



## **Cordon Sanitaire Evidence Study**

Netheridge STW

September 2019

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August 2019

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# 1. Introduction

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- 1.1 Phlorum Ltd has been commissioned by Gloucester City Council (GCC) to undertake an odour assessment with respect to the Netheridge Sewage Treatment Works (STW) on Netheridge Close Gloucester, GL2 5LE. The National Grid Reference for the centre of the site is 380953, 215806.
- 1.2 The STW is owned and operated by Severn Trent Water Limited (STWL) on land in between the River Severn and The Gloucester and Sharpness Canal, to the north of Quedgeley and to the south of Hempsted.
- 1.3 Land-use in the vicinity of the STW is mixed with residential, commercial and agriculture uses all in proximity. It should be noted that there is a landfill site to the west of Hempsted which is potentially another source of odours.
- 1.4 GCC are preparing a new district level plan, named the 'City Plan'. Within this Plan there will be a policy which will identify an exclusion zone for development, a 'Cordon Sanitaire', around the Netheridge STW.
- 1.5 Under the adopted Local Plan, the Joint Core Strategy<sup>1</sup>, Gloucester's housing need is circa 14,500 dwellings between 2011 and 2031 and the STW will be subjected to increased throughput and potentially more sensitive receptors located in the vicinity of the site.
- 1.6 The purpose of this assessment is to inform proposed extents of the Cordon Sanitaire around the STW (i.e. the area in which odours from the STW could potentially cause significant annoyance to future development within it). A number of odour assessment tools have been used in this assessment, including:
  - A review of odour complaints;
  - Odour surveys;
  - A detailed dispersion modelling assessment; and
  - A review of a previous dispersion modelling assessment.

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<sup>1</sup> Gloucester City Council, Cheltenham Borough Council and Tewkesbury Borough Council (2017) Joint Core Strategy

## 2. Policy and Guidance

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- 2.1 The regulatory framework for odour in England has three main facets. The planning process can determine whether and where any developments with a significant potential for odour release can be located. It also has some control over the siting of developments that may be sensitive to odour from nearby potential sources. Some potentially odorous developments/activities (although not always STWs) are then controlled by the Environmental Permitting Regulations (2010)<sup>2</sup>, or by statutory nuisance provisions under the Environmental Protection Act 1990 where the activities are not permitted.
- 2.2 Several guidance documents were referred to in undertaking this assessment. These are outlined under the relevant headings below.

### Guidance

#### **Code of Practice on Odour Nuisance from Sewage Treatment Works**

- 2.3 The Defra Code of Practice<sup>3</sup> is designed to provide a framework under the statutory nuisance regime enabling the relevant parties to operate, regulate and investigate odour nuisance from sewage treatment works. It provides information on the issues associated with odours from wastewater treatment works, the characteristics of this odour, odour complaints and odour control measures. Defra has also produced detailed odour guidance<sup>4</sup>, which describes investigative techniques, odour control measures, plus communication and intervention strategies.
- 2.4 As this assessment is focused on odours from an STW, this guidance is particularly relevant.

#### **Odour Guidance: Internal Guidance for the Regulation of Odour at Waste Management Sites**

- 2.5 The Environment Agency's Odour Guidance<sup>5</sup> provides a useful guide to the monitoring of odour on site, the description of odours and the impact of meteorological conditions.

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2 The Environmental Permitting (England and Wales) Regulations SI 2016/1154

3 Defra. (2006). Code of Practice on Odour Nuisance from Sewage Treatment Works.

4 Defra. (2010). Odour Guidance for Local Authorities.

5 Environment Agency. (2002). Odour Guidance: Internal Guidance for the Regulation of Odour at Waste Management Sites.

## IAQM Odour Guidance

- 2.6 The Institute of Air Quality Management's (IAQM) Odour Guidance<sup>6</sup> is focused on the assessment of odour impacts for planning purposes. It provides an overview of all the key tools available for assessing odour impacts and weighs up their advantages and disadvantages, whilst advocating a multi-tool approach.
- 2.7 In the absence of agreed standards for odour, the IAQM guidance also summarises key guidance and case law on the issue of development planning and odour risk in order to help define the significance criteria for odour impact assessments.
- 2.8 Of relevance to this assessment is the Mogden Case, which states:

*"that by the time that 5 ouE per m<sup>3</sup> or above is reached nuisance will certainly be established"*

- 2.9 In addition, in the case of the Cockermouth WwTW, the inspector concluded:

*"I am mindful that the assessment based on a 98th percentile 1-hour average odour concentration (C98,1hour) would not result in a totally odour free scenario, as there is a likelihood of some occasional odour issues with sites such as the WWTW. However, any period of exposure to unpleasant odour should be short lived at some 2% of a year. Moreover, there are varying degrees of odour from sewage treatment. At this WWTW, odour from the sludge holding tanks is abated by use of an odour control unit, which odour sampling has shown to have an odour removal efficiency of approximately 98%. Thus it seems that highly offensive odours are unlikely to arise during normal operation. Should odours fall within medium offensiveness, rather than low, the C98, 1hour 3 ouE/m<sup>3</sup> level modelled by the appellant indicates that it would not impinge on the appeal dwellings."*

- 2.10 The Cockermouth ruling is of pertinence as odorous emissions from sludge holding tanks at Netheridge STW are also abated using an Odour Control Unit; as such, a high level of odour control is maintained at the works.

## IPPC Horizontal Guidance H4: Odour Management

- 2.11 Also relevant is the Environment Agency's (EA's) Horizontal Guidance H4<sup>7</sup>, which advises operators on how to comply with permit conditions, with respect to odour. This guidance provides useful information on assessing odour concentrations and on controlling and monitoring odour emissions from permitted processes.

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<sup>6</sup> IAQM. (2014). Guidance on the assessment of odour for planning.

<sup>7</sup> Environment Agency. (2011). Horizontal Guidance H4: Odour Management – How to comply with your environmental permit.

2.12 It should be noted that Netheridge STW is not covered by an environmental permit for odour. Odorous emissions from permitted processes are usually more strictly controlled than those from processes that are not permitted. Therefore, the standards and methods contained within the guidance are stringent, and when applied to non-permitted processes could be considered a worst-case assessment approach.

## Assessment Criteria

2.13 The EA's technical guidance<sup>8</sup> provides information on managing and assessing process odour emissions.

2.14 Odour concentrations are measured in odour units (OUs). There is a European CEN standard for an odour unit that is based on odour detection of a reference compound. The CEN standard is referred to as 1 ou<sub>E</sub> (1 European Odour Unit) and is roughly comparable to 1 OU, which can be a more subjective parameter as it is not standardised.

2.15 As a general indicator of odour concentration, 1 OU represents the concentration of an odorous substance, or mixture of substances, that is just detectable by 50% of the population.

2.16 The EA suggests that for an unpleasant odour, concentrations above the following criteria can be used as a guide to determine whether it might represent a potential nuisance:

- 1.5 ou<sub>E</sub> for a highly offensive odour;
- 3.0 ou<sub>E</sub> for a moderately offensive odour; and
- 6.0 ou<sub>E</sub> for a less offensive odour.

2.17 As such, highly offensive odours are likely to cause a problem at lower concentrations than more pleasant odours.

2.18 Determining the character and offensiveness of an odour is a highly subjective matter and is very difficult to accurately quantify. However, the EA attempts this by providing some examples as follows:

- highly offensive odours = processes involving animal or fish remains, and wastewater treatment;
- moderately offensive odours = intensive livestock rearing, and fat frying;
- less offensive odours = chocolate manufacture, and breweries.

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<sup>8</sup> EA. 2009. Environment Agency Technical Guidance Note H4 – Odour Management. EA: London.



- 2.19 A further problem with odour quantification is that many odours are intermittent, often being emitted over relatively short, non-continuous timescales, which makes accurate measurement of short-term peaks in concentration over extended periods very difficult. Going some way to deal with this issue, the EA guidance recommends that in dispersion modelling assessments odour concentrations are calculated as 98<sup>th</sup> percentile values of hourly mean concentrations. This allows for the top 2% of high odour concentrations to be discounted from an assessment and allows results to be directly compared with the EA odour criteria listed in section 2.16 above.
- 2.20 It should also be noted that the Chartered Institution of Water and Environmental Management (CIWEM) has issued the following statement on odour nuisance potential threshold ranges (where “C<sub>98</sub>” is the 98<sup>th</sup> percentile average odour concentration):

*“CIWEM considers that the following framework is the most reliable that can be defined on the basis of the limited research undertaken in the UK at the time of writing:*

- C<sub>98</sub>, 1-hour >10 ou<sub>E</sub>/m<sup>3</sup> - complaints are highly likely and odour exposure at these levels represents an actionable nuisance;*
- C<sub>98</sub>, 1-hour >5 ou<sub>E</sub>/m<sup>3</sup> - complaints may occur and depending on the sensitivity of the locality and nature of the odour this level may constitute a nuisance; and*
- C<sub>98</sub>, 1-hour <3 ou<sub>E</sub>/m<sup>3</sup> - complaints are unlikely to occur and exposure below this level are unlikely to constitute significant pollution or significant detriment to amenity unless the locality is highly sensitive or the odour highly unpleasant in nature.”*

- 2.21 The CIWEM framework provides a less conservative range of odour concentrations in relation to potential nuisance impacts from WWTWs than those provided in the EA guidance. It suggests that any WwTW odours less than 3 ou<sub>E</sub> in concentration are unlikely to result in a statutory nuisance.

## Odour Nuisance

2.22 Putting the above guidance to one side, it should be noted that the stated range of nuisance thresholds are simply guidance to indicate the *likelihood* of odour complaints occurring at or above the respective concentrations. Odour offensiveness remains a subjective human sensory response to some airborne chemicals, and the test of statutory nuisance is to determine whether actual complaints relating to the emission of these chemicals might be reasonable or not. Coupled with the difficulties and uncertainties surrounding the monitoring and modelling of odour emissions, the review of odour complaints from uses close to, and particularly downwind of, an established odour source, such as a STW, can often provide the most compelling evidence as to the reasonableness of any offensive odours emitted from it.

## Local Policy

2.23 The Adopted Local Plan, which consists of the Joint Core Strategy (2017)<sup>1</sup> and the Gloucester Local Plan (1983)<sup>9</sup> – saved policies, currently directs planning in the district. Also of relevance is the Second Stage Deposit City of Gloucester Local Plan (2002)<sup>10</sup> which was approved by GCC for development management decision making in 2002.

2.24 Within the Second Stage Deposit City of Gloucester Local Plan ‘Policy FRP.12 Sewage Works Cordon Sanitaire’ states:

*“Development likely to be adversely affected by smell from Netheridge and Longford works, within the constraint areas defined on the proposals map, will not be permitted.”*

2.25 The background to the policy also states:

*“In order to reasonably prevent development that would be adversely affected by smell, two cordon sanitaires are shown on the proposals map within which development will not generally be permitted. The cordons do not represent the absolute limit of the area where smells can be detected, but are drawn so as not unreasonably to constrain development in the existing built-up area.”*

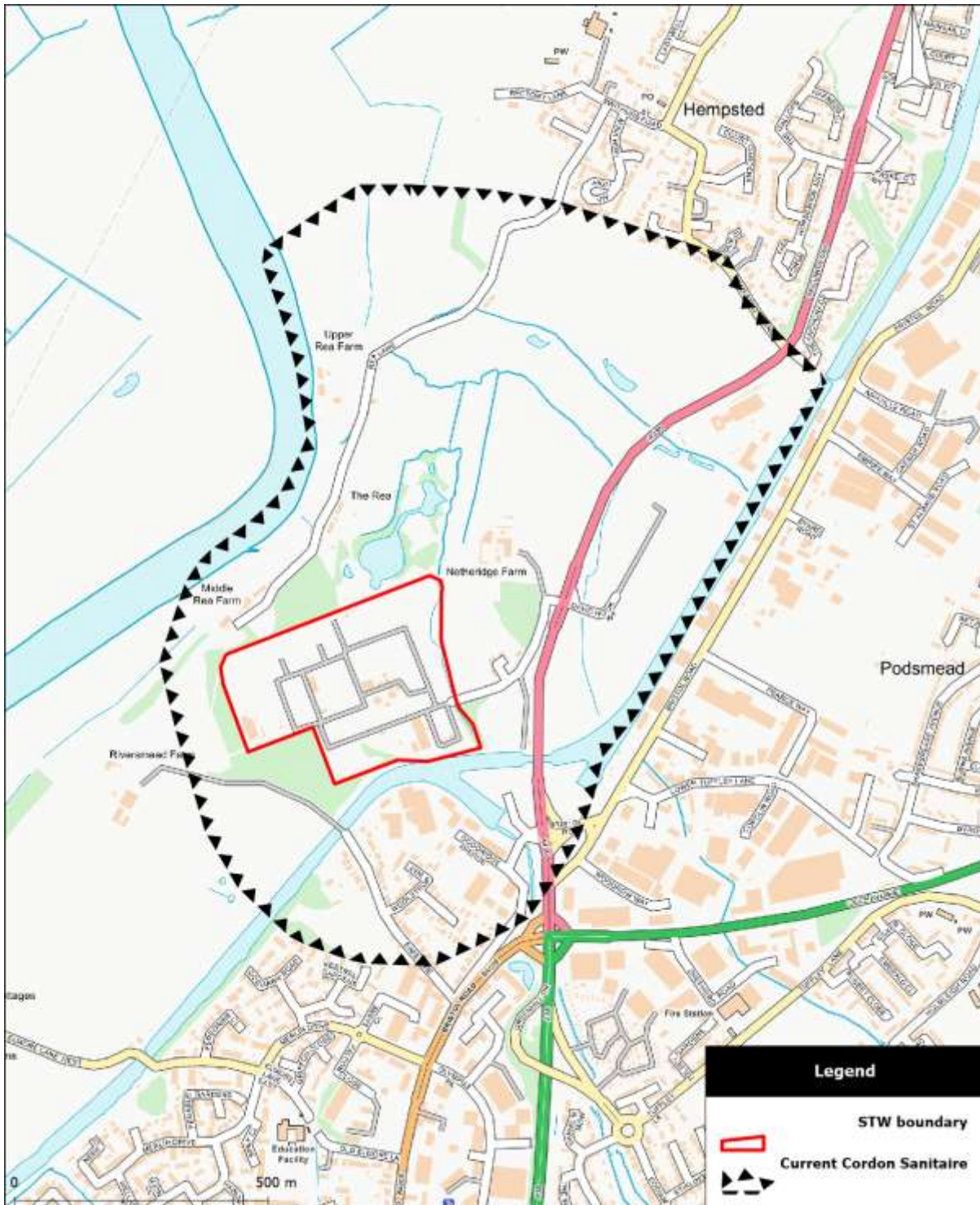
2.26 The extent of the current Cordon Sanitaire is shown in Figure 2.1 overleaf.

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9 GCC (1983) Gloucester Local Plan – Saved Policies

10 GCC (2002) Second Stage Deposit City of Gloucester Local Plan

Figure 2.1: Current Cordon Sanitaire Boundary



Note: Contains OS data © Crown copyright and database right 2019

## 3. Methodology

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### Consultation with STWL

- 3.1 STWL were consulted throughout the assessment process; information regarding the layout and workings of the STW were provided. STWL also suggested the use of odour emission factors from a previous odour report at Netheridge STW, for this assessment.
- 3.2 A tour of the STW was given on the 14<sup>th</sup> of June (post-odour survey) by STWL; the key odour sources were identified.

### Site and Process Description

- 3.3 Netheridge STW primarily treats sewage from the City of Gloucester and its surrounding suburbs. It also treats sludge imports from a variety of smaller local wastewater treatment works (WwTW) and septic tanks.
- 3.4 Netheridge STW undertakes each of the key stages of sewage treatment outlined below:
  - Pre-treatment: Large objects are filtered out of the raw sewage using 16mm screens and are deposited in several skips. The sewage is then passed through a detritor. Grit from the detritor is then deposited into a separate open skip;
  - Primary treatment: the wastewater is then distributed to 4 primary settlement/sedimentation tanks (PSTs);
  - Secondary treatment: the liquor is then distributed to large aeration tanks;
  - Final Treatment: the wastewater is then diverted to six final settlement tanks (FST), prior to discharge to the River Severn. Returned activated sludge (RAS) from the FST is diverted back to aeration tanks, whilst surplus activated sludge (SAS) is thickened in belt thickeners, before being mixed with indigenous sludge.
  - Sludge Treatment: indigenous sludge from the PST is thickened and then diverted to blend tanks where it is mixed with thickened SAS and imported sludge. The sludge is then directed to anaerobic digesters, from which it is then pumped to open pathogen kill tanks (secondary sludge tanks) for 14-day storage. The sludge is then dewatered and stored on large cake pads.

## Future Evolution of the STW

- 3.5 The Netheridge STW will have to increase throughput to cope with the requirements of the Joint Core Strategy.
- 3.6 There is also the potential that the STW in Hayden will close, meaning that Netheridge STW will have to deal with more sludge from the surrounding area.
- 3.7 STWL have requested a screening opinion from GCC for a proposed upgraded anaerobic digestion facility that would be situated to the west of the current extent of the STW.
- 3.8 With reference to this potential upgrade, a strategic asset planner from STWL stated:

*“With regards to the anaerobic digestion process, there is a proposal to upgrade this facility to a more advanced process. However, there is still some work to be done before we’ll be in a position to confirm that this will go ahead in the next few years. I’m not sure if this would also require an extension to the cake pad (the anaerobic digestion upgrade is likely to be linked to the import of sludges from Hayden) - the process being considered produces a sludge with better dewatering properties which would mean smaller volumes of sludge cake being produced. The end product would also contain less volatile material, which means its less odorous.”*

- 3.9 Furthermore, any future changes to the STW must demonstrate that they will not significantly increase the risk of local odour impacts.
- 3.10 As such, it is unlikely that the current and future operation of the STW will result in increased odour impact on the local area. Assessment of the current situation is therefore considered robust in terms of informing a new Cordon Sanitaire in the new City Plan. As such, this assessment has principally been based on current emissions from the STW, as future emissions should not worsen.

## Methods

- 3.11 There are various individual tools that can be used to investigate odour, and each have their own inherent strengths and limitations. These tools may be qualitative, semi-quantitative or quantitative.
- 3.12 Both the Defra H4 guidance, as well as the latest IAQM odour guidance, advocates a multi-tool approach to the assessment of odour. This allows the development of a ‘weight of evidence’ that can increase the confidence in any conclusions reached.
- 3.13 The following techniques have been identified as most suitable for this assessment:
  - 👁 Complaints data analysis:
  - 👁 Site baseline odour survey – where the odour character of the area is sampled using the human nose;

- Detailed atmospheric dispersion modelling – used to forecast exposure with greater spatial and temporal coverage; and
- Qualitative review of past modelling assessment (2009).

## Complaints Data Analysis

- 3.14 The review of odour complaints from uses close to, and particularly downwind of, an established odour source, such as a STW, can often provide the most compelling evidence as to the reasonableness of any offensive odours emitted from it.
- 3.15 The records of complaints made to GCC's Environmental Protection Team regarding odours emanating from Netheridge STW, over the past 10 years, have been compiled and mapped.
- 3.16 It is recognised that certain uses are more sensitive to odour than others (e.g. residential dwellings are generally more sensitive than places of work). As such, the complaints data have been classified by land-use class.

## Odour Survey

- 3.17 An initial site odour survey was carried out on the 2<sup>nd</sup> of May 2019. This survey sampled four locations in the vicinity of the STW and provided a qualitative description of odours detected, as well as their intensity and frequency.
- 3.18 A further three odour surveys were carried out in June and July, 2019. The odour surveys were carried out, where possible, after a period of extended dry weather and under ideal meteorological conditions.
- 3.19 The approach to these odour surveys broadly followed that detailed in the Environment Agency's odour guidance<sup>5</sup> and the IAQM's guidance on the assessment of odour for planning<sup>6</sup>.
- 3.20 At each survey location, 20 samples of odour were taken using the assessor's sense of smell. As advocated in the latest IAQM odour guidance, the German National Standard (VDI 3940:1993) for the determination of odorants in ambient air was used to assess the intensity of odours. The VDI standard intensity (I) scale ranges from 0 (no odour), through 1 (slight/ very weak), to 6 (extremely strong). Additional notes were taken at each survey location, describing the odour (if recognisable) and its likely source.
- 3.21 This information was recorded on an odour assessment reporting sheet, which incorporated both the EA and IAQM guidance. These are included in Appendix A.
- 3.22 From this information, the maximum and average intensity of odours, as well as the pervasiveness of odours were defined. Table 3.1 below, is taken from the IAQM odour guidance and can be used to assess a location's 'odour exposure' at a point in time.

**Table 3.1: Matrix to assess the odour exposure at time and place of sampling.**

		Percentage odour time during the test				
		10%	11-20%	21-30%	31-40%	>41%
Average Intensity	6	Large	Very Large	Very Large	Very Large	Very Large
	5	Medium	Large	Large	Very Large	Very Large
	4	Small	Medium	Medium	Large	Large
	3	Small	Medium	Medium	Medium	Medium
	2	Small	Small	Medium	Medium	Medium
	1	Small	Small	Small	N/A	N/A

Notes: Average should be rounded to the nearest whole number.

The following overriding considerations affect the scoring of the odour annoyance impact:

if average intensity = 0, then the odour effect can for practical purposes be considered negligible; and if average intensity = 1 but percentage odour time = 0%, then the odour effect can for practical purposes be considered negligible.

3.23 The surveys were undertaken by two assessors, who independently assessed the odour intensity experienced at locations both upwind and downwind of the STW. Additional steps were taken to safeguard the quality of the odour survey, these included not consuming strongly flavoured foods or drinks (e.g. coffee) prior to the survey.

## Odour Dispersion Modelling

3.24 In order to model odour emissions from the existing WwTW, it was first necessary to identify the key emissions sources/processes on the site.

3.25 The odour dispersion modelling has focused on the major sources of odour on-site. These were identified as:

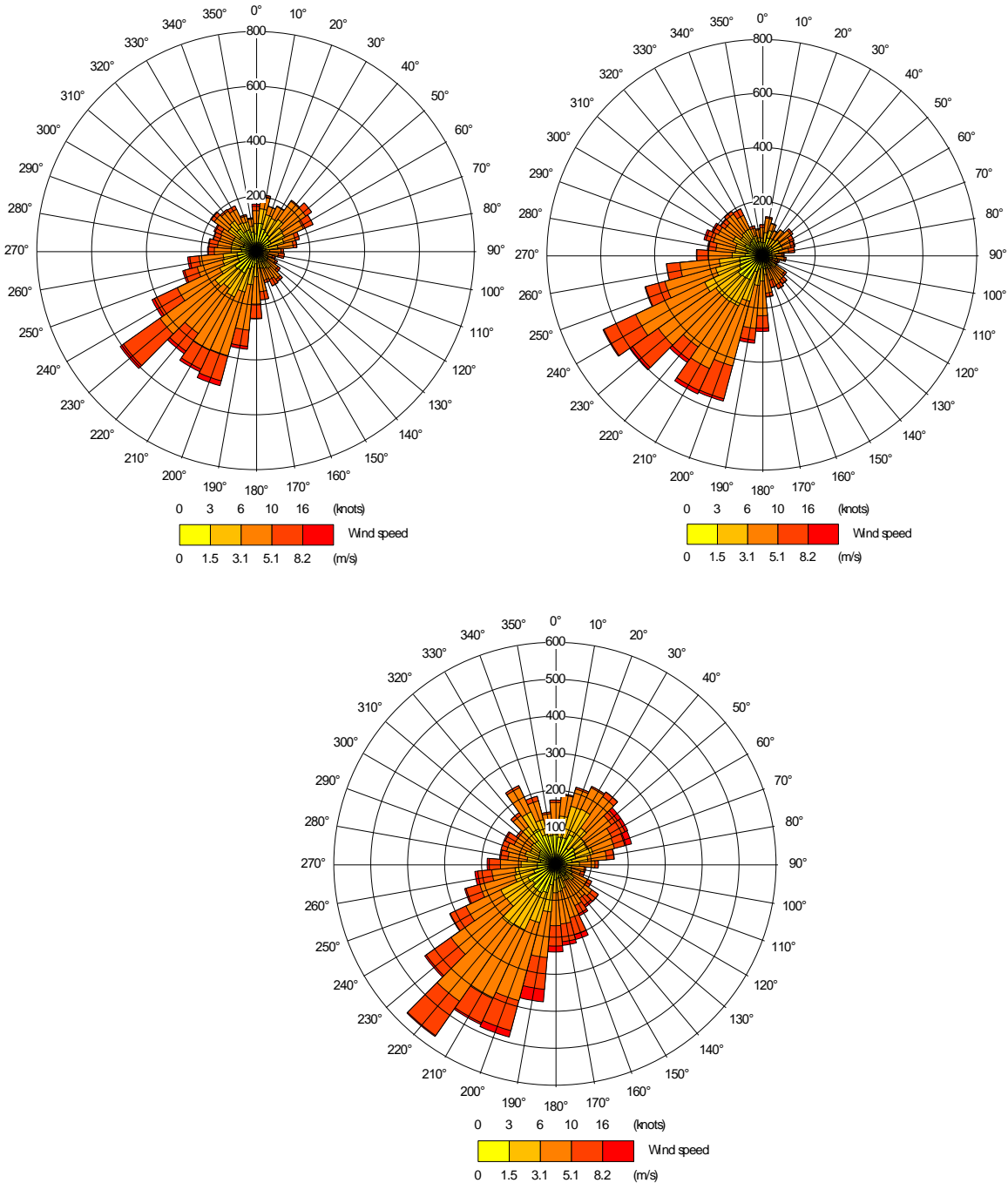
- ☉ Inlet channels;
- ☉ Detritor;
- ☉ Grit and Rag skips;
- ☉ Primary settlement tanks (PSTs);
- ☉ Aeration Tanks (and anoxic zone);
- ☉ Storm Tanks, Channels, and associated Screens and Skips;
- ☉ SAS Buffer Tank;
- ☉ Final Settlement Tank;
- ☉ SAS and RAS channels;
- ☉ Pathogen Kill Tanks;

- ☉ Cake Pads (Fresh and Aged);
- ☉ Sludge Thickening Building Vents;
- ☉ Discharge channel;
- ☉ Rag Pile;
- ☉ Sludge and Blend Tank OCU;
- ☉ Import OCU; and
- ☉ Inlet Well OCU.

- 3.26 It is noted that there will be fugitive emissions of odour from the STW, such as from leaks from covered sources. However, these sources are neither easily identifiable, nor quantifiable and their inclusion, in the words of the IAQM odour guidance could *“lead to an illusory and false impression of accuracy and precision in the numbers generated”*. As such, the dispersion model does not explicitly take account of fugitive sources, proceeding on the basis that it is *“better to be broadly correct than precisely wrong”*.
- 3.27 However, where appropriate, the model inputs (e.g. emission factors and source areas) tend towards worst-case to account for this source of uncertainty.
- 3.28 The atmospheric dispersion modelling assessment was undertaken using the Defra approved ADMS 5.2 detailed dispersion model. Detailed, hourly sequential, meteorological data are used by the model to determine odour transportation and levels of dilution by the wind and vertical air movements. Three years of meteorological data (2016-2018) used in the model were obtained from Gloucester Airport meteorological station (48-52% missing data from Pershore). It is considered to provide the most representative data of similar conditions at the STW.
- 3.29 As impacts are highly sensitive to meteorological conditions, particularly wind direction and speed, discrete receptors were modelled using data from three different meteorological years (2016 to 2018). Wind Roses for each year are included in Plate 3.1.



**Plate 3.1: Wind Roses for Gloucester Airport (2016-2018)**



Note: Top left (2016); Top right (2017); Bottom (2018)

3.30 With reference to Plate 3.1, it is noted that there was a clear south-westerly prevailing wind in all meteorological years. There was also a low occurrence of winds from other directions in all years. Winds from the north-east and north are more frequent in 2018; these northerly winds would blow emissions from the STW towards the closest part of the built-up area of Gloucester.

- 3.31 A contour plot was produced to show the pattern of dispersion of odour across the STW and the surrounding area. The grid originated at UK grid reference 379600, 214000 with 89 × 81 points modelled (50m spacing). 50m spacing was considered to be a reasonable resolution for an assessment of this type (i.e. looking at the general pattern and not specific locations). All receptor points were modelled at ground level.
- 3.32 In order to model emissions from the STW, it was necessary to identify the odour emission rates (emission factors) from plant. STWL do not have their own database of odour emission factors and it was agreed that Phlorum would use factors supplied by a previous Odournet report. Odournet undertook comprehensive olfactometric sampling of the Netheridge STW in October 2008 and many of the factors determined from this sampling have been used in this assessment. Library emission factors from UK Water Industry Research Limited (UKWIR)<sup>11</sup> have also been used to provide more conservative estimates of emissions from specific processes, where appropriate.
- 3.33 A summary of the model inputs, including odour emission rates, are included in Appendix B.

### **Building and Terrain**

- 3.34 Complex terrain may increase or decrease the calculated concentrations at a given point as a result of disturbances to the air flow. Complex terrain data are usually only included in models where slope gradients exceed 10%; however, these were included for completeness.
- 3.35 Height data were derived from OS Terrain 50<sup>12</sup> mapping, with 43,000 spot heights obtained for a 70.5km<sup>2</sup> area around the STW. The spot heights originated at 376820, 219940 and had a 40m spacing.
- 3.36 Buildings can have a significant effect on pollutant dispersion and can increase the maximum predicted ground level concentration. The model has incorporated thirteen buildings/tanks within the STW. The details of which can be found in Appendix B.

### **Surface characteristics**

- 3.37 As the modelled domain covers area with different roughness characteristics (e.g. urban, agricultural, suburban), the surface roughness varies between 0.3m for more open agricultural areas and 0.5m for areas within the built-up environment (including the STW).
- 3.38 The figure applied to the meteorological site was 0.1m; a lower figure was selected as the meteorological station is situated on Gloucester City Airport runway, set back from any major obstacles which could impede air flow.

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<sup>11</sup> UKWIR (2001) Odour Control in Wastewater Treatment – Technical Reference Document.

<sup>12</sup> <https://www.ordnancesurvey.co.uk/business-and-government/products/terrain-50.html>

## Uncertainty

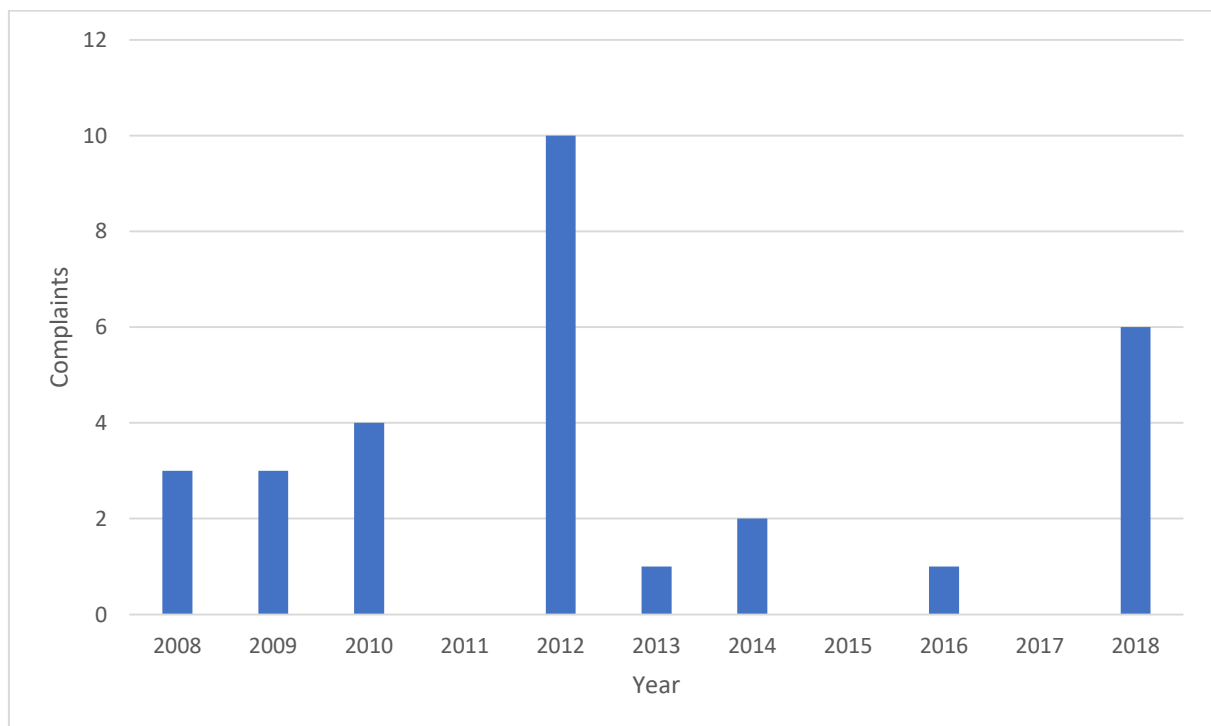
- 3.39 Odour modelling inherently includes a number of uncertainties, these include:
- ☞ Model uncertainty – due to model formulations;
  - ☞ Data uncertainty – due to inaccuracies in the input data, including emissions estimates and meteorology; and
  - ☞ Variability – randomness of measurements used.
- 3.40 To reduce the uncertainty associated with the modelling process several steps have been taken, these include:
- ☞ The use of ADMS5.2, a next generation model, which is a widely used and Defra approved dispersion model that is considered fit for purpose;
  - ☞ The use of three years of sequential meteorological data;
  - ☞ Sensitivity testing of model; and
  - ☞ Review of another modelling report of the STW.
- 3.41 During sensitivity testing, the model was found to be somewhat sensitive to the surface roughness of the model domain (i.e. the area around the STW). In general, the roughness of the model domain is characterised by a single number (e.g. 0.5m), which might represent a more rural or urban location. However, as the STW is located on the urban-rural fringe, and the local area is characterised by both suburban and rural environments, a spatially varying roughness file was, therefore, included in the model.

## 4. Assessment of Impacts

### Complaints Data Analysis

- 4.1 GCC's complete complaints record (from 2008 – 2018) can be found in Appendix C. Specific details of complainants, including addresses and names have been removed from the record.
- 4.2 Between January 2008 and August 2018, 36 complaints were made against the Netheridge STW to GCC; the address of the complainant was given in 30 of these complaints. 24 of these complaints were made from residential dwellings and 6 from commercial properties.
- 4.3 The yearly distribution of complaints made against the STW is shown in Graph 4.1 below.

**Graph 4.1: Complaint by Year (2008-2018)**

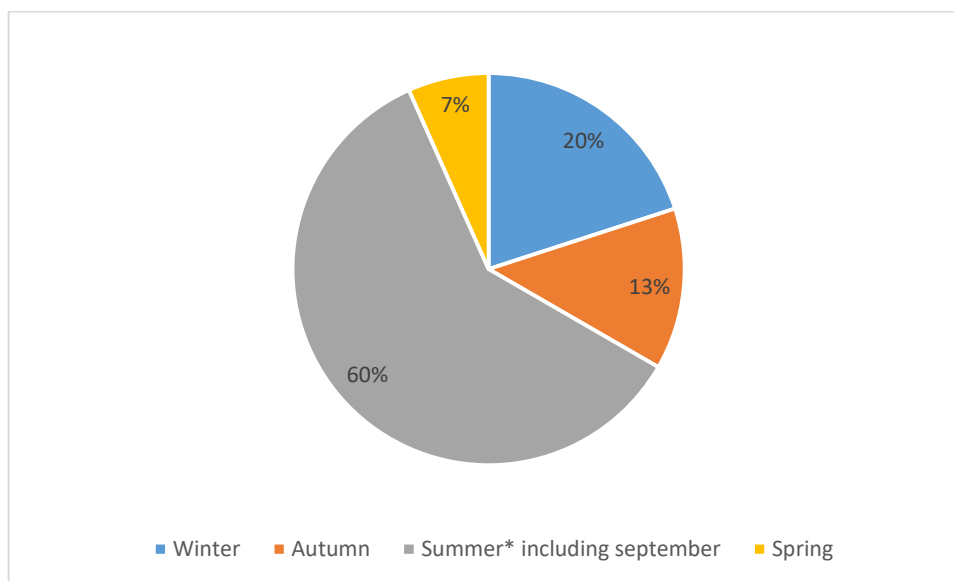


- 4.4 In Graph 4.1, it is evident that 2012 and 2018 were the two worst years for odour complaints made against the STW.
- 4.5 The period between 2013 and 2017 only resulted in four complaints. No complaints were made against the STW in 2011, 2015 or 2017; the summers of these years were on average cooler<sup>13,14</sup> and/or wetter<sup>15</sup> which could explain the lack of odour complaints.

<sup>13</sup> <https://www.theguardian.com/uk/2011/aug/31/uk-summer-coolest-18-years>

4.6 The seasonal distribution of odour complaints made against the STW is shown in Graph 4.2

**Graph 4.2: Complaint by Season (2008-2018)**



4.7 Between 2008 and 2018, 70% of the odour complaints occurred between June and September. This is to be expected as odours are more likely to cause annoyance in the summer months because:

- ☞ Warmer weather heightens olfactory senses;
- ☞ Warmer weather increases bioactivity in sewage and therefore odour emissions;
- ☞ Reduced rainfall and drier air lead to more effective transport of odours by the wind and increased concentrations of odorous substances in less dilute sewage;
- ☞ Residents are more likely to be outside using their gardens; and
- ☞ Residents are more likely to have their windows open.

4.8 Considering the above, it is expected that during the normal operation of the STW most complaints would occur during summer. It is more likely that complaints during months outside of the summer would be due to abnormal operational conditions at the STW.

4.9 During 2012 and 2018 (the two years with particularly high numbers of complaints) all complaints were made during summer months (June – September).

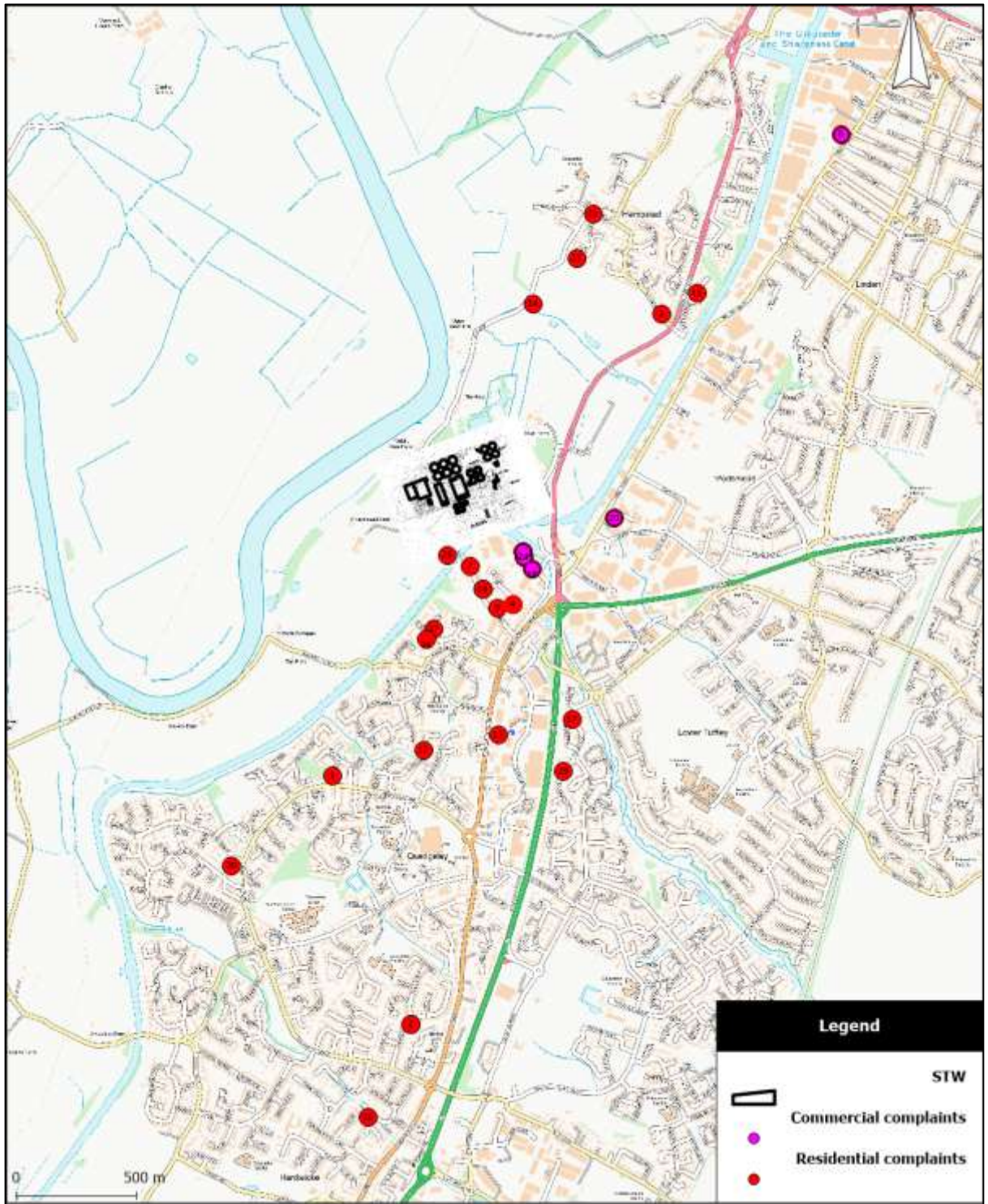
4.10 The location of the complaints are categorised by land-use type (i.e. residential or commercial) in Figure 4.1 and by year of complaint in Figure 4.2

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<sup>14</sup> <https://www.theweathernetwork.com/uk/news/articles/uk-summer-2015-coldest-and-wettest-in-3-years--met-office-/56645>

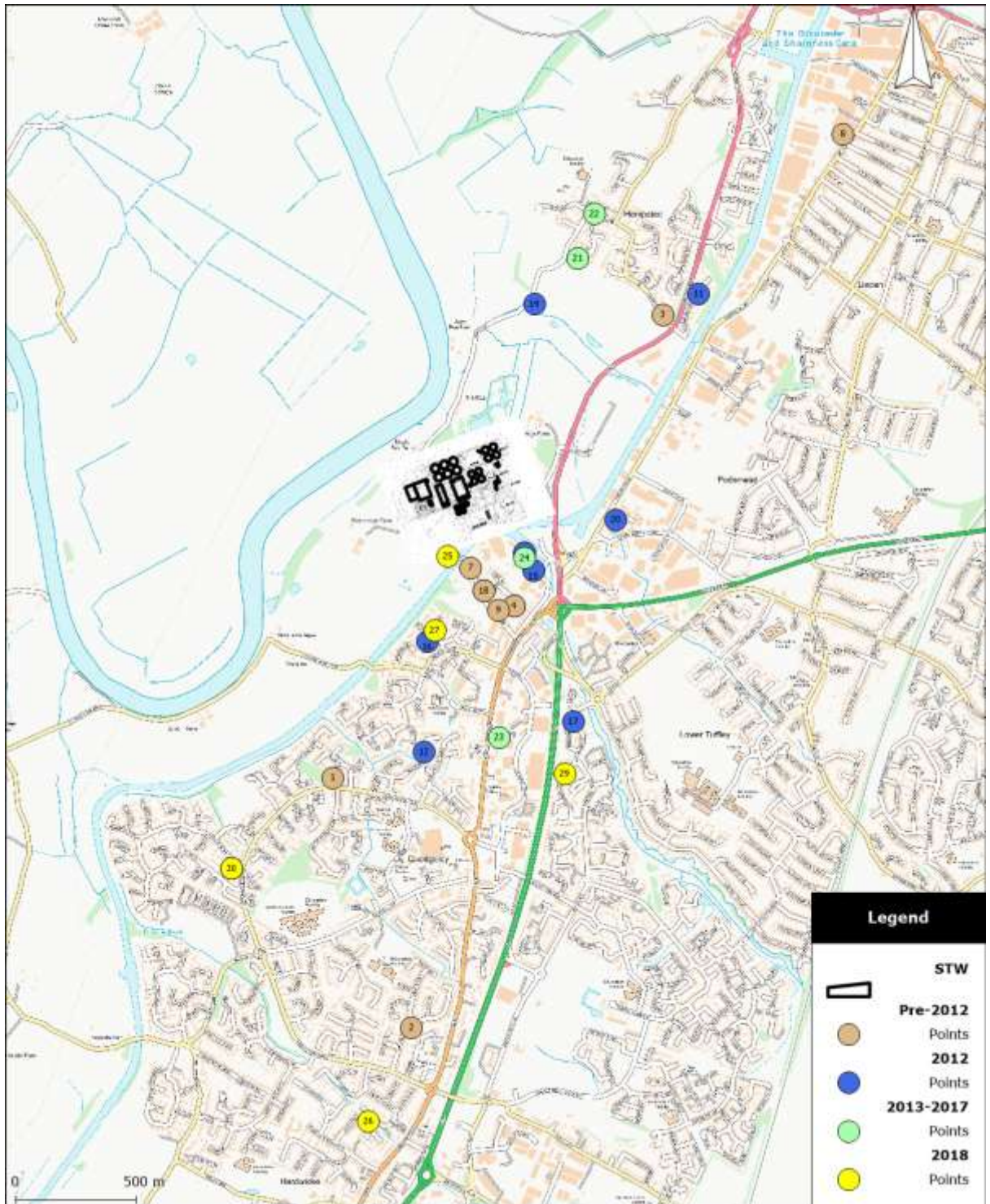
<sup>15</sup> <https://www.theguardian.com/uk-news/2017/sep/01/britains-summer-2017-was-wetter-but-also-warmer-than-average>

**Figure 4.1: Complaints by Land-Use**



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**Figure 4.2: Complaints by Year**

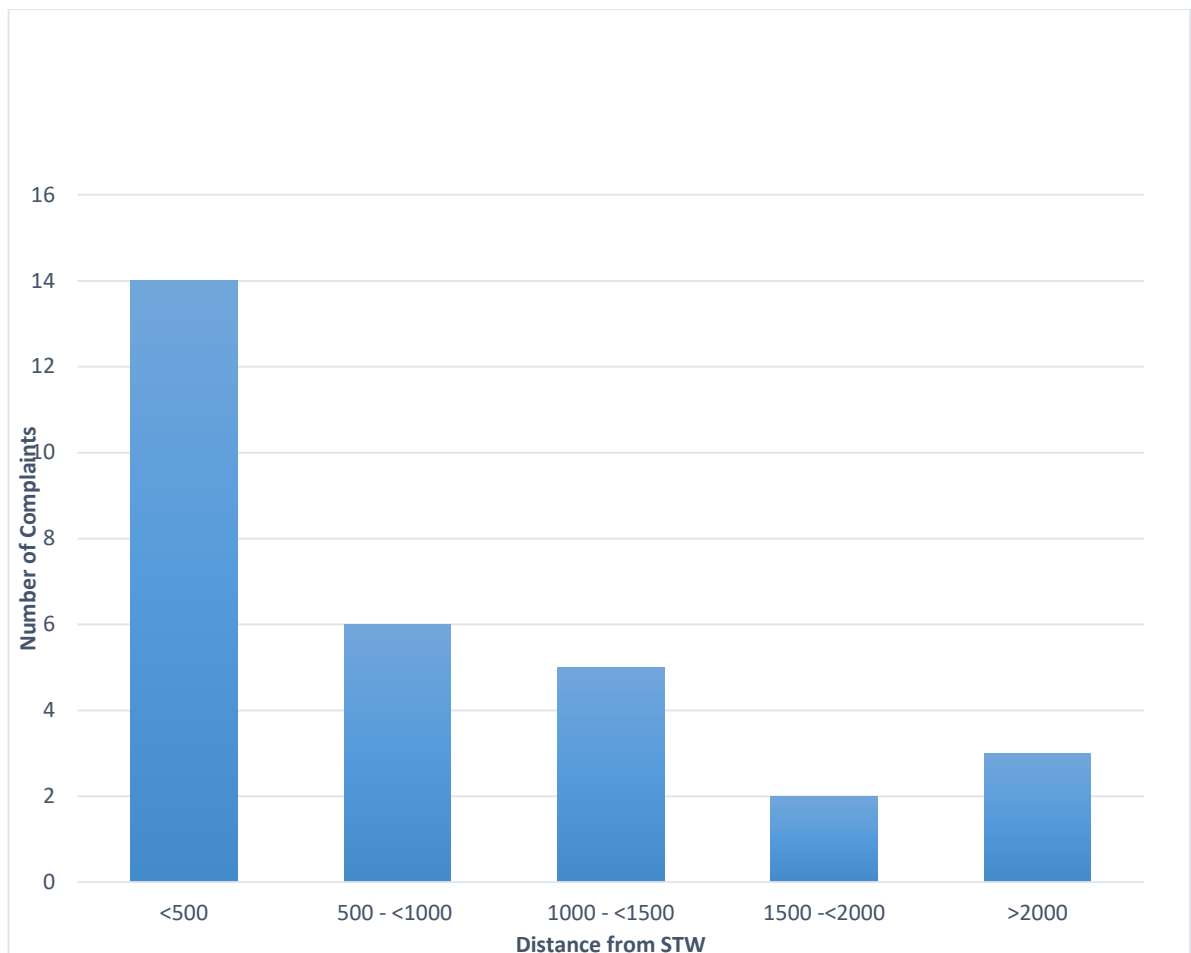


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- 4.11 Complaints made against the STW follow a general linear pattern from the south south-west, in Quedgeley, to the north north-east, in Hempstead. The complaints to the north north-east are focused within Hempsted, which is the nearest built-up residential area in this direction (which is the prevailing down-wind direction from the STW).

- 4.12 More extensive residential uses are located closer to the STW to the south. There is a hotspot of complaints along Sims Lane and in the Goodridge Industrial Estate, which are all located within 500m of the STW.
- 4.13 There have been several complaints made at locations to the south-west of the STW (i.e. the prevailing upwind direction from the STW). Complaints made to the south-west occur regularly between 2008 and 2018, with no single year dominating the complaint record; this suggests that abnormal meteorological conditions (i.e. north or north-easterly winds) within an average year have the potential to cause nuisance to the south-west.
- 4.14 There have been no complaints made against the STW in the past 10 years within Podsmead, which is the closet residential area to the site to the east.
- 4.15 The furthest complaint was made at the postcode GL2 4PZ, on Hillyard Close, roughly 2.5km to the south-west and the closest, at GL2 3NJ at Sims Lane, roughly 200m to the south of the site.
- 4.16 Graph 4.3 below shows the distribution of complaints by distance.

**Graph 4.3: Complaints by distance bands**





- 4.17 The data in Figure 4.1 and Graph 4.3 show that, unsurprisingly, most of the complaints occurred within 500m of the STW, with a steady drop-off in complaint numbers with distance. It is noted that there is an increase (of one complaint) between the 1500-2000m band and the >2000m band; however, two of these complaints were lodged from the same address.
- 4.18 Although single complaints should not be discounted, there is a significant distance between the two complaints to the far south-south-west of the STW (Complaints 2 and 26) and the other complaints. The area in between is also largely highly sensitive to odour (i.e. a residential area). This suggests that either something abnormal is occurring in this location or someone with a particularly sensitive sense of smell lives there.
- 4.19 The furthest complaint to the north-west (Complaint 8) was lodged from a commercial premises. Commercial properties are generally less sensitive to odour impacts than residential dwellings. It is possible that odorous emissions from the STW may have been detected at this location; however, given that the next nearest commercial complaint is located just over 500m from the STW, it is unlikely that any odour nuisance caused at this location was reasonably significant.
- 4.20 Regarding Complaint 8 it is possible that the nearby Landfill site, in Hempsted, may have been the source of the odours that caused the complaint. Further discussion of the potential impact of the landfill site can be found in paragraphs 4.56- 4.58.
- 4.21 Complaint 20 is also likely to be anomalous, as the complaint itself, which is in Appendix C, refers to being woken up at night; however, the post-code is within an industrial estate where there are no dwellings.
- 4.22 It is evident that the odorous emissions from the STW have the potential to cause annoyance at some distance. Most of the complaints occur within 1500m to the north-east and south-west of the site. No complaints have been made in the past 10 years from Podsmead, which is a residential area located 1.0km to the east of the STW.

## Site Baseline Olfactory Survey

- 4.23 An Odour survey or 'sniff test' is a subjective method which can be used to assess levels of odour in ambient air. An assessor can allocate the intensity of an environmental odour, as well as record its frequency and character.
- 4.24 An initial site odour survey was carried out on the 2<sup>nd</sup> of May 2019. This survey sampled at four locations (I.1 – I.4) in the vicinity of the STW and provided a qualitative description of odours detected, as well as their intensity and frequency. It should be noted that this was not a full odour survey, but an initial site visit / walk-around. The wind was blowing from the west-north-west throughout this survey.
- 4.25 The four locations surveyed are shown in Figure 4.3 below.

**Figure 4.3: Initial Survey Locations**



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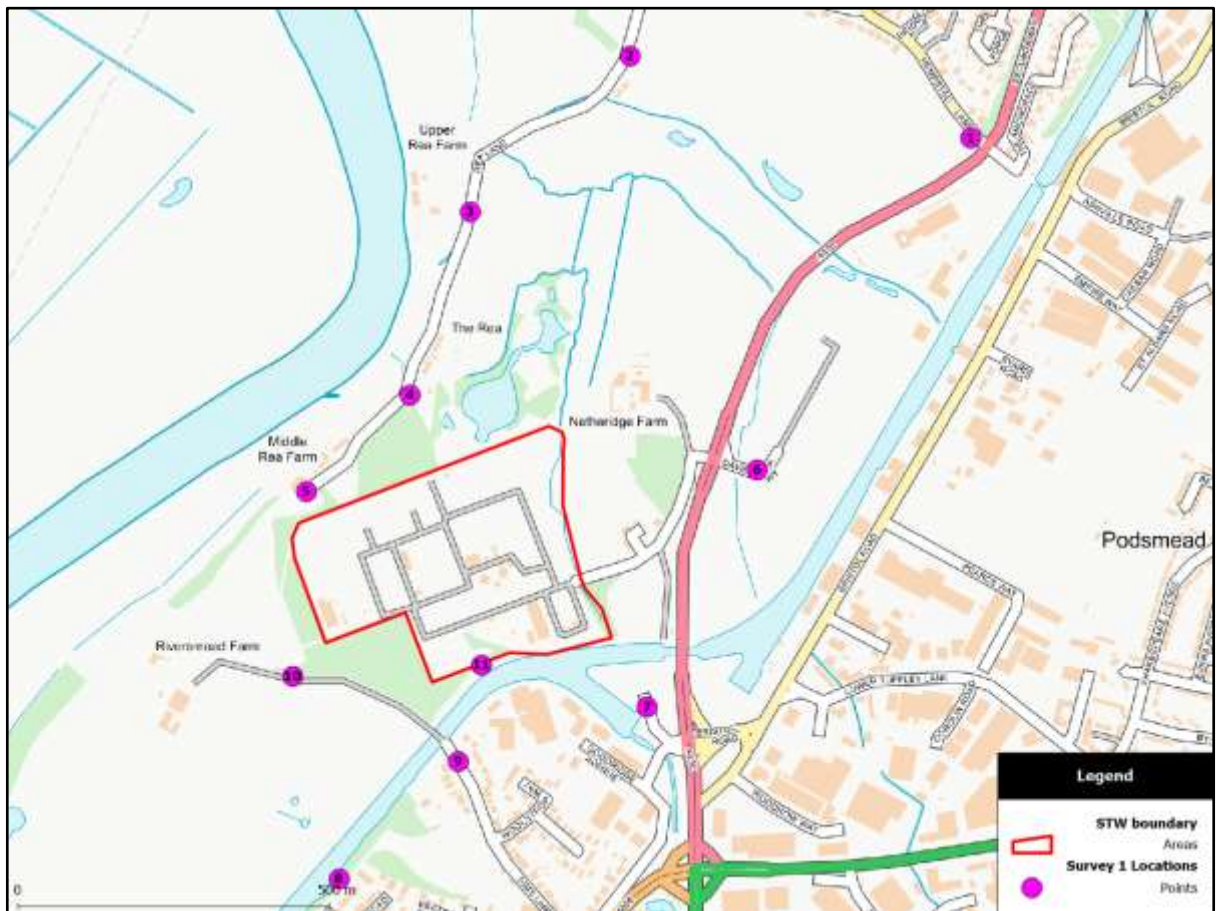
- 4.26 Only at location 4 (at the entrance to the STW) could odours associated with the STW be detected, these were described as “quite strong” and descriptors of “bleachy” and “chemically” were given.
- 4.27 Full odour surveys were carried out on 14<sup>th</sup> June, 20<sup>th</sup> of June and 12<sup>th</sup> July 2019.

- 4.28 The surveys were undertaken by Harley Parfitt and Mark Nichols, who have extensive experience of undertaking odour surveys and assessments in relation to STWs
- 4.29 The approach to the odour survey followed that detailed in the Environment Agency's odour guidance and the IAQM's latest guidance on the assessment of odour for planning.

### **Odour Survey 1**

- 4.30 The first odour survey was carried out on the 14<sup>th</sup> June 2019.
- 4.31 Weather conditions during the survey were damp and mild (16°C), with a gentle breeze blowing from the south-south-west. It was overcast throughout the survey, with light rain.
- 4.32 With reference to Environment Agency guidance<sup>5</sup> Table C2.1 on atmospheric stability and effects on dispersion, observed conditions fell into category D, which indicates a 'Neutral' atmosphere with 'Moderate' potential for odour dispersion. Elevated dispersion, and hence effective dilution of odours from source, tends to occur during unstable conditions, when there are large vertical air movements. The more stable conditions encountered during the survey were therefore considered to be suitable for determining the potential impact of STW odours on local receptors.
- 4.33 The survey was carried out in the vicinity of the STW, the survey locations are indicated on Figure 4.4, below.

**Figure 4.4: Odour Survey 1: Locations**



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4.34 A summary of the average intensity and maximum odour intensity recorded at each survey location is included in Table 4.1, below.

**Table 4.1: Odour Survey 1: Odour Exposure**

Location		Average Intensity	Maximum Intensity	Pervasiveness (% of recognisable odours)	Odour Unpleasantness	Descriptors	IAQM Odour Exposure descriptors
#	Description						
1	Hempsted Lane	1	2	0%	Neutral	Mud; field, wet ground	Negligible
2	Rea Lane	1	2	0%	Neutral	Grass	Negligible
3	Upper Rea Farm	1	3	0%	Neutral	Grass; puddle, manure	Negligible
4	Rea Lane	1	2	0%	Neutral	-	Negligible
5	Track to STW	4	5	65%	Unpleasant	Cheesy; sewage	Large
6	David Hook Way	1	3	0%	Neutral	Sewage, rain, road traffic.	Negligible
7	Fishing Lake	2	4	5%	Neutral/Unpleasant	Fried food; road traffic	Small
8	Goshawk Rd	1	3	0%	Neutral	Floral, mud	Negligible

Location		Average Intensity	Maximum Intensity	Pervasiveness (% of recognisable odours)	Odour Unpleasantness	Descriptors	IAQM Odour Exposure descriptors
#	Description						
9	Sims Lane (E of Canal)	1	3	0%	Neutral	Floral	Negligible
10	Sims Lane (W of Canal)	1	2	0%	Neutral	Foliage	Negligible
11	Canal	1	2	0%	Neutral	Grass	Negligible

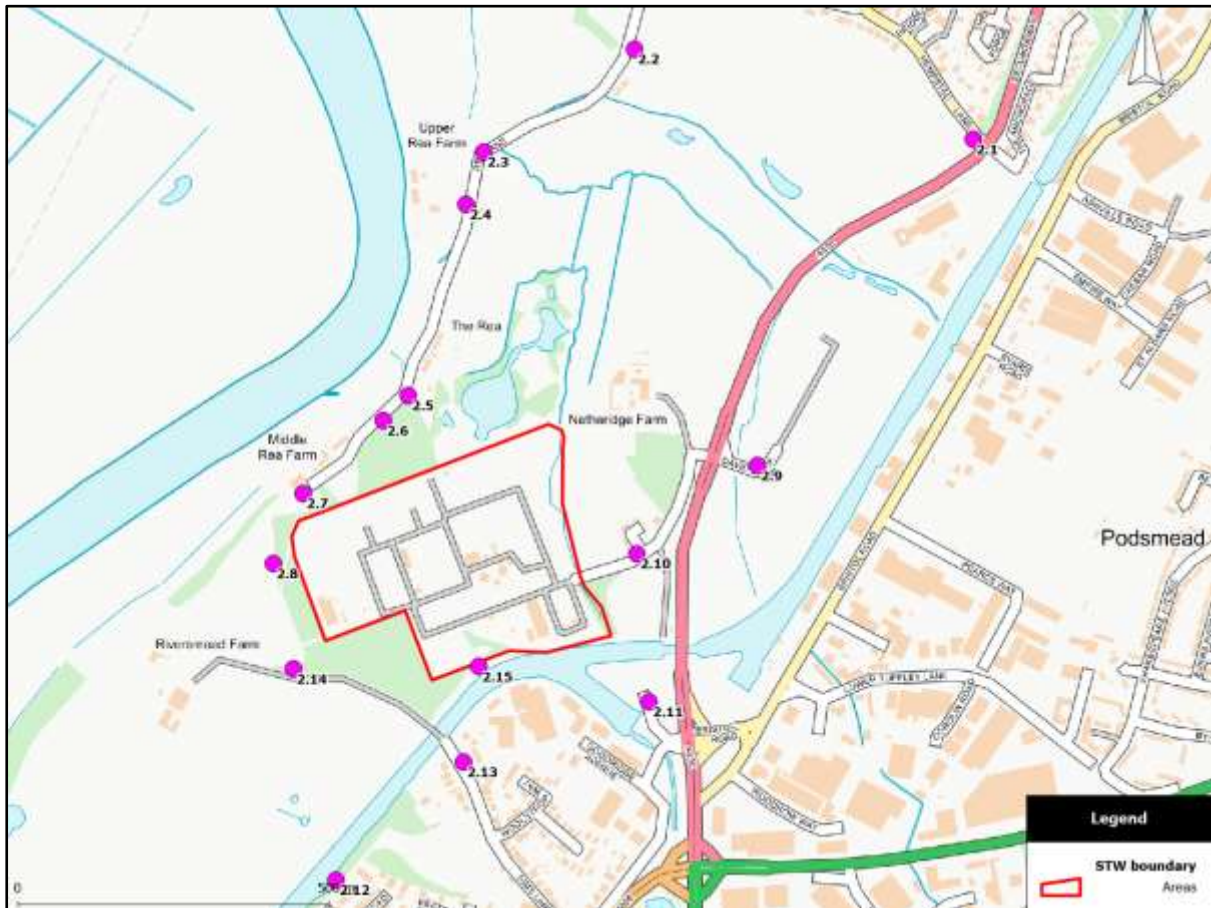
Note: these are a combination of both assessors' results.

- 4.35 The survey began on Hempsted Lane, near Secunda Way, upwind of the STW. It then progressed in a south-westerly direction along Rea Lane heading towards the STW. A number of faint odours, that were not considered to be out of place in a rural area, were detected. Descriptors of these odours consisted of: 'mud', 'grass', 'puddle' and 'manure'. However, at the end of Rea Lane, at Location 5, a strong and pervasive odour could be detected. It is likely that this odour emanated from the STW as descriptors of "cheesy" and "sewage" were used. The odour exposure at this location was considered to be *Large*.
- 4.36 Sewage-like odours could only be detected at one other location during the survey (at Location 6); however, as shown in Table 4.1, odours at this location were, on average, very weak. A maximum odour intensity of 3 was recorded at this location; this corresponds to a 'barely recognisable' odour. It should be noted that despite the detection of sewage-like odour, odour exposure at this location was considered to be *Negligible*, as no strong odours were detected.
- 4.37 It is worth noting that strong "fried food" odours, likely emanating from a nearby KFC restaurant, could be detected at Location 7. Odour exposure at this location was considered to be *Small*; however, no odours associated with the STW could be detected.
- 4.38 Odour exposure at all but two locations was considered to be *Negligible*, with reference to the matrix in Table 3.1.
- 4.39 Odours associated with the STW could be detected at a maximum distance of 350m at Location 6, during survey 1; this location was somewhat down-wind of the site (to the east north-east). No strong sewage odours were detected at this location but a number of 'barely recognisable' sewage odours were detected at times.

## Odour Survey 2

- 4.40 The second odour survey was carried out on the 20<sup>th</sup> June 2019.
- 4.41 Weather conditions during the survey were dry and mild (17°C), with a gentle breeze blowing from the west-south-west. There were scattered clouds during the survey. With reference to Environment Agency guidance<sup>5</sup> Table C2.1, observed atmospheric conditions fell into category C, which indicates a 'Slightly Unstable' atmosphere with 'Moderate' potential for odour dispersion. Conditions were considered to be suitable for the purpose of the survey.
- 4.42 The survey was carried out in the vicinity of the STW, the survey locations are indicated on Figure 4.5, below.

Figure 4.5: Odour Survey 2: Locations



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4.43 A summary of the average intensity and maximum odour intensity recorded at each survey location is included in Table 4.2, below.

**Table 4.2: Odour Survey 2: Odour Exposure**

Location		Average Intensity	Maximum Intensity	Pervasiveness (% of recognisable odours)	Odour Unpleasantness	Descriptors	IAQM Odour Exposure descriptors
#	Description						
1	Hempsted Lane	1	2	0%	Neutral	Mud, fields, foliage	Negligible
2	Rea Lane	1	3	0%	Neutral	rotting grass, foliage	Negligible
3	Upper Rea Farm	1	2	0%	Neutral	rotting grass	Negligible
4	Upper Rea Farm	1	2	0%	Neutral	Grass, foliage	Negligible
5	Rea Lane	1	2	0%	Neutral		Negligible
6	Rea Lane	1	3	0%	Neutral	Mud, grass, rubber	Negligible
7	Track to STW	2	3	0%	Neutral	Watery/ rainy, Sludge cake, cheesy	Negligible
8	Path to West of STW	2	3	0%	Neutral	Cake, vegetation, sewage	Negligible
9	David Hook Way	3	4	15%	Neutral	Road traffic, Sewage/ Sulphurous/ eggy	Small
10	Entrance STW	1	2	0%	Neutral		Negligible
11	Fishing Lake	2	4	20%	Neutral/ Unpleasant	Fried food	Small
12	Goshawk Rd	1	3	0%	Neutral/ pleasant	Flowers	Negligible
13	Sims Lane (E of Canal)	1	3	0%	Neutral/ unpleasant	Sewage	Negligible
14	Sims Lane (W of Canal)	2	3	0%	Neutral	Vegetation	Negligible
15	Canal	1	3	0%	Neutral	Sewage/ Bitumen	Negligible

Note: these are a combination of both assessors' results.

4.44 The survey began on Hempsted Lane, before heading south-west along Rea Lane and a path which tracked the STW western edge. A number of faint odours, that were not considered to be out of place in a rural area, were detected. Descriptors of these odours consisted of: 'mud', 'grass' and 'foliage'. However, at the end of Rea Lane, at Locations 7 and 8, barely recognisable odours likely emanating from the STW were sometimes detected; these included odours with descriptors of 'sludge cake', 'sewage' and 'cheesy'. It should, however, be noted that odour exposure at these locations were considered to be *Negligible* as no strong odours could be detected.

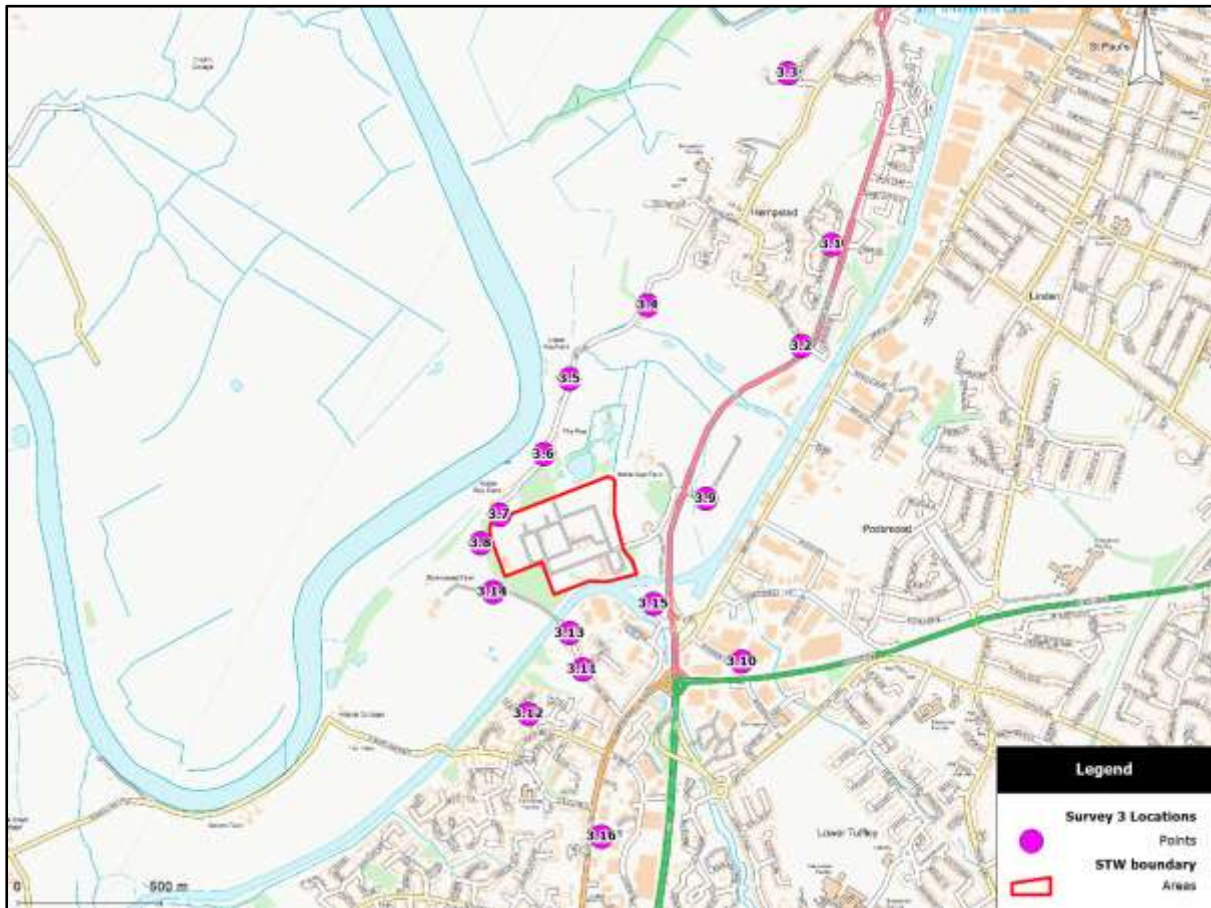
- 4.45 Sewage-like odours could be detected at three other locations during the survey (Location 9, 13 and 15). At Location 9 (David Hook Way) an odour that was easily recognisable as emanating from the STW was detected for a brief period of time, the descriptors for this odour included “eggy”, “sulphurous” and “sewage”. It should, however, be noted that, on average, odours at this location were faint and barely recognisable (strong odours were only detected for 10% of the time) and as such, odour exposure was considered to be *Small*.
- 4.46 At Locations 13 and 15, odours associated with the sewage works could sometimes be detected: however, these odours were considered to be at most barely recognisable and were transient. Odour exposure at these locations was considered to be *Small*.
- 4.47 It is worth noting that strong “fried food” odours, likely emanating from a nearby KFC restaurant, could be detected at Location 11. Odour exposure at this location was considered to be *Small* and no odours associated with the STW could be detected.
- 4.48 Odour exposure at all but two locations was considered to be *Negligible*, with reference to the matrix in Table 3.1.
- 4.49 Odours associated with the STW could be detected at a maximum distance of 350m at Location 9, during survey 2; this location was largely down-wind of the site (to the east north-east). Strong STW odours were detected for 15% of the time at this location.

### **Odour Survey 3**

- 4.50 The third odour survey was carried out on the 12<sup>th</sup> July 2019.
- 4.51 Weather conditions during the survey were dry and hot (24°C), with a gentle breeze blowing from west north-west. It was generally sunny throughout the survey but there were some passing clouds. With reference to Environment Agency guidance<sup>5</sup> Table C2.1, observed atmospheric conditions fell into category C, which indicates a ‘Slightly Unstable’ atmosphere with ‘Moderate’ potential for odour dispersion. Conditions were considered to be suitable for the purpose of the survey.
- 4.52 The survey was carried out in the vicinity of the STW, the survey locations are indicated on Figure 4.6, below.



**Figure 4.6: Odour Survey 3: Locations**



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4.53 A summary of the average intensity and maximum odour intensity recorded at each survey location is included in Table 4.3, below.

**Table 4.3: Odour Survey 3: Odour Exposure**

Location		Average Intensity	Maximum Intensity	Pervasiveness (% of recognisable odours)	Odour Unpleasantness	Descriptors	IAQM Odour Exposure descriptors
#	Description						
1	The Gallops	2	3	0%	Unpleasant	Manure, farmyard	Negligible
2	Hempsted Lane	2	4	13%	Neutral/Unpleasant	Wood chip, silage (sweet), farmyard	Small
3	Near Landfill	2	3	0%	Neutral/Unpleasant	Farmyard, cow straw	Negligible
4	Rea Lane	3	4	35%	Neutral/Unpleasant	Silage, farmyard	Medium
5	Middle Rea Farm	1	2	0%	Neutral/Pleasant	Sweet Floral	Negligible
6	Rea Lane	1	2	0%	Neutral	N/A	Negligible
7	STW track	1	2	0%	Neutral	N/A	Negligible

Location		Average Intensity	Maximum Intensity	Pervasiveness (% of recognisable odours)	Odour Unpleasantness	Descriptors	IAQM Odour Exposure descriptors
#	Description						
8	Path to West of STW	1	2	0%	Neutral	Foliage, Sludge Cake	Negligible
9	David Hook Way	1	2	0%	Neutral	Grass, Road Traffic	Negligible
10	Tops Tiles	1	2	0%	Neutral	Road traffic, food, paint, Sewage, fried food.	Negligible
11	Sims Lane	2	3	0%	Neutral	Sewage, road traffic	Negligible
12	Goshawk rd	1	2	0%	Neutral	Sewage, Petrol	Negligible
13	Sims Lane (E of Canal)	2	4	8%	Neutral/ Unpleasant	Concrete, Sewage (watery)	Small
14	Sims Lane (W of Canal)	1	2	0%	Neutral	Chemicals, hot tarmac, straw	Negligible
15	Fishing Lake	3	5	38%	Unpleasant	Sewage	Medium
16	Fox Run	1	2	0%	Neutral	Foliage	Negligible

Note: these are a combination of both assessors' results.

- 4.54 The survey began in The Gallops, which is 370m to the north of Hempsted Lane (i.e. the starting location of the other two surveys). At this location, on average weak odours could be detected, at times these odours were more distinct (i.e. barely recognisable) but never strong. The descriptors used to describe these odours included 'farmyard' and 'manure'. As no strong odours could be detected odour exposure at this location was considered to be *Negligible*.
- 4.55 Odour intensity was on average weak at Hempsted Lane; however, strong odours could occasionally be detected. The odour descriptors used at these locations included "wood-chip", "silage (sweet)" and "farmyard" and were identified as being somewhere between neutral and unpleasant. Odour exposure at this location was considered to be *Small*.
- 4.56 As the wind was blowing from the west north-west; It was considered unlikely that the odours at Locations 1 and 2 were emanating from the STW (to the south south-west); as such, the third survey point investigated a location near another potential source of odour (i.e. the landfill). Odours at Location 3, near the landfill, were on average faint (sometimes more distinct) and had a similar character to the previous surveyed points, consisting of odours that would not be out of place on a farm. As no strong odours could be detected odour exposure at this location was considered to be *Negligible*.

- 4.57 At Location 4, on Rea Lane, strong odours could be detected for almost half the time. The odour descriptors used at these locations included “silage” and “farmyard” and were identified as being somewhere between neutral and unpleasant. Odour exposure at this location was considered to be *Medium*.
- 4.58 The character of these odours, albeit stronger and more pervasive, was not dissimilar to the previous three locations. Location 4 was also upwind of the landfill, suggesting that the odours detected at Location 4 and the similar odours detected at the previous locations did not come from the landfill. Judging by the descriptors used and that the strongest of these odours was detected at Locations 2 and 4, adjacent to agricultural land, it is considered likely that these odours were agricultural in nature.
- 4.59 The odour survey then continued further down Rea Lane and to the west of the STW (Locations 5 – 8). No strong odours were detected, and only a weak and transient odour described as coming from the STW (‘sludge cake’) was detected. Odour exposure at all locations (5-8) was considered to be Negligible.
- 4.60 Odours with descriptors that suggested the STW (e.g. sewage, chemicals) as a source could be detected at almost all other locations. However, these odours were generally weak and transient.
- 4.61 At Location 13, on Sims Lane, strong ‘sewage’ odours could be detected for approximately 8% of the time; and as such, odour exposure at this location was considered to be Small.
- 4.62 At Location 15, strong and very strong unpleasant odours associated with the STW could be detected for more than a third of the time. Location 13 was directly downwind of the STW and a number of on-site plant were visible. Odour exposure at this location was considered to be *Medium*.
- 4.63 Odour exposure at all but four of the sixteen locations was considered to be *Negligible*, with reference to the matrix in Table 3.1.
- 4.64 Odours associated with the STW could be detected at a maximum distance of 470m at Location 10, during survey 3; this location was largely down-wind of the site (to the south-east) The odour experienced at this location was experienced as a single very weak ‘waft’.

### **Summary**

- 4.65 The results of the odour surveys indicate that strong odours from the STW can sometimes be detected off-site.
- 4.66 It should be noted that most ‘sewage’ odours, including the strongest of these odours, were generally transient and only at two locations (Location 5 of Survey 1 and Location 13 of Survey 3) were strong odours experienced for more than a third of the sampling period.
- 4.67 The baseline odour surveys have also highlighted a number of additional sources of odour, including restaurants, agricultural land and road traffic.

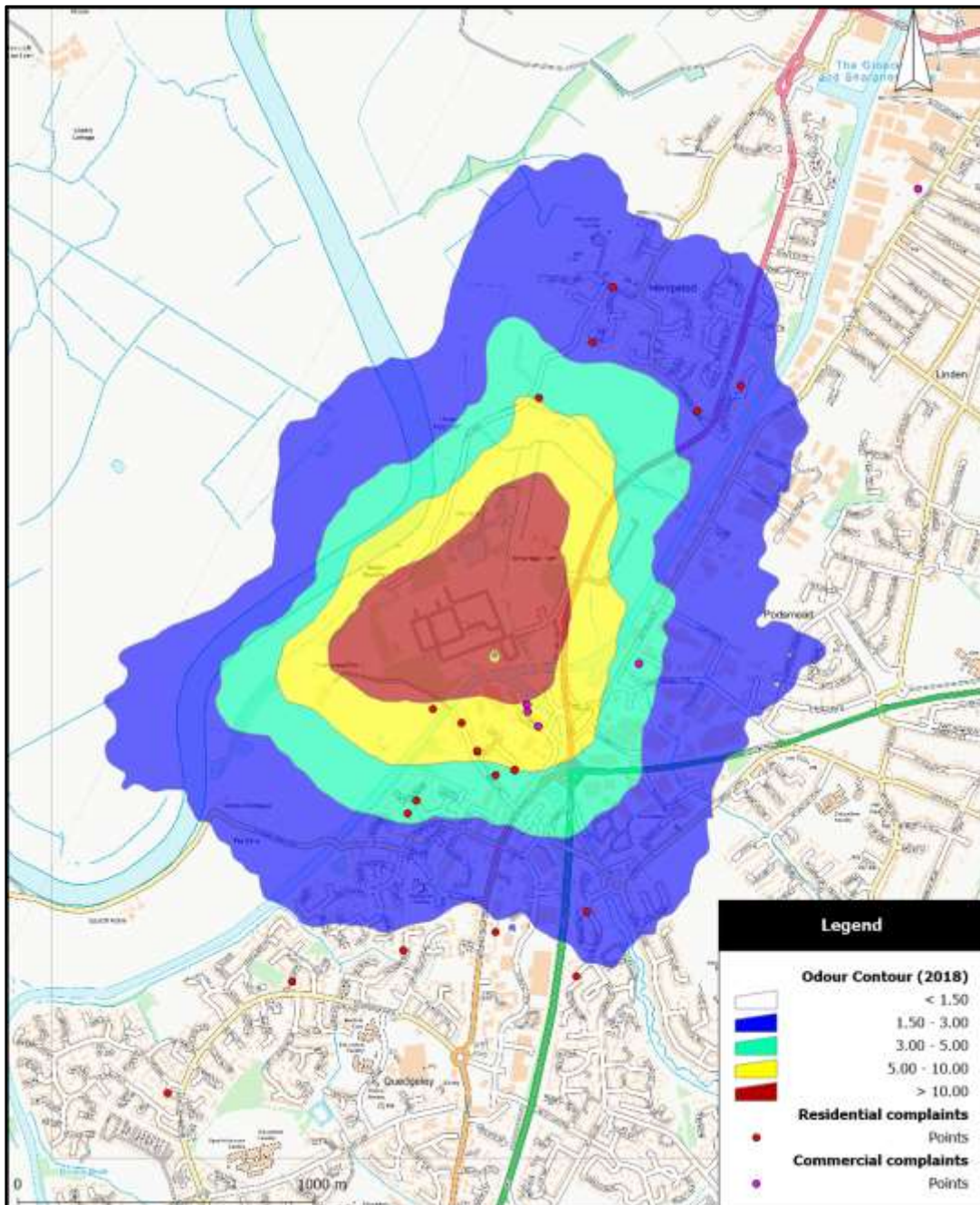
- 4.68 During the second survey, strong odours with descriptors of 'sewage' and 'sulphurous' could be detected circa 350m to the east of the site, on David Hook Way. These odours were, however, relatively transient. This was the furthest that *strong odours* (i.e. maximum intensity of 4 on the VDI Odour intensity scale) associated with STW could be detected.
- 4.69 The strongest odours emanating from the STW (i.e. 5 on the VDI Odour intensity scale) were detected at the Fishing Lake, roughly 120m to the south-east of STW boundary and at the end Rea Lane, within 50m of the western boundary of the site. The odours detected at these locations were at times considered to be 'very strong' with reference to the VDI 394033 Odour intensity scale.
- 4.70 During the third survey and 470m to the south-east of the STW, a weak odour associated with the STW could be detected. This was the furthest that *any* odour associated with STW could be detected.
- 4.71 Odour surveys provide a snapshot of the odour environment at a particular time and it is possible that odours from the STW could be more intense, more pervasive and be detected much further from the site at different times (e.g. under different atmospheric conditions or as a result of particular site activities).

## Dispersion Modelling

4.72 A detailed dispersion model (ADMS-5.2) has been used to predict odour concentrations in the vicinity of the STW. Three years of meteorological year (2016-2018) from Gloucester Airport were used to model the dispersion of odours from the STW.

4.73 The odour contour for the Netheridge STW is shown in Figure 4.7, below.

**Figure 4.7: Odour Contour (2016 - 2018)**



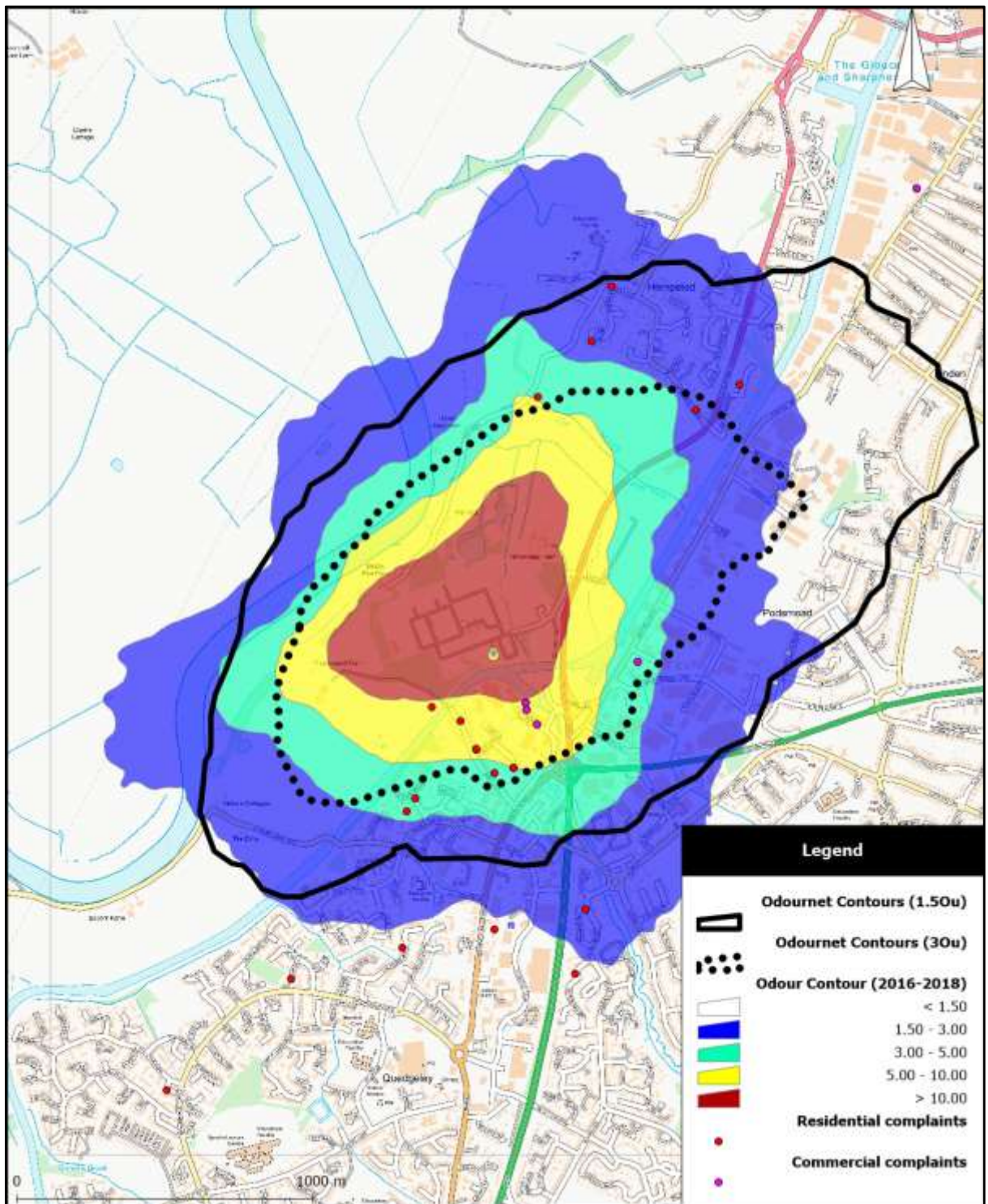
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- 4.74 The  $3\text{OU}_E.\text{m}^{-3}$  contour in Figure 4.7 extends roughly 600m to the south and south-east and nearly 900m to the north north-east; this roughly fits the pattern of complaints lodged against the STW between 2008 and 2018.
- 4.75 The odour contour fits the complaints record particularly well in Hempsted, where all residential complaints fit within the  $1.5\text{OU}_E.\text{m}^{-3}$  threshold for potential nuisance advocated in the Environment Agency's H4 Guidance.
- 4.76 A single commercial complaint, to the far north-east of the STW, is outside of the  $1.5\text{OU}_E.\text{m}^{-3}$  contour. This backs up the assertion of paragraph 4.19 that states that this odour complaint is not a reasonable indicator of potential nuisance.
- 4.77 To the south south-east a number of residential complaints are outside the  $1.5\text{OU}_E.\text{m}^{-3}$  contour. As complaints can provide the most compelling evidence as to the reasonableness of any offensive odours, this suggests that the model might be under predicting odour concentrations to the south and south east. It should be noted that there are four residential complaints just outside (within 200m) of the  $1.5\text{OU}_E.\text{m}^{-3}$  contour.

### **Review and Comparison with Odournet Report**

- 4.78 Odournet produced a report and built a model of emissions from the STW, based on monitoring undertaken in 2008. There have been no major changes to the STWs in the past 10 years and so the reports and their results should be comparable.
- 4.79 Odournet estimated that the STW produces on average, 88,280  $\text{OU}_E/\text{s}$ . In comparison, using the emission factors included in Appendix B (which are partly based on Odournet's factors) it has been estimated that emissions on-site equal 92,818.5  $\text{OU}_E/\text{s}$ . This is marginally higher than the Odournet's estimate for the site and is likely reflective of the conservative estimates we have used to construct the model.
- 4.80 As the odour emission rate for the STW is similar in both reports, the pattern and extent odour contours should be similar. However, there are some key differences in input data and the methods used; for example, Odournet used meteorological data from Brize Norton (2000-2002), which is located further from the application site than Gloucester Airport. In addition, Odournet used the US Environment Protection Agency Industrial Source complex Short-term model (ISC-ST3) to model the pattern of dispersion, whilst our assessment used ADMS-5.
- 4.81 Figure 4.8 below compares the extent of the  $1.5\text{OU}_E.\text{m}^{-3}$  and  $3\text{OU}_E.\text{m}^{-3}$  contours between the two reports.

Figure 4.8 Odour Contour (2016 - 2018), with Odournet overlay



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- 4.82 The two odour contours are of a similar extent, which increases the confidence in the results of Phlorum's assessment.
- 4.83 There are, however, some key differences. Odournet's model extends further to the north-east, whilst the contour from Phlorum's modelling extends further to the south and south-east. This is likely due to differences in the meteorological data used in the assessments.

## 5. Discussion & Conclusions

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- 5.1 Phlorum Ltd has been commissioned by Gloucester City Council (GCC) to undertake an odour assessment with respect to the Netheridge Sewage Treatment Works (STW) on Netheridge Close, Gloucester, GL2 5LE. The National Grid Reference for the centre of the site is 380953, 215806.
- 5.2 The assessment used a number of tools, including: baseline odour surveys; detailed atmospheric dispersion modelling; and an analysis of local complaint records, to consider the likelihood of significant odours affecting the local area.
- 5.3 Although only providing a snapshot of the odour environment, the baseline odour surveys showed that odours from the STW could be detected up to 470m from the STW boundary (350m for strong odours). It is recognised that under different conditions, odours from the STW could be more intense, more pervasive and be detected much further from the site, including in different directions.
- 5.4 In the past 10 years, complaints against the STW have generally been lodged in Hempsted which is the nearest major built-up area to the north north-east (down-wind of the prevailing) and in Quedgeley, to the south and south south-east. Odour complaints are mostly found within 1500m to the north-east and south-west of the site. Despite there being areas of sensitive receptors to the east of the STW, odour complaints there are rare.
- 5.5 Odour contours were produced from detailed dispersion modelling, which was carried out using CERC's ADMS 5.2. The contour plots were produced using three years of meteorological data from Gloucester Airport (2016-2018).
- 5.6 As illustrated in Figure 4.7, the  $3\text{OU}_E.\text{m}^{-3}$  contour, which is considered to be a reasonable threshold for potential nuisance for highly sensitive uses, extends roughly 900m to the north north-east, 600m to the south and south-south-west 400m to the east and to the boundary of the River Severn to the west.
- 5.7 There is a relatively good agreement between the  $1.5\text{OU}_E.\text{m}^{-3}$  and  $3\text{OU}_E.\text{m}^{-3}$  contours (which are two thresholds used to determine reasonable potential for nuisance) and the odour complaints records.
- 5.8 Considering the above, it is recommended that the new Cordon Sanitaire follows a similar pattern to the  $3\text{OU}_E.\text{m}^{-3}$  contour in Figure 4.7.



## Appendix A: Odour Survey Sheets

## Survey 1: 14<sup>th</sup> June 2019

### Assessor 1

### Sheet 1

Location	Reading																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	0	2	1	1	1	0	0	1	2	0	1	1	1	2	1	1	0	0
2	2	1	1	2	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1
3	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	1	1
4	1	0	1	1	1	1	1	1	1	1	1	1	1	2	0	0	1	1	1	1
5	4	5	3	4	5	4	3	3	4	4	4	4	4	4	4	4	3	3	4	3
6	0	0	1	0	1	1	1	0	0	0	1	1	3	1	1	0	1	3	1	0
7	3	1	2	2	1	3	1	1	2	3	1	1	1	1	1	1	1	3	4	4
8	3	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2
9	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1
10	1	2	1	1	1	1	1	1	2	1	1	1	0	0	1	1	1	1	2	1
11	1	2	1	1	0	1	2	1	1	0	1	1	1	1	1	1	1	1	2	1

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	Hempsted Lane	Neutral	Neutral, mud field
2	Rea Lane	Neutral	Grass
3	Upper Rea Farm	Neutral	Grass, stream, puddle
4	Rea Lane	Neutral	
5	Track to STW	Unpleasant	Cheesy, Sewage odour
6	David Hook Way	Neutral	A small whiff of STW
7	Fishing Lake	Neutral/ unpleasant	Chips, road traffic, fried food
8	Goshawk Rd	Pleasant/ Neutral	Floral, mud
9	Sims Lane	Neutral	Floral
10	Sim Lane	Neutral	Foliage
11	Canal	Neutral	Grass/ foliage

## Assessor 2

### Sheet 1

	Reading																			
Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	1	1	1	0	1	1	0	1	0	0	0	2	0	1	1	0	0	1	1
2	0	1	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	1	0
3	3	1	1	0	0	1	0	0	1	0	1	2	2	1	1	0	0	1	0	1
4	0	0	0	2	1	1	0	0	1	0	0	1	1	0	0	0	0	1	1	0
5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	2	4	2	2	3	2
6	0	1	0	1	0	1	0	1	1	1	0	0	0	0	1	1	0	0	2	1
7	3	1	0	1	3	1	0	1	0	0	1	1	0	2	2	1	0	1	3	2
8	2	1	1	1	1	1	2	2	0	1	2	1	1	2	3	1	0	1	0	1
9	2	2	1	1	1	1	2	2	0	1	2	1	1	2	3	1	0	1	0	1
10	1	1	1	1	1	1	0	0	1	1	1	1	0	1	0	1	1	1	0	0
11	0	0	0	1	1	0	1	1	0	0	1	0	1	1	0	2	1	2	1	0

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	Hempsted Lane	Neutral	Wet ground, road traffic, foliage
2	Rea Lane	Neutral	Wet foliage, foliage
3	Upper Rea Farm	Neutral/unpleasant	Manure. Wet ground, foliage
4	Rea Lane	Neutral	
5	Track to STW	Unpleasant	Manure. Waste, cheesy
6	David Hook Way	Neutral	Rain, road traffic
7	Fishing Lake	Neutral	Grease/fried food, wet ground
8	Goshawk Rd	Neutral	Flowers
9	Sims Lane	Neutral	
10	Sim Lane	Neutral	Foliage
11	Canal	Neutral	Foliage

## Survey 2: 20<sup>th</sup> June 2019

### Assessor 1

### Sheet 1

Location	Reading																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	2	1	1	0	1	1	1	1	2	1	0	2	0	1	0	0	0	1
2	2	2	1	2	2	2	3	1	2	1	1	1	1	1	1	1	1	1	1	2
3	1	1	1	2	2	2	2	2	1	1	1	1	1	2	1	0	1	0	0	1
4	1	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	0
6	3	1	1	1	1	0	1	1	2	2	2	1	1	1	2	1	1	2	0	1
7	1	1	2	1	2	1	1	2	3	1	2	2	2	2	3	3	1	2	2	1
8	1	2	2	2	2	2	1	2	1	1	1	1	1	2	1	1	1	1	1	1
9	3	3	3	1	2	2	2	1	1	1	4	2	4	2	4	2	4	2	2	2
10	2	1	1	1	1	2	1	2	1	2	1	2	1	1	1	1	2	1	1	1
11	4	1	3	1	1	1	3	4	2	3	4	4	1	1	1	1	1	1	1	1
12	3	3	1	1	2	1	2	1	2	1	2	1	1	1	1	1	1	2	2	2
13	2	1	1	2	1	1	2	1	3	3	2	2	1	1	1	2	1	1	1	1
14	2	1	1	2	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1
15	2	1	2	2	1	1	1	1	1	3	1	2	1	0	2	2	1	1	1	1

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	Hempsted Lane	Neutral	Mud fields
2	Rea Lane	Neutral	Rotting grass, dog poo, damp earth
3	Upper Rea Farm	Neutral	Rotting grass
4	Upper Rea Farm	Neutral	Grass
5	Rea Lane	Neutral	
6	Rea Lane	Neutral	Mud, grass
7	Track to STW	Neutral	Watery/ rain, sludge cake
8	Path to West of STW	Neutral	Sludge cake, wet, trees, vegetation
9	David Hook Way	Neutral/unpleasant	Road traffic, STW/ sulphurous
10	Entrance STW	Neutral	
11	Fishing Lake	Neutral/unpleasant	Fried food
12	Goshawk Rd	Pleasant/# neutral	Flowers
13	Sims Lane	Neutral/unpleasant	STW
14	Sim Lane	Neutral	Vegetation
15	Canal	Neutral/unpleasant	STW/ bitumen, laid track

## Assessor 2

### Sheet 1

Location	Reading																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	1	1	1	1	1	0	0	1	1	1	0	1	1	0	1	0	1	1
2	2	1	1	1	2	1	1	1	1	2	1	0	1	1	1	1	1	2	2	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	2	2	1	1	1	1	1	2	1	1	2	1	1	1	1	1	2	1	1	1
5	1	1	1	1	0	0	0	1	0	1	2	1	1	0	1	1	1	0	1	1
6	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	0	1	2
7	2	2	2	1	1	1	2	2	1	1	2	1	1	1	2	2	1	2	1	1
8	2	2	3	1	1	2	2	2	3	1	1	2	2	1	3	2	1	1	3	2
9	3	3	3	4	3	2	3	2	2	4	3	3	3	3	2	2	2	2	3	1
10	1	1	1	2	2	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1
11	4	4	4	1	1	2	3	2	2	1	3	3	2	2	4	1	2	1	2	1
12	2	2	1	1	2	2	1	1	1	2	1	1	2	2	1	2	1	1	2	0
13	3	2	1	1	1	1	2	1	1	1	2	3	1	1	1	2	1	1	1	1
14	2	2	1	1	2	3	3	2	1	1	2	2	3	2	1	1	2	1	1	2
15	1	1	1	1	1	1	2	1	1	1	1	1	1	2	1	1	2	1	2	1

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	Hempsted Lane	Pleasant/Neutral	Foliage (windy)
2	Rea Lane	Neutral	Foliage
3	Upper Rea Farm	Neutral	Grass
4	Upper Rea Farm	Neutral	Manure, foliage
5	Rea Lane	Neutral	-
6	Rea Lane	Neutral	Wet tarmac, foliage, rubbery smell
7	Track to STW	Neutral	Occasional cheesy smell
8	Path to West of STW	Neutral	Dog poo, sewage, flowers, floral.
9	David Hook Way	Unpleasant	Eggy, manure, farm
10	Entrance STW	Neutral	-
11	Fishing Lake	Unpleasant	Grease, food, fried chicken
12	Goshawk Rd	Pleasant	Sweet (lavender), floral, foliage
13	Sims Lane	Neutral/unpleasant	Bins
14	Sim Lane	Neutral	Cheesy
15	Canal	Neutral/unpleasant	-

## Survey 3: 12<sup>th</sup> July 2019

### Assessor 1

### Sheet 1

	Reading																			
Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	2	2	1	1	1	3	3	3	3	3	2	3	3	1	2	1	1	1	1
2	3	4	3	3	2	2	1	2	2	1	1	3	2	1	0	1	2	4	3	2
3	1	2	2	2	2	2	2	1	1	1	3	1	2	1	1	2	1	1	1	2
4	4	3	4	4	4	4	4	3	3	3	3	3	3	3	2	2	3	2	1	2
5	2	1	2	1	2	1	1	1	1	1	1	2	1	0	1	1	1	1	1	1
6	1	0	1	1	1	1	1	1	1	1	0	1	1	1	2	1	1	1	0	1
7		0	1	1	2	1	1	2	1	1	1	1	1	1	0	1	2	1	1	1
8	2	1	1	0	1	1	1	1	0	1	2	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	2	1	0	1
10	2	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1
11	2	1	1	3	3	3	2	2	2	2	1	1	1	1	2	1	1	1	1	1
12	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1
13	3	1	3	2	4	2	3	1	3	3	4	2	2	2	3	2	3	3	2	4
14	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1
15	2	1	3	4	3	4	5	5	4	5	4	3	2	1	3	1	4	3	4	3
16	1	1	2	1	1	2	2	1	1	1	1	1	1	1	2	1	2	2	1	2

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	The Gallops	Unpleasant/neutral	Manure, farmyard
2	Hempsted Lane	Unpleasant/neutral	Silage (sweet)
3	Near L:andfill	Unpleasant/neutral	Farmyard, cow straw
4	Rea Lane	Neutral	Silage, farmyard (sweet)
5	Middle Rea Farm	Neutral	
6	Rea Lane	Neutral	
7	STW track	Neutral	
8	Path to West of STW	Neutral	Sludge cake
9	David Hook Way	Neutral	Warm, grass, road traffic
10	Tops Tiles	Neutral	Initial whiff of STW, fried food
11	Sims Lane	Neutral	Roast traffic. STW
12	Goshawk rd	Neutral	Petrol
13	Sims Lane	Neutral/unpleasant	Watery STW, mud, cake
14	Sims Lane	Neutral	Straw
15	Fishing Lake	Unpleasant	Sewage
16	Fox Run	Neutral	Fir, foliage

## Assessor 2

### Sheet 1

	Reading																			
Location	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	1	2	1	1	1	2	1	1	2	1	1	1	2	1	1	1	1	1	1
2	3	3	4	3	4	4	3	2	1	1	1	1	2	1	2	1	3	1	1	1
3	2	2	1	1	1	2	2	3	1	1	1	1	2	1	2	1	1	2	3	2
4	3	3	2	1	2	3	4	4	4	4	4	4	4	3	4	2	2	1	1	2
5	2	2	2	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	1
6	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
7	1	0	1	1	0	1	1	1	1	0	0	1	0	0	1	1	0	0	1	0
8	2	1	1	1	2	2	1	1	1	1	2	1	1	1	1	1	1	2	1	1
9	1	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	1	1
10	2	2	1	1	1	1	2	1	1	2	1	2	1	1	1	2	1	1	2	1
11	2	2	1	1	3	3	1	1	2	1	1	2	1	1	2	1	1	1	1	1
12	1	1	1	2	1	1	1	2	1	1	2	1	1	2	1	2	1	2	1	1
13	3	3	2	3	2	3	2	2	2	1	1	1	2	3	1	2	3	2	1	1
14	1	1	1	1	2	1	1	1	0	0	1	1	0	1	2	1	1	2	1	0
15	3	2	3	3	4	3	3	2	1	3	4	5	5	4	3	3	2	1	3	4
16	1	1	1	1	0	0	2	1	1	1	1	0	1	1	1	1	0	0	2	0

### Sheet 2

Location	Location Description	Odour Unpleasantness	Odour Description + observations and likely source of odour
1	The Gallops	Unpleasant	
2	Hempsted Lane	Unpleasant	Manure, woodchip, agricultural
3	Near L:andfill	Unpleasant/neutral	Manure, fresh cut grass, agricultural, farm
4	Rea Lane	Neutral	Same as #2, but stronger, farm?
5	Middle Rea Farm	Pleasant	Sweet, floral
6	Rea Lane	Neutral	
7	STW track	Neutral	
8	Path to West of STW	Pleasant/ Neutral	Foliage/ vegetation.
9	David Hook Way	Neutral	
10	Tops Tiles	Neutral	Paint, road traffic, food
11	Sims Lane	Neutral	
12	Goshawk rd	Neutral/unpleasant	Sewage (intermittent)
13	Sims Lane	Neutral	Baking concrete
14	Sims Lane	Neutral/unpleasant	Chemicals, hot tarmac
15	Fishing Lake	Unpleasant	Sewage
16	Fox Run	Neutral	

## Appendix B: Model Inputs



## Odour Source Inputs:

Source	Type	Approx. Total Surface Area (m <sup>2</sup> )	Height (m)	Efflux velocity (m.s <sup>-1</sup> )	Odour emission rate (ou <sub>E</sub> .m <sup>-2</sup> .s <sup>-1</sup> )	Source/Justification Proposed
Grit Skip	Area	2.95	1	0.1	50	UK-WIR -typical for Screen
Rag Skip *4	Area	21.2	1.5	0.1	50	UK-WIR -typical for Screen
PST*4	Area	1976.4	0.5	0.1	7.5	UK-WIR high emission rate
Aerobic Zone	Area	5938	1.5	0.1	0.4	Odournet (2009)
Anoxic Zone	Area	480.3	1.5	0.1	8.5	Odournet (2009)
SAS and RAS channel	Area	40.9	0	0.1	0.4	Odournet (2009) (Anoxic Zone)
Storm Tank	Area	2318	0.5	0.1	2.5-4.8	Odournet (2009) 2.5 = residue sludge, 4.8 = Storm Conditions. Storm conditions for 20% of time.
Storm Channel	Area	74.3	2.5	0.1	2.5-4.8	Odournet (2009) 2.5 = residue sludge, 4.8 = Storm Conditions. Storm conditions for 20% of time.
Rag Skip *2 (Storm)	Area	13.2	1.5	0.1	50	UK-WIR -typical for Screen. 20% of time.
Inlet Channel	Area	89.3	2.0	0.1	6.2	UK-WIR -typical Channel to primary tank

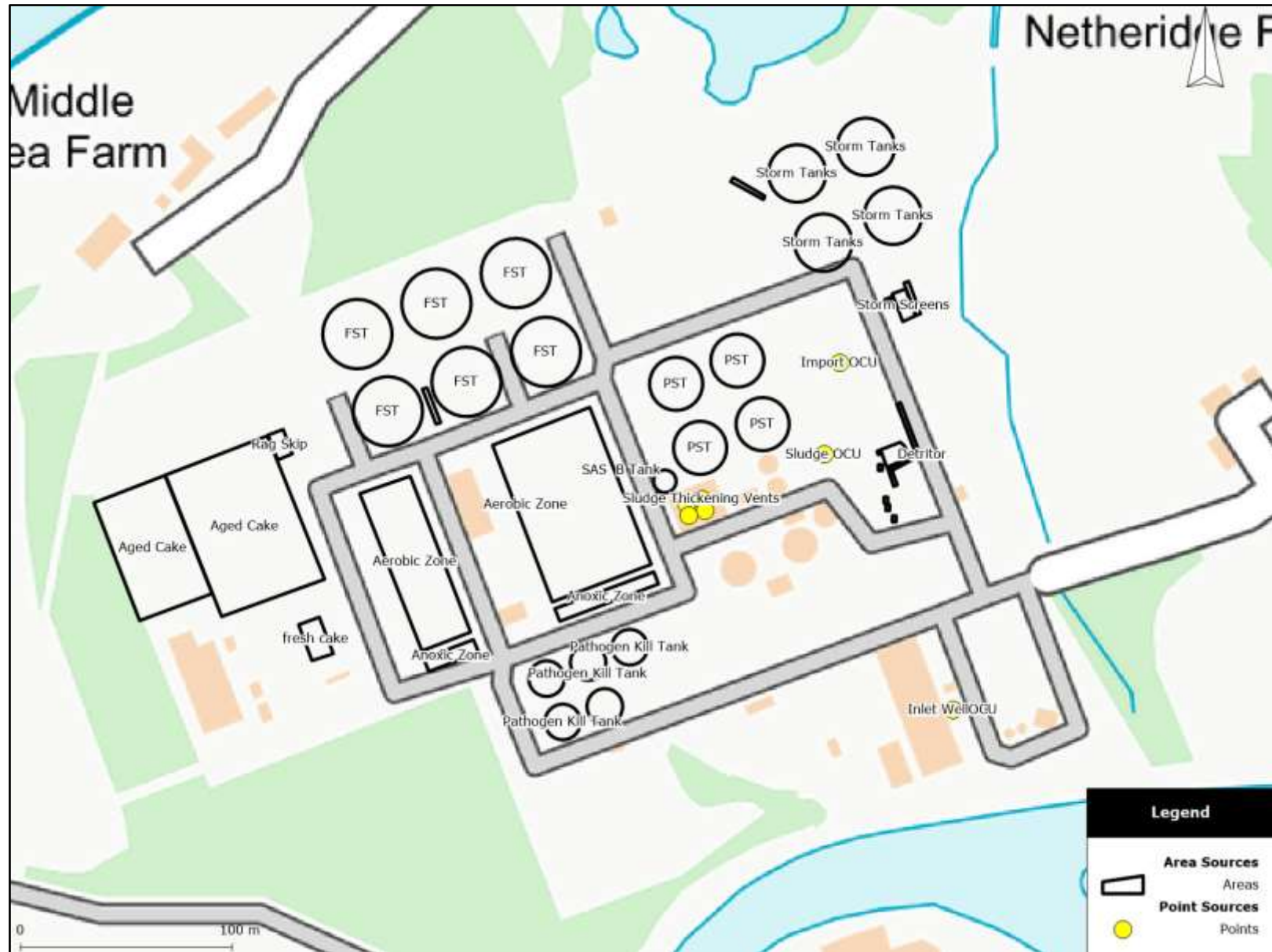
SAS buffer Tank	Area	89.6	5.6	0.1	1	Odournet (2009)
Aged Cake	Area	5934	0	0.1	1.8	Odournet (2009)
Rag Skip (permitted)	Area	92.13	0	0.1	50	UK-WIR -typical for Screen
Fresh Cake	Area	192.50	0	0.1	62.0	UK-WIR Typical Value for Fresh sludge cake
Pathogen Kill Tank *5	Area	1115	7	0.1	0.6	Odournet (2009)
Final Tank*6	Area	5052	0.5	0.1	1.7	UKWIR Final Tank High Emission Rate
Sludge and Blend Tank OCU	Point	-	7.0	15m/s*	14523 Ou/s	Odournet (2009). Combined Odour from Sludge screens /blend tank OCU and Sludge PFT/ digested holding tank OCU**.
Sludge thickening building vent *4	Point	-	9	1*	52.6 Ou/S (*4)	Odournet (2009)
Inlet Well OCU	Point	-	4	15*	502	Odournet (2009)
Import OCU 2	Point	-	13	15*	128	Odournet (2009)

Note: \*assumed value \*\*as Picket Thickeners are no longer in-use on-site, this emission rate is likely worst-case.

## Buildings

Source	Type	Height (m)	Length (m) / Diameter (m)	Width	Angle
SAS Thickening Building	Rectangular	4	12	11	340
Inlet Pumping Station	Rectangular	8	18	24	340
Office Building Area 1	Rectangular	9	62	24	340
Office Building Area 2	Rectangular	4	8	7	340
Emergency Holding Tank	Circular	12	9	9	0
Digester 1	Circular	12	9	9	0
Digester 2	Circular	12	9	9	0
Digester 3	Circular	12	9	9	0
Gas Holder	Circular	14	7	7	0
Sludge handling Tank 1	Circular	6	5	5	0
Sludge handling Tank 2	Circular	6	5	5	0
Sludge handling Tank 3	Circular	5	4	4	0
Sludge handling Tank 4	Circular	5	4	4	0

## Modelled Odour Sources



## Appendix C: Odour Complaint Record

**Table C.1: Complaints Records 2008 – July 2018**

02-Jan-08	Routine odour monitoring	GL2 4UU
05-Mar-08	Smell overpowering this morning. Feels nauseous.	GL2 4UU
12-May-08	Reported to out of hours service on 10.5.08 at 21.55 hrs. Smell from Hempsted Sewage Works	GL2 5EJ
08-Jan-09	Customer lives in Hempsted and reports that the smell coming from Netheridge Sewage Treatment Works is particularly bad today - is making customer feel quite sick. Please investigate.	GL2 3NQ
02-Jun-09	Customer calling from Quedgeley as smell is particularly bad today she realises it is probably the heat but is concerned about whether it is harmful at all.	GL2 5LA
05-Oct-09	Customer called to complain about the smell coming from the Netheridge site. He advises that the smell is getting worse and that something should be done.	GL2 5EJ
27-May-10	Mr XXXXX of XXXXX has complained that smell has been very bad for the last 2 or 3 weeks again. It is affecting his business - his staff are complaining about the conditions and his customers are not happy either	N/A
02-Aug-10	Smell from Sewage works last week, last night and this morning	GL1 5SR
16-Aug-10	Email from customer, pls respond as appropriate asap: "Can I ask if there is provisions to resolve the apparent foul odour in the sewage treatment works near to Hempstead / Quedgeley? It is particularly unpleasant and even more so when sitting outside the MacDonald's Restaurant having a meal.  For the way forward what is going to be done. More houses and estates are being built. Can the treatment works cope with such increase?"	GL2 3NJ
21-Sep-10	My complaint is about the awful smell of what appears to be, Raw Sewage that hovers between Hempstead and Quedgeley. I believe this smell originates from the Netheridge Treatment Works based alongside the Gloucester canal and appears to worsen as the population grows in the local area. I am sure this problem cannot be healthy, especially during the summer months when windows are opened during the late hours for ventilation. When waiting in traffic during the rush hour, it is quite common to see families in their vehicles, grimacing with hands held to noses during these conditions. (Not a good advert to tourists visiting local attractions.) Surely there must be plans to eradicate this problem in view the new dwellings being erected in the area.	no address given
17-Nov-10	I wish to make a complaint about the nuisance odour which appears to be arising from the Severn Trent sewage treatment plant in Quedgeley. We have extensive cases of foul odour and feel that this needs to be reported and investigated. Being an Environmental Lead Auditor and having extensive experience of auditing ETP's this is a unnecessary occurrence and feel you need to take steps to correct this. Perhaps some canvassing of the neighbourhood would be a good fact finding solution?	GL2 3NJ
09-Dec-10	Caller called to complain about bad smell coming from area. Customer describes smell as over powering.	GL2 3NJ
20-Jul-12		no address given
27-Jul-12	Problem Details: There is an awful smell of sewage across Quedgeley today and I suspect, once again, it is due to activities at the Netheridge treatment works. This has been an issue since I have moved here in 1998 and the poor people of Quedgeley have to suffer on the hottest day of the year when we should be enjoying our gardens and opening our windows in this glorious weather.	GL2 3NJ
31-Jul-12	You will not have failed to notice the awful smells coming from the treatment plant and wafting over Quedgeley.	GL2 4NU

	<p>Are there measurements that have to be kept or guide lines from the environmental health? I know it is a treatment plant but I have never found this problem in other towns. Just wondered if anyone is monitoring it.</p> <p>It used to be pretty bad on a Weds for about an hour. That is acceptable but we have had it pretty much every Sunday (no chance of a barbeque) and most afternoons this week.</p>	
24-Aug-12	<p>For the past couple of weeks there has been a smell in the air reminiscent of "pigs?" although unlikely to be that. I wonder if you have had any other complaints or are we a one-off or too sensitive. Unfortunately the wind direction has been changing so difficult to pinpoint as there is the sewerage station one way and the refuse tip the other. Perhaps sometime you could check if there has been any particular different method of working at either of these two places. Maybe not them at all and some temporary phenomenon?</p>	GL2 5JW
30-Aug-12	Customer called to advise that the smell from Netheridge sewage works is very bad to the point that he is unable to sit outside or open their windows	no address
03-Sep-12	Complaining about the smell coming from Netheridge Water Treatment (he thinks). Has been quite bad for several days - end of last week - but today it's really bad.	GL2 4SY
04-Sep-12	Customer called to advise that there is a horrible smell from Netheridge Sewage works, it is so bad that she can actually taste it please can this be looked into	no address given
05-Sep-12	Customer called to advise that a horrible smell in the area started about 8-9 days, it started off with a copper based smell, this is waking her up in the night and several people in the area have had stomach upsets with in this time period. Unable to go in the garden or open the windows. There seems to be more of a chemical smell at night time, can taste copper. They are pretty sure is Netheridge.	GL2 5DN
06-Sep-12	Customer complaining about the terrible smell coming from Netheridge Water Treatment plant. Although it's not as bad as it used to be, customer says that over the last couple of days the smell has been very strong. She would like to know whether this is being monitored on a regular basis by EH.	Goodridge Trading Estate GL2 5EA
07-Sep-12	Customer called to advise that there is a terrible smell coming from the Netheridge treatment works in Hempsted. Customer advised that this is an ongoing problem please investigate.	GL4 0TT
07-Sep-12	Customer called to advise that there is a terrible smell, they are having constant headaches, cannot go outside to enjoy the weather due to the smell or open their windows. Please can this be looked into and advise the customer	Goodridge Trading Estate GL2 5EB
07-Jun-13	Constant strong odour of sewage from the Netheridge Treatment plant, it has been highly pungent for several days, very unpleasant when in the garden at times overpowering	GL2 5LN
15-Sep-14	Customer has called to complain about the stench that is coming from the Netheridge Sewage works the customer has been on to Severn Trent.	. GL2 4NX
05-Nov-14	Customer called to report a sewage smell in the area customer complained Severn trent ref 2001894442	GL2 5LH
11-Feb-16	Mr. XXXXXXX, secretary of XXXXXXX Ltd rang to report Hydrogen sulphide, possibly coming from Netheridge treatment plant.	GL2 5EA
25-Jun-18	Strong smell coming into the property customer thinks the smell is coming from the sewage treatment works. Has been going on for a few weeks, unable to open the windows.	GL2 4NU
25-Jun-18	Customer has called to complain about the stench that is coming from the	

	Netheridge Sewage works. States that he can smell it all year round but affects him more in the summer and cannot enjoy garden or have windows open. Has complained previously in 2014.	GL2 3NJ
04-Jul-18	caller complaining about the terrible smell - has put up with it over the years but in the hot weather it has become unbearable - very unpleasant and is having an effect on her health	GL2 4PZ
09-Jul-18	Smell from sewage works non-stop strong smell for 2 weeks cannot open any windows doors or go outside without smelling breathing it even worse with the hot weather, customer feels this is a risk to residents' health. Residents were sent a letter from the sewage works advising them of a new system they were using that would mean no more smells however this has not happened and strong smell is a regular occurrence	GL2 5EJ
13-Jul-18	Once again I am writing to complain about the constant stench coming from the sewerage works at Hempsted, every night its near on impossible to get and fresh air without the stench, I contacted the Council previously over this and nothing happened and still it seems there is no action, in the 21st century people should not have to live with this, I do expect to live in a clear air environment.	GL4 0SY
31-Aug-18	emails sent over to the team regarding the smell at the treatment works	GL2 4XZ



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