Isles of Scilly

Capital Delivery Programme

Odour Assessment

Bishop and Wolf Pumping Station and Screening Plant

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Odour Assessment:
Bishop and Wolf Pumping Station and Screening Plant, Scilly

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Experts in air quality management & assessment

Document Control

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Contents

Tables

Figures

1 Introduction

1.1 This report describes the assessment of odour effects associated with the construction of a screening plant replacing the existing Bishop and Wolf pumping station located off Little Porth Road, Hugh Town, St Mary's, Isles of Scilly. The assessment has been carried out by Air Quality Consultants Ltd (AQC) on behalf of Pell Frischmann (for Southwest Water) to support the planning application.

1.2 The proposed development is described as:

"the construction of an enlarged wastewater infrastructure building, which will replace the existing Bishop and Wolf SPS building. The new building will house new variable-speed pumps and a new screening plant. The screening plant will remove objects such as rags, paper, plastics, and metals to prevent damage and clogging of downstream equipment, piping, and appurtenances as well as ensuring they do not enter the marine environment."

1.3 The proposed development includes an odour control system to treat air from the building, which is to be discharged via a rooftop stack. The activities to be undertaken within the new building include the screening of wastewater, the storage of used screens and screened material, and the retention of the existing pumping equipment and wet well.

1.4 The location and setting of the proposed development is shown in Figure 1.

Figure 1: Location of the Proposed Screening Plant

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1.5 The assessment identifies the potential odour effects associated with the screening plant and utilises an odour risk assessment.

2 Odour in Legislation, Policy and Guidance

National Legislation

Environmental Protection Act

2.1 There are currently no statutory standards in the UK covering the release and subsequent impacts of odours. This is due to complexities involved with measuring and assessing odours against compliance criteria, and the inherently subjective nature of odours.

2.2 It is recognised that odours have the potential to pose a nuisance for residents living near to an offensive source of odour. Determination of whether or not an odour constitutes a statutory nuisance in these cases is usually the responsibility of the local planning authority or the Environment Agency. The Environmental Protection Act 1990 (1990) outlines that a local authority can require measures to be taken where any:

"dust, steam, smell or other effluvia arising on an industrial, trade and business premises and being prejudicial to health or a nuisance…" or

"fumes or gases are emitted from premises so as to be prejudicial to health or cause a nuisance.."

2.3 Odour can also be controlled under the Statutory Nuisance provisions of Part III of the Environmental Protection Act.

Planning Policy

National Planning Policy Framework

2.4 The National Planning Policy Framework (NPPF) (2024) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which is an environmental objective:

"to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy"..

2.5 To prevent unacceptable risks from pollution, Paragraph 187 of the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions

such as air and water quality, taking into account relevant information such as river basin management plans".

Paragraph 198 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.6 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2021), which makes clear that *"Odour…can also be a planning concern, for example, because of the effect on local amenity"*. It also provides guidance on options for mitigating impacts, and states that *"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact".*

Odour Guidance

Environment Agency Guidance

2.7 The Environment Agency has produced a horizontal guidance note (H4) on odour assessment and management (Environment Agency, 2011), which is designed for operators of Environment Agency-regulated processes (i.e., those which classify as Part A(1) processes under the Pollution Prevention and Control (PPC) regime). The H4 guidance document is primarily aimed at methods to control and manage the release of odours, but also contains a series of recommended assessment methods which can be used to assess potential odour impacts.

Institute of Air Quality Management Guidance

2.8 The latest UK guidance on odour was published by the Institute of Air Quality Management (IAQM) in 2018 (IAQM, 2018). The IAQM guidance sets out assessment methods which may be utilised in the assessment of odours for planning applications. It is the only UK odour guidance document which contains a method for estimating the significance of potential odour impacts.

3 Assessment Approach

3.1 Odour impact assessment is a challenging and subjective science. There are a number of odour assessment methods and tools that have been developed which are widely used in the UK, including desk-based methods, such as complaints analysis and qualitative risk assessment, through to field odour testing (sniff testing) and dispersion modelling. Each has its advantages and disadvantages and not all assessment methods are appropriate in every case; for example, where a potentially odorous process is proposed rather than existing, then assessment methods such as sniff testing and odour sampling are less relevant than predictive methods such as odour risk assessment. The scale and location of odorous processes is also important in selecting appropriate assessment methodologies, with more simple methodologies often sufficient for small or remotely located processes.

3.2 The approach to assessing the odour effects from the screening plant has been to utilise the qualitative risk-assessment approach described in the IAQM guidance on assessment of odours for planning (IAQM, 2018).

Odour Risk Assessment

3.3 The odour risk assessment set out in the IAQM guidance follows a Source-Pathway-Receptor approach. This approach describes the concept that, in order for an odour impact (such as annoyance or nuisance) to occur, there must be a source of odour, a pathway to transport the odour to an off-site location, and a receptor (e.g. people) to be affected by the odour.

3.4 The risk of odour effects at a given receptor location may be estimated using the following fundamental relationship:

Effect ≈ Dose x Response

3.5 In this relationship, the **dose** is a measure of the likely exposure to odours, in other words the ***impact***. The **response** is determined by the sensitivity of the receiving environment and thus the overall ***effect*** is the result of changes in odour exposure at specific receptors, taking into account their sensitivity to odours.

3.6 In order to determine the risk of potential odour effects from the screening plant, the 'FIDOR' factors for odour exposure have been used. These factors are commonly used in the assessment of odours and are outlined in the IAQM guidance, but are also described in the Environment Agency's H4 guidance document on odour management (Environment Agency, 2011). The FIDOR factors are:

- **F**requency – the frequency with which odours are detected;
- **I**ntensity – the intensity of odours detected;
- **D**uration – the duration of exposure to detectable odours;

- **O**ffensiveness – the level of pleasantness or unpleasantness of odours; and
- **R**eceptor – the sensitivity of the location where odours are detected, and/or the proximity of odour releases to an odour-sensitive location.

3.7 Odour emissions from the screening plant have been assigned a risk-ranking based on the "effect ≈ dose x response" relationship, whereby the dose (impact) is determined by the "FIDO" part of FIDOR, and the response is determined by the "R" (receptor sensitivity). The risk of odour effects can therefore be described as:

Effect ≈ Impact (FIDO) x Receptor Sensitivity (R)

3.8 The key factors that will influence the effects of odours are the magnitude of the odour source(s), the effectiveness of the pathway for transporting odours, and the sensitivity of the receptor. The methodology set out in the IAQM guidance document describes in detail a Source-Pathway-Receptor approach to odour risk assessment, and includes tables and matrices to assist in determining the likely risk of odour effects. The IAQM methodology is outlined below. It includes an element of professional judgement.

3.9 The assessment examines the source odour potential (source magnitude) of the screening plant, and then identifies the effectiveness of the pathway and receptor sensitivity at sensitive locations.

3.10 Table 1 describes the risk-rating criteria (high, medium and low) for source odour potential, pathway effectiveness and receptor sensitivity applied in this assessment. This table has been adapted from Table 8 in the IAQM odour guidance.

Table 1: Source-Pathway-Receptor Risk Ratings

Source Odour Potential	Pathway Effectiveness	Receptor Sensitivity
Large Source Odour Potential: Large-scale odour source and/or a source with highly unpleasant odours (hedonic tone -2 to -4); no odour control.	**Highly Effective Pathway:** Very short distance between source and receptor; receptor downwind of source relative to prevailing wind; ground level releases; no obstacle between source and receptor.	**High Sensitivity:** Highly sensitive receptors e.g. residential properties and schools.
Medium Source Odour Potential: Medium-scale odour source and/or a source with moderately unpleasant odours (hedonic tone 0 to -2); basic odour controls.	**Moderately Effective Pathway:** Receptor is local to the source; releases are elevated, but compromised by building effects.	**Medium Sensitivity:** Moderately sensitive receptors e.g. commercial and retail premises, and recreation areas.
Small Source Odour Potential: Small-scale odour source and/or a source with pleasant odours (hedonic tone +4 – 0); best practise odour controls.	**Ineffective Pathway:** Long distance between source and receptor (>500 m); receptors upwind of source relative to prevailing wind; odour release from stack/high level.	**Low Sensitivity:** Receptors not sensitive e.g. industrial activities or farms.

3.11 The risk ratings for source magnitude and pathway effectiveness (for each receptor) identified using the criteria in Table 1 are then combined using the matrix shown in Table 2 to estimate an overall risk of odour impact at each specific receptor location.

Table 2: Assessment of Risk of Odour Impact at a Specific Receptor Location

Pathway Effectiveness	Source Odour Potential (Source Magnitude)		
	Large	**Medium**	**Small**
Highly Effective	High Risk	Medium Risk	Low Risk
Moderately Effective	Medium Risk	Low Risk	Negligible Risk
Ineffective	Low Risk	Negligible Risk	Negligible Risk

3.12 The next stage of the risk assessment is to identify the potential odour effect at each receptor location. This is done using the matrix presented in Table 3, which combines the overall odour impact risk descriptor for each receptor with the receptor sensitivity determined using the criteria in Table 1.

Table 3: Assessment of Potential Odour Effect at a Specific Receptor Location

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

3.13 As a final stage of assessment, an overall significance of odour effects is determined, based on professional judgment and taking into account the significance of the effect at each specific receptor location.

4 Odour Impact Assessment

Odour Risk Assessment

Process Description

Existing Process

4.1 The existing Bishop and Wolf pumping station currently collects flows from the Hugh Town catchment, which are pumped via a rising main to The Garrison and then discharged off Morning Point. Currently, the odour emissions associated with the existing pumping station are fugitive emissions through a wet well drain cover outside the current building and through a 10-metre high ventilation pipe (approximately) serving the wet well. Odour emissions from this pipe are not subject to any odour abatement.

Proposed Process

4.2 The proposal is to demolish the existing building and construct a new building which will house a Longwood elevator screen, with Haigh Lisep screening handling equipment, to screen effluent coming from Hugh Town prior to discharge at Morning Point. The current pumping station equipment will be housed within the new building, with the 10 m ventilation pipe retained. The existing external wet well drainage cover will now be enclosed by the new enlarged building. Storage of screens will be within wheelie bin-sized containers within the building, with used screens anticipated to be removed every two to three days. It is expected that the screening plant will operate 24 hours a day, 365 days per year.

4.3 Furthermore, air from the building will be passed through a Peacemaker Dry Scrubber[1] located inside the new plant building and discharged through a rooftop stack.

Source Odour Potential

4.4 The first step of the odour risk assessment is to identify the source odour potential or odour magnitude. This takes into account the scale and nature of the odorous processes; the continuity, intensity and offensiveness of odour releases; and any odour control measures that are used. In essence, it must consider the odour potential of the source with respect to the FIDO part of FIDOR.

4.5 The screening plant handles wastewater which can contain organic material, which is biodegradable. Biodegradation can result in odours being produced as the organic material breaks down under the influence of biological action. The strength and nature of odours produced is dependent on a number of variables including the volume and composition of the waste, the length of time it has been stored, the influence of temperature and moisture, and mechanical action.

[1] https://awteu.com/air-watertreatmentspeacemakerdryscrubbers.html

4.6 Typically, fresh organic matter is less odorous than organic matter that is a number of days or weeks old and has had time for biological breakdown to begin (either aerobic or anaerobic). Conversely, organic matter which has been allowed to significantly biodegrade often becomes less odorous again (e.g. mature compost). In this case, the time for wastewater to reach the site should be relatively short, coming straight from homes and business in the wider Hugh Town area and thus is unlikely to become septic (as a result of anaerobic decomposition in the sewage network) and thus more odorous.

4.7 The main odour sources and overall source odour potential for the screening plant are described in Table 4.

Table 4: Identification of Odour Sources and Overall Source Odour Potential

Odour Source	Description	Frequency and Duration	Intensity and Offensiveness
Screening and pumping of waste water	The pumping and screening of wastewater will occur inside the building. The screening will occur above ground. The ventilated air from the screening of wastewater will pass through an odour control scrubber before being discharged through a stack.	The screening plant is expected to operate 24 hours a day, 365 days a year.	Raw effluent has the potential to produce odours of high intensity and high offensiveness.
Wet well vent	The wet well associated with the screening plant is expected to constantly store an amount of wastewater. The displaced odorous air is assumed to passively vent via the existing ventilation pipe.	The ventilation of the wet well is expected to be 24 hours a day, 365 days a year.	Raw effluent has the potential to produce odours of high intensity and high offensiveness.
Screened Material	De-watered screened material will be stored in small containers within the building.	They will be collected every 2-3 days throughout the year. Collection time is thought to be minimal (less than an hour per visit).	De-watered screened material has the potential to produce odours of moderate intensity and offensiveness.
Overall Source Odour Potential	SEPA's odour guidance (Scottish Environmental Protection Agency, 2010) suggests that sewer odour has a hedonic score of -3.68, which indicates that odours from the proposed development site have the potential to be offensive. The screening of the wastewater has the potential to cause agitation and, therefore, may exacerbate the odour. However, these odours will be odour controlled using a scrubber. As such, the odour's offensiveness and intensity will be moderate at most and not as offensive as raw effluent. The screening plant is very small, and well below the scale of a small sewage treatment works, which the IAQM odour guidance (IAQM, 2018) classes as having the potential to have a medium odour source potential. Overall, when taking into account the reduced offensiveness for the majority of the odour emissions, the level of containment provided by the building, and the number of assets and amount of wastewater processed onsite, the overall source odour potential of the screening plant is judged to be **Small.**		

Pathway Effectiveness

4.8 In order to consider the effectiveness of the pathway, it is important to consider receptor locations in terms of their proximity to the odour sources and the prevailing wind direction. Six receptor locations have been selected for this assessment, which represent worst-case residential locations near the proposed development. These receptor locations are shown in Figure 2.

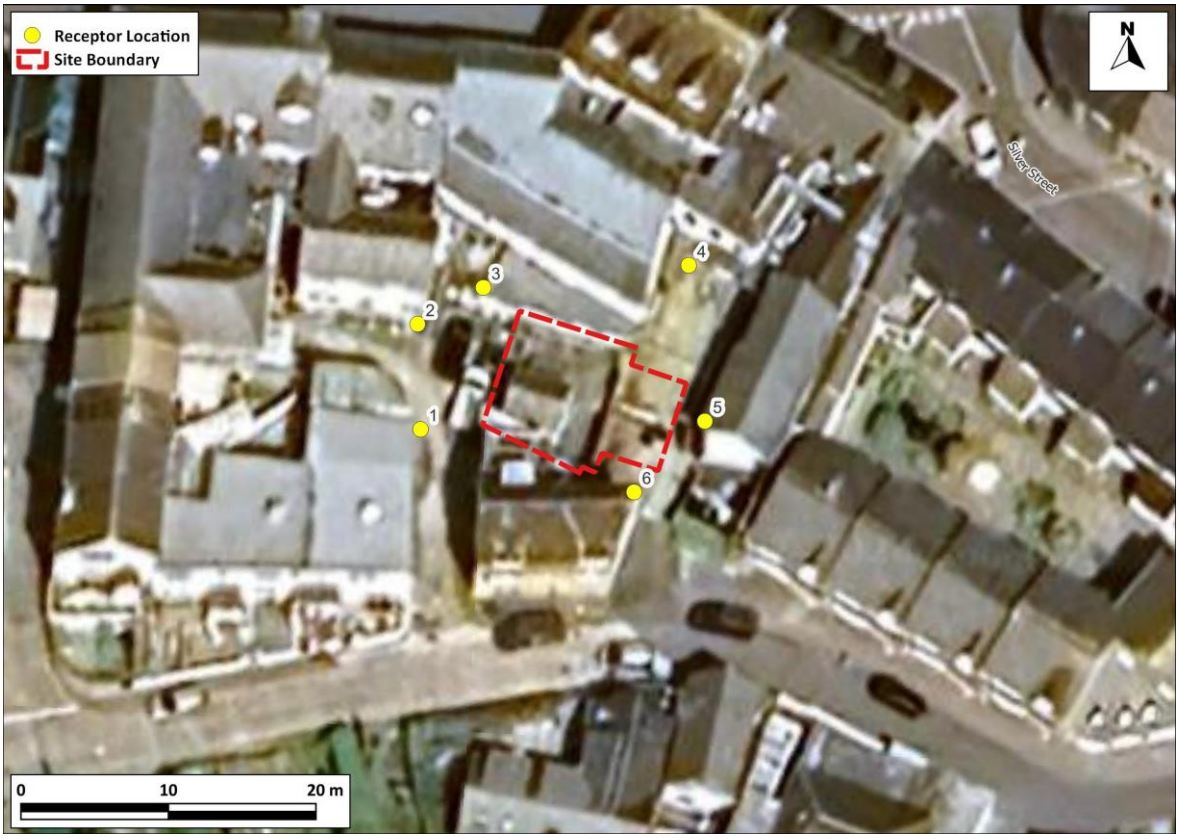

Figure 2: Assessed Receptor Locations

Imagery ©2024 Airbus, CNES / Airbus, Getmapping plc, Maxar Technologies, Map data ©2024

4.9 The wind rose for the Scilly, St Mary's meteorological station (2018-2022), presented in Figure 3, demonstrates that the prevailing wind in the region is from the southwest, with few other significant components. In general, odours will be transported by the wind and will not be detectable at locations upwind of a source. The exception to this is during very light wind conditions when odours may disperse against the wind direction, although typically only for relatively short distances. In this case, as receptors are very close to the odour source, this is likely to occur, although the wind rose indicates light wind speeds (< 2 m/s) are infrequent.

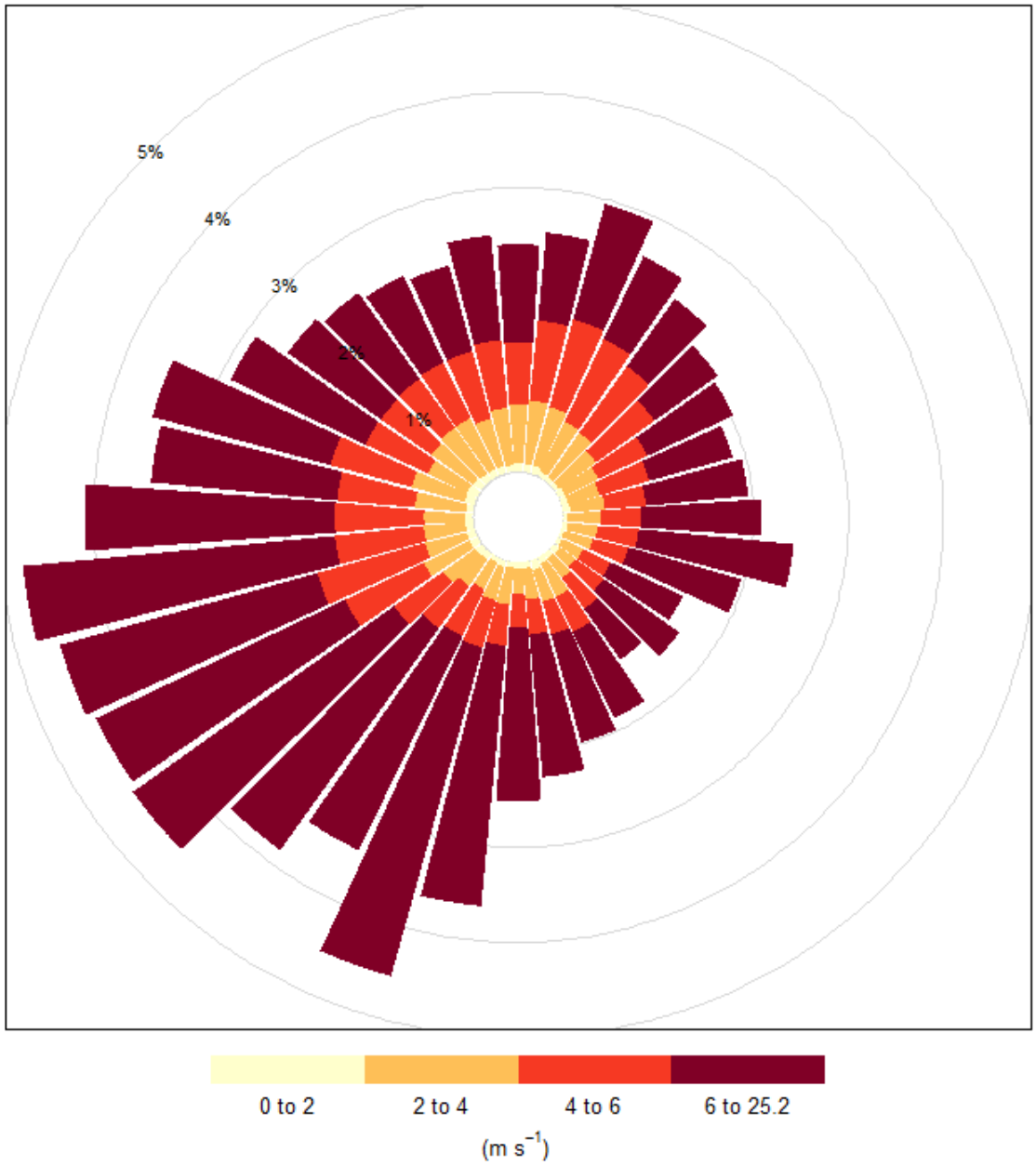

Figure 3: Windrose for Scilly, St Mary's (2018-2022)

4.10 The distances between the screening plant and all nearby assessed sensitive receptors are all under 10 m. As a result of this, the effectiveness of the odour pathway between the screening plant and the nearby sensitive receptors can all be considered highly effective for all receptors, regardless of wind direction.

Receptor Sensitivity

4.11 The sensitivity of each of the receptors is set out in Table 5. Receptor sensitivities are based on the descriptors presented in Table 1. The surrounding buildings are a mix of residential and commercial

uses (sometimes mixed use in a single building); as such, as a conservative approach, all buildings have been considered as high sensitivity receptors.

Potential Odour Effects

4.12 The assessment of the potential odour effects at sensitive receptor locations is presented in Table 5. This brings together the source odour potential, effectiveness of pathway and receptor sensitivity identified using the criteria described in Table 1, to identify an overall potential for odour effects, using the matrices set out in Table 2 and Table 3.

Table 5: Assessment of Potential Odour Effects from the Screening Plant

Receptor	Risk of Odour Impact (Dose)			Receptor Sensitivity	Likely Odour Effect
	Source Odour Potential	Effectiveness of Pathway	Risk of Odour Impact		
1-6	Small	Highly Effective	Low	High	Slight Adverse

4.13 The potential odour effects have been identified using the effect ≈ dose x response relationship identified in Paragraph 3.4. The process is described as follows:

1) Identify the impact:

4.14 Based on a small source odour potential, where the pathway is deemed to be highly effective, then the risk of odour impacts (dose) is judged to be low risk (see Table 2).

2) Consider the response:

4.15 Based on the matrix presented in Table 3, a low risk of odour impact at a high sensitivity receptor will lead to a slight adverse odour effect.

4.16 The potential odour effects at each receptor location are summarised in the final column of Table 5. The final stage of the risk assessment is to make an overall judgement as to the likely significance of effects.

4.17 The findings of this risk assessment have identified a slight adverse risk of odour effect at all assessed receptors. As IAQM guidance (IAQM, 2018) concludes that any effects that are slight adverse or less can be considered not significant, the odour effects from the screening plant are deemed to be **not significant**.

4.18 The above judgment has also considered that while the proposed development results in an increase in the number and size of odorous assets, the main additional odour source (the screening plant itself) will be within a fully contained building and odour controlled. As a result, there is likely to be little difference between the current and future odour situation.

4.19 However, due to the proximity of nearby residential receptors and acknowledging that emissions from odour control units are not necessarily odourless, it is recommended that the odour control unit stack is at such a height that exceeds the roof eaves height of the adjacent residential receptors to improve dispersion.

5 Summary

5.1 The odour effects of the new Bishop and Wolf screening plant on nearby sensitive receptor locations has been assessed, utilising an odour risk assessment.

5.2 The odour risk assessment has identified a potential for slight adverse odour effects at sensitive receptor locations resulting from the operation of the screening plant. In accordance with IAQM guidance, this is considered **not significant**.

5.3 Due to the proximity of nearby residential receptors, it is recommended that the odour control unit stack is at such a height that it exceeds the roof eaves height of the adjacent residential receptors.

6 References

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7 Appendices

A1 Professional Experience

Penny Wilson, BSc (Hons) CSci MIEnvSc MIAQM

Ms Wilson is a Technical Director with AQC, with more than 20 years' relevant experience in the field of air quality. She has been responsible for numerous assessments for a range of infrastructure developments including power stations, road schemes, ports, airports and residential/commercial developments. The assessments have covered operational and construction impacts, including dust and odour nuisance. She also provides services to local authorities in support of their LAQM duties, including the preparation of Review and Assessment and Action Plan reports, as well as audits of Air Quality Assessments submitted with planning and DCO applications. She has provided expert evidence to a number of Public Inquiries and civil court, and is a Member of the Institute of Air Quality Management and a Chartered Scientist.

Adam Dawson, BSc (Hons) MSc MIEnvSc MIAQM

Mr Dawson is a Principal Consultant with AQC with over ten years' experience in the field of air quality assessment. He undertakes air quality and odour assessments for AQC, covering residential and commercial developments, industrial installations, energy centres and waste facilities. He has experience using a range of dispersion models including ADMS-Roads, ADMS-5 and Breeze AERMOD to complete quantitative modelling assessments, for both planning and permitting purposes. He previously spent over two years as part of the Environment Agency's permitting team, so has extensive experience of the permitting process and industrial emissions. He is a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

Ben Collier, BSc (Hons)

Mr Collier is an Assistant Consultant with AQC and joined the company in 2023. Throughout his BSc Environmental Science degree at the University of the West of England, he developed an interest in planetary processes and impacts, in particular those in relation to air quality. During his studies, Mr Collier completed several atmospheric-related projects, with topics varying from the impact of urban air pollution to the potential of renewable energy to improve air quality; many of these included GIS based analysis.