where a complete solution from the point of view of residential neighbours may not always be achieved notwithstanding the employment of Best Practicable Means (BPM).
- 2.3.6 This Guide provides advice on what constitutes good practice for local authorities in fulfilling their statutory duties. Local authorities are encouraged to develop their own policies and service performance standards and to review from time to time their services to identify any areas where under-performance may be a concern and improvements may be possible. It remains the responsibility of each local authority to make its own arrangements to comply with its legal obligations and to seek legal and technical advice on fulfilling its statutory duties.

Institute of Air Quality Management Guidance (IAQM)

- 2.3.7 This Guidance (Ref. 9) is for assessing odour impacts for planning purposes. The planning system has the task of guiding development to the most appropriate locations: ideally, significant sources of odour should be separated from odour-sensitive users of the surrounding land (sensitive receptors); failing this, it may be possible to employ control and mitigation measures to make a proposed development acceptable from a land-use perspective. New proposals for such developments may require an odour impact assessment to be submitted, either as a stand-alone assessment or as part of an Environmental Statement, to accompany the planning application

3 Background of Odour Exposure Criteria

3.1 Definition

- 3.1.1 Odour concentration is expressed in terms of European Odour Units per metre cubed of air (OU_E/m^3). Odour nuisance develops as a result of intermittent but regular exposure to odours that are recognisable and have an offensive character.
- 3.1.2 The key factors that contribute to the development of odour annoyance are summarised by the acronym FIDOL (For a more detailed explanation please see Section 4):
- Frequency of exposure
 - Intensity or strength of exposure
 - Duration of exposure
 - Offensiveness
 - Location sensitivity
- 3.1.3 Taking these factors into account, a number of odour impact criteria have been developed that enable the odour impact risk of emitting facilities to be predicted using dispersion modelling techniques. These criteria are generally defined in terms of a minimum concentration of odour (reflecting the intensity/strength element of FIDOL) that occurs for a defined minimum period of time (reflecting duration and frequency element of FIDOL) over a typical meteorological year.
- 3.1.4 The concentration element of these criteria can be increased or lowered to reflect variations in the offensiveness of the odours released from a specific type of facility, and the sensitivity of nearby sensitive locations.
- 3.1.5 In the UK, odour impact criteria are generally expressed in terms of a European odour unit concentration that occurs for more than 2% of the hours of a typical meteorological year, and have been designed for application to permanent residential properties which are considered to be the most sensitive from an impact risk perspective.
- 3.1.6 The most commonly applied criterion from this perspective is the 'Newbiggin criterion' which was originally introduced into a public inquiry for a new sewage works at Newbiggin-by-the-sea in 1995, and equates to an odour exposure level of 5 European odour units per cubic meter ($C_{98, 1\text{-hour}} > 5 \text{OU}_E/\text{m}^3$).
- 3.1.7 The Newbiggin criteria have been successfully applied during numerous planning and nuisance assessment studies since 1995, including for sewage activities.
- 3.1.8 Since 2002, a range of indicative odour annoyance criteria have also been applied to assess odour impact risk from residential properties, which have supplemented the use of the Newbiggin criterion. These criteria were introduced in the draft Horizontal Guidance Note for Odour H4 issued by the Environment Agency and define three different levels of exposure at which odour impact or annoyance could potentially be expected to occur, for odours with high, moderate and low offensiveness (see Section 3.2).

3.2 Environment Agency guidelines

3.2.1 In April 2011, the Environment Agency published H4 Odour Management guidance (H4). In Appendix 3 – Modelling Odour Exposure, benchmark exposure levels are provided. The benchmarks are based on the 98th percentile of hourly mean concentrations of odour modelled over a year at the site/installation boundary. The benchmarks are presented in **Table 1**.

Table 1 - Environment Agency H4 Guidance Benchmark Odour Criteria

Relative Offensiveness	Indicative criterion
Most Offensive	1.5 OU_E/m^3 for most offensive odours - 98 th percentile (hourly average)
Moderately Offensive	3.0 OU_E/m^3 for moderately offensive odours 98 th - percentile (hourly average);
Less Offensive	6.0 OU_E/m^3 for less offensive odours - 98 th percentile (hourly average).

3.2.2 These indicative criteria aim to differentiate between odours of different offensiveness, and range from $C_{98, 1\text{-hour}} > 1.5 \text{OU}_E/\text{m}^3$ (for highly offensive odours) to $C_{98, 1\text{-hour}} > 6 \text{OU}_E/\text{m}^3$ (for low offensive odours). It should be noted that the sewage treatment sector does not currently fall under the IPPC regime and that these criteria are based on relatively limited data and have not undergone any robust validation in terms of their applicability to the sewage treatment sector in the UK.

3.3 UK Water industry Research findings

3.3.1 The main source of research into odour impacts in the UK has been undertaken by the wastewater industry. An in-depth study of the correlation between modelled odour impacts and human response was published by the UK Water industry Research (UKWIR) in 2001 (Ref. 10). This was based on a review of the correlation between reported odour complaints and modelled odour impacts in relation to nine wastewater treatment works in the UK with on-going odour complaints. The findings of this research and subsequent UKWIR research indicated the following, based on the modelled 98th percentile of hourly mean concentrations of odour:

- At below $5.0 \text{OU}_E/\text{m}^3$, complaints are relatively rare, at only 3% of the total registered.
- At between $5.0 \text{OU}_E/\text{m}^3$ and $10.0 \text{OU}_E/\text{m}^3$, a significant proportion of total registered complaints occur; 38% of the total.
- The majority of complaints occur in areas of modelled exposures of greater than $10.0 \text{OU}_E/\text{m}^3$, 59% of the total.

3.4 Choice of Odour Benchmarks for this Study

3.4.1 Odours from STWs are usually placed in the High offensive category. Based on the combination of the information above, for this study, to assess the significance of the odour exposure levels generated by the works, the Newbiggin criterion ($C_{98, 1\text{-hour}} = 5 \text{OU}_E/\text{m}^3$), and the most stringent Environment Agency H4 criterion ($C_{98, 1\text{-hour}} = 1.5 \text{OU}_E/\text{m}^3$) were used.

4 Methodology

4.1 Approach

- 4.1.1 For the purpose of assessing the impact of odour arising from the STW the Newbiggin criterion ($C_{98, 1\text{-hour}} = 5 \text{ OU}_E/\text{m}^3$), and the most stringent Environment Agency H4 criterion ($C_{98, 1\text{-hour}} = 1.5 \text{ OU}_E/\text{m}^3$) Benchmark odour criteria have been applied. The assessment has been conducted in accordance with the guidance published by the IAQM.

4.2 Extent of the Study Area

- 4.2.1 The odour assessment considers the potential odour impacts resulting from odour emissions associated with the Thames Water STW on the Land East of Basingstoke Site Allocation.
- 4.2.2 The STW is located approximately 4.5km to the north east of Basingstoke Town Centre and covers a 17 hectare area. The STW is located in a predominantly rural area, bordered on all sides by agricultural land. The nearest existing residential dwellings to the STW are located approximately 0.6km to the west in Chineham (which currently forms the settlement boundary for Basingstoke).
- 4.2.3 The Proposed Development site is located immediately to the west of the STW. The extent of the Proposed Development and its location in relation to the STW is presented in **Figure 1**.

4.3 Odour Sources

- 4.3.1 The Thames Water operated Basingstoke STW is a conventional works, comprising a number of sources. The sources contained within the model setup are defined as either area sources or circular sources, these are explicitly listed below:
- Area Sources – An inlet channel, a screening area, a secondary treatment area, a sludge import screen, a dewatering facility, sludge consolidation tanks, sludge storage tanks, sludge cake storage and a sludge thickening building.
 - Circular Sources – 6 No. primary settling tanks (PST), 3 No. storm tanks, 2 No. picket fence thickener (PFT), 2 No. digested sludge buffer tanks, a return liquor holding tank, and a liquor treatment plant.

4.4 Emission Data

- 4.4.1 Odournet Ltd were appointed to undertake an odour monitoring exercise to clarify the current operational regime of the STW and to identify any potential sources of odour. Thames Water provided WSP with the relevant odour emissions data, and WSP undertook the odour modelling using the AERMOD dispersion model.
- 4.4.2 Emission estimates (expressed in terms of European odour units) for each source were then defined using data collected from the STW. To the best of WSP knowledge, all of the data provided by Thames Water (and Odournet) that were utilised in the assessment model was collected using sampling and analysis techniques compliant with the British Standard Olfactometry BSEN13725:20003.
- 4.4.3 When defining emissions, the following factors were considered:

-
- a) The dimensions of each odour source;
 - b) The frequency of use of each aspect of the STW; and
 - c) The potential influence of seasonal differences in terms of temperature and rainfall.

4.5 Assessment of the Odour Impact

- 4.5.1 An odour annoyance or 'nuisance' develops over time through intermittent exposure to odours over an extended period of time (see **Section 3**). The odour assessment focussed on assessing the long-term odour exposure levels which may occur at the Proposed Development to the west of the STW.
- 4.5.2 The odour modelling assessment was undertaken using an atmospheric dispersion modelling technique which provided a statistical analysis of the odour exposure levels that are likely to occur around the STW for a typical meteorological year. The output of the model was presented as contours ranging from 5 – 1.5 odour units (OU_E/m^3) and plotted on a plan of the area surrounding the STW to illustrate the potential impact on the Proposed Development.
- 4.5.3 The detailed dispersion modelling was conducted using the US Environmental Protection Agency (US EPA) AERMOD dispersion model. The dispersion modelling was undertaken in line with recent guidance issued by the US EPA and the Environment Agency.
- 4.5.4 The dispersion model utilises meteorological data to simulate the dispersion and dilution of any potential odour generated by the STW. The meteorological data used in this assessment was obtained from a 5 year period from 2009 - 2013 from the Odiham recording station (wind rose presented in **Appendix A**). In addition, data describing the topography of the local area were obtained from Ordnance Survey. The locations of the odour sources at the STW were defined and provided by Thames Water.
- 4.5.5 For the odour assessment, one model scenario was modelled which is detailed below:
 - a) Scenario 1: Baseline – The potential odour exposure levels which are predicted to be generated from the STW under the current operational regime.

4.6 Exposure Criteria

- 4.6.1 Prior to assessing impacts, the odour exposure was defined. As briefly mentioned in Section 3, an odour exposure requires three inputs: a source, a pathway and the presence of receptors. The scale of the impact is determined by parameters collectively referred to as FIDOL (Frequency, Intensity, Duration, Offensiveness and Location); these are described in more detail in Table 1 below.

Table 2 – Description of FIDOL Factors

Parameter	Description
Frequency	How often an individual is exposed to odour
Intensity	The individual's perception of the strength of the odour
Duration	The overall duration that individuals are exposed to an odour over time
Offensiveness	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.
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.

- 4.6.2 Based on the FIDOL factors (**Table 2**), a three odour impact criteria have been developed (**Table 1**) that enable the odour impact risk of proposed facilities to be predicted using dispersion modelling techniques. These criteria are defined in terms of a minimum concentration of odour (reflecting the intensity/strength) that occurs for a minimum period of time (reflecting duration and frequency) over a typical meteorological year. The concentration element of these criteria can be increased or lowered to reflect variations in the offensiveness of the odours released from a specific type of facility, and the sensitivity of nearby sensitive locations.
- 4.6.3 There are variations in receptor sensitivity in relation to odour and the general agreed principles are highlighted below in **Table 3**.

Table 3 – Receptor Sensitivity

Receptor Sensitivity	Description
High	<p>Surrounding land where:</p> <ul style="list-style-type: none"> • Users can reasonably expect enjoyment of a high level of amenity; and • 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. <p>Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.</p>
Medium	<p>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 continuously or regularly for extended periods as part of the normal pattern of use of the land. <p>Examples may include places of work, commercial/retail premises and playing/recreation fields.</p>
Low	<p>Surrounding land where:</p> <ul style="list-style-type: none"> • 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. <p>Examples may include industrial use, farms, footpaths and roads.</p>

4.6.4 It is generally agreed that highly sensitive receptors subjected to large odour exposure will experience a substantial adverse effect, and low sensitivity receptor will experience a small to negligible effect. However between the two extremes various combinations of receptor type versus odour exposure will occur; therefore IAQM has produced a suggested magnitude of impact table for the effects of odour at various receptor sensitivities (**Table 4**).

Table 4 – IAQM Suggested Descriptors for Magnitude of Odour Effects

Odour Exposure (Impact)	Receptor Sensitivity		
	Low	Medium	High
Very Large	Moderate Adverse	Substantial Adverse	Substantial Adverse
Large	Slight Adverse	Moderate Adverse	Substantial Adverse
Medium	Negligible	Slight Adverse	Moderate Adverse
Small	Negligible	Negligible	Slight Adverse
Negligible	Negligible	Negligible	Negligible

4.6.5 Criteria carried forward into the final version of the Environment Agency H4 Guidance (see **Section 3**) defined three different levels of exposure at which odour impact or annoyance could potentially be expected to occur, for odours with high, moderate and low offensiveness. The benchmark odour criteria are presented in the **Table 1**.

- 4.6.6 The benchmark criteria aim to differentiate between odours of different relative offensiveness, and range from $C_{98, 1\text{-hour}} > 1.5 \text{ OU}_E/\text{m}^3$ (highly offensive odours) to $C_{98, 1\text{-hour}} > 6 \text{ OU}_E/\text{m}^3$ (low offensive odours).
- 4.6.7 **Table 5** identifies the odour concentration level at various receptor sensitivities, and provides an effect descriptor for the impacts predicted by dispersion modelling.

Table 5 – Proposed Odour Effect Descriptor for Impacts Predicted by Modelling

Odour Exposure Level (C_{98} OU_E/m^3)	Receptor Sensitivity		
	Low	Medium	High
>10	Moderate	Substantial	Substantial
5 - 10	Moderate	Moderate	Substantial
3 - 5	Slight	Moderate	Moderate
1.5 - 3	Negligible	Slight	Moderate
0.5 - 1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

4.7 Sensitive Receptors

- 4.7.1 Examples of areas representative of public exposure locations that are sensitive to odour resulting from the STW are shown in **Table 3**.
- 4.7.2 The sensitivity of the area to odour generated by the STW has been determined qualitatively using professional judgement and the criteria provided in the IAQM Odour Guidance.
- 4.7.3 Sensitive receptors are residents and users of the Proposed Development, as they are to be present at the Application Site continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land and can reasonably expect enjoyment of a high level of amenity. These will include locations that have the potential to be affected by odour as a result of the STW located to the east of the Proposed Development.
- 4.7.4 Therefore locations that are considered to be sensitive to odour resulting from the STW current operation include residential areas and the proposed school. All receptors within the Proposed Development are considered of High sensitivity.

5 Discussion of Model Results

- 5.1.1 The output of the dispersion model for the current baseline for both the Master Plan option A and Master Plan option B are presented in **Figure 2** and **Figure 3** below, respectively.
- 5.1.2 Odour exposure levels are displayed as graduated shading from green for lower exposure levels ($C_{98, 1\text{-hour}} > 1.5 \text{ OU}_E/\text{m}^3$) through to red for higher exposure levels ($C_{98, 1\text{-hour}} > 5 \text{ OU}_E/\text{m}^3$) encompassing the areas in which odour concentrations of $1.5 \text{ OU}_E/\text{m}^3$ and $5 \text{ OU}_E/\text{m}^3$ are exceeded for more than 175 hours per year.
- 5.1.3 It is evident from the contour levels presented in Figures 2 and 3 that the odour exposure levels that are predicted to occur within the Proposed Development boundaries range from $1.5 \text{ OU}_E/\text{m}^3$ and below, to $4 \text{ OU}_E/\text{m}^3$.
- 5.1.4 Applying the IAQM methodology, using both the more stringent Environmental Agency's criteria of $C_{98, 1\text{-hour}} > 5 \text{ OU}_E/\text{m}^3$, and the Newbiggin criterion of $C_{98, 1\text{-hour}} = 5 \text{ OU}_E/\text{m}^3$, the impact of the STW current operation conditions on the Proposed Development is considered moderate, according to Table 5.
- 5.1.5 However, it is our opinion that, in the light of the UK Water industry Research findings, which indicate that below $5.0 \text{ OU}_E/\text{m}^3$, complaints are relatively rare, odour exposures observed at the closest residences for Master Plan option A, whilst still a little in excess of the Environment Agency's benchmark for highly offensive odours, with a 98th percentile hourly mean of $2.0 \text{ OU}_E/\text{m}^3$ over a one year, the level is predicted to remain in the lower end of the range that UKWIR research suggests gives rise to an insignificant proportion of complaints.
- 5.1.6 None the less, and using a conservative approach, it is recommended that under the modelled emission scenario, Master Plan option B is taken forward where at residential land uses considered, the predicted levels are below $C_{98, 1\text{-hour}} = 1.5 \text{ OU}_E/\text{m}^3$ which means that that odour from the STW would rarely be detectable.
- 5.1.7 Special attention is required to the school location though, which site remains the same in both Master Plan options being considered. Being a particularly vulnerable group of sensitive receptors, it is recommended that the layout of the Master plan is reconsidered to position the School below the $C_{98, 1\text{-hour}} = 1.5 \text{ OU}_E/\text{m}^3$ value.

6 Conclusions

6.1.1 The findings of the study can be summarised as follows:

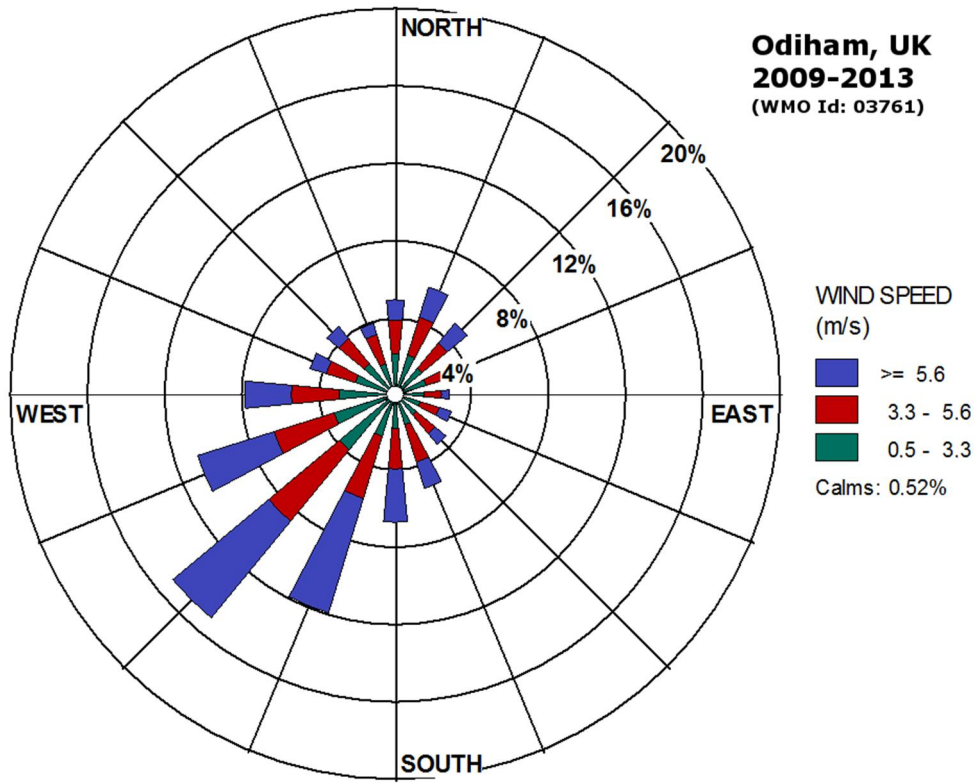
- A range of odour sources were modelled at the STW associated with the handling and treatment of sewage, and storage, thickening and export of sewage sludge.
- Odour exposure levels predicted at the areas of residential land and school location are encompassed within the $C_{98\ 1\ \text{hour}} = 1.5$ and $4\ \text{OU}_E/\text{m}^3$ odour exposure levels.
- It is recommended that the location of the proposed school within the Master Plan Options be reconsidered to position the school below the $C_{98\ 1\ \text{hour}} = 1.5\ \text{OU}_E/\text{m}^3$ odour exposure level.
- It is recommended that Master Plan Option A be amended to position all residential parcels below the $C_{98\ 1\ \text{hour}} = 1.5\ \text{OU}_E/\text{m}^3$ level.

6.1.2 With these recommended mitigation measures in place, the proposed development will not be significantly affected by the nearby STW odour emissions and will comply with European and national odour legislation and guidance and with local planning policy.

7 References

- [1] The Environmental Protection Act 1990;
- [2] Environmental Permitting (England and Wales) Regulations (amendment) 2012;
- [3] National Planning Policy Framework 2012;
- [4] Basingstoke and Deane Local Plan (Revised Pre-Submission Draft Document) 2011-2029 (April 2014);
- [5] Environment agency Guidance – H4 Odour Management (2011);
- [6] Integrated Pollution Prevention Control – Draft Horizontal H4 Guidance for Odour (2002);
- [7] Defra's 2006 'Code of Practice on Odour Nuisance from a Sewage Treatment Works';
- [8] Odour Guidance for Local Authorities;
- [9] Institute of Air Quality Management Guidance (IAQM);
- [10] UK Water Industry Research (UKWIR), 2001;

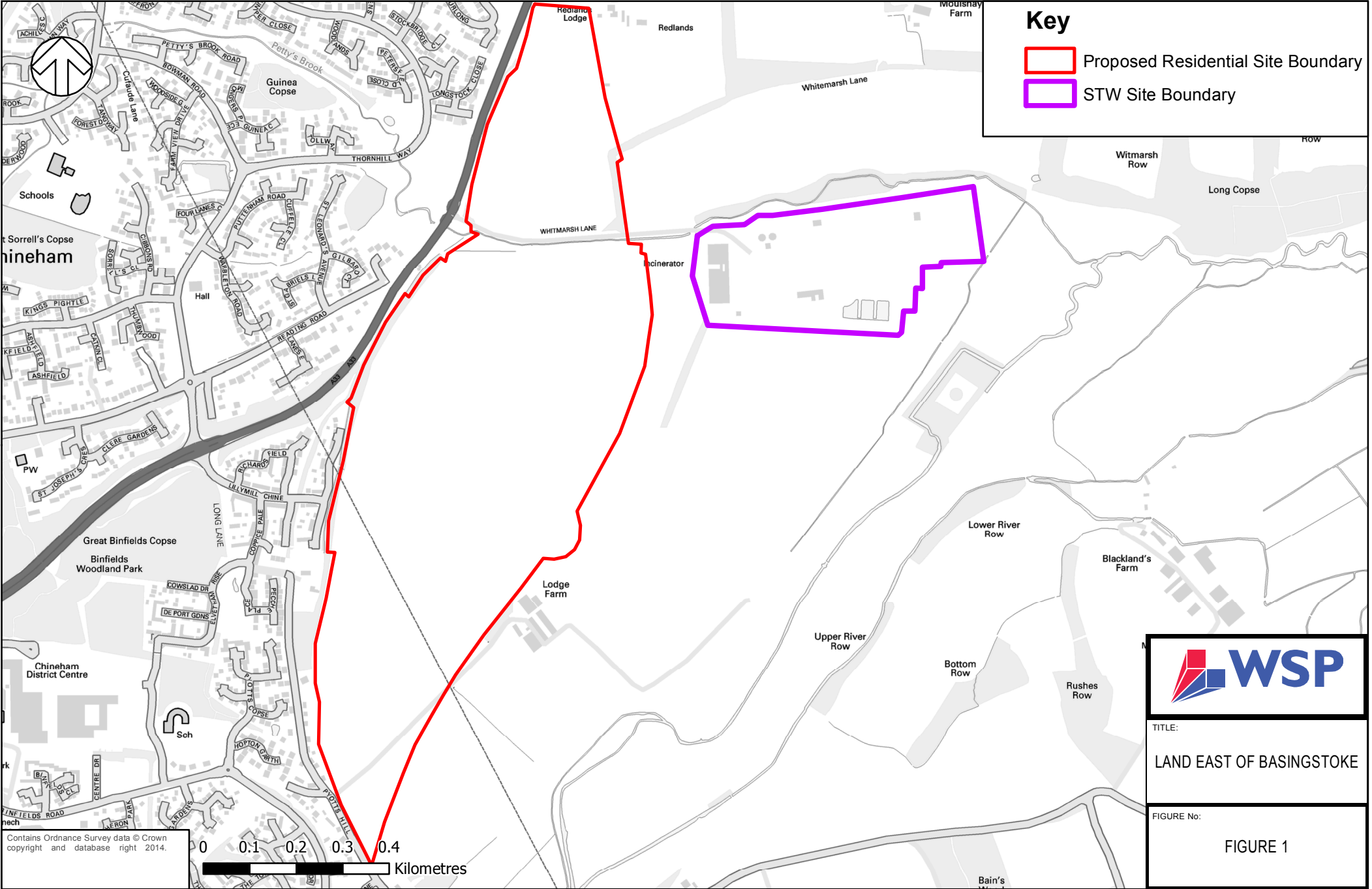
9 Appendix A - Wind Rose for 2009-2013, Odiham





Date Modified:

Drawn By:

File:



Key

-  Proposed Residential Site Boundary
-  STW Site Boundary



TITLE:
LAND EAST OF BASINGSTOKE

FIGURE No:
FIGURE 1

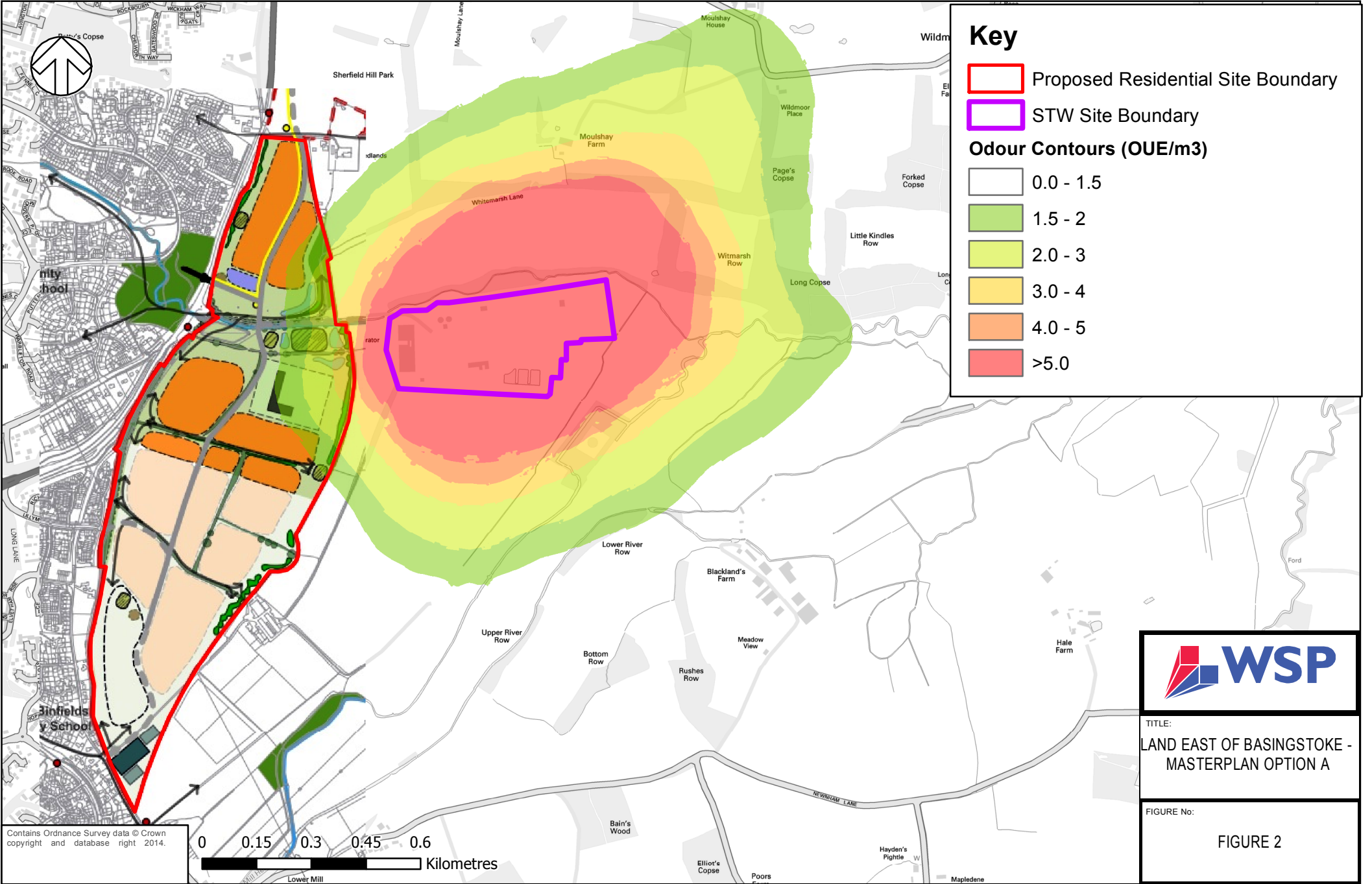
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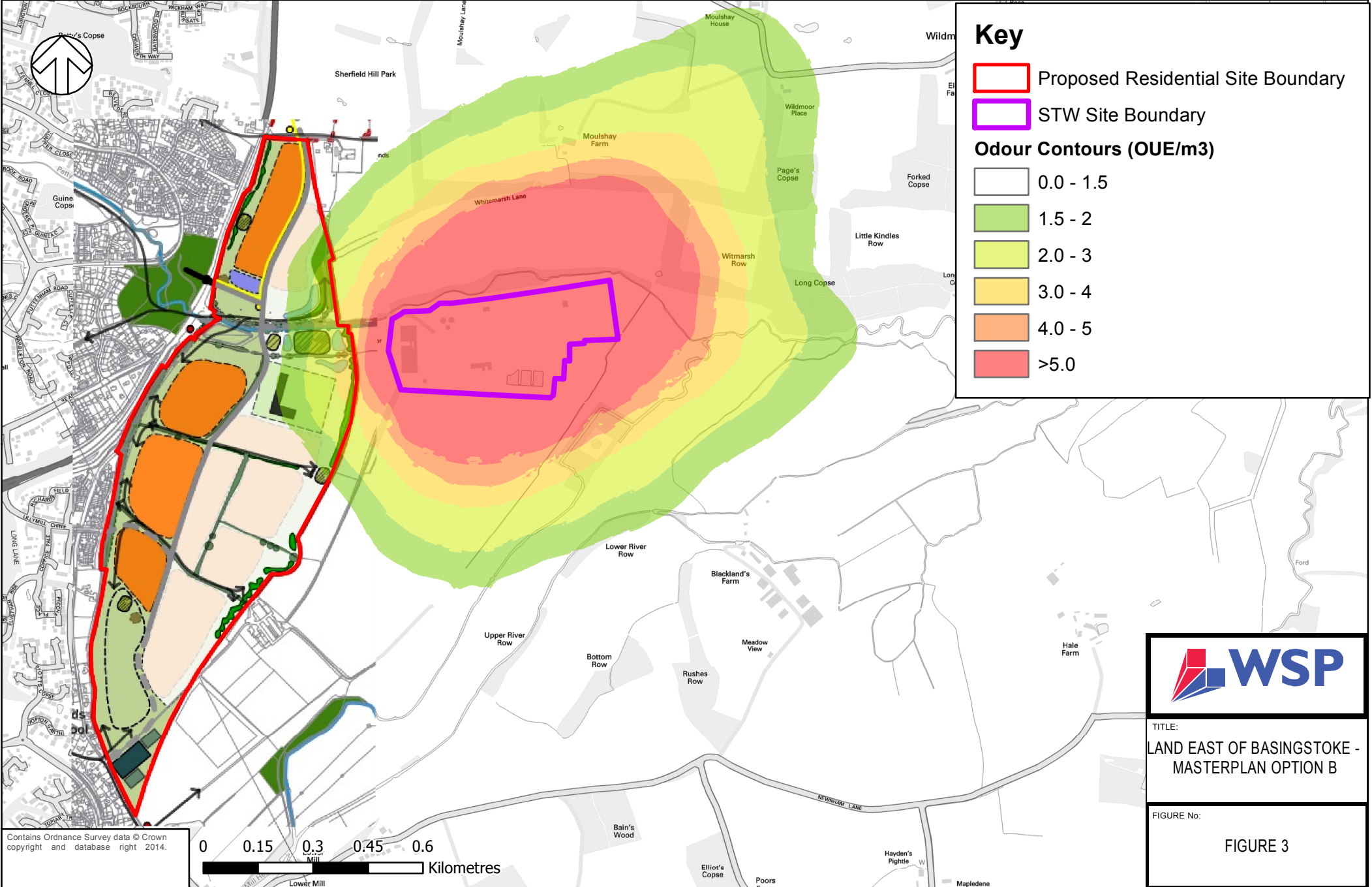
TITLE:
LAND EAST OF BASINGSTOKE -
MASTERPLAN OPTION A

FIGURE No:
FIGURE 2

Date Modified:

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File:



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TITLE:
LAND EAST OF BASINSTOKE -
MASTERPLAN OPTION B

FIGURE No:
FIGURE 3

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