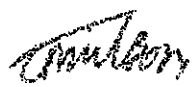
A REPORT BY ENVIROS CONSULTING LIMITED: FEBRUARY 2006

# ST MODWEN VENTURES LIMITED

## AIR QUALITY ASSESSMENT - PROPOSED DEVELOPMENT AT THE WIGAN ENTERPRISE PARK, WIGAN.

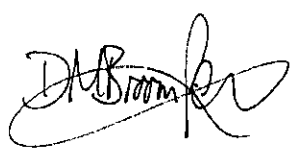
| | |
|---|---|
| **Publication title** | Air Quality Assessment – Proposed development at the Wigan Enterprise Park, Wigan |
| **CAN** | ST1560001A |
| **Version** | Draft Report |
| **Date** | February 2006 |
| **File Reference** | gmw160206rpt.doc |

**Air Quality Assessment prepared by:**



**Gary Wilson – Project Manager**

**Directed, reviewed and approved by:**



**Dr. Mark Broomfield – Project Director**

| | |
|---|---|
| **Client Address:** | St Modwen Ventures Limited<br>Sir Stanley Clarke House<br>7 Ridgeway<br>Quinton Business Park<br>Quinton<br>Birmingham<br>B32 1AF |
| **Enviros Contact Details:** | Enviros Consulting Ltd<br>Enviros House<br>Shrewsbury Business Park<br>Shrewsbury<br>SY2 6LG |

## FIGURES

## EXECUTIVE SUMMARY

Enviros Consulting Ltd was commissioned by Prosurv Consult Limited on behalf of St Modwen Ventures Ltd to undertake an air quality assessment of a proposed development at the Wigan Enterprise Park. The air quality assessment is needed to assess the impact of emissions to air from road traffic on the A577 Manchester Road in Wigan. The proposed development could result in an increase in traffic movements on this road which lies within an Air Quality Management Area.

A screening assessment of road traffic emissions on the A577 Manchester Road in Wigan was carried out using the DMRB screening tool.

It was found that the development of the site will not lead to any measurable or significant impact on air quality on the Manchester Road in Wigan.

It is therefore concluded that the proposed development on Wigan Enterprise Park is acceptable from the perspective of air quality on the Manchester Road.

# 1. INTRODUCTION

St Modwen Ventures Limited is proposing to develop five industrial units on the Wigan Enterprise Park in Wigan. The units will be used for light industrial use with limited office space (B1, B2 and B8 uses). Wigan Metropolitan Borough Council (WMBC) is concerned about a possible increase in levels of air pollution on the A577 Manchester Road in Wigan. Manchester Road has been declared as an Air Quality Management Area (AQMA) due to the high concentration levels of nitrogen dioxide. Prosurv Consult Limited (Prosurv) has commissioned Enviros Consulting Ltd (Enviros) to carry out an air quality screening assessment to assess the impacts of the increase in traffic movements caused by the development on local air quality.

The proposed development site is located on Seaman Way, off the A577 Manchester Road, approximately 2km southeast of Wigan. The location of the proposed development, Manchester Road and the surrounding area are shown in Figure 1.

Emissions from road traffic using the Manchester Road could potentially have an effect on air quality at nearby sensitive human receptors, and are considered in this report. The effects of emissions from vehicles using other roads in the vicinity of the Manchester Road have not been assessed individually. However, emissions from the roads not assessed individually were taken into account by the use of appropriate background air quality data. The assessment methodology was agreed by WMBC prior to commencing the work (Ref. 1).

Emissions from the railway line that crosses Manchester Road are unlikely to have any significant impact on air quality. Only stationary, idling engines (e.g. at depots or termini) give rise to potential significant emissions within 50 metres of the source (Ref. 2).

This assessment is based on maps of the area, the site plan (Ref. 3) and data obtained during a site visit undertaken by Enviros. Traffic information was supplied by Greater Manchester Transport Unit (Ref. 4). All information supplied for use in this study was accepted *de facto*.

# 2. ROAD TRAFFIC EMISSIONS: SCREENING ASSESSMENT

## 2.1 Introduction

A screening assessment has been carried out to predict the likely impact of emissions from road traffic on air quality along the Manchester Road. The Design Manual for Roads and Bridges (DMRB) screening assessment tool (Ref. 5) was used. The DMRB procedure was developed by the Highways Agency and is regularly employed to assess the potential impacts of traffic-derived pollutants in close proximity to roads.

The DMRB screening assessment has been carried out for various receptor locations along the Manchester Road in the vicinity of the development site, (see Figure 1). It was agreed with WMBC that levels of nitrogen dioxide ($NO_2$) are the only cause for concern and the study was carried out to predict $NO_2$ levels at these locations.

The DMRB procedure calculates concentrations of pollutants up to 200m from the roadside using emission factors for the vehicle mix and traffic speeds on the roadway. The procedure allows for the expected improvement in car design and fuel quality leading to reduced emissions from individual vehicles. Concentrations have been predicted for 2006.

## 2.2 Screening Methodology

The technique is used as a component of an air quality study, designed as a screening tool. This is used to establish whether a more detailed air quality assessment is appropriate for any of the air pollutants under consideration. The technique consists of a series of data tabulations that are used to provide estimated levels of traffic pollutants within 200m of a road. The DMRB does not involve detailed modelling techniques.

The method involves estimating air pollution concentrations at selected locations along the road network. Estimates are made of concentrations of pollutants including nitrogen dioxide. It takes into account vehicle flow and speed, the distance of the location being assessed from the roads carrying the traffic and changes in exhaust emissions brought about by new technology and more stringent legislation.

The DMRB provides estimates of annual average concentrations of the above substances. Values are derived from these annual averages for comparison with air quality objectives and guidelines. The derivations from annual mean values are based on observed statistical frequency distributions of pollutant concentrations in the UK and take into account the normal variability in traffic activity and weather conditions that give rise to high levels of pollution. The DMRB model requires the following input data:

- Plans of the site to determine distance from the roads;
- Annual average daily traffic flow figures; and
- Information on traffic speeds and vehicle composition.

To calculate the concentrations from any given road network at any given receptor site, the following methodology was applied, as laid down in the DMRB:

- Division of the network of roads into as few continuous sections as possible;
- Measurement of the shortest distance between the receptor (in this case the properties nearest to Manchester Road) and the centre of the carriageway of the road;
- Estimation of the speed of the traffic at the point nearest the proposed development;
- Calculation of the effective traffic flow for the section in terms of 1996 light duty vehicles (LDVs) travelling at 100 kilometres per hour (kph), as follows:

  Division of the total traffic flow into separate flows of light-duty and heavy-duty vehicles;

  Determination of the effective flow factors for the two types of vehicles for the year in question;

  Determination of speed correction factors for the two types of vehicle for the speed estimated;

  Multiplication of the flow of light and heavy-duty vehicles by the appropriate effective flow factors and by the appropriate speed correction factors;

  Addition of the effective flows of light and heavy-duty vehicles to give the total effective flow for the section.

  Determination of the section's contribution to pollution at the receptor for each pollutant and addition of the estimated contributions from each section to give the total network contribution to average pollution levels at the receptor;

- Estimation of background pollutant concentrations;
- Comparison of overall levels of pollutants with air quality objectives.

The concentrations predicted by the DMRB model are compared with air quality criteria specified in the DMRB. These criteria are derived from air quality objectives (Ref 6), but are not themselves statutory. The criterion used in this study is shown in Table 1.

The DMRB is a statistical screening model largely based on national averages concerning, for example, traffic composition and site dispersion characteristics. Because of its use as a general screening model for national application, irrespective of local conditions, its approach errs on the side of caution, tending to overestimate predicted concentrations (e.g. by application of worst case meteorological dispersion conditions). Should any of the concentrations exceed the relevant criterion value, this does not mean that an exceedance will occur in practice.

**Table 1 Air Quality Objectives used in DMRB (Ref. 6)**

| Substance | Information Source | Statistic | EAL ($\mu g/m^3$) |
|---|---|---|---|
| Nitrogen dioxide | Air Quality Strategy objective | Annual mean | 40 |

### 2.2.1 Assessment Locations

The assessment location is situated to the east of Wigan. Levels of air pollutants have been assessed in the vicinity of Manchester Road and the proposed development site at a number of sensitive human receptors. These assessment locations provide an indication of pollutant levels at the closest locations to the road where the levels may impact upon residents. These receptor locations are shown on Figure 1.

### 2.2.2 Results Interpretation

The model results were examined to determine whether the new development could have a significant effect on air quality at the receptors.

## 2.3 Input Data

### 2.3.1 Background Air Quality

As discussed above, the principal air pollutants of concern to the study are vehicular emissions of oxides of nitrogen ($NO_x$) in the form of nitrogen dioxide ($NO_2$).

The availability of background air quality monitoring data was discussed with the local authority. Background air quality levels used in the DMRB model were taken from the National Air Quality Archive active concentration maps provided by Department of the Environment, Food and Rural Affairs, DEFRA (www.airquality.co.uk) (Ref. 7) and diffusion tube monitoring data provided by WMBC (Ref. 8). The background air quality concentrations considered in this assessment are presented in Table 2.

**Table 2 Background air quality for Wigan, 2006 (Ref. 7 and Ref.8)**

| Pollutant | Concentration ($\mu g/m^3$) | Details |
|---|---|---|
| Oxides of nitrogen | **48.4** | Interpolated map value for grid square corresponding to assessment location (359500,404500) |
| | 44.14 | Wigan automatic monitoring station – urban centre monitoring location |
| Nitrogen dioxide | 28.02 | Interpolated map value for grid square corresponding to assessment location (359500,404500) |
| | 25.2 | Wigan automatic monitoring station – urban centre monitoring location |
| | **31.6** | Nitrogen dioxide diffusion tube measurement on Dobson Park Way (360213, 405166) |

The $NO_x$ value of 48.4 µg/m³ was considered as the most appropriate background concentration because the interpolated value covers the area of the assessment location. The $NO_2$ diffusion tube measurement on Dobson Park Way of 31.6 µg/m³ was considered as the most appropriate background concentration as it is from recent monitoring data and is located off Manchester Road in close proximity to the assessment location.

### 2.3.2 Current Traffic Flows

Greater Manchester Transport Unit (Ref. 4) supplied the traffic flow data for Manchester Road. The data were supplied from a count carried out in 2004. The count was taken between Makerfield Way and Common Nook, approximately 360 metres northwest of Seaman Way. The percentage of HDVs was calculated from the traffic data that categorised the flows into vehicle types.

Expected levels of traffic in 2006 were estimated from the traffic count data using the Department for Transport's Tempro database (Ref. 9). Tempro derives district-specific traffic growth factors from the National Trip End Model forecasts of growth in car traffic, underlying car ownership trends and planning data projections. The traffic data are shown in Table 4.

The mean speed for the traffic on the Manchester Road has been estimated for this assessment following observations made during the site visit. This has been estimated to give a realistic representation of the predicted speeds over a 24 hour period, based on a speed limit of 30 mph, the slowing traffic approaching traffic lights and junctions and the accelerating traffic leaving the lights and junctions. The mean speeds used in this assessment are given in Table 3.

### 2.3.3 Traffic flows due to the proposed Wigan Enterprise Park development

The predicted traffic data for the proposed Wigan Enterprise Park development was discussed and confirmed with Prosurv (Ref. 10). The vehicle movements were derived from the number of car park spaces and loading bays identified on the development site plan (Ref. 3) and the estimated numbers of movements associated with each parking space and loading bay per day.

140 car parking spaces and 17 loading bays are proposed. It was assumed that each day one light vehicle would enter and leave each parking space, generating 280 light vehicle movements per day, plus an extra 20 vehicles per day to cover any extra movements. It was assumed that each loading bay could be used 4 times per day, producing 136 heavy duty vehicle movements per day. Therefore the proposed Wigan Enterprise Park development is predicted to generate an extra 436 vehicle movements per day. It was assumed that half of the generated vehicles travel along the southeast bound road section and half travel along the northeast bound road section. The predicted traffic flows on the Manchester Road before and after the proposed development is built are shown in Table 3.

**Table 3 Traffic Assessment Input Data for Manchester Road (2006).**

| | Current Manchester Road traffic flows | | Predicted Manchester Road traffic flows | |
|---|---|---|---|---|
| Traffic Direction | Southeast | Northwest | Southeast | Northwest |
| Annual Average Daily Traffic Flow (AADT) | 10292 | 10215 | 10510 | 10433 |
| % Heavy Duty Vehicles (HDVs) | 3.9% | 3.1% | 4.5% | 3.7% |
| % Light Duty Vehicles (LDVs) | 96.1% | 96.9% | 95.5% | 96.3% |

### 2.3.4 Sensitive receptor locations

The nitrogen dioxide concentrations were predicted at six locations along the Manchester Road to find the highest predicted concentration levels produced by the road traffic. This was completed for the two scenarios, with and without the proposed Wigan Enterprise Park development. Table 4 summarises the different receptor locations, the distance each receptor is from the carriageway and corresponding vehicle speeds at each location.

**Table 4 Receptors used in the DMRB screening assessment.**

| Receptor Name | Description | Distance to the centre of the road section (m) | | Estimated vehicle speed (kph) | | |
|---|---|---|---|---|---|---|
| | | Southeast bound | Northwest bound | Southeast bound | Northwest bound | Comment |
| Receptor 1 | Residential property north of the A577 | 10 | 16 | 48 | 48 | Away from junctions |
| Receptor 2 | Residential property south of the A577 | 19 | 13 | 48 | 48 | Away from junctions |
| Receptor 3 | Residential property north of the A577 | 53 | 59 | 40 | 16 | NE bound traffic slowing down approaching the junction and SW bound traffic accelerating away from the junction |
| Receptor 4 | Playground south of the A577 | 39 | 33 | 40 | 16 | |
| Receptor 5 | Residential property north of the A577 | 9 | 15 | 24 | 24 | SW bound traffic slowing down approaching the junction and NE traffic slowly accelerating away from the junction |
| Receptor 6 | Residential property south of the A577 | 15 | 9 | 24 | 24 | |

# 3. RESULTS AND DISCUSSION

## 3.1 Impacts on local air quality

The results of the screening assessment are shown in Table 5.

**Table 5 Modelled concentrations at the receptors along Manchester Road**

| Receptor Name | Annual mean $NO_2$ concentration ($\mu g/m^3$) | |
|---|---|---|
| | Pre-development | Post-development |
| Air Quality Objective | 40 | |
| Background Concentration | 31.6 | |
| Receptor 1 | 37.2 | 37.7 |
| Receptor 2 | 36.8 | 37.2 |
| Receptor 3 | 34.0 | 34.2 |
| Receptor 4 | 35.4 | 35.8 |
| Receptor 5 | 38.4 | 39.1 |
| Receptor 6 | 38.4 | 39.0 |

The highest estimated annual mean nitrogen dioxide concentration at any of the receptors along the Manchester Road is 39.1 $\mu g/m^3$. This complies with the air quality objective. The forecast increment due to the proposed development is a maximum of 1.8% of the concentrations produced by the current traffic flows. Because of the worst case assumptions used in the study the actual increase would be less than this figure. An increase of 1.8% would in practice not be detectable by practical means. A small change of this scale would be marked by changes brought about by factors such as different weather conditions, and would be well within measurement uncertainty which is typically ±10% to 30%.

Overall, no discernible effect on air quality will be generated by the proposed Wigan Enterprise Park development.

# 4. CONCLUSIONS AND RECOMMENDATIONS

A screening assessment of road traffic on air quality close to the A577 Manchester Road in Wigan due to traffic likely to be generated by the proposed Wigan Enterprise Park development was carried out.

The study considered levels of nitrogen dioxide, the only air pollutant of significant concern.

The development of the site would not lead to any measurable or significant impact on air quality in the vicinity of Manchester Road in Wigan. The increase in levels of nitrogen dioxide would not be detectable, and levels of nitrogen dioxide are forecast to comply with the air quality objective, with or without the proposed development.

It is therefore concluded that the proposed Wigan Enterprise Park development is acceptable from the perspective of air quality along the Manchester Road.

## 5. REFERENCES


1. Wigan Metropolitan Borough Council, Telephone conversation with Paul Gallagher (05th January 2006).

2. Department of the Environment, Food and Rural Affairs, Local Air Quality Management, LAQM TG(03). January 2003.

3. Roberts Gardner Architects and Chartered Surveyors. Site plan of the Wigan Enterprise Park proposed development (January 2006).

4. Greater Manchester Transport Unit, traffic data for Manchester Road, 08th February 2006.

5. Department for Transport, Design Manual for Roads and Bridges, version 1.02, November 2003.

6. The Air Quality Regulations (England) 2000, Statutory Instrument No 928, The Stationery Office.

7. National Air Quality Information Archive, www.airquality.co.uk, accessed January 2006.

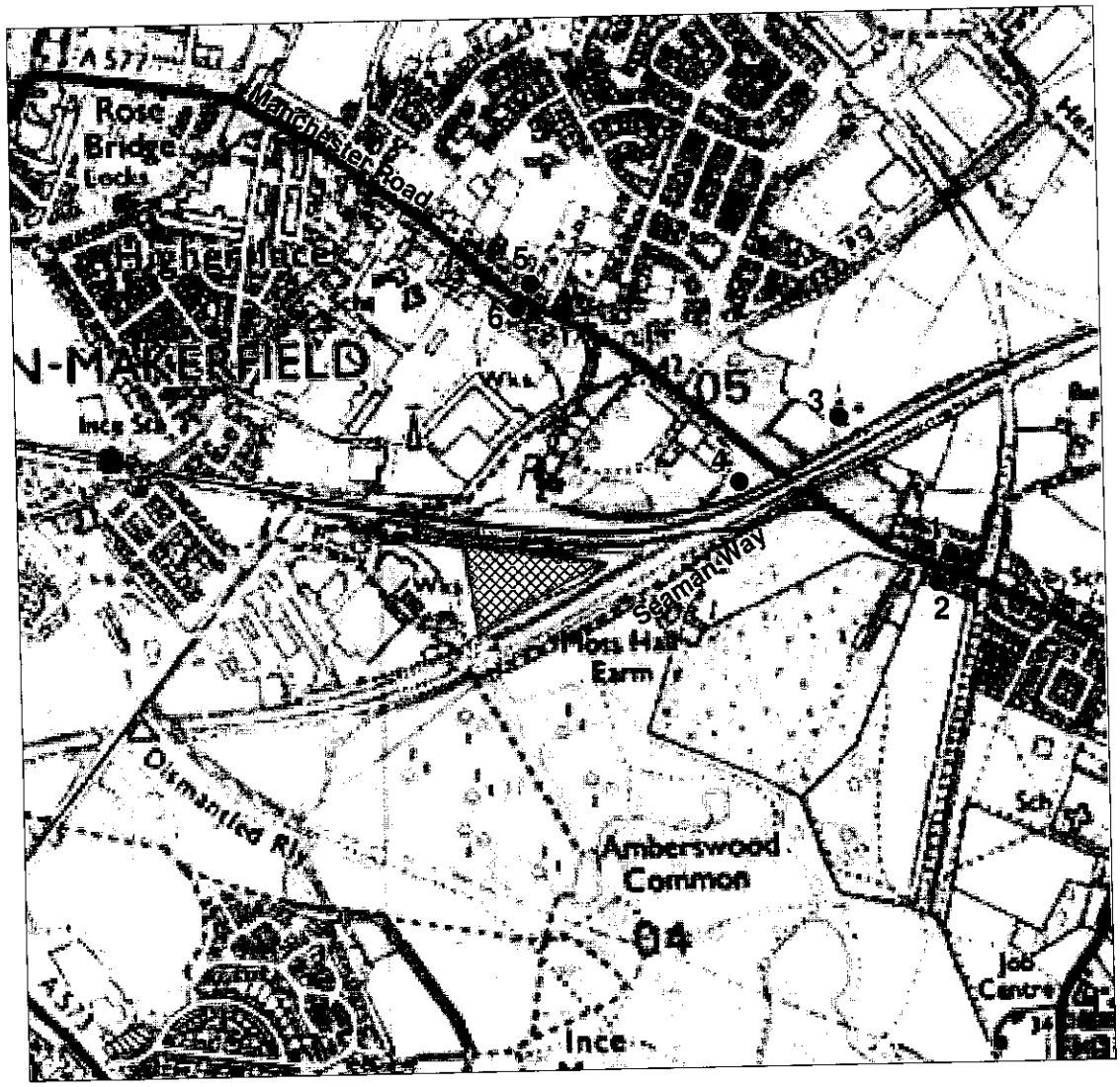
8. Wigan Metropolitan Borough Council, diffusion tube monitoring data, (February 2006)

9. Department for Transport, Tempro version 4.2.3, (obtained from Department for Transport website. www.dft.gov.uk/roads/roadnetwork/heta/hetatemp.htm), February 2006.

10. Prosurv Consult Ltd, correspondence with Richard Berry, February 2006.

# FIGURES

Figure 1 Location of closest receptors along the A577 Manchester Road.




Proposed development site

Sensitive Human Receptor Locations



| | | | |
|---|---|---|---|
| SCALE: | 1:13160 (approx) | CAN: | ST1560001A |
| CONTENT: | GMW | DRAWN: | GMW |
| CHECKED: | DMB | DATE: | February 2006 |

AIR QUALITY ASSESSMENT - PROPOSED DEVELOPMENT ON THE WIGAN ENTERPRISE PARK, WIGAN

**FIGURE 1**

Location of closest receptors along the A577 Manchester Road

ENVIROS