MOTT MACDONALD

Staplefield Wetland Creation

Air Quality Assessment

November 2023

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Air Quality Assessment

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Contents

1 Introduction

1.1 Overview

As part of the Water Industry National Environment Programme 3 (WINEP 3), Southern Water has identified an opportunity to explore alternative Asset Management Plan 7 (AMP7) wastewater management options to meet proposed phosphorus limits. Southern Water is required to ensure that Staplefield wastewater treatment works (WwTW) meets the new permit requirement of 0.5mg/l total phosphorus (TP) by 22 December 2024[1].

In line with Environment Agency (EA) policy, Southern Water is committed to improving sustainability by reducing the use of hard infrastructure solutions for improving wastewater treatment at their WwTWs. As such, an Integrated Constructed Wetland (ICW) is proposed to be constructed to reduce TP concentrations to a level that would comply with the revised permit (hereafter referred to as the 'proposed development').

Mott MacDonald has been commissioned by Southern Water to provide environmental and planning services to support the delivery of a treatment wetland at Staplefield WwTW. The design of the ICW has been completed by VESI Environmental. Where references to the design are made, this is based on understanding from consultation with, and documents provided by, the design team.

This report presents the air quality assessment undertaken to support the planning application for the development of land adjacent to Staplefield WwTW. This land is within Mid Sussex District Council (MSDC) Local Planning Authority (LPA).

1.2 Objectives

This report provides an assessment on the key effects associated with the proposed development, looking specifically at:

- Nuisance, health effects and/or loss of amenity caused by construction dust on sensitive receptors; and
- A qualitative review of construction traffic.

During the construction phase, the proposed development would involve dust generating activities such as earth moving. This assessment has been undertaken in accordance with the best practice guidance published by the Institute of Air Quality Management (IAQM) (2023) 'Guidance on the assessment of dust from demolition and construction[2].

Traffic movements are expected to remain unchanged against existing conditions, following opening of the proposed development and as a result, traffic emissions during the operational phase are not considered further within this report.

A review of the Staplefield WwTW records provided by Southern Water showed no odour complaints have been received since the record began in 2003. Staplefield WwTW is a small site where a number of the assets associated with wastewater treatment are covered to reduce opportunity for odour emission and the receptors susceptible to odour are located over 100 metres (m) from the existing WwTW. The proposed development will accept treated effluent of

[1] VESI Environmental (2023) Draft Design Summary Staplefield Integrated Constructed Wetland (752214-SBN-ZZ-00-SP-W-00001).

[2] Institute of Air Quality Management (2023). 'Guidance on the assessment of dust from demolition and construction.' Accessible at: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-dust-2023-BG-v6-amendments.pdf assessed November 2023.

the same quality currently released into the River Ouse which creates no odour impact. Effluent treated to the current standard has a low odour potential. The effluent will receive further treatment within a highly oxygenated wetland environment where natural processes are not expected to produce additional unpleasant odours. Therefore, consideration of potential for odour has been appropriately addressed and is not considered further as part of this assessment.

1.3 Site Location

The proposed development is located off Cuckfield Road, Cuckfield within West Sussex, England, RH17 6ES. The grid reference of the centre of the current WwTW is TQ 27959 27401. The site is located 30 kilometres (km) east of the South Downs National Park, as presented in Figure 1.1. The existing land use of the proposed site and surrounding area is arable farmland; farmland is located to the north, east, south and west of the proposed development, with a small number of isolated residential properties located 200m north west and north east and 350m north of the proposed development.

The main elements of the ICW will be located within the field adjacent to the east of the WwTW, currently characterised by farmland under private ownership. Other ancillary elements will be located within the current operational WwTW, and within the field adjacent to the east of the WwTW. Some additional elements, which include the flood mitigation area and an area for a construction compound, will be located to the south of the ICW and in the field to the north west of the WwTW respectively.

The red line boundary has been considered for this assessment, which is a larger area than the proposed site boundary, on a precautionary basis. Both the red line boundary and proposed site boundary are shown on Figure 1.1.

Figure 1.1: Site Location

1.4 Key Pollutants

1.4.1 Overview

The assessment considers concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) only, as these are the key pollutants of concern associated with road traffic and dust in the study area. A description of these pollutants is provided below.

1.4.2 Oxides of Nitrogen

Oxides of Nitrogen (NO_x) is a collective term used to describe a mixture of nitric oxide (NO) and NO_2. These are primarily formed from nitrogen in the atmosphere and nitrogen in fossil fuels via high temperature combustion. The main sources in the UK are road traffic and power generation.

During the process of combustion, atmospheric and fuel nitrogen is partially oxidised via a series of complex reactions to NO. The process is dependent on the temperature, pressure, oxygen concentration and residence time of the combustion gases in the combustion zone. Most NO_X exhausting from a combustion process is in the form of NO, which is a colourless and tasteless gas. It is readily oxidised to NO_2, a more harmful form of NO_X, by chemical reaction with ozone and other chemicals in the atmosphere.

1.4.3 Particulates

Particulate matter is formed of solid and liquid particles, both organic and inorganic, that are present in the atmosphere. PM_{10} is defined as particulate matter with a diameter of 10 microns (µm) or less. $PM_{2.5}$ is defined as particulate matter with a diameter of 2.5µm or less. Exposure to high concentrations of particulate matter smaller than the PM_{10} fraction can cause harmful cardiovascular and respiratory effects in humans.

Primary sources are numerous such as anthropogenic sources include power stations, other industrial processes, road transport, domestic coal burning, and trans-boundary pollution and natural sources include erosion of natural materials, oceans (sea salt) and dust storms. Secondary particulate matter originates as other pollutants which are re-formed into aerosols in the atmosphere. Secondary particulates are significant contributors to the overall atmospheric loading of particulates. In urban areas, road traffic is generally the greatest source of fine particulate matter, although localised effects are also associated with construction and demolition activity.

2 Legislation and Policy

2.1 Overview

This section summarises the relevant international and national legislation, policy and planning guidance in relation to air quality. In addition, local planning policy guidance has been reviewed to identify air quality policy implications related to the proposed development.

2.2 Legislation

2.2.1 England

The Air Quality Standards Regulations (2010), Air Quality Standards (amendment) Regulations (2016), Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations (2019) and Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020) implement Directive 2008/50/EC on ambient air quality.

These define limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants.

The limit values apply everywhere, with the exception of:

- Any locations situated within areas where members of the public do not have access and there is no fixed habitation;
- In accordance with Article 2 (1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply;
- On the carriageway of roads; and
- On the central reservations of roads except where there is normally pedestrian access to the central reservation.

The Department for Environment Food and Rural Affairs (Defra) assesses and reports on the compliance with the limit values, splitting the UK into 43 zones and/or agglomerations. Zones and/or agglomerations achieve compliance when everywhere within the zone and/or agglomeration (excepting locations provided in the Directive) does not exceed the relevant limit value.

Part IV of the Environment Act (1995) (as amended in Schedule 11 of the Environment Act 2021) requires that every local authority shall periodically carry out a review of air quality within its area, including predictions of likely future air quality. The air quality objectives, specifically for use by local authorities in carrying out their air quality management duties, are set out in the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002). In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values transposed into UK law although compliance dates differ.

As part of the review of air quality, the local authority must assess whether air quality objectives are being achieved or are likely to be achieved within the relevant periods and identify the relevant sources of emissions it considers responsible for the failure to achieve the objectives. Any parts of a local authority's area where the objectives are not being achieved or are not likely to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, local authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The Environment Act also requires that the UK Government produces a national 'air quality strategy' (AQS) containing standards, objectives, and measures for improving ambient air quality and to keep these policies under review.

2.2.2 Statutory Nuisance

Section 79(1)(d) of the Environmental Protection Act (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 defence by operators, if employed to prevent or to counteract the effects of the nuisance.

In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase, potential sources being the clearance, earthworks, construction, and landscaping processes.

The aforementioned regulations define the air quality limit values and air quality objectives for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. For the assessment, baseline air quality concentrations are compared against the limit values and objectives to help identify the sensitivity of the area that the proposed development is situated in. The possible impact of changes in concentrations of air pollutants which could occur as a result of the proposed development are considered taking into account the existing baseline.

2.3 Policy

2.3.1 UK Air Quality Strategy

The Environment Act requires the UK Government to produce a national AQS. The AQS establishes the UK framework for air quality improvements. The measures agreed at the national and international level are the foundations on which the strategy is based. The first AQS, adopted in 1997 and its subsequent iterations, have now been superseded as of the 14 January 2019 with the Clean Air Strategy 2019 (CAS).

The CAS does not set legally binding objectives; the CAS instead has targets for reducing total UK emissions of NOx and fine particulate matter ($PM_{2.5}$) from sectors such as road transport, domestic sources, and construction plant (non-road mobile machinery (NRMM)).

Further to this, the UK Government has produced a draft revised AQS which is due to be published in final later in 2023. The revised AQS will replace the 2007 strategy and compliment the CAS. The revised AQS will set out the actions the UK Government expects local authorities in England to take in support of achieving the Government's long-term air quality goals, including their two new $PM_{2.5}$ targets, which are as follows:

- An annual mean concentration target for $PM_{2.5}$ of 10µg/m^3 across England by 2040.
- A population exposure reduction target of 35% by 2040 compared to a 2018 baseline.

As well as this, the Environmental Improvement Plan 2023 for England, which is discussed further in Section 2.3.4, records the legal targets and sets interim targets to be met by the end of January 2028. These targets are not legal thresholds but have been included for reference. They are:

- The highest annual mean concentration in the most recent full calendar year must not exceed 12µg/m^3 of $PM_{2.5}$.

- Compared to 2018, the reduction in population exposure to $PM_{2.5}$ in the most recent full calendar year must be 22% or greater.

2.3.2 National planning policy

The revised National Planning Policy Framework (NPPF) was published in September 2023 and sets out the UK Government's planning policy framework for England, including the expectation for content and quality of planning applications and local plan policy.

With regard to air quality, the NPFF states that:

- Paragraph 174 '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 quality…'
- Paragraph 186 'Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible, these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'

2.3.3 National Planning Practice Guidance

On 6 March 2014, the Department for Communities and Local Government published a National Planning Practice Guidance web-based resource which was last updated on 24 June 2021.

The National Planning Practice Guidance includes a dedicated section on air quality (last updated 1 November 2019). It notes that, for new planning applications, the LPA may require information on:

- The 'baseline' local air quality, including what would happen to air quality in the absence of the development;
  - 'Whether the proposed development could significantly change air quality during the construction and operational phases '(and the consequences of this for public health and biodiversity)'; and
  - 'Whether occupiers or users of the development could experience poor living conditions or health due to poor air quality'.

It also states the following in relation to determining whether air quality is relevant to a planning decision:

- *'Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity'.*

2.3.4 25 Year Environment Plan

Defra's "A Green Future: Our 25 Year Plan to Improve the Environment" (25 Year Environment Plan) (2018) is a policy paper published on 11 January 2018 setting out what the UK Government will do to improve the environment, including restoring and safeguarding wildlife habitats. The first revision of the 25 Year Environment Plan 'Environmental Improvement Plan 2023' was published on 31 January 2023 and sets the two interim targets presented in Section 2.3.1 for $PM_{2.5}$ annual mean concentrations and population exposure.

The 25 Year Environment Plan sets out aims to achieve clean air by:

- "Meeting legally binding targets to reduce emissions of five damaging air pollutants; this should halve the effects of air pollution on health by 2030".
- "Ending the sale of new conventional petrol and diesel cars and vans by [2030]" (the original deadline of 2040 has been brought forward).
- "Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework".

The assessment has considered the targets set out for $PM_{2.5}$ within the assessment as set out in Section 2.3.1.

2.4 Local Planning Policy

The proposed development is located within the MSDC.

2.4.1 Mid Sussex District Council Local Plan

MSDC's Local Plan 2014 - 2031 was adopted in March 2018 and sets out the spatial vision for the district and strategic policies for future development in the district. A review of the MSDC Local Plan indicated the following policy in relation to air quality that is relevant to this assessment:

- 'Policy DP29: Noise, Air and Light Pollution – with regard to air pollution, it does not cause unacceptable levels of air pollutions to:
  - Development on land adjacent to an existing use which generates air pollution or odour would not cause any adverse effects on the proposed development or can be mitigated to reduce exposure to poor air quality to recognised and acceptable levels.
  - Development proposals (where appropriate) are consistent with Air Quality Management Plans.
  - The degree of the impact of noise and light pollution from new development or change of use is likely to be greater in rural locations, especially where it is in or close to specially designated areas and sites.'

2.5 Summary

This section has identified the legislation and policy framework relevant to this assessment. Applicable air quality standards are summarised in Table 2.1.The new $PM_{2.5}$ air quality target mentioned above is set out in the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 but as the target is not legally binding until 2040 has not been included in Table 2.2.

Table 2.1: Relevant air quality objectives and limit values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date – Air Quality Objectives	Attainment Date – Limit Values
NO_2	Annual	40 µg/m^3	-	31 December 2005[(a)]	1 January 2010[(c)]
	1 Hour	200 µg/m^3	18	31 December 2005[(a)]	1 January 2010[(c)]
Particulates (PM_{10})	Annual	40 µg/m^3	-	31 December 2004[(a)]	1 January 2005[(c)]
	24 Hour	50 µg/m^3	35	31 December 2004[(a)]	1 January 2005[(c)]
Fine particulates ($PM_{2.5}$) [(d)]	Annual	20 µg/m^3	-	-	1 January 2020[(c)]
		25 µg/m^3	-	2020[(b)]	-

Notes: (a) Air Quality (England) Regulations 2000 as amended.
(b) Air Quality Strategy 2007.
(c) EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law.
(d) As the Air Quality Strategy 2007 and EU Directive 2008/50/EC have a different numerical standard for PM2.5, the more stringent standard of 20µg/m3 has been adopted for this assessment.

It should be noted that the air quality objectives only apply in locations of relevant exposure, i.e., where members of the public might reasonably be exposed to pollutants for the respective averaging periods. Table 2.2 presents where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment of air quality.

Table 2.2: Locations where the air quality objectives apply

Averaging period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
24-Hour	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-Hour	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations, etc., which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: Defra's Local Air Quality Management Technical Guidance (LAQM TG22).

3 Methodology

3.1 Construction Phase

This section describes the approaches taken to consider the air quality effects of the construction phase assessments of the proposed development.

3.1.1 Construction Dust

Construction activities can result in temporary effects from dust. 'Dust' is a generic term which usually refers to particulate matter in the size range 1-75µm in diameter. The most common impacts from dust emissions are soiling and increased ambient PM_{10} concentrations. Dust can arise from numerous construction activities such as concrete-batching, piling, sand blasting, wind erosion on material stockpiles and earth-moving activities. It can be mechanically transported either by wind or through the movement of vehicles onto the public highway (transport of debris on vehicle wheels or uncovered loads).

Guidance from the IAQM recommends splitting the construction activities into four separate source categories and determining the dust risk associated with each of these individually. This assessment has determined the risk of each of the following source categories:

- Demolition
- Earthworks
- Construction
- Trackout (the transport of dust and dirt onto the public road network)

The risk of each source for dust effects is described as 'negligible', 'low risk', 'medium risk' or 'high risk' depending on the nature and scale of the construction activities, and the proximity of sensitive receptors to the construction activities or the proposed development boundary. The assessment is used to identify appropriate mitigation measures proportional to the level of risk, to reduce the effects such that they are not significant.

The assessment considers three separate effects from dust:

- Annoyance due to dust soiling
- Harm to ecological receptors
- The risk of health effects due to an increase in exposure to PM_{10}

Step 1 of the assessment applies screening criteria to the proposed development, which states that an assessment will normally be required where there is:

- A 'human receptor' within:
  - 250m of the proposed development boundary
  - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the proposed development entrance(s)
- An 'ecological receptor' within:
  - 50m of the proposed development boundary; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the proposed development entrance(s)

To assess the likely dust risk, firstly the overall dust emission magnitude ('small', 'medium' or 'large') from each of the dust sources identified (demolition, earthworks, construction and trackout) is established in accordance with the criteria outlined in Table A.1 in Appendix A.

The sensitivity of receptors is then defined (as 'high', 'medium' or 'low') for each dust effect (dust soiling, human health and ecosystem impacts) in accordance with the criteria presented within Table A.2 in Appendix A.

The sensitivity of the surrounding area is determined for each activity using the matrices in Table A.3 to Table A.5 in Appendix A. The sensitivity of the area is based on the distance of the source to the closest receptors, the receptor sensitivity, and in the case of PM_{10} effects, the local background concentration. The highest level of area sensitivity defined for each dust effect has been used in this assessment.

The final step of the assessment combines the dust emission magnitude and the sensitivity of the area, using the matrices presented within Table A.6 to Table A.8 in Appendix A to determine the dust risk categories for each activity for dust soiling and health effects.

The dust risk category defined for each dust source and effect is then used to determine appropriate site-specific mitigation measures to be adopted. It should be noted that in line with the recommendations of IAQM guidance, significance is only assigned to construction effects following mitigation.

Results of the construction dust assessment are presented in Section 5.1.

3.1.2 Construction Site Plant Emissions

Construction requires the use of different equipment such as excavators and on-site generators. All construction plants have an energy demand with some as a direct emission to air from exhausts. Guidance from the IAQM[1] notes that effects from exhaust will likely not be significant. Given the nature of the site plant, effects of plant emissions on local air quality are considered of negligible significance relative to the surrounding road traffic contributions on the local road network. Construction plant emissions have therefore not been assessed further. However, mitigation measures to reduce the impacts on local air quality are presented in Section 6.

3.1.3 Construction Road Traffic Emissions

EPUK and IAQM[3] guidance indicates that an assessment of traffic emissions is only likely to be required for large, long term construction sites that will generate an additional annual average flow of greater than 100 heavy duty vehicles (HDVs) per day or greater than 500 light duty vehicles (LDVs) per day. Due to the nature of the proposed development, it is not anticipated that the LDV or the HDV flows will be below these thresholds during the construction phase. On this basis, no further consideration has been given to the effects of construction road traffic on ambient air quality.

[3] Environmental Protection UK and Institute of Air Quality Management (2017), 'Land-Use Planning and Development Control: Planning for Air Quality'.

4 Baseline

4.1 Overview

Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. For the purposes of this assessment, data has been obtained from Defra and MSDC[4].

The most recent year of representative monitoring data available from MSDC is for 2022. Local authority data for the year 2022 is expected to be representative of 'normal' conditions, as it is not considered to have been affected by the coronavirus (Covid-19) pandemic. Therefore, 2022 local authority data has been used to determine baseline conditions.

4.2 Local Authority Review and Assessment

4.2.1 AQMAs

MSDC has declared one AQMA in its administrative area, designated for exceedances of the NO_2 annual mean objective. Mid Sussex AQMA No.1 was declared in 2012 and is approximately 23km south of the proposed development boundary. There are no other AQMAs relevant to the proposed development.

4.2.2 Local Authority Monitoring

4.2.2.1 Automatic Monitoring

MSDC operates one automatic monitoring station within their administrative area, monitoring NO_2. This site is a kerbside site and is located on London Road, East Grinstead. Due the site type and distance from the proposed development (21km), the data from this automatic monitoring station is not considered representative of the proposed development and therefore has not been used in this assessment.

4.2.2.2 Diffusion Tube Monitoring

MSDC undertakes NO_2 non-automatic (passive) diffusion tube monitoring at 34 sites across its district. There are no diffusion tube monitoring sites located within 3km of the proposed development. MSDC rural site types have therefore been used as representative sites and are presented in Table 4.1 and Figure 4.1. Although these sites are not located in close proximity to the proposed development, due to their similar rural characteristics, they can be considered to be representative.

Table 4.1: Local authority NO_2 monitoring results (µg/m^3)

Site ID	Site Type	National Grid Reference		Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2022 (%)	2018	2019	2020	2021	2022
		X	Y							
MSAQ9	Rural	525664	125035	100	100.0	9.0	8.5	6.1	6.1	6.3
MSAQ35	Rural	528904	114415	73.4	73.4		7.2	6.6	6.7	6.8

Source: Mid Sussex District Council Annual Status Report 2023. Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG22.

[4] Mid Sussex District Council Annual Status Report 2023 Available at: 2023 ASR Air Quality Annual Status Report (midsussex.gov.uk) Accessed November 2023.

Figure 4.1: Proposed development for local authority monitoring

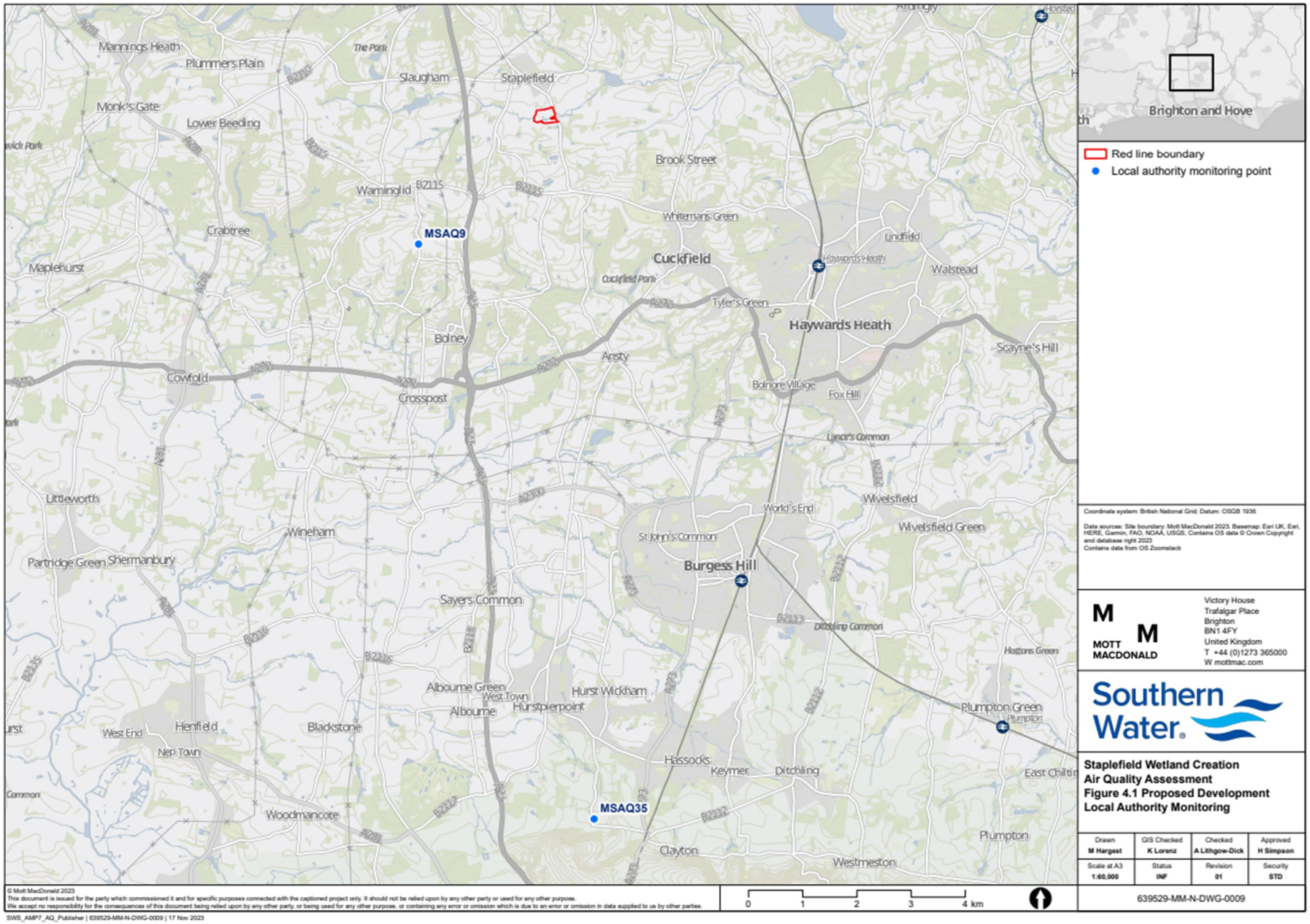


Table 4.1 highlights that the diffusion tube monitoring results show that there have been no exceedances of the annual mean NO_2 objective of 40µg/m^3 at any monitoring sites between 2018 and 2022.

4.3 Defra Projected Background Concentrations

Defra provides mapped future year projections of background pollution concentrations for NO_X, NO_2, PM_{10} and $PM_{2.5}$ for each 1km grid square across the UK for all years between 2018 to 2030. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 (the baseline year) UK monitoring data.

Table 4.2 presents the background concentrations across the 1km grid square containing the proposed development in the current year of 2023 and expected opening year of 2024. The maximum background concentrations at the proposed development are all within the relevant objectives.

Table 4.2: Defra projected background concentrations of NO_X, NO_2, PM_{10} and $PM_{2.5}$ for the proposed development (µg/m^3) for 2023

1km Grid Square Location (OS Grid Reference)		Background concentrations (µg/m^3)			
X	**Y**	**NO_2**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
527500	127500	9.7	12.7	14.1	9.2
528500	127500	9.0	11.7	14.1	9.2

Source: Defra, 2023[5]

4.4 Summary

The baseline assessment indicates that there have been no exceedances of the long-term NO_2, PM_{10} and $PM_{2.5}$ objectives at any of the monitoring sites in recent years. However, exceedances of short-term NO_2 objectives have been recorded in the past.

The Defra predictions indicate that the background concentrations within the site boundary are unlikely to exceed the relevant objectives for all relevant pollutants.

Ambient pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ are generally predicted to decrease into the future, due to uptake of cleaner vehicles and technologies. As such it is considered that air quality conditions at the proposed development and surrounds would improve and continue to meet the air quality objectives in future years.

[5] Department for Environment Food and Rural Affairs, 2023. Defra Background Maps, Reference Year 2018, Released August 2020. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

5 Construction Dust Assessment

5.1 Construction Dust

Dust emissions from the proposed development will only occur during the construction phase and therefore all effects from the construction dust emissions are described as temporary. The magnitude descriptors that have been applied are presented in Table 5.1 along with the justification for the selection.

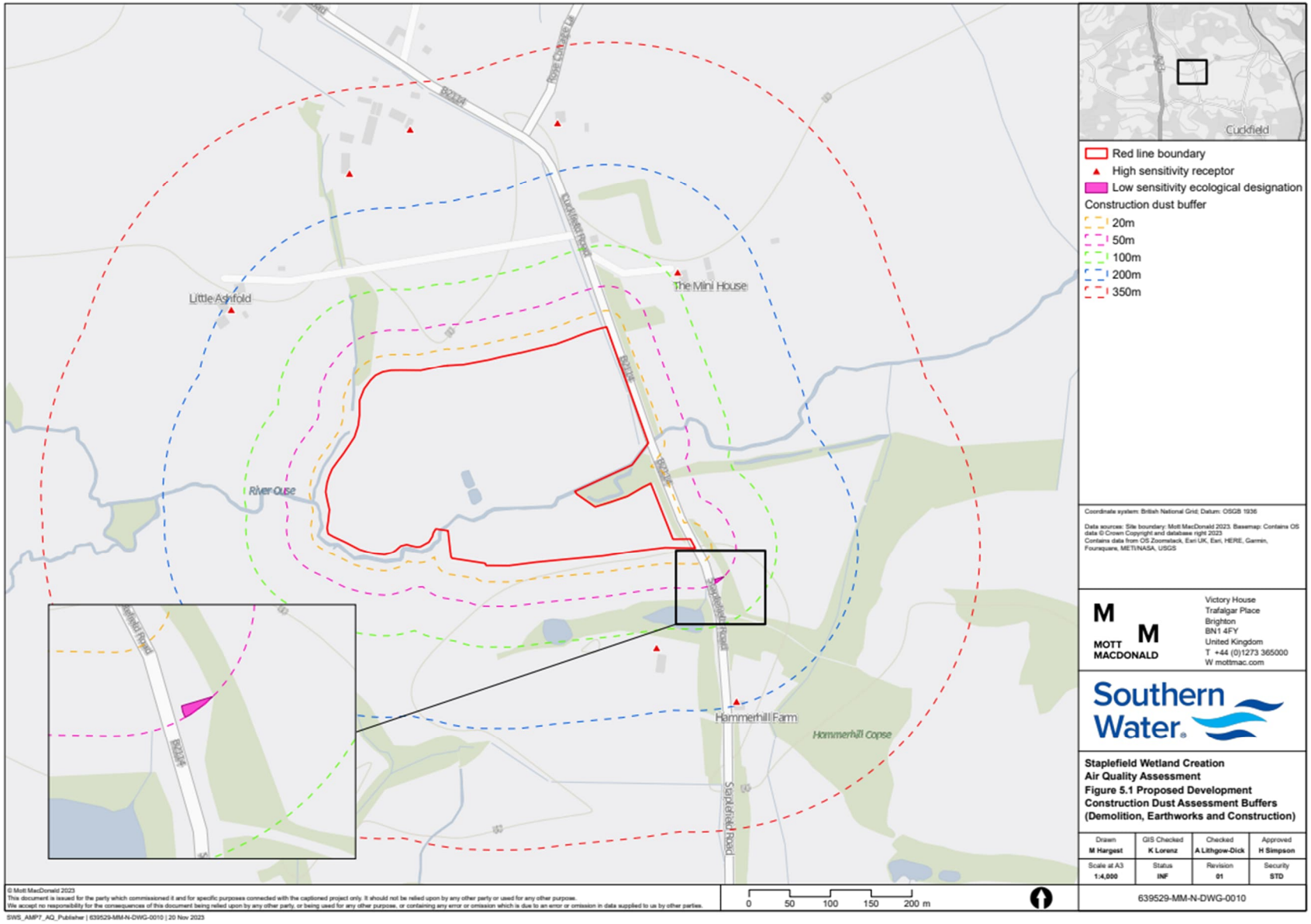
Table 5.1: Dust emission magnitude

Activity	Dust emission magnitude	Justification
Demolition	No emissions from this activity	No building demolition planned.
Earthworks	Medium	Soil in the area is classified as clay. This has the potential to become dry and dusty in the summer. The total area of the proposed site affected by earthworks will be approximately 87,500m^2 and as such the dust emission magnitude from earthworks is considered to be medium.
Construction	Small	There are no buildings in the scheme besides a kiosk for power feeds and wastewater treatment monitoring. It is expected that potentially dusty materials will be used such as concrete based slabs and chambers, therefore the dust emission magnitude from construction is small.
Trackout	Medium	The maximum number of daily Heavy Duty Vehicle movements is expected to be between 20 – 50. The unpaved road is more than 200m in length and thus the emission from trackout is considered to be medium.

In accordance with IAQM guidance, the sensitivity of the area to dust soiling and health effects was determined through the identification of sensitive receptors within a given distance from dust emitting activities and background particulate levels which are expressed as annual mean PM_{10} concentrations. This is presented in Table 5.2.

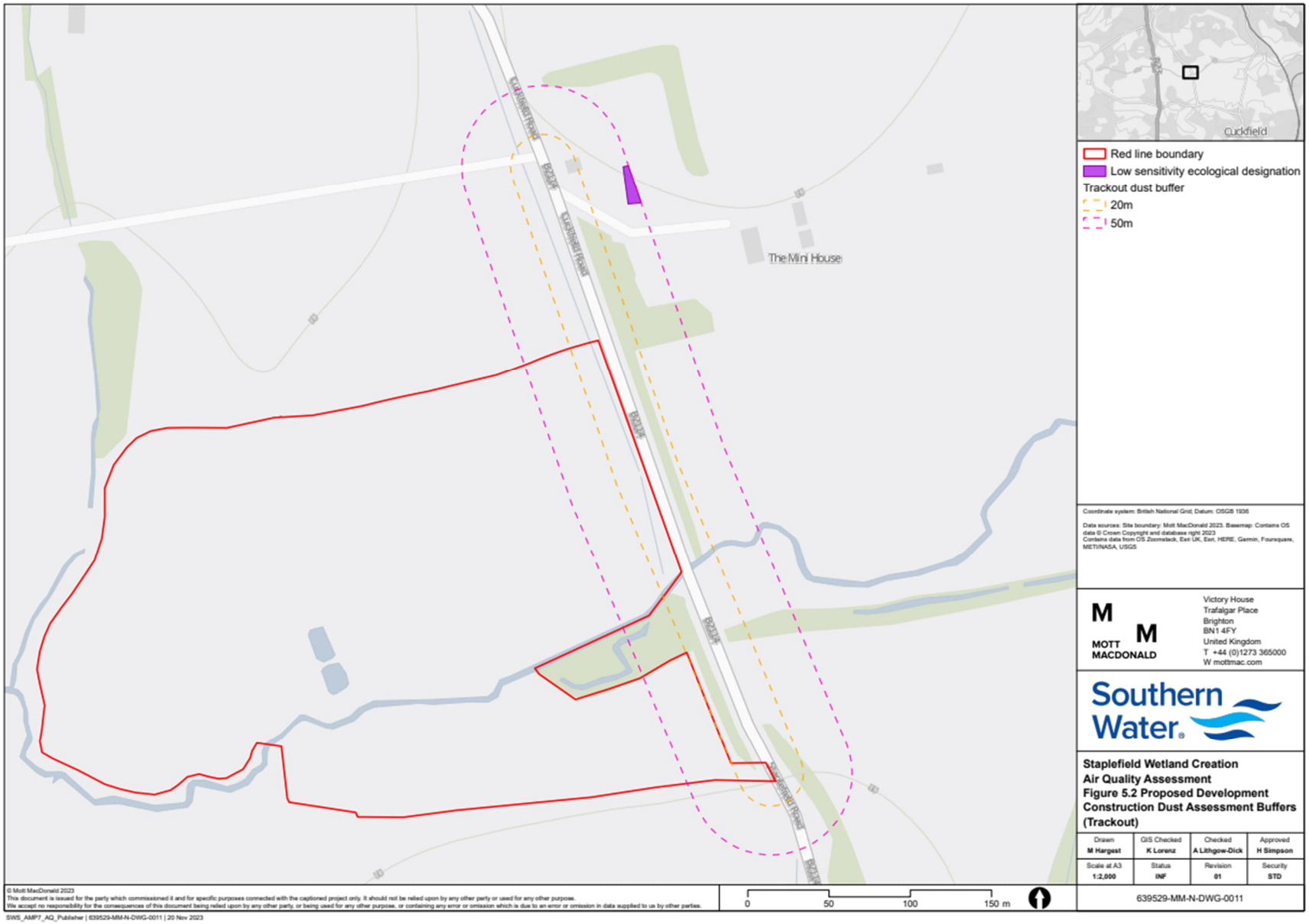
providing details of the sensitivity of the area based on nearby sensitive receptors. The proposed development construction dust assessment buffers for demolition, earthworks, and construction can be seen in Figure 5.1 and for trackout in Figure 5.2.

Figure 5.1: Proposed development construction dust assessment buffers (demolition, earthworks, and construction)



Note: As highlighted in Table 5.2, the majority of the 50m buffer is dominated by low sensitivity Farmland, which has not been highlighted in this figure.

Figure 5.2: Proposed development construction dust assessment buffers (trackout)



Note: As highlighted in Table 5.2, the majority of the 50m buffer is dominated by low sensitivity Farmland, which has not been highlighted in this figure.

Table 5.2: Receptor sensitivity of the area to dust soiling and health effect of PM_{10}

Activity	Dust soiling		Health effects of PM_{10}		Ecological Impacts	
	Sensitivity of the area	**Comment**	**Sensitivity of the area**	**Comment**	**Sensitivity of the area**	**Comment**
Demolition	Low	There are between one and ten low sensitivity receptors (farmland) within 20m of the proposed development as well as one low sensitivity receptor (public right of way) and least two high sensitivity receptors (residential properties) within the 100 - 200m buffer.	Low	The maximum adjusted background annual PM_{10} concentration in 2023 for the site is 13.14µg/m^3. There are between one and ten low sensitivity receptors (farmland) within 20m of the proposed development as well as one low sensitivity receptor (public right of way) and at least two high sensitivity receptor residential properties) within the 100 – 200m buffer.	Low	No receptors within 50m of the proposed development.
Earthworks	Low		Low		Low	
Construction	Low		Low		Low	
Trackout	Low	There are no high sensitivity receptors (residential properties) within 50m of the route used by the construction vehicles up to 200m north and south of the site entrance. There is one high level receptor (residential property) 80m from the route used by the construction vehicles with the garden of the property within 50m of the route used by the construction vehicles. There are also eight low level sensitivity receptors (farmland) within 20m of the trackout route.	Low	The maximum adjusted background annual PM_{10} concentration in 2023 for the site is 13.14µg/m^3. There are no high sensitivity receptors (residential properties) within 50m of the route used by the construction vehicles up to 200m north and south of the site entrance. There is one high level receptor (residential property) 80m from the route used by the construction vehicles with the garden of the property within 50m of the route used by the construction vehicles. There are also eight low level sensitivity receptors (farmland) within 20m of the trackout route.	Low	Two medium sensitivity ecological receptors (nationally designated priority habitat - deciduous woodland and traditional orchard) within 50m of the proposed development.

The overall risks to receptors from dust soiling effects, human health effects and ecological impacts are presented in Table 5.3. Risk is based on the criteria outlined in Table A.6 to Table A.8 found in Appendix A. Table 5.3 shows the risk of dust soiling effects, human health, and ecological receptors without mitigation as 'Low' for earthworks and trackout, 'Negligible' for construction, and N/A for demolition.

Table 5.3: Dust Risk Summary

Potential Impact	Risk			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Dust soiling	N/A	Low	Negligible	Low
Health effects	N/A	Low	Negligible	Low
Ecological	N/A	Low	Negligible	Low

Mitigation measures appropriate for the proposed development have been presented in Section 6. Such measures should be included within a Construction Environmental Management Plan (CEMP) to reduce the overall predicted risk.

6 Mitigation

This section presents the proposed mitigation to reduce the potential effects predicted in the preceding sections of this report.

These measures will be incorporated into a CEMP. It is the responsibility of the build contractor to ensure the dust and emission control methods presented below are agreed with the local authority and implemented effectively.

6.1 Construction Dust

During the construction phase, construction activities associated with the proposed development are predicted to have at worst, a 'low' risk of dust soiling effects, human health and ecological from construction activities with no mitigation in place.

Best practice mitigation measures for the proposed development as outlined in IAQM guidance are presented below, based on the dust risk levels presented in Table 5.2.

6.1.1 Communications

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.

6.1.2 Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the logbook.

6.1.3 Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads, see figures in Section 5.1) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make the inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

6.1.4 Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.
- Cover, seed, or fence stockpiles to prevent wind whipping.

6.1.5 Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary. No idling vehicles.
- Avoid the use of diesel- or petrol- powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas.

6.1.6 Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

6.1.7 Waste Management

- Avoid bonfires and burning of waste materials.

6.1.8 Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

6.1.9 Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

7 Conclusions

This report provides an assessment of the following key effects associated with the construction and operational phase of the proposed development:

- Nuisance, health effects and/or loss of amenity caused by construction dust on sensitive receptors; and
- A qualitative review of construction traffic.

A qualitative assessment of the construction dust effects predicted that the level of risk of dust creating nuisance and/or loss of amenity, PM_{10} leading to adverse health effects (without mitigation) and risk for ecological receptors is 'low' risk. Following the appropriate mitigation measures listed in Section 6, dust effects are considered to be not significant.

Due to the nature of the proposed development, the number of HDVs flows per day is less than 100. On this basis, no further consideration has been given to the effects of construction road traffic on ambient air quality.

Traffic movements are expected to remain unchanged against existing conditions, following opening of the proposed development and as a result, traffic emissions during the operational phase are not considered within this report.

Following review of the Staplefield WwTW records, no odour complaints have been received since records began in 2003. Staplefield WwTW is a small site where a number of the assets associated with wastewater treatment are covered to reduce opportunity for odour emission and the receptors susceptible to odour are located over 100m from the existing WwTW. The proposed development will accept treated effluent of the same quality currently released into the River Ouse which creates no odour impact. Effluent treated to the current standard has a low odour potential. The effluent will receive further treatment within a highly oxygenated wetland environment where natural processes are not expected to produce additional unpleasant odours. Therefore consideration of potential for odour has been appropriately addressed and has not been considered further as part of this assessment.

The proposed development is not considered to conflict with any national, regional or local planning policy.

Appendices

A. Construction Dust Tables

Table A.1: Determination of dust raising magnitude

Source	Small	Medium	Large
Demolition	Total building volume <12,000m^3, construction material with low potential for dust release (e.g., metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.	Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6-12m above ground level.	Total building volume >75,000m^3, potentially dusty construction material (e.g., concrete), on site crushing and screening, demolition activities >12m above ground
Earthworks	Total site area <18,000m^2, soil type with large grain size (e.g., sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height.	Total site area 18,000m^2 – 110,000m^2, moderately dusty soil type (e.g., silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m-6m in height.	Total site area >110,000m^2, potentially dusty soil type (e.g., clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6m in height.
Construction	Total building volume <12,000m^3, construction material with low potential for dust release (e.g., metal cladding or timber.	Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material (e.g., concrete), on site concrete batching.	Total building volume >75,000m^3, on site concrete batching, sandblasting.
Trackout	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.	20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g., high clay content), unpaved road length 50 m – 100 m.	>50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g., high clay content), unpaved road length >100m.

Source: IAQM (2023)

Table A.2: Receptor sensitivity

Source	High	Medium	Low
Sensitivities of people to dust soiling effects	● Users can reasonably expect (see note A) an enjoyment of a high level of amenity; or ● The appearance, aesthetics or value of their property would be diminished by soiling; and ● The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. ● Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks (see note B) and car showrooms.	● Users would expect (see note A) to enjoy a reasonable level of amenity, but would not reasonably expect (see note A) to enjoy the same level of amenity as in their home; or ● The appearance, aesthetics or value of their property could be diminished by soiling; or ● The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. ● Indicative examples include parks and places of work.	● The enjoyment of amenity would not reasonably be expected (see note A); or ● Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or ● There is transient exposure, where the people or ● Property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. ● Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks (see note B) and roads.
Sensitivities of people to the health effects of PM_{10}	● Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day - See note C). ● Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	● Locations where the people exposed are workers (see note D), and exposure is over a period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). ● Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	● Locations where human exposure is transient (see note E). ● Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of receptors to ecological effects (see note F)	● Locations with an international or national designation and the designated features may be affected by dust soiling; or ● Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain (see note G). ● Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.	● Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or ● Locations with a national designation where the features may be affected by dust deposition ● Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	● Locations with a local designation where the features may be affected by dust deposition. ● Indicative example is a Local Nature Reserve with dust sensitive features.

Source: IAQM (2023)

A The public's expectation will vary depending on the existing dust deposition in the area.

B Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with workplace or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

C This follows DEFRA guidance as set out in LAQM.TG (22).

D Excluding the fact that air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM_{10}. However, they are considered as less sensitive than the general public because those most sensitive to effects of air pollution, e.g., young children are not normally workers. As such, workers have been included in the medium sensitivity category.

E There are no standards that apply to short-term exposure, e.g., one or two hours, but there is still a risk of health effects, albeit less certain.

F A Habitat Regulation Assessment of the Scheme may be required as part of the planning process, if the Scheme lies close to an internationally designated site i.e., SACs, Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.

G Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

Table A.3: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Low	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Source: IAQM (2023)

Table A.4: Sensitivity of the area to human health effects

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>=1	Low	Low	Low	Low	Low

Source: IAQM (2023)

Table A.5: Sensitivity of the area to ecological effects

Receptor Sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Source: IAQM (2023)

Table A.6: Risk of dust effects – demolition

Sensitivity of Area	Dust Emissions Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Low Risk

Source: IAQM (2023)

Table A.7: Risk of dust effects – earthworks

Sensitivity of Area	Dust Emissions Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

Source: IAQM (2023)

Table A.8: Risk of dust effects – construction

Sensitivity of Area	Dust Emissions Magnitude		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

Source: IAQM (2023)