

# Report

8 March 2018

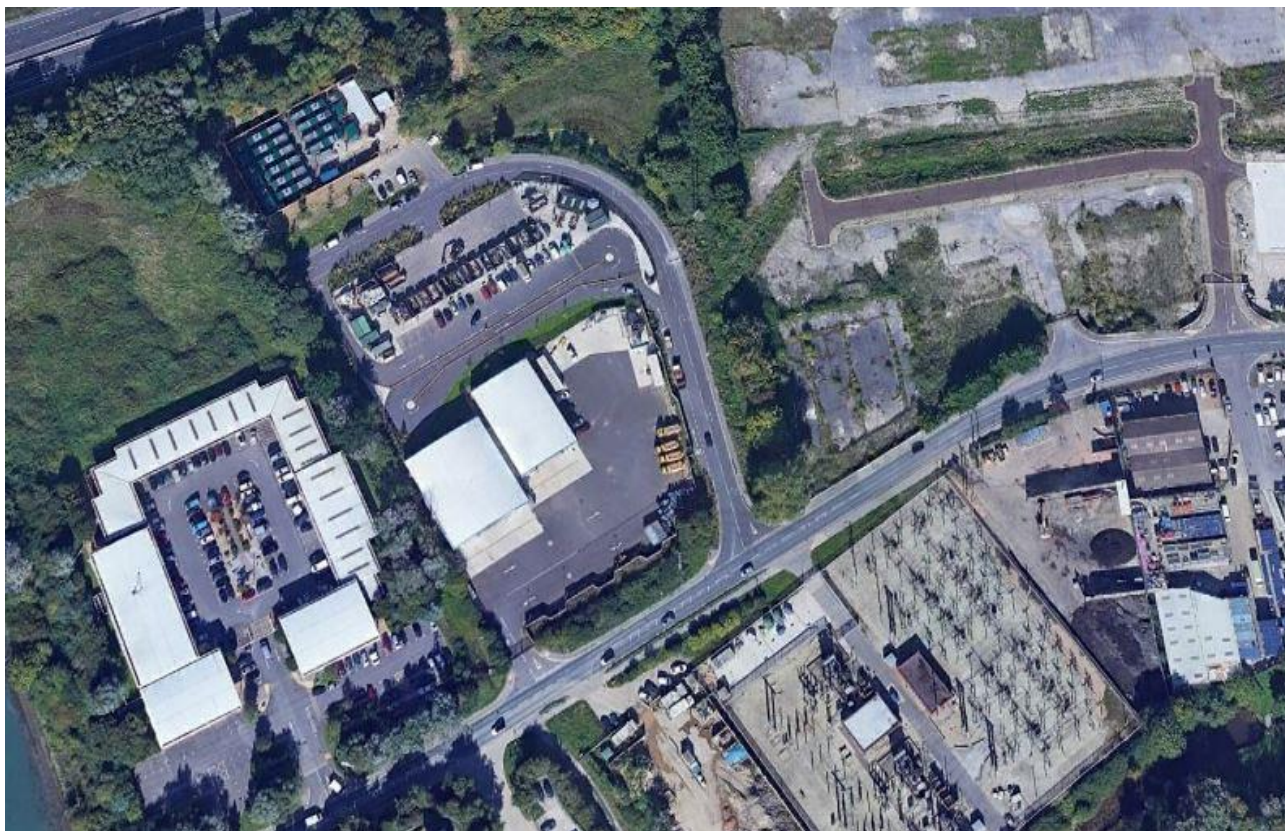


# TEMPLE

LEADERS IN ENVIRONMENT,  
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**Report for** – Ridge & Partners LLP  
T4039 Harts Farm Way, Havant  
Air Quality Assessment  
Draft



## Document version control

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## 1.0 Introduction

Temple Group Ltd (Temple) has undertaken an air quality assessment for a proposed mixed-use development. This is in support of an application for the industrial and business development at Harts Farm Way, to be submitted to Havant Borough Council.

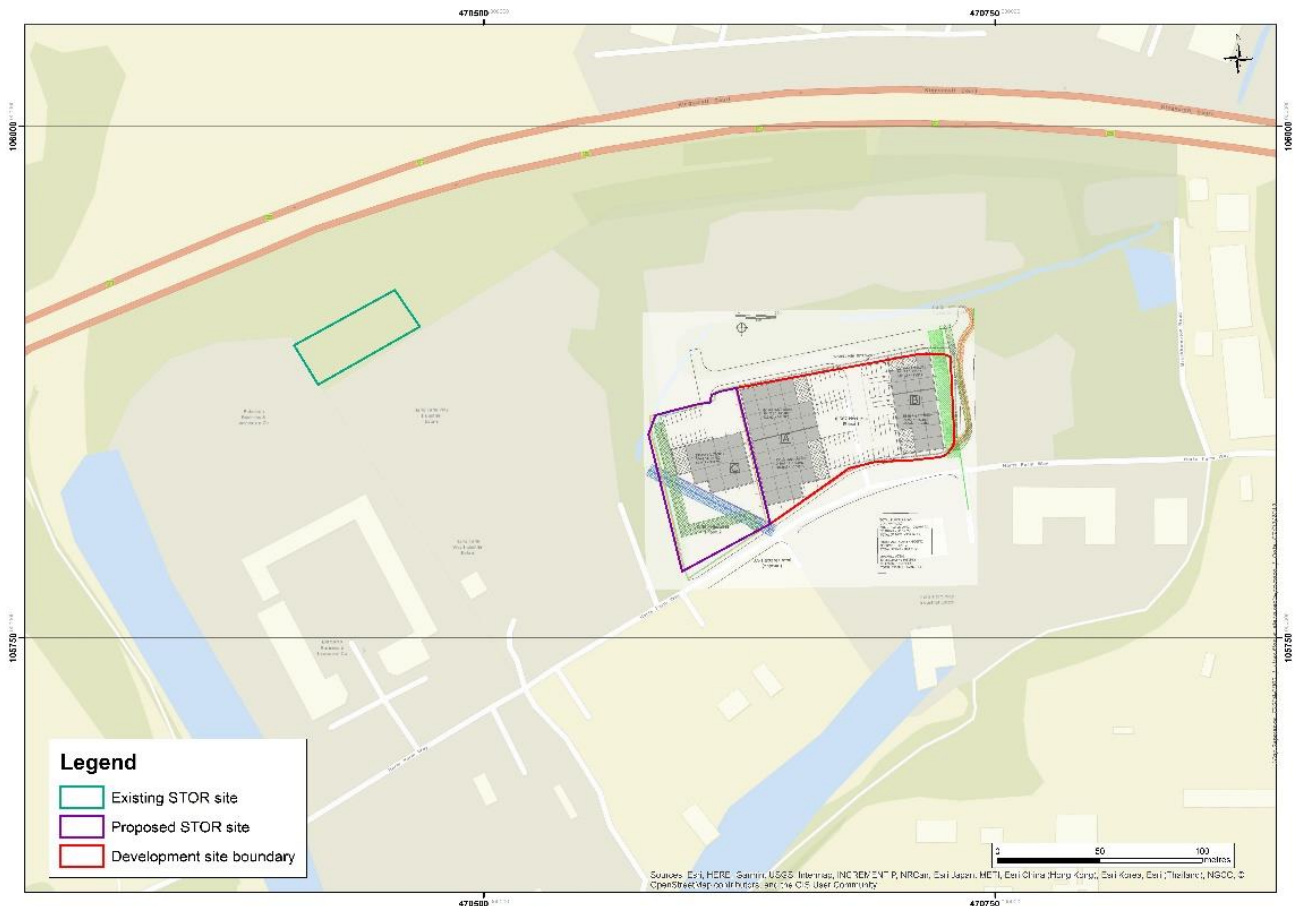
The site is located within the Broadmarsh Industrial Estate. The site is currently vacant, and it is located approximately 140 m to the south of the busy A27. The area surrounding the site is predominantly industrial. The proposed development will be delivered in two phases. Phase 1 consists of the construction of two industrial units (Building A and B) and 56 car parking spaces. Phase 2 of the development has been already permitted and comprises the introduction of a proposed generation plant to support the National Grid with electricity, dependant on the applicant submitting the plans for development imminently, and constructing within 1 year. Should this not occur, Phase 2 will commence of an additional industrial unit (Building C). For the purposes of differentiation, these schemes have been named Phase 2a for the STOR site option, and Phase 2b for the industrial unit option.

In addition to the proposed generation plant, there is currently an existing Short Term Operating Reserve (STOR) site located approximately 140 m to the northwest of the proposed development. There is also a waste transfer station located approximately 75 m to the northwest of the proposed development, and a waste water treatment facility located approximately 150 m to the southeast.

The proposed development will be impacted upon by the existing local air quality, including road traffic emissions and emissions from the proposed adjacent STOR site as part of the Phase 2a scenario, should this go ahead. The existing STOR site further to the northwest only operates at peak usage periods<sup>1</sup> (limited to between 100 and 200 hours per year) and has been ruled to be unlikely to significantly impact on the local air quality in the area. The primary pollutants of interest for this assessment are nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). The site location plan is shown in **Figure 1**.

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<sup>1</sup> DCS/EH/JPD/140822002 - Consultation on Planning Application APP/14/00800, Lands at Harts Farm Way, Havant.



**Figure 1 Site location**

This assessment details the potential air quality concentrations the proposed development receptors will experience. A baseline assessment of local air quality has been undertaken to establish existing and historic air quality conditions at the development site and in the local area. Additional assessment has been undertaken for the potential impact of Phase 1, and Phase 2b, on local air quality, as well as the potential impact of the adjacent STOR site for the Phase 2a scenario. In addition, a qualitative assessment of odour in the area has been carried out, focusing on the nearby waste transfer station and the waste water treatment facility.

## 2.0 Legislation and policy

### 2.1 National policy

#### 2.1.1 Air quality strategy

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland<sup>2</sup> (AQS) sets the framework for government policy on air quality in the UK. Air quality objective levels are set out in legislation in the Air Quality (England) Regulations 2000<sup>3</sup>, as amended<sup>4</sup> (shown in **Table 1**). In setting air quality objectives, due account was taken of health and socio-economic cost-benefit factors, together with consideration of the practicalities of achieving such targets.

These air quality objectives were meant to be achieved in 2004 for PM<sub>10</sub>, and 2005 for NO<sub>2</sub>. Although achievement of air quality objectives is not a statutory requirement, they reflect statutory limits outlined in The Air Quality Standards Regulations 2010<sup>5</sup>, which require the Secretary of State to achieve EU limit values set out in EU Ambient Air Quality Directives<sup>6 7</sup>.

**Table 1 Air quality objectives relevant to the assessment**

| Pollutant                           | Air quality objective levels                                           | Measured as  |
|-------------------------------------|------------------------------------------------------------------------|--------------|
| Nitrogen dioxide (NO <sub>2</sub> ) | 200 µg/m <sup>3</sup> , not to be exceeded more than 18 times per year | 1-hour mean  |
|                                     | 40 µg/m <sup>3</sup>                                                   | Annual mean  |
| Particles (PM <sub>10</sub> )       | 50 µg/m <sup>3</sup> , not to be exceeded more than 35 times per year  | 24-hour mean |
|                                     | 40 µg/m <sup>3</sup>                                                   | Annual mean  |

#### 2.1.2 The Environment Act 1995

The Environment Act 1995<sup>8</sup>, specifically Sections 82-84, requires all local authorities to carry out periodic reviews of air quality within their administrative areas. This review and assessment process now follows a phased approach, whereby local authorities only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded. The aim of this review process is to assess whether the air quality objectives are likely to be achieved. Areas where objectives are likely to be exceeded are to be declared air quality management areas (AQMA) by the local authorities.

<sup>2</sup> Department of the Environment, Food and Rural Affairs, et al. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 1 s.l, s.n (2007).

<sup>3</sup> The Air Quality (England) Regulations 2000 (2000 No. 928).

<sup>4</sup> The Air Quality (England) (Amendment) Regulations 2002 (2002 No. 3043).

<sup>5</sup> The Air Quality Standards Regulations 2010, (2010 No. 1001). London: HMSO.

<sup>6</sup> The European Parliament and the Council of the European Union, 2008, Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air and cleaner air for Europe. Official Journal of the European Union L152/2 11.6.2008.

<sup>7</sup> The European Parliament and the Council of the European Union, 2004, Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (Fourth Daughter Directive). Official Journal of the European Union L23/3 26.1.2005.

<sup>8</sup> Environment Act 1995, Part IV Air Quality.

### 2.1.3 National Planning Policy Framework and Planning Practice Guidance

The National Planning Policy Framework (NPPF)<sup>9</sup> was published on the 27<sup>th</sup> March 2012. Paragraph 109 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”*.

Paragraph 124 of the NPPF states, *“Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new Development in Air Quality Management Areas is consistent with the local air quality action plan.”*

The Planning Practice Guidance (PPG) supports the NPPF and was first published online in 2014. Its stated purpose is to provide *“guiding principles on how planning can take into account the impact of new development on air quality”*. This guidance highlights the role of the local air quality management (LAQM) regime in pursuing national air quality objectives and its implications for planning. It also includes recommendations on how detailed an air quality assessment should be or how impacts on air quality can be mitigated.

## 2.2 Regional and local policy

### 2.2.1 Local Development Framework

Havant Borough's Local Development Framework was adopted in March 2011<sup>10</sup>. Policies included in the plan relating to air quality include **DM10 Pollution**, which states:

*“Developments that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:*

- 1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk;*
- 2. National air quality standards or objectives would not be breached.”*

### 2.2.2 Havant Borough Council air quality action plan

Air quality within the Havant Area is generally very good, and the nitrogen dioxide (NO<sub>2</sub>) air quality objectives are likely to be achieved throughout the Borough; therefore, no Air Quality Action Plan has been prepared to date.

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<sup>9</sup> National Planning Policy Framework, March 2012

<sup>10</sup> Havant Borough Council Core Strategy, Local Development Framework, March 2011

## 2.3 Technical standards and guidance

### 2.3.1 Land-use planning & development control: planning for air quality

Environmental Protection UK (EPUK) and the IAQM have developed a procedure for assessing the significance of changes in traffic volume on local air quality in their guidance document, 'Land-Use Planning & Development Control: Planning for Air Quality'<sup>11</sup>. The procedure is designed to assess potential impacts resulting from changes in road use, including realignment, expansion and increased traffic flow. It can also be used to assess the potential air quality impacts of future combined heat and power (CHP) plant or boilers. An assessment of impacts from the development has been carried out in accordance with the EPUK method.

### 2.3.2 Local air quality management: technical guidance LAQM.TG(16)

The Department for Environment, Food and Rural Affairs (Defra) technical guidance note LAQM.TG(16)<sup>12</sup> is intended to provide guidance to local authorities undertaking the local review and assessment process. They are also used in developing methods for air quality assessments.

In accordance with the LAQM.TG(16) guidance, the annual mean pollutant objectives are deemed to apply at sensitive receptors, such as residences. The hourly and daily mean objectives are deemed to apply at all other locations, with the exception of, for example, kerbside sites where public exposure is expected to be short term.

### 2.3.3 Environment Agency odour guidance

The Environment Agency published a horizontal guidance note on odour management (H4)<sup>13</sup> in 2011. The H4 guidance note<sup>13</sup> provides guidance on permit conditions, assessment, control measures and monitoring. The note also gives a set of benchmark odour criteria for allowable odour concentration, as described in Table 2.

**Table 2 H4 benchmark odour criteria**

| 98 <sup>th</sup> percentile odour unit concentration (C <sub>98</sub> ouE/m <sup>3</sup> ) | Offensiveness        | Odour emission sources                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.5                                                                                        | Most offensive       | <ul style="list-style-type: none"> <li>• processes involving decaying animal or fish remains</li> <li>• processes involving septic effluent or sludge</li> <li>• biological landfill odours</li> </ul>  |
| 3                                                                                          | Moderately offensive | <ul style="list-style-type: none"> <li>• intensive livestock rearing</li> <li>• fat frying (food processing)</li> <li>• sugar beet processing</li> <li>• well aerated green waste composting</li> </ul> |
| 6                                                                                          | Less offensive       | <ul style="list-style-type: none"> <li>• brewery</li> <li>• confectionery</li> <li>• coffee roasting</li> <li>• bakery</li> </ul>                                                                       |

<sup>11</sup> EPUK and IAQM. Land-use Planning & Development Control: Planning for Air Quality (2017).

<sup>12</sup> Defra. Local Air Quality Management: Technical Guidance LAQM.TG(16) (2016).

<sup>13</sup> Additional guidance for H4 odour management how to comply with your environmental permit, 2011. Environment Agency.

The guidance also describes the ‘hedonic tone’ of an odour, i.e. the generally accepted degree of pleasantness or unpleasantness (offensiveness) for a particular odour. Hedonic tones typically range from +4 for very pleasant odours (e.g. bakeries) to -4 for foul odours (e.g. rotting flesh). Neutral odours score 0. The hedonic tone score refers to the type of smell, irrespective of its intensity. This helps to decide how offensive an odour may be.

#### **2.3.4 Guidance on the assessment of odour for planning**

The Institute of Air Quality Management (IAQM) has produced guidance on the assessment of odour for planning<sup>14</sup>. This guidance provides a framework for assessing the risk of odour effects that may arise and for the development of odour management plans as control measures.

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<sup>14</sup> Bull et al (2014). IAQM Guidance on the assessment of odour for planning, Institute of Air Quality Management, London.

## 3.0 Air quality assessment methodology

### 3.1 General

The proposed development will be impacted upon by the existing local air quality, including road traffic emissions and combustion plant emissions.

The Phase 1 and 2b development scenario includes the provision of 56 car parking spaces.

The Phase 2a development scenario includes 14 diesel generators as part of a STOR site, which will result in combustion emissions, primarily NO<sub>2</sub>, in the local area.

#### 3.1.1 Study area

Information from appropriate local monitoring sites have been considered, as well as modelled pollution levels in the immediate vicinity of the proposed development site. The local monitoring sites considered are shown in **Figure 2**.

#### 3.1.2 Pollutants

The main pollutants for consideration in this study are:

- NO<sub>2</sub> and PM<sub>10</sub> emissions from existing and development-related traffic sources; and
- NO<sub>2</sub> emissions from the Phase 2a STOR site.

The adopted methodology for assessing these pollutants is summarised in the following sections.

### 3.2 Screening Assessment for Impacts of the Development

Road traffic is a primary source of emissions to air. The combustion of fuel in vehicles leads to a number of harmful by-products which can affect air quality in the vicinity of roads. Areas with high traffic volumes or near to major roads often experience elevated pollutant levels, particularly in the form of NO<sub>2</sub> and PM<sub>10</sub>. Fixed sources, such as the diesel generators, can also be important emissions sources.

The preliminary scoping stage of the EPUK guidance<sup>11</sup> involves the identification of impacts of the local area on a development. This takes into account any potential exposure that future residents or users may experience as a result of emissions from the locality. Background and future baseline air quality are taken into account, and the presence and proximity of AQMAs, heavily-trafficked roads and/or other sources are used as indicators of exceedences.

The impact of a development on the local area is also identified. This is undertaken in two stages. The first stage details simple criteria to scope out the potential impacts of the proposed development on the local area if the proposed development is small, or where impacts can be considered to have insignificant effects. The Stage 1 criteria are:

A) If any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha;
- more than 1,000 m<sup>2</sup> of floor space for all other uses or a site area greater than 1 ha;

B) coupled with any of the following:

- the development has more than 10 parking spaces;
- the development will have a centralised energy facility or other centralised combustion process.

Criteria under both A) and B) must be met in order for the assessment to proceed to the second stage. If the criteria are not met then there is no requirement to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered to have insignificant effects.

The second stage requires consideration of road traffic and combustion processes in order to determine whether further assessment of the likely impacts of the development is necessary.

The second stage screening criteria are:

- a change in road alignment of five metres or more, within an AQMA;
- light-duty-vehicle (LDV) annual average daily traffic (AADT) flows changing by 100 AADT or more, within or adjacent to an AQMA, or 500 AADT or more elsewhere;
- heavy-duty-vehicle (HDV) flows changing by 25 AADT or more, within or adjacent to an AQMA, or 100 AADT elsewhere;
- inclusion of one or more substantial combustion processes, where there is a risk of impacts at relevant receptors:
  - typically, any combustion plant where the single or combined NO<sub>x</sub> emission rate is more than 5 mg/s (provided pollutants are adequately dispersed) will need to be assessed;
  - in situations where:
    - the emissions are released close to buildings with relevant receptors;
    - the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings; or
    - the stack height is lower than the receptor,

then consideration will need to be given to potential impacts at much lower emission rates.

If the above criteria are triggered, a detailed assessment of the impacts of the development is required. If none of the criteria in the second stage are triggered, it can be considered that the impacts of the development are insignificant, and therefore a detailed study is only required for the impacts of local air quality on the new receptors introduced by the proposed development.

### **3.3 Detailed air quality assessment method for roads and point sources**

#### **3.3.1 Road sources modelling**

##### **Model selection**

The EPUK screening assessment criteria and the ADMS-Roads Extra dispersion model were used to assess direct effects from the additional traffic on local air quality during operation when the proposed development will be complete and operational. Operational scenarios were modelled for

the earliest years of operation, as background NO<sub>2</sub> concentrations will be higher than in future years. Therefore, the assessment is representative of a conservative approach.

Defra's Emissions Factor Toolkit (EFT v8.0, published November 2017) was used to determine the emissions of NO<sub>x</sub> and PM<sub>10</sub> from operational traffic along the affected links. Background pollution concentrations were taken from the Defra background maps for the relevant 1 km x 1 km grid square for the relevant assessment year.

The ADMS-Roads model considers the key variables that influence pollutant emission and dispersion (meteorology, surface roughness, diurnal traffic flows, predicted future traffic mixes and predicted future engine emission standard mixes). No street canyons were identified for inclusion into the model. Concentrations of NO<sub>2</sub> and PM<sub>10</sub> were predicted at a number of locations in the vicinity of the proposed development<sup>15</sup>. The receptors chosen include those that are representative of worst-case exposure locations within the modelled study area.

## Receptors

The proposed site use is industrial, and the surrounding area is industrial, and as such represent low sensitivity receptors. The nearest residential residences are located at a large distance from the proposed development site, and have been covered under the existing STOR site approvals<sup>1</sup>, and the Phase 2a air quality assessment accepted by Council in 2017<sup>16</sup>. As such, the focus of this assessment is on the low sensitivity receptors within the vicinity of the proposed development site.

## Meteorological data

This study utilised meteorological data from Gatwick Airport for 2016, which is considered a suitable, representative site, in line with the requirements of LAQM.TG(16)<sup>17</sup>.

## Model verification

Model verification refers to checks that are carried out on model performance in relation to roads modelling at a local level. Modelled concentrations are compared with the results of local monitoring data and, where there is a disparity between modelled and monitored concentrations, an adjustment may be applied to the final model output. Verification was undertaken in line with Defra technical guidance note LAQM.TG(16)<sup>17</sup>.

## Assessment scenarios

The primary pollutants of interest are NO<sub>2</sub> and PM<sub>10</sub> for the roads sources. Predictions of NO<sub>2</sub> and PM<sub>10</sub> have been made for the base year 2016, a future reference case year 2018 without the Proposed Development and an operational year 2018 with the Proposed Development. The predicted contributions have been combined with the relevant background pollutant concentration for each receptor location. It should be noted that this represents a conservative assessment with respect to background concentrations and vehicle emission rates.

<sup>15</sup> Defra's NO<sub>x</sub> to NO<sub>2</sub> converter (v6.1) was used to calculate the resulting NO<sub>2</sub> concentrations predicted from the model.

<sup>16</sup> Green Frog Power II Ltd. Proposed Peak Power Generation Facility – Harts Farm Way (2017).

<sup>17</sup> Department for Environment, Food and Rural Affairs. 2016. Local Air Quality Management: Technical Guidance LAQM.TG(16).

### **3.3.2 Plant modelling**

#### **Model selection**

The EPUK screening assessment criteria and the ADMS dispersion model were used to assess direct effects from the Phase 2a STOR site on local air quality should the proposed development will be complete and operational. Operational scenarios were modelled for 2018.

The ADMS model considers the key variables that influence pollutant emissions and dispersion (meteorology, surface roughness, atmospheric stability). Concentrations of NO<sub>2</sub> were predicted at a number of locations in the vicinity of the proposed development.

#### **Receptors**

A grid of receptors have been modelled, at ground level, in order to present the pollutant concentration contours surrounding the plant. The specified receptor points for the roads modelling has also been assessed for the potential cumulative concentrations with the plant contribution.

#### **Meteorological data**

This study utilised meteorological data from Gatwick Airport, in line with the roads modelling. In line with best practice, the years 2014, 2015 and 2016 were modelled to account for any variation between years. The year 2016 was found to represent the worst-case year, and the results have been presented in this report.

#### **Model verification**

Unlike roads modelling, it is not practical or necessary to carry out verification of plant models. As such, no adjustment of plant results has been carried out.

#### **Background concentrations**

The Defra background annual mean concentrations have been used for assessment against the annual mean objective. For assessment against the short-term objective, double the annual mean background concentrations has been used in line with standard practice and guidance<sup>12</sup>.

#### **Assessment scenarios**

As the plant is gas-fired, the pollutant of concern is NO<sub>2</sub>. Predictions of NO<sub>2</sub> have been made for each year of meteorological data assessed.

The worst-case year will be presented alongside the roads modelling results to show the cumulative concentrations from the proposed development (unless there is no significant difference between the years, in which case the same year as the roads modelling will be utilised).

#### **Post processing of results**

The conversion rate of NO<sub>x</sub> to NO<sub>2</sub> utilised is in accordance with the Environment Agency Air Quality Modelling and Assessment Unit<sup>18</sup> which allows for the conversion of 70% of NO<sub>x</sub> to NO<sub>2</sub> for long term averages, and 35% conversion of NO<sub>x</sub> to NO<sub>2</sub> for the one-hour average.

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<sup>18</sup> Environment Agency. Conversion Ratios for NO<sub>x</sub> and NO<sub>2</sub>, Air Quality Modelling and Assessment Unit.

### 3.3.3 Assessment of results and significant criteria

The potential impacts of the proposed development were assessed by comparing estimated pollutant concentrations with the air quality objectives (**Table 3**), with and without the proposed development in place.

In addition to the air quality objectives, the EPUK<sup>19</sup> guidance descriptors for magnitude of impact have been used, primarily because they consider effects in terms of the magnitude of change from existing concentrations and also relative to the air quality objectives. The impact magnitudes have been used to determine the significance of effects. In this assessment, a moderate or substantial impact is considered significant.

#### Impact magnitude

The EPUK guidance document provides criteria for describing impacts as a result of a development. In the absence of other specific guidance, it forms the basis for this assessment.

**Table 3** shows the impact descriptors that take account of the percentage change in concentration relative to the air quality objective and the annual mean concentration at the receptor during the assessment year.

**Table 3 Air quality impact descriptors for changes to annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations**

| Long-term average concentration at receptor in assessment year | % Change in concentration relative to Air Quality Assessment Level (AQAL) |             |             |             |
|----------------------------------------------------------------|---------------------------------------------------------------------------|-------------|-------------|-------------|
|                                                                | 1                                                                         | 2 – 5       | 6 – 10      | >10         |
| 75% or less of AQAL                                            | Negligible                                                                | Negligible  | Slight      | Moderate    |
| 76 – 94% of AQAL                                               | Negligible                                                                | Slight      | Moderate    | Moderate    |
| 95 – 102% of AQAL                                              | Slight                                                                    | Moderate    | Moderate    | Substantial |
| 103 – 109% of AQAL                                             | Moderate                                                                  | Moderate    | Substantial | Substantial |
| 110% or more of AQAL                                           | Moderate                                                                  | Substantial | Substantial | Substantial |

The overall significance of predicted changes in local air quality that are predicted, including background pollutant concentrations, has been established through the consideration of the following factors:

- the existing and future air quality in the absence of the development;
- duration (temporary or long term);
- reversibility (reversible or permanent);
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

The impact descriptors used in this air quality assessment relate to the national air quality objectives i.e. the air quality assessment levels used are the air quality objectives, **Table 3**.

<sup>19</sup> Moorcroft and Barrowcliffe. et al. Land-use Planning & Development Control: Planning for Air Quality. V1.2. Environmental Protection UK and the Institute of Air Quality Management, London (2017).

### 3.4 Odour assessment methodology

The method adopted for this odour assessment is in line with the IAQM guidance on the assessment of odour for planning<sup>20</sup>. The general method outlined in this guidance is as follows:

- "1. A description of existing baseline odour conditions (including complaints history) where relevant.*
- "2. A description of the location of receptors and their relative sensitivities to odour effects.*
- "3. Details of potential odour sources (whether existing or proposed), including the activities and materials involved (including a brief outline of quantities, durations, methods of handling and storage, etc) and the resulting potential for generating odours, covering fugitive sources, diffuse sources and point sources as applicable.*
- "4. A description of control/mitigation measures incorporated into the scheme (including management controls and, where appropriate, engineering controls).*
- "5. A prediction or observation (or combination of both), using appropriate assessment tools, of the likely odour impact and resulting effects at relevant sensitive receptors, and taking into account:*
  - "a. the likely magnitude of odour emissions (after control by measures incorporated into the scheme, if applicable);*
  - "b. the likely meteorological characteristics at the site;*
  - "c. the dispersion and dilution afforded by the pathway to the receptors and the resulting magnitude of odour that could result;*
  - "d. the sensitivity of the receptors [...]; and*
  - "e. the potential cumulative odour effects with any odours of a similar character, (e.g. if odours from kitchen waste are in addition to an existing municipal solid waste throughput.)*
- "6. Where odour modelling has been used the reports should contain full details of the input data and modelling options used to allow a third party to reproduce the results.*
- "7. Where odour effects are assessed as significant, details of appropriate further mitigation and control measures that could allow the proposal to proceed without causing significant loss of amenity.*
- "8. The residual odour impacts and their effects [...].*
- "9. A conclusion on the significance of the residual effect, i.e. whether "significant" or "not significant"."*

In order to predict or observe and assess likely odour impact, as per point 5, at least one odour assessment tool needs to be utilised. The assessment tool(s) must take the FIDOL<sup>14</sup> factors, described in **Table 4**, into account.

**Table 4 Description of the FIDOL factors**

|                      |                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency            | How often an individual is exposed to odour.                                                                                                                                                                                                                                                                                                                            |
| Intensity            | The individual's perception of the strength of the odour.                                                                                                                                                                                                                                                                                                               |
| Duration             | The overall duration that individuals are exposed to an odour over time.                                                                                                                                                                                                                                                                                                |
| Odour unpleasantness | Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score. |
| Location             | The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity, and socio-economic factors.                                                                                                 |

### Odour risk assessment

The IAQM guidance<sup>20</sup> provides a method for qualitative risk based odour assessment. This method is based on the Source-Pathway-Receptor (S-P-R) concept. The concept is that for an adverse effect (e.g. disamenity, annoyance, nuisance or complaint) to occur, there must be odour exposure. For odour exposure to occur, there must be:

- a Source of odour release to atmosphere;
- a Pathway for the odour to travel from the source; and
- a Receptor that could experience an adverse effect.

The fundamental relationship underlying the S-P-R concept is:

$$\text{Effect} \approx \text{Dose} \times \text{Response}$$

For the purposes of odour assessment, the dose can be considered to be equivalent to the odour exposure, i.e. the impact. Using the FIDOL factors, the impact is determined with FIDO. The effect is the resultant change on specific receptors, taking their sensitivities into consideration. Sensitivity is categorised as L (location) in the FIDOL factors. Therefore, the risk of odour effects can be described by the relationship:

$$\text{Risk of odour effects} \approx \text{Impact} \times \text{Location}$$

$$\text{Risk of odour effects} \approx \text{FIDO} \times \text{L}$$

The key factors which will influence the effects of odours are:

- source odour potential (odour release magnitude, how odorous the compounds are, the unpleasantness of the odour);
- pathway effectiveness (how easily the odours are transported in the atmosphere); and
- receptor sensitivity.

<sup>20</sup> Bull et al (2014). IAQM Guidance on the assessment of odour for planning, Institute of Air Quality Management, London.

**Table 5** shows example risk factors for the S-P-R assessment concept, modified from the IAQM guidance<sup>14</sup>.

**Table 5 S-P-R risk factors**

| Source odour potential                                                                                                                                                                                                                                                                                                                                    | Pathway effectiveness                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Receptor                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Large source odour potential</b><br>Large scale odour source<br>Materials usage:<br>>100,000 tonnes/ m <sup>3</sup> / year<br>Area sources >1,000 m <sup>2</sup><br>Highly odorous release<br>Low odour detection thresholds<br>Offensiveness: "most offensive"<br>Hedonic tone score = -2 to -4<br>No mitigation (open air operation, no containment) | <b>Highly effective pathway for odour flux to receptor</b><br>Receptor adjacent to source/ site<br>Distance well below official set-back distances<br>Wind direction: high frequency (%) of winds from source to receptor or downwind, from source, of prevailing wind direction<br>Effectiveness of dispersion/ dilution: open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.                | <b>High sensitivity receptor</b><br>Surrounding land where users can expect to enjoy a high level of amenity and where people would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal intended use of the land, e.g. residential dwellings, schools/ educational facilities, hospitals, tourist/ cultural areas/ attractions.                                                      |
| <b>Medium source odour potential</b><br>Medium scale odour source<br>Materials usage:<br>1,000 – 100,000 tonnes/ m <sup>3</sup> / year<br>Area sources 100 – 1,000 m <sup>2</sup><br>Moderately odorous release<br>Offensiveness: "moderately offensive"<br>Hedonic tone score = 0 to -2<br>Some mitigation, but significant residual odour remains       | <b>Moderately effective pathway for odour flux to receptor</b><br>Receptor is local to the source<br>Where mitigation relies on dispersion/ dilution – releases are elevated, but compromised by building effects.                                                                                                                                                                                                                                                     | <b>Medium sensitivity receptor</b><br>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 intended use of the land e.g. places of work, commercial/ retail premises, playing/ recreation fields. |
| <b>Small source odour potential</b><br>Small scale odour source<br>Materials usage:<br><1,000 tonnes/ m <sup>3</sup> / year<br>Area sources <10 m <sup>2</sup><br>High odour detection thresholds<br>Offensiveness: "less offensive"<br>Hedonic tone score = 0 to +4<br>Effective, tangible mitigation measures in place                                  | <b>Ineffective pathway for odour flux to receptor</b><br>Receptor is remote from source/ site<br>Distance exceeds any official set-back distances<br>Wind direction: low frequency (%) of winds from source to receptor or upwind, from source, of prevailing wind direction<br>Where mitigation relies on dispersion/ dilution – releases are from high level (e.g. stacks or roof vents > 3 m above roof/ ridge height) and are not compromised by building effects. | <b>Low sensitivity receptor</b><br>Surrounding land where the enjoyment of amenity would not reasonably be expected or where 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 intended land use e.g. industrial areas, farms, footpaths, roads.                                                                                                        |

When the source odour potential and pathway effectiveness for each receptor have been defined using **Table 5**, these are considered together to predict the risk of odour exposure (impact) at the receptor location, using the matrix shown in **Table 6**<sup>14</sup>.

**Table 6 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    |

The effect of the odour impact on the specific receptor location is then estimated by taking into consideration its sensitivity. This can be estimated using the matrix shown in **Table 7**.

**Table 7 Odour effect matrix to assess effect at 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          |

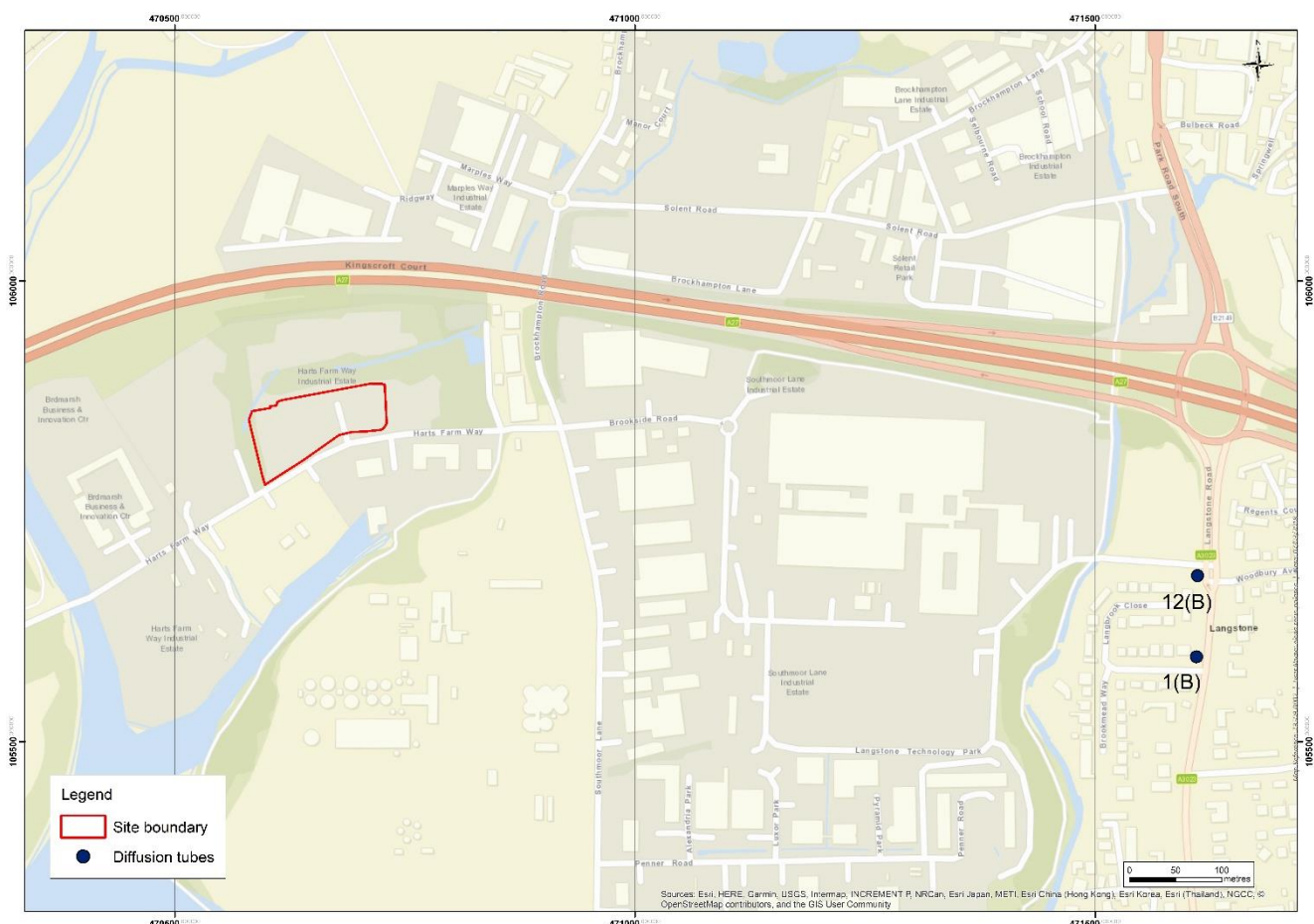
## 4.0 Baseline conditions

### 4.1 Site description

The proposed development is located in Havant, and it forms part of the Broadmarsh Industrial Estate. It measures approximately 0.54 ha and it is located to the south of the A27. Harts Farm Way runs immediately adjacent to the south of the proposed development. As stated in **Section 1.0**, the area is mainly industrial, and the closest residential units are located approximately 400 m away from the site. There is an existing STOR site located 150 m to the north west of the proposed development.

**Figure 2** shows the proposed development site and includes the local air quality monitoring stations, the data from which was considered in this assessment.

**Figure 2 Study area and local monitoring locations**



### 4.2 Local authority review and assessment information

Havant Borough Council currently does not have any Air Quality Management Areas (AQMAs).

The most recent local authority report<sup>21</sup> available at the time of writing confirmed that the national annual mean air quality objective for all pollutants are likely to be achieved throughout the Borough.

## 4.3 Local monitoring

### 4.3.1 Automatic monitoring sites

Havant Borough Council does not undertake any automatic monitoring.

### 4.3.2 Diffusion tube monitoring sites

Diffusion tubes are used to monitor NO<sub>2</sub> concentrations at kerbside, urban centre and background locations. There are two representative monitoring locations relatively close to the proposed development site, as shown in **Figure 2**.

The most representative diffusion tube monitoring sites are sites 1(B) and 12(B), which are located in a similar roadside location to the proposed development site. The results of NO<sub>2</sub> diffusion tube monitoring are shown in **Table 8**. The results indicate that NO<sub>2</sub> concentrations at the sites met the annual mean objective in all recent years. Concentrations were also below 60 µg/m<sup>3</sup>, indicating the NO<sub>2</sub> hourly mean objective is likely to have been met at this site in all recent years.

**Table 8 Annual mean NO<sub>2</sub> concentrations at diffusion tube sites (µg/m<sup>3</sup>)**

| Site Name        | Location              | Site Type | 2012        | 2013 | 2014 | 2015 | 2016 |
|------------------|-----------------------|-----------|-------------|------|------|------|------|
| 1(B)             | Langstone Road (West) | Roadside  | 29.5        | 28.6 | 32.4 | 33.6 | 38.5 |
| 12(B)            | Xyratex               | Roadside  | 33.9        | 35.0 | 39.6 | 29.8 | 34.2 |
| <b>Objective</b> |                       |           | <b>40.0</b> |      |      |      |      |

- **Bold** indicates exceedance of the objectives. **Underlined Bold** indicates a potential exceedance of the one-hour objective, due to recorded annual mean concentrations exceeding 60 µg/m<sup>3</sup>. ND = No Data.
- Source: Havant Borough Council Air Quality Annual Status Report (June 2017).

## 4.4 Pollutant background concentrations

Background concentrations of NO<sub>2</sub> and PM<sub>10</sub> were obtained from the Defra background maps<sup>22</sup> for the 1 km x 1 km grid square centred on OS co-ordinates 470500, 105500, corresponding to the location of the proposed development. These background maps are available for each year up to 2030. Background NO<sub>2</sub> and PM<sub>10</sub> concentrations for 2016, the baseline year, and 2018, the earliest year for operation, are shown in **Table 9**.

**Table 9 Defra annual mean background pollutant concentrations at the proposed development (µg/m<sup>3</sup>)**

| Pollutant        | 2016 | 2018 | Objective   |
|------------------|------|------|-------------|
| NO <sub>2</sub>  | 18.7 | 17.7 | <b>40.0</b> |
| PM <sub>10</sub> | 14.7 | 14.5 | <b>40.0</b> |

<sup>21</sup> Havant Borough Council Air Quality Annual Status Report, June 2017.

<sup>22</sup> Defra background mapping data for local authorities – 2015 <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>.

## **4.5 Cumulative impacts**

The existing STOR site located to the northwest will give rise to short-term pollution when in operation; however, it is restricted to operating less than 200 hours per year, and has been deemed by Council not to significantly impact on local air quality<sup>1</sup>.

In addition, there are two odour sources in the vicinity, namely the waste transfer facility and the waste water treatment facility, both of which will contribute to odour levels in the local area.

## **4.6 Overall baseline**

Given that the development site is located in an industrial area and set back from the A27, it is considered that the roadside diffusion tube sites along the quieter Langstone Road are representative of annual NO<sub>2</sub> concentrations in the proposed development. The roadside diffusion tube monitoring sites (1B, 12B) results indicates that NO<sub>2</sub> levels are below the annual objectives in recent years. Extreme short term NO<sub>2</sub> concentrations have the potential to be significantly higher when the existing STOR site is in operation

There is also the identified potential for odour being present in the vicinity of the proposed development site.

## 5.0 Operational phase assessment

### 5.1 Road traffic and point source assessment

#### 5.1.1 Screening assessment

The proposed development has been assessed against the two-stage screening criteria of the EPUK guidance, as described in **Section 3.2**.

For the proposed development, the floor space will be more than 1,000 m<sup>2</sup>, and the development has more than ten parking spaces. As such, the stage one thresholds have been triggered, and second stage screening is required.

There will be no changes in road alignment due to the proposed development, and the trip rate is not expected to exceed the threshold of 500 light vehicle trips per day, or 100 heavy vehicle trips per day. As such, the proposed development is not expected to result in a significant impact on the local air quality for the Phase 1 and Phase 2b scenarios.

However, for the Phase 2a scenario, a STOR site will be located immediately adjacent to the proposed Phase 1 development. The impacts of the STOR site on local sensitive receptors, including residences, has been included in the air quality assessment commissioned by Green Frog Power II Ltd<sup>16</sup>, however, this assessment did not address the potential short-term exposure of the low sensitivity receptors such as industrial users. As such, a detailed assessment has been carried out which establishes the baseline, without the Phase 2a STOR site, and the future baseline with the previously approved Phase 2a STOR site, should this be constructed.

#### 5.1.2 Detailed assessment – Phase 1 and Phase 2b only

For the Phase 1 and Phase 2b scenario, the main emission source is the A27. The short-term impacts from the existing STOR site, given the low hours of operation, have previously been deemed not to significantly adversely affect local air quality in the area<sup>16</sup>, and as such this has not been modelled.

#### Traffic sources

Traffic data for the local roads of interest were obtained from the Department of Transport (DfT) database, for the base year of 2016<sup>23</sup>. TEMPro v7.2 was used to adjust the 2016 to the higher forecast 2018 traffic levels.

**Table 10 Traffic flow rates used in the assessment**

| Road Links   |           |              | 2016 Verification Year |       | 2018 Baseline |       |
|--------------|-----------|--------------|------------------------|-------|---------------|-------|
| Link ID      | Road Name | Speed (km/h) | AADT                   | % HDV | AADT          | % HDV |
| A27          | A27       | 100          | 79,073                 | 3.6   | 81,279        | 3.6   |
| Verification | A3023     | 40           | 27,197                 | 2.0   | N/A           | N/A   |

<sup>23</sup> Department of Transport. Traffic counts. <https://www.dft.gov.uk/traffic-counts>.

## Model verification

Model verification for NO<sub>2</sub> has been undertaken for this assessment using the diffusion tube sites located on Langstone Road. The calculations for the verification process are shown in **Table 11**.

**Table 11 Verification table for NO<sub>2</sub>**

| Verification parameters                                                  | 1(B) | 12(B) |
|--------------------------------------------------------------------------|------|-------|
| Monitored total NO <sub>2</sub> (µg/m <sup>3</sup> )                     | 38.5 | 34.2  |
| Background NO <sub>2</sub> (µg/m <sup>3</sup> )                          | 18.7 | 18.7  |
| Background NO <sub>x</sub> (µg/m <sup>3</sup> )                          | 26.7 | 26.7  |
| Monitored road contribution NO <sub>x</sub> (µg/m <sup>3</sup> )         | 41.5 | 31.8  |
| Modelled road contribution NO <sub>x</sub> (µg/m <sup>3</sup> )          | 13.2 | 10.6  |
| Monitored NO <sub>x</sub> / Modelled NO <sub>x</sub> (Adjustment Factor) | 3.08 |       |

## Impacts of the development on existing receptors

Given that the Phase 1 and Phase 2b scenario will not generate significant traffic, and does not exceed the threshold for a detailed assessment, the proposed development under the Phase 1 and 2b scenario will not result in adverse impacts on existing receptors.

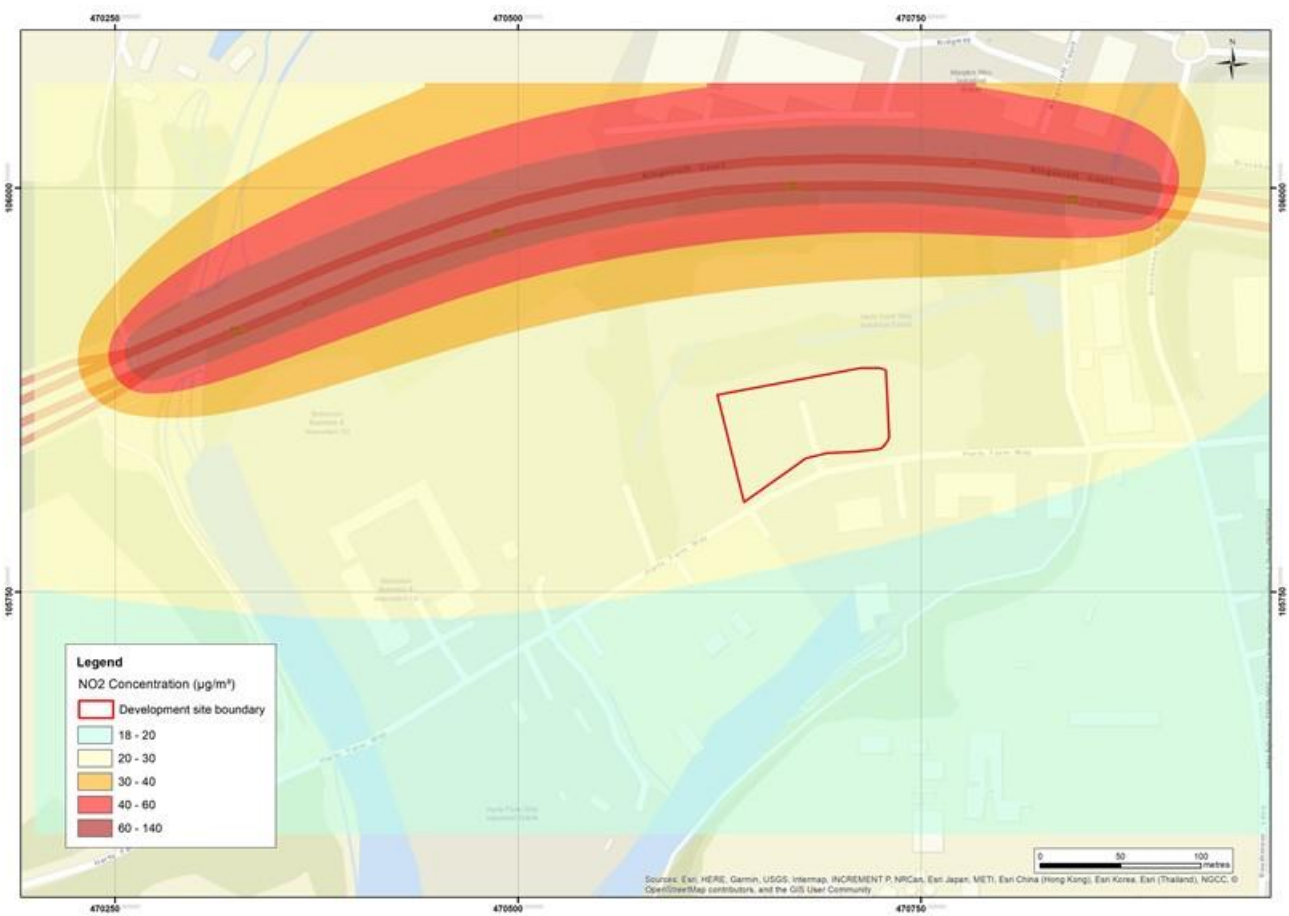
## Impacts on the development

The A27 road is the main source of pollution in the vicinity of the proposed development, under the Phase 1 and Phase 2b scenario. The results of the dispersion modelling of the A27 are shown in the following contour graphs, with the adjusted predicted concentrations of NO<sub>2</sub> and PM<sub>10</sub> shown including the Defra background concentrations for 2018.

As can be seen from the contour graphs, the concentrations of NO<sub>2</sub> and PM<sub>10</sub> predicted at the proposed development site are well below the annual objectives. Additionally, given the NO<sub>2</sub> concentrations are below the limit of 40 µg/m<sup>3</sup>, they are considerably less than 60 µg/m<sup>3</sup>, which is considered the threshold at which the hourly objective may be breached for roadside locations<sup>24</sup>. It should be noted that it is only the short-term objective that is applicable to the low sensitivity industrial site.

<sup>24</sup> Defra. LAQM.TG16.

Figure 3 NO<sub>2</sub> ground level contour graph – Phase 1 and 2b scenario



The map displays PM10 concentration contours in  $\mu\text{g}/\text{m}^3$  around a development site. The site boundary is outlined in red. The contours show a concentration gradient, with the highest values (orange and red) located near the site and decreasing as distance increases. The map includes a legend, a scale bar (0 to 100 metres), and a north arrow. The background is a grayscale aerial photograph showing the surrounding landscape, including roads and buildings.

**Legend**  
 PM10 Concentration ( $\mu\text{g}/\text{m}^3$ )

|                           |
|---------------------------|
| Development site boundary |
| 14 - 15                   |
| 15 - 16                   |
| 16 - 17                   |
| 17 - 19                   |
| 19 - 21                   |
| 21 - 24                   |
| 24 - 27                   |
| 27 - 29                   |
| 29 - 32                   |

The roads assessment has been detailed in the previous section, however for the Phase 1 and Phase 2a scenario, there is the addition point source modelling, which is described below. The A27 has been shown in the previous section not to contribute significantly to pollutant levels at the site, at either short-term (applicable) or long-term (information only) averaging periods.

The dispersion of emissions from the adjacent STOR site have been modelled using the ADMS dispersion model.

The generator stacks have a diameter of 0.35 m and a release height of 5.9 m above the ground<sup>25</sup>. The conversion rate of NO<sub>x</sub> to NO<sub>2</sub> utilised is in accordance with the Environment Agency Air Quality Modelling and Assessment Unit<sup>21</sup> which states that the percentage of NO<sub>2</sub> at the point of emission from a combustion process is generally less than 10 per cent, as the remaining emissions are

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typically made up of nitric oxide (NO). Between the point of emission and receptor locations, further atmospheric reactions may result in the creation of NO<sub>2</sub> from NO. Concentrations of 70 per cent NO<sub>2</sub> for long term, and 35 per cent for short term, have been chosen as a conservative estimate, representative of these further atmospheric reactions. The Defra background annual mean concentrations have been used for 2018; for short term assessment, double the annual mean background concentrations have been used. The STOR site operates 2,000 hours in a year; the same adjustment factor agreed in the methodology of the STOR site air quality assessment<sup>16</sup> has been used to maintain consistency between the assessments.

The details of the STOR site modelled in this assessment are detailed in **Table 12**. The building parameters are detailed in **Table 13**.

**Table 12 STOR specifications**

| Specifications                                      | Generators (x14)       |
|-----------------------------------------------------|------------------------|
| Exhaust volume flow rate                            | 0.35 m <sup>3</sup> /h |
| Exhaust stack release height                        | 3.97 m                 |
| Exhaust stack diameter                              | 0.35 m                 |
| Exhaust temperature                                 | 432 °C                 |
| NO <sub>x</sub> emission rate (as NO <sub>2</sub> ) | 0.59 g/s               |
| Operating hours                                     | 2,000 h/y              |

**Table 13 STOR building dimensions as modelled**

| Container number          | Height (m) | Length (m) | Width (m) |
|---------------------------|------------|------------|-----------|
| Generator container (x14) | 2.9        | 2.4        | 12.3      |

## Impacts of the development on new and existing receptors

The impacts of the Phase 2a STOR site on existing receptors has already been undertaken and approved<sup>16</sup>. As such, this work has not been replicated. This assessment has instead focused on the potential impacts of the new receptors introduced in the proposed Phase 1 development. It is noted that these new receptors are low sensitivity receptors due to the industrial zoning, and hence only the short-term pollutant objectives apply to this development. However, the long-term cumulative emissions of the Phase 2a STOR site and the A27 road have been shown for completeness (as information only), for NO<sub>2</sub>, which is the primary pollutant of concern.

As can be seen from the contour graphs, the concentrations of NO<sub>2</sub> predicted at the proposed Phase 1 development site, as a result of the Phase 2a STOR site, are well above the short-term objective for NO<sub>2</sub> throughout the site area. This is a direct result of the operation of the STOR site, which, due to its close proximity, can be reasonably expected to result in exceedances of the short-term objective. Whilst not applicable to this land use type, it is noted that there is a partial exceedance to the annual mean at this site.

Figure 5 NO<sub>2</sub> ground level contour graph – Short Term – STOR and background concentrations only – Phase 1 and 2a scenario

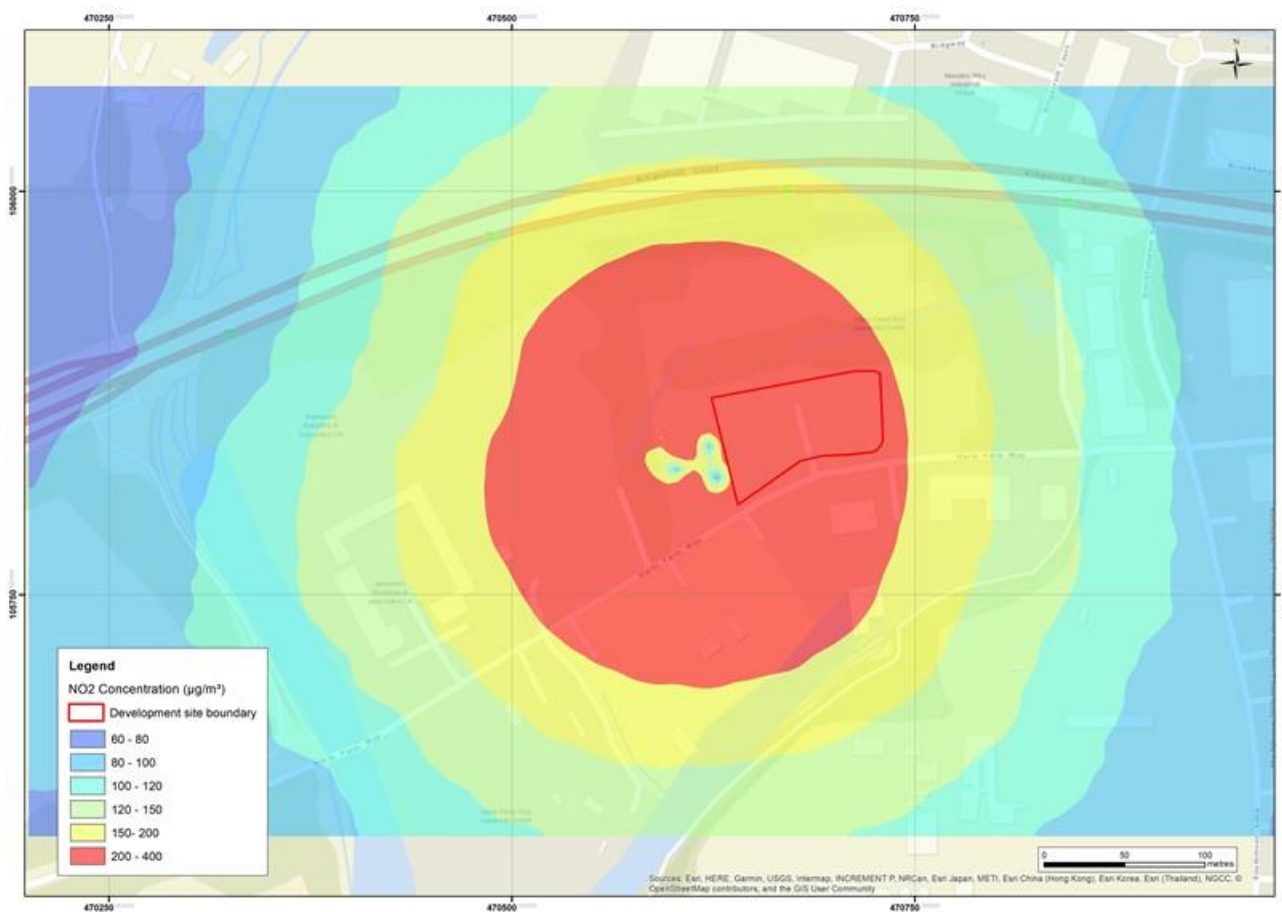
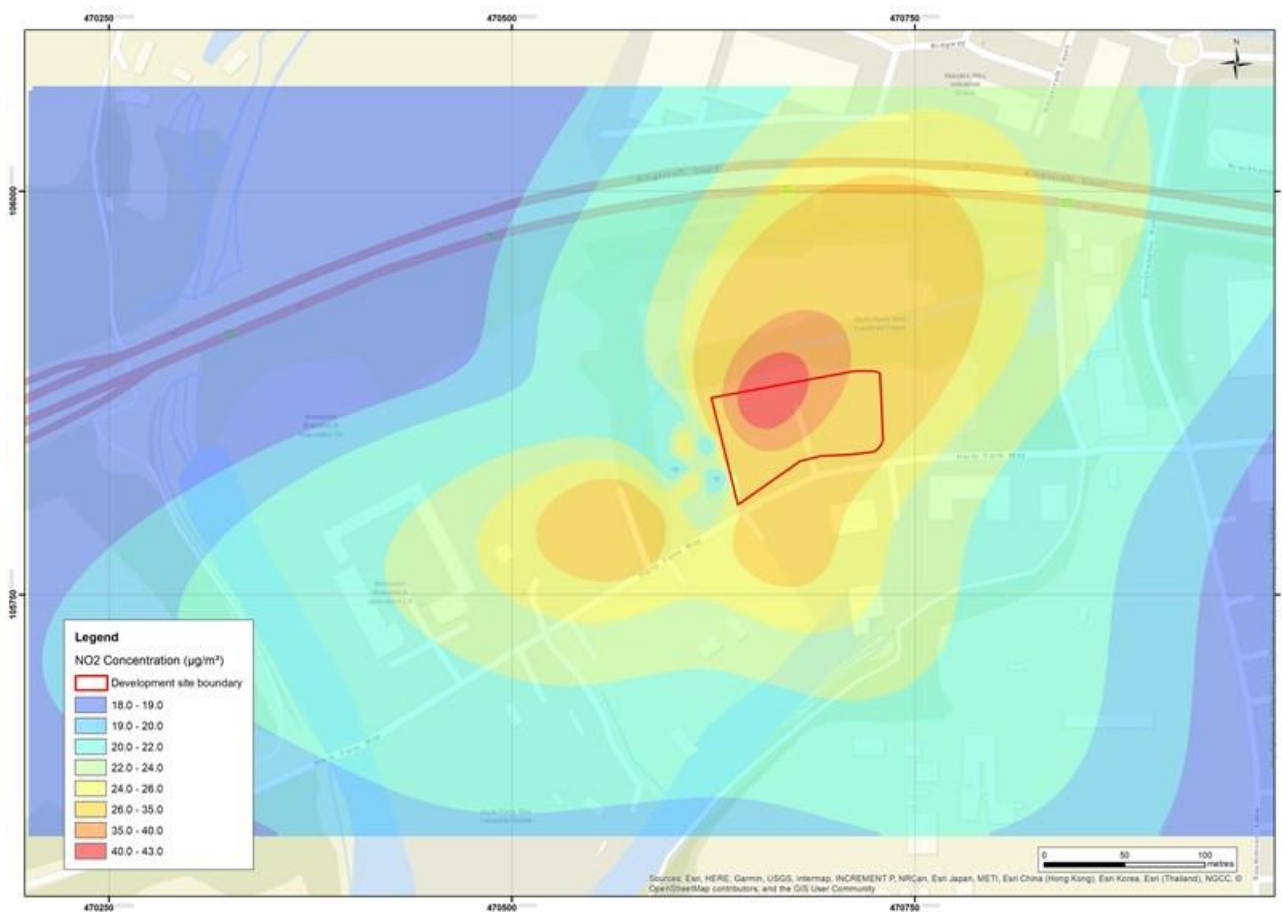


Figure 6 NO<sub>2</sub> ground level contour graph – Long Term (Annual) – STOR, A27 and background cumulative emissions – Phase 1 and 2a scenario (for information only)



## 5.2 Odour assessment

### Receptor description and study area

The Havant Household Waste Recycling Centre has the potential to impact on the proposed development due to its proximity. In addition

**Table 14** provides a summary of the proposed development receptors, their sensitivity and their location relative to the Havant Household Waste Recycling Centre (HHWRC) and the Southern Water Waste Water Treatment Facility (SWWWTF).

**Table 14 Receptor sensitivities and locations**

| Receptor                                 | Sensitivity | Location |        |
|------------------------------------------|-------------|----------|--------|
|                                          |             | HHWRC    | SWWWTF |
| Proposed development – Unit A (Phase 1)  | Low         | 75 m     | 165 m  |
| Proposed development – Unit B (Phase 1)  | Low         | 144 m    | 155 m  |
| Proposed development – Unit C (Phase 2b) | Low         | 44 m     | 150 m  |

### Process description and potential odour sources

The HHWRC is a waste sorting and temporary storage facility and therefore has the potential to give rise to unpleasant odours. Some of the items that are currently accepted by the HHWRC and that have the potential to generate odours are garden waste, animal waste, cooking oil, engine oil, and paint.

The SWWWTF consists of water and sewage treatment, including digestion ponds located on the far south side of the facility, approximately 570 m from the proposed development site.

### Odour risk assessment

Due to the industrial nature of the proposed development, a qualitative assessment method has been employed. Using **Table 7** the source odour potential and pathway effectiveness have been defined.

#### 5.2.1 Source odour potential

Factors which contribute to the source odour potential were considered:

- moderate material throughput;
- unpleasantness “most offensive”;
- hedonic tone “unpleasant” to “very unpleasant”; and
- mitigation / control – effective, tangible mitigation measures in place.

The source odour potential has been determined as **medium**.

#### 5.2.2 Pathway effectiveness

Factors which contribute to the pathway effectiveness were considered:

- receptors are adjacent to the Havant Household Waste Recycling Centre; and
- receptors are relatively separated from the SWWWTF.

The pathway effectiveness of odour flux to receptor has been determined as **moderately effective**.

### 5.2.3 Receptor sensitivity

The method described in **Section 15** also requires the receptor sensitivities to be determined. These can be seen in **Table 14**.

### 5.2.4 Risk of odour exposure (impact)

Using **Table 7**, the risk of odour impact at each receptor was determined. These are shown in **Table 15**.

**Table 15 Risk of odour exposure (impact) at each receptor location**

| Receptor                                 | Source odour potential | Pathway effectiveness | Risk of odour exposure |
|------------------------------------------|------------------------|-----------------------|------------------------|
| <b>HHWRC</b>                             |                        |                       |                        |
| Proposed development – Unit A (Phase 1)  | Medium                 | Moderately effective  | <b>Low risk</b>        |
| Proposed development – Unit B (Phase 1)  | Medium                 | Moderately effective  | <b>Low risk</b>        |
| Proposed development – Unit C (Phase 2b) | Medium                 | Moderately effective  | <b>Low risk</b>        |
| <b>SWWWTF</b>                            |                        |                       |                        |
| Proposed development – Unit A (Phase 1)  | Large                  | Moderately effective  | <b>Medium risk</b>     |
| Proposed development – Unit B (Phase 1)  | Large                  | Moderately effective  | <b>Medium risk</b>     |
| Proposed development – Unit C (Phase 2b) | Large                  | Moderately effective  | <b>Medium risk</b>     |

### 5.2.5 Risk of odour effects

Using **Table 14** the risk of odour exposure (impact), determined in **Table 15**, is combined with the receptor sensitivity. The overall risk of odour effect at each receptor is summarised in **Table 16**. It is concluded that there is an overall negligible effect of odour on the proposed development site.

**Table 16 Summary of the likely odour effects at sensitive receptors**

| Receptor                                 | Risk of odour exposure | Receptor sensitivity | Likely odour effect |
|------------------------------------------|------------------------|----------------------|---------------------|
| <b>HHWRC</b>                             |                        |                      |                     |
| Proposed development – Unit A (Phase 1)  | Low risk               | Low                  | Negligible effect   |
| Proposed development – Unit B (Phase 1)  | Low risk               | Low                  | Negligible effect   |
| Proposed development – Unit C (Phase 2b) | Low risk               | Low                  | Negligible effect   |
| <b>SWWTF</b>                             |                        |                      |                     |
| Proposed development – Unit A (Phase 1)  | Medium risk            | Low                  | Negligible effect   |
| Proposed development – Unit B (Phase 1)  | Medium risk            | Low                  | Negligible effect   |
| Proposed development – Unit C (Phase 2b) | Medium risk            | Low                  | Negligible effect   |

### 5.2.6 Mitigation and residual effects

The odour risk assessment determined a negligible effect of odour at all receptors. As such, no mitigation is considered to be required.

## **6.0 Evaluation of assessment results**

### **6.1 Operational impacts and development constraints**

This section considers air quality impacts in the vicinity of the proposed development in order to examine the suitability of the site for the intended use.

The existing air quality is considered reasonably good, with the exception of the existing STOR site which has the potential for adverse air quality during low frequency short-term operation (less than 200 hours per year).

For the Phase 1 and 2b scenario, the air quality is considered to be reasonably good, as above, and pollutant levels are expected to be within the applicable short-term objectives.

However, for the Phase 1 and 2a scenario, with the introduced STOR site adjacent to the Phase 1 buildings, it is considered likely that the short-term NO<sub>2</sub> objective will be exceeded.

It is taken into consideration that the site is intended for industrial use, and that the Phase 2a STOR facility has already been approved (without taking into consideration short-term impacts on low sensitivity receptors). However, should the Phase 2a STOR site be developed (which is currently not a certainty), mitigation and/or additional management measures will likely need to be introduced.

## **7.0 Mitigation**

### **7.1 Mitigation measures for Phase 1 and 2b**

The air quality objectives are expected to be met when the proposed Phase 1 and 2b development is operational. Therefore, no mitigation of exposure for new receptors introduced by the proposed development is required.

### **7.2 Mitigation measures for Phase 1 and 2a**

The short-term air quality objective for NO<sub>2</sub> is expected to be exceeded should the Phase 2a STOR site be built. Should this arise, mitigation measures, including mechanical ventilation, will need to be considered. Given the STOR site has not been confirmed, this has not been assessed as part of this study, and will need to be re-assessed once the design plans are known.

## 8.0 Conclusions

The air quality assessment has determined the following:

- Baseline air quality conditions at the proposed development site are expected to meet the applicable short-term NO<sub>2</sub> and PM<sub>10</sub> air quality objectives.
- The Phase 1 and 2b scenario will not have a significant impact on local air quality, and is expected to experience acceptable air quality, within the applicable objectives, and is considered suitable for development.
- The Phase 1 and 2a scenario, with the STOR site, can be expected to result in exceedances of the applicable short-term objective for NO<sub>2</sub>, and therefore, should the STOR site be developed, further mitigation is considered to be required.

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