# AQUIND Limited

# AQUIND INTERCONNECTOR

## Environmental Statement – Volume 3 – Appendix 23.3 Air Quality Traffic Modelling

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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# CONTENTS



# *TABLES*

## *PLATES*

# APPENDIX 23.3 AIR QUALITY TRAFFIC MODELLING

## 1.1. SCOPE OF THE ASSESSMENT

### 1.1.1. INTRODUCTION

1.1.1.1. This appendix details the methodology for the assessment of traffic impacts that was undertaken for the temporary effects of construction traffic and the temporary effects of road closures and diversions resulting from the construction works for the AQUIND Interconnector.

### 1.1.2. STUDY AREA

1.1.2.1. The study areas for the construction traffic assessment and the road closure and diversion assessment were defined by the traffic modelling data supplied by Systra as detailed in Chapter 22 Traffic and Transport (APP-137).

**Construction Traffic**

1.1.2.2. The construction traffic routes relevant to the converter station and cabling operations are described in Chapter 22 Traffic and Transport, and are shown in Figure 23.3 (APP-325). Following the guidance from the Design Manual for Roads and Bridges ('DMRB') (The Highways Agency, 2007), a study area up to 200 m from the road centreline supplied with the traffic model was selected, as beyond this distance air pollutant emissions from traffic are expected to have dispersed to a concentration equivalent to background concentrations. The 200 m study area is shown in Figure 23.3. The supplied traffic flow data was screened against the criteria in Institute of Air Quality Management ('IAQM') construction dust assessment guidance (Institute of Air Quality Managment, 2016) and criteria in the IAQM Planning Guidance (Moorcroft, et al., 2017) to obtain an affected road network. Given the sensitivities associated with air quality in the City of Portsmouth area, a decision was taken to include all the supplied construction traffic routes within the study area for assessment as affected roads.

**Road Closures and Diversions**

1.1.2.3. The road closures and diversions are described in Chapter 22 Traffic and Transport. The traffic data supplied by Systra was screened against criteria from the IAQM planning guidance (Moorcroft, et al., 2017) to obtain an affected road network for assessment. Where an Air Quality Management Area ('AQMA') was found to include affected roads, the more stringent criteria from the IAQM Planning Guidance was

applied. Professional judgement was used to obtain a contiguous affected road network for assessment that would reflect the movement of traffic in the City of Portsmouth and any associated changes in air quality. Following guidance from the DMRB HA 207/07 (The Highways Agency, 2007), a study area up to 200 m from the affected road network centreline supplied with the traffic model was selected, as beyond this distance air pollutant emissions from traffic are expected to have dispersed to a concentration equivalent to background concentrations. The 200 m study area is shown in Figure 23.4 (APP-326).

## 1.2. ASSESSMENT METHODOLOGY

### 1.2.1. CONSTRUCTION STAGE

**Screening**

1.2.1.1. Data from the transport assessment was screened against criteria from the IAQM construction dust guidance (Institute of Air Quality Managment, 2016) and the IAQM Planning Guidance (Moorcroft, et al., 2017) in order to obtain an affected road network. Construction traffic was added to the model for traffic diversions by the WSP transport team as detailed in Chapter 22 (Traffic and Transport). Where affected links were found to be within an AQMA, the more stringent screening criteria from the IAQM Planning Guidance were applied as in Table 1.

**Table 1 - Indicative Traffic Screening Criteria**

| The development will: | Indicative criteria to Proceed to an Air Quality Assessment |
|---|---|
| **1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5 t gross vehicle weight).** | A change of LDV flows of:<br>- more than 100 AADT within or adjacent to an AQMA<br>- more than 500 AADT elsewhere. |
| **2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5 t gross vehicle weight).** | A change of HDV flows of:<br>- more than 25 AADT within or adjacent to an AQMA<br>- more than 100 AADT elsewhere. |

1.2.1.2. This produced an affected road network that included contiguous and non-contiguous sections. Where non-contiguous sections were present, professional judgement was used to join up areas, e.g. between adjacent AQMAs, to produce a collection of contiguous road networks.

1.2.1.3. This was undertaken for each of the two Do-Something scenarios supplied compared

to the Do-Minimum Scenario, with the differences compiled such that the affected road network for each of the Do-Something scenarios was the same.

1.2.1.4. Further modification of the affected road network was undertaken following consultation with the relevant Environmental Health Officers ('EHO'), in particular EHO for Havant Borough Council who indicated that only specific areas of the affected road network in the district of Havant would require assessment due to the known presence of elevated concentrations of $NO_2$ in these areas.

### Baseline Year

1.2.1.5. In order that a robust assessment can be undertaken, a Baseline year is required for assessment that can be used to validate the model outputs through comparison with monitored data.

1.2.1.6. The most recent diffusion tube monitoring data (for 2018) was obtained from each of the affected local authorities where it was appropriate. Monitored $NO_2$ concentrations were converted to $NO_x$ concentrations using the Defra $NO_x$ to $NO_2$ Calculator v7.0 (May 2019) (Department for the Environment, Food & Rural Affairs, 2019) The supplied traffic data for the 2026 future baseline Do-Minimum scenario was factorised using the Department for Transport Trip End Model Presentation Program (TEMPro) version 7.2 to match the year of the monitored data.

### Receptors

1.2.1.7. Representative receptors were chosen covering the entire modelled network based on the methodology used in the Department for Transport WebTAG methodology. representative receptors at distances of 20 m, 70 m, 115 m and 175 m were interpolated either side of each affected link using QuantumGIS (QGIS) v3.8 from the mid-point of each affected road link. Additional representative receptors were interpolated at 4 m from the centre of each affected road link in order to provide an indication of compliance with the EU Directive 2008/50/EC. The relevant modelled concentration was applied to representative receptors, chosen as those experiencing either the highest concentrations or largest changes in a Verification Zone. These are presented in Table 2.

## Table 2 - Individual Identified Representative Receptors

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **Verification Zone 1** | | | | |
| **I Glancey, 108 New Road** | 465415 | 101428 | Community | No |
| **Meadow House Rest Home, 47-51 Stubbington Avenue** | 465232 | 102361 | Residential | Yes |
| **Stubbington Avenue Dental Practice, Ring Baxter & Reid, 12 Stubbington Avenue** | 465081 | 102326 | Community | Yes |
| **Good Manors Day Nursery, Stubbington Lodge, 45 Stubbington Avenue** | 465199 | 102365 | Community | Yes |
| **The Harbour School Stamshaw, Ranelagh Road** | 464202.4 | 102388 | Community | No |
| **24 Grafton Street** | 464443 | 101317 | Residential | Yes |
| **110 Grafton Street** | 464463 | 101375 | Residential | Yes |
| **401j Old Commercial Road** | 464410 | 101270 | Residential | Yes |
| **St. John Ambulance, 406-414 Old Commercial Road** | 464438 | 101263 | Community | Yes |
| **14 Harbour Way** | 464054 | 102853 | Residential | No |
| **4 Osier Close** | 464067 | 102999 | Residential | No |
| **Horndean House, Percy Chandler Street** | 464599 | 100619 | Residential | No |
| **Horndean House, Percy Chandler Street** | 464599 | 100619 | Residential | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **Verification Zone 2** | | | | |
| **My Dentist, B P Henning Dental Surgeon, 310 Chichester Road** | 465950 | 102005 | Community | No |
| **Doctors Surgery, 111 Copnor Road** | 465970 | 101871 | Community | No |
| **Mary Rose Manor, Copnor Road** | 466008 | 101789.3 | Residential | No |
| **Shearwater, 18 Moorings Way** | 466733.3 | 100380.6 | Residential | Yes |
| **Portsmouth College, Tangier Road** | 467360 | 101435 | Community | No |
| **Tangier Road Children's Home, 265-267 Tangier Road** | 467276.9 | 101502.9 | Residential | No |
| **94 Eastern Road** | 466758 | 100631 | Residential | Yes |
| **5 Hayling Avenue** | 466152 | 101216 | Residential | No |
| **3 Plover Reach** | 466737 | 100262 | Residential | Yes |
| **18 The Haven** | 466967 | 100434 | Residential | Yes |
| **The Harbour School, Waterside Unit, Locksway Road** | 467372.2 | 99960.21 | Community | No |
| **University of Portsmouth, Bungalow 2, Flat 10 Langstone Student Village, Furze Lane** | 467614 | 100094.1 | Residential | No |
| **Miltoncross Academy, Milton Road** | 466304.7 | 100547.6 | Community | No |
| **The Limes, Woodlands Walk** | 467367 | 100182.2 | Community | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **Solent NHS Trust, St Marys Hospital, Milton Road** | 466055 | 100450 | Community | No |
| **27 Finch Road** | 467635 | 99257 | Community | No |
| **51 Fort Cumberland Road** | 467810 | 99175 | Residential | No |
| **36 Finch Road** | 467724 | 99245 | Residential | No |
| **Al 4 Southsea Leisure Park, Melville Road** | 467756.8 | 99070.88 | Commercial | No |
| **88 Seaway Crescent** | 467611 | 99817 | Residential | No |
| **The Thatched House, Milton Locks** | 467740 | 99838 | Residential | No |
| **20 Broom Close** | 467736 | 99951 | Residential | No |
| **383 Eastern Road** | 467276 | 101191 | Residential | No |
| **229 Hayling Avenue** | 467155 | 101172 | Residential | No |
| **Verification Zone 3** | | | | |
| **Admiral Lord Nelson School, Dundas Lane** | 466928 | 102498 | Community | No |
| **Stage 2 Business Centre, Dundas Lane** | 466854.3 | 102581 | Commercial | No |
| **Eastern Road Car Sales** | 467449.5 | 102135.8 | Commercial | No |
| **Texaco Ltd, Eastern Road Service Station, Eastern Road** | 467465 | 102127 | Commercial | No |
| **Building F, Bilton Way** | 467423 | 102828 | Commercial | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **60 Ecton Lane** | 467110 | 103423 | Residential | No |
| **Morrisons, Anchorage Road** | 467282.8 | 103395 | Commercial | No |
| **Tudor Sailing Club, Eastern Road** | 467568 | 103047 | Commercial | No |
| **Seward Portsmouth, Building B, Bilton Way** | 467396 | 102916 | Commercial | No |
| **Smeg UK Ltd, 1-2 And 4, Interchange Park, Robinson Way** | 467264.4 | 103192.8 | Commercial | No |
| **Verification Zone 4** | | | | |
| **Solent Infant School, Evelegh Road** | 467805 | 105860 | Community | No |
| **65 Evelegh Road** | 468275 | 105912 | Community | No |
| **A N A Treatment Centres Ltd, Fleming House, Waterworks Road** | 467880 | 105610 | Community | No |
| **331 Havant Road** | 468319 | 105803 | Residential | No |
| **3 Highbury Grove** | 465742 | 104850 | Residential | No |
| **6 Highbury Grove** | 465753 | 104810 | Residential | No |
| **11 Highbury Grove** | 465766 | 104848 | Residential | No |
| **77 Lealand Road** | 467596 | 105223 | Residential | No |
| **4 Copsey Close** | 467745 | 105661 | Residential | No |
| **96 Station Road** | 467367 | 105029 | Residential | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **National Plastics, Unit B2, Mountbatten Business Park, Jackson Close** | 467431 | 104899 | Commercial | No |
| **Hampshire Sports Equipment Ltd, Unit A3 Mountbatten Business Park Jackson Close** | 467499 | 104878 | Commercial | No |
| **Sainsburys, Fitzherbert Road** | 467750 | 104990 | Commercial | No |
| **Farlington Sports Centre, Eastern Road** | 467594.3 | 104798.8 | Commercial | No |
| **Solent Fish Ltd, Unit 5, Marshlands Road** | 467960.5 | 105053.3 | Commercial | No |
| **Verification Zone 5** | | | | |
| **K B Griffin Builders, Towers Farm, 16 Portsdown Hill Road** | 469419.8 | 106469.1 | Residential | No |
| **36 Hurstville Drive** | 468779 | 109005.8 | Residential | No |
| **Edenvale Nursing Home, 63-65 Silvester Road** | 468646.1 | 110941.5 | Residential | No |
| **2 Padnell Road** | 469233.1 | 111071.6 | Community | No |
| **Queenswood Surgery, 223 London Road** | 468752 | 110488.1 | Community | No |
| **197 London Road** | 468606.4 | 110203.2 | Residential | No |
| **Trimak Ltd, Cowpalin Family Practice, 26-30 London Road** | 469208.4 | 111028.8 | Community | No |
| **Purbrook Junior & Infant School, Aldermoor Road East** | 467810.8 | 108123.8 | Community | No |
| **Oaklands Care Home, 216 Stakes Hill Road** | 468644.4 | 108097.8 | Residential | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **Latham Lodge Rest Home, 137-139 Stakes Road** | 468184.2 | 107781.8 | Residential | No |
| **Belmont Castle Rest Home, 18-20 Portsdown Hill Road** | 469360.7 | 106442.6 | Residential | No |
| **79 Silvester Road** | 468570.8 | 110977 | Residential | No |
| **31 Trefoil Close** | 468968.1 | 109089.4 | Residential | No |
| **2 Lower Bere Wood** | 468648.6 | 109027.4 | Residential | No |
| **9 Trefoil Close** | 468993.8 | 109097.1 | Residential | No |
| **28 Hurstville Drive** | 468759.6 | 108974.3 | Residential | No |
| **1 Dogwood Dell** | 468798.8 | 108359.2 | Residential | No |
| **3 Lily Avenue** | 466879 | 106864.9 | Residential | No |
| **45 Hurstville Drive** | 468870.9 | 109197.6 | Residential | No |
| **14 Siskin Grove** | 469348.2 | 109013.2 | Residential | No |
| **Broadways Coffee Shop, 14 London Road** | 467287.9 | 107876.3 | Commercial | No |
| **33c London Road** | 466943 | 106942 | Residential | No |
| **15 London Road** | 466914.9 | 106838.7 | Residential | No |
| **44 Stakes Road** | 467625 | 107771 | Residential | No |
| **Debney Lodge, Mey Close** | 468976.1 | 109279.5 | Residential | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **179 Park Avenue** | 467609.1 | 107735.4 | Residential | No |
| **2 Boundary Way** | 466745 | 106545 | Residential | No |
| **Lavender House, 121 Hillcrest, Denmead** | 466817 | 111784.6 | Residential | No |
| **Lily Cottage, 121 Hillcrest, Denmead** | 466868.7 | 111815 | Residential | No |
| **Managers Office, Wellesley Court, Darnel Road** | 467010.6 | 110631.8 | Residential | No |
| **The Conifers, Soake Road** | 466829 | 111045 | Residential | No |
| **Soake Farmhouse, Soake Road** | 466816 | 111111 | Residential | No |
| **The Coach House, Soake Road** | 466846 | 111164 | Residential | No |
| **35 Great Mead** | 466408 | 111314 | Residential | No |
| **St. Michaels, Hambledon Road** | 466845 | 110923 | Residential | No |
| **115 The Homestead, Anmore Road** | 466712 | 111820 | Residential | No |
| **117 Kings Cottage, Anmore Road** | 466740 | 111844 | Residential | No |
| **20 Mill Close** | 466639 | 111739 | Residential | No |
| **Verification Zone 6** | | | | |
| **109 Browning Avenue** | 462499 | 106448 | Community | No |
| **Highbury College, Tudor Crescent** | 466131 | 104623.3 | Community | No |

| Name | x | y | Class | In AQMA |
|---|---|---|---|---|
| **Graduate Court, Tudor Crescent** | 466377.4 | 104485.1 | Residential | No |
| **37 Portsdown View** | 469539 | 106592 | Residential | No |
| **43 Coleridge Road** | 462734 | 106371 | Residential | No |
| **39 Falmouth Road** | 463045 | 106105 | Residential | No |
| **1 Falmouth Road** | 463164 | 105976 | Residential | No |
| **41 Tudor Crescent** | 465964 | 104580 | Residential | No |
| **97 Hillsley Road** | 462719 | 106489 | Residential | No |
| **19 Hillsley Road** | 462979 | 106336 | Residential | No |
| **Oyster Quay, Port Way** | 463773 | 104994 | Residential | No |
| **Oyster Quay, Port Way** | 463773 | 104994 | Residential | No |
| **Oyster Quay, Port Way** | 463805 | 105025 | Residential | No |

### Traffic Model

1.2.1.8. Traffic impacts resulting from the proposed development were modelled using the Solent Sub-Regional Transport Model, which is a multi-modal strategic transport model for Hampshire, the Isle of Wight and Portsmouth. The model is operated by the Systra consultancy under contract to Solent Transport. The model includes calibrated 2015 baseline flows and covers predicted travel growth and committed developments up to 2041.

1.2.1.9. Given the length of the cabling works, it is likely that several sections will be worked on at any given point in time. Cabling construction is to be undertaken in 100 m sections, and it has been assumed that up to six 100 m sections will be under working conditions at any one time. Further detail is provided in Chapter 22 Traffic and Transport.

1.2.1.10. Three scenarios are provided as follows:

- 2022 Do-Minimum which outlines conditions without construction of the proposed development;
- 2022 Do-Something 1 (DS1) which incorporates cable works at six locations and lane closures on the northbound carriageway of the A2030 Eastern Road; and
- 2022 Do-Something 2 (DS2) which incorporates cable works at six locations and lane closures on the southbound carriageway of the A2030 Eastern Road.

1.2.1.11. The assessment assumes that queueing and congestion is represented in the Systra SRTM traffic data through variations in link flow average daily speeds on the approach to junctions and roundabouts.

1.2.1.12. Data was provided for the air quality assessment in both tabular and GIS formats.

### Modelling

1.2.1.13. Once screened, the data for the affected road networks was loaded into Cambridge Environmental Research Consultants ('CERC') Atmospheric Dispersion Modelling System for Roads ('ADMS-Roads') version 4.1.1. Geographical data for the affected road network was extracted using QGIS v3.8 and loaded in the ADMS-Roads model.

1.2.1.14. Emissions factors for each of the links within the affected road network were obtained using the Defra Emissions Factor Toolkit v9.0 (Department for Environment, Food & Rural Affairs, 2019).

1.2.1.15. Meteorological data was obtained for the 2018 Baseline year using the RAF Thorney Island monitoring station, with missing cloud cover data for this station filled in using data from the nearby Southampton Airport monitoring station in order to provide the most complete meteorological data file possible. A meteorological data file with 96.6% usable data was produced.

1.2.1.16. The effect of street canyons was examined, and the models were run with and without

the application of the complex street canyon module. Street canyons were determined through the use of OS Mastermap topography data for buildings within 15 m of the road centreline and processed using the ADMS ArcGIS Street Canyon Python Module to produce a complex street canyon file.

### Results Processing

1.2.1.17. Modelled $NO_x$ output was converted to $NO_2$ using the Defra $NO_x$ to $NO_2$ Calculator and a linear verification applied against monitored $NO_2$ data from the relevant council. The affected road network was broken down into zones according to the presence of the affected link's geographical location, the presence of monitoring, and the type of link present as shown in Plate 1.

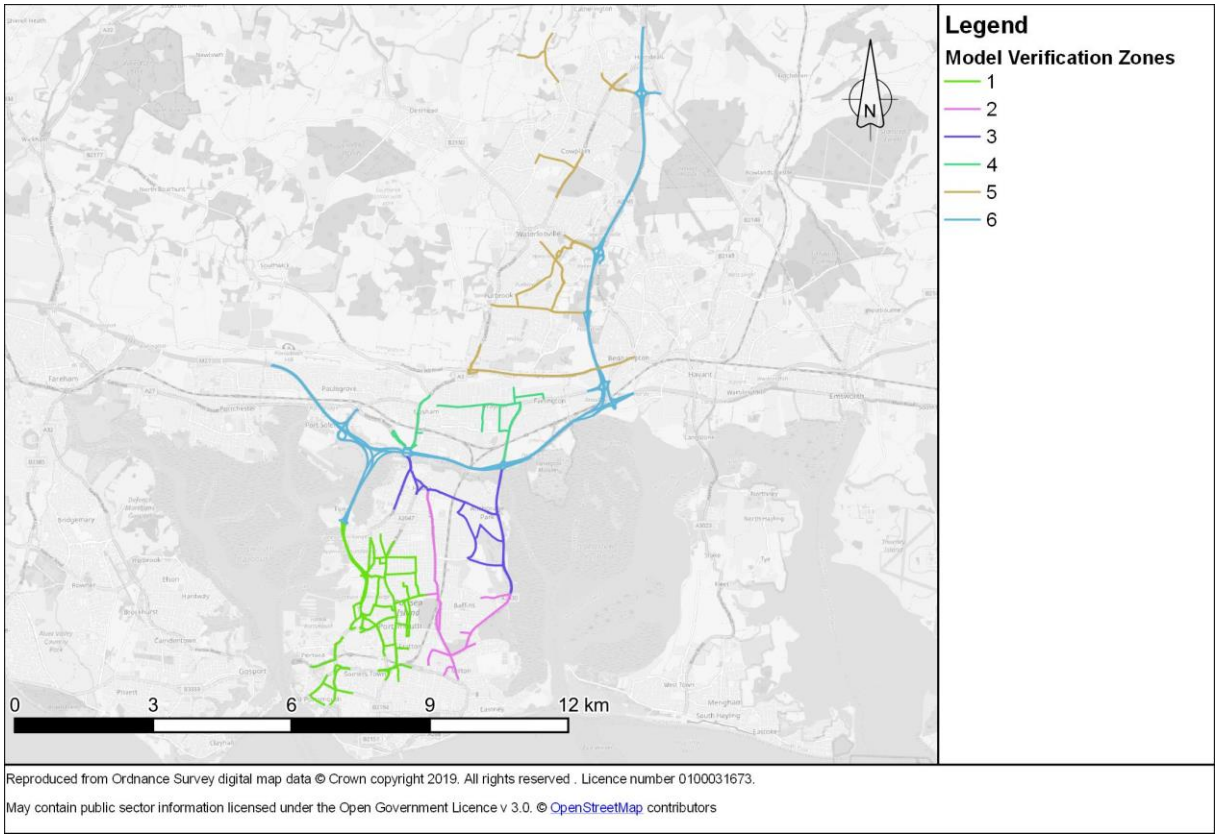


**Plate 1 - Model Verification Zones**

1.2.1.18. The modelled road component concentrations for each of the representative modelling points were combined with the relevant background concentrations to produce a total concentration. The modelled total concentrations are applied as follows:

- Modelled concentrations at 4 m from the road centreline applied directly to the road link for the purpose of compliance with the EU Directive 2008/50/EC.
- Modelled concentration at 20 m for receptors between 0 m and 50 m from the nearest road centreline;
- Modelled concentration at 70 m for receptors between 50 m and 100 m from the nearest road centreline;
- Modelled concentration at 115 m for receptors between 100 m and 150 m from the nearest road centreline; and
- Modelled concentration at 175 m for receptors between 150 m and 200 m from the nearest road centreline.

1.2.1.19. The discrete receptor locations were plotted either side of the centre of each road link using a GIS system and added as receptor points in the ADMS modelling system. This arrangement has the potential to be affected by meteorological conditions, therefore the worst-case prediction from either side of the road link was taken forward as the modelled concentration.

1.2.1.20. A spatial join was performed on all receptors within 200 m of the affected road link was performed to determine the closest affected road link and thus which concentration should be applied.

**Minimising Uncertainty**

1.2.1.21. Discrepancies may occur between measured and modelled concentrations for several reasons including:

- Traffic data uncertainties, including estimates of speeds, total flows and proportions of vehicle types;
- Emission estimates for vehicles using Emission Factors Toolkit v9.0 are based on Defra predictions;
- Estimates of background concentrations and future trends;
- The use of meteorological data which is not representative of the application site;
- $NO_x$:$NO_2$ conversion using the Defra conversion tool v7;
- Known limitations to the ADMS v4.1.1 modelling software, and
- The precision and accuracy of monitoring methods.

1.2.1.22. Disparities between modelling and monitoring results are likely to be a result of a combination of all these aspects.

1.2.1.23. A number of steps were taken to either minimise uncertainty in the modelling process or, where this was not possible, to follow a conservative approach to avoid the risk of underprediction of pollutant concentrations.

- **Verification** is the process by which uncertainties such as those described above are investigated and minimised. Annual mean roadside $NO_x$ concentrations were predicted using the ADMS-Roads modelling software for the derived baseline scenario. A comparison of modelled vs. monitored annual mean roadside $NO_x$ concentrations was undertaken for a large number of $NO_2$ diffusion tube locations described in Section 1.4. These locations were used as they were considered reflective of the variation in air quality over the area of the affected road links, and traffic data was available from Systra to verify performance.
- **Verification zones** (Plate 1) were chosen based on the availability of monitoring data, similarity of geographic features (e.g. road type and density, built-up or open areas and presence of AQMAs). Verification zones allow for different adjustment factors to be applied to the model that may better suit the location as opposed to a uniform verification.
- An **adjustment factor** was derived from the linear interpolation of the monitored $NO_x$ values and modelled $NO_x$ predictions according to the Diffusion Tubes for Ambient $NO_2$ Monitoring: Practical Guidance for Laboratories and Users guidance document (AEA Energy & Environment, 2008).

- **Meteorological sensitivity** is considered where dispersion conditions from different years may affect predicted concentrations. Testing for the point source modelling revealed 2014 produced the worst-case model outputs, however traffic data was not provided for a Baseline year. In order to obtain a baseline year for traffic data, the supplied data had to be de-growthed using TEMPro v7. It was considered that it was more appropriate to undertake this operation for the latest year for which ratified monitoring was available (2018) rather than adjusting the data further.
- Due to the differing effects that **meteorology** might have for receptors on each side an affected link, the concentrations on each side of affected links were calculated, and the highest concentration applied to receptors on both sides of the affected link in order to provide a conservative prediction.
- Background pollutant concentrations were obtained from the **Defra Background Air Quality Archive** as these were found to provide more conservative estimates than monitoring. Background monitoring was also not available over many areas of the affected road network, therefore for consistency the Defra values were used.
- Vehicle emission standards/EFTs were obtained using the **Defra Emissions Factor Toolkit v9.0**. The projections for fleet composition and fuel use in EFT v9.0 are based on current predictions and available information derived from the Aristotle University of Thessaloniki COPERT model, which is the accepted standard by EU institutions. There are, however, a number of uncertainties in the data which include:
    - Future fleet mix as a result of commitments such as those from the UK Government to be net carbon neutral by 2050, and to ban the sale of fossil-fuelled (petrol and diesel) powered vehicles by 2040;
    - Uncertainty as to the impact on emissions of the introduction of the World-harmonised Light-duty Test Procedure ('WLTP');
    - The proportion of Euro 6 vehicles in the fleet that were not required to meet the WLTP for which $NO_x$ emissions are underestimated; and
    - Unknown deterioration and failure rates for complex emissions control systems in Euro 6 vehicles.

Considering these factors, and the large number of assumptions and additional local traffic monitoring required in producing a customised COPERT output, the Defra EFT v9.0 remains the best option for representing vehicle emissions.

- **Street canyons** were derived using the OS Mastermap Topography dataset with the building height attribute applied for all buildings within 15 m of affected links, and the modelled road network exported from the ADMS-roads Mapping tool. These datasets were processed using the CERC ADMS Canyon python tool for ArcGIS and the impact of their use was investigated. The outputs from this tool were found to be highly conservative, creating canyon data where few or no buildings existed on a road link. The model was then run with and without the inputs created by the canyon tool, and the most appropriate result used for the relevant reporting. In the case of general outputs for traffic diversions and construction traffic, more conservative results were found without the application of the canyon tool given the coarse output from the model and minimum modelled distance from the affected link centreline of 20 m. In the case of compliance with the EU Directive 2008/50/EC, the opposite was found to be true where the modelled distance from the affected link centreline was 4 m. Verification factors were derived for the model outputs both with- and without the street canyon module. The model correction factors with the street canyon were generally found to be lower for the six verification zones, however the error within the model was found to be not significantly affected. Sensitive receptor pollutant concentration predictions were made without the use of the complex canyon tool, and predictions for the assessment of compliance with the EU Directive 2008/50/EC were made with the use of the complex canyon tool.
- A **Root Mean Squared Error** test was applied to the monitored and modelled data used for verification, both before and after correction. Consistently high errors were recorded in the monitored vs modelled data both from the data with and without the street canyon module, suggesting an incompatibility between the type of monitoring undertaken for LAQM purposes where the locations representative of worst exposure are monitored (largely roadside), and the type of monitoring required for model verification purposes where locations representative of more general exposure and network specific background locations would be required. Where the RMSE was changed in an unacceptable manner, i.e. a large increase, then this test was used for the judgement not to apply a correction factor.

### 1.2.2. DECOMMISSIONING

1.2.2.1. Works for decommissioning are expected to be equivalent to those involved in construction. The effects of sustainable transport policies on traffic flows are not known over the minimum 40-year lifespan of the proposed development, neither are the effects of emissions legislation and improving technology on vehicle emissions.

## 1.3. BASELINE ENVIRONMENT

### 1.3.1. LOCAL AIR QUALITY MANAGEMENT

1.3.1.1. The following section provides relevant Local Air Quality Management ('LAQM') information from the affected local authorities in addition to the baseline data provided in Chapter 23 Air Quality.

**Havant**

1.3.1.2. Within the district of Havant there are no AQMAs relevant to the proposed development described in the 2018 Annual Status Report (Havant Borough Council, 2019). Diffusion tube monitoring results for the 2018 baseline year were obtained directly from the EHO, and the relevant results are shown in Table 2.

**Table 3 - Relevant Havant Diffusion Tube Results**

| ID | Location | x | y | In AQMA? | 2018 $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|---|
| **HA8** | London Road (Purbrook) | 467322 | 107976 | No | 27.8 |
| **HA10** | Ramblers Way | 470032 | 110043 | No | 21.4 |
| **HA25(B)** | Stakes Road | 468479 | 107721 | No | 26.8 |

1.3.1.3. Section 4 falls wholly within the local authority area, however traffic from sections 1, 2, 3 and 4 are likely to use roads within the local authority area. All results are below 70 % of the annual mean limit value for $NO_2$.

**City of Portsmouth**

1.3.1.4. There are four AQMAs within the city of Portsmouth that are likely to be affected by traffic as a result of road closures and diversions, and generated construction traffic. These are AQMAs 6, 7, 9 and 11, all of which are declared for exceedances of the $NO_2$ limit value of 40 $\mu g/m^3$. The 2019 ASR (Portsmouth City Council, 2019) details that monitored concentrations within the AQMA all continue to exceed the limit value for $NO_2$ of 40 $\mu g/m^3$, except for AQMA 9 where the monitored concentration is 37.8 $\mu g/m^3$. Portsmouth City Council is in the process of reviewing its current Air Quality Action Plan.

1.3.1.5. Relevant diffusion tube monitoring data are shown in Table 4.

**Table 4 - Relevant City of Portsmouth Diffusion Tube Monitoring Results**

| ID | Location | x | y | In AQMA? | 2018 $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|---|
| **PO1** | Lord Montgomery Way (LMW-FST) | 463872 | 99874 | Yes | 42.9 |
| **PO2** | 12 Chadderton Gardens (CG-12) | 463705 | 99371 | No | 17.1 |
| **PO3** | 121A High Street (HS-121A) | 463408 | 99460 | Yes | 24.1 |
| **PO5** | 119 Whale Island Way (WIW-119) | 464230 | 102194 | No | 28.1 |
| **PO6** | 88 Stanley Road (SR-88) | 464331 | 102197 | No | 30.9 |
| **PO7** | 138 Lower Derby Road (LDR-138) | 464291 | 102279 | No | 27.7 |
| **PO8** | 492 Hawthorn Crescent (HC-492) | 466690 | 104355 | No | 26.0 |
| **PO9** | 6 Northern Road (NR-6) | 465621 | 105528 | No | 36.7 |
| **PO11** | Anchorage Road, Column 6 (AR-Col6) | 466869 | 103457 | No | 22.9 |
| **PO14** | 4 Merlyn Drive (MD-4) | 466109 | 103736 | No | 21.7 |
| **PO15** | 29 Milton Road (MR-29) | 466120 | 101324 | No | 27.6 |
| **PO16** | Parade Court, London Road (LR-PC) | 465474 | 104205 | No | 29.6 |
| **PO18** | 4 Milton Road (MR-4) | 466097 | 101332 | No | 26.0 |
| **PO19** | 7 Velder Avenue (VA-7) | 466392 | 100226 | Yes | 37.7 |

| ID | Location | x | y | In AQMA? | 2018 $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|---|
| **PO23** | 106 Victoria Road North (VRN-106) | 464974 | 99766 | No | 34.6 |
| **PO24** | 221 Fratton Road (FR-221) | 465111 | 100737 | Yes | 36.8 |
| **PO25** | 117 Kingston Road (KR-117) | 465036 | 101547 | Yes | 38.2 |
| **PO26** | The TAP (PH), London Road (LR-TAP) | 464900 | 101976 | Yes | 46.0 |
| **PO30** | Market Tavern (PH), Mile End Road (MER-MT) | 464478 | 101457 | Yes | 39.2 |
| **PO32** | Larch Court, Church Road (CR-Corner) | 464559 | 100980 | No | 31.9 |
| **PO34** | Sovereign Gate, Commercial Road (CR-UF) | 464425 | 100893 | Yes | 33.3 |
| **PO35** | Hampshire Terrace (HT-AM) | 463837 | 99759 | No | 30.1 |
| **PO37** | London Road | 464925 | 102129 | Yes | 40.6 |
| **PO38** | Gatcombe Park (AURN) | 465403 | 103952 | No | 18.7 |
| **PO39** | Burrfields Road | 466004 | 102348 | No | 34.0 |
| **PO40** | Mile End Road | 464397 | 101270 | Yes | 34.0 |
| **PO42** | Admiral Drake (PH), Kingston Crescent (KC-ADPH) | 464552 | 101940 | Yes | 38.1 |
| **PO43** | Vanguard House, Kingston Crescent (KC-VH) | 464774 | 101922 | No | 32.5 |
| **PO48** | 28 Stamshaw Road East (SR-E28) | 464597 | 102119 | No | 30.5 |

| ID | Location | x | y | In AQMA? | 2018 $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|---|
| **PO53** | DEFRA CAQMS, Anglsea Road (AR-DEFRA) | 463835 | 100259 | No | 30.5 |
| **PO56** | Gunwharf Road, Column 4 (GWR-Col4) | 463261 | 99782 | No | 35.1 |
| **PO57** | 23 St Nicolas Street (StNS-23 Formal StJSc-Col7) | 463478 | 99348 | No | 20.3 |
| **PO58** | 9 St Georges Street (St GS-9) | 463487 | 99659 | No | 29.3 |
| **PO61** | 1/10 Southwick House Milton Road. On the fence (MR- SH) | 466136 | 100610 | No | 33.7 |
| **PO62** | 12 Hambrook House Milton Road (MR-HH) | 466165 | 100573 | No | 22.0 |
| **PO63** | 209 Milton Road (SR-209) | 466354 | 100172 | Yes | 34.2 |
| **PO65** | 12ooring Way (MW-12) | 466681 | 100373 | Yes | 28.2 |
| **PO66** | 1 Velder Avenue (VA-1) | 466267 | 100216 | Yes | 31.9 |
| **PO67** | 23 Velder Avenue (VA-23) | 466457 | 100253 | Yes | 36.7 |
| **PO68** | 36 Velder Avenue (VA-36) | 466501 | 100277 | Yes | 36.9 |
| **PO71** | 19 Havant Road (HR-19) | 465711 | 105624 | No | 27.8 |
| **PO72** | 60 Northern Road (NR-60) | 465657 | 105577 | No | 26.5 |
| **PO73** | 52 Northern Road (NR-52) | 465653 | 105544 | No | 27.4 |
| **PO75** | 1-6 Chipstead House, Southampton Road (SR-CH) | 465618 | 105619 | No | 25.7 |

| ID | Location | x | y | In AQMA? | 2018 $NO_2$ ($\mu g/m^3$) |
|---|---|---|---|---|---|
| **PO76** | 142 Copnor Road (CR-142) | 466002 | 102053 | No | 31.3 |
| **PO77** | Copnor School Playground, Copnor Road (CR-School) | 466008 | 102097 | No | 21.2 |
| **PO78** | 3 Goldsmith Avenue (GA-3) | 466523 | 99599 | No | 25.0 |
| **PO86** | 91 Fawcett Road (FR-91) | 465201 | 99734 | No | 28.9 |
| **PO87** | Priory School, Fawcett Road (FR-PSc) | 465183 | 99904 | No | 27.3 |
| **PO90** | 18 Baffins Road (BR-18) | 466095 | 100813 | No | 24.0 |
| **PO91** | 3 Baffins Road (BR-3) | 466070 | 100819 | No | 26.7 |
| **PO92** | Locksway Road-13 (LR-13) | 466525 | 99736 | No | 27.3 |

1.3.1.6. Sections 5, 6, 7, 8, 9 and 10 are located wholly within the local authority area, and section 4 partially within the local authority area. Concentrations recorded at PO1, PO26 and PO37, located inside AQMAs, were above the 40 µg/m³ limit value.

## 1.3.2. MODEL VERIFICATION

### Verification Zone 1

1.3.2.1. The results for verification Zone 1 are shown in Table 5.

**Table 5 - Zone 1 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO1** | 22.0 | 42.9 | 36.4 | 79.8 | 34.3 | 20.9 | 45.6 | 16.0 | 0.4 |
| **PO3** | 22.0 | 24.1 | -1.5 | 38.4 | 34.3 | 2.1 | 4.2 | 10.3 | 2.5 |
| **PO5** | 24.9 | 28.1 | 3.6 | 45.8 | 39.3 | 3.2 | 6.5 | 16.0 | 2.5 |
| **PO6** | 24.9 | 30.9 | 7.1 | 51.6 | 39.3 | 6.0 | 12.3 | 19.3 | 1.6 |
| **PO7** | 24.9 | 27.7 | 10.3 | 45.1 | 39.3 | 2.9 | 5.8 | 11.4 | 2.0 |
| **PO23** | 20.8 | 34.6 | 16.2 | 60.4 | 31.6 | 13.8 | 28.8 | 22.9 | 0.8 |
| **PO24** | 21.0 | 36.8 | 28.4 | 65.2 | 31.9 | 15.8 | 33.3 | 15.1 | 0.5 |
| **PO25** | 22.6 | 38.2 | 24.8 | 68.3 | 35.0 | 15.6 | 33.3 | 17.1 | 0.5 |
| **PO26** | 27.9 | 46.0 | 20.7 | 87.0 | 46.8 | 18.1 | 40.2 | 25.4 | 0.6 |
| **PO30** | 27.9 | 39.2 | 21.5 | 70.9 | 46.8 | 11.3 | 24.1 | 12.9 | 0.5 |
| **PO32** | 23.7 | 31.9 | -2.6 | 54.1 | 37.3 | 8.2 | 16.8 | 25.8 | 1.5 |
| **PO34** | 23.7 | 33.3 | 1.4 | 57.3 | 37.3 | 9.6 | 20.0 | 26.2 | 1.3 |

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO35** | 22.0 | 30.1 | 14.5 | 50.7 | 34.3 | 8.1 | 16.4 | 12.8 | 0.8 |
| **PO37** | 24.9 | 40.6 | 22.4 | 73.1 | 39.3 | 15.7 | 33.8 | 25.5 | 0.8 |
| **PO40** | 27.9 | 34.0 | -11.5 | 59.4 | 46.8 | 6.1 | 12.6 | 28.4 | 2.3 |
| **PO42** | 27.9 | 38.0 | 8.1 | 68.4 | 46.8 | 10.2 | 21.6 | 22.0 | 1.0 |
| **PO43** | 27.9 | 32.5 | 0.6 | 56.4 | 46.8 | 4.6 | 9.5 | 16.2 | 1.7 |
| **PO48** | 24.9 | 30.5 | 20.6 | 50.9 | 39.3 | 5.7 | 11.6 | 10.2 | 0.9 |
| **PO53** | 23.9 | 30.5 | 0.6 | 51.8 | 38.3 | 6.7 | 13.6 | 16.9 | 1.2 |
| **PO56** | 22.0 | 35.1 | 42.8 | 61.6 | 34.3 | 13.1 | 27.3 | 1.5 | 0.1 |
| **PO58** | 22.0 | 29.3 | 29.9 | 49.1 | 34.3 | 7.3 | 14.8 | 2.4 | 0.2 |
| **PO86** | 20.4 | 28.9 | 28.9 | 47.9 | 30.7 | 8.5 | 17.2 | 6.6 | 0.4 |
| **PO87** | 20.4 | 27.3 | 20.4 | 44.6 | 30.7 | 6.9 | 13.9 | 8.9 | 0.6 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG(09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

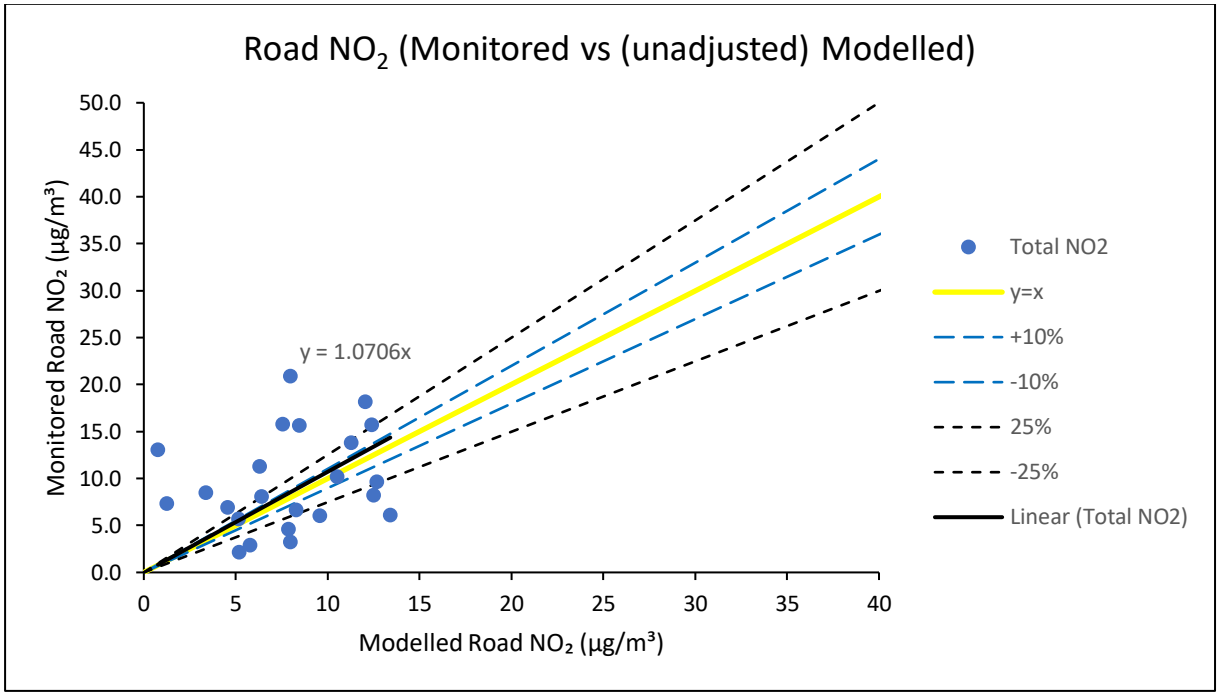


**Plate 2 - Zone 1 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

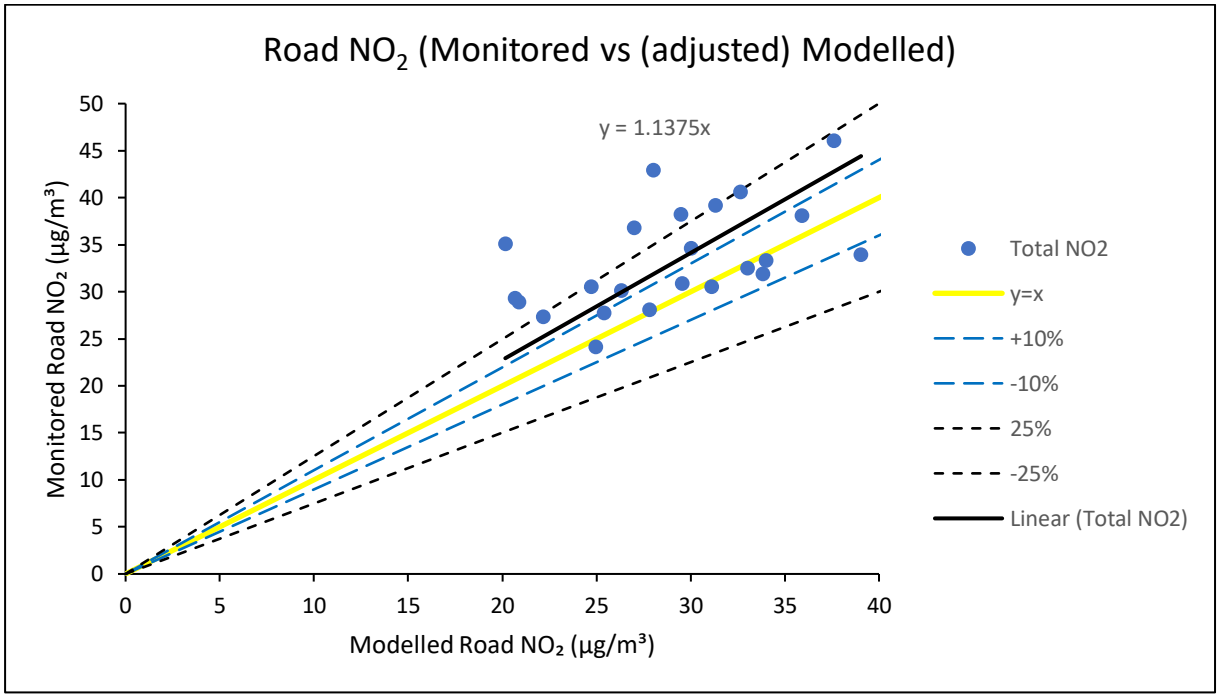


**Plate 3 - Zone 1 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.2. An adjustment factor of 1.10 was applied to the model for this verification zone. Plate 2 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 1.07x. Following application of the adjustment factor, the relationship was improved as shown in Plate 3, with the best-fit line achieving a gradient of 1.14x. Whilst it is not an improvement in the direct relationship, it brings a greater number of results to within 25% correlation.

1.3.2.3. The performance of the model is summarised in Table 6.

**Table 6 – Zone 1 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m$^3$)** | 7.28 | 6.88 | Model marginally under-predicts after adjustment |
| **Correlation** | 0.56 | 0.52 | |
| **Fractional Bias** | 0.17 | 0.15 | |

1.3.2.4. Table 6 shows that the Root Mean Squared Error of 7.28 µg/m³ is reduced marginally to 6.88 µg/m³. The Fractional Bias shows that the model produces very small under predictions.

**Verification Zone 2**

1.3.2.5. The results for verification Zone 1 are shown in Table 7.

**Table 7 - Zone 2 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO15** | 19.6 | 27.6 | 3.6 | 45.5 | 29.4 | 8.0 | 16.1 | 17.9 | 1.1 |
| **PO18** | 19.6 | 26.0 | -5.6 | 42.1 | 29.4 | 6.4 | 12.7 | 19.7 | 1.5 |
| **PO19** | 20.8 | 37.7 | 28.1 | 67.3 | 31.5 | 16.9 | 35.8 | 18.4 | 0.5 |
| **PO39** | 19.5 | 34.0 | 25.7 | 59.4 | 29.2 | 14.5 | 30.2 | 13.6 | 0.5 |
| **PO61** | 20.8 | 33.7 | 15.9 | 58.2 | 31.5 | 12.9 | 26.8 | 21.0 | 0.8 |
| **PO62** | 20.8 | 22.0 | -1.8 | 33.9 | 31.5 | 1.3 | 2.5 | 8.8 | 3.6 |
| **PO63** | 20.8 | 34.2 | 17.5 | 59.3 | 31.5 | 13.4 | 27.9 | 20.7 | 0.7 |
| **PO65** | 20.8 | 28.2 | 12.9 | 46.5 | 31.5 | 7.5 | 15.1 | 13.2 | 0.9 |
| **PO66** | 20.8 | 31.9 | 23.4 | 54.3 | 31.5 | 11.1 | 22.9 | 12.9 | 0.6 |
| **PO67** | 20.8 | 36.7 | 28.5 | 65.1 | 31.5 | 16.0 | 33.7 | 16.7 | 0.5 |
| **PO68** | 20.8 | 36.9 | 27.1 | 65.4 | 31.5 | 16.1 | 34.0 | 17.9 | 0.5 |
| **PO76** | 19.5 | 31.3 | 16.7 | 53.3 | 29.2 | 11.8 | 24.1 | 15.2 | 0.6 |

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO77** | 19.5 | 21.2 | -12.3 | 32.6 | 29.2 | 1.7 | 3.4 | 10.7 | 3.1 |
| **PO78** | 19.5 | 25.0 | 32.6 | 40.0 | 29.0 | 5.6 | 11.1 | 1.6 | 0.1 |
| **PO90** | 20.8 | 24.0 | 8.0 | 37.8 | 31.5 | 3.2 | 6.3 | 8.1 | 1.3 |
| **PO91** | 20.8 | 26.7 | 17.4 | 43.3 | 31.5 | 5.9 | 11.8 | 8.0 | 0.7 |
| **PO92** | 19.5 | 27.3 | 34.5 | 44.6 | 29.0 | 7.8 | 15.7 | 3.5 | 0.2 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG(09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

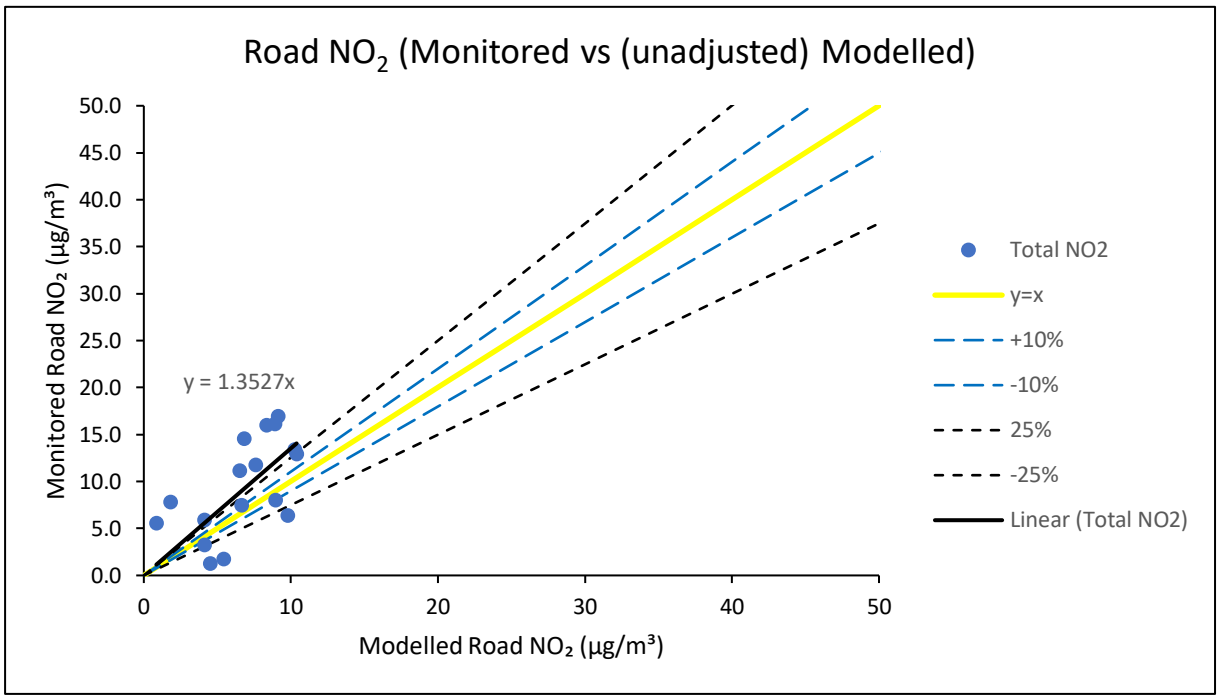


**Plate 4 - Zone 2 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

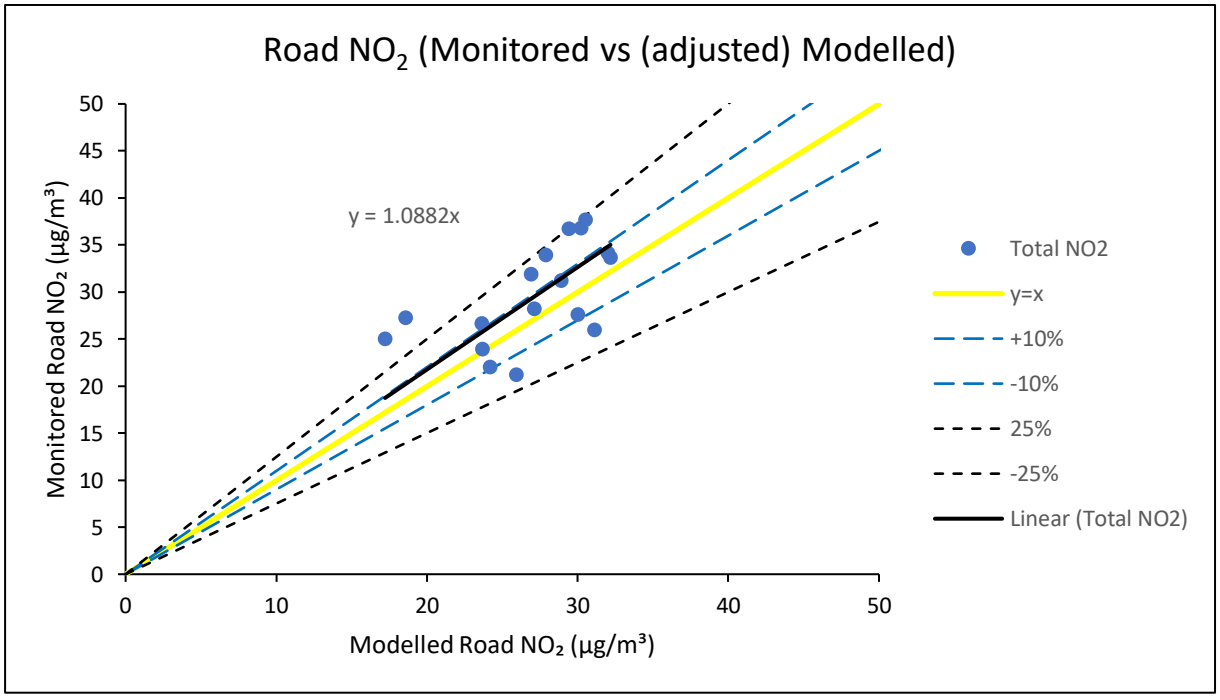


**Plate 5 - Zone 2 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.6. An adjustment factor of 1.4 was applied for verification Zone 2. Plate 4 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 1.35x. Following application of the adjustment factor, the relationship was improved as shown in Plate 3, with the best-fit line achieving a gradient of 1.09x. This is an improvement in the direct relationship between modelled and monitored total $NO_2$ and brings the majority of results within 25 %.

1.3.2.7. The performance of the model is summarised in Table 8.

**Table 8 - Zone 2 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m$^3$)** | 6.64 | 5.02 | Model marginally under-predicts after adjustment |
| **Correlation** | 0.59 | 0.60 | |
| **Fractional Bias** | 0.19 | 0.09 | |

1.3.2.8. Table 8 shows a reduction of 1.62 µg/m$^3$ in the model error. The correlation coefficient improves by 0.01, which cannot be considered statistically significant, however the 0.1 improvement of the fractional bias means the rate of under-prediction is slightly reduced by model correction.

**Verification Zone 3**

1.3.2.9. The results for verification Zone 3 are shown in Table 9.

**Table 9 - Zone 3 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO16** | 24.3 | 29.6 | -5.4 | 48.2 | 37.4 | 5.3 | 10.8 | 28.3 | 2.6 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG (09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

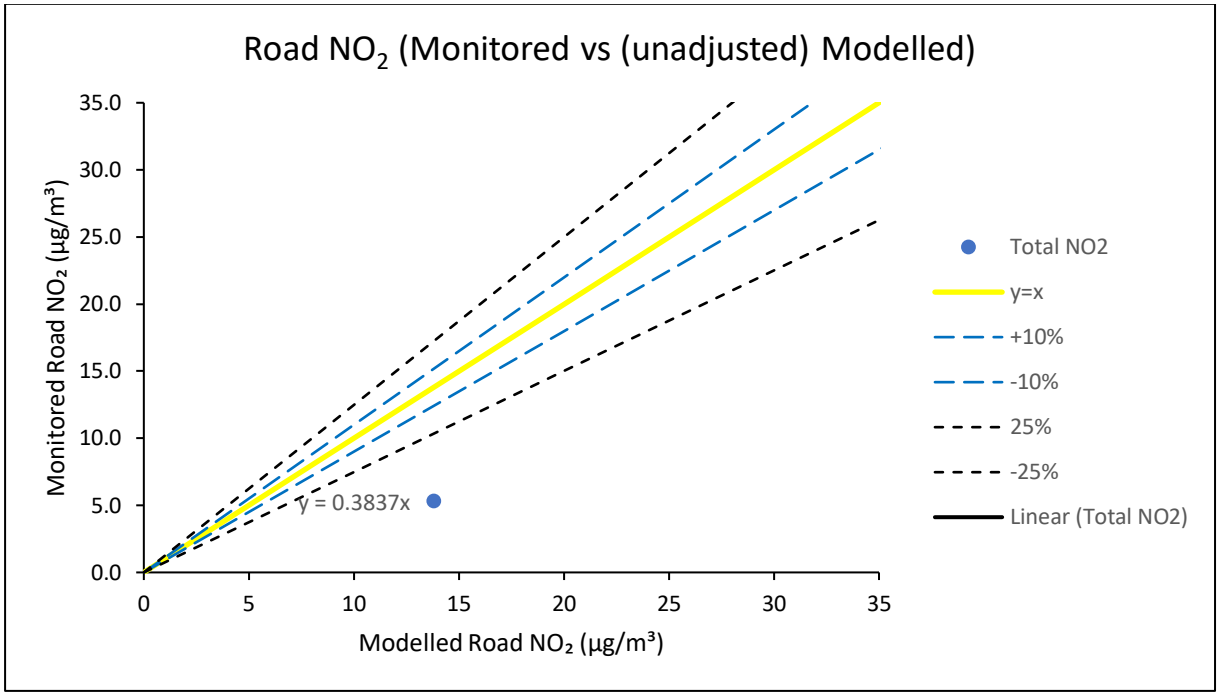


**Plate 6 - Zone 3 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

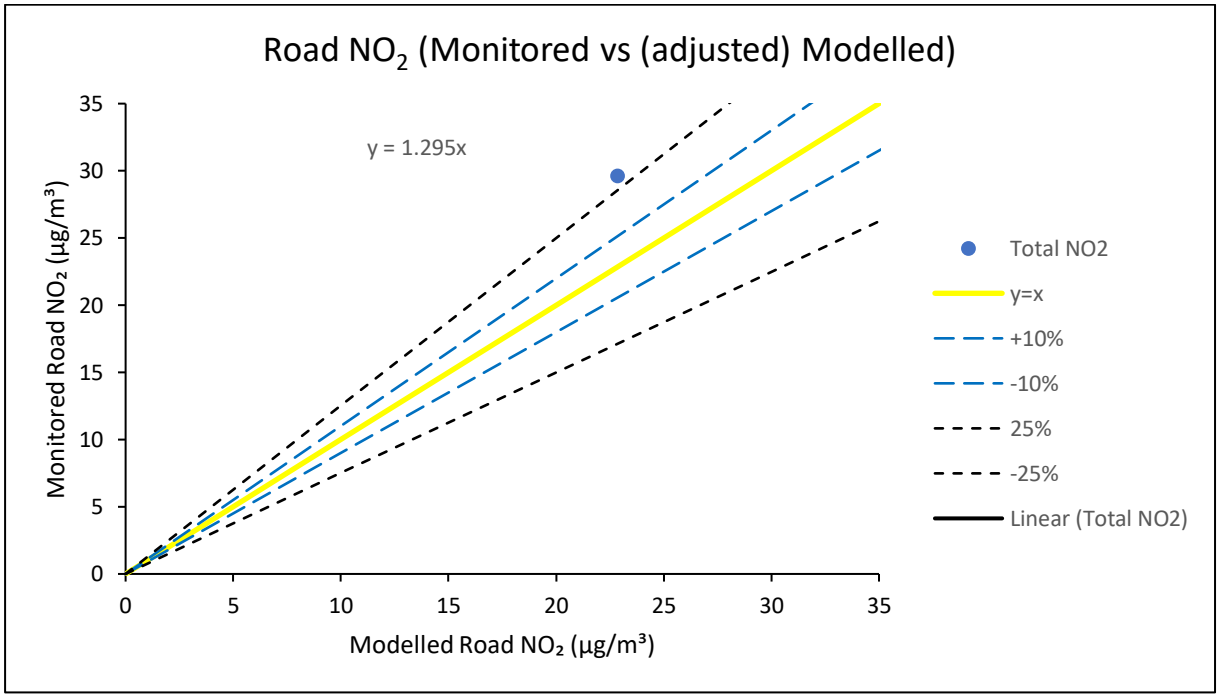


**Plate 7 - Zone 3 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.10. An adjustment factor of 0.38 was applied for this verification zone. Plate 6 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 0.38x. Following application of the adjustment factor, the relationship was improved as shown in Plate 7, with the best-fit line achieving a gradient of 1.3x. This brings the relationship between monitored and modelled $NO_2$ closer to the 25 % relationship.

1.3.2.11. The performance of the model is summarised in Table 10.

**Table 10 - Zone 3 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m$^3$)** | 1.59 | 6.74 | Model marginally under-predicts after adjustment |
| **Correlation** | - | - | |
| **Fractional Bias** | -0.05 | 0.26 | |

1.3.2.12. Table 10 that despite an improvement in the relationship between monitored and modelled $NO_2$, there is a marked increase in the error in the model of 5.15 µg/m$^3$. A correlation coefficient is not possible as this zone only uses a single diffusion tube monitoring point.

1.3.2.13. The fractional bias rate shows that the model moves from a slight over-prediction to a slight under-prediction.

1.3.2.14. Given the marked increase in the error following correction, the uncorrected model output was reported for this zone.

**Verification Zone 4**

1.3.2.15. The results for verification Zone 4 are shown in Table 11.

**Table 11 - Zone 4 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **PO9** | 20.9 | 36.7 | 35.6 | 64.7 | 31.3 | 15.8 | 33.4 | 11.9 | 0.4 |
| **PO71** | 20.9 | 27.8 | 23.5 | 45.2 | 31.3 | 6.9 | 13.9 | 7.0 | 0.5 |
| **PO72** | 20.9 | 26.5 | -13.3 | 42.5 | 31.3 | 5.6 | 11.3 | 25.3 | 2.2 |
| **PO73** | 20.9 | 27.4 | 0.0 | 44.4 | 31.3 | 6.5 | 13.2 | 19.6 | 1.5 |
| **PO75** | 20.9 | 25.7 | 18.6 | 40.9 | 31.3 | 4.9 | 9.7 | 6.4 | 0.7 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG(09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

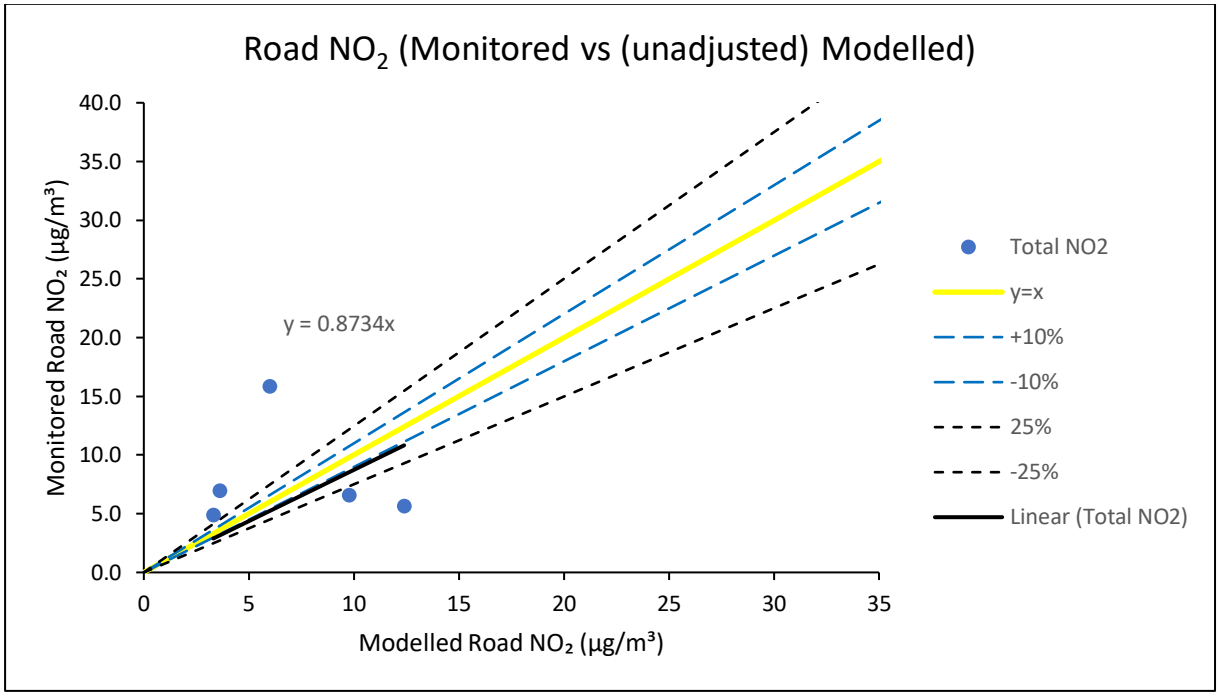


**Plate 8 - Zone 4 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

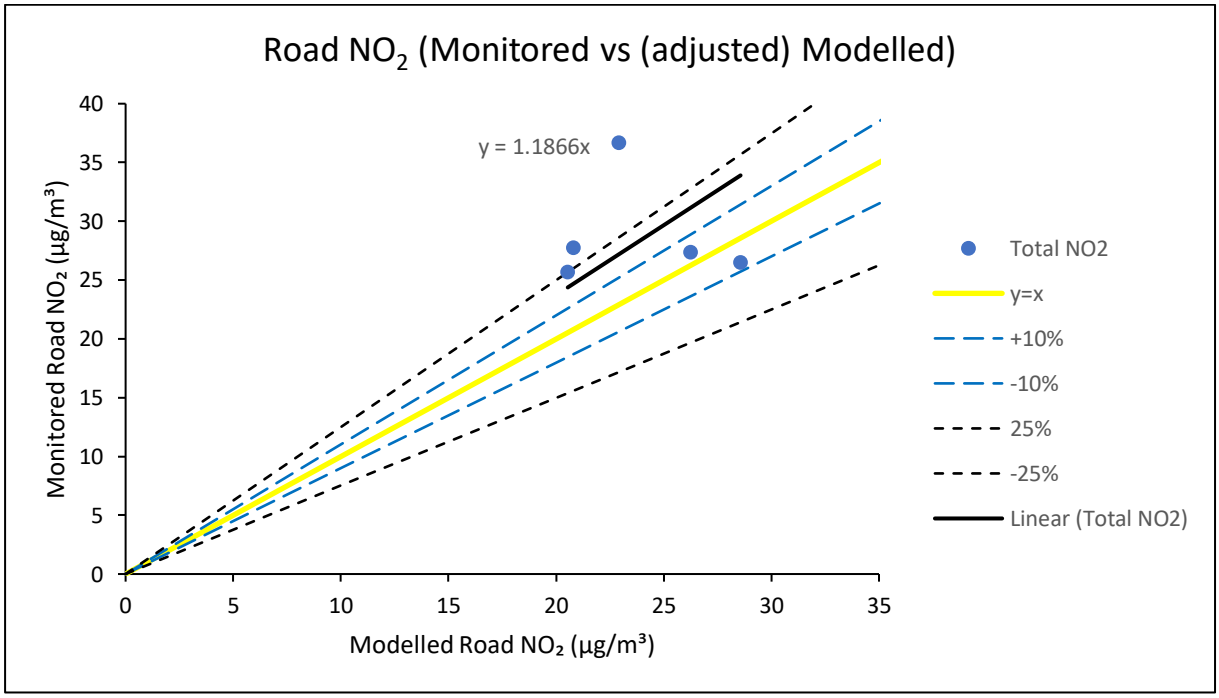


**Plate 9 - Zone 4 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.16. An adjustment factor of 0.88 was applied for this verification zone. Plate 8 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 0.87x. Following application of the adjustment factor, the relationship was changed to 1.19x as shown in Plate 9. Whilst not an improvement in the direct relationship, a larger number of points are brought within the 25 % relationship between monitored and modelled $NO_2$.

1.3.2.17. The performance of the model is summarised in Table 12.

**Table 12 - Zone 4 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m$^3$)** | 7.05 | 7.36 | Model marginally under-predicts after adjustment |
| **Correlation** | 0.13 | 0.13 | |
| **Fractional Bias** | 0.16 | 0.19 | |

1.3.2.18. Table 12 shows a slight increase in the model error of 0.31 µg/m$^3$. The correlation coefficient improves is unchanged, and the fractional bias shows a slight increase in the tendency of the model to under-predict.

**Verification Zone 5**

1.3.2.19. The results for verification Zone 5 are shown in Table 13.

**Table 13 - Zone 5 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **HA8** | 15.7 | 27.8 | 48.1 | 46.7 | 22.3 | 12.2 | 24.4 | 1.0 | 0.0 |
| **HA25 (B)** | 15.7 | 26.8 | 31.5 | 44.6 | 22.4 | 11.2 | 22.2 | 7.0 | 0.3 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG (09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

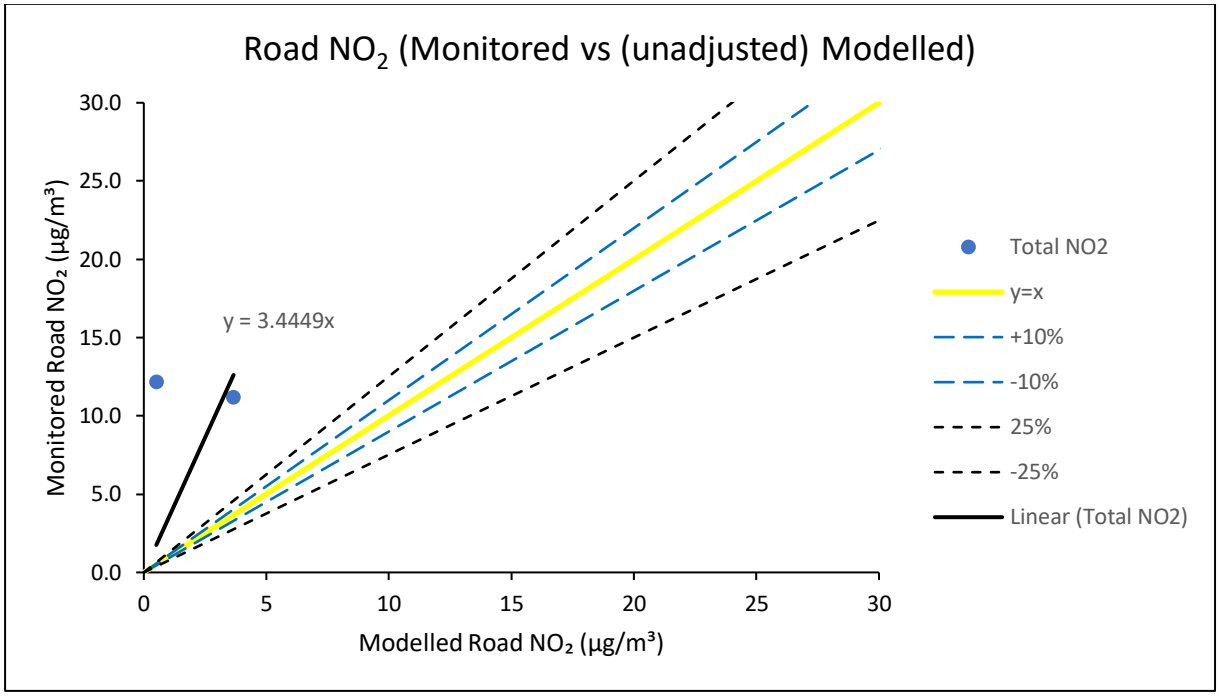


**Plate 10 - Zone 5 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

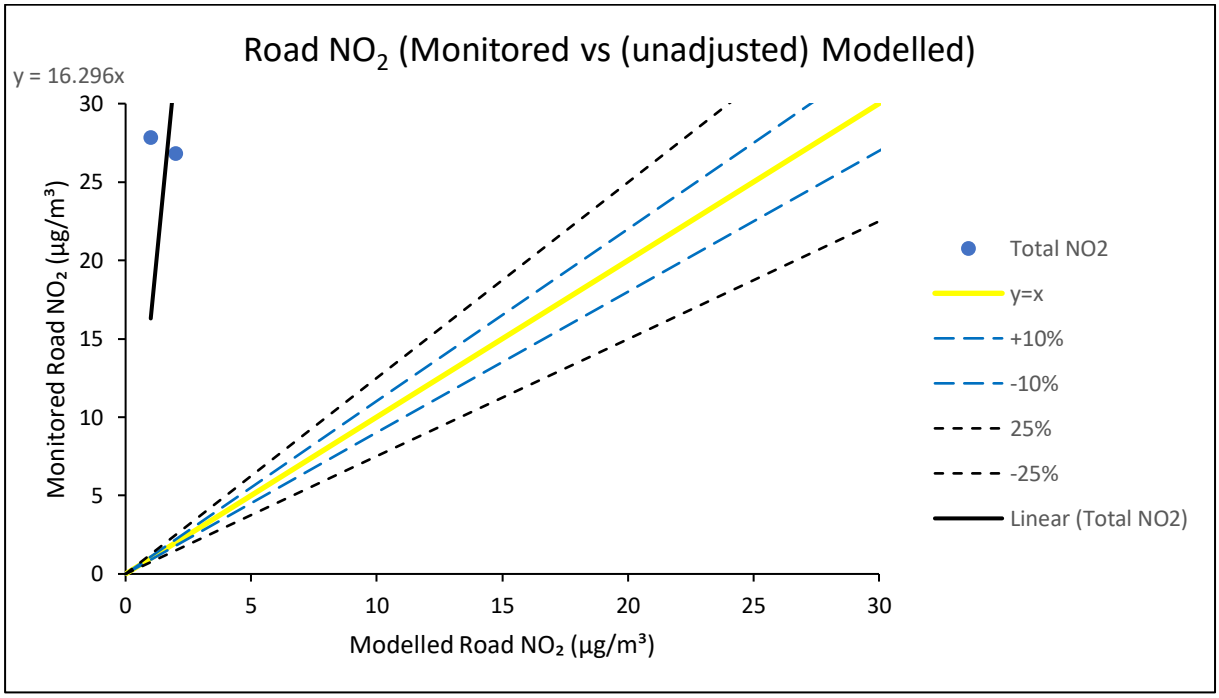


**Plate 11 - Zone 5 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.20. An adjustment factor of 3.58 was applied for verification Zone 5. Plate 10 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 0.87x. Following application of the adjustment factor, the relationship was changed to 1.19x as shown in Plate 11. Whilst not an improvement in the direct relationship, a larger number of points are brought within the 25 % relationship between monitored and modelled $NO_2$. The performance of the model is summarised in Table 14.

**Table 14 - Zone 5 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m$^3$)** | 11.19 | 8.55 | Model marginally under-predicts after adjustment |
| **Correlation** | 1.0 | 1.0 | |
| **Fractional Bias** | 0.50 | 0.24 | |

1.3.2.21. Table 14 shows large improvement in the model error of 2.64 µg/m³. The correlation coefficient improves is unchanged at 1.0, and the fractional bias shows a slight reduction in the tendency of the model to under-predict.

**Verification Zone 6**

1.3.2.22. The results for verification Zone 6 are shown in Table 15.

**Table 15 - Zone 6 Diffusion Tube Verification and Adjustment Factor Derivation**

| Site ID | Total B/G $NO_2$ | Monitored Total $NO_2$ | % Diff. | Monitored Total $NO_x$ | Total B/G $NO_x$ | Monitored Road Contribution $NO_2$ | Monitored Road Contribution $NO_x$ | Modelled Road $NO_x$ | Ratio of Monitored Road to Modelled Road |
|---|---|---|---|---|---|---|---|---|---|
| **HA10** | 15.8 | 21.4 | 15.4 | 33.2 | 22.4 | 5.6 | 10.8 | 9.8 | 0.9 |
| **PO8** | 24.8 | 26.0 | -13.4 | 41.1 | 38.8 | 1.1 | 2.2 | 20.0 | 8.9 |
| | Defra Background maps | LA Diffusion tube data | LAQM.TG(09) | NOx to $NO_2$ calculator | Defra Background maps | Derived (LAQM.TG(09)) | Derived (LAQM.TG(09)) | ADMS-roads output | Derived (LAQM.TG(09)) |

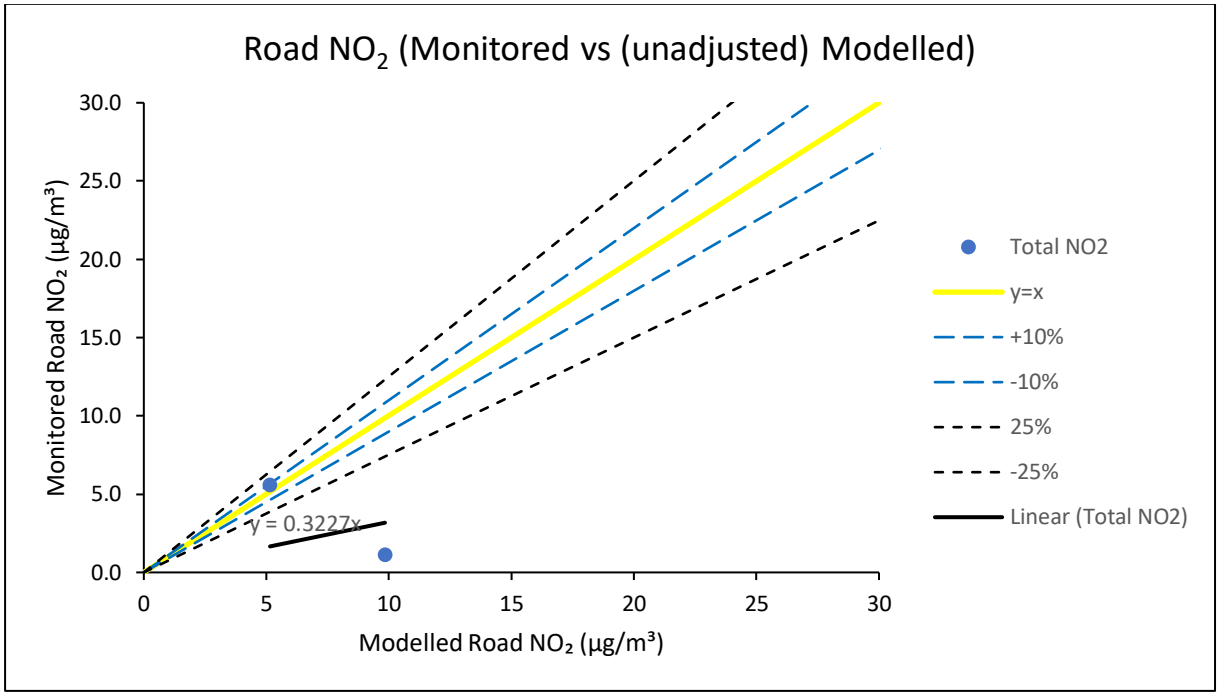


**Plate 12 - Zone 6 Graph of Monitored $NO_2$ against Modelled $NO_2$ before Adjustment**

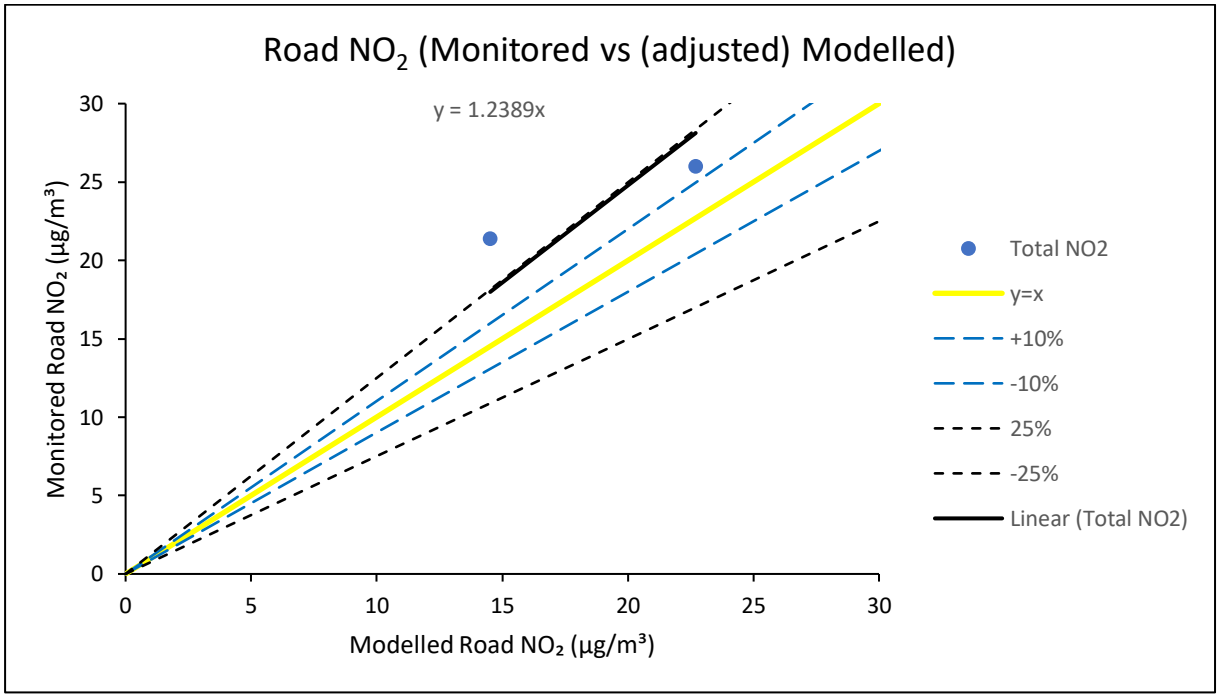


**Plate 13 - Zone 6 Graph of Monitored $NO_2$ against Modelled $NO_2$ after Adjustment**

1.3.2.23. An adjustment factor of 0.31 was applied for this verification zone. Plate 12 shows the relationship between monitored and modelled $NO_2$ with the best-fit line gradient of 0.32x. Following application of the adjustment factor, the relationship was improved to 1.24x as shown in Plate 13.

1.3.2.24. The performance of the model is summarised in Table 16.

**Table 16 - Zone 6 Model Performance**

| Statistic | Results before verification and adjustment | Results after verification and adjustment | Comments |
|---|---|---|---|
| **RMSE (µg/m³)** | 3.38 | 5.36 | Model marginally under-predicts after adjustment |
| **Correlation** | 1 | 1 | |
| **Fractional Bias** | 0.00 | 0.24 | |

1.3.2.25. Table 16 shows an increase in the model error from 3.38 µg/m³ to 5.36 µg/m³. The correlation coefficient shows at 1:1 correlation, and the fractional bias shows a slight increase in the tendency of the model to under-predict.

1.3.2.26. Given the increase in the model error and the increase in the tendency of the model to under-predict, the correction factor was not applied to this verification zone and the uncorrected model output was reported.

### Verification Summary

1.3.2.27. The verification figures presented here are for the modelled pollutant predictions resulting from the ADMS-Roads output run without the complex canyon module. The results for the representative receptors from this arrangement were found to represent the worst-case predictions.

1.3.2.28. Verification for the assessment of Compliance with the EU Directive 2008/50/EC was undertaken using the predicted outputs from the ADMS-Roads model that included the complex canyon module. The verification factors are shown in Table 46 together with those run without the canyon module.

**Table 17 - Comparison of Correction Factors With- and Without the Complex Canyon Module**

| Verification Zone | Factor with complex canyon module | Factor without complex canyon module |
|---|---|---|
| **1** | 0.81 | 1.10 |
| **2** | 1.09 | 1.40 |
| **3** | 0.33 | 0.38 |

| Verification Zone | Factor with complex canyon module | Factor without complex canyon module |
|---|---|---|
| **4** | 0.83 | 0.88 |
| **5** | 2.80 | 3.58 |
| **6** | 0.31 | 0.31 |

1.3.2.29. None of the adjustment factors were found to be excessive, with the highest factor being 3.58 in Zone 5, however the RMSE model performance metric in the model for all verification zones (Table 35, Table 37, Table 39, Table 41, Table 43 and Table 45) was found to be consistently higher than the recommended 10 % of the objective value of 40 µg/m³, but within 25 % of the objective for the purposes of modelling (Department for Environment, Food and Rural Affairs, 2009). Whilst this was the case, a number of individual diffusion tube results remained outside of the 25 % bracket. This is suspected to be as a result of the inherent difference in the requirements of monitoring for LAQM purposes and for modelling purposes.

1.3.2.30. It is the case that no project specific monitoring programme was undertaken for this project. Given the high volume of diffusion tubes covering the affected road network this was not considered to be necessary. However, these diffusion tubes are placed by local authorities on the basis of monitoring for LAQM purposes and are typically located in the areas of worst-case exposure and as such may be located at complex junctions or areas subject to multiple large emission sources. This type of monitoring is not the most relevant type of monitoring that would be required for model verification, but the assessment has used the data that was available. LAQM monitoring has the capability to skew results due precisely to the objective of monitoring for the worst-case exposure, whereas monitoring for the purpose of model verification has the objective of looking for the most representative exposure over a larger area in order to accurately predict at the largest number of modelled receptors. Air quality models can be refined, but typically perform poorly in highly complex situations or close to high emission sources of pollution. Where complex situations exist, and a proportional approach allows, more complex modelling such as Computational Fluid Dynamics can be undertaken. For this reason, in an area as complex and highly populated as the south of England, and especially the City of Portsmouth where a large number of complex situations are likely to exist, there are likely to be a number of areas where model performance may be challenged.

1.3.2.31. Table 18 provides a summary of the resulting RMSE for each zone and justification for the results presented.

**Table 18 - Comparison of RMSE for each verification zone**

| Verification Zone | Before adjustment | After adjustment | Results reported | Justification |
|---|---|---|---|---|
| **1** | 7.28 | 6.88 | Adjusted | RMSE improvement |
| **2** | 6.64 | 5.02 | Adjusted | RMSE improvement |
| **3** | 1.59 | 6.74 | Unadjusted | RMSE deterioration |
| **4** | 7.05 | 7.36 | Adjusted | RMSE improvement |
| **5** | 11.19 | 8.55 | Adjusted | RMSE improvement |
| **6** | 3.38 | 5.36 | Unadjusted | RMSE deterioration |

1.3.2.32. The implications of the model performance metric data on the modelled predictions has been considered in the judgement of significance for the Proposed Development.

# 1.4. PREDICTED IMPACTS

## 1.4.1. DIVERSION TRAFFIC

### Construction Stage

#### Embedded Mitigation

1.4.1.1. Embedded mitigation is described in the Construction Traffic Management Plan ('CTMP'), and includes the following:

- Temporary traffic signals to be used where lane closures or partial carriageway closure is required. during peak times the signals will be manually adjusted to ensure delays are kept to a minimum;
- Road closures may be required where the highway is of insufficient width to accommodate works and have traffic continue to flow at a safe distance. Where this is required diversion routes will be agreed with the local highways authority; and

- Construction hours will be scheduled to avoid peak times, especially where schools are in the immediate vicinity of works, and to avoid particular major scheduled events.

#### Impacts

1.4.1.2. The overall impacts for the DS1 scenario are presented in Figure 23.6, Figure 23.7 and Figure 23.10 and for the DS2 scenario in Figure 23.9, Figure 23.8 and Figure 23.11.

### Verification Zone 1

#### Verification Zone 1 Receptors

1.4.1.3. Within this Verification Zone, the number of impacted receptors is shown in Table 19.

**Table 19 - Impacted Receptors in Verification Zone 1**

| Type | Receptor Count |
|---|---|
| **Residential** | 29,424 |
| **Commercial** | 1,719 |
| **Community** | 176 |
| **Military** | 7 |
| **Total Number of Receptors** | **31,326** |

1.4.1.4. Within the numbers of receptors shown in Table 19, there are receptors with particular sensitivity, as shown in Table 20.

**Table 20 - Particularly Sensitive Receptors in Verification Zone 1**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 80 |
| **Medical** | 33 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 0 |
| **Care Home** | 12 |

#### Verification Zone 1 Results

1.4.1.5. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 21.

**Table 21 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 1**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2022) Maximum Modelled Concentration (µg/m³) | **48.2** | 23.6 | 14.6 |
| | DS1 (2022) Maximum Modelled Concentration (µg/m³) | **48.3** | 23.6 | 14.6 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 798 | 221 | 277 |
| | No Change in Concentration | 15,237 | 26,497 | 30,106 |
| | Deterioration in Concentration | 15,291 | 4,608 | 943 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement (µg/m³) | 0.2 | 0.1 | 0.1 |
| | Maximum Deterioration (µg/m³) | 0.6 | 0.2 | 0.1 |

1.4.1.6. The summary results in Table 21 show that there is a deterioration of 0.1 µg/m³ in the highest predicted concentration at receptors within Verification Zone 1 for $NO_2$ in the DS1 scenario. The maximum DS1 concentration of 48.3 µg/m³ is 121% of the objective against an exceedance of similar magnitude in the DM scenario. Figure 23.7 Sheet 1 should be compared with Figure 23.6 Sheet 1 for a comparison of the DM against the DS1 scenario. There are imperceptible changes in the highest predicted concentrations for $PM_{10}$ and $PM_{2.5}$.

1.4.1.7. The highest predicted concentration of 48.3 µg/m³ for $NO_2$ under the DS1 scenario. occurs at high occupancy residential receptors on Old Commercial Street and Grafton Street, closest to the M275 and is due to the proximity of the receptors to high traffic flows and large, complex junctions.

1.4.1.8. The highest predicted deterioration of 0.6 µg/m³ in concentrations of $NO_2$ occurs at high occupancy residential receptors on Percy Chandler Street where the DM concentration is 15.5 µg/m³.

1.4.1.9. The highest predicted improvement of 0.2 µg/m³ in concentrations of $NO_2$ occur along Osier Way and Harbour Way.

1.4.1.10. For $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at most of the receptors assessed for the DS1 scenario. However, more receptors will experience a deterioration than an improvement in this scenario for these pollutants. For $NO_2$, a roughly equal number of receptors will experience either no change in concentrations or a deterioration in concentration. Whilst some properties are shown to experience a deterioration in concentrations of all pollutants, the highest predicted improvement is of a lower magnitude than the highest predicted improvement for $NO_2$ and $PM_{10}$, whilst the maximum improvement and maximum deterioration are equal for $PM_{2.5}$.

1.4.1.11. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 22.

**Table 22 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 1**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **48.2** | 23.6 | 14.6 |
| | DS2 (2026) Maximum Modelled Concentration | **48.4** | 23.6 | 14.6 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 171 | 149 | 0 |
| | No Change in Concentration | 26,663 | 29,384 | 31,043 |
| | Deterioration in Concentration | 4,492 | 1,793 | 283 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.1 | 0.1 | 0 |
| | Maximum Deterioration | 0.7 | 0.1 | 0.1 |

1.4.1.12. The summary results in Table 22 show that there is a deterioration of 0.2 µg/m$^3$ in the highest predicted concentration at receptors within the study area for $NO_2$ in the DS2 scenario. The maximum DS2 concentration of 48.4 µg/m$^3$ is 121% of the objective. Figure 23.8 Sheet 1 should be compared with Figure 23.6 Sheet 1 for a comparison of the DM against the DS2 scenario. There is a no change in the highest predicted concentrations for $PM_{10}$ and $PM_{2.5}$.

1.4.1.13. The highest predicted concentration of 48.4 µg/m³ for $NO_2$ under the DS1 scenario occurs at high occupancy residential receptors on Old Commercial Street and Grafton Street, closest to the M275.

1.4.1.14. The highest predicted deterioration of 0.7 µg/m³ in concentrations of $NO_2$ occurs at high occupancy residential receptors on Percy Chandler Street where the DM concentration is 15.8 µg/m³.

1.4.1.15. The highest predicted improvement of 0.1 µg/m³ in concentrations of $NO_2$ occur along Osier Way and Harbour Way, closest to the M275.

1.4.1.16. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at most of the receptors assessed for the DS1 scenario. However, more receptors will experience a deterioration than an improvement in this scenario DS2. Whilst some properties are shown to experience a deterioration in concentrations of all pollutants, the highest predicted deterioration is of a lower magnitude than the highest predicted improvement for $NO_2$ $PM_{10}$ and $PM_{2.5}$.

1.4.1.17. $NO_2$ concentrations at a selection of representative receptors is shown in Table 23, consisting of high sensitivity receptors highlighted in Table 23, Figure 23.7 Sheet 1 and Figure 23.8 Sheet 1, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 23 - Verification Zone 1 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **I Glancey, 108 New Road, Portsmouth** | 20.8 | 21 | 0.2 | Negligible Adverse | 20.8 | 0.0 | Negligible Adverse | No |
| **Meadow House Rest Home, 47-51, 47 Stubbington Avenue, Portsmouth** | 19.8 | 19.6 | -0.2 | Negligible Beneficial | 19.8 | 0.0 | Negligible Beneficial | Yes |
| **Stubbington Avenue Dental Practice, Ring Baxter & Reid, 12 Stubbington Avenue, Portsmouth** | 19.8 | 19.6 | -0.2 | Negligible Beneficial | 19.8 | 0.0 | Negligible Beneficial | Yes |
| **Good Manors Day Nursery, Good Manors Day Nursery, Stubbington Lodge, 45 Stubbington Avenue, Portsmouth** | 19.8 | 19.6 | -0.2 | Negligible Beneficial | 19.8 | 0.0 | Negligible Beneficial | Yes |
| **The Harbour School Stamshaw, Ranelagh Road, Portsmouth** | 46.5 | 46.8 | 0.3 | Moderate Adverse | 47.2 | 0.7 | Substantial Adverse | No |
| **24 Grafton Street, Portsmouth** | 48.2 | 48.3 | 0.1 | Moderate Adverse | 48.4 | 0.2 | Moderate Adverse | Yes |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **110 Grafton Street, Portsmouth** | 48.2 | 48.3 | 0.1 | Moderate Adverse | 48.4 | 0.2 | Moderate Adverse | Yes |
| **401j, Old Commercial Road, Portsmouth** | 48.2 | 48.3 | 0.1 | Moderate Adverse | 48.4 | 0.2 | Moderate Adverse | Yes |
| **St. John Ambulance, St John Ambulance, 406-414, 406 Old Commercial Road, Portsmouth** | 48.2 | 48.3 | 0.1 | Moderate Adverse | 48.4 | 0.2 | Moderate Adverse | Yes |
| **14 Harbour Way, Portsmouth** | 45 | 45.1 | 0.1 | Moderate Adverse | 45.1 | 0.1 | Moderate Adverse | No |
| **4 Osier Close, Portsmouth** | 45 | 45.1 | 0.1 | Moderate Adverse | 45.1 | 0.1 | Moderate Adverse | No |
| **Flat 5, Horndean House, Percy Chandler Street, Portsmouth** | 29.5 | 30.1 | 0.6 | Slight Adverse | 29.6 | 0.1 | Negligible Adverse | No |
| **Flat 1, Horndean House, Percy Chandler Street, Portsmouth** | 29.5 | 30.1 | 0.6 | Slight Adverse | 29.6 | 0.1 | Negligible Adverse | No |

### Verification Zone 2

#### Verification Zone 2 Receptors

1.4.1.18. Within this Verification Zone, the number of impacted receptors is shown in Table 24.

**Table 24 - Impacted Receptors in Verification Zone 2**

| Type | Receptor Count |
|---|---|
| **Residential** | 9,206 |
| **Commercial** | 410 |
| **Community** | 55 |
| **Military** | 0 |
| **Total Number of Receptors** | **9,671** |

1.4.1.19. Within the numbers of receptors shown in Table 24, there are receptors with particular sensitivity, as shown in Table 25.

**Table 25 - Particularly Sensitive Receptors in Verification Zone 2**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 14 |
| **Medical** | 22 |
| **Hospice** | 4 |
| **Sheltered Accommodation** | 1 |
| **Care Home** | 42 |

#### Verification Zone 2 Results

1.4.1.20. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 26.

**Table 26 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 2**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 26.7 | 20.8 | 13.5 |

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| | DS1 (2026) Maximum Modelled Concentration | 26.8 | 20.8 | 13.5 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 3,312 | 2,619 | 556 |
| | No Change in Concentration | 2,503 | 4,696 | 7,819 |
| | Deterioration in Concentration | 3,856 | 2,356 | 1,296 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 1.2 | 0.3 | 0.1 |
| | Maximum Deterioration | 0.7 | 0.2 | 0.1 |

1.4.1.21. The summary results in Table 26 show that there is a negligible deterioration of 0.1 µg/m$^3$ in the highest predicted concentration at receptors within Verification Zone 2 for $NO_2$ in the DS1 scenario. The maximum DS1 concentration of 26.8 µg/m$^3$ is significantly under the objective. Figure 23.7 Sheet 2 should be compared with Figure 23.6 Sheet 2 for a comparison of the DM against the DS1 scenario. There is no change in the highest predicted concentrations for $PM_{10}$ and $PM_{2.5}$.

1.4.1.22. The highest predicted concentration of 26.8 µg/m³ for $NO_2$ under the DS1 scenario occurs at seven residential receptors and two commercial receptors at the junction of Baffins Road and Hayling Avenue.

1.4.1.23. The highest predicted deterioration of 0.7 µg/m³ in concentrations of $NO_2$ occurs at a receptors on Folkstone Road, where the DM concentration is 24.2 µg/m³.

1.4.1.24. The highest predicted improvement of 1.2 µg/m³ in concentrations of $NO_2$ occurs at high density residential receptors at the junction of Eastern Road and Hayling Avenue.

1.4.1.25. For $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For $NO_2$, a minority of receptors are predicted to experience no change in concentrations, with greater numbers predicted to experience either an improvement or a deterioration. For $NO_2$ and $PM_{2.5}$, more receptors are predicted to experience a deterioration, whilst for $PM_{10}$ more receptors are predicted to experience an improvement in concentrations. Overall, the level of maximum improvement is greater than the maximum deterioration, except for $PM_{2.5}$ where they are equal.

1.4.1.26. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 27.

**Table 27 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 2**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | 40 | 40 | 25 |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 26.7 | 20.8 | 13.5 |
| | DS2 (2026) Maximum Modelled Concentration | 26.9 | 20.9 | 13.5 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 1,287 | 908 | 35 |
| | No Change in Concentration | 5,772 | 7,615 | 8,695 |
| | Deterioration in Concentration | 2,612 | 1,148 | 941 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.2 | 0.1 | 0.1 |
| | Maximum Deterioration | 0.2 | 0.1 | 0.1 |

1.4.1.27. The summary results in Table 27 show that there is predicted to be a negligible deterioration of 0.2 µg/m³ in the highest predicted concentration within the study area for $NO_2$ in the DS2 scenario. Figure 23.8 Sheet 2 should be compared with Figure 23.6 Sheet 2 for a comparison of the DM against the DS2 scenario. There is a negligible 0.1 µg/m³ increase in the highest predicted concentration of $PM_{10}$.

1.4.1.28. The highest predicted concentration of 26.9 µg/m³ for $NO_2$ under the DS2 scenario occurs at seven residential receptors and two commercial receptors at the junction of Baffins Road and Hayling Avenue.

1.4.1.29. The highest predicted deterioration of 0.2 µg/m³ in concentrations of $NO_2$ occurs at receptors at the junction of Baffins Road and Hayling Avenue where the DM concentrations is 27 µg/m³, and on Bowler Avenue where the DM concentrations is 24.3µg/m³.

1.4.1.30. The highest predicted improvement of 0.2 µg/m³ in concentrations of $NO_2$ occurs at high density residential receptors at the junction of Eastern Road and Hayling Avenue.

1.4.1.31. For all modelled pollutants, concentrations are not predicted to change at the majority of receptors assessed for the DS2 scenario. A larger number of receptors are predicted to experience a deterioration in ambient pollutant concentrations than an improvement.

1.4.1.32. $NO_2$ concentrations at a selection of representative receptors is shown in Table 28 consisting of high sensitivity receptors highlighted in Table 28, Figure 23.7 Sheet 2 and Figure 23.8 Sheet 2, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 28 - Verification Zone 2 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **My Dentist, B P Henning Dental Surgeon, 310 Chichester Road, Portsmouth** | 23 | 23.2 | 0.2 | Negligible Adverse | 23.1 | 0.1 | Negligible Adverse | No |
| **Doctors Surgery, 111 Copnor Road, Portsmouth** | 23 | 23.2 | 0.2 | Negligible Adverse | 23.1 | 0.1 | Negligible Adverse | No |
| **Mary Rose Manor, Copnor Road, Portsmouth** | 20.9 | 21.3 | 0.4 | Negligible Adverse | 21 | 0.1 | Negligible Adverse | No |
| **Shearwater, 18 Moorings Way, Southsea** | 21.3 | 21.2 | -0.1 | Negligible Beneficial | 21.2 | -0.1 | Negligible Beneficial | Yes |
| **Portsmouth College, Tangier Road, Portsmouth** | 16 | 15.8 | -0.2 | Negligible Beneficial | 15.9 | -0.1 | Negligible Beneficial | No |
| **Tangier Road Children's Home, 265-267, 265 Tangier Road, Portsmouth** | 16 | 15.8 | -0.2 | Negligible Beneficial | 15.9 | -0.1 | Negligible Beneficial | No |
| **94 Eastern Road, Portsmouth** | 23.1 | 22.7 | -0.4 | Negligible Beneficial | 23 | -0.1 | Negligible Beneficial | Yes |
| **5 Hayling Avenue, Portsmouth** | 26.7 | 26.8 | 0.1 | Negligible Adverse | 26.9 | 0.2 | Negligible Adverse | No |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **3 Plover Reach, Southsea** | 25.7 | 25.2 | -0.5 | Negligible Beneficial | 25.6 | -0.1 | Negligible Beneficial | Yes |
| **18 The Haven, Southsea** | 25.7 | 25.2 | -0.5 | Negligible Beneficial | 25.6 | -0.1 | Negligible Beneficial | Yes |

### Verification Zone 3

#### Verification Zone 3 Receptors

1.4.1.33. Within Verification Zone 3, the number of impacted receptors is shown in Table 29.

**Table 29 - Impacted Receptors in Verification Zone 3**

| Type | Receptor Count |
|---|---|
| **Residential** | 2,868 |
| **Commercial** | 398 |
| **Community** | 17 |
| **Military** | 0 |
| **Total Number of Receptors** | **3,283** |

1.4.1.34. Within the numbers of receptors shown in Table 29, there are receptors with particular sensitivity, as shown in Table 30.

**Table 30 - Particularly Sensitive Receptors in Verification Zone 3**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 10 |
| **Medical** | 0 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 0 |
| **Care Home** | 82 |

#### Verification Zone 3 Results

1.4.1.35. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 31.

**Table 31 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 3**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 32.3 | 22.1 | 12.8 |
| | DS1 (2026) Maximum Modelled Concentration | 32.7 | 22.2 | 12.9 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 152 | 100 | 109 |
| | No Change in Concentration | 1,250 | 2,651 | 2,844 |
| | Deterioration in Concentration | 1,881 | 532 | 330 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.7 | 0.3 | 0.1 |
| | Maximum Deterioration | 0.5 | 0.2 | 0.1 |

1.4.1.36. The summary results in Table 31 show a negligible predicted deterioration in the maximum concentration at receptors within Verification Zone 3 for $NO_2$ of 0.4 µg/m³ in the DS1 scenario. The maximum DS1 concentration of 32.7 µg/m³ is under the objective. Figure 23.7 Sheet 3 should be compared with Figure 23.6 Sheet 3 for a comparison of the DM against the DS1 scenario. There is a negligible increase in the highest predicted concentrations for $PM_{10}$ and no change in the highest predicted concentration of $PM_{2.5}$.

1.4.1.37. The highest predicted concentration of 32.7 µg/m³ for $NO_2$ under the DS1 scenario occurs at residential receptors on Northern Parade at its nearest point to the A3 London Road.

1.4.1.38. The highest predicted deterioration of 0.5 µg/m³ in concentrations of $NO_2$ occurs at commercial receptors on Dundas Lane, and includes the Admiral Lord Nelson School, where the DM concentration is 18.6 µg/m³.

1.4.1.39. The highest predicted improvement of 0.7 µg/m³ in concentrations of $NO_2$ occurs at residential and commercial receptors at the junction of Burrfields Road and Eastern Road.

1.4.1.40. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For all modelled pollutants a greater number of receptors are predicted to experience a deterioration in concentrations compared to those that are predicted to experience an improvement.

1.4.1.41. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 32.

**Table 32 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 3**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 32.3 | 22.1 | 12.8 |
| | DS2 (2026) Maximum Modelled Concentration | 32.6 | 22.1 | 12.8 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 111 | 49 | 50 |
| | No Change in Concentration | 1,806 | 2,629 | 2,949 |
| | Deterioration in Concentration | 1,366 | 605 | 284 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.5 | 0.2 | 0.1 |
| | Maximum Deterioration | 0.6 | 0.2 | 0.1 |

1.4.1.42. The summary results in Table 32 show a negligible predicted deterioration in the maximum concentration at receptors within Verification Zone 3 for $NO_2$ of 0.3 µg/m³ in the DS1 scenario. The maximum DS2 concentration of 32.6 µg/m$^3$ is under the objective. Figure 23.8 Sheet 3 should be compared with Figure 23.6 Sheet 3 for a comparison of the DM against the DS2 scenario. There is a negligible increase in the highest predicted concentrations for $PM_{10}$ and no change in the highest predicted concentration of $PM_{2.5}$.

1.4.1.43. The highest predicted concentration of 32.6 µg/m³ for $NO_2$ under the DS2 scenario occurs at 59 high density residential receptors and four commercial receptors at the junction of Military Road with the A3 London Road.

1.4.1.44. The highest predicted deterioration of 0.6 µg/m³ in concentrations of $NO_2$ occurs at commercial receptors on Dundas Lane, and includes the Admiral Lord Nelson School, where the DM concentration is 18.6 µg/m³.

1.4.1.45. The highest predicted improvement of 0.5 µg/m³ in concentrations of $NO_2$ occurs at commercial receptors on Bilton Way.

1.4.1.46. For all modelled pollutants, concentrations are predicted to be unchanged at the majority of receptors assessed for the DS2 scenario. A larger number of receptors are predicted to experience aa deterioration in ambient concentrations of all modelled pollutants compared to those predicted to experience an improvement.

1.4.1.47. $NO_2$ concentrations at a selection of representative receptors are shown in Table 33, consisting of high sensitivity receptors highlighted in Table 33, Figure 23.7 Sheet 3 and Figure 23.8 Sheet 3, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 33 - Verification Zone 3 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **Admiral Lord Nelson School, Dundas Lane, Portsmouth** | 18.7 | 19.2 | 0.5 | Negligible Adverse | 19.3 | 0.6 | Negligible Adverse | No |
| **Dundas Lane, Portsmouth** | 18.6 | 19.1 | 0.5 | Negligible Adverse | 19.1 | 0.5 | Negligible Adverse | No |
| **Eastern Road Car Sales, Eastern Road, Portsmouth** | 20.2 | 19.5 | -0.7 | Negligible Beneficial | 19.9 | -0.3 | Negligible Beneficial | No |
| **Texaco Ltd, Texaco, Eastern Road Service Station, Eastern Road, Portsmouth** | 20.2 | 19.5 | -0.7 | Negligible Beneficial | 19.9 | -0.3 | Negligible Beneficial | No |
| **Bilton Way, Portsmouth** | 20.7 | 20.2 | -0.5 | Negligible Beneficial | 20.2 | -0.5 | Negligible Beneficial | No |

### Verification Zone 4

#### Verification Zone 4 Receptors

1.4.1.48. Within Verification Zone 4, the number of impacted receptors is shown in Table 34.

**Table 34 - Impacted Receptors in Verification Zone 4**

| Type | Receptor Count |
|---|---|
| **Residential** | 4,890 |
| **Commercial** | 363 |
| **Community** | 49 |
| **Military** | 0 |
| **Total Number of Receptors** | **5,302** |

1.4.1.49. Within the numbers of receptors shown in Table 34, there are receptors with particular sensitivity, as shown in Table 35.

**Table 35 - Particularly Sensitive Receptors in Verification Zone 4**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 11 |
| **Medical** | 24 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 0 |
| **Care Home** | 11 |

#### Verification Zone 4 Results

**1.4.1.50.** During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 36.

**Table 36 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 4**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **41.7** | 22.7 | 13.5 |
| | DS1 (2026) Maximum Modelled Concentration | **41.7** | 22.7 | 13.5 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 490 | 403 | 152 |
| | No Change in Concentration | 2,824 | 4,173 | 4,891 |
| | Deterioration in Concentration | 1,988 | 726 | 259 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.9 | 0.3 | 0.1 |
| | Maximum Deterioration | 1.0 | 0.2 | 0.1 |

1.4.1.51. The modelling results indicate that there is no change in the highest predicted concentration at receptors within Verification Zone 4 for $NO_2$ in the DS1 scenario. The maximum DS1 concentration of 41.7 µg/m³ shown in Table 36 is 104% of the objective, which is unchanged from the Do-Minimum scenario. Figure 23.7 Sheet 4 should be compared with Figure 23.6 Sheet 4 for a comparison of the DM against the DS1 scenario. There is no change in the highest predicted concentrations for $PM_{10}$ and $PM_{2.5}$.

1.4.1.52. The highest predicted concentration of 41.7 µg/m³ for $NO_2$ under the DS1 scenario occurs at 16 residential receptors on either side of the junction of The Old Road, with Highbury Grove.

1.4.1.53. The highest predicted deterioration of 1.0 µg/m³ in concentrations of $NO_2$ occurs at the Inland Revenue offices located north of Portsbridge Roundabout adjacent to the A397 Northern Road where the DM concentration is 30.8 µg/m³.

1.4.1.54. The highest predicted improvement of 0.9 µg/m³ in concentrations of $NO_2$ occurs at 16 residential receptors at the junction of the A2030 Havant Road with Eastern Road.

1.4.1.55. For all modelled pollutants, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For all modelled pollutants, more receptors are predicted to experience a deterioration than an improvement. Overall, the level of maximum deterioration is greater than the maximum improvement, except for $PM_{2.5}$ where they are equal.

1.4.1.56. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 37.

**Table 37 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 4**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **41.7** | 22.7 | 13.5 |
| | DS2 (2026) Maximum Modelled Concentration | **41.7** | 22.7 | 13.5 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 482 | 376 | 147 |
| | No Change in Concentration | 2,834 | 4,200 | 4,896 |
| | Deterioration in Concentration | 1,986 | 726 | 259 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.9 | 0.3 | 0.1 |
| | Maximum Deterioration | 0.5 | 0.2 | 0.1 |

1.4.1.57. The summary results in Table 37.

1.4.1.58. Table 37 show that there is no change in the maximum predicted concentration of $NO_2$. The highest predicted concentration of $NO_2$ is 41.7 µg/m³, which is 104% of the objective and is unchanged from the Do-Minimum scenario. The maximum predicted concentrations of $PM_{10}$ and $PM_{2.5}$ are unchanged. Figure 23.8 Sheet 4 should be compared with Figure 23.6 Sheet 4 for a comparison of the DM against the DS2 scenario.

1.4.1.59. The highest predicted concentration of 41.7 µg/m³ for $NO_2$ under the DS2 scenario occurs at 16 residential receptors on either side of the junction of The Old Road, with Highbury Grove.

1.4.1.60. The highest predicted deterioration of 0.5 µg/m³ in concentrations of $NO_2$ occurs at the Inland Revenue offices located north of Portsbridge Roundabout adjacent to the A397 Northern Road where the DM concentration is 30.8 µg/m³.

1.4.1.61. The highest predicted improvement of 0.9 µg/m³ in concentrations of $NO_2$ occurs at residential receptors at the junction of the A2030 Havant Road with Eastern Road.

1.4.1.62. For all modelled pollutants, concentrations are not predicted to change at the majority of receptors assessed for the DS2 scenario. Whilst a larger number of receptors are predicted to experience a deterioration in concentrations for all modelled pollutants, the maximum improvement in concentrations is predicted to be larger than the maximum deterioration, except for $PM_{2.5}$ where they are of equal magnitude.

1.4.1.63. $NO_2$ concentrations at a selection of representative receptors is shown in Table 38 consisting of high sensitivity receptors highlighted in Table 38, Figure 23.7 Sheet 4 and Figure 23.8 Sheet 4, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 38 - Verification Zone 4 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **Solent Infant School, Evelegh Road, Portsmouth** | 16.8 | 17 | 0.2 | Negligible Adverse | 17 | 0.2 | Negligible Adverse | No |
| **65 Evelegh Road, Portsmouth** | 16.8 | 17 | 0.2 | Negligible Adverse | 17 | 0.2 | Negligible Adverse | No |
| **A N A Treatment Centres Ltd, Fleming House, Waterworks Road, Portsmouth** | 17.9 | 17.4 | -0.5 | Negligible Beneficial | 17.4 | -0.5 | Negligible Beneficial | No |
| **331 Havant Road, Portsmouth** | 17.2 | 17.5 | 0.3 | Negligible Adverse | 17.5 | 0.3 | Negligible Adverse | No |
| **3 Highbury Grove, Portsmouth** | 41.7 | 41.7 | 0 | Moderate | 41.7 | 0 | Moderate | No |
| **6 Highbury Grove, Portsmouth** | 41.7 | 41.7 | 0 | Moderate | 41.7 | 0 | Moderate | No |
| **11 Highbury Grove, Portsmouth** | 41.7 | 41.7 | 0 | Moderate | 41.7 | 0 | Moderate | No |
| **77 Lealand Road, Portsmouth** | 18.1 | 17.5 | -0.6 | Negligible Beneficial | 17.5 | -0.6 | Negligible Beneficial | No |
| **4 Copsey Close, Portsmouth** | 19.3 | 18.4 | -0.9 | Negligible Beneficial | 18.4 | -0.9 | Negligible Beneficial | No |

### Verification Zone 5

#### Verification Zone 5 Receptors

1.4.1.64. Within Verification Zone 5, the number of impacted receptors is shown in Table 39.

**Table 39 - Impacted Receptors in Verification Zone 5**

| Type | Receptor Count |
|---|---|
| **Residential** | 7,324 |
| **Commercial** | 255 |
| **Community** | 37 |
| **Military** | 1 |
| **Total Number of Receptors** | **7,617** |

1.4.1.65. Within the numbers of receptors shown in Table 39, there are receptors with particular sensitivity, as shown in Table 40.

**Table 40 - Particularly Sensitive Receptors in Verification Zone 5**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 11 |
| **Medical** | 7 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 0 |
| **Care Home** | 18 |

#### Verification Zone 5 Results

1.4.1.66. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 41.

**Table 41 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 5**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 38.8 | 25.7 | 13.9 |
| | DS1 (2026) Maximum Modelled Concentration | 39.5 | 26.0 | 14.0 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 1,061 | 955 | 773 |
| | No Change in Concentration | 762 | 2,177 | 4,769 |
| | Deterioration in Concentration | 5,794 | 4,485 | 2,075 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 2.5 | 1.0 | 0.3 |
| | Maximum Deterioration | 2.5 | 1.1 | 0.3 |

1.4.1.67. The summary results in Table 41 show that there is a predicted deterioration in the highest concentration for all modelled pollutants at receptors within Verification Zone 5 under the DS1 scenario. Figure 23.7 Sheet 5 should be compared with Figure 23.6 Sheet 5 for a comparison of the DM against the DS1 scenario. The maximum predicted $NO_2$ concentration of 39.5 µg/m³ is just under the objective. The potential to exceed the objective under both the Do-Minimum and DS1 scenarios is within the error in the model.

1.4.1.68. The highest predicted concentration of 39.5 µg/m³ for $NO_2$ under the DS1 scenario occurs at residential receptors north of the junction of London Road with the B2177 Portsdown Hill Road.

1.4.1.69. The highest predicted deterioration of 2.5 µg/m³ in concentrations of $NO_2$ occurs at residential receptors on Maralyn Road, up to 200m from Stakes Hill Road where the DM concentration is 20.7 µg/m³.

1.4.1.70. The highest predicted improvement of 2.5 µg/m³ in concentrations of $NO_2$ occurs at residential receptors north of the junction of London Road with the B2177 Portsdown Hill Road.

1.4.1.71. For $NO_2$ and $PM_{10}$ the majority of receptors in Verification Zone 5 are predicted to experience a deterioration in concentrations, whilst for $PM_{2.5}$ the majority are predicted to experience no change. Overall, the predicted magnitude of maximum improvement is equal to the maximum deterioration, except for $PM_{10}$ where the predicted magnitude of maximum deterioration is greater.

1.4.1.72. The following receptors are presented in Table 43 in response to a request from the EHO for Havant:

- Nº 2 Bedhampton Hill, Havant, representative of concentrations in the Portsdown Hill area of Havant;
- Nº 262 Stakes Hill Road, Havant, representative of the Stakes Hill area;
- Nº 32 Hurstville Drive, Havant, representative of the Hurstville area; and
- Nº 54. Westbrook Grove, Havant, representative of the Aldermoor area.

1.4.1.73. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 42.

**Table 42 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 5**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | 38.8 | 25.7 | 13.9 |
| | DS2 (2026) Maximum Modelled Concentration | 39.2 | 25.9 | 14 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 1,061 | 955 | 773 |
| | No Change in Concentration | 763 | 2,143 | 4,768 |
| | Deterioration in Concentration | 5,793 | 4,519 | 2,076 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 2.5 | 1 | 0.3 |
| | Maximum Deterioration | 2.6 | 1.1 | 0.3 |

1.4.1.74. The summary results in Table 42 show that there is a predicted deterioration in the highest concentration for all modelled pollutants at receptors within Verification Zone 5 under the DS2 scenario. The maximum predicted $NO_2$ concentration of 39.2 µg/m³ is just under the objective. The potential to exceed the objective under both the Do-Minimum and DS1 scenarios is within the error in the model.

1.4.1.75. Figure 23.8 Sheet 5 should be compared with Figure 23.6 Sheet 5 for a comparison of the DM against the DS2 scenario.

1.4.1.76. The highest predicted concentration of 39.2 µg/m³ for $NO_2$ under the DS2 scenario occurs at 6 residential receptors north of the junction of London Road with the B2177 Portsdown Hill Road.

1.4.1.77. The highest predicted deterioration of 2.6 µg/m³ in concentrations of $NO_2$ occurs at 17 residential receptors on Maralyn Road, up to 200m from Stakes Hill Road where the DM concentration is 20.7 µg/m³.

1.4.1.78. The highest predicted improvement of 2.5 µg/m³ in concentrations of $NO_2$ occurs at 4 residential receptors north of the junction of London Road with the B2177 Portsdown Hill Road.

1.4.1.79. For $NO_2$ and $PM_{10}$ a larger number of receptors are predicted to experience a deterioration in concentrations compared to those experiencing no change or an improvement, whereas for $PM_{2.5}$ are larger number of receptors are predicted to experience no change. For $NO_2$ and $PM_{10}$ the maximum predicted improvements in concentrations are greater than the maximum predicted deterioration, and for $PM_{2.5}$ the predcited deterioration is of a greater magnitude than the predicted improvement.

1.4.1.80. The following receptor results are presented in Table 43 in response to a request from the EHO for Havant:

- At No. 2 Bedhampton Hill, Havant, representative of concentrations in the Portsdown Hill area of Havan;
- At No. 262 Stakes Hill Road, Havant, representative of the Stakes Hill area;
- At No. 32 Hurstville Drive, Havant, representative of the Hurstville area; and
- At No. 54. Westbrook Grove, Havant, representative of the Aldermoor area.

1.4.1.81. $NO_2$ concentrations at a selection of representative receptors is shown in Table 43 consisting of high sensitivity receptors highlighted in Table 43, Figure 23.7 Sheet 5 and Figure 23.8 Sheet 5, and within 50 m of the road centreline, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 43 - Verification Zone 5 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **K B Griffin Builders, Towers Farm, 16 Portsdown Hill Road, Havant** | 31.1 | 31.7 | 0.6 | Slight Adverse | 31.7 | 0.6 | Slight Adverse | No |
| **36 Hurstville Drive, Waterlooville** | 17.3 | 19.5 | 2.2 | Slight Adverse | 19.5 | 2.2 | Slight Adverse | No |
| **Edenvale Nursing Home, 63-65, 63 Silvester Road, Waterlooville** | 15.5 | 16.5 | 1.0 | Negligible Adverse | 16.5 | 1.0 | Negligible Adverse | No |
| **2 Padnell Road, Waterlooville** | 18.1 | 17.9 | -0.2 | Negligible Beneficial | 17.9 | -0.2 | Negligible Beneficial | No |
| **Queenswood Surgery, 223 London Road, Waterlooville** | 18 | 18.4 | 0.4 | Negligible Adverse | 18.4 | 0.4 | Negligible Adverse | No |
| **197 London Road, Waterlooville** | 18 | 18.4 | 0.4 | Negligible Adverse | 18.4 | 0.4 | Negligible Adverse | No |
| **Trimak Ltd, Cowpalin Family Practice, 26-30, 26 London Road, Waterlooville** | 18.1 | 17.9 | -0.2 | Negligible Beneficial | 17.9 | -0.2 | Negligible Beneficial | No |
| **Purbrook Junior & Infant School, Aldermoor Road East, Waterlooville** | 15.1 | 16.2 | 1.1 | Negligible Adverse | 16.1 | 1.0 | Negligible Adverse | No |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **Oaklands Care Home, 216 Stakes Hill Road, Waterlooville** | 19.2 | 20.4 | 1.2 | Negligible Adverse | 20.4 | 1.2 | Negligible Adverse | No |
| **Latham Lodge Rest Home, 137-139, 137 Stakes Road, Waterlooville** | 19 | 19.4 | 0.4 | Negligible Adverse | 19.5 | 0.5 | Negligible Adverse | No |
| **Belmont Castle Rest Home, 18-20, 18 Portsdown Hill Road, Havant** | 31.1 | 31.7 | 0.6 | Slight Adverse | 31.7 | 0.6 | Slight Adverse | No |
| **79 Silvester Road, Waterlooville** | 15.5 | 16.5 | 1.0 | Negligible Adverse | 16.5 | 1.0 | Negligible Adverse | No |
| **31 Trefoil Close, Waterlooville** | 23.6 | 25.9 | 2.3 | Slight Adverse | 25.9 | 2.3 | Slight Adverse | No |
| **2 Lower Bere Wood, Waterlooville** | 17.3 | 19.5 | 2.2 | Slight Adverse | 19.5 | 2.2 | Slight Adverse | No |
| **9 Trefoil Close, Waterlooville** | 24.5 | 26 | 1.5 | Negligible Adverse | 26 | 1.5 | Negligible Adverse | No |
| **28 Hurstville Drive, Waterlooville** | 17.4 | 18.8 | 1.4 | Negligible Adverse | 18.8 | 1.4 | Negligible Adverse | No |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **1 Dogwood Dell, Waterlooville** | 17.9 | 19.2 | 1.3 | Negligible Adverse | 19.2 | 1.3 | Negligible Adverse | No |
| **3 Lily Avenue, Waterlooville** | 18 | 17.7 | -0.3 | Negligible Beneficial | 17.7 | -0.3 | Negligible Beneficial | No |
| **45 Hurstville Drive, Waterlooville** | 20 | 19.7 | -0.3 | Negligible Beneficial | 19.7 | -0.3 | Negligible Beneficial | No |
| **14 Siskin Grove, Waterlooville** | 34.4 | 33.9 | -0.5 | Slight Beneficial | 33.9 | -0.5 | Slight Beneficial | No |
| **Broadways Coffee Shop, 14 London Road, Waterlooville** | 15 | 14.3 | -0.7 | Negligible Beneficial | 14.3 | -0.7 | Negligible Beneficial | No |
| **33c, 33 London Road, Waterlooville** | 24.5 | 23.7 | -0.8 | Negligible Beneficial | 23.7 | -0.8 | Negligible Beneficial | No |
| **15 London Road, Waterlooville** | 24.7 | 23.7 | -1.0 | Negligible Beneficial | 23.7 | -1.0 | Negligible Beneficial | No |
| **44 Stakes Road, Waterlooville** | 18.9 | 17.9 | -1.0 | Negligible Beneficial | 17.9 | -1.0 | Negligible Beneficial | No |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **9 Debney Lodge, Mey Close, Waterlooville** | 29.3 | 27.1 | -2.2 | Slight Beneficial | 27.1 | -2.2 | Slight Beneficial | No |
| **179 Park Avenue, Waterlooville** | 17.9 | 15.5 | -2.4 | Slight Beneficial | 15.6 | -2.3 | Slight Beneficial | No |
| **2 Boundary Way, Portsmouth** | 35.1 | 32.7 | -2.4 | Moderate Beneficial | 32.6 | -2.5 | Moderate Beneficial | No |
| **2 Bedhampton Hill, Denmead** | 31.1 | 31.7 | 0.6 | Slight Adverse | 31.7 | 0.6 | Slight Adverse | No |
| **262 Stakes Hill Road, Waterlooville** | 20.4 | 21.6 | 1.2 | Negligible Adverse | 21.7 | 1.3 | Negligible Adverse | No |
| **32 Hurstville Drive, Waterlooville** | 17.3 | 19.5 | 2.2 | Slight Adverse | 19.5 | 2.2 | Slight Adverse | No |
| **54 Westbrook Grove, Waterlooville** | 15.1 | 16.2 | 1.1 | Negligible Adverse | 16.2 | 1.1 | Negligible Adverse | No |
| **Wansbeck, 8 Boundary Way** | 38.8 | 39.5 | 0.7 | Moderate Adverse | 39.2 | 0.4 | Moderate Adverse | No |

### Verification Zone 6

#### Verification Zone 6 Receptors

1.4.1.82. Within Verification Zone 6, the number of impacted receptors is shown in Table 44.

**Table 44 - Impacted Receptors in Verification Zone 6**

| Type | Receptor Count |
|---|---|
| **Residential** | 4,004 |
| **Commercial** | 445 |
| **Community** | 22 |
| **Military** | 2 |
| **Total Number of Receptors** | **4,473** |

1.4.1.83. Within the numbers of receptors shown in Table 44, there are receptors with particular sensitivity, as shown in Table 45.

**Table 45 - Particularly Sensitive Receptors in Verification Zone 6**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 9 |
| **Medical** | 1 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 0 |
| **Care Home** | 6 |

#### Verification Zone 6 Results

1.4.1.84. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 46.

**Table 46 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for Verification Zone 6**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **53.6** | 31.6 | 16.3 |

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| | DS1 (2026) Maximum Modelled Concentration | **53.6** | 31.7 | 16.3 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 228 | 8 | 7 |
| | No Change in Concentration | 3,757 | 4,251 | 4,446 |
| | Deterioration in Concentration | 488 | 214 | 20 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.6 | 0.2 | 0.1 |
| | Maximum Deterioration | 0.3 | 0.1 | 0.1 |

1.4.1.85. The summary results in Table 46 show an exceedance under the Do-Minimum scenario for $NO_2$ which is unchanged under the DS1 scenario. This result should be interpreted in conjunction with the information on verification and model error in Appendix 23.3 (Air Quality Traffic Modelling) of the ES Volume 3 (document reference 6.3.23.3) taking into account that it was decided not to use the model correction factors in this zone due to a large increase in the model error. Figure 23.7 Sheet 6 should be compared with Figure 23.6 Sheet 6 for a comparison of the DM against the DS1 scenario. There is negligible improvement in the highest predicted concentrations for $PM_{10}$ and no change for $PM_{2.5}$.

1.4.1.86. The highest predicted concentration of 53.6 µg/m³ for $NO_2$ under the DS1 scenario occurs at residential and commercial receptors adjacent to the westbound carriageway of the M27 in the Portsdown Hill and Paulsgrove areas.

1.4.1.87. The highest predicted deterioration of 0.3 µg/m³ in concentrations of $NO_2$ occurs at locations close to the M275 in the Tipner Lane area of Portsmouth where the DM concentration is 47.6 µg/m³, at residential receptors on Glebe Park Avenue where the DM concentration is 33.7 µg/m³, and on Holly Drive and Badger Brow where the DM concentration is 32.8 µg/m³.

1.4.1.88. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For $NO_2$ a greater number of receptors are predicted to experience an improvement compared to those predicted to experience a deterioration, whilst for $PM_{10}$ and $PM_{2.5}$ a greater number are predicted to experience a deterioration.

1.4.1.89. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 47.

**Table 47 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for Verification Zone 6**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **53.6** | 31.6 | 16.3 |
| | DS2 (2026) Maximum Modelled Concentration | **53.6** | 31.6 | 16.3 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 128 | 74 | 73 |
| | No Change in Concentration | 3,952 | 4,227 | 4,382 |
| | Deterioration in Concentration | 393 | 172 | 18 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.4 | 0.2 | 0.1 |
| | Maximum Deterioration | 0.3 | 0.1 | 0.1 |

1.4.1.90. The summary results in Table 47 show an exceedance under the Do-Minimum scenario for $NO_2$. This is predicted to be unchanged under the DS2 scenario. This result should be interpreted in conjunction with the information on verification and model error in Appendix 23.3 (Air Quality Traffic Modelling) of the ES Volume 3 (document reference 6.3.23.3) taking into account that it was decided not to use the model correction factors in this zone due to a large increase in the model error. Figure 23.8 Sheet 6 should be compared with Figure 23.6 Sheet 6 for a comparison of the DM against the DS2 scenario. There is also no change in the highest predicted concentrations for $PM_{10}$ and $PM_{2.5}$.

1.4.1.91. The highest predicted concentration of 53.6 µg/m³ for $NO_2$ under the DS2 scenario occurs at receptors adjacent to the westbound carriageway of the M27 in the Portsdown area.

1.4.1.92. The highest predicted deterioration of 0.3 µg/m³ in concentrations of $NO_2$ occurs at residential receptors on Glebe Park Avenue where the DM concentration is 33.7 µg/m³, and on Holly Drive and Badger Brow where the DM concentration is 32.8 µg/m³.

1.4.1.93. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For $NO_2$ and $PM_{10}$ a greater number of receptors are predicted to experience a deterioration compared to those predicted to experience a improvement, whilst for $PM_{2.5}$ a greater number are predicted to experience a deterioration.

1.4.1.94. $NO_2$ concentrations at a selection of representative receptors is shown in Table 48, consisting of high sensitivity receptors highlighted in Table 48, Figure 23.7 Sheet 6 and Figure 23.8 Sheet 6, and within 50 m of the road centreline, and those receptors predicted to experience the highest concentrations or largest changes (> ±0.2 µg/m³).

**Table 48 - Verification Zone 6 Representative Receptor Selection**

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **109 Browning Avenue, Portsmouth** | 53.6 | 53.6 | 0 | Moderate | 53.6 | 0.0 | Moderate | No |
| **Highbury College, Tudor Crescent, Portsmouth** | 49.1 | 49 | -0.1 | Moderate Beneficial | 49.2 | 0.1 | Moderate Beneficial | No |
| **Flat 33, Graduate Court, Tudor Crescent, Portsmouth** | 47.7 | 47.8 | 0.1 | Moderate Adverse | 47.7 | 0.0 | Moderate Adverse | No |
| **37 Portsdown View, Havant** | 40.3 | 40.5 | 0.2 | Slight Adverse | 40.4 | 0.1 | Slight Adverse | No |
| **43 Coleridge Road, Portsmouth** | 53.6 | 53.6 | 0 | Moderate | 53.6 | 0.0 | Moderate | No |
| **39 Falmouth Road, Portsmouth** | 53.6 | 53.6 | 0 | Moderate | 53.6 | 0.0 | Moderate | No |
| **1 Falmouth Road, Portsmouth** | 52.6 | 52.6 | 0 | Moderate | 52.6 | 0.0 | Moderate | No |
| **41 Tudor Crescent, Portsmouth** | 49 | 49.1 | 0.1 | Moderate Adverse | 49 | 0.0 | Moderate Adverse | No |
| **97 Hillsley Road, Portsmouth** | 52.8 | 52.8 | 0 | Moderate | 52.8 | 0.0 | Moderate | No |
| **19 Hillsley Road, Portsmouth** | 52.8 | 52.8 | 0 | Moderate | 52.8 | 0.0 | Moderate | No |

| Receptor | $NO_2$ Concentration (µg/m³) | | | | | | | In AQMA |
|---|---|---|---|---|---|---|---|---|
| | DM | DS1 | DS1 Change | IAQM | DS2 | DS2 Change | IAQM | |
| **Flat 10, Oyster Quay, Port Way, Portsmouth** | 45.6 | 45.5 | -0.1 | Moderate Beneficial | 45.6 | 0.0 | Moderate Beneficial | No |
| **Flat 2, Oyster Quay, Port Way, Portsmouth** | 45.6 | 45.5 | -0.1 | Moderate Beneficial | 45.6 | 0.0 | Moderate Beneficial | No |
| **Flat 39, Oyster Quay, Port Way, Portsmouth** | 45.6 | 45.5 | -0.1 | Moderate Beneficial | 45.6 | 0.0 | Moderate Beneficial | No |

### Air Quality Management Areas

#### AQMA Receptors

1.4.1.95. Within the City of Portsmouth, the combined number of impacted receptors affected by roads intersecting the city's AQMAs are shown in Table 49.

**Table 49 - Impacted Receptors affected by AQMAs**

| Type | Receptor Count |
|---|---|
| **Residential** | 14,515 |
| **Commercial** | 1,150 |
| **Community** | 89 |
| **Military** | 1 |
| **Total Number of Receptors** | **15,755** |

**1.4.1.96.** Within the numbers of receptors shown in Table 49, there are receptors with particular sensitivity, as shown in Table 50.

**Table 50 - Particularly Sensitive Receptors affected by AQMAs**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 37 |
| **Medical** | 17 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 1 |
| **Care Home** | 42 |

#### AQMA Results

1.4.1.97. During the construction stage a summary of the results for road closure and diversion traffic for the DS1 scenario are shown in Table 51.

**Table 51 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 1 (2026) for AQMAs**

| | | Construction Scenario DS1 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **48.2** | 23.6 | 14.6 |
| | DS1 (2026) Maximum Modelled Concentration | **48.3** | 23.6 | 14.6 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 2,403 | 1,633 | 695 |
| | No Change in Concentration | 5,261 | 12,066 | 14,637 |
| | Deterioration in Concentration | 8,091 | 2,056 | 423 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 1.2 | 0.3 | 0.1 |
| | Maximum Deterioration | 0.4 | 0.2 | 0.1 |

1.4.1.98. The summary results in Table 51 show that there is a deterioration of 0.5 µg/m³ in the highest predicted concentration at receptors within the Portsmouth AQMAs for $NO_2$ in the DS1 scenario. The maximum DS1 concentration of 48.3 µg/m³ is 121% the objective. Figure 23.10 should be compared to Figure 23.9 for a comparison of the DM against the DS1 scenario. There is no change in the highest predicted concentrations for $PM_{10}$ or $PM_{2.5}$.

1.4.1.99. The highest predicted concentration of 48.3 µg/m³ for $NO_2$ under the DS1 scenario occurs at high occupancy residential receptors on Old Commercial Street and Grafton Street, closest to the M275.

1.4.1.100. The highest predicted deterioration of 0.4 µg/m³ in concentrations of $NO_2$ occurs at receptors on Whale Island Way, close to the M275, where the DM concentration is 43.6 µg/m³.

1.4.1.101. The highest predicted improvement of 1.2 µg/m³ in concentrations of $NO_2$ occurs at high density residential receptors and one commercial receptor located north of the junction of Hayling Avenue and Eastern Road.

1.4.1.102. For $PM_{10}$ and $PM_{2.5}$, concentrations are not predicted to change at the majority of the receptors assessed for the DS1 scenario. For $NO_2$ a majority of receptors are predicted to experience a deterioration in ambient concentrations. For all modelled pollutants, more receptors are predicted to experience a deterioration than an improvement in pollutant concentrations. Overall, the level of maximum improvement is greater than the maximum deterioration, except for $PM_{2.5}$ where they are equal.

1.4.1.103. A summary of the results for diversions and road closures for the DS2 scenario are shown in Table 52.

**Table 52 – Non-construction Related Traffic Assessment Results for the Do-Something Scenario 2 (2026) for AQMAs**

| | | Construction Scenario DS2 2026 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Summary Results** | DM (2026) Maximum Modelled Concentration | **48.2** | 23.6 | 14.6 |
| | DS2 (2026) Maximum Modelled Concentration | **48.4** | 23.6 | 14.6 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 1005 | 673 | 0 |
| | No Change in Concentration | 11,857 | 13,848 | 15,472 |
| | Deterioration in Concentration | 2,893 | 1,234 | 283 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 0.2 | 0.1 | 0 |
| | Maximum Deterioration | 0.2 | 0.1 | 0.1 |

1.4.1.104. The summary results in Table 52 show that there is a deterioration of 0.2 µg/m$^3$ in the highest predicted concentration at receptors within the Portsmouth AQMAs for $NO_2$ in the DS2 scenario. The maximum DS2 concentration of 48.4 µg/m$^3$ is 121% of objective. Figure 23.11 should be compared to Figure 23.9. There is no change in the highest predicted concentrations for $PM_{10}$ or $PM_{2.5}$.

1.4.1.105. The highest predicted concentration of 48.4 µg/m³ for $NO_2$ under the DS2 scenario occurs at high occupancy residential receptors on Old Commercial Street and Grafton Street, closest to the M275.

1.4.1.106. The highest predicted deterioration of 0.2 µg/m³ in concentrations of $NO_2$ occurs at receptors on Grafton Street and Old Commercial Street where the DM concentration is 48.2 µg/m³, at high density residential receptors on Simpson Road near the M275 where the DM concentration is 44.2 µg/m³, at receptors on Whale Island Way where the DM concentration is 43.6 µg/m³, and on Simpson road nearer to Twyford Avenue where the DM concentration is 29.3 µg/m³.

1.4.1.107. The highest predicted improvement of 0.2 µg/m³ in concentrations of $NO_2$ occurs high occupancy residential receptors at the junction of Eastern Road with Hayling Avenue.

1.4.1.108. For all modelled pollutants, concentrations are not predicted to change at the vast majority of receptors assessed for the DS2 scenario. The maximum predicted improvement in concentrations of $NO_2$ and $PM_{10}$ is equal to the maximum predicted deterioration, however for $PM_{2.5}$ the maximum predicted deterioration and maximum predicted improvement are equal.

## 1.4.2. CONSTRUCTION TRAFFIC

### Construction Stage

#### Embedded Mitigation

1.4.2.1. Embedded mitigation is described in the CTMP, and includes the following:

- Temporary traffic signals to be used where lane closures or partial carriageway closure is required. during peak times the signals will be manually adjusted to ensure delays are kept to a minimum;
- Road closures may be required where the highway is of insufficient width to accommodate works and have traffic continue to flow at a safe distance. Where this is required diversion routes will be agreed with the local highways authority; and
- Construction hours will be scheduled to avoid peak times, especially where schools are in the immediate vicinity of works, and to avoid particular major scheduled events.

#### Impacts

1.4.2.2. Within 200 m of the routes affected by construction traffic, the number of impacted receptors is shown in Table 53.

**Table 53 - Impacted Receptors for Construction Traffic**

| Type | Receptor Count |
|---|---|
| **Residential** | 13,071 |
| **Commercial** | 578 |
| **Community** | 55 |
| **Military** | 0 |
| **Total Number of Receptors** | **13,704** |

1.4.2.3. Within the numbers of receptors shown in Table 53, there are receptors with particular sensitivity, as shown in Table 54.

**Table 54 - Particularly Sensitive Receptors for Construction Traffic**

| Sensitive Receptor | Receptor Count |
|---|---|
| **Schools** | 16 |
| **Medical** | 11 |
| **Hospice** | 0 |
| **Sheltered Accommodation** | 1 |
| **Care Home** | 54 |

1.4.2.4. A summary of the results for generated construction traffic for the DS1 scenario is shown in Table 55, Figure 23.6, Figure 23.7 and Figure 23.10.

**Table 55 – Generated Construction Traffic Assessment Results for the Do-Something Scenario 1 (2026)**

| | | Construction Scenario DS1 2022 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Number of properties greater than limit value** | DM (2026) Maximum Modelled Concentration | 33.6 | 23.1 | 13.0 |
| | DS1 (2026) Maximum Modelled Concentration | 33.5 | 19.6 | 12.7 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 8,586 | 7,717 | 6,020 |
| | No Change in Concentration | 3,107 | 4,484 | 6,609 |
| | Deterioration in Concentration | 2,011 | 1,503 | 1,075 |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 9.2 | 5.1 | 1.5 |
| | Maximum Deterioration | 10.0 | 1.8 | 0.5 |

1.4.2.5. The summary of results shown in Table 55 shows that there is an improvement of 0.1 µg/m$^3$ in the highest predicted concentration at receptors within the study area for $NO_2$. The maximum DS1 concentration of 33.5 µg/m$^3$ is 84 % of the objective. There is a large improvement in the highest predicted concentration for $PM_{10}$ and a smaller improvement in the maximum $PM_{2.5}$ concentration.

1.4.2.6. The highest predicted $NO_2$ concentration under the DS1 scenario is located at a single residential receptor at 72 Lower Road, east of the Bedhampton Roundabout.

1.4.2.7. The maximum predicted improvement of 9.2 µg/m$^3$ in $NO_2$ concentrations is predicted at residential receptors off the A3 London Road in the Corbett Road area.

1.4.2.8. The maximum predicted deterioration of 10.0 µg/m$^3$ in $NO_2$ concentrations is located at residential receptors the B2150 Hambledon Road where the DM concentration is 14.9 µg/m$^3$.

1.4.2.9. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are predicted to improve at more receptors than are predicted to deteriorate under scenario DS1.

1.4.2.10. Areas of predicted improvement are modelled in the vicinity of planned temporary road closures as part of the Proposed Development.

1.4.2.11. A summary of the results for generated construction traffic for the DS2 scenario are shown in Table 56, Figure 23.8, Figure 23.9 and Figure 23.11.

**Table 56 – Generated Construction Traffic Assessment Results for the Do-Something Scenario 2 (2026)**

| | | Construction Scenario DS2 2022 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m$^3$)** | | **40** | **40** | **25** |
| **Number of properties greater than limit value** | DM (2026) Maximum Modelled Concentration | 33.6 | 23.1 | 13.0 |
| | DS2 (2026) Maximum Modelled Concentration | 29.6 | 18.5 | 12.7 |
| | Removed Exceedances | 0 | 0 | 0 |
| | New Exceedances | 0 | 0 | 0 |
| **Total Number of Properties** | Improvement in Concentration | 13,264 | 12,177 | 8,030 |
| | No Change in Concentration | 244 | 1,281 | 5,573 |
| | Deterioration in Concentration | 196 | 246 | 101 |

| | | Construction Scenario DS2 2022 | | |
|---|---|---|---|---|
| **Pollutant** | | **$NO_2$** | **$PM_{10}$** | **$PM_{2.5}$** |
| **Annual Mean Limit Value (µg/m³)** | | **40** | **40** | **25** |
| **Do Something-Do Minimum Annual Mean Change (µg/m³)** | Maximum Improvement | 9.4 | 4.9 | 1.5 |
| | Maximum Deterioration | 7.0 | 1.0 | 0.0 |

1.4.2.12. The summary results in Table 56 show that there is an improvement of 4.3 µg/m$^3$ in the highest predicted concentration at receptors within the study area for $NO_2$ in the DS2 scenario. This is a larger improvement than the DS1 scenario. The maximum DS2 concentration of 29.6 µg/m$^3$ is 74 % of the objective. There is a large improvement in the highest predicted concentrations for $PM_{10}$, and a smaller improvement in the maximum $PM_{2.5}$ concentration.

1.4.2.13. The highest predicted concentration for $NO_2$ of 29.6 µg/m³ under the DS2 scenario is located at a single residential receptor at 72 Lower Road, east of the Bedhampton Roundabout.

1.4.2.14. The maximum predicted improvement of 9.4 µg/m³ in $NO_2$ concentrations is predicted at residential receptors along Mountbatten Drive, Alexander Close and Corbett Road.

1.4.2.15. The maximum predicted deterioration of 7.0 µg/m³ in $NO_2$ concentrations is located at two residential receptors, St Michaels and The Cedars on Hambledon Road where the DM concentration is 14.9 µg/m³.

1.4.2.16. For $NO_2$, $PM_{10}$ and $PM_{2.5}$, concentrations are predicted to improve at more receptors than are predicted to deteriorate under scenario DS2. More receptors will experience an improvement under DS2 than DS1. Whilst some properties are shown to experience a deterioration in concentrations of all pollutants, the highest predicted deterioration is of a lower magnitude than the highest predicted improvement for $NO_2$ $PM_{10}$ and $PM_{2.5}$.

### 1.4.3. COMPLIANCE WITH DIRECTIVE 2008/50/EC

1.4.3.1. Due to the nature of the diversions, road closures and construction traffic operation, all of the predicted impacts are transitory in nature, and so are not predicted to impact on the ability of the Compliance Risk Road Network applicable to the proposed development to meet its obligations under EU Directive 2008/50/EC.

1.4.3.2. There is however, an area within the City of Portsmouth where the roadside concentration is predicted to be above the limit value for $NO_2$ of 40 µg/m³. The predicted concentration for 2026 at the roundabout of A3, Hope Street and Commercial Road is predicted to be 45.8 µg/m³ under the Do-Minimum and DS1 scenarios, and 44.9 µg/m³ under the DS2 scenario. The predicted 2026 compliance concentration for this area, adjusted using the Defra Roadside $NO_2$ Projection Factors (Department for Environment, Food and Rural Affairs, 2019), is 31.6 µg/m³.

1.4.3.3. The A3 between the roundabout with Hope Street and Commercial Street, up to the junction with Princess Royal Road is predicted to experience concentrations between 36 µg/m³ and 39 µg/m³, suggesting exceedances of the limit value may be possible taking into account error in the modelling, however due to the temporary nature of the diversions, the risk of exceedance is substantially reduced.

### 1.4.4. DECOMMISSIONING STAGE

1.4.4.1. Methodology and effects from decommissioning are expected to be of the same nature, magnitude and significance as for construction.

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