Teddington Direct River Abstraction

Preliminary Environmental Information Report

Appendix 13.3 – Odour Risk Assessment Methodology

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Appendix 13.3 – Odour Risk Assessment Methodology

A.1.1 Odour annoyance is recognised as a symptom that develops as a result of intermittent but regular exposure to odours that are recognisable and have an offensive character. The key factors that contribute to the development of odour annoyance can be summarised by the acronym FIDOL:

a. Frequency of exposure
b. Intensity or strength of exposure
c. Duration of exposure
d. Offensiveness
e. Location sensitivity

A.1.2 Taking these factors into account, the assessment approach adopted was based on the principles described in the Institute of Air Quality Management (IAQM) odour guidance for planning (IAQM, 2018) and used qualitative techniques to assess the potential risk of odour impact on nearby residential areas during the construction and operation of the Teddington Direct River Abstraction Project (hereafter, 'the Project').

A.1.3 The approach used a Source–Pathway–Receptor (S–P–R) methodology, which considers the odour characteristics of the emissions Source (S), the effectiveness of the Pathway (P) for odour to travel through to nearby receptors, and the nature of the Receptors (R) which could experience the odours.

A.1.4 The Source–Pathway steps of the process represent the first four elements of FIDOL (the frequency, intensity, duration and offensiveness of exposure are determined by a mixture of source characteristics and effectiveness of transfer between source and receptor), with the Receptor step representing the location sensitivity element.

A.1.5 Three steps are carried out in order to rank the odour impact of an odour source, which in effect involves estimating the overall odour dose from an odour source and also considering receptor sensitivity as shown in the relationship for odour impact.

A.1.6 The first step is to estimate the 'Source Odour Potential', which takes into account factors such as the magnitude of the odour release (taking into account odour-control measures), how inherently odorous the compounds are and the unpleasantness of the odour, and the frequency and duration of their release.

A.1.7 Table A.1 shows the example risk ranking of these factors used to determine, the Source Odour Potential as either Small, Medium or Large.

A.1.8 The next step is to estimate the 'Pathway Effectiveness' of odour transport to the receptor versus the mitigating effect of control measures and dilution/dispersion in the atmosphere. Important factors considered here are: the distance of the receptors from the site (and hence the opportunity for dilution/dispersion to occur), location of the source to the sensitive receptors in

terms of predominant wind direction, the likely effectiveness of any odour controls, and the effectiveness of the point of release in promoting good dispersion. Table A.1 shows the example risk ranking of these factors used to determine the Pathway Effectiveness as either Ineffective, Moderately effective or Highly effective.

A.1.9 The estimates of Source Odour Potential and the Pathway Effectiveness are considered together using Table A.2 to predict the risk of odour exposure (impact) at the receptor location. 0 is the final step which is used to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity (based on Table A.1) and the outcome of Table A.2.

A.1.10 The odour effects may range from negligible, through slight adverse and moderate adverse, up to substantial adverse.

Table A.1 Examples of risk factors for odour source, pathway and receptor sensitivity

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting the source odour potential include: • The magnitude of the odour release (taking into account odour-control measures) • How inherently odorous the compounds are • The unpleasantness of the odour	Factors affecting the odour flux to the receptor are: • Distance from source to receptor • The frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind) • The effectiveness of any mitigation/control in reducing flux to the receptor • The effectiveness of dispersion/dilution in reducing the odour flux to the receptor • Topography and terrain	For the sensitivity of people to odour, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:
Large Source Odour Potential Magnitude – Larger Permitted processes of odorous nature or large Sewage Treatment Works (STWs); materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^2.	**Highly effective pathway for odour flux to receptor** Distance – receptor is adjacent to the source/site; distance well below any official set-back distances. Direction – high frequency (%) of winds from source to receptor (or, qualitatively, receptors downwind of	**High sensitivity receptor** – Surrounding land where: • Users can reasonably expect enjoyment of a high level of amenity. • The people would reasonably be expected to be present here continuously, or at least

Source Odour Potential	Pathway Effectiveness	Receptor
The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds (ODTs) where known. Unpleasantness – processes classed as 'Most offensive'; or (where known) compounds/odours having unpleasant (-2) to very unpleasant (-4) hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.	source with respect to prevailing wind). Effectiveness of dispersion/dilution – open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.	regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium Source Odour Potential Magnitude – smaller Permitted processes or small STWs; materials usage thousands of tonnes/m^3 per year; area sources of hundreds of m^2. The compounds involved are moderately odorous. Unpleasantness – processes classed in Environment Agency odour guidance as 'Moderately offensive'; or (where known) odours having neutral (0) to unpleasant (-2) hedonic score. Mitigation/control – some mitigation measures in place, but significant residual odour remains.	**Moderately effective pathway for odour flux to receptor** Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated but compromised by building effects.	**Medium sensitivity receptor** – Surrounding land where: • Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home, or • People would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude – falls below industries permitted by local	**Ineffective pathway for odour flux to receptor** Distance – receptor is remote from the source;	**Low sensitivity receptor** – Surrounding land where: • The enjoyment of amenity would not

Source Odour Potential	Pathway Effectiveness	Receptor
authorities (Part B) threshold; materials usage hundreds of tonnes/m^3 per year; area sources of tens m^2. The compounds involved are only mildly odorous, having relatively high ODTs where known. Unpleasantness – processes classed as 'Less offensive' in Environment Agency odour guidance; or (where known) compounds/odours having neutral (0) to very pleasant (+4) hedonic score. Mitigation/control – effective, tangible mitigation measures in place (e.g. best available technique, best practicable means) leading to little or no residual odour.	distance exceeds any official set-back distances. Direction – low frequency (%) of winds from source to receptor (or, qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/ dilution – releases are from high level (e.g. stacks, or roof vents >3m above ridge height) and are not compromised by surrounding buildings.	reasonably be expected, or • There is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.

Table A.2 Risk of odour exposure (impact) at the specific receptor location

		Source Odour Potential		
		Small	Medium	Large
Pathway Effectiveness	Highly effective pathway	Low risk	Medium risk	High risk
	Moderately effective pathway	Negligible risk	Low risk	Medium risk
	Ineffective pathway	Negligible risk	Negligible risk	Low risk

Table A.3 Likely magnitude of odour effect at the specific receptor location

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