

5 AIR QUALITY ASSESSMENT

5.1 Impact from Construction Activities

The assessment of construction activities has focused on demolition, earthworks, construction and track out activities at the site. Using the criteria provided in Table 7 the dust emission class for each activity is as follows:

- Demolition = Small;
- Earthworks = Medium;
- Construction = Small; and
- Track out = Small.

Based on the risk categories for each activity in relation to the surrounding sensitive receptors (Table 8) the site is considered to have a low risk. This is summarised in Table 16.

Table 16 – Overall Risk of Site based on each Construction Activity

Construction Activity	Distance to Nearest Receptor (m)		Dust Emission Class		
	Dust Soiling & PM ₁₀	Ecological	Large	Medium	Small
Demolition	20 – 100	N/A	N/A	N/A	Low Risk Site
Earthworks	20 – 50	N/A	N/A	Medium Risk Site	N/A
Construction	20 – 50	N/A	N/A	N/A	Low Risk Site
Track out	20 – 50	N/A	N/A	N/A	Low Risk Site

Based on Table 9, the sensitivity of the surrounding area is considered medium. As such, the significance of effects from demolition, earthworks, construction and track out activities with no mitigation is, at worst, slight adverse (see Table 10). With mitigation, the significance of effects from demolition, earthworks, construction and track out activities remains or reduces to negligible (see Table 11). This is summarised in the following table.

Table 17 – Summary of Significance for Construction Activities

Source	Dust Soiling and PM ₁₀ Effects	
	With no Mitigation	With Mitigation
Demolition	Negligible	Negligible
Earthworks	Slight Adverse	Negligible
Construction	Negligible	Negligible
Track Out	Negligible	Negligible

It should also be noted that the likelihood of an adverse impact occurring is correlated to wind speed and wind direction. As such, unfavourable wind speeds and wind directions



must occur at the same time as a dust generating activity in order to generate an adverse impact. The overall impacts also assume that the dust generating activities are occurring over the entirety of the site meaning that as an activity moves further away from a potential receptor the magnitude and significance of the impact will be further reduced.

5.2 Impact of Vehicle Emissions

5.2.1 Model Verification

Using the guidance provided in Box A3.6 within the Local Air Quality Management Technical Guidance TG(09)¹⁹, the modelled output has been verified against the monitoring data obtained from the NO₂ diffusion tube monitoring site. The following tables provide a summary of the model verification process for NO_x/NO₂. It has not been possible to verify modelled PM₁₀ concentrations.

Predicted NO₂ concentrations for 2011 have been compared against the monitored NO₂ concentrations from the diffusion tubes listed in Table 6. The results of this comparison are provided in Table 18.

Table 18 – Comparison of Modelled and Monitored NO₂ Concentrations (µg/m³)

Air Quality Assessment ID	Receptor Description	Modelled Concentration	Monitored Concentration	Difference [(modelled - monitored)/monitored] x100
V1	Tankersley School Diffusion Tube	30.4	24.1	26.3%
V2	5, Moor Lane, Birdwell Diffusion Tube	33.8	36.0	-6.1%
V3	Cock Inn, Birdwell Diffusion Tube	32.7	35.9	-8.8%
V4	Sheffield Rd, Birdwell Diffusion Tube	25.8	37.7	-31.5%
V5	Sheffield Road, Birdwell Diffusion Tube	30.9	34.0	-9.1%

The modelled concentrations show a large over- and under-prediction at the V1 and V4 diffusion tubes, respectively. Based on the location of these diffusion tubes, which have been derived from the Councils latest air quality report, it would appear that the locations provided are not correct. As such, the modelled concentrations at these locations are not representative. Due to the time constrictions associated with the completion of this project it has not been possible to verify the exact location of these diffusions. However, it has been possible to undertake model verification based on the remaining diffusion tubes.

As described in the Technical Guidance (LAQM.TG09), in order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within ±25% (ideally ±10%) of the monitored concentrations. Modelled NO₂ concentrations at V2, V3 and V5 are within these limits. As such, no adjustment has been made to the modelled concentrations across the modelled domain.

¹⁹ Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG09), Defra, February 2009

5.2.2 Nitrogen Dioxide

Predicted annual mean concentrations for NO₂ in 2018 are provided in Table 19. As mentioned in Section 4.6.1, NO₂ concentrations have been calculated from the predicted NO_x concentrations using the latest NO_x-NO₂ conversion spreadsheet available from the Air Quality Archive.

Table 19 – Comparison of Predicted Annual Mean NO₂ Concentrations (µg/m³), Do-Minimum and Do-Something (2018)

Receptor	Total Concentration			Magnitude of Change	Significance of Change
	Do-Minimum	Do-Something	Change		
R1	34.4	34.6	0.2	Imperceptible	Negligible
R2	33.5	33.7	0.2	Imperceptible	Negligible
R3	32.3	32.5	0.2	Imperceptible	Negligible
R4	31.3	31.5	0.2	Imperceptible	Negligible
R5	31.3	31.5	0.2	Imperceptible	Negligible
R6	34.5	34.6	0.1	Imperceptible	Negligible
R7	31.5	31.6	0.1	Imperceptible	Negligible
R8	30.2	30.3	0.1	Imperceptible	Negligible
R9	30.0	30.0	0.0	Imperceptible	Negligible
R10	29.5	29.5	0.0	Imperceptible	Negligible
R11	29.6	29.7	0.1	Imperceptible	Negligible
R12	29.6	29.8	0.2	Imperceptible	Negligible
R13	30.1	30.3	0.2	Imperceptible	Negligible
R14	37.2	37.3	0.1	Imperceptible	Negligible
R15	29.1	29.1	0.0	Imperceptible	Negligible
R16	29.7	29.8	0.1	Imperceptible	Negligible
R17	28.7	28.8	0.1	Imperceptible	Negligible
R18	26.6	26.7	0.1	Imperceptible	Negligible
R19	25.3	25.4	0.1	Imperceptible	Negligible
R20	27.4	27.5	0.1	Imperceptible	Negligible
Objective	40.0				



The magnitude of change between the modelled Do-Minimum and Do-Something scenarios is considered imperceptible at all modelled receptors. The significance of this change is considered to be negligible as all modelled concentrations are below $36 \mu\text{g}/\text{m}^3$.

Overall, using the flow chart presented in Figure 4, air quality (NO_2) is a “low priority consideration” at the modelled locations in 2014.



5.2.3 Particulate Matter

Predicted annual mean concentrations for PM₁₀ in 2018 are provided in Table 20. Table 21 provides the number of days when the 24-hour mean objective is exceeded.

The change in predicted long and short terms concentrations is considered to be imperceptible at all existing modelled receptors and the significance of this change is considered to be negligible.

Overall, using the flow chart presented in Figure 4, air quality (PM₁₀) is a “low priority consideration” at the modelled locations.

Table 20 – Comparison of Predicted Annual Mean PM₁₀ Concentrations (µg/m³), Do-Minimum and Do-Something (2018)

Receptor	Total Concentration			Magnitude of Change	Significance of Change
	Do-Minimum	Do-Something	Change		
R1	19.7	19.8	0.1	Imperceptible	Negligible
R2	19.6	19.6	0.0	Imperceptible	Negligible
R3	19.4	19.4	0.0	Imperceptible	Negligible
R4	19.2	19.2	0.0	Imperceptible	Negligible
R5	19.2	19.2	0.0	Imperceptible	Negligible
R6	19.6	19.7	0.1	Imperceptible	Negligible
R7	19.1	19.1	0.0	Imperceptible	Negligible
R8	19.0	19.0	0.0	Imperceptible	Negligible
R9	19.0	19.0	0.0	Imperceptible	Negligible
R10	18.9	18.9	0.0	Imperceptible	Negligible
R11	18.9	18.9	0.0	Imperceptible	Negligible
R12	19.0	19.0	0.0	Imperceptible	Negligible
R13	19.1	19.1	0.0	Imperceptible	Negligible
R14	19.6	19.6	0.0	Imperceptible	Negligible
R15	18.6	18.6	0.0	Imperceptible	Negligible
R16	18.7	18.7	0.0	Imperceptible	Negligible
R17	18.6	18.6	0.0	Imperceptible	Negligible
R18	18.4	18.4	0.0	Imperceptible	Negligible
R19	18.2	18.2	0.0	Imperceptible	Negligible
R20	18.4	18.4	0.0	Imperceptible	Negligible
Objective	40.0				

Table 21 – Comparison of Predicted PM₁₀ 24-Hour Mean Exceedences, Do-Minimum and Do-Something (2018)

Receptor	No. of Days			Magnitude of Change	Significance of Change
	Do-Minimum	Do-Something	Change		
R1	3	3	0	Imperceptible	Negligible
R2	3	3	0	Imperceptible	Negligible
R3	3	3	0	Imperceptible	Negligible
R4	3	3	0	Imperceptible	Negligible
R5	2	2	0	Imperceptible	Negligible
R6	3	3	0	Imperceptible	Negligible
R7	2	2	0	Imperceptible	Negligible
R8	2	2	0	Imperceptible	Negligible
R9	2	2	0	Imperceptible	Negligible
R10	2	2	0	Imperceptible	Negligible
R11	2	2	0	Imperceptible	Negligible
R12	2	2	0	Imperceptible	Negligible
R13	2	2	0	Imperceptible	Negligible
R14	3	3	0	Imperceptible	Negligible
R15	2	2	0	Imperceptible	Negligible
R16	2	2	0	Imperceptible	Negligible
R17	2	2	0	Imperceptible	Negligible
R18	2	2	0	Imperceptible	Negligible
R19	2	2	0	Imperceptible	Negligible
R20	2	2	0	Imperceptible	Negligible
Objective	35				

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Impact from Construction Activities

A qualitative assessment of dust levels associated with the proposed development has been carried out. The qualitative assessment shows that with no mitigation the significance of dust soiling and PM₁₀ is, at worst, slight adverse. However, this can be reduced to negligible through appropriate mitigation measures. Implementation of the following Best Practice Measures based on a low risk site²⁰ will help reduce the impact of the construction activities to an acceptable level:

Site Planning:

- Erect effective barriers around dusty activities or the site boundary;
- No bonfires; and
- Plan site layout – machinery and dust causing activities should be located away from sensitive receptors.

Demolition Works:

- Use water as dust suppressant;
- Cutting equipment to use water as suppressant or suitable local extract ventilation; and
- Use enclosed chutes and covered skips.

Construction Traffic:

- All vehicles to switch off engines – no idling vehicles;
- Effective vehicle cleaning and specific wheel-washing on leaving site;
- All loads entering and leaving site to be covered;
- No site runoff of water or mud; and
- All non road mobile machinery (NRMM) to use ultra low sulphur tax-exempt diesel (ULSD) where available.

Site Activities:

- Minimise dust generating activities;
- Use water as dust suppressant where applicable; and
- Enclose stockpiles or keep them securely sheeted.

With the above mitigation measures enforced, the likelihood of nuisance dust episodes occurring at those receptors adjacent to the development are considered medium to low. Notwithstanding this, the developer should take into account the potential impact of air quality and dust on occupational exposure standards (in order to minimise worker exposure) and breaches of air quality objectives that may occur outside the site boundary.

²⁰ The control of dust and emissions from construction and demolition – Best Practice Guidance, produced in partnership by London Councils and the Greater London Authority, November 2006



Monitoring is not recommended at this stage, however, continuous visual assessment of the site should be undertaken and a complaints log maintained in order to determine the origin of a particular dust nuisance. Keeping an accurate and up to date complaints log will isolate particular site activities to a nuisance dust episode and help prevent it from reoccurring in the future.

6.2 Impact of Vehicle Emissions

The change in predicted NO₂ and PM₁₀ concentrations at existing receptors in 2018 following completion of the proposed development is considered to be imperceptible. The significance of this change for both NO₂ and PM₁₀ is considered to be negligible.

Overall, using the flow chart presented in Figure 4, air quality (NO₂ and PM₁₀) is a “low priority consideration” at the modelled locations in each of the modelled years.

The assessment undertaken is worst case in terms of the likely increase in traffic flows on the local road network following completion of the proposed development, including the increase in vehicle flows on the network to the south of the development and at the Junction 36 of the M1.

In terms of any impact within the AQMA declared along the A61 Sheffield Road and at the junction with the A6133 in Barnsley, any increase in traffic flows will also be considered imperceptible at this location.

6.2.1 Mitigation of Vehicle Impacts

It is important to ensure that mitigation measures are related to the scale of the impact of the development. At worst, the proposed development is considered to have an imperceptible impact on existing levels of air quality. The significance of this impact is considered to be negligible. As such, no mitigation measures have been proposed.