

Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Environmental Statement

Chapter 18: Odour

Application Document Reference: 5.2.18
PINS Project Reference: WW010003
APFP Regulation No. 5(2)a

Revision No. 03
February 2024

Document Control

Document title	Chapter 18: Odour
Version No.	03
Date Approved	25.04.23
Date 1st Issued	30.01.23

Version History

Version	Date	Author	Description of change
01	30.01.23	-	DCO Submission
02	25.04.23	-	Updated to reflect Section 51 Advice
03	19.02.24	-	Updated in relation to EXQ2 ventilation shaft controls, and clarified mitigation text

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Summary

Introduction section

This chapter of the Environmental Statement (ES) presents the potential impacts of the Proposed Development on odour during its construction (including commissioning), operation and maintenance, and decommissioning phases.

The odour assessment has taken account of both national and local planning policy, including the requirements of the National Policy Statement for Waste Water, and legislation pertaining to statutory nuisance. Environmental permitting requirements, whilst discussed in this chapter, will be met through the separate Odour Modelling Assessment Report and the Odour Management Plan (OMP), which will form part of the Environmental Management System (EMS).

Summary relevant mitigation

In developing the Proposed Development through an iterative process including consultation and engagement with consultees, and through the Environmental Impact Assessment, (EIA) the Applicant has sought to identify and incorporate suitable measures and mitigation for potentially significant adverse effects, as well as maximising beneficial effects where possible.

Some measures are 'embedded' in the design of the Proposed Development for which consent is sought by virtue of the scope of the authorised development as set out in Schedule 1 to the Development Consent Order (DCO) and the accompanying Works Plans. These are considered primary mitigation. For example, adjustment of Order Limits to avoid sensitive features, amending the sizing and location of temporary access routes and compounds.

Secondary measures may be detailed activities for example measures contained within Part A and Part B of the Code of Construction Practice (CoCP) and the preparation and delivery of an odour monitoring plan (OMP). These secondary measures are differentiated from the good practice measures.

Tertiary measures comprise good practice measures (such as measures within Considerate Contractors Scheme) and measures integrated into legal requirements secured through environmental permits and consents.

Assessment approach

The assessment of odour has followed the National Planning Practice Guidance (Gov.uk, 2019), the Institute of Air Quality Management's (IAQM) Guidance on the Assessment of Odour for Planning (IAQM, 2018) and the Environment Agency's 'H4 Odour Management guidance' and, where relevant, taken account of feedback and comments received during scoping, statutory stakeholder consultation, input from relevant technical working groups and public consultation.

The significance of an odour effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact. The assessment of odour has been undertaken using qualitative and quantitative approaches following the IAQM's guidance on the assessment of odour for planning. The IAQM guidance promotes a 'multi-tool approach where practicable'. Accordingly, a qualitative risk assessment approach has been applied in combination with quantitative odour prediction using a dispersion model for the operational phase, to evaluate the potential for odour impacts on receptors in the surrounding area.

The scale of exposure (impact) is determined using factors referred to as the FIDO factors (**F**requency, **I**ntensity, **D**uration and **O** odour unpleasantness) and sensitivity of receptors determined by **L**ocation. Together, the FIDOL factors aid in the overall assessment of effect of odour. They have been considered when determining the odour impacts at receptor locations.

The quantitative odour dispersion modelling has used five years of meteorological data to account for variability in weather conditions, with the worst-case year results used for assessment of significance. As the proposed waste water treatment plant (WWTP) does not currently exist, the quantitative odour predictions apply estimated emission rates from measurements taken at the existing Cambridge WWTP from a July 2019 odour survey. To enable a robust application of the odour emission rates within the model, the annual odour emission rates are based on values from the existing Cambridge WWTP during the summer months, when odour emissions are expected to be highest. Also, emissions for all processes have been included in the modelling exercise, even if some of them (e.g. final settlement tanks (FSTs), interstage pump stations (PS), final effluent (FE)) may deliver a minimal or neutral odour impact due to design and mitigation measures adopted as part of the Proposed Development. This is a conservative approach, which is likely to lead to an overestimate of overall odour emission predictions.

The qualitative risk assessment follows a Source-Pathway-Receptor concept; for odour exposure to occur and cause an effect, all three links in the Source-Pathway-Receptor model must be present. In other words, there must be a means for the odour to be released into the air (source), a way for the odour to travel through the air (pathway) and people (receptor) must be present at the locations where the odour is present.

The source odour potential was classified based on the magnitude of the possible odour release, its unpleasantness and any design/mitigation/control measures adopted as part of the Proposed Development, noting that all of the more offensive sources are enclosed and the odour can be controlled. The pathway effectiveness was determined based on five years (2016 to 2020) of wind data from Cambridge City Airport (with missing data supplemented from RAF Mildenhall) and the distance from the source to the receptor. Receptor sensitivity was defined based on the level of amenity people could reasonably expect to enjoy at different land use types e.g. residential, schools and footpaths. The source odour potential, the pathway effectiveness and the receptor sensitivity were then combined to determine

the odour exposure risk, which is used to determine the impact, at individual receptor locations.

Both the quantitative and qualitative approaches considered the maximum design envelope parameters and the design and mitigation measures adopted as part of the Proposed Development.

The maximum design envelope parameters include potential impacts from odour release during construction, testing, commissioning, and decommissioning of the existing Cambridge WWTP. As well as odour release during normal operation, odour releases during abnormal operation, spills and leaks, sludge and waste water deliveries and from air valves have been considered.

The design has evolved following Phase Three Consultation and has been updated so that there are no vents along the waste water transfer tunnel corridor that would passively release odour. There will be a tunnel vent located at the interception shaft at the start of the waste water transfer tunnel within the existing Cambridge WWTP. The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control.

Summary construction effects

Odour impacts during the construction of the Proposed Development, which includes connecting new pipelines to the existing sewerage network, are predicted to be of temporary duration during the construction phase. The results of the assessment of residual effects take account of secondary mitigation measures identified within Part A and Part B of the CoCP. Overall, the odour risk identified from the construction activities are negligible and not significant.

Summary operation effects

Odour impacts during abnormal operation of the proposed WWTP, as well as deliveries of waste water and sludge by vehicles, accidental spills and leaks, and the operation of the treated effluent discharge outfall to the River Cam (hereafter referred to as 'the outfall') have been assessed qualitatively. The results of the assessment of residual effects take into account the secondary mitigation measures, including the preliminary Odour Management Plan (OMP), to reduce and manage odour emissions. Overall, the residual effect from operational activities discussed above would be negligible and not significant.

The results of odour modelling reported in this assessment for the normal operation of the proposed WWTP indicate that the modelled odour exposure levels with a Medium impact ($30\text{ou}_E/\text{m}^3$ to $50\text{ou}_E/\text{m}^3$) are within 200m of the outer perimeter of the proposed WWTP. The magnitudes of odour impacts at all modelled discrete receptors however range from Negligible to Very Small (up to $1.5\text{ou}_E/\text{m}^3$). Based on the modelled odour impacts, the sensitivity of receptors and the incorporation of the embedded design features (primary mitigation) within the proposed WWTP, the effect of the proposed WWTP on odour at all

modelled sensitive receptor locations during normal operation would be negligible and not significant.

Summary decommissioning effects

Odour impacts during the decommissioning of the existing Cambridge WWTP, existing Waterbeach Water Recycling Centre (WRC) and the future decommissioning of the proposed WWTP, specifically the draining and cleaning of tanks, will be of short duration. The results of the assessment of residual effect take into account secondary mitigation measures contained within Part A and B of the CoCP. Overall, the odour risks identified from the decommissioning activities are negligible and not significant.

Closing

Overall, the effect of the Proposed Development on odour during the construction, operational and decommissioning phases are not significant, and the Proposed Development does not conflict with national or local policies in relation to odour.

1 Introduction

1.1 Purpose of this chapter

- 1.1.1 This chapter of the Environmental Statement (ES) presents the potential impacts of the Proposed Development on odour.
- 1.1.2 The ES has been prepared as part of the application to the Planning Inspectorate (PINS) for development consent. This chapter considers the potential odour impacts of the Proposed Development during its construction (including commissioning), operation and maintenance, and decommissioning of the existing Cambridge WWTP, with reference to:
- construction of the proposed waste water treatment plant (WWTP) involving connections to existing waste water infrastructure;
 - decommissioning of the existing Cambridge WWTP for purpose of permit surrender;
 - wet commissioning of the proposed WWTP;
 - operation of waste water treatment processes at the Proposed Development; and
 - ancillary, abnormal and emergency (such as complete failure of all the ventilation facilities throughout the site) activities associated with the Cambridge Waste Water Treatment Plant Relocation (CWWTPR) project.
- 1.1.3 This chapter summarises information from supporting studies, technical reports and publicly available data which are included within Odour Impact Assessment Report (Appendix 18.2 App Doc Ref 5.4.18.2), Code of Construction Practice (CoCP) Part A & B (Appendix 2.1 and 2.2, App Doc Ref 5.4.2.1 & 5.4.2.2) and Preliminary Odour Management Plan (OMP) (Appendix 18.4 App Doc Ref 5.4.18.4)

1.2 Competency statement

- 1.2.1 Odour modelling undertaken to inform this chapter has been undertaken by Binnies on behalf of the applicant.
- 1.2.2 Summaries of the qualifications and experience of the chapter authors are set out in Table 1-1.

Table 1-1: Competent experts

Author	Qualification / Professional Membership	Years of experience	Project experience summary
JB	MSc Air Pollution Management and Control, University of Birmingham, 2011	11 years	Principal air quality consultant with experience on many projects requiring the application of quantitative and qualitative

Author	Qualification / Professional Membership	Years of experience	Project experience summary
	<p>BSc (Hons) Environmental Studies, University of Manchester, 2010</p> <p>Member of Institution of Environmental Sciences</p> <p>Member of Institute of Air Quality Management</p>		<p>assessment methodologies from the Institute of Air Quality Management (IAQM), Environment Agency, Defra and National Highways as well as other international practices. He has worked on projects across a range of sectors including water, transportation, power, and infrastructure both domestically and internationally.</p>
CM	<p>MSc Air Pollution Management and Control, University of Birmingham, 2007</p> <p>BSc (Hons) Environmental Science, University of Birmingham, 2006</p> <p>Member of the Institute of Environmental Sciences</p> <p>Member of the Institute of Air Quality Management</p>	15 years	<p>Air quality practice leader and oversees air quality assessments across the Mott MacDonald Group. He has been the technical lead for many air quality assessments and has experience of working in a range of sectors including water, power, oil and gas, petrochemicals, transportation and buildings. He oversees Environmental Permit applications and leads on the environment aspects of due diligence and Lenders' Technical Advisor work.</p> <p>Managed a variety of projects from small-scale mixed-use developments in the UK to large international environmental and social impact assessments (ESIA) to a range of international standards such as the Equator Principles and the International Finance Corporation (IFC) Performance Standards. He has recently been an Expert Witness for three transport projects in the UK on behalf of National Highways.</p>

National Policy Statement requirements

- 1.2.3 Planning policy on waste water Nationally Significant Infrastructure Projects (NSIPs) is contained in the National Policy Statement (NPS) for Waste Water (Department of Environment, Food and Rural Affairs, 2012).
- 1.2.4 Table 1-2 sets out how the scope proposed in this chapter complies with the NPS for Waste Water.

Table 1-2: Scope and NPS compliance

NPS requirement	Compliance of ES scope with NPS requirements
<p>Paragraph 4.3.6</p> <p>The assessment provided by the applicant should include:</p> <ul style="list-style-type: none"> ● a description of the component plant and processes of the development which will give rise to odour; ● nature of the odour emissions from the identified sources; ● consideration of the prevailing wind conditions; ● premises or locations that may be affected by the emissions; ● effects of the odour on identified premises or locations; and ● measures to be employed to prevent or mitigate odorous emissions. 	<p>An odour assessment has been undertaken and summarised in this ES chapter. A description of plant and processes which create odour, the odour character and consideration of the local features such as topography and meteorological data has been included in Section 2.5.</p> <p>The local worst-case receptors and their sensitivities are assessed to determine the likelihood of impacts or significant effects from odour. The results of the assessment are presented in Section 4: Assessment of Effects.</p> <p>Mitigation measures have been presented in Section 5.2, as well as the Code of Construction Practice (CoCP) Part A & B (Appendix 2.1 and 2.2 App Doc Ref 5.4.2.1 & 5.4.2.2), Outline Commissioning Plan (Appendix 2.4, App Doc Ref 5.4.2.4) and Outline Decommissioning Plan (Appendix 2.3, App Doc Ref 5.4.2.3) to prevent and mitigate odour emissions. These include design-specific mitigation (e.g. covered processes and positioning of odorous processes away from receptors) and management practices.</p>
<p>Paragraph 4.3.7</p> <p>These factors should be examined and assessed by means of a thorough and objective source receptor pathway risk assessment of potential odour impacts.</p>	<p>A Source-Pathway-Receptor assessment has been undertaken as part of the odour assessment and presented in Section 4: Assessment of Effects.</p>
<p>Paragraph 4.3.8</p> <p>Odour impacts should be assessed using appropriate odour impact standards that reflect whether the odour source is highly offensive, moderately offensive or less offensive.</p>	<p>The IAQM’s Guidance on the assessment of odour for planning has been used to quantify the offensiveness of odour, the results of which are presented in Section 2.2: Assessment Methodology. This guidance is considered best practice and has been developed specifically for planning purposes.</p>
<p>Paragraph 4.3.9</p> <p>The odour impact assessment should also include consideration of:</p> <ul style="list-style-type: none"> ● ancillary activities associated with the project, for example, transport of sludge; and ● the effects of abnormal operations (e.g. a major plant failure) and emergencies such as loss of sludge disposal route. 	<p>Consideration of ancillary activities and abnormal operations has been incorporated into the odour assessment, including the commissioning and decommissioning activities.</p>

Local Planning policy

1.2.5 Local planning policy of relevance to the Proposed Development includes:

- South Cambridgeshire District Council (SCDC) Local Plan 2018 (South Cambridgeshire District Council, 2018) with particular reference to:

- Policy SC/12: (p216) ‘Air Quality’ seeks to ensure that new developments do not exacerbate or be negatively impacted by air pollution and pollution from odour.
- Policy SC/14: (p219) ‘Odour and Other Fugitive Emissions to Air’ states that all major developments require an odour impact risk assessment or detailed odour impact assessment. Both odour-generating and odour-sensitive developments should be considered when assessing odour impacts.
- Cambridge City Council Local Plan 2018 (Cambridge City Council, 2018) with reference to:
 - Policy 36: (p134) ‘Air quality, odour and dust’ details that development will only be permitted where it will not lead to significant adverse effects on health, the environment or amenity and that any sources of odour generated by the development are appropriately mitigated and monitored.
- Cambridgeshire and Peterborough Minerals and Waste Local Plan 2036 (Cambridgeshire County Council and Peterborough City Council, 2021) with reference to:
 - Policy 17: (p49) ‘New mineral and waste management development must:... (b) ... taking into account environmental needs through the structure, layout and design of buildings and places, (C) provide a high standard of amenity for users of new buildings and maintain or enhance the existing amenity of neighbours’.
 - Policy 18: (p50) ‘New development must not result in unacceptable adverse impacts on the amenity of existing occupiers of any land or property, including... (f) air quality from odour, fumes, dust, smoke or other sources’.

1.3 Legislation

- 1.3.1 The principal legislative and planning context in relation to the assessment of the effects of the Proposed Development on odour is presented below.

Statutory nuisance

- 1.3.2 Section 79(1)(d) of the Environmental Protection Act 1990 (Parliament of the United Kingdom, 1990) defines (one type of) ‘statutory nuisance’ as ‘any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance’. Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. Best practicable means is a widely used technique to prevent or to counteract the effects of the potential nuisance.

Environmental Permitting

- 1.3.3 The Environmental Permitting (England and Wales) Regulations 2016 (Gov.uk, 2016) require the control of pollution, including odour. The Environment Agency issues and regulates environmental permits to enforce these regulations. The existing Cambridge WWTP is currently operated under an environmental permit and the proposed WWTP will require a new, separate environmental permit to operate.
- 1.3.4 Under an environmental permit, the site operator must prevent or, where that is not possible, minimise odour. Appropriate measures must be used, such as:
- minimising quantities and storage times for odorous materials;
 - managing materials and processes in ways which minimise odour; and
 - providing effective containment and abatement for odorous materials and activities.
- 1.3.5 Any process monitoring which indicates an odour issue, or reports from the community of odour pollution, must be responded to effectively and proportionately.
- 1.3.6 The environmental permit also requires the operator to have a written Environmental Management System (EMS), which includes a set of plans and procedures describing measures to avoid, reduce and eliminate potential environmental impacts associated with the activities covered by the permit. This includes an Odour Management Plan (OMP), which must explain how odour will be prevented or minimised from a site.

1.4 Consultation

Scoping

1.4.1 Table 1-3 provides a summary of key points raised during scoping.

Table 1-3: Key points raised during scoping

ID	Consultee	Points raised	Response
3.14.3	Planning Inspectorate	The ES should include additional information on future decommissioning (extent and duration) at the Proposed Development.	<p>Activities at the existing Cambridge WWTP have been assessed and presented in Section 4.4.</p> <p>Decommissioning of the proposed WWTP would be assessed as part of the planning application pertaining to the redevelopment of the site in the future and has not been considered in detail this chapter.</p> <p>Decommissioning effects would be expected to be of a similar nature to effects anticipated during construction and commissioning as they would follow a similar process.</p>
3.14.5		The ES should include further information on operational odour impacts from surface manhole valves.	Further information provided on the operation of surface manhole valves is provided in Chapter 2: Project Description (App Doc Ref 5.2.2). These are minor and intermittent sources of odour. There are no intermediate permanent access shafts between the Milton works and the proposed WWTW, which have been removed during further design evolution since scoping.
3.14.6		The ES should consider the potential for cumulative effects with the Milton Landfill and Waterbeach WRC despite the facilities falling slightly outside the 3km study area extent.	The ES has considered the potential for cumulative effects with the existing Cambridge WWTP, Milton Landfill and Waterbeach WRC. This is detailed in Section 4.2 and Section 4.3.
3.14.7		All assumptions and limitations with regard to the assessment should be clearly specified in all relevant sections of the ES. The assumptions used to inform the modelling should demonstrate how a worst-case scenario has been reflected.	All assumptions and limitations relevant to the assessment and modelling have been presented in the ES and demonstrate how the worst-case scenario for odour has been reflected.

ID	Consultee	Points raised	Response
n/a	South Cambridgeshire District Council (SCDC)	The ES should provide further detail on the commissioning of the proposed WWTP and the decommissioning of the existing Cambridge WWTP, in relation to the duration over which temporary odour emissions could be expected (hours, days or months?) and how it will be managed until it is considered “typical” of the operations of the site.	Information on the duration over which temporary odour emissions could be expected during periods within the commissioning of the proposed WWTP and the decommissioning of the existing Cambridge WWTP is included in Chapter 2: Project Description (App Doc Ref 5.2.2). The measures for how odour will be managed are contained within Code of Construction Practice (CoCP) Part A & B (Appendix 2.1 and 2.2, App Doc Ref 5.4.2.1 & 5.4.2.2), Outline Commissioning Plan (Appendix 2.4, App Doc Ref 5.4.2.4) and Outline Decommissioning Plan (Appendix 2.3, App Doc Ref 5.4.2.3).
n/a		The ES should provide clarification on the vents associated with the transfer tunnel from the existing Cambridge WWTP to the proposed WWTP, with the system designed sufficiently to ensure that the vents do not cause odour impacts.	There is a tunnel vent located at the interception shaft at the start of the waste water transfer tunnel within the existing Cambridge WWTP. The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control. Section 4.3 assess operation of the vent.
n/a		The ES should demonstrate that odour has been a consideration when designing the public access areas to and around the site.	The footpath to the north-east of the proposed WWTP under Institute of Air Quality Management guidance (IAQM, 2018) is a low-sensitivity receptor and has been considered as such in the odour assessment. The footpath is set away from the proposed WWTP. See Chapter 2: Project Description (App Doc Ref 5.2.2) for further information on design, and the Landscape, Ecological and Recreational Management Plan (Appendix 8.14, App Doc Ref 5.4.8.14).

Technical Working Groups

1.4.2 Table 1-4 provides a summary of key points raised during engagement with Technical Working Groups.

Table 1-4: Key points raised during engagement with Technical Working Groups

Date	Consultee	Points raised	How and where addressed
24/06/2021	SCDC	Method agreed.	None to address
16/11/2021	SCDC and Greater Cambridge Shared Planning	SCDC Principal Environment Officer suggested that it would be useful for parish councillors and other stakeholders to have context as to	The criteria utilised for determining the significance of odour effects are described in this chapter. A baseline ‘sniff-testing’ survey has been

Date	Consultee	Points raised	How and where addressed
		the likely odour impacts and what ‘negligible’ impacts means in real terms.	completed and outcome summarised in Section 3. Appendix 18.3 (App Doc Ref 5.4.18.3) provides a copy of the test report.
02/02/2022	SCDC and Greater Cambridge Shared Planning	Consideration of odour at the effluent outfall point.	The operation of the treated effluent discharge outfall to the River Cam (hereafter referred to as the outfall) is considered in Section 4.3.
29/04/2022		Details of the decommissioning plan and to review time scales to consider impacts of noise/odour and air quality.	An Outline Decommissioning Plan is provided (Appendix 2.3, App Doc Ref 5.4.2.3).
29/04/2022		Details of the vent shafts particularly the one nearest the core site. Ideally would like these modelled.	The modelling of vent shafts has been considered, however there is little merit in this exercise owing to the variability of operation and taking into account the embedded measures as part of the design for vents that seek to minimise odour.
29/04/2022		The need to reassure residents about odour and that impact on recreational areas/walkways has been considered.	Chapter 2: Project Description describes the features of the Proposed Development designed to control its odorous elements. The landscape masterplan which sets out the location of proposed pathways has been informed by detailed odour modelling. The location of features within the masterplan has sought to route pathways away from the main works, ensuring that effects from odour would not be significant. The guidance from the IAQM has been applied for the assessment of receptors, including the proposed pathways. The modelling adopted takes a conservative view of the potential for odour and therefore the odour levels that may be experienced within the area of land where proposed footpaths are situated represents a worst case.
29/04/2022		Would like to see timings of actual decommissioning and commissioning plan so can map out potential periods of impact eg: connection of tunnel and actual period this will fall into.	Outline Commissioning Plan (Appendix 2.4, App Doc Ref 5.4.2.4) and Outline Decommissioning Plan (Appendix 2.3, App Doc Ref 5.4.2.3). The draft decommissioning plan was shared with the Environment Agency on 14th July 2022. Chapter 2: Project Description provides detail on the expected timings of activities.

Date	Consultee	Points raised	How and where addressed
			The decommissioning and commissioning programmes, have been set out but are subject to refinement. SDC and GCSP will be kept informed as to the final timings.

Statutory s42 consultation

1.4.3 Table 1-5 provides a summary of key points raised during the statutory s42 consultation.

Table 1-5: Key points raised during statutory consultation

Date	Consultee	Points raised	How and where addressed
27/04/2022	South Cambridge District Council	The District Council considers more details are required particularly with regard to the use of negative pressure and air locks on sludge buildings, covers on tanks, etc. The documents refer to higher concentrations of odour being experienced from the site whilst the site becomes operational which may continue for a number of months before settling down. The District Council considers that Anglian Water should model this odour and base this on their experience of similar new sites. This will ensure transparency and a sound evidence base upon which to assess, manage and consider complaints, should they arise from either local residents or people visiting the area. It is noted that some odour may be released from vent shafts with one proposed vent shaft in particular to be located approximately 10m away from a residential property on Low Fen Drove Way. Further information should be provided about this aspect so that the impact on the property can be fully understood e.g., how often the vent shaft is likely to release odour and the methodology for assessing the potential impact.	Outline Commissioning Plan (Appendix 2.4, App Doc Ref 5.4.2.4). This describes the likely significant effects during commissioning of the proposed WWTP. Increased odour risk is not anticipated during that phase. Following consultation feedback, design review and evolution has enabled the removal of the intermediate vent shaft .

Date	Consultee	Points raised	How and where addressed
27/04/2022	South Cambridge District Council	The Council would expect that, should the DCO be granted for this development proposal, odour monitoring should be undertaken to verify any modelling undertaken within twelve months of the site becoming fully operational. This would need to be reflected in a requirement of the DCO and which the District Council would expect to comment upon at the DCO examination stage.	Preliminary OMP (Appendix 18.4, App Doc Ref 5.4.18.4) includes details in relation to operational monitoring practices and frequency. Anglian Water is not seeking to disapply the Environmental Permit under the DCO. The OMP would be subject to and controlled under the Environmental Permit, regulated by the Environment Agency.
27/04/2022	Cambridge City Council	The main potential source of odour impact for Cambridge will be the waste water transfer tunnel between the CWWTP and ReWWTP ('the WW transfer tunnel'). From an operational level the City Council, along with other neighbouring Districts to the WW transfer tunnel site, will need to be able to assess and understand in greater detail potential odour impacts associated with the proposed ReWWTP. Alongside the WW transfer tunnel structure, the proposals provide for three ventilation shafts in addition to primary inlet points and pumping infrastructure. The three ventilation shafts are proposed with one adjacent to the B1047 Horningsea Road and the Poplar Hall Farm access road; one close to Red House Close, Fen Ditton; and the third located within the CWWTP. It is stated that in the case of potential odour from the ventilation shafts associated with the transfer tunnel, the design, the location, and height of vents will be modified to mitigate against odour impacts where possible and that a suitable maintenance regime will be put in place to minimise the potential for odour. There is currently no odour modelling and prediction of odour level contours available for these vent shaft locations – although the principles outlined, which include filters and above ground level discharges,	Following consultation feedback, design review and evolution has enabled the removal of the intermediate vent shaft located at Shaft 4. Therefore, odour impacts are not expected along the route of the waste water transfer tunnel during operation. One ventilation shaft will be retained within the footprint of the existing Cambridge WWTP. This will be odour controlled and given that its operation would be intermittent (it is not actively vented, but 'breathes' as water levels change and air is displaced from the pipe), no significant effects are anticipated. A second vent is contained within the proposed WWTP.

Date	Consultee	Points raised	How and where addressed
		<p>are noted. Local site-specific significance of odour impact assessment has also not been provided for the transfer tunnels' infrastructure between the existing and proposed site. This information will be required as ideally in advance of any DCO application to allow the City Council to form a view on the local impacts of the scheme from odour.</p>	
27/04/2022	Fen Ditton Parish Council	<p>Given that the model leaves an average of around 6 days per year with conditions worse than the model inputs and excludes emergency/out of design conditions, FDPC considers Anglian Water should reverse model odour spread to predict and report how much the wind speeds or source terms would have to increase for 0.75 and 1.5ou detection limits to be breached at the 600m zone and at residences including Musgrave Way, High Ditch Rd, Marleigh, Horningsea and Biggin Abbey some of which are within Anglian Water's mapped 1km zone. In addition, although the wind rose for Cambridge Airfield and Mildenhall (2020) looks plausible the ES should include a comparison of the modelled wind speeds and those in a longer term data span in case the former has missed the strong south easterlies or the north easterlies and north westerlies that sometimes occur.</p>	<p>Five years of hourly meteorological data have been included in the odour assessment with wind data presented in wind roses in Odour Assessment Method and Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1). This represents up to 43,848 hours of meteorological data, covering all conditions encountered over a five year period. The assessment approach follows professional guidance and best practice.</p>
27/04/2022	Horningsea Parish Council	<p>The odour modelling presented is understood to be based on a preliminary assessment and doesn't account for odour that could occur with above average weather conditions or outside of 'normal operations', such as spillages, accidents or ancillary operations e.g., transporting sludge. The documents do not provide any analysis of the</p>	<p>Odour modelling presented within the ES incorporates five years of hourly meteorological data as per IAQM's 'Guidance on the assessment of odour for planning' (IAQM, 2018) to account for variability in weather conditions. Meteorological data has been discussed further in Odour Assessment Method and Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1).</p>

Date	Consultee	Points raised	How and where addressed
		frequency of these types of incidents and how they could impact odour levels	Odour impacts outside of normal operations and during ancillary operations have been considered qualitatively using a risk based approach following the IAQM Source-Pathway-Receptor model.
27/04/2022	Horningsea Parish Council	It is also unclear if the modelling is based on a continuous bund, or the latest reduced height bund with ventilation gaps. There doesn't appear to be any variation in the odour profile in the vicinity of the ventilation gaps, which could suggest that the odour profile is not current. Furthermore, there appears to be no assessment of conditions classified by the Institute of Air Quality Management (IAQM) as the 'most offensive odours', such as occurrences of septicity, which have a significant bearing on the odour classification and impact on the environs. HPC believe that these are important omissions.	Odour modelling is based on the final layout and earth bank design. The earth bank is not expected to influence odour dispersion, although it has some effect on surface roughness. Odour modelling incorporates emissions from the least, moderate and most offensive odour sources within the proposed WWTP under normal operating conditions.
27/04/2022	Horningsea Parish Council	We also request more detailed information on the data behind the odour models presented to us. The PEI Odour Paper states that prevailing wind is from the Southwest, but no detailed data is provided and the radial key is missing from the wind rose provided, so we have no certainty of the number of days it blows from the south west. There must be significant number of days it blows from the north and would therefore have an impact on sensitive receptors such as Fen Ditton Primary School.	Odour modelling presented within the ES incorporates five years of hourly sequential meteorological data. Wind direction and speed are presented as wind roses, along with a description of how to interpret the wind roses, in Odour Assessment Method and Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1).
27/04/2022	Horningsea Parish Council	We also request more information on the odour impact of the tunnels, pumping venting and from the vent shafts. Odour nuisance is already experienced in the existing Fen Ditton transfer area. Ventilation shafts (Field Lane) and manhole outside pumping station create problematic odour for residences, gardens and inside homes. There is	Following consultation feedback, design review and evolution has enabled the removal of the intermediate vent shafts at Shaft 4. Therefore, odour impacts are not expected along the route of the waste water transfer tunnel during operation.

Date	Consultee	Points raised	How and where addressed
		also a possibility of cumulative effects – residents in Abbots Way, Horningsea, have repeatedly complained about the Amey Cespa plant and could be impacted by odour from both directions.	
27/04/2022	Horningsea Parish Council	<p>Odour document shows a contours map with a 1km ‘odour buffer zone’ which encompasses the majority of homes in the village of Fen Ditton, a number of homes in Horningsea Village, Fen Ditton Conservation Area, Baits Bite Lock Conservation Area and Horningsea Conservation Area. However, we cannot find any reference to the 1km buffer in the main text. HPC would like an explanation of the 1km buffer zone because it contains sensitive receptors. NB: The cemetery and allotments in Horningsea are missing from the odour diagrams and are approximately 600m and 800m away from the plant, therefore within 1km. We consider these to also be sensitive receptors.</p>	<p>The Preliminary Environmental Information (PEI) for Odour presented a figure (<i>Figure 2: Predicted odour concentration contours for the proposed WWTP</i>, Book of Figures – Odour, App Doc Ref 5.3.18) which included the location of the proposed WWTP, odour contours, community considerations and a 1km buffer from the proposed WWTP amongst other detail.</p> <p>Assuming this is the map referred to, the 1km buffer is only intended to give context of scale and nothing more. The modelled odour contours are presented to give a prediction of odour concentration during operation of the proposed WWTP.</p>

Statutory s47 local community consultation

1.4.4 The Consultation Report (App Doc Ref 6.1) details the responses to all comments made during the public consultation. Matters raised in relevance to Odour include:

- impact of weather conditions on odour;
- odour impacts on receptors;
- odour in construction and from decommissioning activities; and
- odour impact to users of the proposed recreational pathways within the landscape masterplan.

2 Assessment Approach

2.1 Guidance

National Planning Practice Guidance

- 2.1.1 The National Planning Practice Guidance (Gov.uk, 2019) includes a section on air quality, which sets out the information local planning authorities may require in relation to air quality and odour and matters for determining whether they are relevant to a planning decision. It also states that 'odour and dust can be a planning concern, for example, because of the effect on local amenity' (Reference ID: 32-001-20191101).

Guidance on the Assessment of Odour for Planning

- 2.1.2 The IAQM published the Guidance on the Assessment of Odour for Planning in 2018 (IAQM, 2018), providing appropriate best-practice odour methods for use in assessing odour for planning applications. This guidance was developed specifically for planning purposes and does not replace other guidance issued by the Environment Agency for regulatory purposes. The guidance presents a range of tools for the assessment of odour, from Source-Pathway-Receptor risk assessments to atmospheric modelling. The guidance emphasises the importance of combining assessment tools where possible to minimise uncertainty and increase confidence in the overall assessment conclusions.

H4 Odour Management guidance

- 2.1.3 Environment Agency's H4 Odour Management guidance (Environment Agency, 2011) provides information on best practice management of odour at waste facilities. The guidance covers the Environment Agency's regulatory requirements with regard to odour, advice on the modelling and management of odour, and the aspects that should be dealt with in an OMP.

2.2 Assessment methodology

- 2.2.1 The general approach to assessment is described in Chapter 5: EIA Methodology (App Doc Ref 5.2.5).
- 2.2.2 Primary mitigation for the Proposed Development has been identified as part of an iterative design process and is described in Chapter 2 (Project Description: App Doc Ref 5.2.2) and Chapter 3 (Site Selection and Alternatives: App Doc Ref 5.2.3). The preliminary assessment of the likely significant environmental effects has been undertaken with the assumption that primary and tertiary mitigation will be implemented.
- 2.2.3 Following the preliminary assessment of the likely significant effects of the Proposed Development, any further mitigation measures (secondary mitigation) are identified and described. These mitigation measures would further reduce an adverse effect or

enhance a beneficial one. The assessment of likely significant effects is then carried out taking into account the identified secondary mitigation measures to identify the 'residual' environmental effects.

- 2.2.4 This section provides specific details of the odour methodology applied to the assessment of the Proposed Development.
- 2.2.5 The full method of assessment for odour used for the Proposed Development is detailed within the Odour Assessment Method & Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1).
- 2.2.6 The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor affected by the impact. The assessment of odour is by qualitative and quantitative approaches following the IAQM's guidance on the assessment of odour for planning (IAQM, 2018). The IAQM guidance promotes a 'multi-tool approach where practicable'. Accordingly, a qualitative risk assessment approach has been applied in combination with quantitative odour prediction using a dispersion model for the operational phase, to evaluate the potential for odour impacts on receptors in the surrounding area.
- 2.2.7 The terms used to define magnitude and sensitivity of receptors are based on IAQM guidance (IAQM, 2018).
- 2.2.8 The scale of exposure (impact) is determined using factors referred to as the FIDO factors (**F**requency, **I**ntensity, **D**uration and **O** odour unpleasantness) and sensitivity of receptors determined by **L**ocation. Together, the FIDOL factors presented in Table 2-1 aid in the overall assessment of effect of odour. They have been considered when determining the odour impacts at receptor locations.

Table 2-1: Description of the FIDOL factors

Factor	Description
Frequency	How often an individual is exposed to odour.
Intensity	The individual's perception of the strength of the odour.
Duration	The overall duration that individuals are exposed to an odour over time.
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/ intensity.
Location	The type of and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.

- 2.2.9 Table 2-2 presents a summary of the method and odour assessment tools used for different activities during the construction, operation and decommissioning phases.

Table 2-2: Summary of method and odour assessment tools by phase

Phase	Activity	Method	Odour assessment tool	Details	Rationale
Construction	Short-term emissions from works to tie into existing sewers	Qualitative	Risk-based assessment using Source-Pathway-Receptor approach	Risk-based score or description (negligible, low, medium, high risk impact)	Activities are likely to have a low risk of adverse effects.
	Seeding, testing and commissioning of the proposed WWTP				Activities would be temporary and intermittent with a short duration.
Operation and maintenance	Short-term abnormal operation of the proposed WWTP	Qualitative	Risk-based assessment using Source-Pathway-Receptor approach	Risk-based score or description (negligible, low, medium, high risk impact)	Activities likely to have a low risk of adverse effects.
	Accidental spills or leaks of sludge/septic waste water deliveries				Activities would be temporary and intermittent with a short duration.
	Operation of sewer valves	Quantitative (modelling)	New generation atmospheric dispersion model, AERMOD	Predicted concentration (ou_e/m^3)	Sources of odour are clearly identifiable.
	Normal operation of the proposed WWTP				Activities would be permanent with a long term duration. Emission rates are known or can be reasonably approximated.
Any maintenance activity that may require an interruption to activated sludge process (ASP) Maintenance to the inlet	Qualitative	Risk-based assessment using Source-Pathway-Receptor approach	Risk-based score or description (negligible, low, medium, high risk impact)	Activities likely to have a low risk of adverse effects.	

Phase	Activity	Method	Odour assessment tool	Details	Rationale
	Maintenance of the sludge treatment centre (STC) Maintenance of digesters requiring opening of process area to open air				
Decommissioning	Cleaning and draining of tanks at the existing Cambridge WWTP and existing Waterbeach WRC	Qualitative	Risk based assessment using Source-Pathway-Receptor approach	Risk-based score or description (negligible, low, medium, high risk impact)	Activities likely to have a low risk of adverse effects. Activities would be temporary with a limited duration.
	Disconnecting the section of the Waterbeach pipeline between its connection with the transfer tunnel and connection to the proposed WWTP	Qualitative	Risk based assessment using Source-Pathway-Receptor approach	Risk-based score or description (negligible, low, medium, high risk impact)	Activities likely to have a low risk of adverse effects. Activities would be temporary with a limited duration.

Source: Table 4 IAQM 2018 Guidance

Quantitative approach

- 2.2.10 A standalone quantitative assessment report is provided within the Odour Impact Assessment Report (App Doc Ref 5.4.18.2).
- 2.2.11 A quantitative approach using atmospheric dispersion modelling has been used in accordance with the IAQM odour guidance and the Environment Agency's H4 Odour Management guidance (Environment Agency, 2011). The odour modelling inputs and assumptions are detailed below and in Odour Impact Assessment Report (Appendix 18.2, App Doc Ref 5.4.18.2).
- 2.2.12 The IAQM descriptors for odour effect are presented in Table 2-4. 'Adverse' or 'beneficial' are added to the descriptors depending on whether there is an increase or decrease in odour exposure, respectively. Background odour sources are de minimis within the 3km radius study area (see Section 2.3), and therefore have not been included within the modelling.
- 2.2.13 The IAQM guidance provides a range of tables for determining significance based on the type of odour and how it is perceived, building upon the principles of the FIDOL factors presented in Table 2-1. The guidance states that 'odours from sewage treatment works plant operating normally, i.e., non-septic conditions, would not be expected to be at the 'most offensive' end of the spectrum and can be considered on par with 'moderately offensive' odours such as 'intensive livestock rearing'. The Proposed Development would be non-septic under normal operating conditions and therefore is considered to fall into the 'moderately offensive' category for assessment (Table 5: H4 Benchmark odour criteria within IAQM guidance 2018).
- 2.2.14 Dispersion modelling provides predicted results as a concentration, i.e., an odour unit per cubic metre of air. The Environment Agency H4 guidance (Environment Agency, 2011) explains that an odour unit is a measure of the concentration of a mixture of odorous compounds and is defined by the European Committee for Standardisation (CEN) as ou_E (European Odour Unit). One European Odour Unit per cubic metre ($1ou_E/m^3$) is the point of detection and means that odour concentrations measuring $1ou_E/m^3$ should be detected (smelled) by half of the population, while the other half would not be able to detect an odour of this concentration.

Model Selection

- 2.2.15 A new generation dispersion model, AERMOD (executable version 21112), has been used for the odour modelling. This model is widely used, including for the prediction of odour impact, and was developed for the United States Environmental Protection Agency.
- 2.2.16 Its use for odour modelling has been accepted by the UK Environment Agency and it is considered a suitable predictive modelling tool for odour assessment by the IAQM for the assessment of odour for planning purposes.
- 2.2.17 A wide range of input data must be incorporated into the dispersion model including odour emission rates, source emission parameters (e.g., temperature, exit velocity,

diameter), building dimensions for structures close to odour sources, meteorological data, surrounding land use and receptor locations. Details of model parameters are presented in Odour Impact Assessment Report (Appendix 18.2, App Doc Ref 5.4.18.2).

Impacts of climate change on future odour emissions

- 2.2.18 An increase in summer temperatures and reduced rainfall could increase odour due to reduced influent dilution. The slower flow from reduced rainfall may also cause longer transfer times to the proposed WWTP which could cause extensive anaerobic decomposition to occur.
- 2.2.19 Table 2-3 presents temperature statistics for each season using data recorded at Cambridge City Airport (with missing data supplemented from RAF Mildenhall) in 2019. The data demonstrates that the average Summer 2019 temperature was 18°C with a maximum recorded temperature of 38°C which occurred in July.
- 2.2.20 The average temperature in Summer 2019 was 7°C warmer than the annual average. The maximum recorded temperature and minimum recorded temperature in Summer 2019 are considerably higher than those recorded for the other three seasons.
- 2.2.21 The impact of climate change on odour concentrations has been considered in the odour modelling assessment by using odour emission rates from the existing Cambridge WWTP obtained from monitoring during the Summer of 2019. These emission rates obtained during the summer months have been applied to the proposed WWTP across the whole year.
- 2.2.22 The application of summer odour emission rates all year round is conservative. This is because odour concentrations are calculated on an hourly basis using the 98th percentile across a calendar year. Therefore, this assessment is using emission rates from the summer during colder months when emission rates are likely to be much lower.
- 2.2.23 Furthermore, climate change is not expected to alter future baseline odour emissions. Both existing odour sources and the Proposed Development would be expected to comply with the requirements of their environmental permits and mitigate any increases in odour emissions associated with changes in climate.

Table 2-3: Seasonal temperature statistics from Cambridge City Airport for 2019 (°C)

Season	Average	Maximum	Minimum
Spring	10	24	-2
Summer	18	38	8
Autumn	11	25	-3
Winter	6	18	-5
Average	11	-	-

Notes: Seasons based on three consecutive whole months with spring starting in March

Quantitative Impact Assessment criteria

Magnitude of impact

- 2.2.24 The modelled impacts have been described at local receptors based on the predicted odour exposure level from the modelling. Odour is expressed as a one-hour average at the 98th percentile of total annual hours of odour emissions (ou_E/m^3), in line with IAQM and Environment Agency guidance.
- 2.2.25 The IAQM odour guidance outlines the magnitude of odour impact predicted for ‘moderately offensive’ odours based on modelled changes in odour exposure level. These descriptors are presented in Table 2-4 and have been used when assessing the operational impacts of the proposed WWTP.

Table 2-4: IAQM odour magnitude of effect descriptors for impacts predicted by modelling – ‘moderately offensive’ odours

Magnitude of impact	Odour exposure level $C_{98,ou_E}/m^3$
Very Large	≥ 10
Large	5-<10
Medium	3-<5
Small	1.5-<3
Very Small	0.5-<1.5
Negligible	<0.5

Source: Adapted from Table 7 IAQM 2018.

Sensitivity of receptor

- 2.2.26 The criteria for defining receptor sensitivity for the assessment of odour impacts are defined in Table 2-5.

Table 2-5: Receptor sensitivity

Receptor criteria	Study area
High sensitivity receptor	Surrounding land where people could reasonably expect a high level of amenity and would reasonably be expected to be present here continuously, or at least regularly for extended periods (e.g., residential dwellings, hospitals and schools).
Medium sensitivity receptor	Surrounding land where people could expect to enjoy a reasonable level of amenity but not the same level of amenity as in their own home. People would not reasonably be expected to be present here continuously or regularly for extended periods. (e.g., places of work, commercial/retail premises and playing fields).
Low sensitivity receptor	Surrounding land where the enjoyment of amenity would not reasonably be expected or there is transient exposure and people would reasonably be expected to be present but only for limited periods of time (e.g., farms, footpaths, roads).

Source: Table 2 IAQM guidance.

Significance of effect

2.2.27 The magnitude of impact and the sensitivity of receptors are combined in Table 2-6 to give the overall effect descriptor.

Table 2-6: IAQM descriptors for magnitudes of odour effects

Magnitude of impacts	Sensitivity/value of receptor		
	Low	Medium	High
Very Large	Moderate	Substantial	Substantial
Large	Slight	Moderate	Moderate
Medium	Negligible	Slight	Moderate
Small	Negligible	Negligible	Slight
Very Small	Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible

Qualitative approach

2.2.28 The qualitative risk assessment follows the Source-Pathway-Receptor concept; for odour exposure to occur and cause an effect, all three links in the Source-Pathway-Receptor model must be present. There must be a means for the odour to be released into the air (source), a way for the odour to travel through the air (pathway) and people (receptor) must be present at the locations where the odour is present.

2.2.29 A risk-based approach has been adopted to consider the potential for odour effects to occur considering the scale of the odorous emissions, distance to nearby sensitive areas or receptors, prevailing wind conditions, and the management measures, which would prevent or reduce odour emissions at the source. This involved applying the assessment approach set out in the IAQM's guidance on the assessment of odour for planning (IAQM, 2018).

Qualitative Impact Assessment criteria

Magnitude of impact

2.2.30 The source odour potential has been determined based on Table 9 of the IAQM odour guidance (IAQM, 2018) taking into account the FIDOL factors and presented in Table 2-7. This considers the magnitude of the odour release, taking into account any mitigation measures, how odorous the compounds are and the unpleasantness of the odour.

Table 2-7: Source odour potential

Source odour potential	Description
Large	Magnitude – Larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m ³ per year; area sources of thousands of m ² , the compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known.

Source odour potential	Description
	<p>Unpleasantness – processes classed in H4 Odour Management Guidance* as “Most offensive”; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score.</p> <p>Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.</p>
Medium	<p>Magnitude – Smaller Permitted processes or small Sewage Treatment Works (STWs); materials usage thousands of tonnes/m³ per year; area sources of hundreds of m². The compounds involved are moderately odorous.</p> <p>Unpleasantness – processes classed in H4 Odour Management Guidance * as “Moderately offensive”; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score.</p> <p>Mitigation/control – some mitigation measures in place, but significant residual odour remains.</p>
Small	<p>Magnitude – Falls below Part B threshold; materials usage hundreds of tonnes/m³ per year; area sources of tens of m². The compounds involved are only mildly odorous, having relatively high ODTs where known.</p> <p>Unpleasantness – processes classed in H4 Odour Management Guidance *as “Less offensive”; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score.</p> <p>Mitigation/control – effective, tangible mitigation measures in place (e.g. BAT, BPM) leading to little or no residual odour.</p>

Source: Table 9 IAQM guidance. * H4 Odour Management Guidance (Environment Agency, 2011)

Sensitivity of receptor

2.2.31 The criteria for defining receptor sensitivity for the assessment of odour impacts are defined within Table 2-5.

Pathway effectiveness

2.2.32 The location of a sensitive receptor determines the pathway effectiveness and is based on Table 9 of the IAQM odour guidance (IAQM, 2018). Pathway effectiveness is the transport mechanism for odour through the air to the receptor and is primarily determined based on:

- distance between the odour source and the receptor; and
- direction with respect to frequency of wind (whether the receptor is downwind or upwind of the odour source).

2.2.33 The approach for determining pathway effectiveness is presented in Table 2-8 and Figure 2-1. Wind direction has been split into downwind and upwind based on recorded meteorological data from Cambridge City Airport, presented in Figure 2-1, which demonstrates that prevailing wind is from the south-west, as is typical for the UK.

Table 2-8: Distance and direction for pathway effectiveness

Distance	Direction	Effectiveness
Less than 200m	Downwind	Highly Effective
200m to 500m	Downwind	Moderately Effective
More than or equal to 500m	Downwind	Ineffective
Less than 100m	Upwind	Highly Effective
100m to 300m	Upwind	Moderately Effective
More than or equal to 300m	Upwind	Ineffective
Immediately adjacent	All	Highly Effective

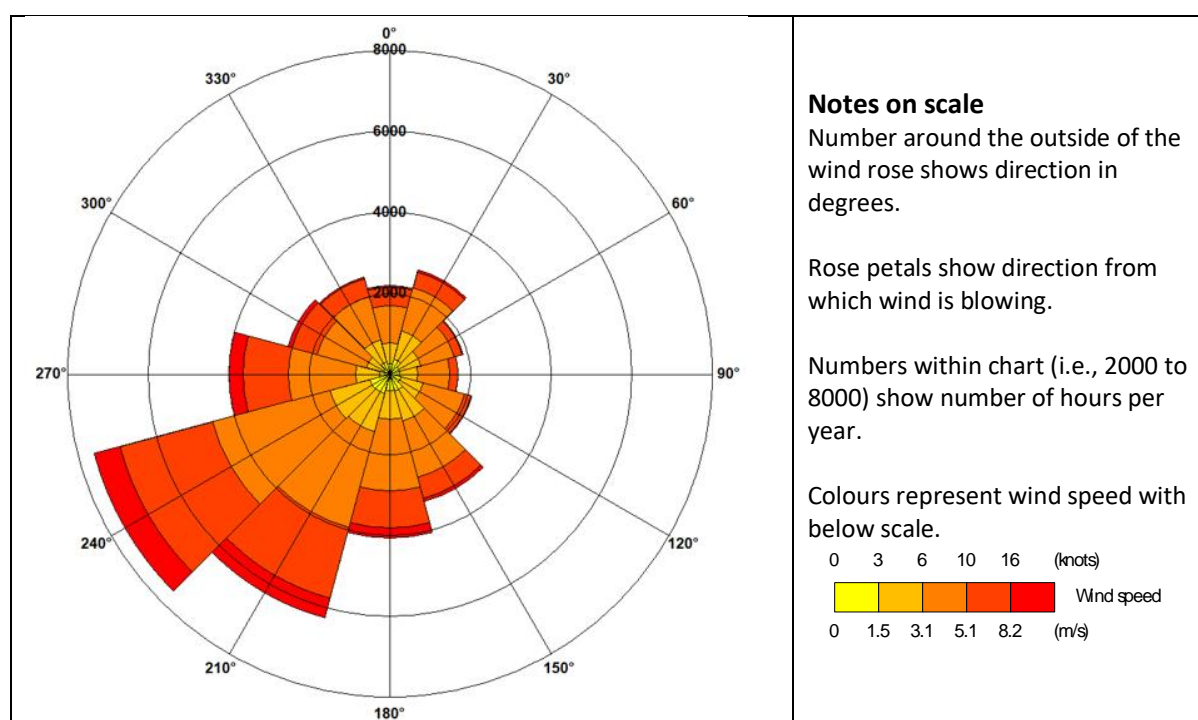


Figure 2-1: Combined 2016 - 2020 wind rose from Cambridge City Airport used to define pathway effectiveness (2016 - 2020)

Odour Exposure Risk

- 2.2.34 The source odour potential and the pathway effectiveness are combined to predict the odour exposure risk at the receptor location as presented in Table 2-9.
- 2.2.35 The odour exposure risk is combined with the receptor sensitivity to derive the potential ‘magnitude of odour effect’ ranging from negligible to major adverse based on Table 10 of the IAQM odour guidance (IAQM, 2018) and presented in Table 2-10.

Table 2-9: Odour exposure risk (impact) at receptors

		Source odour potential		
		Small	Medium	Large
Pathway effectiveness	Highly effective	Low risk	Medium risk	High risk
	Moderately effective	Negligible risk	Low risk	Medium risk
	Ineffective	Negligible risk	Negligible risk	Low risk

Source: Table 10 IAQM 2018

Table 2-10: IAQM descriptors for magnitudes of odour effects

Risk of odour exposure	Receptor sensitivity		
	Low	Medium	High
High	Slight adverse effect	Moderate adverse effect	Substantial adverse effect
Medium	Negligible effect	Slight adverse effect	Moderate adverse effect
Low	Negligible effect	Negligible effect	Slight adverse effect
Negligible	Negligible effect	Negligible effect	Negligible effect

Source: Table 11 IAQM 2018

Significance of effect

- 2.2.36 The conclusion on the overall significance of likely odour effects on the surrounding area has been determined on the basis of the ‘weight-of-evidence’ provided by both odour assessment tools, with consideration of their inherent strengths, weaknesses and uncertainties and has been quantified as either ‘significant’ or ‘not significant’.
- 2.2.37 The odour impact descriptors are assigned for each sensitive receptor according to the tool applied. The Chartered Institute of Water and Environmental Management (CIWEM) Position Policy Statement and the IAQM guidance state that for concentrations below $3 \text{ ou}_E/\text{m}^3$, complaints are unlikely to occur and exposure below this level is unlikely to constitute significant pollution or significant detriment to amenity unless the locality is highly sensitive or the odour highly unpleasant in nature.
- 2.2.38 Where there are multiple receptors, an overall significance of effect on the surrounding area is required. The IAQM odour guidance (IAQM, 2018) states: ‘this requires the competent and suitably experienced Air Quality Practitioner to apply professional judgement’.
- 2.2.39 For the purposes of this assessment, impacts of **Slight Adverse** or **Slight Beneficial** and above would generally be considered to cause a significant effect, although professional judgement would be applied. It is worth noting that a single Slight Adverse or Slight Beneficial impact does not necessarily equate to an overall significant effect. The IAQM guidance (IAQM, 2018) also states that ‘concluding that an effect is significant should not mean, of itself, that a development proposal is unacceptable and the planning application should be refused; rather, it should mean that careful consideration needs to be given to the consequences, scope for securing

further mitigation, and the balance with any wider environmental, social and economic benefits that the proposal would bring’.

Residual effect

2.2.40 The assessment of effects follows the approach set out within Chapter 5: EIA Methodology (App Doc Ref 5.2.5). Effects have been assessed to take into account for both embedded (primary) mitigation, best practice and measures secured by legal requirements (tertiary mitigation), and after the application of further mitigation measures (secondary mitigation). Effects after mitigation are referred to as ‘residual effects’.

2.3 Study area

2.3.1 The maximum area of land required for the construction, operation, and maintenance of the Proposed Development and decommissioning of the existing WWTP, including land required for permanent and temporary purposes, within the Location and Scheme Order Limits Plan (App Doc Ref 4.1).

2.3.2 For odour, the relevant guidance does not limit the distances at which receptors could be considered, although a limit must be applied to undertake a modelling assessment. Based on professional judgement and the outcome of the iterative odour modelling undertaken throughout the design process, a 3km radius from the Proposed Development was selected for the modelling.

2.3.3 The receptors closest to the construction of the sewer connections and decommissioning and commissioning activities have been considered qualitatively in relation to these particular activities, as these would most likely experience the greatest odour impacts.

2.3.4 The receptors relevant to odour are:

- human receptors (additional information on human receptor sensitivities is provided in Table 2-5).

2.3.5 The key sources relevant to odour are:

- waste water and sludge treatment processes (e.g., the sludge digesters) at the Proposed Development; and
- decommissioning activities at the existing Cambridge WWTP (e.g., cleaning of tanks).

2.4 Temporal scope of assessment

Construction

2.4.1 For the assessment, these effects will be taken to be those for which the source begins and ends during the construction and commissioning stages prior to the

proposed WWTP becoming fully operational as set out in Chapter 2 Project Description (App Doc Ref 5.2.2).

2.4.2 The assumed assessment years for construction are from 2024 until 2028.

Operation and maintenance

2.4.3 For the assessment, these are the effects that, start once the proposed WWTP is commissioned and fully operational and includes the effects of the physical presence of the infrastructure, its operation, use and maintenance, including the permanent change in land use.

2.4.4 The assessment of operational effects is representative of all future operation (excluding any commissioning period for the proposed WWTP as this is part of the Construction Phase). The proposed WWTP proposes to become fully operational in 2028, therefore the assessment year for the Operational Phase is 2028.

Duration of effects

2.4.5 Timescales associated with these effects, regardless of phase are as follows:

- Short-term – endures for up to 12 months after construction or decommissioning
- Medium-term – endures for 1-5 years
- Long-term – endures for 5-15 years
- Permanent effects – endures for more than 15 years and / or effects which cannot be reversed (e.g. where buried archaeology is permanently removed during construction)

Phase 2 expansion

2.4.6 Phase 2 construction is within the operational lifetime of the WWTP, expected to be 2036-2050, but likely before 2041

2.4.7 Construction of 2 additional tanks would not result in new or worse impacts than those considered at the construction phase years 1 – 4 in relation to short term emissions that may be associated with commissioning of the additional tanks. Construction activities would be inside the earth bank and controlled by measures within a CEMP (and associated sub-plans), a CTMP, and CWTP approved prior to the start of construction.

2.4.8 The odour impact assessment has considered a worst case covering full capacity operation i.e. with the additional tanks.

2.5 Baseline study

Desktop data

Odour Emissions Data

- 2.5.1 The proposed WWTP does not currently exist, therefore, all emission rates used to predict odour emissions from the proposed WWTP have been estimated from measurements taken at the existing Cambridge WWTP from a July 2019 odour survey carried out by Silsoe Odours Ltd (ARUP, 2019).
- 2.5.2 The application of odour emission rates from a survey carried out in a summer month is conservative as higher summer temperatures and reduced rainfall can cause reduced influent dilution and an increase in odour.
- 2.5.3 The emission rates modelled for each of the proposed WWTP processes are presented in Odour Impact Assessment Report (Appendix 18.2, App Doc Ref 5.4.18.2).

Surveys

Odour 'sniff' survey

- 2.5.4 Odour sniff surveys were undertaken on the 14th April, 5th May and 13th May 2022. The objective of the surveys was to subjectively record the odours perceived in the area surrounding the existing Cambridge WWTP.
- 2.5.5 The results of the survey are intended to help put the proposed WWTP predicted odour concentrations into context by combining the results of the sniff surveys with odour contour plots from the existing Cambridge WWTP.
- 2.5.6 The odour sniff survey report, produced by Silsoe Odours Ltd, is presented in Sniff Test Survey Report (Appendix 18.3, App Doc Ref 5.4.18.3).

2.6 Maximum design envelope (Rochdale) parameters for assessment

- 2.6.1 The design parameters and assumptions presented are in line with the 'maximum design envelope' approach (base scheme design) as described in introductory chapters of the ES (2 and 5). For each element of this chapter the maximum design envelope parameters detailed within Table 2-11 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group.
- 2.6.2 The assessment parameters are based on the design of the proposed WWTP and access, transfer tunnel route and outfall location, transfer pipeline corridor from a pumping station off Bannold Drove, Waterbeach (hereafter referred to as Waterbeach pipeline) and connections within the existing Cambridge WWTP as described in Chapter 2: Project Description (App Doc Ref 5.2.2). The assessment considers a realistic maximum design envelope based on the maximum scale of the

elements and as a result no effects of greater significance than those assessed are likely.

Table 2-11: Maximum design envelope parameters (Rochdale) for odour quality assessment

Potential impact	Maximum design scenario	Justification
Odour release (short-term) in construction	<p>Connection of the transfer tunnel to the existing sewer (at Shaft 1 and 2) over a duration of approximately four weeks.</p> <p>Works at the existing Cambridge WWTP will be subject to existing permit controls including odour control.</p> <p>Air extraction system mobile odour filtration unit will be used adjacent to the sewer shafts during the works.</p>	Represents construction activity with potential for odour release
Odour release during testing and commissioning	<p>Testing and commissioning of the proposed WWTP will last up to approximately 12 months.</p> <p>Deliveries of sludge as part of testing and commissioning of the proposed WWTP will be in sealed vehicles.</p> <p>Use of a temporary storage lagoon for up to six months.</p>	Represents construction activity with potential for odour release
Odour release from decommissioning (draining and cleaning of tanks)	<p>These decommissioning activities will be temporary, likely to be largely completed within a four month period.</p> <p>Five primary settlement tanks, two aeration tanks and seven final settlement tanks to be drained and cleaned at the existing Cambridge WWTP.</p>	Represents decommissioning activity in the existing Cambridge WWTP and the duration with potential for odour release
Odour release from normal operation and maintenance	<p>Inlet works will be a covered structure.</p> <p>Odour control units will be installed at the sludge treatment centre.</p> <p>Low turbulence process activities will be used.</p> <p>Processed sludge cake will be ‘dewatered’ and digested using biological treatment.</p> <p>Use of covered reception areas at the terminal pumping station (TPS), inlet works and at the sludge tanks. Air from these areas will be vented through the odour control units.</p> <p>The outfall located at the River Cam will be operating continually with infrequent storm flows (once in ten years).</p> <p>Intermittent maintenance activities taking place over short periods (days)</p>	Represents operational activity with potential for odour release
Short-term odour release – abnormal operation	An OMP as part of the Industrial Emissions Directive (IED) permit will be in place continuously and exists as a live document which will be followed and updated by site staff as required.	Represents abnormal operational activity with potential for odour release

Potential impact	Maximum design scenario	Justification
	Abnormal operations (emergency release of bio gas) would be highly unlikely but, when required, could prevent major accidents. ¹	
Short-term odour release as a result of spills and leaks	<p>An OMP as part of the IED permit will be in place continuously and exists as a live document which will be followed and updated by site staff as required.</p> <p>Notwithstanding the OMP, it is anticipated that small to large scale spills at locations where sludge and waste water are delivered to the proposed WWTP may occur infrequently and would release odour for a short duration during cleaning.</p> <p>This assessment considers spills from:</p> <ul style="list-style-type: none"> • within the proposed WWTP; • on the access road/junction with the B1047 Horningsea Road; and • near junction 35 (the Quy Interchange) of the A14. 	Represents abnormal operational activity and duration with potential for odour release.
Intermittent odour release during sludge and waste water deliveries	<p>Deliveries of waste water and sludge for treatment at the proposed WWTP will be in sealed vehicles.</p> <p>Connections/inlets for delivery are located away from the periphery of the proposed WWTP.</p> <p>Assumption is that deliveries would occur daily (seven days per week).</p>	<p>Represents operational activity with potential for odour release.</p> <p>Represents the design feature location within the proposed WWTP</p>
Intermittent odour release from air valves	Up to 16 air valves will be part of the Waterbeach transfer pipeline. These will be below ground with a manhole cover at ground level. They will be approximately 0.5m in diameter and 1m in depth and attached to the rising main via new connecting pipework.	Represents the maximum quantity of air valves in the Waterbeach pipeline
Intermittent odour release from vent	Tunnel vent located at the interception shaft at the start of the transfer tunnel within the existing Cambridge WWTP. The structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control.	Represents the design feature and location within the Proposed Development

¹ Using the FIDOL criteria 'highly unlikely' is adopted

2.7 Impacts scoped out of the assessment

2.7.1 The impacts scoped out of the assessment are listed in Table 2-12.

Table 2-12: Impacts scoped out of the odour assessment

Potential impact	Justification
Construction odour impacts	Construction activities are unlikely to involve odorous materials. The opening up of sewers during connection of the waste water transfer tunnel to the existing sewer network has been considered in the ES.
Commissioning activities for the transfer tunnel and the outfall	Commissioning activities are unlikely to produce odour.
Operational odour impacts from the transfer corridor vents (Proposed Development)	There are no vents along the transfer tunnel for the Proposed Development that would passively release odour. There is a tunnel vent located at the interception shaft at the start of the waste water transfer tunnel within the existing Cambridge WWTP. The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control. This vent is assessed qualitatively in section 4.3.
Decommissioning of the proposed WWTP	Decommissioning of the proposed WWTP would be assessed as part of the planning application pertaining to the redevelopment of the site in the future and has not been considered in this chapter, although these are expected to be similar in nature but less significant than those encountered during construction.

2.8 Mitigation measures adopted as part of the Proposed Development

- 2.8.1 This section refers to the mitigation types, as defined in Section 1.5 of Chapter 5: EIA Methodology (App Doc Ref 5.2.5), and how they apply to the assessment of odour.
- 2.8.2 In developing the Proposed Development through an iterative process including consultation and engagement with consultees, and through the Environmental Impact Assessment, (EIA) the Applicant has sought to identify and incorporate suitable measures and mitigation for potentially significant adverse effects, as well as maximising beneficial effects where possible.
- 2.8.3 Some measures are 'embedded' in the design of the Proposed Development for which consent is sought by virtue of the scope of the authorised development as set out in Schedule 1 to the DCO and the accompanying Works Plans. These are considered primary mitigation. For example, adjustment of Order Limits to avoid sensitive features, amending the sizing and location of temporary access routes and compounds.
- 2.8.4 Secondary measures may be detailed activities for example the preparation of detailed AIMS in accordance with the CoCP, the preparation and delivery of a monitoring plan for specific matters (air quality, water quality) or the preparation

and delivery of specific environmental management plans (for example air, noise, water), and the preparation and implementation is secured through the CoCP. These secondary measures are differentiated from the good practice measures.

- 2.8.5 Tertiary measures comprise good practice measures (such as measures within Considerate Contractors Scheme) and measures integrated into legal requirements secured through environmental permits and consents (least flexible as either the legislation exists to create the mitigation or does not (i.e. Protected Species Licensing).
- 2.8.6 The approach in Chapter 5: EIA Methodology sets out required permits and consents related to the Proposed Development.
- 2.8.7 Where beneficial effects are voluntarily introduced without the requirement to mitigate an effect, these are termed 'enhancement measures'.
- 2.8.8 The remainder of this section sets out the embedded measures (primary), legal requirements (tertiary) and additional measures (secondary) relevant to the assessment of odour.

Primary (embedded) and tertiary measures

- 2.8.9 Primary and tertiary mitigation form part of the Proposed Development and therefore, the preliminary assessment of effects takes account of these measures.
- 2.8.10 Table 2-13 sets out the embedded mitigation measures that will be adopted during the construction, operation, maintenance and decommissioning of the Proposed Development.
- 2.8.11 The operation of the Proposed Development will require an environmental permit, which is issued and regulated by the Environment Agency. The environmental permit for the Proposed Development will require the operator to have a written EMS, which includes a set of plans and procedures describing measures to avoid, reduce and eliminate potential environmental impacts associated with the activities covered by the permit. This includes an OMP, which details how site operations are to be managed to minimise odour impacts. The OMP for the Proposed Development will be a 'living document' with regular updates, which outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event of an incident such as a spillage and will outline how to record odour events and respond to complaints.
- 2.8.12 Under the environmental permit, the operator will continually monitor treatment performance, prevent and respond to any on-site issues at the earliest opportunity.
- 2.8.13 For the purpose of the application, a Preliminary Odour Management Plan (Appendix 18.4, App Doc Ref 5.18.4) has been drafted, which is considered secondary mitigation for the purpose of this Application, and will likely form the baseline of the OMP submitted as part of the IED permit application.
- 2.8.14 During the decommissioning stage at the existing Cambridge WWTP, tanks will be drained through the existing treatment process as far as reasonably practical. Any

residual sludge within the primary settlement tanks, aeration tanks or final settlement tanks that cannot be pumped to the sludge treatment process will be removed via suction pump and either taken offsite for treatment or treated onsite via a process such as a quick lime dosing plant. These processes would be sealed; however, when dosing with lime the resulting sludge cake would be odorous. The sludge cake will be stored on site for as little time as possible and odour suppression equipment, such as fogging/misting systems, will be used where appropriate to minimise any offsite impacts.

Table 2-13: Primary and tertiary mitigation measures relating to odour adopted as part of the Proposed Development

Mitigation measures		Type	Applied to	Justification
Construction				
Commissioning	Use of odour ventilation and treatment processes designed to mitigate against odour during the normal operation of the proposed WWTP.	Primary	Proposed WWTP	To manage the effects from short-term odour release during commissioning so that they are 'not significant'.
Operation				
Siting of processes	Design so that the treated effluent processes are near the boundary and odorous processes nearer to the centre works layout.	Primary	Proposed WWTP	To retain a low odour profile beyond the earth bank boundary.
Turbulence	Design that allows for reducing turbulence in the process to minimise odour dispersion (more turbulence can result in more odour).	Primary	Proposed WWTP	Design feature intended to minimise odour dispersion.
Odour control	Inclusion of odour control facilities (considered critical equipment) to operate continuously in all conditions. Their power supply will be protected, and standby equipment will be brought online automatically should equipment fail.	Primary	Proposed WWTP	Design feature intended to minimise odour dispersion in operation so that effects beyond the earth bank limits are negligible and are 'not significant'.
Sludge treatment	Odour control plant within the sludge treatment centre.	Primary	Proposed WWTP	Design feature intended to minimise odour dispersion in operation so that effects beyond the earth bank limits are negligible and are 'not significant'.
Terminal pumping station / inlet	Covered reception areas at the terminal pumping station, inlet works and sludge tanks. Venting of air from these areas vented through the odour control plant.	Primary	Proposed WWTP	Design feature intended to minimise odour dispersion in operation so that effects beyond the earth bank limits are negligible and are 'not significant'.

Mitigation measures		Type	Applied to	Justification
Surface areas of exposed tanks	Reducing the overall footprint of the inlet works, primary tanks and sludge tanks to minimise exposed surface area.	Primary	Proposed WWTP	Design feature intended to minimise odour dispersion in operation so that effects beyond the earth bank limits are negligible and are 'not significant'.
Delivery of sludge and waste water	Any waste water and sludge imported to the proposed WWTP during testing and commissioning will arrive via sealed articulated tankers and pumped into covered reception areas. Processed sludge cake will be 'dewatered' and digested using biological treatment, which reduces the potential for odour.	Primary	Proposed WWTP	Management and process feature intended to minimise odour dispersion in operation so that effects beyond the earth bank limits are negligible and are 'not significant'.
Transport of sludge cake (biofertilizer) offsite	The dried sludge cake will be transported away from the site in articulated skips, with a pull-over cover used during transit.	Primary	Proposed WWTP	Cover feature as standard to minimise odour emissions so that affects are negligible.
Vent at the interception shaft at the start of the transfer tunnel in location of existing Cambridge WWTP	The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control.	Primary	Vent in location of existing Cambridge WWTP	Design feature intended to minimise odour release from the transfer tunnel vent.
Use of valves in sewer mains	Installation of valves below ground within the manhole chamber.	Primary	Waterbeach pipeline	Standard design that means intermittent small odour release is below ground.
Decommissioning				
Draining and cleaning of waste	Any residual sludge within the primary settlement tanks, aeration tanks or final settlement tanks that	Primary	Existing Cambridge WWTP	To manage the effects from short-term odour release during the decommissioning

Mitigation measures	Type	Applied to	Justification
<p>water storage tanks and equipment</p> <p>cannot be pumped to the sludge treatment process will be removed via suction pump and either taken offsite for treatment or treated onsite via a process such as a quick lime dosing plant. These processes would be sealed; however, when dosing with lime the resulting sludge cake would likely be odorous. This sludge cake will be stored on site for as little time as possible and odour suppression equipment, such as fogging or misting systems, will be used where appropriate to minimise any offsite impacts.</p>			<p>of the existing Cambridge WWTP so that they are 'not significant'.</p>
<p>Removal of residual sludge and waste water</p>	<p>Primary</p>	<p>Existing Cambridge WWTP</p>	<p>To manage the effects from short-term odour release during the decommissioning of the existing Cambridge WWTP so that they are 'not significant'.</p>

Secondary mitigation

Construction

Code of Construction Practice

- 2.8.15 During the construction phase, the CoCP and associated management plans specify the range of measures to avoid and minimise impacts that may occur in construction (CoCP Part A Appendix 2.1 (App Doc Ref 5.4.2.1)).

Operation

- 2.8.16 Operation and maintenance activities would be subject to operational management plans and procedures. The management plans and procedures will sit within the EMS required under the environmental permitting regime. These would be 'live' documents that identify the environmental risks and legal obligations associated with the operations of the Proposed Development once construction has been completed. These specify the management measures the operator will implement in order to prevent or minimise the environmental effects associated with the Proposed Development.
- 2.8.17 For the purpose of the Proposed Development's DCO application, a Preliminary Odour Management Plan has been drafted, which is considered secondary mitigation for the purpose of this Application, and will likely form the baseline of the OMP submitted as part of the IED permit application.

Decommissioning

- 2.8.18 Decommissioning of the existing Cambridge WWTP would be subject to a Decommissioning Management Plan which is to be agreed with the Local Planning Authority (LPA). An outline Decommissioning Management Plan (Appendix 2.3, App Doc Ref 5.4.2.3) describes measures applied to this activity. Post grant of the DCO and prior to commencement of decommissioning a detailed plan will be prepared and agreed with the LPA.

2.9 Assumptions and limitations

- 2.9.1 The odour modelling predictions are based on the most reasonable, robust and representative methodologies. However, there is an inherent level of uncertainty associated with the model predictions due to:
- uncertainties associated with background odour concentrations;
 - uncertainties with model input parameters such as surface roughness length;
 - uncertainties with odour emission predictions for the Proposed Development;
 - uncertainties with recorded meteorological data; and
 - simplifications made in the model algorithms or post-processing of the data that represent atmospheric dispersion.

2.9.2 In order to best manage these uncertainties, the odour modelling has used a conservative approach:

- five years of meteorological data have been assessed, with the worst-case year results presented in Section 4.3;
- emissions for all processes have been included in the modelling exercise, even if some of them (e.g., final settlement tanks (FST), interstage pump stations (PS), final effluent) may deliver a minimal or neutral odour impact due to design and mitigation measures adopted as part of the Proposed Development; this is a conservative approach, which could inflate overall site emission predictions: and
- annual odour emission rates are based on values from the existing Cambridge WWTP during the summer months, when odour emissions are expected to be highest.

3 Baseline Environment

3.1 Current baseline

- 3.1.1 The Proposed Development is located in a semi-rural location where existing agricultural practices are expected to cause intermittent odours. In the context of the rural environment, baseline odour is generally not considered a nuisance by people living and working in the area. The River Cam has the potential to produce odour through natural decomposition processes. A sniff survey (see Sniff Test Survey Report, Appendix 18.3, App Doc Ref 5.4.18.3) has been undertaken in April and May 2022 which demonstrates that odours associated with the River Cam near the Scheme Order Limits, have a 'not offensive' to 'low/potentially offensive' rating and are intermittent.
- 3.1.2 Some localised areas close to the existing Cambridge WWTP currently experience intermittent odours from its operation, likely due to the age of the plant and historic technology and processes. The existing Cambridge WWTP is located approximately 2km to the west of the proposed WWTP. Odour modelling undertaken for the existing Cambridge WWTP in 2018 (Odour Impact Assessment Report, App Doc Ref 5.4.18.2) indicates that modelled odour concentrations above $30 \mu\text{E}/\text{m}^3$ would not be expected to occur any further to the east than the River Cam and would not overlap with the predicted odour impacts from the proposed WWTP; which are not expected to occur further to the west than the B1047 Horningsea Road. The existing Cambridge WWTP and the proposed WWTP will only operate at the same time for a short duration (weeks) during commissioning of the proposed WWTP. It is highly unlikely that the 98th percentile conditions would occur at the same location for both WWTPs.
- 3.1.3 The sniff survey (see Sniff Test Survey Report, Appendix 18.3, App Doc Ref: 5.4.18.3) demonstrates that the 'most offensive' odours (i.e., those with the greatest unpleasantness) caused by operations at the existing Cambridge WWTP, along with the highest intensities and duration were found within the existing Cambridge WWTP boundary close to open top sludge tanks and composting activities. Sludge tanks at the proposed WWTP will be covered to prevent direct odour emissions to air and there will be no composting activities.
- 3.1.4 The Waterbeach Waste Management Park and the Milton Landfill have the potential to generate odour of a similar hedonic tone to the proposed WWTP. The mitigated odour potential from the Waterbeach Waste Management Park would be similar to that of the existing Cambridge WWTP. The Milton Landfill is of open air design and therefore may have a higher odour potential than the existing Cambridge WWTP. However, as these sites are further from the Proposed Development (a minimum of 2km) than the existing Cambridge WWTP, it is unlikely that the Waterbeach Waste Management Park and the Milton Landfill would cause a combined effect with the odour from the proposed WWTP. Further information on the potential of cumulative effects is provided in Section 4.5.

3.2 Future baseline

- 3.2.1 Development considered in the future baseline is identified under the Cumulative Effects assessment. Where relevant identified receptors have been included in the assessment.
- 3.2.2 For the aspect of odour, it is considered that the future baseline conditions at the Proposed Development will remain broadly the same as the current baseline as there are currently no committed developments likely to produce substantial odour close to the Scheme Order Limits. At the existing Cambridge WWTP, the intermittent odours from the WWTP processes will cease once the site is decommissioned.

Impacts of climate change on future baseline

- 3.2.3 An assessment of climate resilience is presented in Chapter 9 Climate Resilience (App Doc Ref 5.2.9). Climate change is not expected to alter future baseline odour emissions. Existing odour sources would be expected to comply with the requirements of their environmental permits and mitigate any increases in odour emissions associated with changes in climate.
- 3.2.4 As above, there are no committed developments likely to produce substantial odour close to the Scheme Order Limits.
- 3.2.5 The impact of climate change on odour emissions from the Proposed Development is discussed in Section 2.2.

4 Assessment of Effects

4.1.1 The section presents the assessment of effects and sets out a preliminary assessment that takes into account primary and tertiary mitigation in determining effects and then considers secondary mitigation and the assessment of residual effects.

4.2 Construction phase

4.2.1 The potential environmental impacts related to odour from the construction of the Proposed Development are indicated in Table 2-11 together with the maximum design scenario. These are the assumptions (maximum parameters) for the purpose of the odour assessment against which each impact has been assessed.

4.2.2 A description of the potential effect of odour on receptors caused by each identified impact is set out below. This assessment has been completed on the basis that primary (embedded within design) and tertiary (integrated into legal requirements secured through environmental permits and consents) mitigation measures (see section 5.2) and will be in place.

4.2.3 Odour effects during the construction phase have been qualitatively assessed following a risk-based Source-Pathway-Receptor model as discussed in Section 2.2.

4.2.4 Table 1-2 and Figure 18.2: Odour receptors within the Odour Assessment Method & Effect Summary (Book of Figures – Odour, App Doc Ref 5.3.18) present the locations and sensitivity of the receptors that have been considered in this assessment. These represent receptors closest to construction and decommissioning activities.

4.2.5 Table 1-1 within the Odour Assessment Method & Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1) presents the risk assessment matrix for odour effects during construction and decommissioning including locations of receptors, potential impacts, source odour potential, pathway, odour exposure risk, receptor sensitivity and likely odour effect based on guidance presented in Section 2.2.

4.2.6 The overall odour exposure risk and significance of effect has been determined with the considered with regard to the FIDOL factors discussed in Section 2.2.

Proposed WWTP

4.2.7 This section sets out the assessment of effects in relation to the proposed WWTP including the landscaping proposals, final effluent pipeline, outfall, transfer tunnel and new access connection connecting with the B1047 Horningsea Road.

Testing and commissioning of proposed WWTP

Magnitude of impact

4.2.8 Wet commissioning includes the transport of seed sludge and commencement of biological processes with the proposed WWTP. During this period the existing Cambridge WWTP and the proposed WWTP will have active treatment processes. At

the proposed WWTP the following design features will be operational at the time of commissioning; covered reception areas at the terminal pumping station, inlet works and sludge tanks; low turbulence processes; and venting of air from TPS, inlet and sludge tanks through odour control plant.

- 4.2.9 Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with an uninterruptible power supply (UPS).
- 4.2.10 The preliminary odour management plan includes the measures that the transport of seed sludge will be in sealed tankers and pumped into the tanks through a closed process.
- 4.2.11 The source odour potential of these activities is classified as medium.
- 4.2.12 The pathway is described as ineffective to moderately effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.2.13 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.2.14 The closest receptors to the proposed WWTP are classed as low to high sensitivity.

Significance of effect

- 4.2.15 The likely odour effect is expected to be, at worst, negligible, based on the likely frequency and duration of any effects, the distance from the source and the function of embedded odour control features. As mentioned in Section 5.2 the risk of odour will be mitigated by a number of specific design features to minimise and prevent odour.

Secondary mitigation or enhancement

- 4.2.16 The following measures would further mitigate the impact to negligible. These are set out within Section 7.8 (Air quality) of the CoCP Part A (see Appendix 2.1, App Doc Ref: 5.4.2.1) and includes:

- Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. The frequency of site inspections should be increased when activities with a high potential to produce odour are being carried out e.g., works during high temperature days. An inspection log should be kept and made available to the overseeing authority on request.

Residual effect

- 4.2.17 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Waterbeach pipeline

- 4.2.18 This section sets out the assessment of effects in relation to the Waterbeach pipeline which consists of a transfer section running from the north near Waterbeach to Low Fen Drove Way, a section crossing the area of land required for the construction of the proposed WWTP, a section south of the A14 which connects to the area of land where the existing Cambridge WWTP is located.
- 4.2.19 Further detail is presented in the Chapter 2: Project Description (App Doc Ref 5.2.2) and the route of the transfer pipeline is shown in Design Plans - Proposed Waste Water Treatment Plant (App Doc Ref: 4.9).

Connection to new pumping station

Magnitude of impact

- 4.2.20 Odour may be released when the Waterbeach transfer pipeline is connected to a new section of pipe linking to a new pumping station.
- 4.2.21 During works to connect to the new pumping station there may be a need to open parts of an existing sewerage network to the open air and this may result in additional odour releases which may be noticeable at nearby receptor locations. Any odour releases from this connection would be temporary and would occur for no more than four weeks.
- 4.2.22 The source odour potential of these activities is classified as small.
- 4.2.23 The pathway is described as highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.2.24 Overall, the odour exposure risk is classed as negligible based on the likely low frequency, intensity and duration of odour emissions.

Sensitivity of receptor

- 4.2.25 The pumping station location is not yet determined. As a worst case, it has been assumed that the connection of the pumping station will be located at the closest point between the Scheme Order Limit and sensitive receptors. Therefore, the closest sensitive receptors are at the north-eastern edge of Waterbeach and are 60m from construction activities and are classed as high sensitivity.

Significance of effect

- 4.2.26 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations, based on the likely frequency, intensity and short-term duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features.

Secondary mitigation or enhancement

- 4.2.27 The following measures would further mitigate the impact of negligible. These are set out within the CoCP Part B (App Doc Ref 5.4.2.2). The measures of particular relevance to odour are:

- Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. An inspection log should be kept and made available to the overseeing authority on request; and
- Use of an air extraction system and a mobile odour filtration unit located adjacent to the sewer shafts.

Residual effect

4.2.28 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Testing and commissioning of completed pipeline

Magnitude of impact

4.2.29 Testing of the pipeline will involve filling the pipeline with water and would therefore have no associated odour. The source odour potential of these activities is classified as negligible.

4.2.30 The pathway is described as ineffective as the completed pipeline will be underground.

4.2.31 Overall, the odour exposure risk is classed as negligible.

Sensitivity of receptor

4.2.32 The closest receptors to the testing and commissioning of the completed pipeline are classed as high sensitivity.

Significance of effect

4.2.33 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations, based on the likely frequency, intensity, location and short-term duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features.

Secondary mitigation or enhancement

4.2.34 There are no secondary mitigation measures relevant to the testing and commissioning of the completed Waterbeach pipeline and the effect remains as negligible and is **not significant**.

Residual effect

4.2.35 The residual effect remains as negligible and is **not significant**.

Existing Cambridge WWTP

4.2.36 This section sets out the assessment of effects in relation to activities within the existing Cambridge WWTP.

Odour release from breaking open existing sewer

Magnitude of impact

- 4.2.37 Odour may be released when the new transfer tunnel is connected to the existing sewerage. The action of opening up existing sewers to the open air may result in new odour releases which may be noticeable at nearby receptor locations. Any odour releases would be temporary and would occur intermittently for no more than four weeks. The breaking open of the existing sewers would release odours primarily from fresh sewage which has had less time to decompose and is therefore less odorous, so the source odour potential of these activities is classified as small.
- 4.2.38 The pathway is described as Ineffective to Highly Effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.2.39 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.2.40 The closest receptors to the existing sewer shafts are classed as Low to High sensitivity.

Significance of effect

- 4.2.41 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations based on the frequency, intensity and duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features, including the existing measures forming part of the operating controls of a permitted location.

Secondary mitigation or enhancement

- 4.2.42 The following measures would further mitigate the impact of Negligible. These are set out within Section 7.8 (Air quality) of the CoCP Part A and Part B (Appendix 2.1 and 2.2, App Doc Ref 5.4.2.1 and 5.4.2.2). The measures of particular relevance to odour are detailed in CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2), including:
- Odour release during tie in works would be minimised using an air extraction system and a mobile odour filtration unit located adjacent to the open shafts.
 - To ensure effective odour control during the tie in works, regular site inspections by the person accountable for odour issues on site should be undertaken to minimise the risk of causing nuisance and/or loss of amenity. An inspection log should be kept and made available to the overseeing authority on request.

Residual effect

- 4.2.43 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Connection of the Waterbeach pipeline to existing sewer

Magnitude of impact

- 4.2.44 Odour may be released when connecting the terminus of the Waterbeach pipeline to the existing sewer network. The action of opening up existing sewers to the open air may result in new odour releases which may be detected at nearby receptor locations. Any odour releases associated with this connection would be temporary and would occur for no more than four weeks.
- 4.2.45 These activities would release odours primarily from fresh sewage which has had less time to decompose and is therefore less odorous, so the source odour potential is classified as Small.
- 4.2.46 The pathway is described as Ineffective to Highly Effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.2.47 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.2.48 The closest receptors to the connection of the Waterbeach pipeline to existing sewer are classed as Low to High sensitivity.

Significance of effect

- 4.2.49 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations based on the frequency, intensity and duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features. As mentioned in Table 2-13, the risk of odour will be mitigated through use of an air extraction system and a mobile odour filtration unit located adjacent to the sewer shafts. In addition, the measures in the CoCP and the existing measures forming part of the operating controls of a permitted location would be in place.

Secondary mitigation or enhancement

- 4.2.50 The following measures would further mitigate the impact of negligible. These are set out within Section 7.8 (Air quality) of the CoCP Part A and Part B (Appendix 2.1 and 2.2, App Doc Ref 5.4.2.1 and 5.4.2.2).
- 4.2.51 The measures of particular relevance to odour are detailed in CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2), including:
- Odour release during tie in works would be minimized using an air extraction system and a mobile odour filtration unit located adjacent to the open shafts.
 - To ensure effective odour control during the tie in works, regular site inspections by the person accountable for odour issues on site should be undertaken to minimise the risk of causing nuisance and/or loss of amenity. An inspection log should be kept and made available to the overseeing authority on request.

Residual effect

- 4.2.52 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Monitoring

- 4.2.53 No monitoring is required for construction of the Proposed Development.

4.3 Operation phase

- 4.3.1 The potential environmental impacts of odour from the operation and maintenance of the proposed WWTP are indicated in Table 2-11 together with the maximum design scenario. These are the assumptions (maximum parameters) for the purposes of the odour assessment against which each impact has been assessed.
- 4.3.2 A description of the potential effect of odour on receptors caused by each identified impact is set out below. This assessment has been completed on the basis that primary (embedded within design) and tertiary (integrated into legal requirements secured through environmental permits and consents) mitigation measures (see Section 5.2) will be in place.
- 4.3.3 The operation of the proposed WWTP would require an environmental permit, which will be issued and regulated by the Environment Agency. The environmental permit for the proposed WWTP will require the operator to have a written management system (an environmental management system (EMS)), which includes a set of plans and procedures describing measures to avoid, reduce and eliminate potential environmental impacts associated with the activities covered by the permit and is therefore considered tertiary mitigation. Under the environmental permit, the operator would be legally required to continually monitor treatment performance, and to prevent and respond to any on-site issues at the earliest opportunity.
- 4.3.4 The EMS requires an OMP (based on a Preliminary Odour Management Plan, Appendix 18.4, App Doc Ref 5.4.18.4) which will detail how site operations are to be managed to minimise odour impacts. The OMP will be a 'living document' with regular revision and updates and will outline operational odour management, monitoring and reporting measures and include controls to be implemented in the event of an incident such as a spillage, so odour can be mitigated as far as possible. The document will also outline how to record odour events and respond to complaints.
- 4.3.5 For the purpose of the application, a Preliminary Odour Management Plan (App Doc Ref 5.4.18.4) has been drafted, which is considered secondary mitigation for the purpose of this Application, consistent with the relevant guidance for the OMP and will likely form the baseline of the OMP submitted as part of the environmental permit application.
- 4.3.6 The proposed WWTP has been assessed quantitatively using the AERMOD dispersion model, whilst all other aspects of the Proposed Development's operation have been

qualitatively assessed following a risk-based Source-Pathway-Receptor model as discussed in Section 2.2.

- 4.3.7 Table 1-1 and Table 1-2 and Figure 18.2 Odour receptors within the Odour Assessment Method & Effect Summary (Book of Figures – Odour, App Doc Ref 5.3.18) present the locations and sensitivity of the receptors that have been considered in the dispersion model. These represent receptors closest to operational activities.
- 4.3.8 The overall odour exposure risk (qualitative assessment), magnitude of impact (quantitative assessment) and significance of effect have been determined with regard to the FIDOL factors as discussed in Section 2.2.

Proposed WWTP

- 4.3.9 This section sets out the assessment of effects in relation to the operation and maintenance of the proposed WWTP including the landscaping proposals, the final effluent pipeline, the outfall, the waste water transfer tunnel and a new access connecting with the B1047 Horningsea Road.

Operation of the proposed WWTP – quantitative assessment

Magnitude of impact

- 4.3.10 Once the proposed WWTP is operational, all embedded (primary) mitigation measures will be fully in place including all odour control equipment. The odour control design features are set out within Section 5.2 and in Chapter 2: Project Description (App Doc Ref 5.2.2). Operational activities include the receiving of waste water from the waste water transfer tunnel, in addition to receiving sludge and septic waste water from offsite by tanker. All biological processes within the proposed WWTP will be active. The Proposed Development will be operating in accordance with an IED permit which also requires the operator to implement an EMS and operational management activities including a detailed OMP which is approved by the regulator (the Environment Agency).
- 4.3.11 Management of impacts will be managed through the following design measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):
- Covered reception areas at the terminal pumping station, inlet works and sludge tanks.
 - Low turbulence processes.
 - Venting of air from TPS, inlet and sludge tanks through the odour control plant.
 - Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with an uninterruptible power supply (UPS).
- 4.3.12 A contour plot of the predicted ground level odour concentrations, based on summer odour emission rates all year (see from paragraph 2.2.18) and the modelled

year in which the highest odour concentration was predicted (i.e. 2016), is presented Figure 4-1.

4.3.13 The contour plot demonstrates that modelled odour exposure levels with a small impact ($1.5\text{ou}_E/\text{m}^3$ to $3\text{ou}_E/\text{m}^3$) are within 500m of the outer perimeter of the proposed WWTP's earth bank and those with a medium impact ($3\text{ou}_E/\text{m}^3$ to $5\text{ou}_E/\text{m}^3$) are within 200m.

4.3.14 During normal operation there would be intermittent maintenance activities. These activities are expected to take place over short periods (days) and are not expected to materially alter the predicted operational odour contours presented in Figure 4-1.

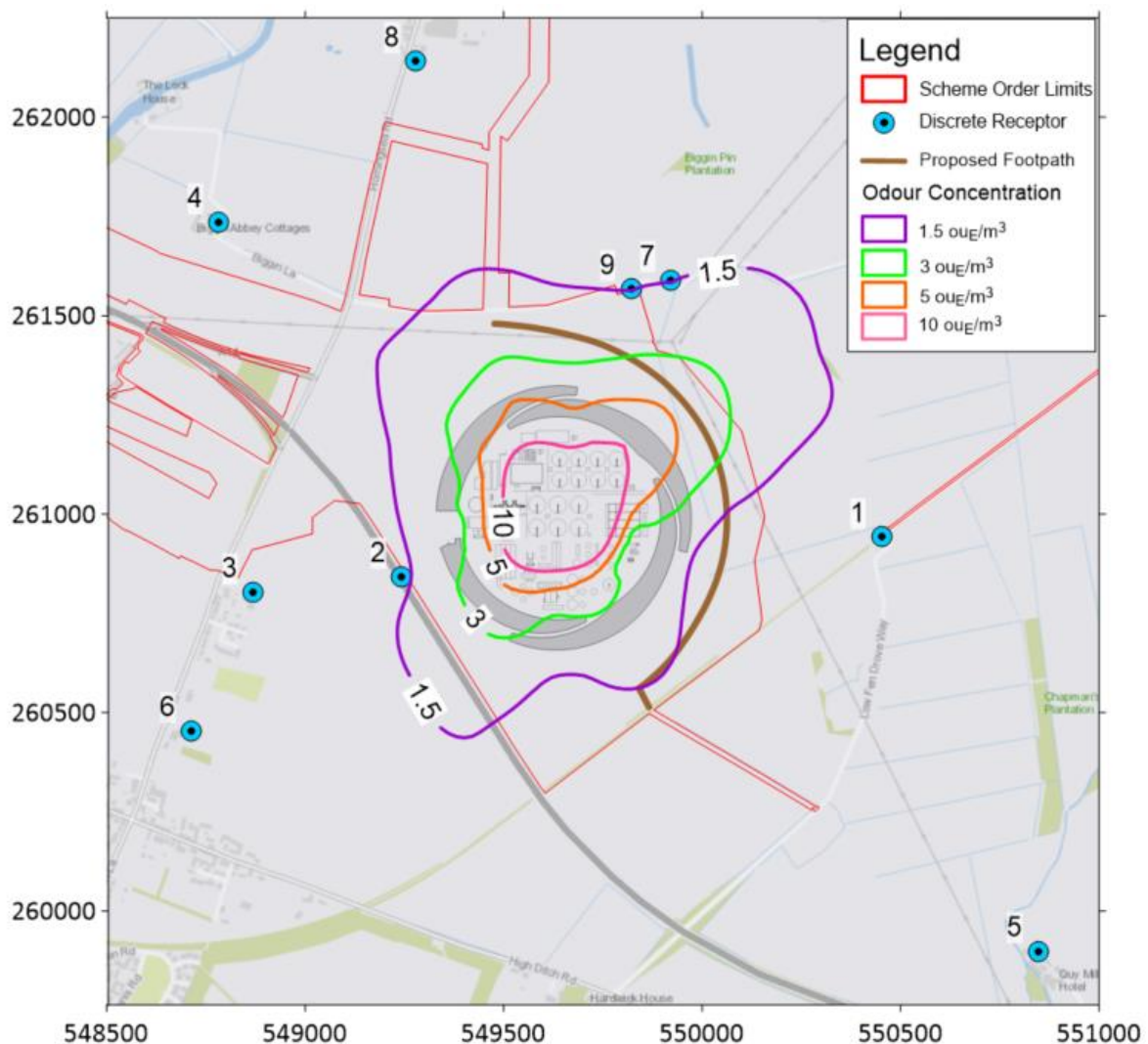


Figure 4-1: Contour plot of one-hour 98th percentile odour concentrations (ou_E/m^3)

Note: Results presented for the worst case meteorological year of 2016. The worst case meteorological year is determined by calculating the year with the maximum offsite concentration modelled across the gridded receptors. Minimum contour = $1.5\text{ou}_E/\text{m}^3$, maximum contour = $10\text{ou}_E/\text{m}^3$. X and Y axis show British National Grid coordinates.

4.3.15 The route of the proposed footpath is not yet finalised, however the indicative route presented in Figure 4-1 shows that the odour concentration for the one-hour 98th

percentile is predicted to be between the 3 and 5 ou_E/m^3 and the magnitude of impact for proposed footpath users is therefore medium.

- 4.3.16 Table 4-1 presents the predicted odour concentrations at sensitive receptor locations from the operation of the proposed WWTP. Discrete receptor locations are presented in Figure 4-1 in this report and Figure 18.2: Odour receptors within the Odour Assessment Method & Effect Summary (Book of Figures – Odour, App Doc Ref 5.3.18). Discrete receptors include those of low sensitivity (footpaths/bridleways/roads) and high sensitivity (hotel, school, residential).
- 4.3.17 At these worst case modelled discrete receptors, the predicted one-hour 98th percentile odour concentrations range from 0.1 ou_E/m^3 to 1.47 ou_E/m^3 .
- 4.3.18 The largest predicted odour concentration for the one-hour 98th percentile at existing high sensitivity receptors is 0.5 ou_E/m^3 at Receptor 4, 'Biggin Abbey' a residential property to the north west of the proposed WWTP, and is classed as a negligible impact.
- 4.3.19 The largest predicted odour concentration for the one-hour 98th percentile is 1.4 ou_E/m^3 located at Receptor 7 (PRoW Low Fen Drove Way 85/14), which is a low sensitivity receptor, and Receptor 9 (future residential property), a high sensitivity receptor, and is classed as a very small impact.
- 4.3.20 In line with guidance from the IAQM (IAQM, 2018) presented in Section 2.2, the magnitude of odour impact at all modelled discrete receptors range from negligible to very small.

Table 4-1: Predicted one-hour 98th percentile odour concentrations at discrete receptor locations - update with final model run

Receptor ID	Receptor name	Odour concentration (ou_E/m^3)*	Odour impact (magnitude)	Sensitivity	Significance of effect
1	Gatehouse	0.39	Negligible	High	Negligible
2	A14	1.24	Very Small	Low	Negligible
3	Property east of the B1047 Horningsea Road, Fen Ditton	0.33	Negligible	High	Negligible
4	Biggin Abbey	0.49	Negligible	High	Negligible
5	Quy Mill Hotel	0.12	Negligible	High	Negligible
6	Fen Ditton Community Primary School	0.25	Negligible	High	Negligible

Receptor ID	Receptor name	Odour concentration (ou _E /m ³)*	Odour impact (magnitude)	Sensitivity	Significance of effect
7	PRoW Low Fen Drove Way 85/14	1.46	Very Small	Low	Negligible
8	Property to south of Horningsea	0.46	Negligible	High	Negligible
9	Future residential property to north of the proposed WWTP	1.47	Very Small	High	Negligible

Notes: See Figure 18.2: Odour receptors for locations within the Technical Chapter Figures (Book of Figures – Odour, App Doc Ref 5.3.18)

* 98th percentile of 1-hour mean odour concentrations (ou_E/m³) based on summer emission rates. Odour modelling based on highly conservative assumptions including, but not limited to, no reductions in emissions rates or predicted concentrations for seasonal variation (emission rates are expected to be lower in colder seasons). See Odour Impact Assessment Report, Appendix 18.2, App Doc Ref 5.4.18.2 for further information regarding model parameters.

Sensitivity of receptor

4.3.21 The receptors closest to the proposed WWTP are classed as Low (footpaths/bridleways/roads) to high (hotel, school, residential) sensitivity as presented in Table 4-1.

Significance of effect

4.3.22 Based on the modelled odour impacts, the sensitivity of receptors and the incorporation of the embedded design features within the proposed WWTP (primary mitigation), the proposed WWTP has a negligible effect on odour at all modelled sensitive receptor locations. Table 1-3 within the Odour Assessment Method & Effect Summary (Appendix 18.1, App Doc Ref 5.4.18.1) presents the magnitude of impact, receptor sensitivity and significance of effect at each modelled receptor.

Secondary mitigation or enhancement

4.3.23 The effect of the proposed WWTP is, at worst, ‘negligible’. Nevertheless, measures to control odour emissions are contained within the preliminary OMP. The preliminary OMP outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event of an incident such as a spillage and will outline how to record odour events and respond to complaints. A Preliminary OMP has been drafted, consistent with the relevant guidance for the OMP.

Residual effect

- 4.3.24 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Operation of WWTP – abnormal operations, accidents or emergencies – qualitative assessment

Magnitude of impact

- 4.3.25 In the unlikely scenario that there is a failure of the boiler plant, the on-site flare may need to be used. This is to ensure the safety of workers and people nearby by preventing a build-up of the biogas recovered during the treatment processes. The flare will be of a specialised design to minimise emissions to air during use and flare usage will be limited under the environmental permit. If both the boilers and flare were unavailable due to failure, an extremely unlikely event, the biogas that is generated during the treatment process may need to be vented to the air to reduce pressure in the system. If biogas was released, some constituents such as methane would dissipate from site readily as it is less dense (lighter) than air, others such as hydrogen sulphide, would sink as it is denser (heavier) than air. An event of this nature would be extremely rare and emergency procedures would be in place under the EMS to limit this odour release to the shortest time possible, to limit the risk to the environment.
- 4.3.26 The source odour potential of these activities is classified as medium as hydrogen sulphide could be released during emergencies as a constituent of biogas.
- 4.3.27 The pathway is described as ineffective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.3.28 Overall, the odour exposure risk is classed as negligible to medium.

Sensitivity of receptor

- 4.3.29 Emergency infrequent events could result in short-term odour effects at sensitive receptors. The closest receptors to the proposed WWTP are classed as low to high sensitivity.

Significance of effect

- 4.3.30 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations identified based on the low frequency and short duration of any effects, the source odour potential, the pathway effectiveness, and sensitivity of receptors. Emergency protocols would be applied as part of the detailed OMP that would be required as part of the IED permit.

Secondary mitigation or enhancement

- 4.3.31 The effect of the proposed WWTP is, at worst, 'negligible'. Nevertheless, measures to control odour emissions are contained within the preliminary OMP (App Doc Ref 5.4.18.2). The preliminary OMP outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event

of an incident such as a spillage, and will outline how to record odour events and respond to complaints. A Preliminary OMP (App Doc Ref 5.4.18.2) has been drafted, consistent with the relevant guidance for the OMP.

Residual effect

- 4.3.32 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Deliveries of waste water and sludge by vehicle – qualitative assessment

Magnitude of impact

- 4.3.33 During operation, sludge will be imported to the proposed WWTP. All imported sludge will arrive via sealed articulated tankers and pumped into covered reception areas, as detailed in Table 2-11.
- 4.3.34 Processed sludge cake will be 'dewatered' and digested using biological treatment, which reduces the potential for odour. The dried sludge cake will be transported away from the site in articulated skips with a pull-over cover used during transit.
- 4.3.35 The loading area is located towards the centre of the proposed WWTP as shown in Design Plans - Proposed Waste Water Treatment Plant (App Doc Ref 4.9).
- 4.3.36 The source odour potential of these activities is classified as small.
- 4.3.37 The pathway is described as ineffective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.3.38 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.3.39 Short-term odour release from deliveries could result in short-term odour effects at the very closest sensitive receptors. The closest receptors to the proposed WWTP are classed as low to high sensitivity.

Significance of effect

- 4.3.40 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations based to the short duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features.

Secondary mitigation or enhancement

- 4.3.41 The effect of the proposed WWTP is, at worst, 'negligible'. Nevertheless, measures to control odour emissions are contained within the preliminary OMP. The preliminary OMP outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event of an incident such as a spillage, and will outline how to record odour events and respond to complaints. A Preliminary OMP has been drafted, consistent with the relevant guidance for the OMP.

Residual effect

- 4.3.42 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Accidental spills and leaks associated with dried sludge movements – qualitative assessment

Magnitude of impact

- 4.3.43 During operation, dried sludge cake will be transported away from the site in articulated skips with a pull-over cover used during transit. There is the potential for accidental spills and leaks from vehicles transporting waste water and sludge.
- 4.3.44 The source odour potential of accidental spills and leaks from sludge movements is classified as small.
- 4.3.45 The pathway is described as ineffective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.3.46 The overall risk as a result of accidental spills and leaks from sludge movements is dependent on the location of the spill and is classed as negligible to low.

Sensitivity of receptor

- 4.3.47 Accidental spills and leaks from sludge movements could result in short-term odour effects at sensitive receptors. The closest receptors to the proposed WWTP are classed as low to high sensitivity.

Significance of effect

- 4.3.48 The likely odour effects of accidental spills and leaks from sludge movements are expected to be, at worst, negligible at the nearest receptor locations based on the low frequency and short duration, the source odour potential, pathway effectiveness and receptor sensitivity, the highly infrequent and short duration of any effects, and taking into account management plans and systems in place as a requirement of the IED permit.

Secondary mitigation or enhancement

- 4.3.49 The effect of the proposed WWTP is, at worst, 'negligible'. Nevertheless, measures to control odour emissions are contained within the preliminary OMP (App Doc Ref 5.4.18.4). The preliminary OMP (App Doc Ref 5.4.18.4) outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event of an incident such as a spillage, and will outline how to record odour events and respond to complaints. A Preliminary OMP (App Doc Ref 5.4.18.4) has been drafted, consistent with the relevant guidance for the OMP.

Residual effect

- 4.3.50 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Operation of the outfall – qualitative assessment

Magnitude of impact

- 4.3.51 The final output of waste water treatment is the release of the cleaned effluent back into the water cycle. Treated effluent from the proposed WWTP will be released into the River Cam.
- 4.3.52 The effluent has been fully treated and the outfall has been design for aeration and effective mixing to minimize odour, and the source odour potential from the outfall is classified as small.
- 4.3.53 The pathway is described as ineffective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.3.54 The overall risk from the operation of the outfall is classed as negligible to low.

Sensitivity of receptor

- 4.3.55 The receptors closest to the proposed outfall are classed as low to high sensitivity.

Significance of effect

- 4.3.56 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations identified based on the source odour potential, pathway effectiveness and receptor sensitivity.

Secondary mitigation or enhancement

- 4.3.57 The effect of the proposed WWTP is, at worst, 'negligible'. Nevertheless, measures to control odour emissions are contained within the preliminary OMP. The preliminary OMP (App Doc Ref 5.4.18.4) outlines operational odour management, monitoring and reporting measures. It will also include controls to be implemented in the event of an incident such as a spillage, and will outline how to record odour events and respond to complaints. A Preliminary OMP (App Doc Ref 5.4.18.4) has been drafted, consistent with the relevant guidance for the OMP.

Residual effect

- 4.3.58 The residual effect is negligible and **not significant**. No significant residual effects have been determined.

Waterbeach transfer pipeline

- 4.3.59 This section sets out the assessment of effects in relation to the Waterbeach pipeline which consists of a transfer section running from the north near Waterbeach to Low Fen Drove Way, a section crossing the area of land required for the construction of the proposed WWTP, a section south of the A14 which connects to the area of land where the existing Cambridge WWTP is located.

Sewer air valves

Magnitude of impact

- 4.3.60 The new pipeline connecting from Waterbeach to the proposed WWTP will require sewer air valves (also known as manhole vents), which are designed to release air when the system is under high pressure. This assists in maintaining flows and pressures within the transfer pipeline. Releases of air from the sewer air valves may cause very localised, infrequent odour at the location of surface manholes in Waterbeach. These are similar to existing sewers within most residential areas with mains connections. To manage the release of air from the sewer air valves and reduce localized impacts, standard design will include valves to be installed below ground within the manhole chambers allowing intermittent small odour release below ground.
- 4.3.61 The odour potential from sewer air valves is classified as small.
- 4.3.62 Whilst information on the precise location of sewer air valves is not available, this assessment has conservatively assumed the pathway is described as highly effective.
- 4.3.63 The overall risk from the operation of air valves is classed as negligible based on low intensity, low odour unpleasantness (waste in the pipeline has not had time to decompose) and short-term duration of impact.

Sensitivity of receptor

- 4.3.64 The release of pressure from sewer air valves could result in short-term odour effects at sensitive receptors whose sensitivity is high.

Significance of effect

- 4.3.65 Sewer air valves are installed as standard in sewers across the UK; the small amount of odour released from these valves would be identical to that experienced occasionally in any typical street. The odour effect is therefore considered to be, at worst, negligible based on the low intensity, low odour unpleasantness (waste in the pipeline has not had time to decompose) and short-term duration of impact. The overall effect is therefore **not significant** and further mitigation would not be required.

Secondary mitigation or enhancement

- 4.3.66 No further mitigation proposed.

Residual effect

- 4.3.67 No additional mitigation or enhancement measures are proposed, and the residual odour effects are negligible and therefore **not significant**.

Existing Cambridge WWTP

- 4.3.68 This section sets out the assessment of effects in relation to operational activities within the existing Cambridge WWTP.

Presence of vent in location of existing Cambridge WWTP

Magnitude of impact

- 4.3.69 The interception shaft at the start of the waste water transfer tunnel within the existing Cambridge WWTP will require a tunnel vent. The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control. Furthermore, monitoring equipment at the dosing facility will comply with the Applicant's and the suppliers' documented standards for dosing facilities, of which the ventilation structure forms part of.
- 4.3.70 All vented gases would pass through the odour filter installation and the resulting source odour potential is classified as small.
- 4.3.71 The pathway is described as moderately effective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.3.72 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.3.73 The receptors closest to the existing sewer shafts are classed as low to high sensitivity.

Significance of effect

- 4.3.74 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations based on the frequency, intensity and duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features. As mentioned in Section 5.2 the risk of odour will be mitigated through use of a permanent vent stack inclusive of carbon filter.

Secondary mitigation or enhancement

- 4.3.75 The vent filter will be maintained and replaced in accordance with the manufacturer's specifications. The Odour Management Plan will include specific requirement in relation to maintenance of the vent.

Residual effect

- 4.3.76 The residual odour effects remain as negligible and therefore **not significant**.

Monitoring

- 4.3.77 During the operational phase, monitoring of odour will be a requirement of the environmental permit issued by the Environment Agency.
- 4.3.78 The environmental permit will specify the monitoring parameters, duration, frequency and reporting requirements.
- 4.3.79 The written management system for the facility will have tailored management and monitoring procedures and plans devised to operate the facility to be compliant with regulations and permit conditions.

- 4.3.80 Data will be used by the regulator to determine compliance with the operating permit and be used in instances where permits are varied.
- 4.3.81 No specific monitoring is required in relation to odour that may be associated with the operation of the Waterbeach pipeline.

4.4 Decommissioning

- 4.4.1 Decommissioning of the existing Cambridge WWTP has been considered. The relevant activities include:
- draining down, and cleaning of various waste tanks such as primary settlement tanks, aeration tanks and final settlement tanks;
 - prevention of rainwater ingress in open-top tanks; and
 - disposal and treatment of any waste that cannot be transferred to the proposed WWTP.
- 4.4.2 Decommissioning activities for the purpose of rescinding the existing environmental permit are detailed within Chapter 2, of the ES (App Doc Ref 5.2.2). A Decommissioning Plan will be produced and implemented to control odour emissions that are not already abated by existing odour control measures.
- 4.4.3 A description of the potential effect of odour on receptors caused by decommissioning activities is set out below. This assessment has been completed on the basis that designed-in measures (see CoCP A & B requirements (Appendix 2.1 and 2.2, App Doc Ref 5.4.2.1 and 5.4.2.2)), and an Outline Decommissioning Plan (Appendix 2.3, App Doc Ref 5.4.2.3) are implemented during decommissioning activities.

Existing Cambridge WWTP

- 4.4.4 This section sets out the assessment of effects in relation to activities completed to rescind the permit. Demolition activities and intrusive works to decommission the existing Cambridge WWTP are outside of the scope of this project. These are considered within the cumulative assessment.

Draining and cleaning of waste water storage tanks and equipment

Magnitude of impact

- 4.4.5 Where practicable, the odour control measures at the existing Cambridge WWTP will remain in place to minimise any impacts.
- 4.4.6 During the decommissioning process at the existing Cambridge WWTP, tanks will be drained through the existing treatment process as far as reasonably practical. The digestion process relies on tanks being full to overflow the waste water into the next stage of the process, so unavoidably some sludge will remain in the digesters at the end of decommissioning that is not fully digested and will require further treatment.

- 4.4.7 The decommissioning processes will require relatively short interventions and the source odour potential is classified as small.
- 4.4.8 The pathway is described as ineffective to highly effective based on the location (distance and direction) of sensitive receptors relative to the odour source.
- 4.4.9 Overall, the odour exposure risk is classed as negligible to low.

Sensitivity of receptor

- 4.4.10 The closest receptors to the existing Cambridge WWTP are classed as low to high sensitivity.

Significance of effect

- 4.4.11 The likely odour effect is expected to be, at worst, negligible at the nearest receptor locations identified based on the short duration of any effects, the source odour potential, pathway effectiveness, sensitivity of receptors and the function of embedded odour control features. With the mitigation measures in place, odour effects during decommissioning are anticipated to be similar to current conditions at the existing Cambridge WWTP and would not cause new odour effects at receptors.

Secondary mitigation or enhancement

- 4.4.12 The likely odour effect from draining and cleaning of waste water storage tanks and equipment is expected to be, at worst, negligible. Nevertheless, following measures will be applied in respect of residual sludge within the primary settlement tanks, aeration tanks or final settlement tanks that cannot be pumped to the sludge treatment process. This will be removed via suction pump and either taken offsite for treatment or treated onsite via a process such as a quick lime dosing plant. These processes would be sealed; however, when dosing with lime the resulting sludge cake would likely be odorous. This sludge cake will be stored on site for as little time as possible and odour suppression equipment, such as fogging or misting systems, used where appropriate to minimise any offsite impacts.
- 4.4.13 The above measures to manage temporary short term odour release from the draining and cleaning of waste water storage tanks and equipment are within Section 6, Decommissioning Management Plan (Application Document Ref 5.4.2.3), in relation to the use of suction pumps and offsite for treatment or onsite treatment using a quick lime dosing plant, and Section 7.8, Construction odours, within the CoCP Part A (App Doc Ref 5.4.2.1) in relation to use of odour suppression equipment, such as fogging/misting systems.

Residual effect

- 4.4.14 The residual effect remains as negligible and is **not significant**.

Monitoring

- 4.4.15 No additional monitoring is required for decommissioning of the Proposed Development.

4.5 Cumulative effects

- 4.5.1 Cumulative effects are those arising from impacts of the Proposed Development in combination with impacts of other proposed or consented development projects that are not yet built or operational. An assessment of cumulative effects for odour has been completed and is reported in Chapter 22: Cumulative effects (App Doc Ref 5.2.22).
- 4.5.2 For odour, there are no residual cumulative effects.

4.6 Inter-related effects

- 4.6.1 Inter-relationships are the impacts and associated effects of different aspects of the construction, operation of the Proposed Development and the decommissioning of the existing Cambridge WWTP on the same receptor. The assessment of inter-related effects has been completed and is reported in Chapter 22: Cumulative effects (App Doc Ref 5.2.22).
- 4.6.2 The following summarises the inter-related effects identified for odour:
- During wet commissioning there will be the potential for odour emissions from both the existing Cambridge WWTP and the proposed WWTP, for a limited time. The area affected by predicted odour emissions (above $3 \text{ ou}_E/\text{m}^3$ at the one-hour 98th percentile) would not overlap as discussed in Section 3.1.

5 Conclusion and Summary

- 5.1.1 This assessment of the effects, and their significance, of the Proposed Development as it applies to odour has been thoroughly carried out based on the information currently available.
- 5.1.2 Odour impacts during the construction of the Proposed Development, through works which include making connections to new pipelines to the existing sewerage, are predicted to be of short duration during the construction phase. The results of the assessment of residual effects, take into account secondary mitigation measures identified within Part A and Part B of the CoCP. Overall, the odour risks identified from the construction activities are **negligible** and **not significant**.
- 5.1.3 Odour impacts during the decommissioning of the existing Cambridge WWTP, existing Waterbeach WRC and the future decommissioning of the proposed WWTP, specifically the draining and cleaning of tanks, are expected to be of short duration. The results of the assessment of residual effects take into account secondary mitigation measures identified within Part A and Part B of the CoCP. Overall, the odour risks identified from the decommissioning activities are **negligible** and **not significant**.
- 5.1.4 Odour emissions from normal operation of the proposed WWTP have been assessed through odour modelling using best practice approaches. The assessment has been undertaken based on a number of conservative assumptions which may exaggerate the predicted odour contour extents associated with the proposed WWTP.
- 5.1.5 The results of odour modelling reported in this assessment indicate that the modelled odour exposure levels with a Medium impact ($30\text{ou}_E/\text{m}^3$ to $50\text{ou}_E/\text{m}^3$) are within 200m of the outer perimeter of the proposed WWTP. The odour impacts from the normal operation of the proposed WWTP are **not significant**.
- 5.1.6 Odour impacts during unlikely periods of abnormal operation of the proposed WWTP, deliveries of waste water and sludge by vehicles, accidental spills and leaks and the operation of the outfall have been assessed qualitatively. The results of the assessment of residual effects take into account the secondary mitigation measures, including the preliminary OMP (App Doc Ref 5.4.18.4), to reduce and manage odour emissions. Overall, the residual effect from operational activities discussed above would be **negligible** and **not significant**.
- 5.1.7 Identified impacts, effects and associated mitigation are summarised in Table 5-1. This assessment and the Proposed Development adhere to the requirements of national and local planning policy and legislation presented in Section 1.2 of this chapter.

Table 5-1: Summary of odour effects

Works description	Description of effect	Primary and tertiary measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Initial classification of effect	Additional/ Secondary mitigation	Residual effect significance	Proposed monitoring
Construction								
Testing and commissioning of the proposed WWTP	Odour emission from transportation of seed sludge and commencement of biological processes with the proposed WWTP	<p>During this period the existing Cambridge WWTP and the proposed WWTP will have active treatment processes as part of the design:</p> <ul style="list-style-type: none"> Covered reception areas at the terminal pumping station, inlet works and sludge tanks; Low turbulence processes; Venting of air from TPS, inlet and sludge tanks through the odour control plant; Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with an uninterruptable power supply UPS <p>Management of impacts will be managed through the following measures, as outlined in the preliminary OMP (App Doc Ref 5.4.18.4):</p> <ul style="list-style-type: none"> Covered reception areas receiving waste water and sludge deliveries Transport seed sludge in sealed tankers and pumped into the tanks through a closed process. 	<p>Source odour potential: Medium</p> <p>Pathway: Ineffective - Moderately Effective</p> <p>Odour exposure risk: Negligible - Low</p>	Low - High	Negligible	Section 7.8 of the CoCP Part A (App Doc Ref 5.4.2.1) secured through a requirement of the draft DCO (Application Document Ref 2.1).	Negligible (not significant)	None
Connection of the Waterbeach pipeline to a new section of pipe linking to a new pumping station	Odour emission from short term tie in works	<ul style="list-style-type: none"> None 	<p>Source odour potential: Small</p> <p>Pathway: Highly Effective</p> <p>Odour exposure risk: Negligible</p>	High	Negligible	<p>None</p> <p>Measures within CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> Odour release during tie in works would be minimized using an air extraction system and a mobile odour filtration unit located adjacent to the open shafts. To ensure effective odour control during the tie in works, regular site inspections by the person accountable for odour issues on site should be undertaken to minimise the risk of causing nuisance and/or loss of amenity. An inspection log should be kept and made available to the overseeing authority on request. 	Negligible (not significant)	None
Testing and commissioning of the completed Waterbeach pipeline	Odour emission from short-term testing and commissioning	<ul style="list-style-type: none"> Use of potable water for testing 	<p>Source odour potential: Small</p> <p>Pathway: Ineffective</p>	High	Negligible		Negligible (not significant)	None

Works description	Description of effect	Primary and tertiary measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Initial classification of effect	Additional/ Secondary mitigation	Residual effect significance	Proposed monitoring
			Odour exposure risk: Negligible					
Odour release from breaking open existing sewer during connections within the exiting Cambridge WWTP	Odour emissions from short-term tie-in works	<ul style="list-style-type: none"> None 	Source odour potential: Small Pathway: Ineffective – Highly Effective Odour exposure risk: Negligible - Low	Low - High	Negligible	Management of impacts through the following measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2): <ul style="list-style-type: none"> Use of air extraction system and a mobile odour filtration unit adjacent to the sewer shafts. Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. 	Negligible (not significant)	None
Connection of the Waterbeach pipeline to the existing sewer	Odour emission from short-term tie-in works	<ul style="list-style-type: none"> Existing measures forming part of the operating controls of a permitted location would be in place. 	Source odour potential: Small Pathway: Ineffective – Highly Effective Odour exposure risk: Negligible - Low	Low - High	Negligible	As above	Negligible (not significant)	None
Decommissioning		<ul style="list-style-type: none"> 						
Draining and cleaning of tanks and equipment at the existing Cambridge WWTP	Odour emission from draining and cleaning	<ul style="list-style-type: none"> Existing odour controls as required by the existing environmental permit and associated odour management plan for the existing Cambridge WWTP 	Source odour potential: Small Pathway: Ineffective – Highly Effective Odour exposure risk: Negligible - Low	Low - High	Negligible	Removal of residual sludge via suction pump and taken offsite for treatment or treated onsite such as in a quick lime dosing plant. Implementation of Section 6 (Plant to be decommissioned), Decommissioning Plan (Application Document Ref 5.4.2.3). Use of odour suppression equipment, such as fogging/misting systems. Section 7.8 (Air quality), Construction odours of the CoCP Part A (Appendix 2.1, Application Document Ref 5.4.2.1). Measures within CoCP Part B (App Doc Ref 5.4.2.2) setting out how potential odour impacts arising from activities associated with connecting into and diverting existing sewers will be managed. Decommissioning Management Plan (Application Document Ref 5.4.2.3).	Negligible (not significant)	None
Operation								
Normal operation of the proposed WWTP	Odour emission from normal operation of the proposed WWTP	Control measures will be in place as required by the environmental permit (IED) and include operating in accordance with the approved OMP, and having	Negligible - Small	Low - High	Negligible	Outline OMP (Appendix 18.4, App Doc Ref 5.4.18.4) including operational odour management, monitoring and reporting	Negligible (not significant)	None

Works description	Description of effect	Primary and tertiary measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Initial classification of effect	Additional/ Secondary mitigation	Residual effect significance	Proposed monitoring
		<p>established emergency response procedures. The preliminary OMP (App Doc Ref 5.4.18.4) will outline operational odour management, monitoring and reporting measures, and controls to be in place in the event of an incident, record odour events and respond to complaints.</p> <p>Management of impacts will be managed through the following design measures as described in ES Chapter 2 Project Description, Sections 2.3 Waste water treatment plant, 2.4 Sludge treatment centre, and 2.5 Odour control (App Doc Ref 5.2.2):</p> <ul style="list-style-type: none"> Covered reception areas at the terminal pumping station, inlet works and sludge tanks, low turbulence processes Venting of air from TPS, inlet and sludge tanks through the odour control plant Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with a UPS. 				measures such as controls to be implemented in the event of an incident such as a spillage, recording of odour events and responding to complaints.		
Operation of WWTP - abnormal operations accidents or emergencies	Odour emission from biogas release to air (if required)	<ul style="list-style-type: none"> To minimise emissions during use and flare usage will be limited under the Environmental Permit (IED) permit controls including detailed OMP (Application Document Ref 5.4.18.4) outlining operational odour management, monitoring and reporting measures. Controls required by the Environmental Permit (IED) permit such as operating in accordance with approved OMP, and having established emergency response procedures and Emergency Response Plans 	<p>Source odour potential: Medium</p> <p>Pathway: Ineffective – Highly Effective</p> <p>Odour exposure risk: Negligible - Medium</p>	Low - High	Negligible	As above	Negligible (not significant)	None
Deliveries of waste water and sludge by vehicle	Short term odour release from deliveries	<p>Design includes a loading area located towards the centre of the proposed WWTP.</p> <p>Treatment processes such that processed sludge cake will be 'dewatered' and digested using biological treatment, which reduces the potential for odour</p> <p>Management of impacts through the following measures, as outlined in the preliminary OMP (App Doc Ref 5.4.18.4):</p> <ul style="list-style-type: none"> Use of sealed vehicles for the delivery of waste water and sludge <p>Covered reception areas receiving waste water and sludge deliveries</p>	<p>Source odour potential: Small</p> <p>Pathway: Ineffective – Highly Effective</p> <p>Odour exposure risk: Negligible - Low</p>	Low- High	Negligible	As above	Negligible (not significant)	None
Accidental spills, leaks of sludge/ movements	Odour emission from sludge tanker spill within the WWTP	Controls required by the IED permit such as operating in accordance with approved OMP (Application Document Ref 5.4.18.4), and	Source odour potential: Small	Low - High	Negligible	As above	Negligible (not significant)	None

Works description	Description of effect	Primary and tertiary measures adopted as part of the project	Magnitude of impact	Sensitivity of receptor	Initial classification of effect	Additional/ Secondary mitigation	Residual effect significance	Proposed monitoring
		having an established emergency response procedure. Management of impacts through the following measures, as outlined in the preliminary OMP (App Doc Ref 5.4.18.4): <ul style="list-style-type: none"> • Use of sealed vehicles for the delivery of waste water and sludge • Covered reception areas receiving waste water and sludge deliveries 	Pathway: Ineffective – Highly Effective Odour exposure risk: Negligible - Low					
Operation of the outfall	Odour emission from release of cleaned effluent into water cycle	Design for aeration and effective mixing at outfall	Source odour potential: Small Pathway: Ineffective – Highly Effective Odour exposure risk: Negligible - Low	Low- High	Negligible	As above	Negligible (not significant)	None
Operation of sewer valves along the Waterbeach pipeline	Short term odour release from sewer air valves	To manage the release of air from the sewer air valves and reduce localized impacts, standard design will include valves to be installed below ground within the manhole chambers allowing intermittent small odour release below ground.	Source odour potential: Small Pathway: Highly Effective Odour exposure risk: Negligible	High	Negligible	None	Negligible (not significant)	None
Presence of vent in location of existing Cambridge WWTP	Intermittent releases through vent that may be odourous	The ventilation structure will include a permanent vent stack inclusive of a carbon filter, extending to a height of up to 10m above ground level and an adjacent filter installation at ground level for odour control.	Source odour potential: Small Pathway: Moderately Effective to Highly Effective Odour exposure risk: Negligible to Low	Low to High	Negligible	Monitoring of the structure in accordance with the suppliers specifications and managed operated and inspected in accordance with the approved OMP	Negligible (not significant)	None

5.2 Securing mitigation

5.2.1 The delivery of mitigation will be controlled through the ‘Development Consent Order’ (DCO) which:

- identifies parameters within which certain works activities will be located and constructed (e.g. maximum and minimum building dimensions (including below ground), or locational zones);
- sets requirements for construction, operation and maintenance of the Proposed Development to be undertaken in accordance with ‘control plans / documents’ (including those that are related to compliance with environmental permits); and
- sets requirements for the control of specific issues or works (e.g. time limits around the completion of the outfall construction)

5.2.2 Table 5-2 summarises all mitigation in relation to odour, how these measures are secured, the party responsible for the implementation of the measure, when the measure would be delivered and any mechanisms to deliver the measure.

Table 5-2: Odour mitigation summary

Works description	Description of impact	Residual effect	Mitigation measure	Mitigation type	Secured by	Responsible party	Timing on the provision of the measure	Trigger for the discharge of any related requirement
Construction								
Testing and commissioning of the proposed WWTP	Odour emission from transportation of seed sludge and commencement of biological processes with the proposed WWTP	Negligible	<p>Management of impacts will be managed through the following design measures:</p> <ul style="list-style-type: none"> Covered reception areas at the terminal pumping station, inlet works and sludge tanks Low turbulence processes Venting of air from TPS, inlet and sludge tanks through the odour control plant Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with an uninterruptible power supply UPS Transport seed sludge in sealed tankers and pumped into the tanks through a closed process <p>Measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. 	Embedded (Primary) and Secondary	A to implement Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) secured through a requirement of the draft DCO (Application Document Ref 2.1).	Applicant / Appointed contractor(s)	Pre-construction	Detailed design pre-construction
Connection of the Waterbeach pipeline to the pumping station	Odour emission from short term tie in works	Negligible	<p>Management of impacts through the following measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> An air extraction system will be put in place and a mobile odour filtration unit located adjacent to the sewer shafts. Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. 	Secondary	A requirement to implement Section 7.8, CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2) secured through a requirement of the draft DCO (Application Document Reference 2.1).	Appointed contractor(s)	Pre-construction	Approved CEMP prior to start of construction
Testing and commissioning of the completed Waterbeach pipeline	Odour emission from short-term testing and commissioning	Negligible	<ul style="list-style-type: none"> Section 6.8 of the CoCP Part A Measures within CoCP Part B setting out how potential odour impacts arising from activities associated with connecting into and diverting existing sewers will be managed. 	Secondary	A requirement to implement Section 7.8, CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and secured through a requirement of the draft DCO (Application Document Reference 2.1).	Appointed contractor(s)	Pre-construction	Approved CEMP prior to start of construction
Odour release from breaking open existing sewer during connections	Odour emissions from short-term tie-in works	Negligible	<p>Management of impacts through the following measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> Use of air extraction system and a mobile odour filtration unit adjacent to the sewer shafts. 	Secondary	A requirement to implement Section 7.8, CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and secured through a requirement of the draft DCO (Application Document Reference 2.1).	Appointed contractor(s)	Pre-construction	Approved CEMP prior to start of construction

Works description	Description of impact	Residual effect	Mitigation measure	Mitigation type	Secured by	Responsible party	Timing on the provision of the measure	Trigger for the discharge of any related requirement
			<ul style="list-style-type: none"> Regular site inspections by the person accountable for odour issues on site to minimise the risk of causing nuisance and/or loss of amenity. 					
Connection of the Waterbeach pipeline to the existing sewer	Odour emission from short-term tie-in works	Negligible	<p>Management of impacts through the following measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> Use of air extraction system and a mobile odour filtration unit adjacent to the sewer shafts. Section 7.8, Construction odours of the CoCP Part A (Application Document Ref 5.4.2.1). Measures within CoCP Part B (Appendix 2.2, Application Document Ref 5.4.2.2) setting out how potential odour impacts arising from activities associated with connecting into and diverting existing sewers will be managed. 	Secondary	A requirement within Schedule 2 to implement Section 7.8, CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and secured through a requirement of the draft DCO (Application Document Reference 2.1).	Appointed contractor(s)	Pre-construction	Approved CEMP prior to start of construction
Decommissioning								
Draining and cleaning of tanks and equipment at the existing Cambridge WWTP	Odour emission from draining and cleaning of the existing Cambridge WWTP waste water storage tanks and equipment	Negligible	<ul style="list-style-type: none"> Transfer of the existing permit controls and odour management plan at the existing Cambridge WWTP to the proposed WWTP. Section 3.5, OMP (Appendix 18.4, Application Document Ref 5.4.18.4). Removal of residual sludge via suction pump and taken offsite for treatment or treated onsite such as in a quick lime dosing plant. Implementation of Section 6, Decommissioning Management Plan (Application Document Ref 5.4.2.3). Use of odour suppression equipment, such as fogging/misting systems. Section 7.8, Construction odours of the CoCP Part A (Appendix 2.1, Application Document Ref 5.4.2.1). 	Secondary/ Tertiary	Requirement to comply with existing Cambridge WWTP environment permit Decommissioning Plan (Application Document Reference 5.4.2.4) secured through a requirement of the draft DCO (Appendix 2.3, Application Document Reference 2.1)	Applicant / Appointed contractor(s)	Pre-construction	Approved CEMP prior to start of construction Approved Decommissioning Management Plan prior to decommissioning start
Operation								
Normal operation of the proposed WWTP	Odour emission from normal operation of the proposed WWTP	Negligible	Control measures will be in place as required by the Environmental Permit (IED) and include operating in accordance with approved OMP, and having established emergency response procedures. The preliminary OMP (App Doc Ref 5.4.18.4) will outline operational odour management, monitoring and reporting measures, and controls to be in place in the event of an incident, record odour events and respond to complaints.	Secondary/ Tertiary	Preparation of an operational monitoring programme as part of the written EMS to cover periodic monitoring activities and emergency response activities to accord with the requirements of the Environmental Permit.	Applicant	Prior to commencement of operation	Approved Odour Management Plan as part of environmental permitting process EMS including operational procedures for odour control, waste management, spill response, emergency response and pest control in

Works description	Description of impact	Residual effect	Mitigation measure	Mitigation type	Secured by	Responsible party	Timing on the provision of the measure	Trigger for the discharge of any related requirement
			<p>Management of impacts will be managed through the following design measures as described in Section 7.8 (Air quality) of the CoCP Part A (Appendix 2.1, App Doc Ref 5.4.2.1) and the CoCP Part B (Appendix 2.2, App Doc Ref 5.4.2.2):</p> <ul style="list-style-type: none"> Covered reception areas at the terminal pumping station, inlet works and sludge tanks Low turbulence processes Venting of air from TPS, inlet and sludge tanks through the odour control plant Odour control facilities will be critical equipment to operate continuously in all conditions and supplied with a UPS 	Embedded (Primary)	DCO Schedule 2 Requirement 7 (Detailed Design) (App Doc Ref 2.1)(Detailed Design)	Applicant	Pre-construction	place prior to start of operation. Detailed design approved pre-construction
Operation of WWTP- abnormal operations accidents or emergencies	Odour emission from biogas release to air (if required)	Negligible	<ul style="list-style-type: none"> Controls required by the IED permit such as operating in accordance with approved OMP, and having established emergency response procedures To minimise emissions to air during use and flare usage will be monitored under IED permit controls including detailed OMP (Application Document Ref 5.4.18.4) outlining operational odour management, monitoring and reporting measures. 	Secondary/Tertiary	Preparation of an operational monitoring programme as part of the written EMS to cover periodic monitoring activities and emergency response activities to accord with the requirements of the Environmental Permit. Requirement to prepare detailed OMP based on preliminary OMP (Application Document Ref 5.4.18.4)	Applicant	Prior to commencement of operation	Approved Odour Management Plan as part of environmental permitting process EMS including operational procedures for odour control, waste management, spill response, emergency response and pest control in place prior to start of operation.
Deliveries of waste water and sludge by vehicle	Short term odour release from deliveries	Negligible	<p>Management of impacts will be managed through the following measures, as outlined in the preliminary OMP (App Doc Ref 5.4.18.4):</p> <ul style="list-style-type: none"> Use of sealed vehicles for the delivery of waste water and sludge Covered reception areas receiving waste water and sludge deliveries 	Secondary	Preparation of an operational monitoring programme as part of the written EMS to cover periodic monitoring activities and emergency response activities to accord with the requirements of the Environmental Permit.	Applicant	Prior to commencement of operation	Approved Odour Management Plan

Works description	Description of impact	Residual effect	Mitigation measure	Mitigation type	Secured by	Responsible party	Timing on the provision of the measure	Trigger for the discharge of any related requirement
					Requirement to prepare detailed OMP based on Outline OMP (Application Document Ref 5.4.18.4)			
Accidental spills, leaks of sludge/ movements	Odour emission from sludge tanker spill within the WWTP	Negligible	<p>Controls required by the IED permit such as operating in accordance with approved OMP (App Doc Ref 5.4.18.4), and having an established emergency response procedure.</p> <p>Management of impacts will be managed through the following measures, as outlined in the preliminary OMP (App Doc Ref 5.4.18.4):</p> <ul style="list-style-type: none"> • Use of sealed vehicles for the delivery of waste water and sludge • Covered reception areas receiving waste water and sludge deliveries 	Secondary/ Tertiary	<p>Preparation of an operational monitoring programme as part of the written EMS to cover periodic monitoring activities and emergency response activities to accord with the requirements of the Environmental Permit.</p> <p>Requirement to prepare detailed OMP based on Outline OMP (Application Document Ref 5.4.18.4)</p>	Applicant	Prior to commencement of operation	Approved Odour Management Plan as part of environmental permitting process EMS including operational procedures for odour control, waste management, spill response, emergency response and pest control in place prior to start of operation.
Operation of the outfall	Odour emission from release of cleaned effluent into water cycle	Negligible	<p>Design for aeration and effective mixing at outfall</p> <p>Controls required by the Environmental Permit (IED) such as operating in accordance with approved preliminary OMP (App Doc Ref 5.4.18.4), and having established emergency response procedures.</p> <p>The preliminary OMP (App Doc Ref 5.4.18.4) will outline operational odour management, monitoring and reporting measures, and controls to be in place in the event of an incident, record odour events and respond to complaints</p>	Primary	DCO Schedule 2 Requirement 7 (Detailed Design) (App Doc Ref 2.1)(Detailed Design)	Applicant	Prior to construction	Approved design and work plan
				Secondary/ Tertiary	<p>Preparation of an operational monitoring programme as part of the written EMS to cover periodic monitoring activities and emergency response activities to accord with the requirements of the Environmental Permit.</p> <p>Requirement to prepare detailed OMP based on Preliminary OMP (Application Document Ref 5.4.18.4)</p>	Applicant	Prior to commencement of operation	Approved Odour Management Plan as part of environmental permitting process EMS including operational procedures for odour control, waste management, spill response, emergency response and pest control in place prior to start of operation.
Operation of sewer valves along the Waterbeach pipeline	Short-term odour release from sewer air valves	Negligible	To manage the release of air from the sewer air valves and reduce localized impacts, standard design will include valves to be installed below ground within the manhole chambers allowing intermittent small odour release below ground.	Primary	DCO Schedule 2 Requirement 7 (Detailed Design) (App Doc Ref 2.1)(Detailed Design)	Applicant	Construction	Approved design and work plan
Presence of vent in location of existing Cambridge WWTP	Intermittent short-term odour release from ventilation structure	Negligible	<p>Odour mitigation is embedded in the design by incorporating a chemical dosing facility, which prevents septicity and reduces odour formation.</p> <p>The ventilation structure will also include a permanent stack inclusive of a carbon filter, extending to a height of up to 10m</p>	Primary	DCO Schedule 2 Requirement 7 (Detailed Design) (App Doc Ref 2.1)(Detailed Design)	Applicant	Prior to commencement of operation	Approved design

Works description	Description of impact	Residual effect	Mitigation measure	Mitigation type	Secured by	Responsible party	Timing on the provision of the measure	Trigger for the discharge of any related requirement
			above ground level and an adjacent filter installation at ground level for odour control.					
			Management plan includes requirements that vent filter replaced in accordance with manufacturers specification	Secondary	DCO Schedule 2 Requirement 20 (Odour management plan) (App Doc Ref 2.1)			Approved management plan prior to start of construction

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