8 AIR QUALITY

8.1 Introduction

8.1.1 This chapter considers the likely significant effects on air quality associated with the construction and operation of the proposed development, as presented in Chapter 2: Proposed Development Description.

8.1.2 The specific objectives of the chapter are to:

- describe the air quality baseline;
- describe the assessment methodology and significance criteria used in completing the impact assessment;
- describe the potential effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

8.1.3 The assessment has been carried out by Ben Madge (Ramboll) who has 3 years' experience in carrying out air quality assessments for EIAs and has been reviewed by Graham Harker who has been a full member of the Institute of Air Quality Management (IAQM) for more than 10 years.

8.1.4 This chapter refers to the following Technical Appendices (refer to Volume 3):

- Technical Appendix 8.1: Air Quality Policy;
- Technical Appendix 8.2: Air Quality Modelling Inputs for the Detailed Assessment;
- Technical Appendix 8.3: STAG assessment Worksheets; and
- Technical Appendix 8.4: Model Results.

This chapter refers to the following Figures (refer to Volume 4):

- Figure 8.1: Affected Roads as Identified Using DMRB Screening;
- Figure 8.2: Modelled Representative Sensitive Receptors;
- Figure 8.3: Modelled Representative Sensitive Receptors for Construction Traffic;
- Figure 8.4: All Modelled Roads; and
- Figure 8.5: Monitoring Locations Used to Verify the Road Traffic Dispersion Model.

8.2 Scope of Assessment

8.2.1 The scope of the assessment was limited to the following:

- impact of emissions arising during the construction phase from the construction activities and the movement of construction vehicles; and
- impact of exhaust emissions arising from vehicle emissions associated with the operation of the proposed development.

Scoping and Consultation

8.2.2 As per the EIA Scoping Report (refer to Technical Appendix 1.2 in Volume 3), the original air quality assessment scope proposed not to follow Design Manual for Roads and Bridges (DMRB)

guidance[1] due to the limitations of the traffic data available at that time. However, after subsequent discussions with Transport Scotland more up-to-date traffic modelling was undertaken. Details of the consultation process which confirmed the scope of the air quality assessment are provided in Technical Appendix 1.2 in Volume 3.

8.2.3 The scope of the air quality assessment follows the DMRB guidance and methodology.

8.2.4 In addition, the scope of the air quality assessment was agreed with West Lothian Council (WLC), and the significance of the impacts in proximity to the actual junction at existing sensitive receptors have been assessed following IAQM guidance[2].

8.2.5 DMRB Volume 11 Section 3 Part 1 HA 207/07 and HA Interim Advice Note (IAN) 174/13[3] provides the criteria for conducting an assessment of the impact of a scheme on local air quality. This guidance states that affected roads to be assessed meet the following criteria:

- road alignment will change by 5 metres (m) or more; or
- daily traffic flows will change by 1,000 annual average daily traffic (AADT) or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/hr (kilometres per hour) or more; or
- peak hour speed will change by 20 km/hr or more.

8.2.6 The extent of the links meeting the above criteria considered to be significant with a 200 m buffer which form the wider 'study area' are shown in Figure 8.1 in Volume 4.

8.2.7 It should be noted that subsequent to the assessment being completed the DMRB methodology was updated including all of the IAN notes. However, it is considered that the overall conclusions of the assessment would not change as a result of the update of the methodology.

Potential Effects Scoped Out

8.2.8 The following issues were scoped out of the air quality assessment:

- The impact of the assessment upon the regional air quality has not been carried out as the DMRB Guidance has been withdrawn. On this basis total emissions for the affected road network (ARN) for each scenario assessed have not been calculated.
- The impact of the proposed development has not been assessed within the nearby Air Quality Management Areas (AQMA) as these generally fall outside of the affected road network, as defined above. The exception to this is the WLC Broxburn AQMA and the recently declared Newton AQMA.
- The Scottish Transport Appraisal Guidance[4] (STAG) states that an assessment of the change in roadside levels of particulate matter (PM_{10}) and nitrogen dioxide (NO_2) is to be made of all affected roads. However, the LAQ Excel spreadsheet from WebTAG indicated by the link in Section 17[5] was updated in May 2019 to consider particulate matter ($PM_{2.5}$)

[1] Highways England, Transport Scotland, Welsh Government and Department for Infrastructure (Northern Ireland), 1992. Design Manual for Roads and Bridges (DMRB) (as amended August 2018) [online]. Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm (Accessed on 17/09/18).

[2] Moorcroft and Barrowcliffe, et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London

[3] Highways Agency, 2013. INTERIM ADVICE NOTE 174/13: Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07).

[4] Transport Scotland, 2008. Scottish Transport Appraisal Guidance.

[5] Transport Scotland, 2014. Section 17 [online]. Available at: https://www.transport.gov.scot/publication/stag-technical-database/section-17/#s171

in place of PM_{10}. This assessment has followed the STAG guidance and not assessed $PM_{2.5}$ and used the previous version of the LAQ excel spreadsheet because at the time of completion the DMRB assessment methodology had not been updated to include $PM_{2.5}$. Consideration of impacts on $PM_{2.5}$ was given in the detailed air quality assessment carried out for the worst case receptor locations.

- DMRB advises that *"…the worst year in the first 15 years from opening needs to be assessed"*. As air quality impacts from transport, as assessed using DMRB, reduce with time, due to improved emissions from vehicles, the opening year (2022) is considered to be the 'worst year'. No other years were therefore considered by this assessment.

8.3 Assessment Methodology

Construction Dust

8.3.1 An assessment of the effects of dust emissions during construction has been undertaken by considering relevant IAQM guidance[6] and the availability and applicability of dust control measures.

8.3.2 Factors which affect the potential for dust to be created and released from the site during construction activities and which migrate and deposit on surfaces and potentially cause nuisance and harm to human health include:

- The nature, scale and duration of activities;
- Dust control measures employed;
- The local climate and meteorology; and
- The character and land use of the surrounding area.

8.3.3 Published guidance from the IAQM[7] sets out criteria and general conditions which can be applied to construction sites to predict the magnitude of the dust emissions from activities such as demolition, earthworks, construction and track out. Dust emission magnitude is classified as 'large', 'medium' or 'small' depending on certain conditions.

8.3.4 An assessment is undertaken if there are sensitive receptors which could potentially be affected by construction dust. The screening criteria to determine the existence of sensitive receptors is provided below in Table 8.1.

Table 8.1: Construction Dust Screening Criteria

Receptor Type	Screening Criteria
A 'human receptor' within…	350 m of the boundary of the site; or 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).
A 'ecological receptor' within…	50 m of the boundary of the site; or 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

8.3.5 The construction assessment will use the IAQM planning guidance indicative criteria thresholds to assess the need for a detailed assessment of the construction traffic emissions. The indicative criteria for a detailed assessment for locations outside of AQMAs is 100 AADT HDV

[6] Holman, et al., 2016. IAQM Guidance on the assessment of dust from demolition and construction V1.1. Institute of Air Quality Management, London.

[7] Holman, et al., 2014. IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. Available at: www.iaqm.co.uk/ text/guidance/construction-dust-2014.pdf

(>3.5 tonnes). The IAQM impact assessment significance will be applied to these impacts, as discussed below.

Operational Vehicle Emissions

8.3.6 A number of different methodologies were used to assess the impact of operational vehicle emissions. A DMRB screening assessment was used to identify whether the proposed junction would have an overall positive or negative impact on air quality. A more detailed assessment was carried out to assess the potential impacts arising from the operation of the scheme over the affected road network at identified worst case receptors following the detailed DMRB methodology. In addition, at the request of WLC impacts at receptors in the immediate vicinity of the junction were assessed using the EPUK/IAQM guidance. Further details of each methodology are given below.

DMRB Screening Assessment

8.3.7 The methodology to assess the permanent impacts from the operation of the scheme upon the local air quality follows the guidance stated in DMRB HA 207/07, as well as the Highway's Agency's Interim Advice Note (IAN) 174/13 'Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality' (HA207/07)'.

8.3.8 The level of exposure to NO_2 and PM_{10} concentrations have been calculated using the method outlined in STAG Technical Database Section 7 TAG unit A3 Chapter 3. This multiplies near road calculated concentrations by the number of properties in each distance band to produce an assessment score for each affected road link, so the 'Do Minimum' (DM) scenario (i.e. no proposed development implemented) and the 'Do Something' (DS) (i.e. proposed development built and in operation) can be compared. The scores are usually quoted as numbers without units.

8.3.9 Pollutant concentrations were calculated using the DMRB Screening Method Spreadsheet, which calculates concentrations of pollutants at specific locations, based on the distance to the road centre, the AADT flow, speed and composition of vehicles on the road and background air quality. Whilst it is acknowledged that the emission factors in the version of the DMRB available at the time of the assessment were out of date, given that the data is used for a comparative assessment, rather than to predict actual concentrations at individual receptor locations, it is considered that the use of the DMRB spreadsheets for this part of the assessment is appropriate.

8.3.10 It should also be noted that the DMRB methodology was updated in November 2019[8] and now incorporates the latest emission factors. The guidance remains broadly the same, although the new guidance does include a methodology for carrying out a Compliance Risk Assessment to demonstrate impacts on roads included within Defra's Pollution Climate Model (PCM) which is used to demonstrate compliance with the EU air quality objectives. As the assessment for the proposed development has indicated compliance with relevant objectives at all receptor locations when the proposed development is complete and operational, the absence of this element of the assessment is not considered significant.

8.3.11 As previously identified, DMRB advises that "*…the worst year in the first 15 years from opening needs to be assessed"*. As air quality impacts from transport are predicted to, reduce with time, due to improved emissions from vehicles experience has shown that the maximum impacts arise in the year of opening as the future predicted reductions in emissions outweigh

[8] Highways England, 2019, LA 105 Air Quality

the increase in emissions from additional road traffic. The opening year (2022) is therefore considered to be the 'worst year'. The traffic data for the 2022 scenario was provided by Sweco the transport consultants.

DETAILED ASSESSMENT

8.3.12 To assess the permanent impacts from the complete and operational proposed development upon identified worst case sensitive receptors for each road within the affected road network (ARN), the ADMS Roads air dispersion model was used.

8.3.13 The modelling methodology and data inputs used in this assessment are provided in Technical Appendix 8.2 in Volume 3. The assessment used the projected emissions and background data for 2022 and therefore takes into account the long term trends in improvements in air quality.

Baseline Characterisation

Study Area

8.3.14 The 'study area' was defined by the scoping exercise described above in Paragraph 8.2.5 which was carried out by the Transport Consultant, Sweco. The road network included within the assessment is presented in Figure 8.4 in Volume 4.

Desk Study / Field Survey

8.3.15 In order to establish the existing baseline air quality in the vicinity of the site, relevant monitoring data was reviewed and assessed. Data was obtained from the following sources:

- WLC and City of Edinburgh Council (CEC) monitoring data from Annual Progress Reports[9,10];
- Air Quality in Scotland background maps[11]; and
- Department for Environment, Food and Rural Affairs' (Defra) air quality background maps[12].

8.3.16 No site-specific air quality monitoring was carried out.

Assessment of Effects

Sensitivity Criteria

DEMOLITION AND CONSTRUCTION DUST

8.3.17 Published IAQM guidance[13] determines the receptor sensitivity in relation to dust soiling effects, health effects of particulates and ecological effects due to construction activities.

[9] West Lothian Council, 2018. 2018 Air Quality Annual Progress Report. 2018. Available online: https://www.westlothian.gov.uk/media/26639/2018-06-LAQM-Annual-Progress-Report-2018/pdf/2018-06-30_LAQM_Annual_Progress_Report_2018_(A9177277)1.pdf

[10] City of Edinburgh Council, 2017. 2017 Air Quality Annual Progress Report. Available online: http://www.scottishairquality.scot/assets/documents//Edinburgh_Final_APR_2017_for_web_publishing.pdf

[11] Air Quality in Scotland. Online: http://www.scottishairquality.co.uk/data/mapping?view=data Accessed 30/07/2018

[12] Department for Environment, Food and Rural Affairs (Defra), 2018. UK Air [online]. Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015 (Accessed 30/07/2018).

[13] Holman, et al., 2014. IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. Available at: www.iaqm.co.uk/ text/guidance/construction-dust-2014.pdf

OPERATIONAL VEHICLE EMISSIONS

8.3.18 Sensitivity of receptors has been determined in relation to where the UK air quality objectives are applicable regarding NO_2 and PM_{10} from vehicles. The annual mean objective would apply at residential properties, schools, hospitals and care homes and are therefore considered to be of 'high' sensitivity.

8.3.19 The annual mean objective should generally not apply at façades of commercial buildings and therefore these are considered to be of 'low' sensitivity.

Magnitude of Impact

DEMOLITION AND CONSTRUCTION DUST

8.3.20 Published guidance from the IAQM sets out criteria and general conditions which can be applied to construction sites to predict the magnitude of the dust emissions from activities such as demolition, earthworks, construction and track out. Dust emission magnitude is classified as 'large', 'medium' or 'small' depending on certain conditions.

DEMOLITION AND CONSTRUCTION TRAFFIC

8.3.21 The magnitude of impacts at the modelled receptor locations has been assessed using the EPUK/IAQM guidance as detailed in Table 8.5 below.

OPERATIONAL VEHICLE EMISSIONS

8.3.22 DMRB IAN 174/13 sets out a process to assess impacts by magnitude and whether the proposed development causes an overall significant impact. It states *"…that whilst the modelled results are reasonable there is still some element of residual uncertainty, hereafter referred to as Measure of Uncertainty (MoU). This is due to inherent uncertainty in air quality monitoring, modelling and the traffic data used in the assessment"*.

8.3.23 The different magnitude of change criteria for NO_2, PM_{10} and $PM_{2.5}$ concentrations, which is described as a percentage of the relevant air quality threshold, are presented in Tables 8.2-8.4.

Table 8.2: IAN 174/13 Magnitude Criteria for NO_2

Magnitude of Change in Concentration	Value of Change in Annual Average NO_2
Large (>4)	Greater than full MoU value of 10 % of the air quality objective (4 micrograms per cubic metre (µg/m³)).
Medium (>2 to 4)	Greater than half of the MoU (2 µg/m³), but less than the full MoU (4 µg/m³) of 10 % of the air quality objective.
Small (0.4 to 2)	More than 1 % of objective (0.4 µg/m³) and less than half of the MoU i.e. 5% (2 µg/m³). The full MoU is 10 % of the air quality objective (4 µg/m³).
Imperceptible (≤0.4)	Less than or equal to 1 % of objective (0.4 µg/m³).

Table 8.3: IAN 174/13 Magnitude Criteria for PM_{10}

Magnitude of Change in Concentration	Value of Change in Annual Average PM_{10}
Large (>1.8)	Greater than full MoU value of 10 % of the air quality objective (1.8 µg/m³).
Medium (>0.9 to 1.8)	Greater than half of the MoU (0.9 µg/m³), but less than the full MoU (1.8 µg/m³) of 10 % of the air quality objective.

Table 8.3: IAN 174/13 Magnitude Criteria for PM_{10}	
Magnitude of Change in Concentration	**Value of Change in Annual Average PM_{10}**
Small (0.18 to 0.9)	More than 1 % of objective (0.18 µg/m³) and less than half of the MoU, i.e. 5 % (9 µg/m³). The full MoU is 10 % of the air quality objective (1.8 µg/m³).
Imperceptible (≤0.18)	Less than or equal to 1 % of objective (0.18 µg/m³).

Table 8.4: IAN 174/13 Magnitude Criteria for $PM_{2.5}$	
Magnitude of Change in Concentration	**Value of Change in Annual Average PM_{10}**
Large (>1.0)	Greater than full MoU value of 10 % of the air quality objective (1.0 µg/m³).
Medium (>0.5 to 1.0)	Greater than half of the MoU (0.5 µg/m³), but less than the full MoU (1.0 µg/m³) of 10 % of the air quality objective.
Small (0.1 to 0.5)	More than 1 % of objective (0.1 µg/m³) and less than half of the MoU i.e. 5 % (0.5 µg/m³). The full MoU is 10 % of the air quality objective (1.0 µg/m³).
Imperceptible (≤0.1)	Less than or equal to 1 % of objective (0.1 µg/m³).

8.3.24 The IAN 174/13 magnitude criteria will be applied to the results from the detailed DMRB air quality assessment at the identified worst case sensitive receptor locations for the ARN.

8.3.25 For the three identified receptors closest to the proposed junction (the castle, Niddry Mains House, Myre Farm) the magnitude of impacts has also been assessed following the IAQM/EPUK guidance. The guidance has produced a matrix which is to be used to calculate the impacts at individual receptor locations which takes into account both the change in concentration and the resulting overall concentration as given in Table 8.5.

Table 8.5: Impact Descriptors for Individual Receptors				
Long Term Average Concentration at Receptor with Proposed Development	**Percentage Change in Concentration Relative to Annual Mean Air Quality Objective (AQO)**			
	<1	**2 - 5**	**6 – 10**	**>10**
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 – 94% of AQO	Negligible	Slight	Moderate	Moderate
95 – 102% of AQO	Slight	Moderate	Moderate	Substantial
103 – 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial
AQO for NO_2 and PM_{10} is 40 µg/m³ (microgram per cubic metre) and for $PM_{2.5}$ is 25 µg/m³ Changes of less than 0.5 % are considered to be 'negligible'.				

Significance of Effect

CONSTRUCTION AND DEMOLITION

8.3.26 Using the IAQM assessment methodology to identify the appropriate level of mitigation and on the assumption the identified mitigation measures are applied commensurate with the risk of potential dust impacts, the IAQM guidance indicates that that the potential for residual effects to arise during the construction stage would be at worst 'slight adverse'.

8.3.27 Where demolition and construction traffic is of sufficient magnitude to require a quantitative assessment using dispersion modelling, the EPUK/IAQM significance criteria outlined for the

operational impacts have been used. As indicated by the EPUK/IAQM guidance, professional judgement has been used to determine the overall significance of air quality effects.

OPERATIONAL VEHICLE EMISSIONS

8.3.28 The IAN 174 /13 states that "Where the outcomes of the assessment indicate that either all modelled concentrations are less than the air quality thresholds or any changes above the air quality thresholds but where the change is imperceptible, then the scheme effect is likely to be not significant for local air quality". Changes greater than imperceptible are compared to guideline bands which sets an upper level of likely non-significance and the lower level of likely significance. These tables are reproduced in Tables 8.6-8.8.

Table 8.6: IAN 174/13 Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in NO_2 ($\mu g/m^3$)	Number of Receptors with:	
	Worsening of Air Quality Objective already above Objective or Creation of a New Exceedance	Improvement of an Air Quality Objective already above Objective or the Removal of an Existing Exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

Table 8.7: IAN 174/13 Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in PM_{10} ($\mu g/m^3$)	Number of Receptors with:	
	Worsening of Air Quality Objective already above Objective or Creation of a New Exceedance	Improvement of an Air Quality Objective already above Objective or the Removal of an Existing Exceedance
Large (>1.8)	1 to 10	1 to 10
Medium (>0.9 to 1.8)	10 to 30	10 to 30
Small (>0.18 to 0.9)	30 to 60	30 to 60

Table 8.8: IAN 174/13 Guideline to Number of Properties Constituting a Significant Effect

Magnitude of Change in $PM_{2.5}$ ($\mu g/m^3$)	Number of Receptors with:	
	Worsening of Air Quality Objective already above Objective or Creation of a New Exceedance	Improvement of an Air Quality Objective already above Objective or the Removal of an Existing Exceedance
Large (>1.0)	1 to 10	1 to 10
Medium (>0.5 to 1.0)	10 to 30	10 to 30
Small (>0.1 to 0.5)	30 to 60	30 to 60

8.3.29 The significance criteria provided in the EPUK/IAQM's 'Planning for Air Quality' guidance on assessing the impacts of developments on air quality[14], has also been used to assess the significance of effects on air quality as a result of the proposed development at the three identified receptors in proximity to the proposed development.

[14] Moorcroft and Barrowcliffe, et al., 2017. Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

8.3.30 The guidance states that overall significance should be based on professional judgement and *"…will need to take into account such factors as:*

- *The existing and future air quality in the absence of the development;*
- *The extent of current and future population exposure to the impacts; and*
- *The influence and validity of any assumptions adopted when undertaking the prediction of impacts."*

8.4 Baseline Conditions

8.4.1 The site is located in a largely rural area, which is crossed by major transport infrastructure (motorway and rail links). The main source of air pollutants in the vicinity of the site is road transport, particularly related to the existing M9 motorway.

8.4.2 The affected road network is located within West Lothian and the rural fringe of west Edinburgh, split between WLC and CEC jurisdictions. The affected road network incorporates A roads, minor B roads and motorways, and receptors within 200 m of the affected road network includes small urban areas, business parks and isolated residential properties. One statutory ecological receptor lies within the affected area, the Philpstoun Muir Site of Special Scientific Interest (SSSI).

Current Baseline

8.4.3 WLC and CEC carry out air quality monitoring at a number of locations throughout their jurisdiction. A summary of the results from those sites in proximity to the site is presented in Tables 8.9 and 8.10, and the locations of the monitoring stations are shown in Figure 8.5 in Volume 4.

Table 8.9: NO_2 Concentrations Recorded at Local Monitoring Stations

Monitor	Type	Distance to kerb (m)	Authority	Years						
				2011	2012	2013	2014	2015	2016	2017
Annual Mean (µg/m³) (40)										
CM2	CM	2	WLC	36	39	35	32	30	32	30
CM3	CM	2	LWC	NA	32	24	21	21	23	19
ID10	CM	6.2	CEC	NA	29	27	27	26	28	26
DT1	DT	1.8	LWC	32	37	30	24	23	24	23
DT2	DT	3	WLC	35	39	37	28	24	28	26
DT3	DT	4	WLC	36	38	34	26	24	26	26
DT5	DT	2	WLC	37	39	37	28	23	27	27
16	DT	2.8	CEC	44	47	40	40	40	37	35
15a	DT	1.6	CEC	NA	NA	NA	34	39	33	35
58	DT	2.9	CEC	52	48	46	45	45	41	44
15	DT	2	CEC	41	40	39	37	40	40*	41
Number of Hours exceeding 200 µg/m³ (18 exceedances allowed)										
CM2	CM	2	WLC	0	0	0	0	0	0	0

Table 8.9: NO_2 Concentrations Recorded at Local Monitoring Stations

Monitor	Type	Distance to kerb (m)	Authority	Years						
				2011	2012	2013	2014	2015	2016	2017
CM3	CM	2	LWC	0	0	0	0	0	0	0
ID10	CM	6.2	CEC	NA	0	0	0	0	0	NA

Notes:

CM = Continuous Monitor; DT = Diffusion Tube; NR = Not Recorded; NA = Not Available.

Bold: concentrations in exceedance of NAQO (National Air Quality Objective) (annual mean: 40 µg/m^3, Hourly mean 200 µg/m^3, 18 exceedances a year permitted).

Bold underlined: concentrations above 60 µg/m^3 indicating potential exceedances of the short-term NO_2 NAQO

*: Data capture <75 %

Table 8.10: PM_{10} Concentrations Recorded at Local Monitoring Stations

Monitor	Classification	Distance to kerb (m)	Years						
			2011	2012	2013	2014	2015	2016	2017
Annual Mean (µg/m^3) (18)									
CM2	CM	2	18	16	16	17	15	15	14
CM3	CM	2	NA	14.7	19	22	16	15	15
ID10	CM	6.2	NA	15	16	16	16	17	NA
Number of Days exceeding 50 µg/m^3 (7 exceedances allowed)									
CM2	CM	2	3	2	0	2	2	0	0
CM3	CM	2	NA	0	4	1	0	0	0
ID10	CM	6.2	NA	0	1	0	1	0	NA

Notes:

Bold: concentrations in exceedance of NAQO

8.4.4 The closest monitoring station to the site is located at a roadside continuous monitor CM3, located 1.2 kilometres (km) north of the site boundary. Annual mean NO_2 concentrations recorded at this station indicate a comfortable compliance with the annual mean objective (40 µg/m^3). Recorded one hour mean concentrations at this location indicate compliance with the hourly mean NO_2 NAQO.

8.4.5 Roadside monitoring conducted in proximity to Junction 1 of the M9 motorway and the M8 motorway (approximately 4.2 km to the south east of the site) indicates some exceedances of the annual mean NO_2 objective close to the kerb at diffusion tube monitoring sites, with concentrations further from the kerbside dropping to compliance. The automatic monitor located 6 m from the A8 kerbside has recorded concentrations comfortably in compliance with the annual mean objective.

8.4.6 Roadside monitoring located in the Broxburn AQMA (approximately 3.8 km to the south of the site) includes automatic and diffusion tube monitoring. NO_2 concentrations have been in compliance with both the annual and hourly mean NO_2 objectives for all years shown above.

8.4.7 PM_{10} concentrations are recorded at the roadside continuous monitor locations CM3 (approximately 1.2 km to the north of the site) and ID10 (4.5 km to the south east of the site). The annual and 24-hour mean concentrations comply with the relevant PM_{10} objectives.

8.4.8 Concentrations across the site would be expected to meet the relevant NO_2 and PM_{10} short- and long-term air quality objectives.

8.4.9 No local $PM_{2.5}$ monitoring is conducted near the site.

Modelled Background Concentration

8.4.10 No local background monitoring is available. Background oxides of nitrogen (NO_x), NO_2 and PM_{10} concentrations have been obtained from the Air Quality in Scotland website[15] which have been produced to aid local authorities in carrying out their review and assessment duties. $PM_{2.5}$ concentrations have been obtained from the Defra modelled background maps. The background concentrations used in the assessment are provided in Technical Appendix 8.2 in Volume 3.

Future Baseline

8.4.11 Air quality at roadside locations is predicted to decrease in future years due to the gradual renewal of the national vehicle fleet with less polluting and more efficient vehicles. In addition, the actions outlined in the WLC Air Quality Action Plan (AQAP)[16] are expected to improve air quality within Scotland, with the aim of compliance at all locations with European Union (EU) targets by year 2020.

8.4.12 Without the proposed development, the air quality across the site would be expected to remain compliant with relevant air quality objectives.

8.4.13 Due to historic uncertainties regarding vehicle emissions and fleet turnover in future years, the methodology of the scoping statement submitted to Transport Scotland stated that modelling of the future baseline would not take into account the reduction in pollutant emissions through the gradual introduction of cleaner vehicles and would hold the background concentration and emission factors at the base year levels. Since then, Defra has produced a new emission factor toolkit (EFT V9) and related background mapping using 2017 as the reference year. Scotland-specific modelled background concentrations are available online using 2016 as a reference year for NO_2, NO_x and PM_{10}. This latest release of factors and backgrounds are intended to address historic inaccuracies and provide as accurate future predicted concentrations as possible. As such, the modelling has used the opening year emission factors (2022) and predicted background concentrations.

DMRB Screening Assessment Receptors

8.4.14 Following the guidance of DMRB HA207/07, the study area for operational impacts of the proposed junction has been defined within a 200 m of the centre line of the roads identified as being significantly affected by the proposed development as defined in the scoping section of this chapter. The numbers of receptors within this 200 m buffer has been grouped within 50 m bands. A summary of the numbers of sensitive receptors within these 50 m bands is provided in Table 8.11.

[15] Air Quality in Scotland, 2018. Data for Local Authority Review and Assessment purposes [online]. Available at: http://www.scottishairquality.scot/data/mapping?view=data (Accessed on 17/09/18).

[16] Defra, 2017. Air Quality Action Plan for tackling roadside nitrogen dioxide concentrations in Central Scotland (UK0037).

Table 8.11: Summary of Sensitive Receptors within DMRB Defined Study Area			
Distance Bands (m)	**Number of Receptors**		
	Residential	**Community**	**Ecological**
0-50	123	0	1
50-100	239	0	0
100-150	222	1	0
150-200	280	0	0
Total	**864**	**1**	**1**

DETAILED ASSESSMENT RECEPTORS

8.4.15 Residential properties and community facilities (academic and care facilities) are relevant receptors with regards to the annual mean air quality objectives and are considered highly sensitive to changes in air quality. Commercial properties and buildings, roadside locations and amenity spaces are not relevant receptors for the annual mean objectives. Given the stringent nature of the annual mean objectives, no assessment of the DM and DS scenarios has been conducted for the short-term objectives.

8.4.16 Of the high sensitivity receptor 62 existing representative receptors at worst case locations were identified. In addition, 15 worst case locations within the currently undeveloped phases of the Winchburgh Masterplan development has been modelled. A summary of these receptors is provided in Technical Appendix 8.4 in Volume 3.

8.4.17 The ecological receptor located within 200 m of the affected road network is the SSSI of Philpstoun Muir, an upland mixed ash woodland. This SSSI is currently assessed as unfavourable status due to low diversity of the woodland structure, lack of open space and high proportion of non-native species[17]. A transect away from the declared boundary of the SSSI (as identified by OS mapping) out to 200 m with modelled receptors at 0, 10, 20, 30, 40, 50, 75, 100, 150 and 200 m was used to assess any impact of emissions arising from changes in traffic flows arising from the proposed development.

8.5 Assessment of Likely Effects

Construction Effects

8.5.1 Using the evaluation criteria within the IAQM's guidance, the potential dust emission magnitude was identified for each construction stage of the proposed development, as shown in Table 8.12.

Table 8.12: Dust Emission Magnitude for Each Construction Stage		
Activity	**Dust Emission Magnitude**	**Justification**
Earthworks	Large	Total site area for earthworks greater than 10,000 m^2 (square metres). Total excavation volume approximately 88,200 m^3. Total deposition of material approximately 180,000 m^3.
Construction	Small	Total building volume less than 25,000 m^3.
Trackout	Large	Over 50 HDV (heavy duty vehicles; >3.5 tonnes) outward movements in one day. Average demolition and construction traffic is approximately 89

[17] Scottish Natural Heritage (SNH), 2019. Philpstoun Muir SSSI [online]. Available at: https://sitelink.nature.scot/site/1286 (Accessed 30/07/2019).

Table 8.12: Dust Emission Magnitude for Each Construction Stage		
Activity	**Dust Emission Magnitude**	**Justification**
		HDV outward movements per day, with an estimated build period of 50 weeks.

8.5.2 The next stage of the process was to define the sensitivity of the assessment area to dust soiling, human health impacts and ecological receptors. This process combines the sensitivity of the receptor with the distance from the source to determine the overall sensitivity. The sensitivity of the area to dust impacts is provided in Table 8.13.

Table 8.13: Sensitivity of Area to Dust Impacts (taking into account distance to construction activity)		
Sensitivity to Dust Soiling	**Sensitivity to Human Health Impacts**	**Sensitivity to Ecological Receptors**
Low: Between 1-10 high sensitivity receptors within 100 metres of the site boundary. Between 1-10 residential receptors within 50 m of the 500 m extent of the track out route.	Low: Existing PM_{10} background concentrations estimated to be 12 µg/m^3, between 1-10 high sensitivity receptors within 100 m of the proposed development. Between 1-10 residential receptors within 50 m of the 500 m extent of the track out route.	N/A: It is not considered that there are sensitive ecological receptors within either 50 m of the site boundary or 500 m from the site's entrances along routes used by construction vehicles. The site is situated over 1 km from the Philpstoun Muir SSSI.

8.5.3 The dust emission magnitude determined in Table 8.12 was combined with the sensitivity assessment in Table 8.13 to define the risk of impacts for each phase of the proposed development in the absence of mitigation as shown in Table 8.14.

Table 8.14: Risk of Dust Impacts in the absence of mitigation for each Construction Stage			
Sensitivity of the Surrounding Area	**Earthworks (Large)**	**Construction (Small)**	**Trackout (Large)**
Dust Soiling (Low)	Low Risk	Negligible Risk	Low Risk
Human Health (Low)	Low Risk	Negligible Risk	Low Risk

8.5.4 It is therefore concluded that in the absence of suitable mitigation, the construction phase presents a 'low risk' of causing dust impacts.

Construction Traffic Effects

8.5.5 Construction plant delivering and removing materials from development sites can impact air quality. Such activities can result in a significant number of additional HDV movements.

8.5.6 The construction stage is due to last 250 working days and generate an annual average of 60 daily HDV trips, equating to 120 additional AADT HDV movements on the local road network.

8.5.7 It is assumed that excavated earth would be moved to future development areas within the Winchburgh Masterplan site. Fill will be potentially sourced from an existing aggregate quarry/plant located to the south east of Winchburgh.

8.5.8 For the purposes of the air quality assessment, it has been assumed that all construction traffic would travel south along the B8020 for a year, before splitting to reach different locations. This is considered to be a highly conservative estimate of construction traffic, given the likely actual construction period and traffic flows.

8.5.9 The concentrations predicted including emissions from construction traffic using the local road network are presented in Table 8.15 – 8.17 for NO_2, PM_{10} and $PM_{2.5}$ at the most vulnerable modelled off-site receptor locations. These are considered to be the receptors closest to the affected road network, in elevation and proximity.

8.5.10 The results indicate that construction traffic emissions would result in two moderate adverse impacts, two slight adverse impacts and two negligible adverse impacts on NO_2 concentrations at modelled off-site receptor locations, with a maximum increase in annual mean NO_2 concentrations of 7.2 µg/m^3 at R6, a 'worst-case' exposure location on the junction of the B8060 and Winchburgh Main Street.

8.5.11 The results indicate that construction traffic emissions would have a negligible impact on PM_{10} concentrations at all off-site receptor locations except for at R6 which is predicted to have a moderate impact and a slight adverse impact at receptor location R4, with a maximum increase in annual mean PM_{10} concentrations of 1.2 µg/m^3.

8.5.12 The results indicate that construction traffic emissions would have a negligible impact on $PM_{2.5}$ concentrations at all off-site receptor locations except for at R6 which is predicted to have a moderate impact and a slight adverse impact at receptor location R4, with a maximum increase in annual mean $PM_{2.5}$ concentrations of 0.7 µg/m^3.

Table 8.15: Predicted Construction Annual Mean NO_2 at Off-Site Receptors (µg/m^3)

Receptor	Height (m)	Without Development	With Development Traffic	Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
R1	1.5	15.8	18.9	3.2	8	Slight
R2	1.5	15.7	18.5	2.7	7	Slight
R3	1.5	16.4	18.5	2.2	5	Negligible
R4	1.5	17.6	23.0	5.4	13	Moderate
R5	1.5	16.2	17.8	1.6	4	Negligible
R6	1.5	17.2	24.4	7.2	18	Moderate

Table 8.16: Predicted Construction Annual Mean PM_{10} at Off-Site Receptors (µg/m^3)

Receptor	Height (m)	Without Development	With Development Traffic	Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
R1	1.5	12.3	12.9	0.5	3	Negligible
R2	1.5	12.3	12.8	0.4	2	Negligible
R3	1.5	12.4	12.8	0.4	2	Negligible
R4	1.5	12.6	13.5	0.9	5	Slight
R5	1.5	12.3	12.6	0.3	1	Negligible
R6	1.5	12.6	13.8	1.2	7	Moderate

Table 8.17: Predicted Construction Annual Mean $PM_{2.5}$ at Off-Site Receptors (µg/m^3)						
Receptor	**Height (m)**	**Without Development**	**With Development Traffic**	**Traffic Contribution**	**% Change in concentration relative to Assessment Level (AQAL)**	**Impact Descriptor**
R1	1.5	7.0	7.3	0.3	3	Negligible
R2	1.5	7.0	7.3	0.3	3	Negligible
R3	1.5	7.0	7.2	0.2	2	Negligible
R4	1.5	7.2	7.7	0.5	5	Slight
R5	1.5	7.0	7.2	0.2	2	Negligible
R6	1.5	7.2	7.9	0.7	7	Moderate

Operational Effects

DMRB Screening Assessment (Scottish Transport Analysis Guidance (STAG) Unit A3)

8.5.13 The number of properties within the study area for which an improvement or deterioration of air quality is expected for locations within 200 m of affected roads has been calculated to be 865.

8.5.14 For NO_2, within 200 m of affected roads, 248 properties are expected to experience a deterioration of air quality, and 618 are expected to experience an improvement in air quality.

8.5.15 For PM_{10}, within 200 m of affected roads, 251 properties are expected to experience a deterioration of air quality, 615 are expected to experience an improvement in air quality.

8.5.16 The WebTAG scores for 2022 are 16.38 for NO_2 and 15.26 for PM_{10} which suggests that overall, the proposed development would cause a slight improvement of air quality to properties within the study area. The STAG worksheets for NO_2 and PM_{10} are provided in Technical Appendix 8.5 in Volume 3.

Detailed DMRB Assessment at Receptor Locations

POLLUTANT CONCENTRATIONS – HUMAN HEALTH

8.5.17 A summary of the modelling results from the detailed assessment using the ADMS Roads model showing the number of relevant receptors locations predicted to have a beneficial or adverse change in pollutant concentrations, the magnitude of the changes and number of locations predicted to exceed the annual mean objective in the DM and DS scenarios are presented in Table 8.18.

Table 8.18: Summary of Results for Human Health Model Receptors						
Pollutant	**NO_2**		**PM_{10}**		**$PM_{2.5}$**	
Change	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**
Number of Receptors Predicted to Experience an Imperceptible Change	4	7	12	26	11	25
Number of Receptors Predicted to Experience a Small Change	23	29	15	18	16	19
Number of Receptors Predicted to Experience a Medium Change	0	8	0	1	0	1

Table 8.18: Summary of Results for Human Health Model Receptors						
Pollutant	**NO_2**		**PM_{10}**		**$PM_{2.5}$**	
Change	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**	**Beneficial**	**Adverse**
Number of Receptors Predicted to Experience a Large Change	0	1	0	0	0	0
Sub-total number of Receptors	27	45	27	45	27	45
Total number of Receptors	71		72		72	
Air Quality Objective Level Annual Mean (µg/m^3)	40		18		10	
Maximum DM Scenario Predicted Concentration (µg/m^3)	27.9		17.4		8.4	
Maximum DS Scenario Predicted Concentration (µg/m^3)	28.2		17.2		8.5	
Maximum Increase as a result of Development (µg/m^3)	2.0		0.45		0.26	
Maximum Decrease as a result of Development (µg/m^3)	-0.8		-0.2		-0.1	
Number of Receptor Locations Exceeding the Objective in DM Scenario	0		0		0	
Number of Receptor Locations Exceeding the Objective in DS Scenario	0		0		0	

8.5.18 As shown in Table 8.18, no modelled relevant receptor locations are predicted to have exceedances of the annual mean objectives for NO_2, PM_{10} or $PM_{2.5}$ in either the DM and DS scenarios.

8.5.19 Between the DM and DS scenarios, a maximum improvement in air quality is predicted to be a reduction in annual mean concentrations of 0.8 µg/m^3 at receptor location 53, a residential façade within Newton, 1.1 km north of the proposed development. The greatest adverse impact is predicted to occur at receptor 70, a worst-case exposure location within the unbuilt phases of the Winchburgh Masterplan development, with a predicted increase in annual mean NO_2 concentrations of 2.0 µg/m^3.

8.5.20 Under the DS scenario, there is predicted to be 23 small beneficial changes in NO_2. There are predicted to be one large adverse change in air quality, eight medium adverse changes and 15 adverse small changes of air quality. There is predicted to be a total of 11 receptors with an imperceptible change in air quality as a result of the DS scenario.

8.5.21 Between the DM and DS scenarios the maximum improvement in air quality is predicted to be a reduction in annual mean PM_{10} concentrations of 0.2 µg/m^3 at receptor location 53. The greatest adverse impact is predicted to occur at receptor 70, with a predicted increase in annual mean PM_{10} concentrations of 0.45 ug/m^3.

8.5.22 Under the DS scenario, there is predicted to be one receptor with a medium adverse change in annual mean PM_{10} concentrations and 18 small adverse changes. There is predicted to be 15 small beneficial changes to air quality. There is predicted to be a total of 38 receptors with an imperceptible change in air quality as a result of the DS scenario.

8.5.23 Between the DM and DS scenarios the maximum improvement in air quality is predicted to be a reduction in annual mean $PM_{2.5}$ concentrations of 0.1 µg/m^3 at receptor location 53. The greatest adverse impact is predicted to occur at receptor 70, with a predicted increase in annual mean $PM_{2.5}$ concentrations of 0.26 ug/m^3.

8.5.24 Under the DS scenario, there is predicted to be one receptor with a medium adverse change in annual mean $PM_{2.5}$ concentrations and 19 small adverse changes. There is predicted to be 16 small beneficial changes to air quality. There is predicted to be a total of 36 receptors with an imperceptible change in air quality as a result of the DS scenario.

8.5.25 Table 8.18 shows that no receptor locations out of 72 are predicted to have a magnitude of change above imperceptible for NO_2 which are above the NAQO (annual mean) in 2022.

8.5.26 Using the guidance provided in DMRB IAN 74/13 Table 2.3 (provided in Table 8.5) the significance of the impact on NO_2 concentrations at receptor locations in 2022 is considered to be **not significant**.

8.5.27 Table 8.17 shows that no receptor locations out of 72 are predicted to have a magnitude of change above imperceptible for PM_{10} which are above the NAQO (annual mean) in 2022.

8.5.28 The significance of the impact on PM_{10} concentrations at receptor locations in 2022 is considered to be **not significant**.

8.5.29 The predicted annual mean NO_2 concentrations arising at the three identified relevant receptors in close proximity to the proposed development using the EPUK/IAQM is presented below in Table 8.19.

Table 8.19: Predicted Operational Annual Mean NO_2 at Off-Site Receptors (µg/m^3)

Receptor	Height (m)	Without Development	With Development Traffic	Traffic Contribution	% Change in concentration relative to Assessment Level (AQAL)	Impact Descriptor
The Castle (72)	1.5	18.0	18.4	0.4	1	Negligible
Niddry Mains House (27)	1.5	13.2	13.7	0.5	1	Negligible
Myre Farm (71)	1.5	13.9	14.8	0.9	2	Negligible

8.5.30 The modelling results indicate that the modelled existing sensitive receptors in close proximity to the proposed junction would experience negligible adverse impacts as defined by IAQM guidance, with no exceedances of the annual mean NAQOs for NO_2. Negligible impacts are also predicted for PM_{10} and $PM_{2.5}$. Local air quality effects from the operation of the proposed development at the nearest existing receptors are therefore considered to be **not significant**.

8.5.31 Tables of all the modelled results are provided in Technical Appendix 8.4 in Volume 3.

POLLUTANT CONCENTRATIONS – ECOLOGICAL

8.5.32 At the ecological receptors the assessment has predicted ambient NO_x concentrations for comparison with the critical level of 30 µgm^3. A number of modelled receptors have been

considered at varying distances along a transect that extends 200 m from the edge of the indicated boundary of the Philpstoun Muir SSSI.

8.5.33 The assessment demonstrates that the DS scenario would result in a predicted ambient concentration of less than 30 µg/m^3, and the DS scenario results in a reduction in concentrations over the DM scenario. As such, it is considered that the likely impact of the DS scenario is **not significant**.

8.5.34 Tables of all the modelled results are provided in Technical Appendix 8.4 in Volume 3.

8.6 Assessment of Cumulative Effects

8.6.1 The traffic data used in the assessment has been provided by Sweco and has been taken from the SEStran Regional Model (SRM12), which is a strategic four-stage transport model covering the South East of Scotland and includes traffic generated by cumulative schemes. Further information on traffic flows can be found within the Transport Assessment produced by Sweco[18]. The traffic data has therefore accounted for 1,000 residential units of the consented Winchburgh Masterplan development to be completed by the opening year, but this equates to a larger quantum of development than is likely to be existent by 2022 given the current rate of construction. As such, the assessment is considered to represent a robust worst-case assessment.

8.6.2 There are no other cumulative schemes identified.

Cumulative Construction Effects

Dust

8.6.3 The appointed Contractor will be required to implement an Environmental Management Plan (EMP), including stringent management measures and controls (as specified in a EMP or equivalent Method Statement) to be adopted during the construction works. Such management measures and controls would be commensurate to the risk level of the site (and any other nearby sites that may arise subsequent to submission of this EIAR and Draft Roads Order), to reduce the potential for impacts from construction works on air quality.

Traffic Emissions

8.6.4 A quantitative assessment of air quality impacts arising from construction traffic associated with the proposed development and the wider Winchburgh Masterplan development has not been carried out as the quantum of traffic generation anticipated during this stage does not exceed the relevant IAQM threshold.

8.6.5 Additionally, it has been assumed that any future arising cumulative scheme (which would have overlapping construction phases with the proposed development) would develop its own EMP (or equivalent), promoting the use of best practice control and management measures and would agree traffic routing with WLC. It is thus considered likely that impacts from construction traffic associated with such cumulative schemes together with the proposed development would at worst result in negligible residual effects due to there currently not being any other cumulative schemes. If any cumulative scheme(s) would to arise after the submission of this EIAR and Draft Roads Order, the effect would most likely be at worst a minor adverse (not significant) of a temporary nature.

[18] Sweco. August 2019. M9 Winchburgh Junction. Stage 3 Scheme Assessment Report. Engineering and Traffic Assessment.

Cumulative Operational Effects

8.6.6 Traffic generated as a consequence of the 1,000 residential units of the Winchburgh Masterplan development buildout rate has been included in the traffic data modelled as part of the 'Operational Phase' of the proposed development. As the actual construction rate has been much slower, the results and conclusions in the Operational Effects section of this chapter remain valid for the cumulative operational effects assessment.

8.7 Mitigation

Mitigation during Construction

8.7.1 The control of dust emissions from demolition and construction sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. The Environmental Management Plan (EMP) would present the mitigation measures recommended in the IAQM guidance to reduce impacts from low risk sites. This could be secured by an appropriately worded planning condition requiring a dust management strategy to be developed within the EMP, to be approved by WLC.

Mitigation during Operation

8.7.2 No additional mitigation is proposed for the completed and operational proposed development.

8.8 Additional Good Practice Measures

During Construction

8.8.1 Table 8.20 presents recommended good practice measures for a 'low risk' construction site, as per the IAQM guidance, with regards to dust to be implemented on-site by the appointed Contractor.

Table 8.20: Recommended Additional Good Practice Measures for Dust during Construction for a 'Low Risk' Site

Phase/Task	Recommendation	Mitigation
Communications	Highly	Display name and contact details of responsible person for dust issues on site boundary in addition to head/regional office contact information.
Site Management	Highly	Record all complaints and incidents in a site log. Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. Make the complaints log available to the Local Authority if requested. Record any exceptional dust incidents on- or off-site, and the action taken to resolve the situation.
Monitoring	Highly	Carry out regular inspections and record results in the site log book. Increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather.
	Desirable	Undertake daily on- and off-site visual inspections where there are nearby receptors.
Preparing and Maintaining the Site	Highly	Plan site layout to locate dust generating activities as far as possible from receptors. Use solid screens around dusty activities and around stockpiles that are, at least, as high as the stockpile. Avoid site runoff of water and mud.

Table 8.20: Recommended Additional Good Practice Measures for Dust during Construction for a 'Low Risk' Site

Phase/Task	Recommendation	Mitigation
	Desirable	Remove dusty materials from site as soon as possible. Keep site fencing barriers and scaffolding clean using wet methods. Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
Operating Vehicle/Machinery and Sustainable Travel	Highly	Ensure vehicles switch of engines when stationary. Ensure all non-road mobile machinery (NRMM) comply with the correct guidance. Avoid use of generators where possible.
	Desirable	Enforce an on-site speed limit of 10 mph (if long haul routes are required this can be increased with suitable control measures implemented and subject to necessary approval).
Operations	Highly	Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques. Ensure adequate water supply for effective dust and particulate matter suppression. Use enclosed chutes, conveyors and covered skips. Minimise drop heights of materials.
Waste Management	Highly	Avoid bonfires. Reuse and recycle waste to reduce dust from waste materials.
Measures Specific to Demolition	Highly	Ensure effective water suppression is used, preferably through the use of hand held sprays. Avoid explosive blasting. Bag and remove biological debris or damp down material prior to demolition.
	Desirable	Where practical, soft strip inside buildings before demolition of external walls and windows.
Measures Specific to Construction	Desirable	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out. Avoid concrete scabbling where possible.
Measures Specific to Trackout	Desirable	Regularly use water-assisted dust sweepers to clean access and local roads. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving the site are appropriately covered. Implement a wheel washing system.

During Operation

8.8.2 No additional good practice measures have been identified for the completed and operational proposed development.

8.9 Assessment of Residual Effects

Residual Construction Effects

8.9.1 On the assumption that the mitigation measures to be outlined in the EMP, which are considered typical of construction work carried out on large scale development sites, would

be applied to control dust emissions, the effects on air quality during the construction stage at both off- and on-site receptors would be not significant.

8.9.2 Construction traffic would result in two Moderate residual effects at a representative worst-case receptors where construction traffic would pass along the B8020 and enter Winchburgh Main Street. This is in part due to the conservative nature of the assumptions used when modelling the construction traffic regarding the quantum of change in HDV traffic flows and construction period. However, it is not predicted that the annual mean objective would be exceeded at any sensitive receptor locations identified, and the increase in HDV traffic would be temporary (i.e. <1 year). As such, the effect is considered to be not significant.

Residual Operational Effects

8.9.3 It is considered that operational effects from increased traffic emissions associated with the completed proposed development would result in negligible residual impacts on local air quality and at existing and future sensitive receptors. The effects are therefore considered to be not significant.

Residual Cumulative Effects

Construction

8.9.4 It has been assumed that any future arising cumulative scheme that could potentially interact with the construction of the proposed development would develop its own EMP, thereby promoting the use of best practice control and management measures and would agree traffic routing with WLC.

8.9.5 Cumulative dust emissions arising the construction phase of the proposed development together with those which may arise from arising cumulative developments would be not significant with appropriate mitigation in place.

8.9.6 The likely effects from demolition and construction traffic associated with the cumulative schemes together with the proposed development would at worst result moderate adverse residual impacts. As these are considered to be of a temporary nature, they are considered not significant.

Operational

8.9.7 There are no identified cumulative schemes. However, it is considered that the operational effects from the completed proposed development together with any arising cumulative schemes would result in a minor adverse residual effect on local air quality and at identified off-site and on-site receptors, which is considered to be not significant.

8.10 Summary

8.10.1 The assessment has been undertaken following:

- The EPUK and IAQM guidance on 'Land-Use Planning and Development Control' and the IAQM guidance on the assessment of dust from demolition and construction for the demolition phase: and
- DMRB Volume 11 Section 3 HA207/07 and associated IANs for the wider operational phase and the EPUK and IAQM guidance on 'Land-Use Planning and Development Control' for impacts at receptors in proximity to the proposed development.

8.10.2 Consideration has been given to impacts arising during the construction phase and upon completion from increased traffic emissions. Impacts have been predicted at pre-Winchburgh

Masterplan development existing human health receptors, existing Winchburgh Masterplan development sensitive receptors and at worst-case exposure locations within the unbuilt phases of the Winchburgh Masterplan development.

8.10.3 A review of relevant air quality monitoring data indicates that air quality at the site and the surrounding area currently complies with NAQO for all pollutants (i.e. NO_2, PM_{10} and $PM_{2.5}$).

8.10.4 During the construction works, there is the potential that emissions of dust arising from the site could result in a loss of amenity, through soiling, at nearby existing residential properties.

8.10.5 With the implementation of suitable mitigation measures, which would be set out within a EMP, dust effects would be not significant.

8.10.6 The average number of vehicles generated during the construction works has been estimated as 120 daily HDV movements. It has been predicted that emissions from this number of vehicles would result in a moderate impact on local air quality, which due to the relatively short-term nature of the change in traffic flows and no predicted exceedances of air quality objectives the effect is considered not significant.

8.10.7 Air quality impacts once the proposed development has been completed and operational would arise due to emissions from additional road traffic associated with the proposed development.

8.10.8 The assessment has shown that traffic emissions would not result in a significant impact on air quality at existing off-site receptor locations, where air quality with the proposed development operational are predicted to meet all relevant air quality objectives.

8.10.9 The operational phase of the proposed development would not have a significant impact on local air quality. The assessment includes impacts from the proposed development together with those arising from the traffic associated with the wider Winchburgh Masterplan. It is considered that the proposed development complies with the relevant air quality policies as outlined in Technical Appendix 8.1 in Volume 3.

8.10.10 Table 8.20 provides a summary of the anticipated residual effects associated with air quality that are likely to arise as a result of the proposed development.

Table 8.20: Summary of Residual Effects

Likely Significant Effect	Mitigation	Means of Implementation	Residual Effect	Outcome
Construction				
Dust emissions from demolition and construction activities.	Best practice dust mitigation measures set out as part of the EMP.	Appropriately worded planning condition.	Not significant.	Not significant.
Traffic emissions from demolition and construction traffic.	Construction traffic management as part of the EMP.	Appropriately worded planning condition.	Not significant.	Not significant.
Operation				
Traffic emissions from road vehicles.	Not applicable.	Not applicable.	Not significant.	Not significant.