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GLADMAN DEVELOPMENTS LIMITED

LAND AT HEMPSTED LANE, GLOUCESTER

ODOUR ASSESSMENT

JUNE 2021

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GLADMAN DEVELOPMENTS LIMITED

LAND AT HEMPSTED LANE, GLOUCESTER

ODOUR ASSESSMENT

JUNE 2021

PREPARED BY:

[redacted]

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1 INTRODUCTION

1.1.1 Wardell Armstrong has been commissioned by Gladman Developments Ltd to undertake a detailed odour modelling assessment for a proposed residential development at Land at Hempsted Lane, Gloucester.

1.1.2 The proposed development site is located to the south of Hempsted, a village part of the City of Gloucester. To the north of the site are existing residential dwellings, including those along Hempsted Lane. To the south east is the A430, the Gloucester Car Boot and Flea Market and the Gloucester and Sharpness Canal beyond. To the south are wetlands with a sewage treatment works beyond. To the west are open fields and the River Severn beyond. The Netheridge Waste water Treatment Works (WwTW) is located approximately 540m to the south west of the proposed development site.

1.1.3 It is understood that the operator of the WwTW, Severn Trent (ST) also own land in closer proximity to the development, approximately 300m south west at the closest point. This additional land is currently unused and does not house any part of the current WwTW.

1.1.4 From the information provided, we understand that the proposals are for a residential development comprising up to approximately 245 residential dwellings and associated infrastructure.

1.1.5 This report sets out the results of a detailed odour assessment, comprising detailed odour dispersion modelling undertaken using emission rate data agreed with ST.

1.1.6 Wardell Armstrong have previously undertaken a qualitative odour impact assessment for the proposed development in January 2020 (REF: GM10710/006). As part of this assessment, four odour observation site visits were completed between August and September 2019. This report should be read in conjunction with the 2020 report.

1.1.7 The potential for the proposed development to give rise to other air quality impacts on the local area is considered in a separate Air Quality Assessment report also prepared by Wardell Armstrong (REF: GM10325/002, dated January 2020).

2 PLANNING POLICY CONTEXT

2.1 Odour Legislation and Planning Policy

2.1.1 The Environmental Protection Act 1990[1] is the legal framework dealing with odour from industrial, trade or business premises. If odour is present in sufficient quantity, this may constitute a statutory nuisance. The Local Authority is placed under a duty to inspect, detect any nuisance and to serve abatement notices where necessary.

2.1.2 The National Planning Policy Framework (NPPF)[2], introduced in March 2012 and revised in February 2019, sets out planning policy for England. Paragraph 180 advises that planning policies and decisions should ensure that "*development is appropriate for its location"* and that "*the effects… of pollution on health, the natural environment or general amenity and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account*".

2.1.3 In addition, Section 15 of the NPPF advises that "*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 or land instability"*.

Environment Agency H4 Odour Management Guidance

2.1.4 The Environment Agency (EA) has produced a horizontal guidance note on odour management[3], designed for operators of EA regulated processes.

2.1.5 The guidance note recognises that not all odours have the same potential to cause annoyance and odours from, for example, sewage treatment tends to be more 'offensive' than, those from the brewing or baking industries. This has led to a suggested indicative odour exposure criterion of $3ou_E/m^3$ for odours associated with wastewater treatment, compared to $6ou_E/m^3$ for brewery and bakery processes (98^{th} percentile of 1-hour mean concentration).

2.1.6 Odour can be detected at concentrations as low as $C_{98,\ 1\text{-hour}}$ $1ou_E/m^3$. As a very approximate guide:

- At $C_{98,\ 1\text{-hour}}$ 1 - $5ou_E/m^3$, the odour is recognisable;

[1] Environmental Protection Act, 1990

[2] Department for Communities and Local Government, National Planning Policy Framework, July 2018

[3] Environment Agency, Technical Guidance Note H4 – Odour Management, 2011

- $C_{98,\ 1\text{-hour}}$ $5ou_E/m^3$ is classed as a faint odour; and
- $C_{98,\ 1\text{-hour}}$ $10ou_E/m^3$ is classed as a distinct odour.

2.1.7 The values for normal background odours such as from traffic, grass cutting, and plants amount to anything from 5 to $40ou_E/m^3$.

2.1.8 Odour is subjective and therefore what one person may find offensive the next person may not. A rapidly fluctuating odour is often more noticeable than a steady background odour at a low concentration. People can detect and respond to odour exposure that lasts as little as one or two seconds. Factors that are examined when considering the existence of a statutory nuisance are:

- Type of odour;
- Wind strength and direction;
- Duration of odour;
- Time of day; and
- How often it occurs.

Institute of Air Quality Management (IAQM)

2.1.9 The Institute of Air Quality Management have published Guidance for the assessment of odour entitled 'Guidance on the assessment of odour for planning'[4]. This guidance states what information, monitoring and report information is required for an odour assessment, in support of planning applications. The IAQM Guidance is the only UK odour guidance containing methods for estimating the significance of potential odour effect.

2.1.10 The IAQM guidance endorses the use of multiple assessment tools for odour, stating that, "*best practice is to use a multi-tool approach where practicable".*

2.1.11 The IAQM guidance recognises that all year-round site visits are often unfeasible due to the planning application's timetable, deadline and costs. However, the guidance still recommends that three site visits should be undertaken as a minimum, and that these visits should be representative of at least 70% of the Pasquill stability categories experienced at the site over the course of a year.

2.1.12 The Pasquill stability categories are a method for calculating turbulence based on wind speed, solar radiation and cloud cover.

[4] Institute of Air Quality Management (July 2018), Guidance on the Assessment of Odour for Planning

2.1.13 The guidance also includes the use of the FIDOL (Frequency, Intensity, Duration, Offensiveness and Location) factors to determine the degree of odour pollution. Sniff tests are defined by a hedonic score, a quantitative value that assigns a value to the odour. The hedonic score varies from +4 (e.g. bakery smell) through neutral to highly unpleasant -4 (e.g. rotting flesh).

3 ASSESSMENT METHODOLOGY

3.1 Consultation and Scope of Assessment

3.1.1 Consultation relating to the detailed modelling elements of the odour assessment has been undertaken with Severn Trent (ST), the operator of Netheridge WwTW, in a series of communications between 18th February and 6th May 2021. A summary of this consultation is provided below:

- Wardell Armstrong were aware of an existing odour assessment report of the Netheridge WwTW undertaken by Phlorum on behalf of Gloucester Council to establish a cordon sanitaire. It is understood that the data used within this report is based on information and odour emission rates from before a number of recent upgrades took place at the WwTW. Therefore, it was considered that the odour contours predicted within that report to be overly robust.
- Wardell Armstrong were aware that upgrades to the Netheridge WwTW since the data in the Phlorum report was obtained included:
    - Upgrades to the Primary Settlement Tanks (PST's) so that these are no longer used for the thickening of sludge. This previously caused elevated odour emissions at the PST's due to ineffective treatment and rising sludge
    - Upgrades to the treatment and handling of sludge at the works, including the installation of new Gravity Belt Thickeners (GBT's) which dewater the sludge and produce a final sludge cake in smaller quantities, of higher quality and less odorous than the previous sludge cake produced. The GBT process is also connected to a new Odour Control Unit (OCU) to treat odorous emissions from this process before release to atmosphere
    - Given the above improvements at the works, the Final Settlement Tanks (FST's) are also likely to be less odorous due to the upgraded treatment methods and improved operational practices at the works
- On 18th February, an email containing the proposed assessment methodology was sent to ST, outlining that a detailed odour assessment using AERMOD software was to be undertaken to assess the potential odour impact of the WwTW at the proposed development site, utilising reduced odour emission rates for certain odorous sources due to the upgrade works mentioned above. All other emission rates would remain the same as in the Phlorum report. The

exact emission rates to be used in the assessment would be discussed and agreed with ST before the modelling work was undertaken;

- Mr Bruno Lopes, Senior Process Engineer at ST, and Mr Ben Digby, Senior Process Design Engineer at ST responded via email on the 28th April 2021 to confirm that the upgrades mentioned above have already taken place at the Netheridge WwTW around 2015/2016 (i.e. after the odour sampling data used in the Phlorum report was collected in 2009);
- Wardell Armstrong replied via email on 30th April 2021 to propose more appropriate odour emission rates for the PST's and FST's and provided a description of how the storm tanks emissions would be modelled. Further details of these emission rates are given in Section 4 of this report. It was acknowledged by Wardell Armstrong that although the GBT on site now produces a less odorous final sludge cake, as it is not possible to representatively quantify this reduction without undertaking further odour sampling at the works, the overly conservative emission rates used within the previous Phlorum report have been included within the assessment.
- Mr Lopes replied via email on 5th May 2021 to confirm ST had 'no objections' to the proposed emission rates and modelling method proposed.

3.1.2 Consultation with was also undertaken with Ms Joann Meneaud at Gloucester City Council (GCC) for the previous qualitative assessment undertaken by Wardell Armstrong. The details of this consultation are included in the previous 2020 report (REF: GM10710/006) which should be read in conjunction with this report.

4 PREDICTIVE ASSESSMENT – ODOUR DISPERSION MODELLING

4.1.1 Emissions to atmosphere from the Netheridge WwTW have been modelled using AERMOD (Lakes Environmental model version 9.9.5). This is a proprietary quantitative dispersion model that is based upon the Gaussian theory of plume dispersion. The model uses all input data, including the characteristics of the release (i.e. rate, temperature, velocity, height, location, etc.), meteorological data and the locations of the buildings adjacent to the proposed emission points (where appropriate), to predict the concentration of the substance of interest at a specified point.

4.1.2 The model uses sequential hourly meteorological data and the locations of the buildings, to predict the concentration of each substance at each point for each hour over the course of a year. This allows long-term mean and short-term peak ground level concentrations to be estimated over the modelled area, as required.

4.1.3 The odour dispersion modelling has been carried out in accordance with guidance included within the EA H4 Odour Management document.

Model Inputs

Proposed Sensitive Receptor Locations

4.1.4 The assessment focuses on proposed sensitive receptors, as it considers the potential for odour effects within the development site.

4.1.5 The results of the assessment will be used to inform the masterplan for the proposed development, and therefore a uniform Cartesian grid has been modelled, which covers the entire site. The parameters of the modelled Cartesian grid are included in Table 1.

Table 1: Uniform Cartesian Grid Parameters

Parameter	X	Y
South West Grid Coordinates	380111.83	215148.89
Number of Points	39	34
Spacing (m)	50	50
Length (m)	1900.00	1650.00
Total Number of Grid Receptors	1326	

Meteorology

4.1.6 Meteorological data has the greatest impact of the determination of the dispersion of

odour from a given source. In modelling terms, the meteorological data input into the model will determine the dispersion characteristics of odour from Netheridge WwTW and therefore it will affect the distribution of contours of predicted odour levels across the development site.

4.1.7 It is considered that there is no representative meteorological station in the vicinity of the proposed development site. The nearest meteorological station to the site, the Gloucester meteorological station, has a high percentage of missing wind data for 2020 and so was not considered suitable for use within the assessment. The next nearest stations are all over 37km away. Therefore, Numerical Weather Prediction (NWP) Meteorological data has been obtained from the ADM Ltd for use in the model, and this is considered to be the most representative of on-site conditions.

4.1.8 Whilst still not fully representative of actual meteorological conditions experienced on site, the use of this data in the assessment is considered to be more robust than using data from the nearby meteorological stations.

4.1.9 Five years of hourly sequential data (i.e. 2016 to 2020) have been obtained from ADM Ltd, with each year of data being considered separately within the model.

Surface Characteristics

4.1.10 The predominant characteristics of land use in an area provide a measure of the vertical mixing and dilution that is likely to take place in the atmosphere due to factors such as surface roughness and albedo.

4.1.11 The met data used within the assessment has been processed using AERMET software which allows for the incorporation of the surface characteristics around the proposed development site.

4.1.12 Examination of the local setting shows that the site is semi-rural, with urban land uses to the north and east, and more open, cultivated land to the south and west. The met data has been processed using AERMET software to account for these land uses.

Terrain

4.1.13 To consider the impact of terrain surrounding the site on the dispersion of pollutants, x.y.z format terrain data has been used in the model.

Emission Parameters for Odour Sources

4.1.14 Details of the sources to be included in the model have been taken from library values within the UKWIR document and the Phlorum report. All emission rates have been agreed as suitable for use within the assessment with ST. The majority of the sources considered are area sources in nature, and details have been provided of their area and heights. There are also several point source emission sources included in the model.

4.1.15 The area sources and odour emission rates considered in the model are included in Table 2, whilst the point source odour emission rates are shown in Table 3. The locations of these sources are shown in **Appendix A**.

Table 2: Sources and Odour Emission Rates – Area Sources

Odour Source Model Reference	Odour Source Description	SW Corner / Centre Grid Reference		Emission Rate (OU/m²/s)	Area (m²)	Height (m)	Base Elevation (m)
		X	Y				
Polygon Sources							
PAREA1	Rag Skips (x4)	381088	215794	50	22.1	1.5	12
PAREA2	Grit Skip	381084	215820	50	2.9	1	12
PAREA3	Storm Channel	381011	215958	4.8	74.3	2.5	12.43
PAREA4	Rag Skip (Storm x2)	381089	215900	50	13.1	1.5	12.11
PAREA5	Inlet Channel	381094	215851	6.2	89.6	2	12.07
PAREA6	Rag Skip (permitted)	380801	215841	50	92.0	0	15.85
PAREA7	Aged Cake	380716	215808	1.8	5942.2	0	17.4
PAREA8	Fresh Cake	380812	215745	62	194.1	0	14
PAREA9	Aerobic Zone 1	380901	215833	0.4	3942.8	1.5	13
PAREA10	Aerobic Zone 2	380841	215808	0.4	1997.9	1.5	13.81
PAREA11	Anoxic Zone	380872	215730	8.5	240.5	1.5	13.7
PAREA12	SAS and RAS channel	380870	215857	0.4	40.1	0	13.89
PAREA13	Anoxic Zone 2	380932	215752	8.5	241.0	1.5	12.72
Circular Sources							
CAREA1	FST 1	380839	215884	0.7	845.0	0.5	14
CAREA2	FST 2	380877	215898	0.7	845.0	0.5	14
CAREA3	FST 3	380914	215913	0.7	845.0	0.5	13.84

Table 2: Sources and Odour Emission Rates – Area Sources							
Odour Source Model Reference	Odour Source Description	SW Corner / Centre Grid Reference		Emission Rate (OU/m²/s)	Area (m²)	Height (m)	Base Elevation (m)
		X	Y				
CAREA4	FST 4	380929	215875	0.7	845.0	0.5	13.83
CAREA5	FST 5	380891	215860	0.7	845.0	0.5	13.5
CAREA6	FST 6	380854	215847	0.7	845.0	0.5	13.95
CAREA7	PST 1	380990	215861	1.9	494.8	0.5	13
CAREA8	PST 2	381020	215872	1.9	494.8	0.5	13
CAREA9	PST 3	381002	215830	1.9	494.8	0.5	12.43
CAREA10	PST 4	381031	215841	1.9	494.8	0.5	12.8
CAREA11	Storm Tank 1	381047	215961	4.8	576.8	0.5	12
CAREA12	Storm Tank 2 (20% size)	381079	215973	2.5	115.4	0.5	11.69
CAREA13	Storm Tank 3 (20% size)	381060	215928	2.5	115.4	0.5	12.15
CAREA14	Storm Tank 4 (20% size)	381092	215940	2.5	115.4	0.5	11.93
CAREA15	Pathogen Kill Tank 1	380930	215719	0.6	224.3	7	12.86
CAREA16	Pathogen Kill Tank 2	380949	215727	0.6	224.3	7	12.17
CAREA17	Pathogen Kill Tank 3	380969	215734	0.6	224.3	7	12
CAREA18	Pathogen Kill Tank 4	380937	215699	0.6	224.3	7	12.99
CAREA19	Pathogen Kill Tank 5	380957	215707	0.6	224.3	7	12.61
CAREA20	SAS Buffer Tank	380985	215814	1	89.9	5.6	12

Table 3: Sources and Odour Emission Rates – Point Sources								
Odour Source Model Reference	Odour Source Description	SW Corner / Centre Grid Reference		Emission Rate (OU/m²/s)	Diameter (m)	Exit Velocity (m/s)	Height (m)	Base Elevation (m)
		X	Y					
Polygon Sources								
STCK1	Sludge and Blend Tank OCU	381058	215829	14523	22.1	15	7	12.26
STCK2	Sludge Thickening Building Vent 1	380995	215794	52.6	2.9	1	9	12
STCK3	Sludge Thickening Building Vent 2	381001	215796	52.6	74.3	1	9	12

Table 3: Sources and Odour Emission Rates – Point Sources								
Odour Source Model Reference	Odour Source Description	SW Corner / Centre Grid Reference		Emission Rate (OU/m²/s)	Diameter (m)	Exit Velocity (m/s)	Height (m)	Base Elevation (m)
		X	Y					
STCK4	Sludge Thickening Building Vent 3	380993	215799	52.6	13.1	1	9	12
STCK5	Sludge Thickening Building Vent 4	380999	215802	52.6	89.6	1	9	12
STCK6	Inlet Well OCU	381124	215714	502	92.0	15	4	11
STCK7	Import OCU	381074	215869	128	5942.2	15	13	12.79

4.1.16 As discussed earlier in this report, the emission rates values for the PST's and FST's have been adjusted to lower emission rates than those detailed in the Phlorum report, to account for upgrades that have taken place at the WwTW. The emission rates used for both sources are 'typical' library values for each source, taken from the UKWIR document, ('high' UKWIR values were used in the Phlorum report). The 'typical' emission rates used in the assessment are considered to be more representative of current conditions at the WwTW.

4.1.17 Upgrades have also taken place in the sludge treatment area of the Netheridge WwTW, as new GBT's have been installed since 2015/2016. The GBT's have helped to minimise odour at the works through increased treatment of the sludge produced during treatment. The final sludge cake that is now produced is in smaller quantities, of higher quality, and less odorous than the previous sludge cake produced. The GBT's are also connected to Odour Control Units (OCU's) which treat any odorous air from the process before release to atmosphere, to minimise odour emission further.

4.1.18 The new OCU's for the GBT's have not been included in the assessment as it was not possible to obtain representative emission rates for these new sources. Instead, the previous 'Sludge Thickening Building Vents' as detailed in the Phlorum report, have been included in the assessment. This is considered to be overly robust as these emission rates are very high and associated with an older treatment method no longer in use at the works. The OCU's for the new GBT's will treat any odorous air from the process before release to atmosphere.

4.1.19 The Storm Tanks (CAREA11 – CAREA14) are likely to be used only during heavy storm events, usually during the winter months, when increased rainfall increases the flow of water into the WwTW, thereby diluting odour rates within this source. It is

understood that following a storm event, insufficient drainage within the tanks results in some level of odorous sludge left in the bottom of each tank. Therefore, in order to replicate this within the model, 3 of the four storm tanks have been modelled as a smaller odour source (20% of each tank size to represent the remaining sludge) at 100% of the specified emission rate for the whole year. The remaining storm tank has been modelled as full of storm water (100% tank size and constant emission rate) for 100% of the specified emission rate for 6 months of the year.

4.1.20 It is considered that modelling the storm tanks in this way represents an overly robust approach, as it not likely the storm tanks would be full constantly for 6 months as storm events do not tend to happen so frequently. This approach has been agreed with ST.

Treatment of Buildings

4.1.21 Building downwash occurs when the aerodynamic turbulence induced by nearby buildings cause a pollutant, emitted from an elevated point source, to be mixed rapidly toward the ground (downwash), resulting in higher ground-level concentrations.

4.1.22 If buildings are present within a distance of 5 times the height of the point source stack, they can be modelled in AERMOD to assess the impact of building downwash on the odour/pollutant concentrations.

4.1.23 As there are elevated point sources included within the model, several buildings within the Netheridge WwTW have been modelled. These are shown in Table 4 below.

Table 4: Buildings

Odour Source Model Reference	Source	Type	Height (m)	Length (m)/ Diameter (m)	Width	Angle
BLD_1	Office Building 1	Rectangular	9	62	24	290.1
BLD_2	Office Building 2	Rectangular	4	8	7	19.9
BLD_3	Inlet Pumping Station	Rectangular	8	18	24	20.1
BLD_4	SAS Thickening Building	Rectangular	4	12	11	19.8
BLD_5	Emergency holding tank	Circular	12	9	-	0
BLD_6	Digestor tank 1	Circular	12	9	-	0
BLD_7	Digestor tank 2	Circular	12	9	-	0
BLD_8	Digestor tank 3	Circular	12	9	-	0

BLD_9	Gas Holder	Circular	14	7	-	0
BLD_10	Sludge handling tank 1	Circular	6	6	-	0
BLD_11	Sludge handling tank 2	Circular	6	6	-	0
BLD_12	Sludge handling tank 3	Circular	4	4	-	0
BLD_13	Sludge handling tank 4	Circular	5	4	-	0

Modelling Uncertainties

4.1.24 The odour assessment has adopted a conservative approach to try to address the uncertainties involved with dispersion modelling.

4.1.25 The assessment has assumed that the emission rates for the various sources will be constant throughout the year apart from the storm tanks emissions, which have been modelled using variable emissions to reflect real world conditions.

4.1.26 All emission rates and the modelling approach have been agreed with ST. Emission rate data for some of the sources within the Phlorum report are based on odour sampling undertaken at the Netheridge WwTW.

4.1.27 In order to address uncertainties within the meteorological data, the model has included five years' worth of NWP meteorological data, in accordance with the EA H4 odour guidance. NWP data allows for the use of predicted modelled meteorological conditions at the proposed development site within the AERMOD model, as opposed to meteorological data from a less representative met station. Whilst still not fully representative of conditions at the proposed development site, this provides a much more robust set of met data in the model. Each individual year of met data has been run separately, and the highest results presented.

4.1.28 Terrain data has been included in .xyz format in order to address uncertainties relating to the dispersion of odour in the vicinity of the WwTW and proposed development.

4.1.29 As outlined in paragraph 4.1.18, the installation of GBT's at the works means the final sludge cake produced at the works has reduced in quantity and odour. As it has not been possible to undertake odour sampling of the sludge cake following the installation of the GBT's, the previous higher emission rates used within the Phlorum report have been used within this assessment. This is considered to overly robust as the sludge cake currently produced at the site will be of smaller quantities, higher

quality (i.e. more efficiently treated) and therefore less odorous than the previous sludge cake.

4.1.30 As outlined in paragraph 4.1.18, previous emission rates for the 'Sludge Thickening Building Vents' used in the Phlorum report have been used in the current assessment in lieu of representative data for the OCU's of the GBT's. It is considered this is an overly robust approach as the new OCU's will emit considerably less odour as all odorous air from the GBT process is now treated to reduce odour emissions before release to atmosphere.

4.1.31 As outlined in paragraph 4.1.19, the four storm tanks included in the assessment have been modelled using time variable emissions to reflect their intermittent use throughout the year. Even with time variable emissions applied, this is still considered to be an overly robust approach as it is unlikely the storm tanks would contain either 20% sludge for the whole year or be full of storm water constantly for six months of the year.

4.1.32 As a result of these conservative inputs, it is considered the model is more likely to provide an overestimation of the potential odour effects of the WwTW than an underestimation.

4.1.33 Given the nature of the odour source, a level of $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ has been adopted for the assessment (98^{th} percentile of 1-hour mean concentration). This criterion applies at the site boundary but has been assessed across a receptor grid which covers the proposed development site.

5 BASELINE CONDITIONS

5.1 Baseline Odour Conditions

5.1.1 The proposed development is located approximately 540m north of the Netheridge WwTW with a large amount of open agricultural land surrounding the west of the site. Hempsted Recycling Centre is located approximately 920m to the north west of the proposed development site.

5.1.2 Given the proposed development location, and the very large scale of the WwTW, the main potential sources of odour at the site are likely to arise from activities undertaken at the WwTW as well as agricultural odours from the surrounding area.

5.1.3 During two of the four previous site visits to the proposed development site (summarised in Chapter 6), agricultural odours were detected at several monitoring locations within the proposed development site.

5.1.4 The Hempsted Recycling Centre has the potential to contribute to the background odour conditions in the local area. However, no odour from the centre was detected during any of the site visits which suggests it is not likely to cause any odour impact within the proposed development site.

6 SITE VISITS

6.1.1 As part of the previous qualitative odour assessment undertaken by Wardell Armstrong (REF: GM10710/006), four site visits were undertaken on 29th and 30th August and 6th and 12th September 2019.

6.1.2 The IAQM guidance recognises that all round year site visits are often unfeasible due to the planning applications timetable, deadline and costs. Site visits were selected in order to achieve worst case wind conditions conducive for odour generation (downwind of site and lower wind speeds, i.e. <5 m/s). In accordance with the IAQM guidance, some monitoring locations upwind of the WwTW were also chosen and the four visits incorporated different Pasquill stability categories.

6.1.3 The Pasquill stability categories are a method for calculating turbulence based on wind speed, solar radiation and cloud cover.

6.1.4 During each of the site visits, sniff tests were undertaken at a total of 21 monitoring locations within the site. Details of these monitoring locations are shown on Drawing GM10710 - 020.

6.1.5 The sniff tests involved normal breathing over a 5-minute period at each monitoring location, with records made of intensity in accordance with the VDI 3940 scale as provided in Table 5.

6.1.6 Since the completion of the odour observation visits, the red line boundary of the proposed development site was slightly amended, with a small portion of the south eastern corner of the site being excluded. This has resulted in Monitoring Location 8 now being located outside of the proposed development. The results of this location are still included in the assessment.

6.1.7 The full set of site odour observation notes and odour impact effect calculations are detailed in the previous qualitative assessment report undertaken by Wardell Armstrong (REF: GM10710/006) and are included in Appendix B. A summary of the site visits is included below.

6.1.8 All site visits were undertaken in accordance with BS EN 13725. A copy of the odour acuity certificates for the consultants undertaking the site visits is provided in Appendix C.

6.2 Summary of Site Visits

6.2.1 Four site visits were undertaken on the 29th and 30th August and 6th and 12th September 2019. All site visits were undertaken at various downwind and upwind locations in relation to the WwTW with varying wind speeds and Pasquill Stability categories.

6.2.2 During site visit 1, odour was detected at 7 of the 21 observation periods (33.33%). Five of these occurrences originated from Netheridge WwTW (23.81%), with two locations detecting odour from the surrounding agricultural fields and the adjacent road (locations 1 and 8, respectively).

6.2.3 Slight adverse odour effects were calculated at monitoring locations 8 and 13, with negligible impacts calculated at all remaining locations. Monitoring Location 8 is now outside of the proposed development site.

6.2.4 During site visit 2, odour was detected at 8 of the 21 observation periods (38.10%). Five of these occurrences originated from Netheridge WwTW (23.81%), with three locations detecting odour from the surrounding agricultural fields (locations 1 - 3).

6.2.5 Slight adverse odour effects were calculated at monitoring locations 12 and 13, with negligible impacts calculated at all remaining locations.

6.2.6 During site visit 3, odour was detected at 7 of the 21 observation periods (33.33%). All odour detected originated from Netheridge WwTW. Odour effects were calculated as negligible at all 21 monitoring locations.

6.2.7 During site visit 4, odour was detected at 9 of the 21 observation periods (42.86%). All odour detected originated from Netheridge WwTW. Odour effects were calculated as negligible at all 21 monitoring locations.

6.2.8 Combining all four site visits, maximum odour intensities recorded across the monitoring locations ranged from 0 ‘no odour’ to 4 ‘strong’ with a corresponding average odour intensity ranging from 0 ’not perceptible’ to 2 ‘slight/weak’.

6.2.9 A total of 84 observation periods were conducted over the four site visits. Observation periods conducted during the site visits had variable wind directions with low wind speeds less than 5m/s and therefore, any odour present would not have been diluted or dispersed effectively, presenting a robust approach.

6.2.10 Combining all four site visits, no odour was detected at 53 of the 84 observation periods, which accounts for 63.10% of all observation periods. However, odour from sources other than Netheridge WwTW was detected at 5 of the 84 monitoring

locations. Therefore, odour originating from the WwTW was not detected at 58 of the 84 locations (69.05%).

6.2.11 Overall, odour effects were calculated as 'negligible' at 80 of the 84 observation periods (95.24%) undertaken during all four site visits. Slight adverse effects were calculated at 4 observation periods, across three monitoring locations (locations 8, 12 and 13). One of these resulted from odour originating from a source other than the Netheridge WwTW (location 8) and monitoring locations 12 and 13 are both located adjacent to the southern boundary of the site. It is understood that no residential dwellings are proposed within or in close proximity to these locations.

6.2.12 In accordance with IAQM guidance, all of the observation periods undertaken during all four site visits correspond to a **'not significant'** odour impact.

6.2.13 It is considered that the results of the odour observations during 2019 are still valid for the current assessment, as it is understood that no operational changes or upgrades have taken place at the WwTW since the visits were undertaken. It is considered very likely that similar results would be obtained were the visits to be undertaken again.

7 PREDICTED EFFECTS AND THEIR SIGNIFICANCE

7.1 Odour Dispersion Modelling Results

7.1.1 Odour concentrations, as a result of the operation of Netheridge WwTW, have been modelled across a receptor grid which covers the proposed development site and surrounding area (see Table 1). Concentrations have been predicted for each of the last five years of available NWP meteorological data (i.e. 2016 to 2020).

7.1.2 Modelling odour concentrations across a receptor grid allows odour contour plots to be produced, which show the extent of the area across which the benchmark level of $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ is exceeded. These plots, which have been created for each year of meteorological data considered in the assessment, are included in **Appendix D**.

7.1.3 As the proposed development is for residential use, the assessment should consider the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ as the benchmark criteria. Any area of site predicted to experience odour concentrations above this criterion would not usually be considered suitable for residential development.

7.1.4 The results of the assessment show that in all of the years assessed (2016 to 2020), the development site is predicted to be affected by the $C_{98,\ 1\text{-hour}}$ $1.5ou_E/m^3$ odour contours.

7.1.5 In three of the five years assessed (2017, 2018 and2020) the southern section of the proposed development site is predicted to be affected by the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours.

7.1.6 In the three years where the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours impact the development site (2017, 2018, and 2020), the contours only impact the southern areas of the development site and the majority of the site remains outside of the benchmark criteria.

7.1.7 Although there is some similarity between three of the five years of meteorological data considered, 2018 can be considered to be a worst case, as the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours are predicted to affect a greater area of the southern section of proposed development site.

7.1.8 The whole of the development site is not predicted to be affected by the $C_{98,\ 1\text{-hour}}$ 5 or $10ou_E/m^3$ contours.

7.2 Odour Observations

7.2.1 Odour observations were undertaken on four separate site visits on 29th and 30th

August and 6th and 12th September 2019, as part of the previous qualitative odour assessment undertaken by Wardell Armstrong (REF: GM10710/006).

7.2.2 Across all four visits, maximum odour intensities recorded across the monitoring locations ranged from 0 'no odour' to 4 'strong' with a corresponding average odour intensity ranging from 0 'not perceptible' to 2 'slight/weak'.

7.2.3 A total of 84 observation periods were conducted over the six site visits. No odour was detected at 53 of these (63.10%). Of the 31 observation periods that experienced odour, five of these related to odour from the surrounding agricultural fields.

7.2.4 Therefore, odour originating from the WwTW was not detected at 58 of the 84 locations (69.05%).

7.2.5 Odour effects were calculated as 'negligible' at 80 of the 84 observation periods (95.24%) undertaken during all four site visits. Slight adverse effects were calculated at 4 observation periods, across three monitoring locations (locations 8, 12 and 13). One of these resulted from odour originating from a source other than the Netheridge WwTW (location 8) and monitoring locations 12 and 13 are both located adjacent to the southern boundary of the site. It is understood that no residential dwellings are proposed within or in close proximity to these locations.

7.2.6 It is considered that the results of the odour observations during 2019 are still valid for the current assessment, as it is understood that no operational changes or upgrades have taken place at the WwTW since the visits were undertaken. It is considered very likely that similar results would be obtained were the visits to be undertaken again.

7.2.7 In accordance with IAQM guidance, based on the odour observations undertaken across the four site visits, the odour effects of Netheridge WwTW on the proposed development site as a whole, correlate to a **'not significant'** overall odour impact.

7.3 Odour Complaint History

7.3.1 As part of the previous qualitative odour assessment undertaken by Wardell Armstrong (REF: GM10710/006) it was confirmed by GCC that the council have record of 12 odour complaints relating to the WwTW in the last five years (since 2020). Eleven of these are located to the south of the WwTW, with the remaining one complaint, logged in 2016, located to the north east of the proposed development site. The proposed development site is located towards the north east of the WwTW, and so this shows there is potential for greater odour impact to the south of the WwTW.

7.4 Discussion of Results and Recommendations for Mitigation

7.4.1 IAQM guidance states that considerable weight should be given to those assessment tools based on real world observations, such as odour observation site visits and odour complaint histories.

7.4.2 Steps have been taken during the modelling process to improve the perceived reliability of the model, as outlined in Section 5 of this report. These steps are also summarised below:

- All emission rates have been agreed with ST in advance of the modelling assessment. St have agreed the reduced emission rates for the PST's and FST's used in the assessment are more representative of current conditions at the WwTW.
- Four odour observation site visits were undertaken within the proposed development site, (above the minimum of three visits recommended in the IAQM guidance).
- There is no representative meteorological station in close proximity to the proposed development site. Therefore, to obtain more representative meteorological data for use within the assessment, Numerical Weather Prediction models were obtained from the Met Office.
- The NWP data used within the assessment has been processed using AERMET software. The predominant characteristics of land use in an area provide a measure of the vertical mixing and dilution that is likely to take place in the atmosphere due to factors such as surface roughness and albedo. Examination of the local setting shows that the site is semi-rural, with urban land uses to the north and east, and more open, cultivated land to the south and west. The met data has been processed using AERMET software to account for these land uses.
- In order to improve accuracy, detailed terrain data has been included in the model.

7.4.3 The above steps led to an increase in the perceived reliability of the model and the results can be considered to be much more representative than if these steps had not been taken.

7.4.4 When reaching an overall conclusion on the significance of likely odour effects, the

IAQM guidance states that the findings of the different odour assessment tools should be drawn together. This includes community-based tools, such as odour complaint histories, and empirical tools, such as sniff tests. The guidance states that both of these should normally be given *"considerable weight"* when drawing conclusions in an assessment.

7.4.5 The results of the modelling assessment show that in all years considered as part of the assessment (2016 -2020), the development site is predicted to be affected by the $C_{98,\ 1\text{-hour}}$ $1.5ou_E/m^3$ odour contours.

7.4.6 In three of the five years assessed (2017, 2018 and 2020) the southern section of the proposed development site is predicted to be affected by the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours.

7.4.7 Although there is some similarity between three of the five years of meteorological data considered, 2018 can be considered to be a worst case, as the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours are predicted to affect a greater area of the southern section of the proposed development site.

7.4.8 Out of a total of 84 odour observations undertaken within the proposed development during these visits, only 26 of these detected odours from Netheridge WwTW (30.95%).

7.4.9 All monitoring locations within the proposed residential areas of the development site correlate to a negligible odour impact across all four site visits, in accordance with the IAQM guidance.

7.4.10 The results of the odour observation visits correlate well with the results of the modelling exercise. The odour observation results calculate increased odour impacts at monitoring locations in close proximity to the southern border of the site, which correlate well with the areas of site the model predicts will be impacted by the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour contours.

7.4.11 It should be noted that no residential uses are proposed in the southern section of the proposed development site, as shown in the development framework plan, included in **Appendix E.**

7.4.12 The proposed residential areas in the northern half of the development site are not predicted to be impacted by the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour benchmark criteria in any of the five years assessed, as shown in Drawing GM10710-026.

7.4.13 Combining the results of the assessment together, the effect of odour from Netheridge WwTW on the proposed development site is considered to be negligible, which correlates to an overall **'not significant'** effect, in accordance with IAQM guidance.

8 CONCLUSIONS

8.1 Odour Dispersion Modelling

8.1.1 Odour dispersion modelling has been undertaken using AERMOD to consider the potential for odour effects from Netheridge WwTW at the proposed development site.

8.1.2 Steps were taken to increase the perceived reliability of the model in an attempt to ensure the results of the model are as representative of actual current conditions as possible, as discussed in Section 5 and 7.4 of this report.

8.1.3 Odour concentrations have been predicted across a receptor grid, which incorporates the entire proposed development site and surrounding area. This has allowed odour contour plots to be created for each of the five years of meteorological data considered. The predicted odour concentrations have been compared against a benchmark level of $C_{98,\ 1\text{-hour}}\ 3ou_E/m^3$.

8.1.4 The results of the modelling assessment show that in three of the five years assessed (2017, 2018 and2020), the $C_{98,\ 1\text{-hour}}\ 3ou_E/m^3$ odour benchmark criteria contours are predicted to impact small sections of the southern half of the development site

8.1.5 It should be noted that no residential uses are proposed in the southern section of the proposed development site, as shown in the development framework plan, included in **Appendix E.**

8.1.6 The proposed residential areas in the northern half of the development site are not predicted to be impacted by the $C_{98,\ 1\text{-hour}}\ 3ou_E/m^3$ odour benchmark criteria in any of the five years assessed, as shown in Drawing GM10710 – 026.

8.2 Odour Observations

8.2.1 In accordance with IAQM guidance, based on the results of the odour observation site visits, the effects of Netheridge WwTW on the proposed development site as a whole, correlate to a **'not significant'** overall odour impact.

Odour Complaint History

8.2.2 GCC have confirmed that the council have record of 12 odour complaints relating to the WwTW in the last five years. Eleven of these are located to the south of the WwTW, with the remaining one complaint, logged in 2016, located to the north east of the proposed development site. The proposed development site is located towards

the north east of the WwTW, and so this shows there is potential for greater odour impact to the south of the WwTW.

8.3 Summary

8.3.1 The framework plan for the proposed development, included in **Appendix E**, incorporates a setback distance from Netheridge WwTW, with no residential development proposed in the southern areas of the proposed development site. This correlates well with the results of both the odour observation site visits, which predict a negligible odour impact in the northern half of the development site where residential uses are proposed, and the results of the odour modelling assessment, which predict the proposed residential areas will not be impacted by the $C_{98,\ 1\text{-hour}}$ $3ou_E/m^3$ odour benchmark criteria in any of the five years assessed.

8.3.2 Taking the results of the modelling assessment, together with the odour observation results and odour complaint history, it is considered that the effects of odour from Netheridge WwTW on the proposed development site is negligible, which correlates to an overall **'not significant'** effect.

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APPENDICES

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Appendix A
Odour Sources at Netheridge WwTW

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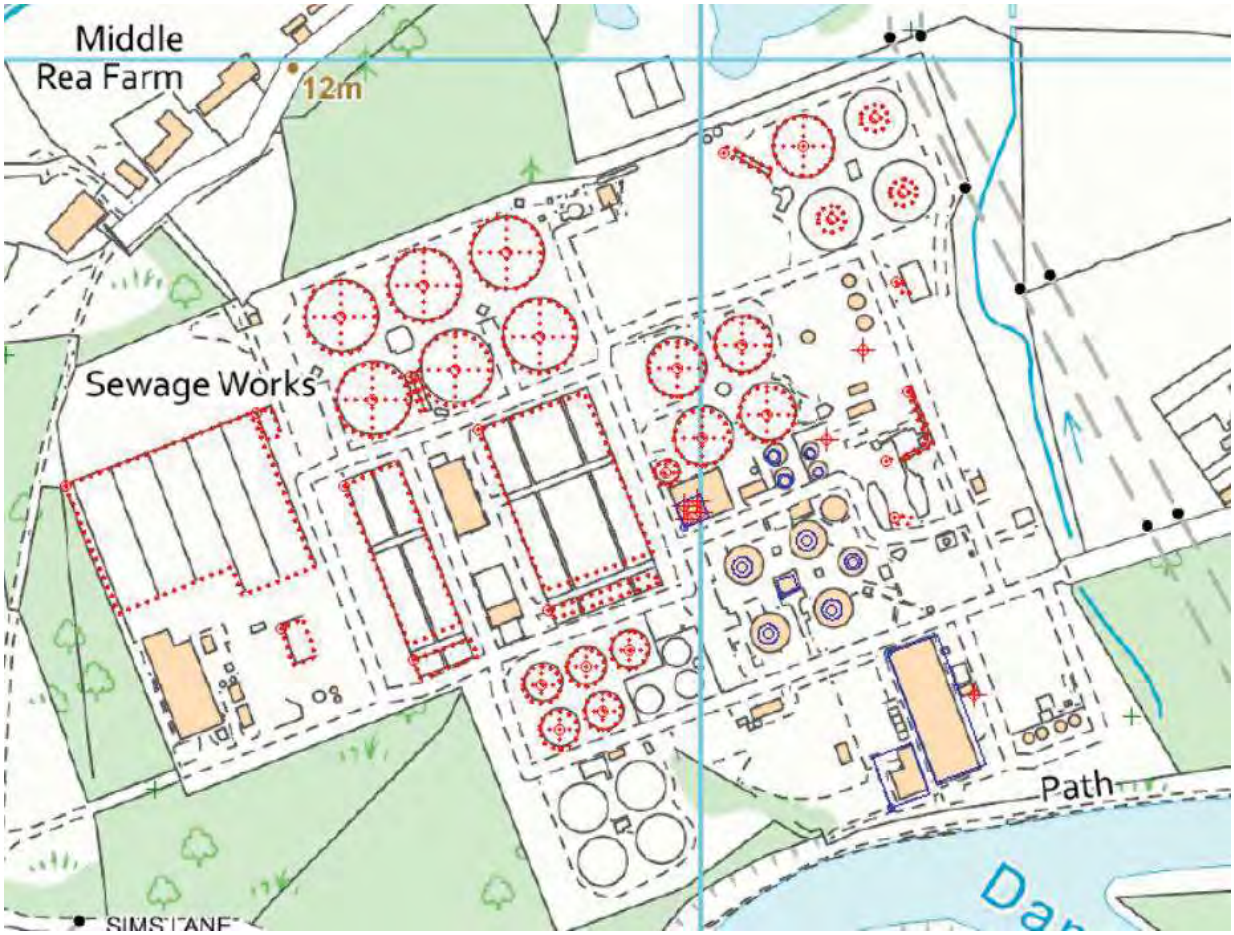
Middle
Rea Farm
12m
Sewage Works
Path

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Appendix B
Site Visit Observations

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Job Number:	GM10710	**Site:**	Hempsted Lane, Gloucester	**Date:**	29/8/19
Start time:	13:45	**Finish Time:**	16:05	**Surveyor:**	Paul Threlfall
General Weather Conditions:	**Temperature:** 21-22°C **Cloud Cover:** 8/8 falling to 4/8		**Wind Direction: SW/SSW** **Wind Strength: Moderate**		

Comments (e.g. site operations, weather changes, general info etc): clouds broke during observations and became sunnier and warmer. Wind speeds dropped slightly. Site slopes downwards towards STW and so those locations further away are higher up and tended to experience higher wind speeds.

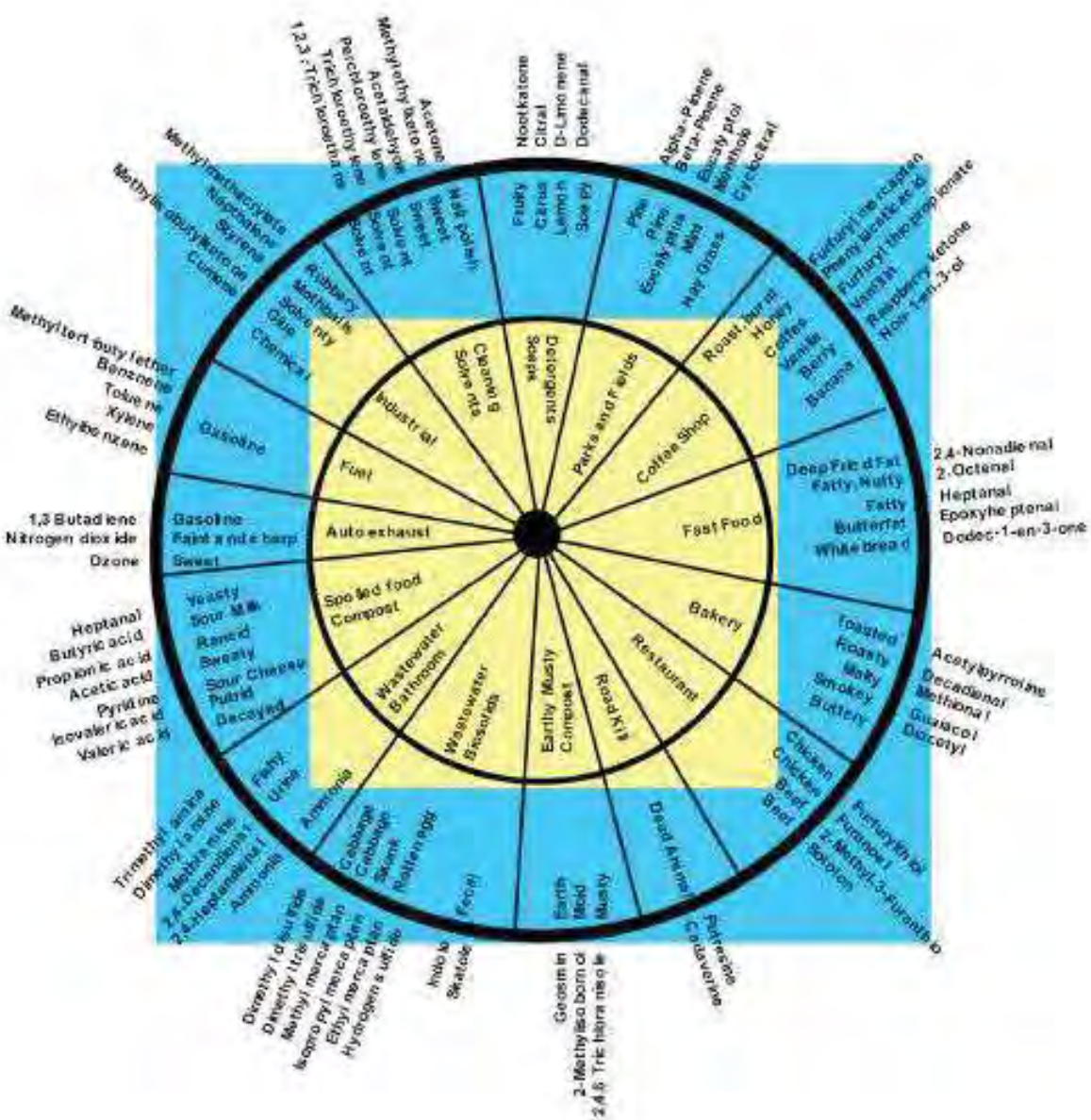
Local Ref. & Description	If first visit – it is useful to stop at site boundary/site entrance to determine the potential odour present. The assessment begins at an upwind location, moving closer to the source and into the downwind location. Record location numbers, mark on map and description of location.
Weather conditions	General description – dry, wet, humid, fog etc.
Temperature	Degrees C (estimate from Met Office or similar) otherwise, very warm, warm, cold, mild etc. Be wary of anemometer readings as they often record the surface temperature on the monitor which, if left in warm car or bag, can give misreading's.
Cloud Cover	Use a scale of 8 where 0 is clear sky and 8 is complete cloud cover. Can convert this number to a percentage.
Wind Strength	Use anemometer as priority, otherwise: Beaufort Scale: 0. Calm (smoke rises vertically) 1. Light Air (direction of wind shown by a smoke drift) 2. Light Breeze (Wind felt on face, leaves rustle) 3. Gentle Breeze (leaves and small twigs in constant movement 4. Moderate Breeze (approx. 5m/s, raises dust and loose paper, small branches move) 5. Fresh Breeze (small tree in leaf begin to sway, small branches move) 6. Strong Breeze (large branches in motion, umbrella used with difficulty) 7. Near Gale (whole trees in motion, inconvenience felt when walking against wind)
Wind Direction	N, NE, NEE etc.
Duration of Test	5 mins minimum. Record any odour detected walking between locations. Note this is standard so does not need to be written in notes.
Intensity	IAQM Guidance 0 to 6. 0. No odour 1. Slight/Very Weak – Potentially odour, may be doubt to whether odour is present 2. Slight/Weak – Odour is present but source/words to describe it are unknown 3. Distinct – Odour character/nature is barely recognisable 4. Strong – Odour character/nature easily recognisable 5. Very Strong – Odour is offensive. Exposure to this level is undesirable 6. Extremely Strong – Odour is offensive. Difficulty staying in locality and instinctive reaction to mitigate against further exposure.
Offensiveness	Use Hedonic Tone score: 1. -4 =extremely unpleasant, 0 = neither unpleasant or pleasant, +4 = extremely pleasant
Nature of Smell	What does it smell like. Use odour wheel where appropriate.
Potential Source	Odour is distinct enough to state a likely source e.g. landfill, sewage treatment works. To be stated when certain of the source (note Intensity 3 is distinct)
Odour Duration	Time 'sniffed' odour for e.g. 30 second 'wave' at intensity 4, 30 Sec @I.4

General Information

Hedonic Score Rating

Very Pleasant	+4
Pleasant	+3
Moderately Pleasant	+2
Mildly Pleasant	+1
Neutral Odour / No Odour	0
Mildly Unpleasant	-1
Moderately Unpleasant	-2
Unpleasant	-3
Very Unpleasant	-4

Odour Wheel



Location Number/ Description	**1**	**2**	**3**	**4**	**5**
Time of 'Sniff Test'	1345	1350	1355	1400	1405
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	4.1, SW	2.9, SW	3.1, SW	3.5, SW	3.3, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	1	1	No Odour	No Odour	No Odour
Offensiveness (-4 to +4)	-1	-1	-	-	-
Nature of odour	Agricultural/Animal	Faecal	-	-	-
Potential Source	Surrounding fields	Gloucester STW	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 200 seconds	1 – 30 seconds	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	Just slightly stronger than a background odour. Very faint. Not an STW odour.	-	-	-	-

Location Number/ Description	**6**	**7**	**8**	**9**	**10**
Time of 'Sniff Test'	1410	1420	1430	1440	1445
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.3, SSW	2.7, SW	1.7, SW	3.9, SW	4.1, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	2/3	2/3	No Odour	No Odour
Offensiveness (-4 to +4)	-	-3	-2	-	-
Nature of odour	-	Aeration (sweet)/Sewage (faecal)	Dusty/Petrol/Car exhausts	-	-
Potential Source	-	Gloucester STW	Adjacent Road (A430)	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	-	2 – 90 seconds 3 – 60 seconds	2 – 100 seconds 3 – 100 seconds	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	Odour faded around halfway between location 7 and 4	Generally sheltered location due to existing hedgerows	-	-

Location Number/ Description	**11**	**12**	**13**	**14**	**15**
Time of 'Sniff Test'	1450	1455	1500	1510	1515
Weather conditions	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny
Wind Speed (m/s)/Direction	3.7, SW	28., SW	2.5, SW	4.1, SW	3.2, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Upwind
Intensity (0 – 6)	1/2	1/2/3	1/2/3	No Odour	No Odour
Offensiveness (-4 to +4)	-2	-2	-2	-	-
Nature of odour	Faecal	Aeration (sweet)/Sewage	Aeration (sweet)/Sewage	-	-
Potential Source	Gloucester STW	Gloucester STW	Gloucester STW	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 60 seconds 2 – 100 seconds	1 – 10 seconds 2 – 60 seconds 3 – 60 seconds	1 – 60 seconds 2 – 90 seconds 3 – 80 seconds	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)		Calm conditions during test.		-	-

Location Number/ Description	**16**	**17**	**18**	**19**	**20**
Time of 'Sniff Test'	1525	1530	1540	1550	1555
Weather conditions	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny	Dry/Partly sunny
Wind Speed (m/s)/Direction	2.6, SW	3.6, SW	2.2, SW	3.2, SW	2.5, SW
Upwind/Downwind Location	Upwind	Downwind	Upwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	No Odour	No Odour	No Odour	No Odour
Offensiveness (-4 to +4)	-	-	-	-	-
Nature of odour	-	-	-	-	-
Potential Source	-	-	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	Some calm conditions	Some calm conditions	Some calm conditions

Location Number/ Description	**21**				
Time of 'Sniff Test'	1600				
Weather conditions	Dry/Partly sunny				
Wind Speed (m/s)/Direction	1.7, SW				
Upwind/Downwind Location	Upwind				
Intensity (0 – 6)	No Odour				
Offensiveness (-4 to +4)	-				
Nature of odour	-				
Potential Source	-				
Odour Duration (seconds) (5 mins = 300 seconds)	-				
Other comments/Rationale (record as much info as you can to aid write up in office)	Some calm conditions				

Job Number:	GM10710	**Site:**	Hempsted Lane, Gloucester	**Date:**	30/8/19
Start time:	08:15	**Finish Time:**	10:35	**Surveyor:**	Paul Threlfall
General Weather Conditions:	**Temperature: 18**°C **Cloud Cover:** 7/8		**Wind Direction: SW** **Wind Strength: Moderate**		

Comments (e.g. site operations, weather changes, general info etc): general pockets of agricultural background odour across majority of 1st field.

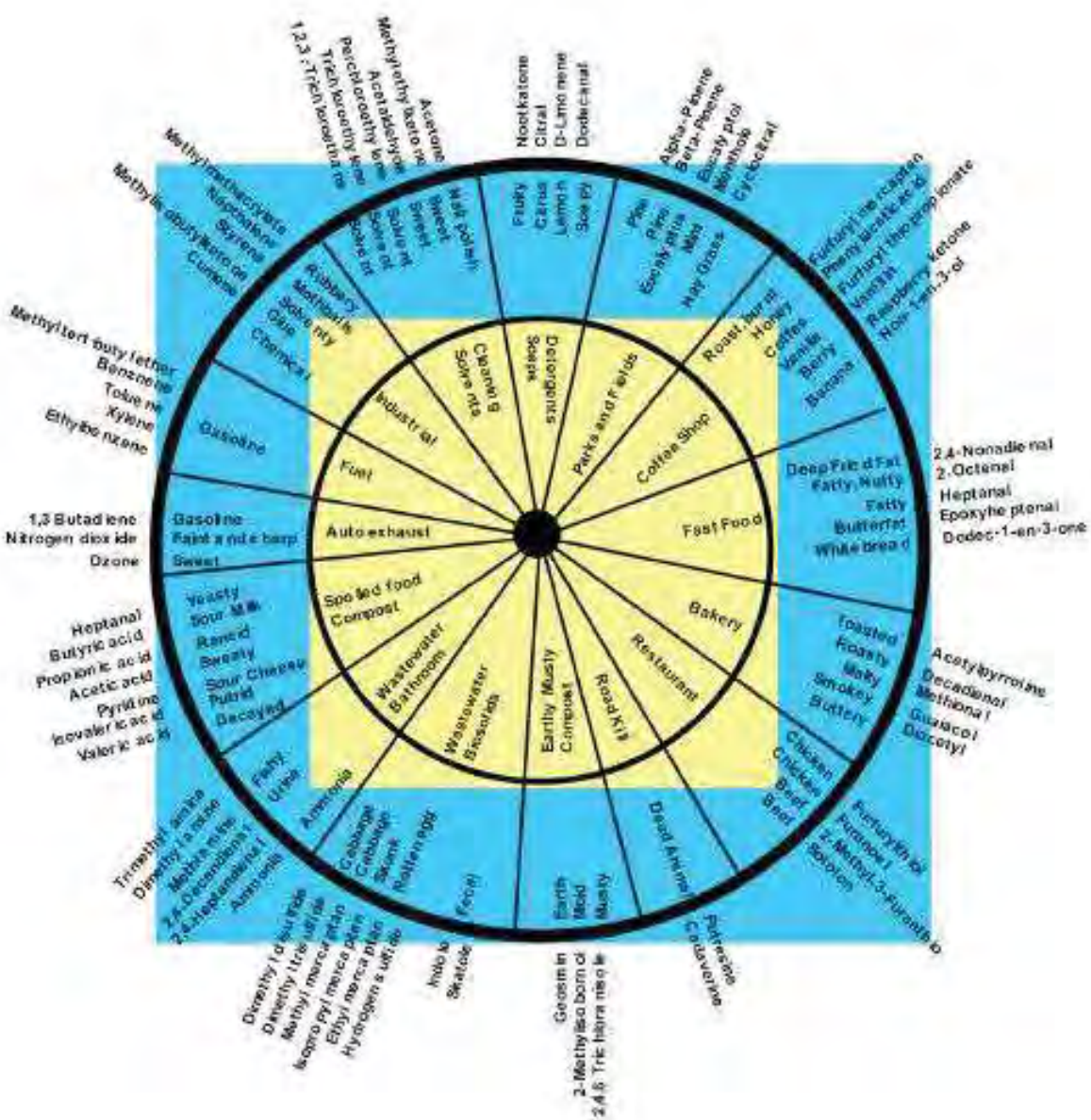
Local Ref. & Description	If first visit – it is useful to stop at site boundary/site entrance to determine the potential odour present. The assessment begins at an upwind location, moving closer to the source and into the downwind location. Record location numbers, mark on map and description of location.
Weather conditions	General description – dry, wet, humid, fog etc.
Temperature	Degrees C (estimate from Met Office or similar) otherwise, very warm, warm, cold, mild etc. Be wary of anemometer readings as they often record the surface temperature on the monitor which, if left in warm car or bag, can give misreading's.
Cloud Cover	Use a scale of 8 where 0 is clear sky and 8 is complete cloud cover. Can convert this number to a percentage.
Wind Strength	Use anemometer as priority, otherwise: Beaufort Scale: 8. Calm (smoke rises vertically) 9. Light Air (direction of wind shown by a smoke drift) 10. Light Breeze (Wind felt on face, leaves rustle) 11. Gentle Breeze (leaves and small twigs in constant movement 12. Moderate Breeze (approx. 5m/s, raises dust and loose paper, small branches move) 13. Fresh Breeze (small tree in leaf begin to sway, small branches move) 14. Strong Breeze (large branches in motion, umbrella used with difficulty) 15. Near Gale (whole trees in motion, inconvenience felt when walking against wind)
Wind Direction	N, NE, NEE etc.
Duration of Test	5 mins minimum. Record any odour detected walking between locations. Note this is standard so does not need to be written in notes.
Intensity	IAQM Guidance 0 to 6. 7. No odour 8. Slight/Very Weak – Potentially odour, may be doubt to whether odour is present 9. Slight/Weak – Odour is present but source/words to describe it are unknown 10. Distinct – Odour character/nature is barely recognisable 11. Strong – Odour character/nature easily recognisable 12. Very Strong – Odour is offensive. Exposure to this level is undesirable 13. Extremely Strong – Odour is offensive. Difficulty staying in locality and instinctive reaction to mitigate against further exposure.
Offensiveness	Use Hedonic Tone score: 2. -4 =extremely unpleasant, 0 = neither unpleasant or pleasant, +4 = extremely pleasant
Nature of Smell	What does it smell like. Use odour wheel where appropriate.
Potential Source	Odour is distinct enough to state a likely source e.g. landfill, sewage treatment works. To be stated when certain of the source (note Intensity 3 is distinct)
Odour Duration	Time 'sniffed' odour for e.g. 30 second 'wave' at intensity 4, 30 Sec @I.4

General Information

Hedonic Score Rating

Very Pleasant	+4
Pleasant	+3
Moderately Pleasant	+2
Mildly Pleasant	+1
Neutral Odour / No Odour	0
Mildly Unpleasant	-1
Moderately Unpleasant	-2
Unpleasant	-3
Very Unpleasant	-4

Odour Wheel



Location Number/ Description	**1**	**2**	**3**	**4**	**5**
Time of 'Sniff Test'	0815	0820	0825	0830	0840
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	1.7, SW	2.4, SW	2.0, SW	3.5, SW	3.1, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	1/2	1/2	1	No Odour	No Odour
Offensiveness (-4 to +4)	-1	-1	-1	-	-
Nature of odour	Agricultural/Animal	Agricultural/Animal	Agricultural/Animal	-	-
Potential Source	Surrounding fields	Surrounding fields	Surrounding fields	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 40 seconds 2 – 90 seconds	1 – 150 seconds 2 – 30 seconds	1 – 30 seconds	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	1 intensity only slightly stronger than background odour. Not an STW odour.	1 intensity only slightly stronger than background odour.	1 intensity only slightly stronger than background odour.	-	-

Location Number/ Description	**6**	**7**	**8**	**9**	**10**
Time of 'Sniff Test'	0845	0900	0850	0910	0915
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.7, SW	3.2, SW	<1m/s, SW	4.2, SW	4.1, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	1/3	No Odour	No Odour	No Odour
Offensiveness (-4 to +4)	-	-3	-	-	-
Nature of odour	-	Sludge/Sewage	-	-	-
Potential Source	-	Gloucester STW	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	-	1 – 90 seconds 3 – 30 seconds	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	Came in short bursts. No odour during calmer conditions.	Often calm conditions	-	-

Location Number/ Description	**11**	**12**	**13**	**14**	**15**
Time of 'Sniff Test'	0920	0925	0930	0950	0955
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.9, SW	1.5, SW	2.2, SW	3.9, SW	4.0, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Upwind
Intensity (0 – 6)	1/2/3	2/3/4	1/2/3	No Odour	No Odour
Offensiveness (-4 to +4)	-2	-3	-2	-	-
Nature of odour	Aeration (sweet)/Sludge	Sludge/Aeration (sweet)	Aeration (sweet)/Sewage	-	-
Potential Source	Gloucester STW	Gloucester STW	Gloucester STW	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 90 seconds 2 – 60 seconds 3 – 30 seconds	2 – 70 seconds 3 – 90 seconds 4 – 10 seconds	1 – 90 seconds 2 – 90 seconds 3 – 60 seconds	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	2 intensity more constant, 3 intensity came in waves. Could detect odour leading up to 12 from 11.	1 intensity tended to be more constant, 2 and 3 came in waves.	-	-

Location Number/ Description	**16**	**17**	**18**	**19**	**20**
Time of 'Sniff Test'	1000	1005	1010	1015	1025
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	3.2, SW	3.5, SW	2.8, SW	3.1, SW	1.3, SW
Upwind/Downwind Location	Upwind	Downwind	Upwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	No Odour	No Odour	No Odour	1
Offensiveness (-4 to +4)	-	-	-	-	-2
Nature of odour	-	-	-	-	Aeration (sweet)/Sludge
Potential Source	-	-	-	-	Gloucester STW
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	-	1 – 60 seconds
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**21**				
Time of 'Sniff Test'	1030				
Weather conditions	Dry/Cloudy				
Wind Speed (m/s)/Direction	1.7, SW				
Upwind/Downwind Location	Upwind				
Intensity (0 – 6)	No Odour				
Offensiveness (-4 to +4)	-				
Nature of odour	-				
Potential Source	-				
Odour Duration (seconds) (5 mins = 300 seconds)	-				
Other comments/Rationale (record as much info as you can to aid write up in office)	-				

Job Number:	GM10710	**Site:**	Hempsted Lane, Gloucester	**Date:**	06/09/19
Start time:	08:00	**Finish Time:**	10:15	**Surveyor:**	Rosie Pitt
General Weather Conditions:	**Temperature: 15**°C **Cloud Cover:** 8/8		**Wind Direction: SW** **Wind Strength: Moderate**		
Comments (e.g. site operations, weather changes, general info etc): general pockets of agricultural background odour across majority of 1st field.					

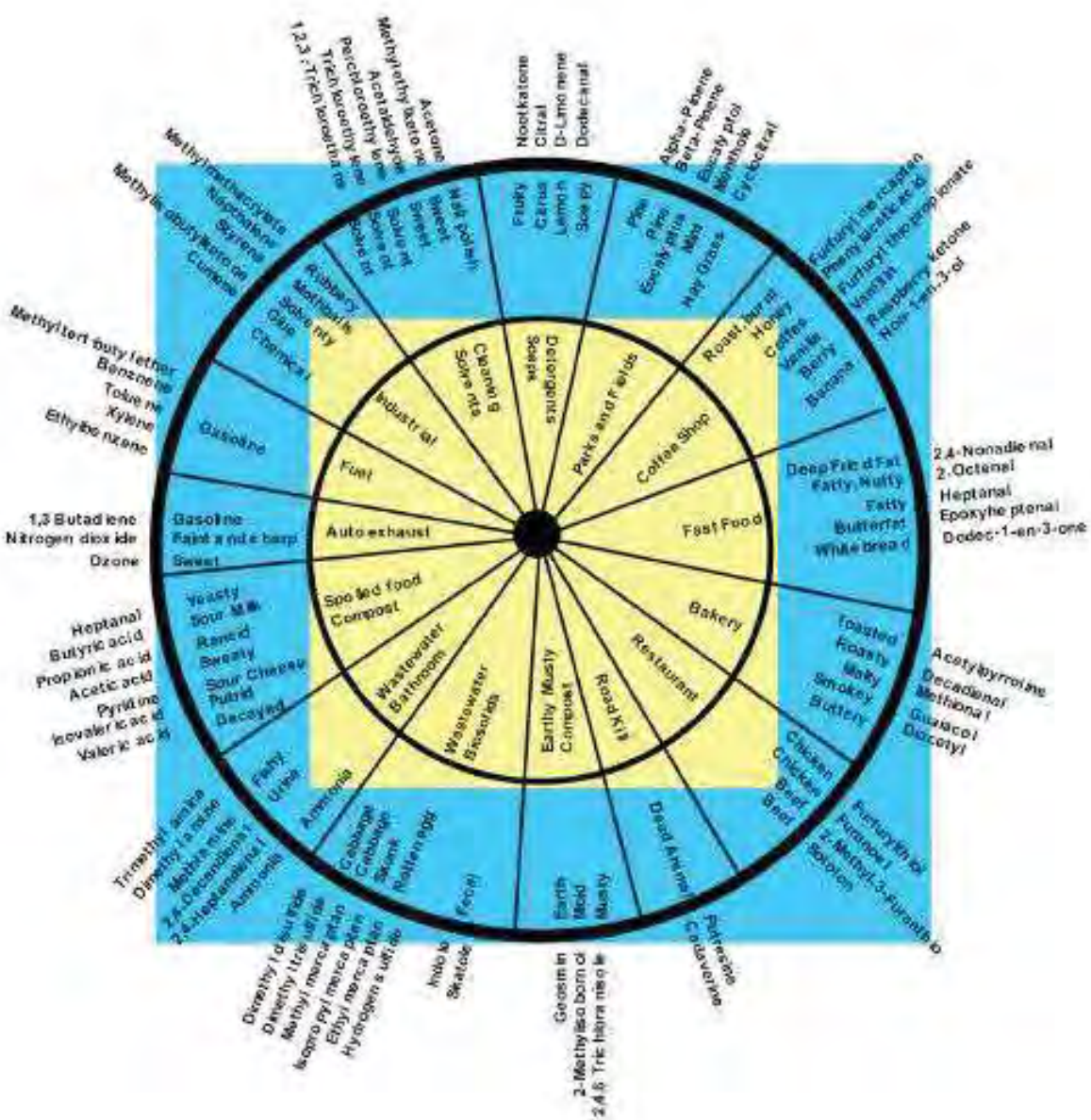
Local Ref. & Description	If first visit – it is useful to stop at site boundary/site entrance to determine the potential odour present. The assessment begins at an upwind location, moving closer to the source and into the downwind location. Record location numbers, mark on map and description of location.
Weather conditions	General description – dry, wet, humid, fog etc.
Temperature	Degrees C (estimate from Met Office or similar) otherwise, very warm, warm, cold, mild etc. Be wary of anemometer readings as they often record the surface temperature on the monitor which, if left in warm car or bag, can give misreading's.
Cloud Cover	Use a scale of 8 where 0 is clear sky and 8 is complete cloud cover. Can convert this number to a percentage.
Wind Strength	Use anemometer as priority, otherwise: Beaufort Scale: 16. Calm (smoke rises vertically) 17. Light Air (direction of wind shown by a smoke drift) 18. Light Breeze (Wind felt on face, leaves rustle) 19. Gentle Breeze (leaves and small twigs in constant movement 20. Moderate Breeze (approx. 5m/s, raises dust and loose paper, small branches move) 21. Fresh Breeze (small tree in leaf begin to sway, small branches move) 22. Strong Breeze (large branches in motion, umbrella used with difficulty) 23. Near Gale (whole trees in motion, inconvenience felt when walking against wind)
Wind Direction	N, NE, NEE etc.
Duration of Test	5 mins minimum. Record any odour detected walking between locations. Note this is standard so does not need to be written in notes.
Intensity	IAQM Guidance 0 to 6. 14. No odour 15. Slight/Very Weak – Potentially odour, may be doubt to whether odour is present 16. Slight/Weak – Odour is present but source/words to describe it are unknown 17. Distinct – Odour character/nature is barely recognisable 18. Strong – Odour character/nature easily recognisable 19. Very Strong – Odour is offensive. Exposure to this level is undesirable 20. Extremely Strong – Odour is offensive. Difficulty staying in locality and instinctive reaction to mitigate against further exposure.
Offensiveness	Use Hedonic Tone score: 3. -4 =extremely unpleasant, 0 = neither unpleasant or pleasant, +4 = extremely pleasant
Nature of Smell	What does it smell like. Use odour wheel where appropriate.
Potential Source	Odour is distinct enough to state a likely source e.g. landfill, sewage treatment works. To be stated when certain of the source (note Intensity 3 is distinct)
Odour Duration	Time 'sniffed' odour for e.g. 30 second 'wave' at intensity 4, 30 Sec @I.4

General Information

Hedonic Score Rating

Very Pleasant	+4
Pleasant	+3
Moderately Pleasant	+2
Mildly Pleasant	+1
Neutral Odour / No Odour	0
Mildly Unpleasant	-1
Moderately Unpleasant	-2
Unpleasant	-3
Very Unpleasant	-4

Odour Wheel



Location Number/ Description	**1**	**2**	**3**	**4**	**5**
Time of 'Sniff Test'	0800	0806	0811	0816	0822
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.0, SW	3.8, SW	4.1, SW	3.5, SW	4.0, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No odour	1/2	1/2	1	1/2
Offensiveness (-4 to +4)	-	-1	-1	-1	-1
Nature of odour	-	Sewage	Sewage	Sewage	Sewage
Potential Source	-	Gloucester STW	Gloucester STW	Gloucester STW	Gloucester STW
Odour Duration (seconds) (5 mins = 300 seconds)	-	1 – 120 seconds 2 – 30 seconds	1 – 30 seconds 2 – 60 seconds	1 – 30 seconds	1 – 30 seconds 2 – 30 seconds
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**6**	**7**	**8**	**9**	**10**
Time of 'Sniff Test'	0827	0832	0837	0845	0850
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.1, SW	3.2, SW	3.5, SW	4.2, SW	4.1, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	No odour	No Odour	No Odour	1
Offensiveness (-4 to +4)	-	-	-	-	-1
Nature of odour	-	-	-	-	Sewage
Potential Source	-	-	-	-	Gloucester STW
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	-	1 – 45 seconds
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**11**	**12**	**13**	**14**	**15**
Time of 'Sniff Test'	0855	0900	0905	0915	0920
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	3.0, SW	2.5, SW	3.1, SW	3.7, SW	4.1, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Upwind
Intensity (0 – 6)	1/2/3	1/2/3	No odour	No Odour	No Odour
Offensiveness (-4 to +4)	-2	-3	-	-	-
Nature of odour	Sewage	Sludge/Aeration (sweet)	-	-	-
Potential Source	Gloucester STW	Gloucester STW	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 80 seconds 2 – 40 seconds 3 – 15 seconds	1 – 45 seconds 2 – 80 seconds 3 – 60 seconds	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	Could detect odour leading up to 12 from 11.	-	-	-

Location Number/ Description	**16**	**17**	**18**	**19**	**20**
Time of 'Sniff Test'	0925	0930	0935	0940	0945
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	3.6, SW	3.4, SW	3.2, SW	3.3, SW	2.9, SW
Upwind/Downwind Location	Upwind	Downwind	Upwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	No Odour	No Odour	No Odour	No odour
Offensiveness (-4 to +4)	-	-	-	-	-
Nature of odour	-	-	-	-	-
Potential Source	-	-	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**21**				
Time of 'Sniff Test'	0950				
Weather conditions	Dry/Cloudy				
Wind Speed (m/s)/Direction	3.1, SW				
Upwind/Downwind Location	Upwind				
Intensity (0 – 6)	No Odour				
Offensiveness (-4 to +4)	-				
Nature of odour	-				
Potential Source	-				
Odour Duration (seconds) (5 mins = 300 seconds)	-				
Other comments/Rationale (record as much info as you can to aid write up in office)	-				

Job Number:	GM10710	**Site:**	Hempsted Lane, Gloucester	**Date:**	12/09/19
Start time:	1900	**Finish Time:**	2130	**Surveyor:**	Rosie Pitt
General Weather Conditions:	**Temperature: 11**°C **Cloud Cover:** 8/8		**Wind Direction: SW** **Wind Strength: Moderate**		

Comments (e.g. site operations, weather changes, general info etc):

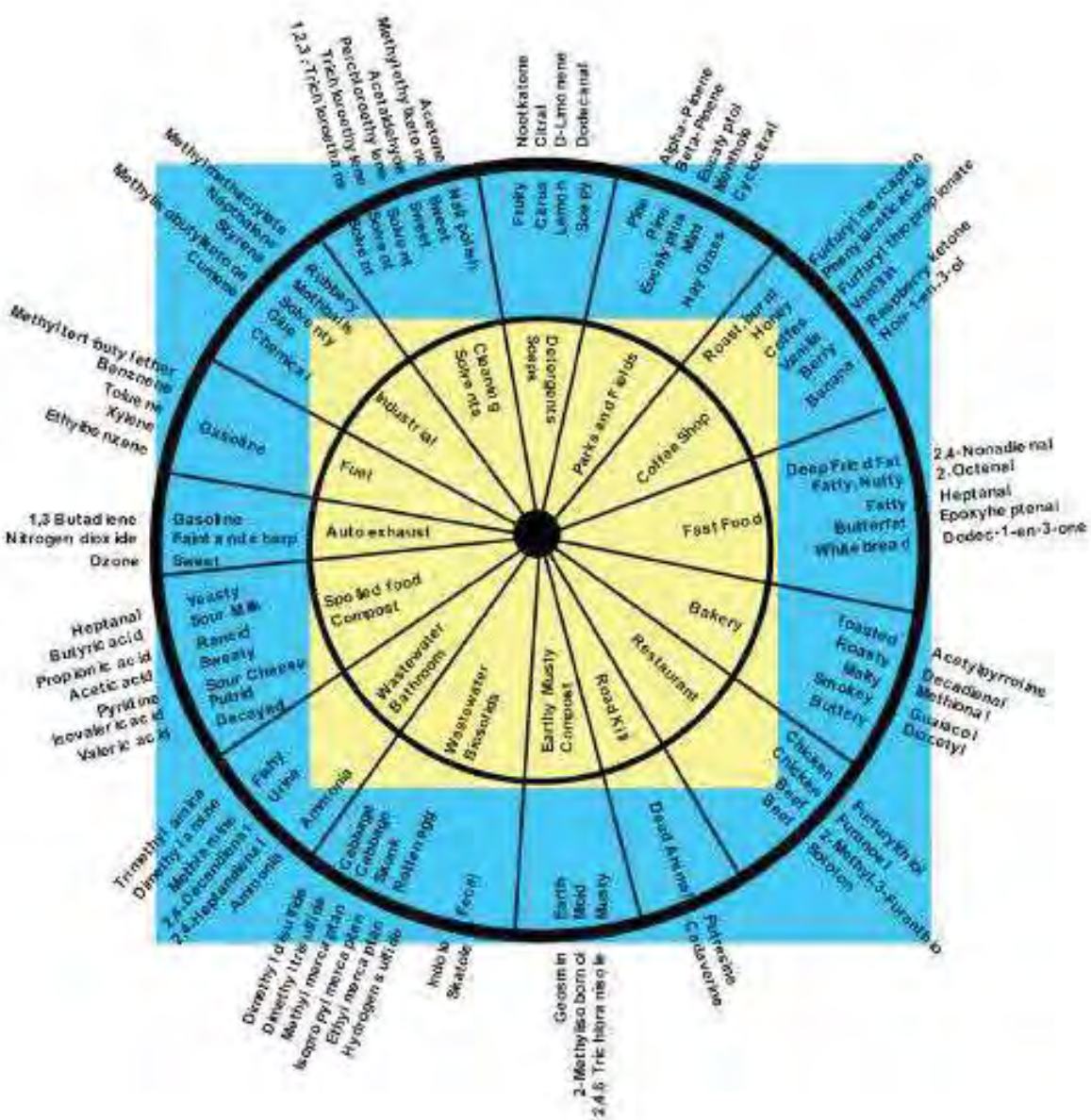
Local Ref. & Description	If first visit – it is useful to stop at site boundary/site entrance to determine the potential odour present. The assessment begins at an upwind location, moving closer to the source and into the downwind location. Record location numbers, mark on map and description of location.
Weather conditions	General description – dry, wet, humid, fog etc.
Temperature	Degrees C (estimate from Met Office or similar) otherwise, very warm, warm, cold, mild etc. Be wary of anemometer readings as they often record the surface temperature on the monitor which, if left in warm car or bag, can give misreading's.
Cloud Cover	Use a scale of 8 where 0 is clear sky and 8 is complete cloud cover. Can convert this number to a percentage.
Wind Strength	Use anemometer as priority, otherwise: Beaufort Scale: 24. Calm (smoke rises vertically) 25. Light Air (direction of wind shown by a smoke drift) 26. Light Breeze (Wind felt on face, leaves rustle) 27. Gentle Breeze (leaves and small twigs in constant movement 28. Moderate Breeze (approx. 5m/s, raises dust and loose paper, small branches move) 29. Fresh Breeze (small tree in leaf begin to sway, small branches move) 30. Strong Breeze (large branches in motion, umbrella used with difficulty) 31. Near Gale (whole trees in motion, inconvenience felt when walking against wind)
Wind Direction	N, NE, NEE etc.
Duration of Test	5 mins minimum. Record any odour detected walking between locations. Note this is standard so does not need to be written in notes.
Intensity	IAQM Guidance 0 to 6. 21. No odour 22. Slight/Very Weak – Potentially odour, may be doubt to whether odour is present 23. Slight/Weak – Odour is present but source/words to describe it are unknown 24. Distinct – Odour character/nature is barely recognisable 25. Strong – Odour character/nature easily recognisable 26. Very Strong – Odour is offensive. Exposure to this level is undesirable 27. Extremely Strong – Odour is offensive. Difficulty staying in locality and instinctive reaction to mitigate against further exposure.
Offensiveness	Use Hedonic Tone score: 4. -4 =extremely unpleasant, 0 = neither unpleasant or pleasant, +4 = extremely pleasant
Nature of Smell	What does it smell like. Use odour wheel where appropriate.
Potential Source	Odour is distinct enough to state a likely source e.g. landfill, sewage treatment works. To be stated when certain of the source (note Intensity 3 is distinct)
Odour Duration	Time 'sniffed' odour for e.g. 30 second 'wave' at intensity 4, 30 Sec @I.4

General Information

Hedonic Score Rating

Very Pleasant	+4
Pleasant	+3
Moderately Pleasant	+2
Mildly Pleasant	+1
Neutral Odour / No Odour	0
Mildly Unpleasant	-1
Moderately Unpleasant	-2
Unpleasant	-3
Very Unpleasant	-4

Odour Wheel



Location Number/ Description	**1**	**2**	**3**	**4**	**5**
Time of 'Sniff Test'	1900	1905	1910	1915	1920
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.8, SW	2.8, SW	3.2, SW	3.0, SW	2.9, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No odour	1/2	1/2	1/2	No odour
Offensiveness (-4 to +4)	-	-1	-1	-1	-
Nature of odour	-	Sewage	Sewage	Sewage	-
Potential Source	-	Gloucester STW	Gloucester STW	Gloucester STW	-
Odour Duration (seconds) (5 mins = 300 seconds)	-	1 – 100 seconds 2 – 40 seconds	1 – 40 seconds 2 – 60 seconds	1 – 40 seconds 2 – 60 seconds	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**6**	**7**	**8**	**9**	**10**
Time of 'Sniff Test'	1925	1930	1935	1945	1950
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	2.4, SW	2.2, SW	1.7, SW	3.9, SW	3.7, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Downwind
Intensity (0 – 6)	No Odour	No odour	No Odour	1/2	1/2
Offensiveness (-4 to +4)	-	-	-	-1	-1
Nature of odour	-	-	-	Sewage	Sewage
Potential Source	-	-	-	Gloucester STW	Gloucester STW
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	1 – 45 seconds 2 – 45 seconds	1 – 50 seconds 2 – 35 seconds
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**11**	**12**	**13**	**14**	**15**
Time of 'Sniff Test'	1955	2000	2005	2010	2015
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	3.1, SW	2.6, SW	3.0, SW	3.8, SW	3.7, SW
Upwind/Downwind Location	Downwind	Downwind	Downwind	Downwind	Upwind
Intensity (0 – 6)	No odour	No odour	No odour	1/2	1/2
Offensiveness (-4 to +4)	-	-	-	-1	-1
Nature of odour	-	-	-	Sewage	Sewage
Potential Source	-	-	-	Gloucester STW	Gloucester STW
Odour Duration (seconds) (5 mins = 300 seconds)	-	-	-	1 – 85 seconds 2 – 60 seconds	1 – 70 seconds 2 – 60 seconds
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**16**	**17**	**18**	**19**	**20**
Time of 'Sniff Test'	2020	2025	2030	2035	2040
Weather conditions	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy	Dry/Cloudy
Wind Speed (m/s)/Direction	3.4, SW	3.3, SW	3.0, SW	3.4, SW	3.0, SW
Upwind/Downwind Location	Upwind	Downwind	Upwind	Downwind	Downwind
Intensity (0 – 6)	1/2	1/2	No Odour	No Odour	No odour
Offensiveness (-4 to +4)	-1	-1	-	-	-
Nature of odour	Sewage	Sewage	-	-	-
Potential Source	Gloucester STW	Gloucester STW	-	-	-
Odour Duration (seconds) (5 mins = 300 seconds)	1 – 45 seconds 2 – 65 seconds	1 – 45 seconds 2 – 60 seconds	-	-	-
Other comments/Rationale (record as much info as you can to aid write up in office)	-	-	-	-	-

Location Number/ Description	**21**				
Time of 'Sniff Test'	2045				
Weather conditions	Dry/Cloudy				
Wind Speed (m/s)/Direction	3.2, SW				
Upwind/Downwind Location	Upwind				
Intensity (0 – 6)	No Odour				
Offensiveness (-4 to +4)	-				
Nature of odour	-				
Potential Source	-				
Odour Duration (seconds) (5 mins = 300 seconds)	-				
Other comments/Rationale (record as much info as you can to aid write up in office)	-				

1 SITE VISIT 1 (29TH AUGUST 2019)

1.1 Site Visit 1 was undertaken on 29th August 2019 from approximately 13:45 to 16:05 hours during a Thursday afternoon.

1.2 Meteorological conditions at the time of the visit were as follows:

- Temperature: 21-22°c;
- Atmosphere: Dry/Partly Cloudy;
- Wind direction: SW/SSW
- Wind strength: Moderate.

1.3 Twenty-one monitoring locations were selected within the development site. These are shown on Drawing GM10710-020. The weather conditions experienced during the sniff tests were conducive to odour generation and propagation with no strong air movement to dilute and disperse odour.

Monitoring Location 1- Downwind of the STW

1.4 This location was monitored for five minutes at 13:45.

1.5 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Agricultural/Animal' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at this intensity for a total duration of 200 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.6 It was noted by the assessor that the odour detected did not relate to odour from the Netheridge STW and instead was believed to originate from the surrounding agricultural fields.

1.7 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 2: Downwind of the STW

1.8 This location was monitored for five minutes at 13:50.

1.9 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Faecal' in nature, with the offensiveness scored at -1 on the hedonic

tone scale. The odour was detected intermittently at this intensity for a total duration of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.10 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 3 – 6: Downwind of the STW

1.11 These locations were monitored for five minutes each between 13:55 and 14:15.

1.12 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 7: Downwind of the STW

1.13 This location was monitored for five minutes at 14:20.

1.14 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Aeration (sweet)/Sewage (faecal)' in nature, with the offensiveness scored at -3 on the hedonic tone scale. The odour was detected intermittently at intensity 2 'slight/weak' for a total duration of 90 seconds and at intensity 3 'distinct' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.15 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 8: Downwind of the STW

1.16 This location was monitored for five minutes at 14:30.

1.17 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Dusty/Petrol/Exhaust' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 2 'slight/weak' for a total duration of 100 seconds and at intensity 3 'distinct' for a total of 100 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.18 It was noted by the assessor that the odour was not related to the STW and instead was originating from the nearby adjacent road (A430).

1.18.1 The average odour intensity is calculated to be 2 'slight/weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a small overall odour exposure with reference to Table 15 of the IAQM guidance and a **slight adverse** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 9 – 10: Downwind of the STW

1.19 These locations were monitored for five minutes each between 14:40 and 14:45.

1.20 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 11: Downwind of the STW

1.20.1 This location was monitored for five minutes at 14:50.

1.20.2 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Faecal' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 60 seconds and at intensity 2 'slight/weak' for a total duration of 100 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.20.3 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 12: Downwind of the STW

1.20.4 This location was monitored for five minutes at 14:55.

1.20.5 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Aeration (sweet)/Sewage' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 10 seconds, at intensity 2 'slight/weak' for a total duration of 60 seconds and at intensity 3 'distinct' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.21 The average odour intensity is calculated to be 1 ‘slight/very weak’, and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 13: Downwind of the STW

1.22 This location was monitored for five minutes at 15:00.

1.23 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 ‘distinct’. The odour detected was ‘Aeration (sweet)/Sewage’ in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 ‘slight/very weak’ for a total of 60 seconds, at intensity 2 ‘slight/weak’ for a total duration of 90 seconds and at intensity 3 ‘distinct’ for a total of 80 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

1.24 The average odour intensity is calculated to be 2 ‘slight/weak’, and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a small overall odour exposure with reference to Table 15 of the IAQM guidance and a **slight adverse** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 14 – 21: Downwind of the STW

1.25 These locations were monitored for five minutes each between 15:10 and 16:00.

1.26 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

2 SITE VISIT 2 (30TH AUGUST 2019)

2.1 Site Visit 2 was undertaken on 30th August 2019 from approximately 08:15 to 10:35 hours during a Friday morning.

2.2 Meteorological conditions at the time of the visits were as follows:

- Temperature: 18°c;
- Atmosphere: Dry/Partly Cloudy;
- Wind direction: SW;
- Wind strength: Moderate

2.3 Twenty-one monitoring locations were selected within the development site. These are shown on Drawing GM10710-020. The weather conditions experienced during the

sniff tests were conducive to odour generation and propagation with no strong air movement to dilute and disperse odour.

Monitoring Location 1- Downwind of the STW

2.4 This location was monitored for five minutes at 08:15.

2.5 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Agricultural/Animal' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 40 seconds and at intensity 2 'slight/weak' for a total of 90 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.6 It was noted by the assessor that the odour detected did not relate to odour from the Netheridge STW and instead was believed to originate from the surrounding agricultural fields.

2.7 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 2: Downwind of the STW

2.8 This location was monitored for five minutes at 08:20.

2.9 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Agricultural/Animal' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 150 seconds and at intensity 2 'slight/weak' for a total of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.10 It was noted by the assessor that the odour detected did not relate to odour from the Netheridge STW and instead was believed to originate from the surrounding agricultural fields.

2.11 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a

negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 3: Downwind of the STW

2.12 This location was monitored for five minutes at 08:25.

2.13 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Agricultural/Animal' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at this intensity for a total duration of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.14 It was noted by the assessor that the odour detected did not relate to odour from the Netheridge STW and instead was believed to originate from the surrounding agricultural fields.

2.15 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 4 – 6: Downwind of the STW

2.16 These locations were monitored for five minutes each between 08:30 and 08:50.

2.17 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be negligible.

Monitoring Location 7: Downwind of the STW

2.18 This location was monitored for five minutes at 09:00.

2.19 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Sludge/Sewage)' in nature, with the offensiveness scored at -3 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 90 seconds and at intensity 3 'distinct' for a total of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.20 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a

negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 8 – 10: Downwind of the STW

2.21 These locations were monitored for five minutes each between 08:50 and 09:15.

2.22 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 11: Downwind of the STW

2.23 This location was monitored for five minutes at 09:20.

2.24 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Aeration (sweet)/Sludge' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 90 seconds, at intensity 2 'slight/weak' for a total duration of 60 seconds, and at intensity 3 'distinct' for a total of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.25 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 12: Downwind of the STW

2.26 This location was monitored for five minutes at 09:25.

2.27 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 4 'strong'. The odour detected was 'Sludge/Aeration (sweet)' in nature, with the offensiveness scored at -3 on the hedonic tone scale. The odour was detected intermittently at intensity 2 'slight/weak' for a total duration of 70 seconds, at intensity 3 'distinct' for a total of 90 seconds, and at intensity 4 'strong' for a total of 10 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.28 The average odour intensity is calculated to be 2 'slight/weak', and in combination with the calculated odour pervasiveness/extent of 3.33% corresponds to a small overall odour exposure with reference to Table 15 of the IAQM guidance and a **slight adverse** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 13: Downwind of the STW

2.29 This location was monitored for five minutes at 09:30.

2.30 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Aeration (sweet)/Sewage' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 90 seconds, at intensity 2 'slight/weak' for a total duration of 90 seconds and at intensity 3 'distinct' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.31 The average odour intensity is calculated to be 2 'slight/weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a small overall odour exposure with reference to Table 15 of the IAQM guidance and a **slight adverse** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 14 – 19: Downwind of the STW

2.32 These locations were monitored for five minutes each between 09:50 and 10:20.

2.33 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 20: Downwind of the STW

This location was monitored for five minutes at 10:25.

2.34 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Aeration (sweet)/Sewage' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at this intensity for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

2.35 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 21: Downwind of the STW

2.36 This location was monitored for five minutes at 10:30.

2.37 No odour was detected during the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

3 SITE VISIT 3 (6TH SEPTEMBER 2019)

3.1 Site Visit 3 was undertaken on 6th September 2019 from approximately 08:00 to 09:50 hours during a Friday morning.

3.2 Meteorological conditions at the time of the visits were as follows:

- Temperature: 15°c;
- Atmosphere: Dry/Cloudy;
- Wind direction: SW;
- Wind strength: Moderate

3.2.1 Twenty-one monitoring locations were selected within the development site. These are shown on Drawing GM10710-020. The weather conditions experienced during the sniff tests were conducive to odour generation and propagation with no strong air movement to dilute and disperse odour.

Monitoring Locations 1: Downwind of the STW

3.3 This location was monitored for five minutes at 08:00.

3.4 No odour was detected during the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 2: Downwind of the STW

3.5 This location was monitored for five minutes at 08:06.

3.6 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 120 seconds, and at intensity 2 'slight/weak' for a total of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.7 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 3: Downwind of the STW

3.8 This location was monitored for five minutes at 08:11.

3.9 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 30 seconds, and at intensity 2 'slight/weak' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.10 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 4: Downwind of the STW

3.11 This location was monitored for five minutes at 08:16.

3.12 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at this intensity for a total duration of 30 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.13 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 5: Downwind of the STW

3.14 This location was monitored for five minutes at 08:22.

3.15 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 30 seconds, and at intensity 2 'slight/weak' for a total of 30 seconds

within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.16 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 6 – 9: Downwind of the STW

3.17 These locations were monitored for five minutes each between 08:27 and 08:42.

3.18 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 10: Downwind of the STW

3.19 This location was monitored for five minutes at 08:50.

3.20 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 1 'slight/very weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at this intensity for a total duration of 45 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.21 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 11: Downwind of the STW

3.22 This location was monitored for five minutes at 08:55.

3.23 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -2 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 80 seconds, at intensity 2 'slight/weak' for a total of 40 seconds, and at intensity 3 'distinct' for a total of 15 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.24 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a

negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 12: Downwind of the STW

3.25 This location was monitored for five minutes at 09:00.

3.26 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 3 'distinct'. The odour detected was 'Sludge/Aeration (sweet)' in nature, with the offensiveness scored at -3 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total of 45 seconds, at intensity 2 'slight/weak' for a total of 80 seconds, and at intensity 3 'distinct' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

3.27 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 13 – 21: Downwind of the STW

3.28 These locations were monitored for five minutes each between 09:05 and 09:50.

3.29 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

4 SITE VISIT 4 (12TH SEPTEMBER 2019)

4.1 Site Visit 4 was undertaken on 12th September 2019 from approximately 19:00 to 21:30 hours during a Thursday evening.

4.2 Meteorological conditions at the time of the visits were as follows:

- Temperature: 11°c;
- Atmosphere: Dry/Cloudy;
- Wind direction: SW;
- Wind strength: Moderate

4.3 Twenty-one monitoring locations were selected within the development site. These are shown on drawing GM10710-020. The weather conditions experienced during the sniff tests were conducive to odour generation and propagation with no strong air movement to dilute and disperse odour.

Monitoring Locations 1: Downwind of the STW

4.4 This location was monitored for five minutes at 19:00.

4.5 No odour was detected during the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 2: Downwind of the STW

4.6 This location was monitored for five minutes at 19:05.

4.7 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 100 seconds, and at intensity 2 'slight/weak' for a total of 40 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.8 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 3: Downwind of the STW

4.9 This location was monitored for five minutes at 19:10.

4.10 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 40 seconds, and at intensity 2 'slight/weak' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.11 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 4: Downwind of the STW

4.12 This location was monitored for five minutes at 19:15.

4.13 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 40 seconds, and at intensity 2 'slight/weak' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.14 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 5 – 8: Downwind of the STW

4.15 These locations were monitored for five minutes each between 19:20 and 19:40.

4.16 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 9: Downwind of the STW

4.17 This location was monitored for five minutes at 19:45.

4.18 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 45 seconds, and at intensity 2 'slight/weak' for a total of 45 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.19 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High

Monitoring Location 10: Downwind of the STW

4.20 This location was monitored for five minutes at 19:50.

4.21 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic

tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 50 seconds, and at intensity 2 'slight/weak' for a total of 35 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.22 The average odour intensity is calculated to be 0 'not perceptible', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 11 – 13: Downwind of the STW

4.23 These locations were monitored for five minutes each between 19:55 and 20:10.

4.24 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

Monitoring Location 14: Downwind of the STW

4.25 This location was monitored for five minutes at 20:10.

4.26 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 85 seconds, and at intensity 2 'slight/weak' for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.27 The average odour intensity is calculated to be 1 'slight/very weak', and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 15: Downwind of the STW

4.28 This location was monitored for five minutes at 20:15.

4.29 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 'slight/weak'. The odour detected was 'Sewage' in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 'slight/very weak' for a total duration of 70 seconds, and at intensity 2 'slight/weak' for a total of 60 seconds

within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.30 The average odour intensity is calculated to be 1 ‘slight/very weak’, and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 16: Downwind of the STW

4.31 This location was monitored for five minutes at 20:20.

4.32 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 ‘slight/weak’. The odour detected was ‘Sewage’ in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 ‘slight/very weak’ for a total duration of 45 seconds, and at intensity 2 ‘slight/weak’ for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.33 The average odour intensity is calculated to be 1 ‘slight/very weak’, and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Location 17: Downwind of the STW

4.34 This location was monitored for five minutes at 20:25.

4.35 Odour was detected during the 5-minute survey period. The maximum odour intensity during the 5-minute observation period was scored at 2 ‘slight/weak’. The odour detected was ‘Sewage’ in nature, with the offensiveness scored at -1 on the hedonic tone scale. The odour was detected intermittently at intensity 1 ‘slight/very weak’ for a total duration of 45 seconds, and at intensity 2 ‘slight/weak’ for a total of 60 seconds within the 5-minute observation period. No odour was detected during the remainder of the 5-minute observation period.

4.36 The average odour intensity is calculated to be 1 ‘slight/very weak’, and in combination with the calculated odour pervasiveness/extent of 0% corresponds to a negligible overall odour exposure with reference to Table 15 of the IAQM guidance and a **negligible** odour effect when taking into account a receptor sensitivity of High.

Monitoring Locations 18 – 21: Downwind of the STW

4.37 These locations were monitored for five minutes each between 20:30 and 20:50.

4.38 No odour was detected during any of the 5-minute survey periods. As the odour was not perceptible, the odour effect is therefore deemed to be **negligible**.

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Appendix C
Odour Acuity Certificates

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Spain Odournet SL • United Kingdom Odournet UK Ltd • France Odournet France
Brazil Odournet Brasil Ltda. • India Odournet Holding India Pvt Ltd

8 Vale View
Vicarage Lane, Bowdon
Altrincham, Cheshire, WA14 3BD
Phone 0161 929 6778
uk@odournet.com
Companies House Cardiff 2900894

Acuity Test Certificate

Organisation	Wardell Armstrong-Leigh
Contact	Paul Threlfall
Address	2 The Avenue
	Leigh
	UK
	WN7 1FS
Telephone	01942 260101
Participant Name	Paul Threlfall
Date	30th September 2019

Criteria Assessed	Acceptable Range	Participants Results
Average of ITE (10^{YITE})	$20 \leq 10^{YITE} \leq 80$	62.26
Standard deviation of ITE (10^{SITE})	$10^{SITE} \leq 2.3$	2.25

Participants Acuity Result	Qualified

Result clarification: Assessor Paul Threlfall qualified as a panel member as his sensitivity to the reference material n-butanol fell within the defined bandwidth according to BSEN 13725 guidelines; also the repeatability of his responses resulted in a standard deviation that was below the limit specified.

Acuity testing was carried out in accordance with standard BSEN 13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry'. The test was carried out over one day, which is the only variation to the standard.

Holly Dawson
Laboratory Manager

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Phone 0161 929 6778
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Companies House Cardiff 2900894

Acuity Test Certificate

[redacted]

Criteria Assessed	Acceptable Range	Participants Results
Average of ITE (10^{YITE})	$20 \leq 10^{YITE} \leq 80$	41.01
Standard deviation of ITE (10^{SITE})	$10^{SITE} \leq 2.3$	1.48

Participants Acuity Result	Qualified

Result clarification:

Assessor Rosie Pitt qualified as a panel member as her sensitivity to the reference material n-butanol fell within the defined bandwidth according to BSEN 13725 guidelines; also the repeatability of her responses resulted in a standard deviation that was below the limit specified.

Acuity testing was carried out in accordance with standard BSEN 13725:2003 'Air quality – Determination of odour concentration by dynamic olfactometry'. The test was carried out over one day, which is the only variation to the standard.

Anna Page
Laboratory Operations Manager

Appendix D
Odour Concentration Maps

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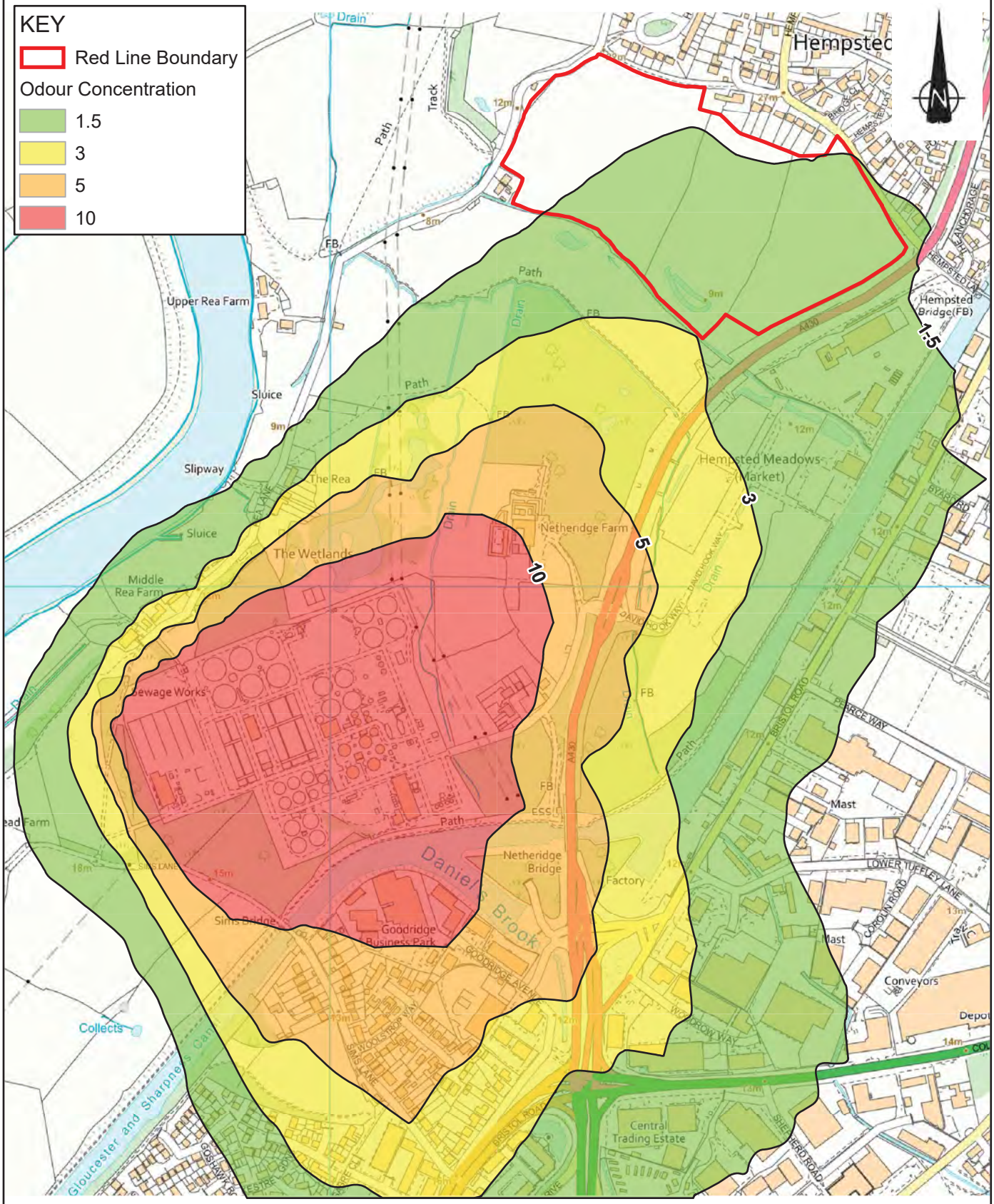

CLIENT: GLADMAN DEVELOPMENTS LTD	DRG No: GM10710-021		REV: P01
	SIZE: A4	SCALE: 1:7,500	DATE: 06/07/2021
PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: 2016 ODOUR CONTOUR PLOT			

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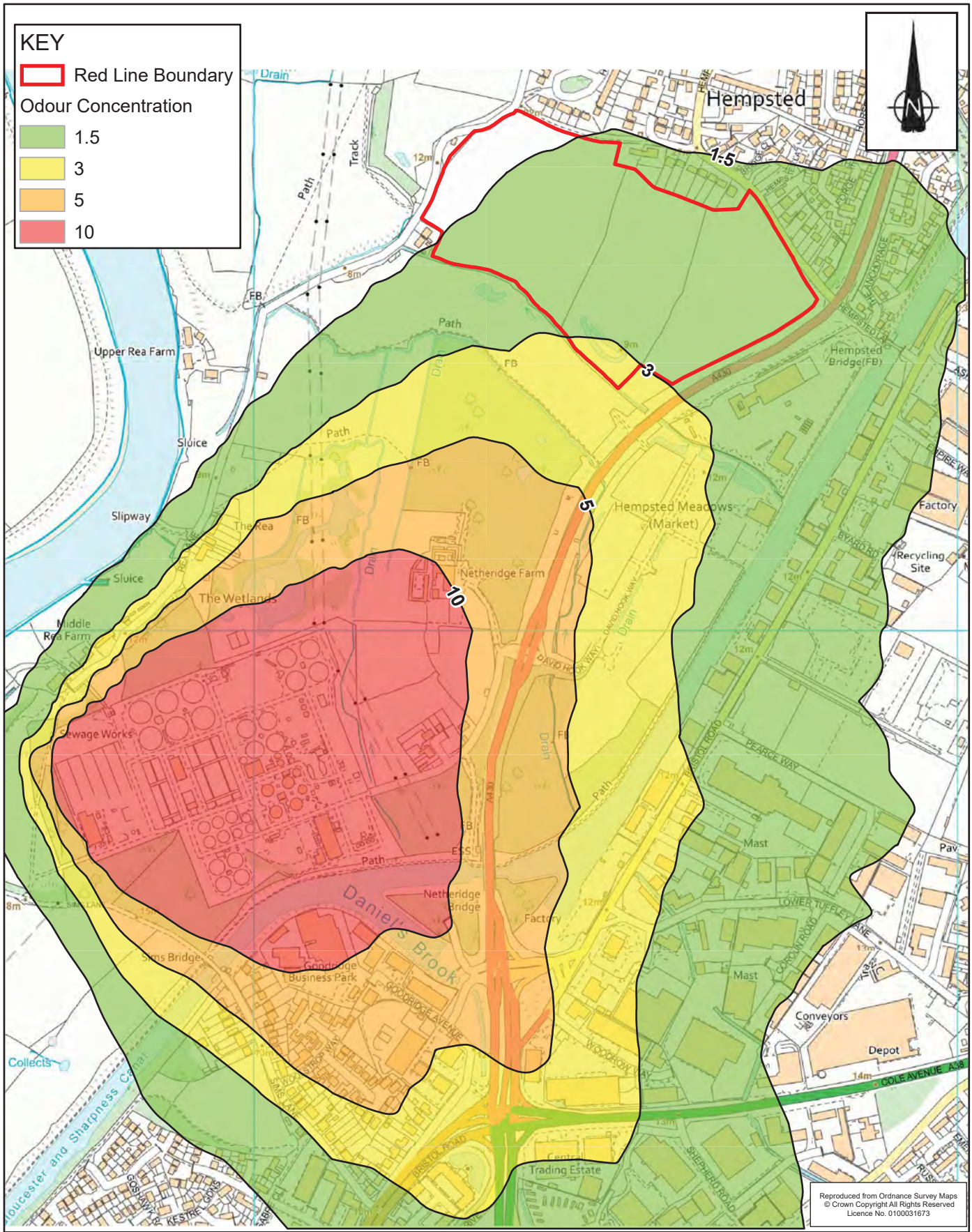

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	SIZE: A4	SCALE: 1:7,500	DATE: 06/07/2021
PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: 2017 ODOUR CONTOUR PLOT			

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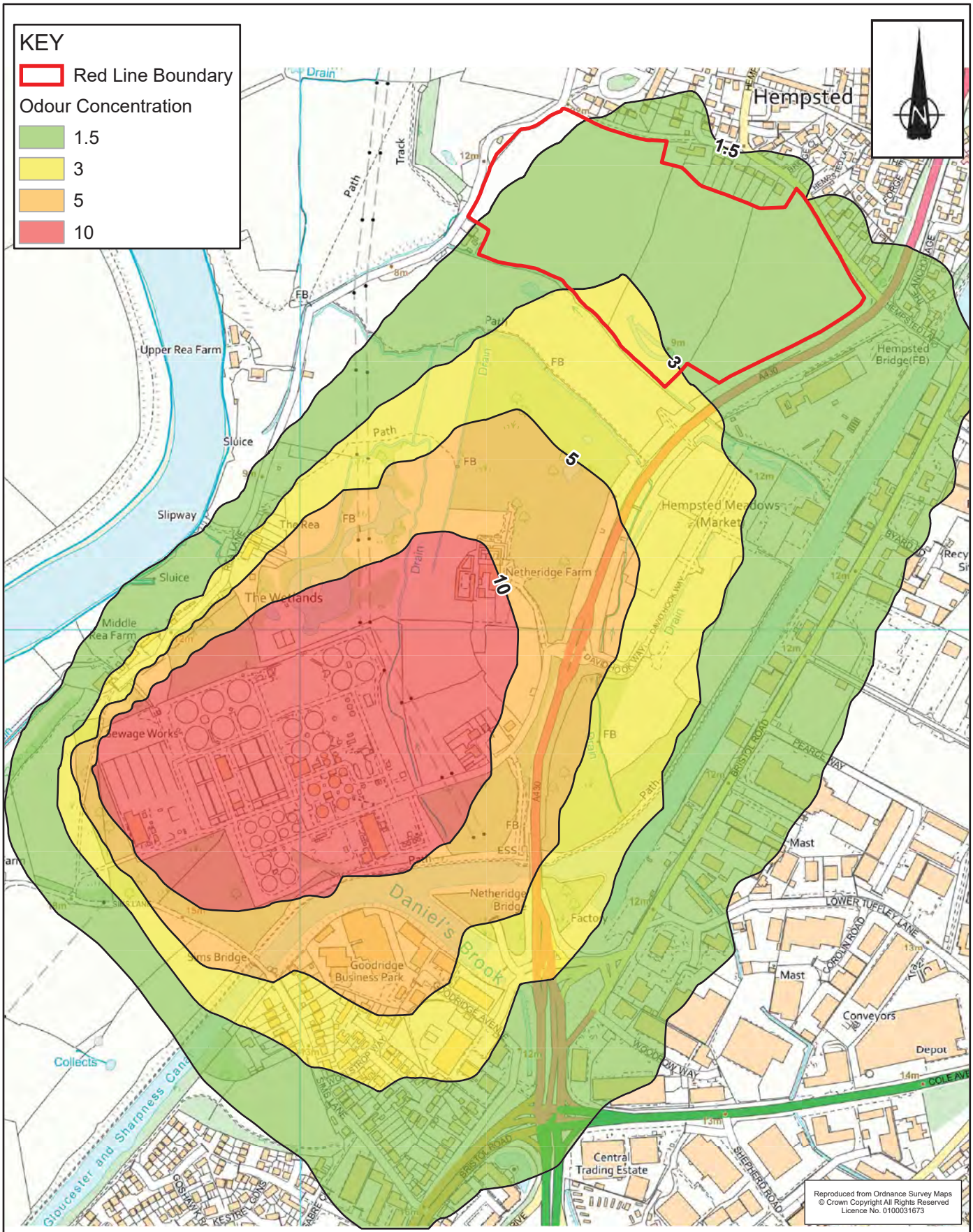

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PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: 2018 ODOUR CONTOUR PLOT			

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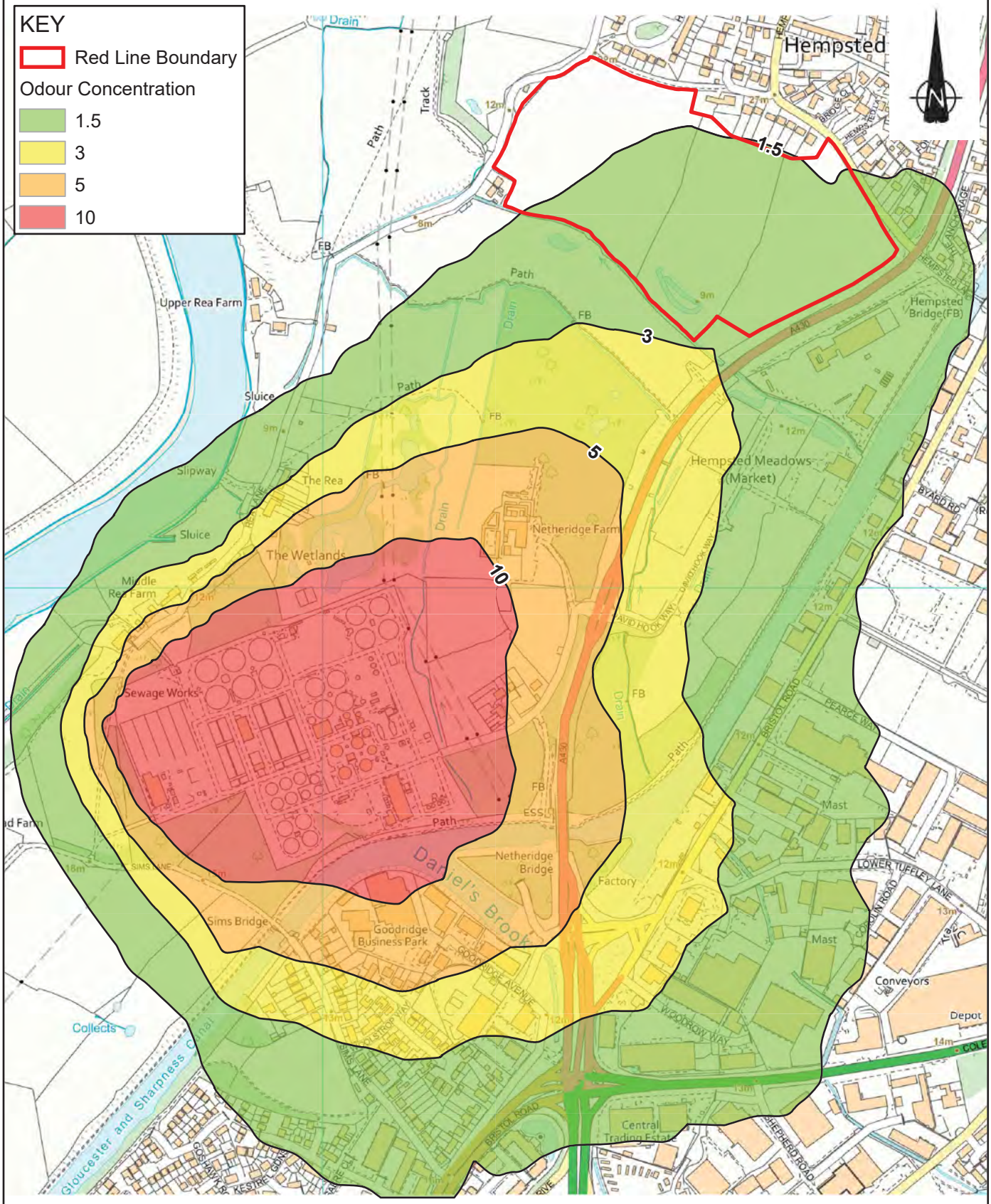

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	SIZE: A4	SCALE: 1:7,500	DATE: 06/07/2021
PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: 2019 ODOUR CONTOUR PLOT			

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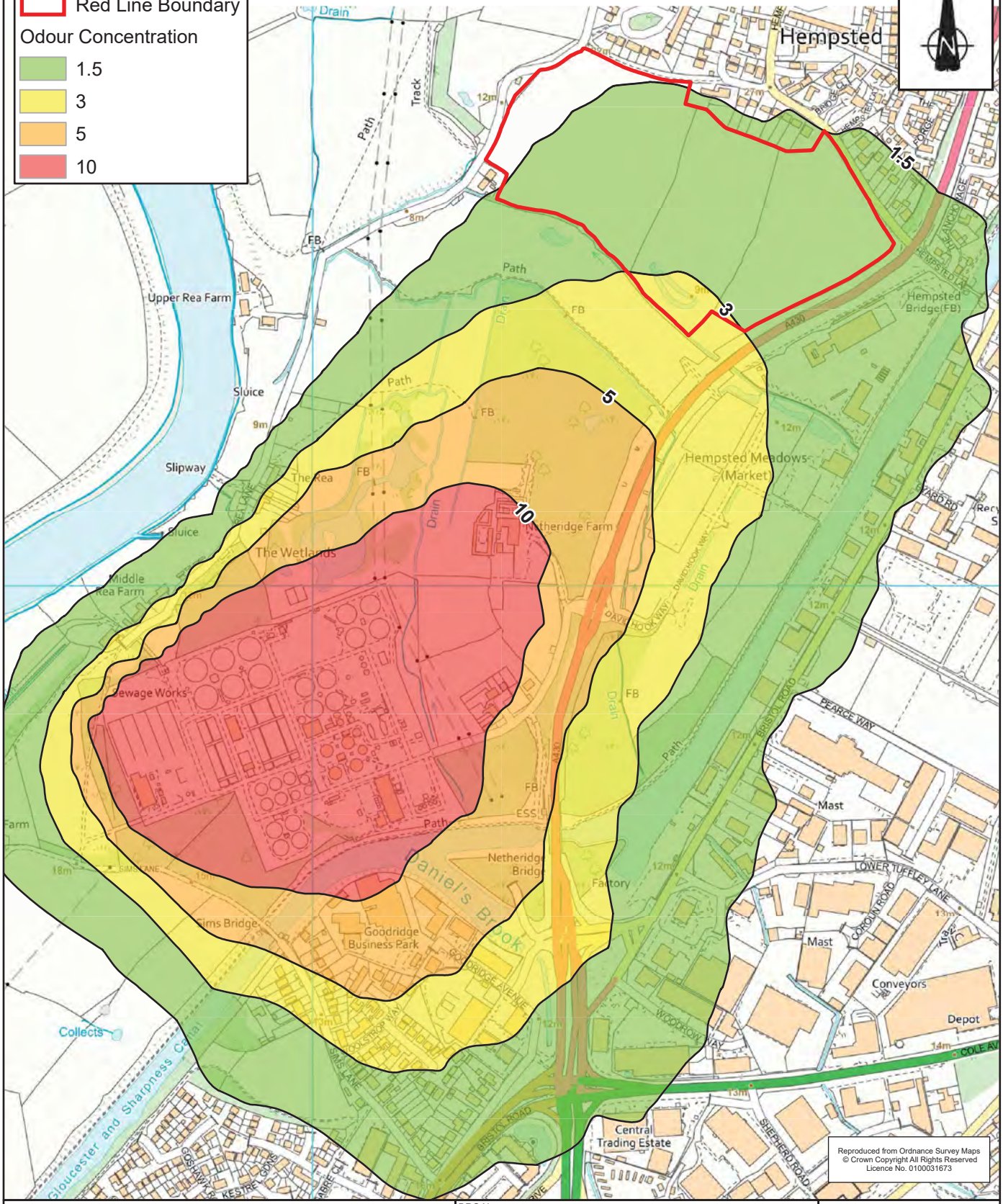

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	SIZE: A4	SCALE: 1:7,500	DATE: 06/07/2021
PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: 2020 ODOUR CONTOUR PLOT			

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Appendix E
Development Framework Plan

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DEVELOPMENT FRAMEWORK PLAN

KEY

- Site boundary (12.22Ha)
- Proposed development (6.4Ha) up to 245 dwellings @38 dph
- Local Equipped Area for Play (0.04Ha)
- Neighbourhood Equipped Area for Play (0.1Ha)
- Public open space: Informal recreation (4.81Ha)
- Incidental greenspace, habitat enhancement and meadow grassland margins (0.87Ha)
- Existing hedgerows and trees
- Proposed hedgerows and trees
- Proposed drainage basin
- Existing drainage basin
- Proposed footways
- Proposed vehicular access
- Proposed pedestrian access
- Proposed primary vehicle route
- Secondary street and lanes / private drives
- Public Right of Way: Bridleway
  Public Right of Way: Footpath
- Permissive path
- Retained agricultural access
- Vehicular access to proposed pumping station
- Proposed pumping station
- Proposed trim trail (stations indicative only)

N:\GM\GM10710 - Land at Hempsted Lane\03 - Design\Graphics\Development Framework\GM10710 LSC 012 Devt Framework Plan Rev H.indd

LAND OFF HEMPSTED LANE, GLOUCESTER

GLADMAN DEVELOPMENTS LIMITED

Dwg: GM10710-012
Revision: H
Date:20/01/2019

Scale : 1: 2,500@A3
Drawn By: YK
Checked By: KMS

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DRAWINGS

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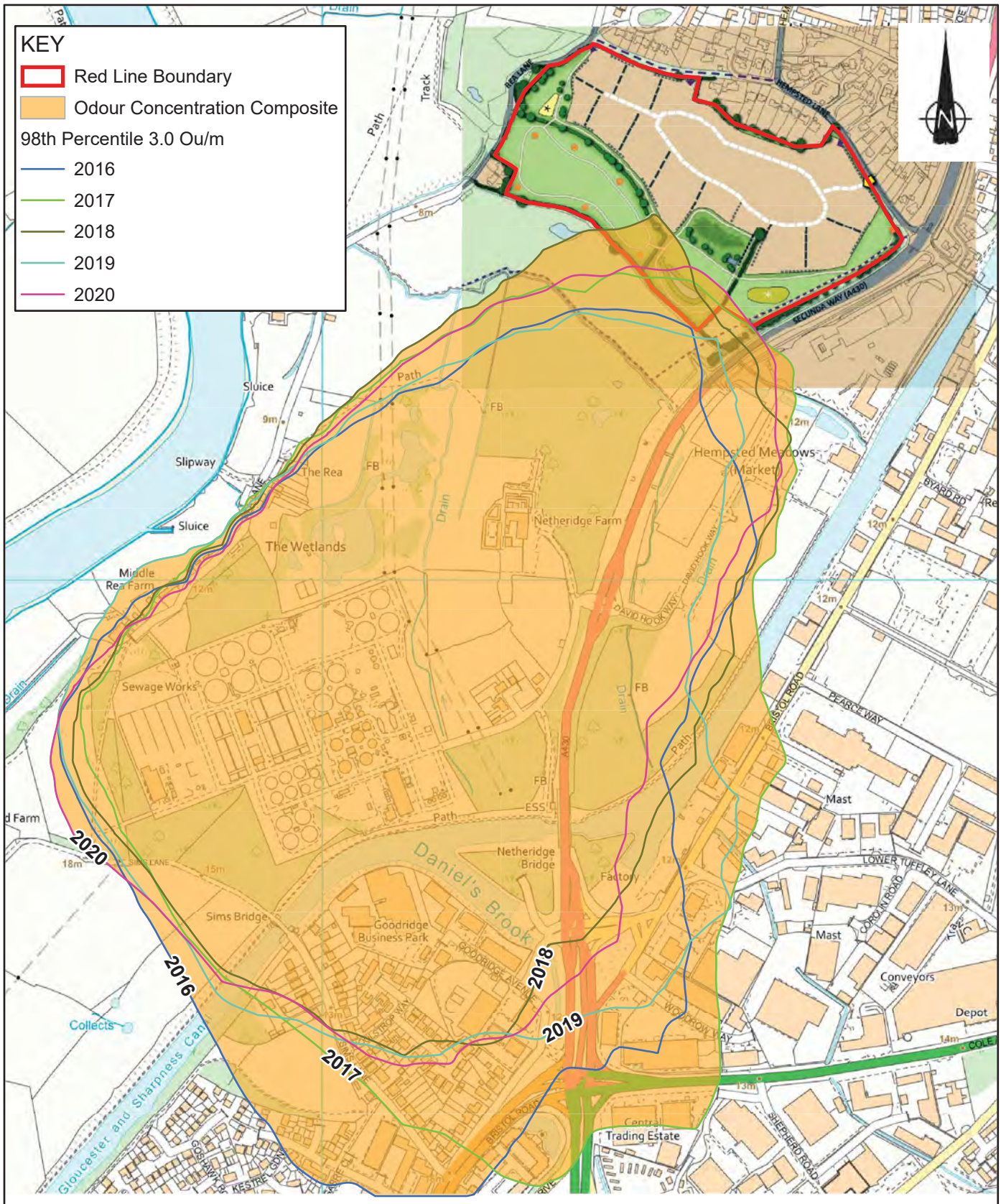

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PROJECT: HEMPSTED LANE, GLOUCESTER	DRAWN BY: CT	CHECKED BY: PT	APPROVED BY: MW
DRAWING TITLE: ODOUR CONCENTRATION COMPOSITE			

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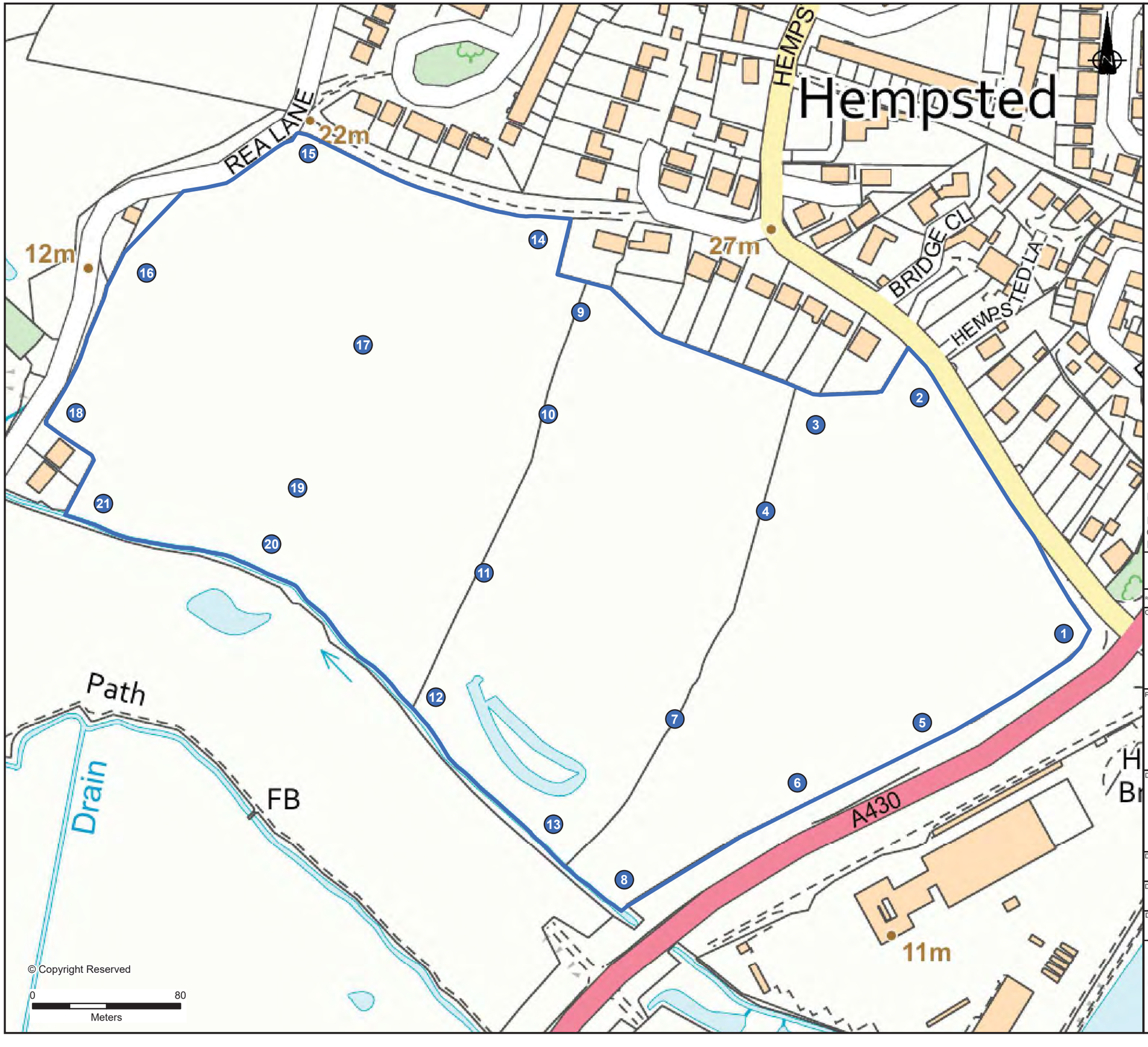

KEY

Study Area

1 Sniff Test Locations

Notes:

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

GLADMAN DEVELOPMENTS LTD

PROJECT

LAND OFF HEMPSTED LANE
GLOUCESTER

DRAWING TITLE

SNIFF TEST LOCATIONS

DRG No.	REV
GM10710-020	A

DRG SIZE	SCALE	DATE
A3	1:2,000	30/01/2020

DRAWN BY	CHECKED BY	APPROVED BY
CT	PT	MW

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