10 AIR QUALITY

10.1 INTRODUCTION

This chapter considers the potential effects of the construction and operation of the Glencorse Water Treatment Works (WTW) on air quality.

A WTW emits little or no air pollutants during operation; there is, however, potential for the construction works to have an impact on air quality as a result of dust from construction activity and vehicle emissions from construction traffic. The air quality assessment will, therefore, focus on the effects and impact of dust and vehicle emissions during the construction phases. No assessment has been made for operational impacts as these are known to be negligible.

10.2 ASSESSMENT METHODOLOGY

For the assessment of construction dust as a nuisance, any on site practices and activities that might be especially liable to generate dust have been identified and the sensitivity of receptors that may be affected determined.

Mitigation measures to minimise the dust generated by these impacts will be adopted by the contractor and have been proposed for inclusion in Environmental Management Plan for the construction works.

Construction vehicle movements will be concentrated on the A702 and on the construction sites. UK Government guidance (1) for assessing the impacts to air quality associated with traffic emissions states that only the following locations (relevant to this project) require assessment.

- Areas where there may be narrow congested streets with residential properties within 5 m of the curb;
- Roads and busy junctions with a daily flow exceeding 10,000 vehicles per day and where people may spend one hour or more close to traffic;
- Where traffic flows are predicted to increase above 5%; and
- All roads with unusually high proportion of heavy goods vehicles (greater than 20% of Annual Average Daily Traffic flow, AADT) if there is relevant exposure within 10 m of these roads and if the flow of heavy duty vehicles is greater than 2,500 vehicles per day.

(1) Part IV of the Environment Act 1995. Local Air Quality Management. Technical Guidance LAQM. TG (03). February 2003. DEFRA, London.

It is recognised by ERM that the Defra guidance has been specifically designed for the local authority review and assessment of air quality, but the methodology has been prepared by the Highways Agency, for the convenient screening of road schemes. The intended use was for all road schemes, and not necessarily just in local authority review and assessment work.

Although these criteria also relate to permanent operational conditions and not construction traffic, they have been applied for this assessment. The existing levels of traffic on the A702 are above 10,000 vehicles per day and the increase in traffic levels attributable to the development is predicted to be more than 5% during some phases of construction, due to increased levels of HGVs on the A702.

On this basis, there is potential for an impact to air quality due to construction traffic, therefore, an assessment has been undertaken using the Design Manual for Roads and Bridges (DMRB) (1) screening methodology. The DMRB incorporates local traffic data, predicted increases in traffic as a result of construction and background air quality data. Nitrogen dioxide (NO_2) and particulate matter (PM_{10}) have been assessed here, as they are the principal pollutants relating to emissions from road traffic. The screening method predicts annual average ground level concentrations at sensitive receptors by applying average roadside emission dispersion curves and correcting for vehicle type and speed. The screening method incorporates the latest vehicle classifications and emission factors used in the National Atmospheric Emissions Inventory (NAEI). As such, it implicitly includes the change in vehicle technologies year by year. The DMRB methodology provides an estimate of ground level concentrations for direct comparison/evaluation with the standards included in the *Air Quality (Scotland) Regulations 2000*, as amended in 2002 (see *Table 10.1*).

Table 10.1 Relevant Air Quality Standards

Pollutant	Air Quality Objective
Nitrogen dioxide (NO_2)	200 micrograms per cubic metre, when expressed as an hourly mean, not to be exceeded more than 18 times a year
Nitrogen dioxide (NO_2)	40 micrograms per cubic metre or less, when expressed as an annual mean
Particulate matter PM_{10}	50 micrograms per cubic metre or less, when expressed as a 24 hour mean, not to be exceeded more than 7 times a year
Particulate matter PM_{10}	18 micrograms per cubic metre or less, when expressed as an annual mean

10.3 AIR QUALITY BASELINE

Midlothian Council has not declared any Air Quality Management Areas (AQMAs) which indicates the air quality in the region is good. The Centre for Ecology and Hydrology on the Bush Estate, Penicuik, operates an air quality monitoring station. Bush Estate is part of the National Air Quality

(1) Highways Agency Design Manual for Roads and Bridges, Version 1.03 (July 2007)

Information Archive's (NAQIA) Automatic Monitoring Rural Network (AURN). The busy A701 and A702 roads are approximately 0.8 kilometres from the monitoring site with the Glencorse site being 1.5 km away to the south-west. Annual average data derived from hourly readings for each day in 2007 for a range of pollutants is provided in *Table 10.2.*

Table 10.2 Annual Average Concentrations for the 2007 from Monitoring Station at Bush Estate

Pollutant	Annual average concentration (µg m^{-3})
Nitrogen Dioxide	9.0
Ozone	55.7
Nitric oxide	2.7
Nitrogen oxides as nitrogen dioxide	14.3

Bush Estate measures background concentrations of nitrogen dioxide, nitric oxide, oxides of nitrogen and ozone. It does not measure background concentrations of particulate matter which are required for the DMRB assessment. Background air quality concentrations of all of the pollutants at the proposed WTW location were, therefore, derived from maps available on the NAQIA website for the year 2005 and adjusted to represent estimated concentrations in 2008 (1) which is the year when construction will begin. This is shown in *Table 10.3*.

Table 10.3 Annual Average Background Emissions Concentrations for 2005 and 2008 (Source: NAQIA).

Pollutant	2005	2008
Nitrogen Oxides (NO_x)	11.0 µg m^{-3}	9.71 µg m^{-3}
Nitrogen Dioxide (NO_2)	8.5 µg m^{-3}	7.87 µg m^{-3}
Particulate Matter (PM_{10})	12.5 µg m^{-3}	11.81 µg m^{-3}

A comparison of *Table 10.2* and *Table 10.3* shows that the concentrations derived from the NAQIA background maps for 2005 are in close agreement with the continuous monitoring taking place at Bush Estate. As expected, the 2005 values are slightly higher than those for 2007. The current air quality around the proposed development sites is considered to be good and typical of rural/semi-rural locations with the main source of emissions being road traffic.

10.4 POTENTIAL IMPACTS

10.4.1 Dust

The activities involved in the construction which have the potential to create dust are:

- topsoil stripping and stockpiling;
- excavation and backfilling;

- activities using cement and concrete;
- movement of vehicles over unpaved surfaces; and
- tracking of mud onto paved roads and subsequent re-suspension.

Residential receptors are located along the A702 and at the boundaries of the construction site. There are no established criteria for the assessment of dust deposition arising from construction sites. Nuisance impacts from dust generation from construction activities are generally considered to be limited to 150 m from the source. This will depend on wind strength and direction so receptors at greater distances can be affected under certain conditions. It should be noted that dust impacts are only likely after a prolonged dry period and in windy conditions.

10.4.2 Traffic

The impacts to air quality as a result of construction traffic on the A702 have been assessed using the DMRB model.

During construction, there are two periods when traffic is expected to peak due to movements of soil offsite. These peaks occur between the 3rd and 5th months and between the 13th and 15th months of the construction period.

Three scenarios have been assessed using the DMRB:
- the current scenario (Do Nothing);
- current traffic + 1st construction peak traffic (3rd - 5th month); and
- current traffic + 2nd construction peak traffic(13th - 15th month).

The variables used for the input into the DMRB are shown in *Table 10.4*.

Table 10.4 Baseline Input Variables for DMRB

Variable	Value
Distance from road to potential roadside receptor	3.5 m (1)
Annual Average Speed	100 km hr^{-1}
Road Type	A
Do Nothing Scenario	
AADT	10,170 vehicles
Total LDV (Light-Duty Vehicle)	97.9%
Total HDV (Heavy-Duty Vehicle)	2.1%
3rd to 5th Month – 1st Construction Peak	
AADT	10,634 vehicles
Total LDV (Light-Duty Vehicle)	94.7%
Total HDV (Heavy-Duty Vehicle)	5.3%
13rd to 15th Month – 2nd Construction Peak	
AADT	10,922 vehicles
Total LDV (Light-Duty Vehicle)	95.1%
Total HDV (Heavy-Duty Vehicle)	4.9%

(1) Using the Year Adjustment Factors Spreadsheet from a base year of 2004 (LAQM)

Variable	Value
(1) A value of 3.5 metres has been used as half of the road width which is 7.2 metres. Receptors can be found on the road side, therefore the minimum possible distance to the centre of the road was used for a conservative approach.	

The results of the DMRB assessment for the peak construction months are presented below: the 3rd to 5th construction months are shown in *Table 10.5* and the 13th to 15th construction months in *Table 10.6*.

Table 10.5 Results of the DMRB Assessment for 3rd to 5th Construction Months

Pollutant	Do Nothing	Increment due to 1st Construction Peak	Total (µg m^{-3})
NO_x	22.3	5.7	28.0
NO_2	11.9	1.5	13.4
PM_{10}	13.6	0.4	14.0

Table 10.6 Results of the DMRB Assessment for 13th to 15th Construction Months

Pollutant	Do Nothing	Increment due to 2nd Construction Peak	Total (µg m^{-3})
NO_x	22.3	5.5	27.8
NO_2	11.9	1.5	13.4
PM_{10}	13.6	0.4	14.0

Table 10.7 Results of the DMRB Assessment

Pollutant	Do Nothing (µg m^{-3})	Do Nothing + 1st Construction Peak (µg m^{-3})	Do Nothing + 2nd Construction Peak (µg m^{-3})	Maximum increase due to construction traffic (µg m^{-3})
NO_x	22.3	28.0	27.8	5.7
NO_2	11.9	13.4	13.4	1.5
PM_{10}	13.6	14.0	14.0	0.4

The annual mean objectives for NO_2 and PM_{10} are comfortably met and are not at risk of being exceeded in any of the three scenarios.

The maximum incremental background concentrations of PM_{10} during both peak construction traffic periods are estimated to be 0.4 µg m^{-3}. This increment is 2.2% of the PM_{10} annual mean objective of 18 µg m^{-3}.

The maximum incremental background concentrations of NO_2 during both peak construction traffic periods are estimated to be 1.5 µg m^{-3}. This is an increment equal to 3.75% of the NO_2 annual mean objective of 40 µg m^{-3}.

10.5 MITIGATION MEASURES

10.5.1 Dust

Impacts on air quality from dust generation from the construction activities will be controlled by adoption of best site management practices including the following:

- A Driver Code of Practice will be developed and implemented addressing prescribed vehicle routes and vehicle speed restrictions to minimise dust generation;

- HGV loads will be covered when transporting friable materials;

- Wheel washing facilities will be available for cleaning dirty vehicles (eg spoil moving wagons) entering public roads;

- Road cleaning will be carried out if roads around site require it and unsurfaced roads will be stabilised to reduce off site transport of mud and dust;

- Temporary top soil and spoil storage piles will be graded and seeded with grass to prevent dust generation close to sensitive receptors; and

- Damping down of areas of unmade ground.

Impacts on air quality from the construction activities will be controlled by adoption of best site management practices including the following.

- Excavation of spoil from the site will be undertaken over two summer seasons to reduce the numbers of HGVs that will be exiting the site over any one period.

In addition to threes specific measures the following measures will reduce air quality impacts.

- A Driver Code of Practice will be developed and implemented addressing prescribed vehicle routes and vehicle speed restrictions;

- A complaints procedure, including 24 hour telephone line, will be set up to received complaints and register actions; and

- A community forum will be established to ensure that issues raised regarding dust emissions are properly addressed.

These measures will be incorporated into the EMP to ensure that significant air quality impacts on residents and recreational users do not occur during construction.

10.5.2 Traffic

The DMRB assessment has been undertaken for the worst case scenarios during the construction phase of Glencorse WTW in order to determine if there will be an impact on air quality. This includes construction traffic during months 3-5 and 13-15 of the works. The temporary nature of the peak construction works, and the magnitude of the impacts, leads to the conclusion

that the impact on air quality is not significant. No mitigation measures are, therefore, deemed necessary.

10.6 ASSESSMENT OF RESIDUAL IMPACTS

Experience from similar construction projects demonstrates that air quality impacts from temporary construction activities are unlikely to be significant. Only in the event of windy conditions after a prolonged dry period would impacts from dust deposition be likely. Such impacts are considered to be short term and localised. With implementation of the proposed mitigation measures, no significant direct impacts on air quality or indirect impacts on receptors such as residential properties are predicted.

The traffic movements at the peak construction periods are not predicted to result in significant impacts on local air quality.

No cumulative impacts on air quality from other planned construction activities in the area are predicted.

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