7.0 AIR QUALITY

7.1 INTRODUCTION

7.1.1 Objectives of Study

This section examines the implications for air quality arising from the proposed development. Potential sources of emissions are identified and are placed in the context of existing air quality and emission sources, as well as being considered in the context of locally sensitive receptors, most notably persons living and working in the area. Potential impacts arising from the construction phases associated with the proposed development have also been considered in this regard.

The assessment is based on the previous planning application submitted for the site which included several warehouses spread throughout the development area. The site has recently been bought by Westlink Group Limited who have revised the development proposals reducing the number of warehouses down to two, one at 1.2 million square feet and the other at 300,000 square feet, plus associated parking and delivery yards.

The assessment outlines the impacts that may result from all sections of the proposed development and where necessary, sets out mitigation measures to reduce them. Through discussions with Halton Borough Council (HBC) it has been agreed that the majority of the air quality assessment completed for the previous development proposals provides adequate information on potential impacts and appropriate mitigation and, if updated to incorporate recent changes in guidance and policy, can be resubmitted in support of the revised planning application. However, the revised development proposals will generate more traffic than the previous proposals and will include a new access route into the western side of the development site, therefore this part of the assessment has been reassessed within this chapter.

7.1.2 Scope of Study

The assessment has been considered in the context of potential impacts on locally sensitive receptors, including residential properties, schools and hospitals and any locations where the young, elderly and infirm could be exposed to elevated pollution levels for extended periods of time and thus where there may be potential human health impacts.

The keys issues considered are as follows:

- Nuisance impacts from construction dust;
- Impacts from site vehicles and mobile plant on local air quality; and
- Impacts from traffic and rail emissions during the operation of the development on local air quality.

The methodology employed for the assessment is presented in *Section 7.2*. Implicit in the review of air quality is the consideration of human health impacts as air quality standards are designed to be protective of human health.

An assessment of existing air quality is presented in *Section 7.3.* This section includes a review of Halton Borough Council's (HBC) Air Quality Review and Assessment work and consideration of locally monitored data to provide an overall baseline assessment of local air quality.

The predicted impacts of the proposed development are presented in *Section 7.4*, including construction and operational impacts of the proposed development, identification of mitigation measures where required and consideration of the effectiveness of these measures in reducing any potential impacts.

A summary of the assessment is presented in *Section 7.5*.

It is known that nitrogen dioxide and PM_{10} (particulate matter with a diameter of less than 10 microns) exceed the objective levels in heavily trafficked locations throughout the UK due to the impact of road traffic emissions. For this reason this assessment focuses mainly on these two pollutants. Due to the close proximity of the development site to various industrial processes sulphur dioxide concentrations have also been considered as part of this assessment.

7.2 Assessment Methodology

7.2.1 Construction Impacts

Unlike other air borne pollutants, it is not possible to accurately predict and quantify the likely impacts from demolition and construction dust emissions. This assessment has therefore concentrated on providing a qualitative assessment of nuisance risk from construction dust on nearby receptors. The potential impact of site vehicles, machinery and mobile plant on local air quality emissions has also been considered. The assessment has specifically focused on the following:

- Characterisation of the surrounding area with regard to the potential for dust nuisance and health related impacts and in particular the identification of sensitive receptors;
- A description of the assumed construction activities and their potential to generate dust;
- A review of possible site vehicles and stationary plant and their potential to contribute to local sources of gaseous pollutants and the impact on local air quality; and
- A discussion of good working practices and suitable mitigation measures in order to minimise the potential for nuisance dust and health impacts from gaseous emissions.

Full details of construction related vehicle movements and use of site plant and mobile machinery is currently unavailable. An assessment of the potential impacts arising from these sources during the construction phase has therefore been considered in a qualitative sense, drawing on current knowledge and experience of other similar construction sites and activities.

7.2.2 Operational Impacts

Road Traffic

The potential impacts arising from changes in road traffic on local air quality resulting from the operation of the proposed development has been assessed in accordance with the methodology set out in the Design Manual for Roads and Bridges (DMRB) 2003: *Environmental Assessment*[1].

The DMRB is a screening tool used for estimating pollutant emissions from road traffic and identifying where increases in traffic numbers might result in a significant change in local pollutant levels. The tool is designed specifically for assessing the impacts of new roads schemes; however the calculation procedures can be applied to the assessment of emissions from road traffic in more general context.

The DMRB methodology was chosen in preference to more complex air dispersion models, for use in this assessment, due to the relatively small increase in traffic predicted by the development and the fact that there are no sensitive receptors in close proximity to the development site.

The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed and percentage of heavy goods vehicles (HGVs). Data for completion of this section of the assessment were supplied by a number of sources, including:

- Halton Borough Council Updating and Screening Report; and
- ADL Traffic Engineering Ltd, who carried out the Traffic Impact Assessment of the proposed development.

The assessment of road traffic impacts has also been carried out with reference to the *Development Control: Planning for Air Quality* guidance produced by the National Society for Clean Air (NSCA)[2]. The report provides guidance on when an air quality assessment should be considered and whether a development is significant in terms of air quality impacts.

Although some professional judgement is required, the NSCA guidance indicates the following criteria for when an assessment should be considered:

[1] Highways Agency (2003) Design Manual for Roads and Bridges Volume 11, Section 3, Part 1 Air Quality

[2] NSCA (2006) Development Control: Planning for Air Quality

- Proposals result in an increase in congestion, a change in either traffic volumes (for example 5% Annual Average Daily traffic (AADT or peak) or a change in vehicle speed (+/- 10kph), or both, on a road with greater than 10,000 vehicles per day (vpd);

- Proposals cause a significant change in traffic composition (e.g. bus stations, HGV parks, increased delivery traffic);

- Proposals include new car parking (>300 spaces) or coach and lorry parks; and

- Developments are located in, or may affect, sensitive areas (e.g. ecological sites) or areas of poor air quality (including Air Quality Management Areas).

The above criteria have been applied to this development to help decide on which road links should be included in the assessment of air quality impacts.

A review of operational site vehicles, machinery and mobile plant has been carried out to provide a qualitative assessment of any potential impacts the operation of the rail depot and warehousing may have on local air quality.

Rail Movements

Emissions from rail transport are highly unlikely to be the primary cause of possible exceedances of air quality objectives anywhere in the UK and emissions are unlikely to have any significant impact on local air quality alongside railway tracks[3]. However, there is the potential for problems to occur in close proximity to large numbers of stationary, idling engines, for example at depot or terminus, but these rail operations already exist and are not a feature of the new development explicitly and indeed will continue if the new development does not proceed. As such their emissions are relevant from a baseline perspective but there is no rail related impact as such associated with the proposed development.

This assessment has therefore concentrated on providing a qualitative assessment of potential emissions arising from the proposed rail operations through consideration of emissions sources in the vicinity of the development site, (available from the National Atmospheric Emissions Inventory) and data on the number of freight generated by the depot.

[3] DEFRA (2003) Local Air Quality Management Technical Guidance LAQM.TG(03)

Significance Criteria

Guidance produced by the NSCA on assessing the impacts of developments on air quality has been used to assess the significance of the proposed redevelopment on local air quality.

The main requirement of an air quality assessment is to describe significance in terms of the change in concentration and the absolute concentration after the change in relation to the UK air quality objectives, EU limit values and the presence/absence of an AQMA. The number of people exposed to the change should also be used to inform a judgment of significance.

The NSCA guidance suggests the use of descriptors to describe the level of significance based on the following three aspects of impact:

- the magnitude of the change;
- the absolute concentrations in relation to air quality objectives; and
- the number of people exposed to the changes.

The magnitude of change is first identified based on the actual numerical change in pollution levels predicted within the assessment as presented in *Table 7.1*. This change is then transcribed into a level of significance, relating the change in magnitude to the relevant air quality objectives and limit values, based on descriptors of significance for each pollutant as detailed in *Table 7.2*. Additionally, the introduction of new relevant exposure is taken into consideration providing a level of significance based on the number of people or receptors experiencing an adverse change in pollution levels following the guidance provided in *Table 7.3*.

Table 7.1 – Descriptors for Changes in Ambient Concentrations of Nitrogen Dioxide and PM_{10}

Magnitude of Change	Annual Mean NO_2/PM_{10}	Days PM_{10}/>50µg/m^3
Very large	Increase/decrease > 25%	Increase/decrease > 25days
Large	Increase/decrease 15-25%	Increase/decrease 15-25 days
Medium	Increase/decrease 10-15%	Increase/decrease 10-15 days
Small	Increase/decrease 5-10%	Increase/decrease 5-10 days
Very Small	Increase/decrease 1-5%	Increase/decrease 1-5 days
Extremely Small	Increase/decrease < 1%	Increase/decrease <1 days

Table 7.2 – Descriptors for Impact Significance for Nitrogen Dioxide and PM_{10}

Air Quality Impact Significance Criteria						
Absolute concentration in relation to standard	Extremely Small	Very Small	Small	Medium	Large	Very Large
Decrease with scheme						
Above standard with scheme	Slight beneficial	Slight beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial	Very substantial beneficial
Above standard without scheme Below with scheme	Slight beneficial	Moderate beneficial	Substantial beneficial	Substantial beneficial	Very substantial beneficial	Very substantial beneficial
Below standard without scheme, but not well below	Negligible	Slight beneficial	Slight beneficial	Moderate beneficial	Moderate beneficial	Substantial beneficial
Well below standard without scheme	Negligible	Negligible	Slight beneficial	Slight beneficial	Slight beneficial	Moderate Beneficial
Increase with scheme						
Above standard without scheme	Slight adverse	Slight adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below standard without scheme Above with scheme	Slight adverse	Moderate adverse	Substantial adverse	Substantial adverse	Very substantial adverse	Very substantial adverse
Below standard with scheme, but not well below	Negligible	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
Well below standard with scheme	Negligible	Negligible	Slight adverse	Slight adverse	Slight adverse	Moderate adverse
Well below the standard = < 75% of the standard level. 'Standard' in the context of this table relates to specific air quality objective or Limit Value in question						

Table 7.3 – Descriptors for Impact Significance for the Introduction of New Relevant Exposure

Absolute Concentration at New Properties in Relation to Standard	**Number of new properties exposed to concentration**			
	0-20	**20-100**	**100-500**	**>500**
Above standard	Slight adverse	Moderate adverse	Substantial adverse	Very substantial adverse
Below standard but not well below	Negligible	Negligible	Slight adverse	Slight adverse
Well below standard	Negligible	Negligible	Negligible	Negligible
Well below the standard = <75% of the standard Level. 'Standard' in the context of this table relates to specific air quality objective or Limit Value in question. The number of properties relates to the number exposed to a particular concentration range, i.e. 10 properties within a development may be exposed to concentrations above the objective and therefore would be affected by slight adverse impact. However 80 properties may be in locations where the predicted concentration is below the standard but not well below, and thus the impact on those properties is negligible.				

Consideration may need to be given to drop off with height above ground level where there are flats involved.

7.3 BASELINE CONDITIONS

7.3.1 Air Quality Objectives

The *Environment Act 1995* provides for the development of a national *Air Quality Strategy*[4] [5] (AQS), containing a framework for the continual improvement of ambient air quality. Within the strategy health-based standards for nine main pollutants are set together with dates for their achievement in the short to medium term. The standards are set to protect the most vulnerable members of society. In addition, it sets objectives for two pollutants for the protection of vegetation and ecosystems. The Act also establishes the creation of a system of local air quality management, which requires local authorities to undertake periodic assessments of air quality in their areas and to take action where the standards set by the AQS are not being met.

The Air Quality (England) Regulations 2000 (SI 2000/928) and *Air Quality (England) (Amended) Regulations 2002* set out the standards and objectives for the purposes of local air quality management for the period between the end of 2003 to the end of 2008. Air quality objectives for seven pollutants including sulphur dioxide (SO_2), nitrogen dioxide (NO_2), the fraction of fine particulate matter of less than 10 micron diameter (PM_{10}), benzene and carbon monoxide (CO) have been derived. Two pollutants, ozone and poly aromatic hydrocarbons (PAHs), are included within the AQS, but have been excluded from the Regulations. Similarly, the objectives for the protection of vegetation and ecosystems are not included for local control. A summary of the objectives for local authority control is given below in *Table 7.4*.

Following on from a review of the AQS and the published AQS addendum[6], new objectives for PM_{10} have been proposed, but are yet to be included in the Regulations in England and Wales, although they have been formally accepted in Scotland.

[4] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (January 2000).

[5] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum (February 2003).

[6] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum (February 2003)

A second review of the AQS was carried out in 2006, as a result of which a consultation document has been produced on options for further improvements in air quality[7]. The review included a comprehensive appraisal of the PM10 objectives. Since the AQS was issued in 2000, research into health impacts of PM_{10} has identified that particulate matter is a pollutant for which there is no threshold below which health impacts will not occur. Research has suggested an alternative method of managing particulate concentrations based on reducing average exposure, rather than identifying and dealing with 'hotspots' and has suggested the introduction of exposure reduction and backstop objectives for both PM_{10} and $PM_{2.5}$. However, the Government currently considers it premature to adopt either the current provisional 2010 objectives or to introduce new exposure reduction measures into the regulations. Therefore the situation remains unchanged and Local Authorities are required to continue working towards the provisional 2010 objectives.

Further consideration of the exposure reduction objectives has been given in the 2007 Air Quality Strategy[8], which recommends the inclusion of an exposure reduction objective for $PM_{2.5}$ of 15% on background concentrations between 2010 and 2020, with an upper limit of 25 μgm^{-3}. These recommendations have yet to be included in regulations.

The recently published Air Quality Standards (England) Regulations 2007[9] revises the achievement date for nitrogen dioxide from 2005 to 2010, in line with the current EU Air Quality Standards.

The air quality objectives in the UK have been derived from the *European Commission Directives*. The *EU Air Quality Framework Directive (1996[10])* established a framework under which the EU can set limit or objective values for a number of air pollutants. The Directive identified 12 target pollutants for which limits have been or will be set within Daughter Directives. The first of these Daughter Directives[11] relating to sulphur dioxide, PM_{10}, oxides of nitrogen and lead was formally adopted in April 1999 and was required to be implemented by all member states by July 2001.

Table 7.4 - Objectives included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the Purpose of Local Air Quality Management

Pollutant	Air Quality Objective		
	Concentration	**Measured as**	**Date to be achieved by**
Benzene	16.25μgm^{-3}	Running annual mean	31 December 2003
	5.0μgm^{-3}	Annual mean	31 December 2010
1,3-butadiene	2.25μgm^{-3}	Running annual mean	31 December 2003
Carbon Monoxide	10mgm^{-3}	Running 8 hour mean	31 December 2003
Lead	0.5μgm^{-3}	Annual mean	31 December 2004
	0.25μgm^{-3}	Annual mean	31 December 2008
Nitrogen Dioxide	200μgm^{-3} (105ppb) not to be exceeded more than 18 times per year	1 hour mean	31 December 2005/1st January 2010[1]
	40μgm^{-3} (21ppb)	Annual mean	31 December 2005/1st January 2010[1]
Particulate Emissions (PM_{10})	50μgm^{-3} not to be exceeded more than 35 times per year	24 hour mean	31 December 2004
	40μgm^{-3}	Annual mean	31 December 2004
	50μgm^{-3} not to be exceeded more than 7 times per year[2]	24 hour mean	31 December 2010
	20μgm^{-3} [2]	Annual mean	31 December 2010
SO_2	350μgm^{-3} (132ppb) not to be exceeded more than 24 times per year	1 hour mean	31 December 2004
	125μgm^{-3} (47ppb) not to be exceeded more than 3 times per year	24 hour mean	31 December 2004
	266μgm^{-3} (100ppb) not to be exceeded more than 35 times per year	15 minute mean	31 December 2005

[1] revised achievement date as set out in the 2007 AQ Regulations
[2] The 2010 objectives for particulates are provisional and not currently included in the Regulations

The UK air quality objectives and EU limits relate to external ambient air where members of the public are regularly present and may be exposed over the averaging period of the objective. Guidance is provided in LAQM.TG(03) on the typical locations where the objectives should and should not apply. A summary of this guidance is provided below in *Table 7.5*.

[7] Defra (2006) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A Consultation document on options for further improvements in air quality

[8] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[9] HMSO (2007) The Air Quality Standards (England) Regulation 2007. Statutory Instrument 2007 / No.64

[10] Council Directive 1996/62/EC Framework Directive on Ambient Air Quality Assessment and Management 27 Sept 1996.

[11] Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.

Table 7.5 – Typical Locations where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:-	Objectives should generally not apply at:-
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, libraries etc.	Building facades of offices or other places of work where members of the public do not have regular access. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24 hour mean	All locations where the annual mean objective would apply. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1 hour mean	All locations where the annual mean and 24 hour mean objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably expected to spend 1-hour or more. Any outdoor locations to which the public might reasonably expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

7.3.2 Local Air Quality Management

Part IV of the *Environment Act 1995* requires local authorities to review and assess current and future air quality in their areas against the objectives included in the AQS, as prescribed in the regulations for the purposes of Local Air Quality Management (LAQM). The initial assessments were carried out in a number of increasingly more detailed stages and in many cases involved predictive work using air dispersion modelling techniques. If an area was identified where air quality was predicted to not meet the air quality objectives by the required date, the local authority was required to designate those locations as 'Air Quality Management Areas' (AQMA). Within 12 months of designation, the Local Authority was required to draw up an action plan for each AQMA detailing measures and target dates in order to improve air quality and meet the objectives.

Within the Borough of Halton there are numerous industrial processes which result in emissions to air. Additionally there are a number of roads where traffic flows exceed 10,000 per day which could give rise to elevated pollution levels. All sources were reviewed as part of the review and assessment process.

During the initial round of assessment carried out by Halton Borough Council (HBC) in 1999, it was concluded that there would be no breaches of the air quality objectives for Carbon Monoxide, Benzene, 1,3-Butadiene and Lead throughout the Borough. With regards to the objectives for Nitrogen Dioxide, Sulphur Dioxide and PM_{10} these were likely to be achieved throughout the whole borough except in two 'hotspot' areas where the risk of breaching the objectives was identified from both vehicle and industrial emissions. The first location was a 50m corridor along the Runcorn-Widnes Bridge approach roads and the second included two industrial boiler plants on the West Bank Dock Industrial Estate. Both are located to the east of the development site as indicated in *Figure* 7.3.2.

As a result of these conclusions HBC deployed a mobile monitoring unit to monitor pollution levels at residential locations within close proximity to the two 'hotspot' areas. No AQMA were declared as a result of the first round of assessments.

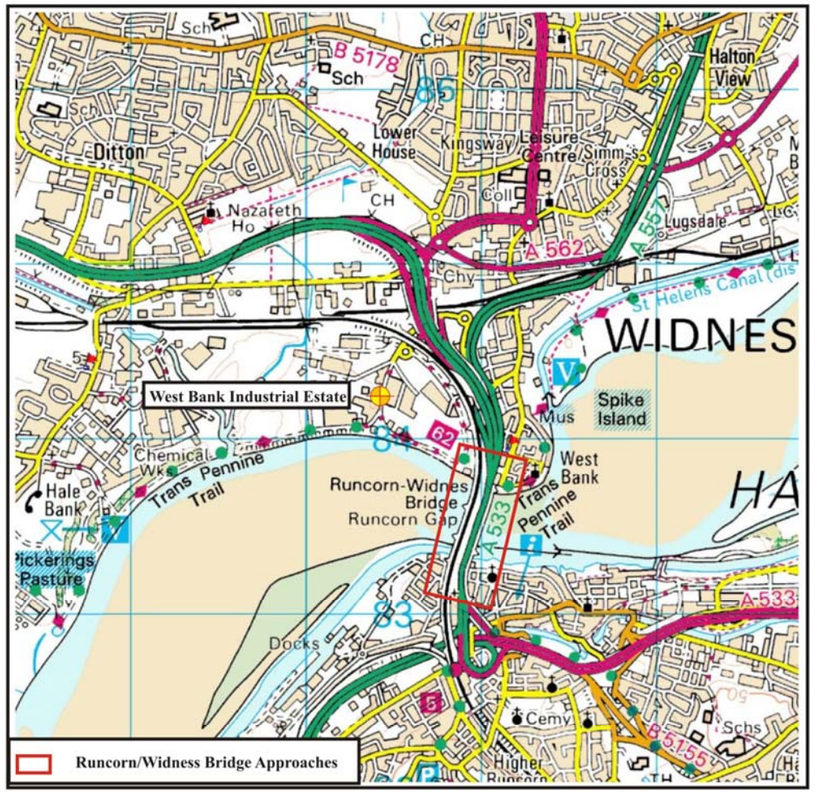
A second round of the Review and Assessment procedure began in 2003. This required each local authority to carry out an Updating and Screening Assessment (USA) to identify areas where there may have been significant changes in air quality since the first round. In the event that significant changes are identified the authority is then required to carry out a more detailed assessment of the relevant area.

HBC completed its USA[12] in July 2003. Since the previous assessment both industrial boiler sources have changed, with one being closed in 2002 and the other changing from high sulphur oil fuel to renewable energy fuel. Subsequently sulphur dioxide emissions in the area have declined. The assessment concluded through the review of monitoring data and a review of current sources that there was no requirement to proceed with any detailed assessment and that all air quality objectives would be met within the borough, including at the development site.

[12] Halton Borough Council (2003) Local Air Quality Management – Updating and Screening Assessment

HBC completed a second USA in 2006[13]. The assessment concluded that there have been no considerable changes in industrial processes and no major changes to the road network, however diffusion tube monitoring revealed exceedance of the annual mean nitrogen dioxide objective on Deacon Road and Hale Road. Deacon Road is located approximately 2 km northeast of the development site in the centre of Widnes, however Hale Road is located approximately 500m to the west of the development site. HBC are currently completing a Details Assessment of nitrogen dioxide in these areas.

Figure 7.3.2
Location of "Hotspot" Areas Identified by HBC in their USA Report



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[13] Halton Borough Council (2006) Local Air Quality Management – Updating and Screening Assessment

7.3.3 Ambient Air Quality Monitoring

Pollutant concentrations can vary both diurnally and seasonally and therefore in order to get a true representation of concentrations and to compare results with the Air Quality Objectives ambient monitoring needs to be carried out for prolonged periods, i.e. years rather than days or months. For this reason, baseline concentrations are established using data monitored over a number of years from existing air quality monitoring stations within the locale of the site rather than carrying out a short term monitoring study at the site itself.

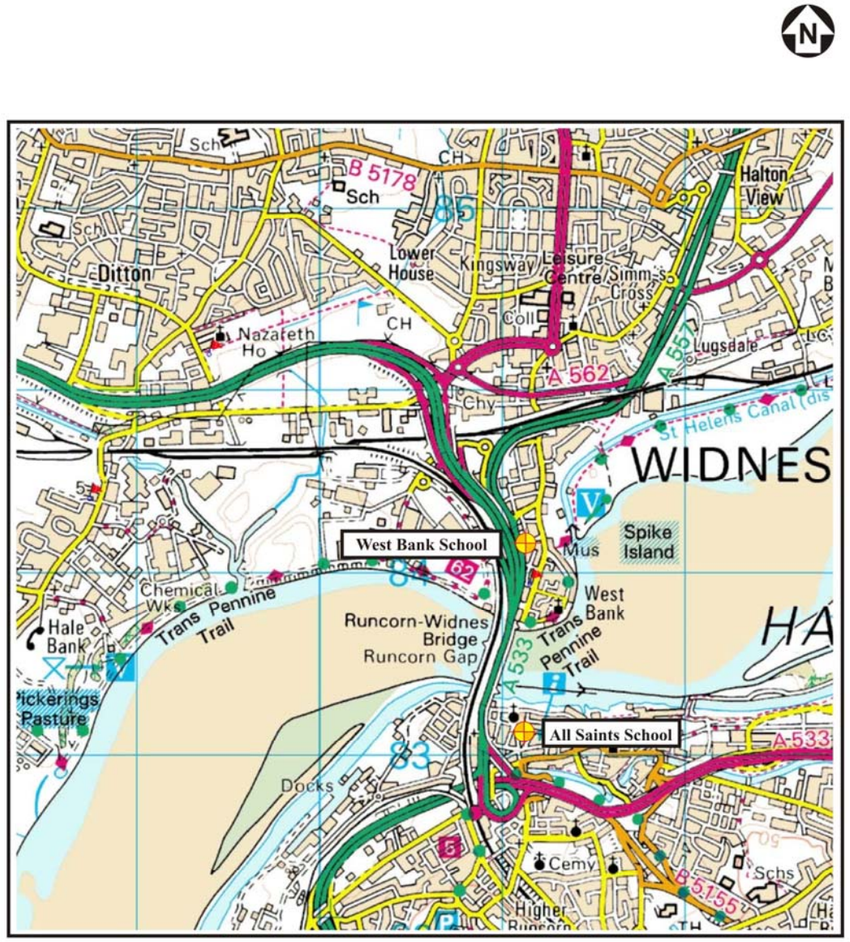
Ambient air quality monitoring is undertaken by a number of organisations. DEFRA fund a network of air quality monitoring sites throughout the UK, collectively known as the UK Automatic Urban and Rural Network (UK AURN), which is operated by NETCEN. In addition, HBC carry out its own monitoring at a number of locations throughout the borough using both automatic monitoring sites and passive diffusion tubes.

A review of the available monitoring data has indicated that there are no DEFRA AURN sites located within the borough of Halton. The closest AURN sites are located in Leeds and Stockport. Carbon Monoxide, Benzene and 1, 3-Butadiene concentrations measured at these sites are well below the UK objective levels.

HBC has carried out monitoring of Benzene and Lead at various locations throughout the borough. All sites indicate levels well below the UK objectives.

As a result of the first round of review and assessments HBC has monitored Nitrogen Dioxide, PM_{10} and Sulphur Dioxide since 2001 using a mobile monitoring station. The monitoring has been concentrated at identified sensitive receptors close to pollution hotspots. In 2001, the station was sited at West Bank School, Widnes close to the Runcorn-Widnes Bridge. For 2002 the station was move to All Saints School on the West Bank Dock Estate. The location of these two sites are presented in *Figure* 7.3.3.

Figure 7.3.3
Location of Mobile Monitoring Stations



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	Project No	63-C8116	Drawn by MN

The mobile station was moved to Fiddlers Reach Power Station at the beginning of 2003. Data from the mobile station is presented in *Table 7.6*.

Both West Bank School and All Saints School are exposed to prevailing westerly winds, which blow along the Mersey Estuary, helping to disperse and dilute emissions from local sources. Data from all three monitoring sites indicates that there will be no breaches of the UK objective levels within Halton.

Table 7.6 – Pollution Concentrations measured at with the Mobile Monitoring Station

Site	Monitoring Period	Pollution Concentration µgm^{-3}						
		PM_{10}		NO_2		SO_2		
		Annual Mean	24Hr Mean	Annual Mean	Hourly Mean	24Hr Mean	Hourly Mean	15min Mean
West Bank School, Widnes	2001	17	27	26	118	24	52	74
All Saints School, Runcorn	2002	16	25	27	84	30	62	125
Runcorn Town Hall	2003	18.5	33.6	24.1	91.7	23.8	42.2	64.5
	2004	17.2	28.9	25.3	93.8	19.0	34.5	46.6
Lower House Lane	2005	22.6	34.2	25.8	83.9	19.7	31.7	51.8
Source: HBC								

HBC has been monitoring Nitrogen Dioxide since 1990, using diffusion tubes, located at kerbside sites throughout the borough. However, as none of the tubes were located within close proximity to the development site, the data collected was not considered of relevance to this assessment and has not been included.

7.3.4 Background concentrations provided by DEFRA

Additional information on estimated background concentrations of pollutants has been obtained from the Estimated Background Air Pollution Maps for 2001 and projections for other years published on the UK National Air Quality Information Archive by Defra. This is a set of data for the whole of the UK giving annual average background concentrations of pollutants on a 1km by 1 km grid basis. The site lies in the southern section of grid square 349500, 384500, and the western section of grid square 350500, 384500. An average of these two squares has been used to provide representative background levels for the site. The 2004 background maps do not provide concentrations of sulphur dioxide; therefore data for this pollutant has been obtained from the 2001 background maps. The data is presented in *Table 7.7* below.

Some caution should be given when considering these background concentrations as monitoring carried out by HBC (*Section 7.3.3*) indicates roadside pollution levels below the background concentrations provided in the 2001 maps. This data is only estimated and does not take into account prevailing meteorological conditions. The prevailing westerly winds along the Mersey are obviously dispersing local emissions to a greater extent than is indicated by these estimated background concentrations.

Since this report was completed revised maps have been produced providing data for 2004, 2005 and 2010. This new data set, presented in *Table 7.8*, indicates background concentrations of oxides of nitrogen and nitrogen dioxide considerably lower than the previous 2001 maps, further indicating that the 2001 maps over estimated background concentrations of these pollutants. Data from the 2004 maps shows concentrations in better agreement with data recorded by the mobile monitoring unit. However, data taken from both data sets indicates background concentrations at the development site are comfortably below the UK air quality objectives.

Table 7.7 – Estimated Annual Average Background Air Pollution Concentrations obtained from Defra 2001 Maps

Pollutant	Year	Annual mean concentration µgm^{-3}
Oxides of Nitrogen	2001	72.1
	2005	63.45
	2010	51.4
Nitrogen dioxide	2001	36.75
	2005	33.65
	2010	29.05
PM_{10}	2001	20.9
	2004	20.3
	2010	18.7
Sulphur dioxide	2001	5.59
Benzene	2001	0.80
	2003	0.71
	2010	0.56
Carbon monoxide	2001	0.4
1,3-butadiene	2001	0.29
	2003	0.23

Table 7.8 – Estimated Annual Average Background Concentrations obtained from the Defra 2004 Maps

Pollutant	Year	Annual mean concentration µgm^{-3}
Oxides of Nitrogen	2004	40.0
	2005	39.2
	2007	36.2
	2010	32.8
Nitrogen dioxide	2004	24.9
	2005	24.7
	2007	23.5
	2010	22.2
PM_{10}	2004	20.8
	2004	20.7
	2007	20.1
	2010	19.3

7.4 ASSESSMENT OF IMPACTS AND MITIGATION MEASURES

7.4.1 Construction Impacts – Nuisance Dust

Impacts

It is inevitable that with any major development demolition and construction activities will cause some disturbance to those nearby. Disruption due to construction is a localised phenomenon and is temporary in nature. In general only people living or working within 100 metres of construction activities are likely to be seriously impacted by nuisance dust.

Dust arising from the majority of construction activities tends to be of a coarse nature. Deposition of coarse dust can lead to soiling of property, including windows, cars, external paintwork and laundry.

The ability of dust particles to remain suspended in the air depends on its shape, size and density. Coarse particles (>30µm), tend to be deposited within 100m of source[14]. Finer particles, between 10-30µm, are generally deposited within 200 to 500m of source, while very fine particles (<10µm), which remain suspended for longer, can travel up to 1km from source. The greatest proportion of construction dust is made up of coarse particles, thus the majority of dust emissions are deposited within 100m of source.

Only a small proportion of dust generated by construction activities would be of a fine nature (PM_{10}), which can enter the human respiratory system and results in adverse health effects. High emissions of specifically fine dust typically arise from specialist activities, such as stone finishing, which can be subject to individual controls. During construction of the proposed development dust emissions may arise from the following activities:

- demolition of existing structures;
- earth moving and major excavation works;
- moving and stockpiling of materials;
- movement of vehicles over unpaved or soiled surfaces causing re-suspension of dust particles;
- wind blown dust emissions from stockpiles and soiled surfaces; and
- fitting out and finishing activities such as cutting and grinding of stone or bricks.

Construction activities will occur over large areas of the site at any one time. Therefore the use of complete enclosures or sophisticated dust extraction and collection systems would not be feasible for reducing emissions from the site. Furthermore, as activities generally take place in the open, local meteorological conditions can greatly influence emissions. This makes it difficult to predict when and where significant emissions or soiling may occur.

It is anticipated that the highest risk of dust impacts may occur during the initial stages of the development, when the demolition of existing structures, earth moving and excavation is undertaken. There is less potential for widespread emissions of dust from the site in later stages, although localised emissions from individual activities may still be of significance. These include stone and brick cutting or grinding.

[14] Office of the Deputy Prime Minister (2000) MPG11: Controlling Environment Effects of Minerals Extraction, Annex 1 – The Control and Mitigation of dust at Mineral and Related Workings

Receptors

It is inevitable that with any development, demolition and construction activities will cause some disturbance to those nearby. Disruption due to construction is a localised phenomenon and is temporary in nature. In general, only people living or working within 100 metres of construction activities are likely to be seriously impacted by nuisance dust[15].

The immediate surroundings, including the buildings, roads and open area, together with the people who access them, will be those most at risk of being exposed to dust effects. Receptors downwind of the predominant wind direction from a development site will be at greater risk of impacts than those upwind. According to the HBC USA report there is a prevailing westerly wind, which blows along the Mersey Estuary, impacting on communities at West Bank, Widnes and Runcorn. Receptors located to the east of the development site would therefore be at most risk from dust impacts.

The development site is located in a predominantly industrial area, bounded to the southeast and southwest by industrial developments and to the north by the rail line servicing the current rail freight terminal. Industrial land uses are generally not sensitive to dust impacts, and in frequent cases can be a significant source of dust emissions. Therefore the potential for dust impacts to arise at the land uses in the immediate vicinity of the site is considered low.

The closest residential receptors (indicated in *Figure* 7.4.1) are as follows:

- Hale Bank – residential dwellings approximately 220 m north of the site;
- Ditton – residential dwellings approximately 375 m west of the site; and
- West Bank – Residential dwelling approximately 400 m east of the site.

As previously discussed the majority of dust particles would be >30µm and would therefore be deposited within 100m of source. Research into the impacts of dust from construction activities have revealed that at least half the people living within 50m of the site boundary tend to be seriously bothered by dust due to construction activities, but beyond 100m the number of people seriously bothered drops to less than 20 percent.

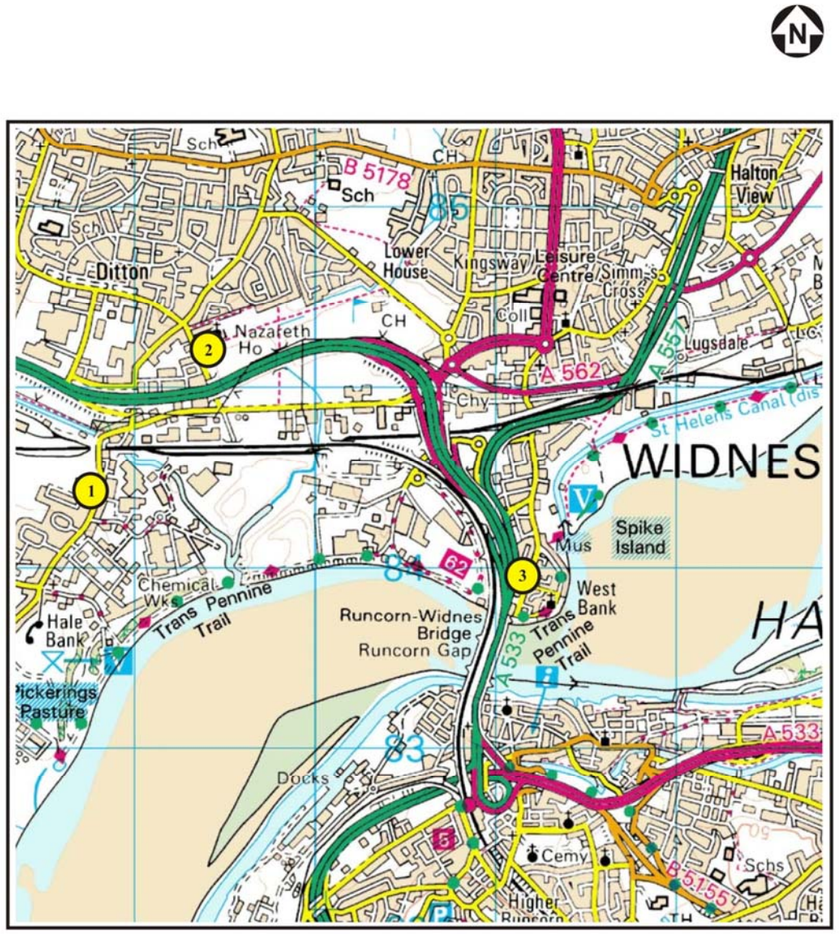
As the nearest receptors are located over 200m from the site boundary nuisance dust impacts from construction activities are likely to be low. Additionally the prevailing wind is westerly, thus greatest impacts would be to the east, significantly reducing any potential for impacts at Hale Bank and Ditton. Receptors at West Bank may be susceptible to some nuisance impacts during very windy conditions, however because they are over 400m from the site boundary any impacts would be low.

Mitigation

It is predicted that nuisance dust impacts during the construction phase would be low, thus site specific mitigation measures are unlikely to be required to control dust emissions, other than those which would be employed as good practice. It is common practice (and often mandatory in built up areas) to employ certain emissions reducing measures during construction, details of which are given below. The use of these measures would reduce any possible impacts to insignificant.

[15] Baughan C J (1980) Nuisance from Road Construction: a study at the A31 Poulner Lane Diversion, Ringwood. TRRL Supplementary Report 562, from DTLR (1994) Design Manual for Roads and Bridges

Figure 7.4.1
Location of Closest Receptors to the Proposed Development Site



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ENVIRON UK Limited Port of Liverpool Building, Pier Head, Liverpool L3 1BY Tel. +44(0)151 227 1989 Fax.+44(0)151 227 4500	Client	Drawbridge Securities (Ditton) Limited	
	Scale	Not to Scale	Date 16/02/2005
	Project No	63-C8116	Drawn by MN

Measures to prevent dust emissions include:

- The provision of easily cleaned hard standings for vehicles, this should include areas close to the site access points;
- Regular cleaning by brushing and water spraying of heavily used hard standing areas;
- The provision of wheel washing facilities;
- Dusty materials, stockpiles and dusty activities, such as stone cutting and grinding, will be sited away from the site boundary or effectively screened;
- Vehicles carrying dusty waste material off-site will be sheeted;
- No fires will be allowed on site;
- Should contaminated soil or materials containing asbestos be encountered during excavation and site preparation, these will be subject to special provisions;
- Materials, plants and equipment will be stored in allocated areas; and
- Trade contractors/suppliers will be required to follow, where possible, a policy of 'just in time' deliveries, direct to the workforce.

Various monitoring provisions should also be employed to ensure the effectiveness of dust control:

- The use of dust and the effectiveness of dust control will be reviewed at regular progress meetings;
- The name, address and telephone number of the contractor and a project environmental manager (responsible for environmental management) will be clearly displayed at the main entrance to the construction site; and
- Any complaints will be recorded, immediately investigated and acted upon by the project environmental manager and reported to HBC.

Construction Plant Impacts

Impacts

During the construction period, lorries will require access to the site to deliver and remove materials; earthmoving plant and other mobile machinery will work on the site and generators and cranes will be in operation. All of these machines will produce exhaust emissions.

Experience of other similar projects has indicated that construction traffic, if properly managed to avoid using minor roads, with timetabled deliveries to prevent congestion and to spread deliveries throughout the day, it is unlikely to make a significant contribution to the overall concentrations of vehicle derived air pollutants.

Although site construction vehicles and stationary construction plant, such as cranes and generators are likely to contribute to local air pollutant emissions, the site is located in an industrial area, some distance from locally sensitive receptors. Impacts from these sources are unlikely to be significant given the site location close to the Mersey, where prevailing westerly winds are known to improve dispersion of pollutant emissions.

Mitigation

Although impacts from construction plant are considered to be insignificant the following mitigation procedures are common practice during construction, and will be employed as standard.

- Construction vehicles visiting the site will use predetermined routes (as agreed with HBC);
- Construction vehicles visiting the site should be timetabled in order to avoid parking in local streets whilst waiting access to the site;
- All vehicles left stationary for significant periods will be required to switch off their engines;
- Stationary construction plant such as cranes and generators will be positioned away from site boundaries and pedestrian walkways; and
- All plant will be maintained in a satisfactory manor to minimise emissions.

7.4.2 Operational Impacts - Rail Freight

The proposed development will give rise to an increase in rail freight accessing the existing rail freight terminal, which will in turn increase the number of trains using the rail line located to the north of the development site.

Emissions from rail transport are highly unlikely to be the primary cause of possible exceedances of air quality objectives anywhere in the UK. Some impacts can occur in close proximity to large numbers of stationary, idling engines, although with regards to Oxides of Nitrogen and Sulphur Dioxide emissions any impacts are unlikely to extend beyond a distance of about 50 meters.

HBC has not identified the local rail line as a significant source of local pollutant emissions during its Review and Assessment process.

Data from the National Atmospheric Emissions Inventory (www.naei.co.uk) provides the percentage contribution to local pollution emissions arising from specific sources. The data for the borough of Halton, taken from grid OS squares 349500, 384500 and 350500, 384500 provides an indication of the main sources of pollution in the vicinity of the proposed development. This data is presented in *Table 7.9*.

The data shows that 'other transport', which includes rail transport, contributes less than 2% to the total emissions of Oxides of Nitrogen, PM_{10} and Sulphur Dioxide. This indicates that rail transport is not a significant source of pollutant emissions in the vicinity of the proposed development.

Table 7.9 – Percentage Contribution to Pollution Emissions during 2002, by Source Type, in the vicinity of the development site,

Source	Oxides of Nitrogen (82.8 Tonnes)	PM_{10} (9.32 Tonnes)	Sulphur Dioxide (6.47 Tonnes)
Industrial Combustion	8%	24%	66%
Industrial Processes	0.1%	35%	6%
Road Traffic	89%	38%	5%
Other Transport (including rail)	0.5%	1.8%	0.8%
Data taken from the National Atmospheric Emissions Inventory			

It is understood that the operation of the proposed development will generate a maximum of 3 additional freight trains per day. When compared with approximately 144 passenger trains, which currently use the line during a typical weekday, this equates to an increase in train movements of 3%. This level of change is unlikely to cause a significant change in local pollution emissions, especially when current rail movements contribute less than 2% of all pollutant emissions in the vicinity of the development site.

7.4.3 Operational Impacts - Road Traffic

Impacts

As discussed in section 7.1.1, the assessment of traffic related impacts has been updated as the proposed development will generate more traffic movements than the previous development proposals. It has been estimated that the development will generate approximately 696 car movements and 2004 HGV movements per day. Additionally, a new access route into the western side of the development site will be provided for cars and LGVs.

The traffic flow data provided by ADL has been used as the basis of the road traffic assessment. New traffic count data was provided for the following roads:

- Speke Road;
- Desotto Road;
- Ditton Road;
- Hale Road; and
- Hale Gate Road.

Traffic count data was also requested for Queensway, however data could not be collected due to access problems. Therefore the base traffic flow used in the previous assessment, which were extracted from the HBC Review and Assessment of Air Quality, has been used for this road. Traffic flows were provided for the following scenarios:

- The existing situation;
- 2010 do nothing;
- 2010 with permitted scheme in place;
- 2010 with proposed scheme.

A summary of the traffic data used in the assessment is provided in *Table 7.10*.

Background data used for the assessment has been taken from the national air quality archive, details of which are given in *Section 7.3.4*. Although this data is higher than monitored roadside data, there are no background monitoring sites within Halton and thus no other sources of data available.

The impact of road emissions on local air quality has been assessed by calculating pollutant concentrations at regular intervals from each road link. This method provides an indication of how pollution levels decline with distance from the road centre. Predicted annual mean Nitrogen Dioxide and PM_{10} concentrations for a number of receptors along each road link are presented in *Tables 7.11, 7.12 and 7.13*.

7.10 – Traffic Data for Links included in Air Quality Assessment

Link Name	2007 Base		2010 Do Nothing		2010 Permitted Development		2010 Proposed Development	
	AADT	%HGV	AADT	%HGV	AADT	%HGV	AADT	%HGV
Speke Road	46135	9.3	48300	9.3	47370	9.5	48825	10.1
Queensway*	84350	9.5	85360	9.5	85916	9.9	86517	10.4
Desotto Road	14504	27.1	15186	27.1	14890	29.3	16465	32
Ditton Road	13279	6.9	13904	6.9	14085	6.8	14835	6.3
Hale Road	10673	8.4	11170	8.4	11290	8.4	12990	7.2
Hale Gate Road	4100	4.7	4292	4.7	4304	4.7	4930	4.1

*base flows for this link taken from HBC USA report and factor using NTF data. All other flows were supplied by ADL

Assessment of Predicted Results

A comparison between the annual predicted concentrations and monitored concentrations should be carried out in order to assess whether the methodology has predicted concentrations within an acceptable margin of error. It should be noted that the DMRB model, as used in this assessment, is a means for estimating air quality impacts rather than predicting precise concentrations. This has already been done in the much more extensive studies carried out by the individual Local Authorities as part of the Local Air Quality Management Process. In particular, the methodology as used in this application is a valuable tool in determining how changes in traffic or other input parameters are likely to influence concentrations. As such, precise agreement with monitoring data or other modelling studies is unlikely, although broad agreement is expected if the model is working correctly.

In this instance the lack of relevant monitoring data in close vicinity to the development site makes verification of the DMRB results difficult. However, comparison of the results predicted at all locations, except those close to Speke Road and Queensway, indicate broad agreement with the monitored concentrations recorded by HBC.

Comparison of the results with the air quality objectives indicates that existing air quality is predicted to meet the current nitrogen dioxide and PM_{10} objectives, which is in agreement with the findings of HBC. The results predicted for 2010 indicate a slight decrease in concentrations of both nitrogen dioxide and PM_{10} due to the gradual renewing of the vehicle fleet with less polluting vehicles. No exceedance of the nitrogen dioxide objective is predicted for 2010, however PM_{10} concentrations are predicted to exceed the provisional short and long term 2010 objectives, although it should be noted that these remain provisional and are unlikely to be brought into regulations.

Comparison of the predicted results for the with and without development scenarios indicates that the most significant impact will arise on Desotto Road as a result of the high number of HGV movements introduced by the development. In this location nitrogen dioxide concentrations are predicted to increase by a maximum of 1.5 μgm^{-3} and annual mean PM_{10} concentrations by 0.5 μgm^{-3}.

Table 7.11 – Predicted Nitrogen Dioxide Concentrations in 2007 and 2010

Recep-tor	Location	Distance from road centre (m)	Annual mean Nitrogen Dioxide Concentration (μgm^{-3})				
			2007 Existing	2010 Do Nothing	2010 Permitted	2010 Proposed	Increase due to development
1	Hale Gate Road	10	24.7	23.3	23.3	23.4	0.1
2		15	24.6	23.1	23.1	23.2	0.1
3		20	24.5	23.0	23.0	23.1	0.1
4	Hale Road	10	27.7	25.8	25.8	26.0	0.2
5		15	27.2	25.3	25.4	25.5	0.2
6		20	26.7	25.0	25.0	25.1	0.1
7	Speke Road	10	34.4	31.1	31.2	31.6	0.5
8		20	32.1	29.2	29.3	29.6	0.4
9		30	30.3	27.8	27.8	28.0	0.2
10	Desotto Road	10	35.1	32.0	32.4	33.5	1.5
11		20	32.7	29.9	30.3	31.1	1.2
12		30	30.8	28.3	28.6	29.3	1.0
13	Ditton Road	10	28.0	26.0	26.0	26.1	0.1
14		20	27.0	25.1	25.2	25.2	0.1
15		30	26.2	24.5	24.5	24.5	0
16	Queens-way	10	36.3	32.7	32.7	33.3	0.6
17		20	33.7	30.5	30.5	31.0	0.5
18		30	31.7	28.8	28.8	29.2	0.4

Table 7.12 – Predicted Annual Mean PM_{10} Concentrations in 2007 and 2010

Recep-tor	Location	Distance from road centre (m)	Annual mean PM_{10} Concentration (μgm^{-3})				
			2007 Existing	2010 Do Nothing	2010 Permitted	2010 Proposed	Increase due to development
1	Hale Gate Road	10	20.6	19.7	19.7	19.7	0
2		15	20.5	19.6	19.6	19.7	0.1
3		20	20.5	19.6	19.6	19.6	0
4	Hale Road	10	21.8	20.6	20.6	20.7	0.1
5		15	21.5	20.4	20.4	20.5	0.1
6		20	21.4	20.3	20.3	20.4	0.1
7	Speke Road	10	24.6	22.5	22.5	22.7	0.2
8		20	23.5	21.8	21.8	21.9	0.1
9		30	22.7	21.2	21.2	21.3	0.1
10	Desotto Road	10	24.6	22.5	22.6	23.0	0.5
11		20	23.5	21.7	21.8	22.1	0.4
12		30	22.7	21.2	21.2	21.4	0.2
13	Ditton Road	10	21.7	20.6	20.6	20.6	0
14		20	21.3	20.3	20.3	20.3	0
15		30	21.1	20.0	20.1	20.1	0.1
16	Queens-way	10	25.6	23.1	23.1	23.3	0.2
17		20	24.3	22.2	22.2	22.3	0.1
18		30	23.3	21.5	21.5	21.6	0.1

Table 7.13 – Predicted Number of Days with PM_{10} Concentrations Greater Than 50 μgm^{-3} in 2007 and 2010

Recep-tor	Location	Distance from road centre (m)	Predicted Number of Days with PM_{10} Concentrations Greater Than 50 μgm^{-3}				
			2007 Existing	2010 Do Nothing	2010 Permitted	2010 Proposed	Increase due to development
1	Hale Gate Road	10	4.2	3.0	3.0	3.1	0.1
2		15	4.1	3.0	3.0	3.0	0
3		20	4.0	2.9	2.9	3.0	0.1
4	Hale Road	10	5.9	4.1	4.2	4.3	0.2
5		15	5.6	3.9	3.9	4.1	0.2
6		20	5.3	3.7	3.7	3.9	0.2
7	Speke Road	10	11.5	7.2	7.2	7.5	0.3
8		20	9.1	5.9	5.9	6.1	0.2
9		30	7.6	5.0	5.0	5.1	0.1
10	Desotto Road	10	11.4	7.1	7.4	8.0	0.9
11		20	9.1	5.8	6.0	6.4	0.6
12		30	7.5	5.0	5.0	5.4	0.4
13	Ditton Road	10	5.9	4.2	4.2	4.2	0
14		20	5.3	3.7	3.8	3.8	0.1
15		30	4.8	3.5	3.5	3.5	0
16	Queens-way	10	13.9	8.3	8.3	8.7	0.4
17		20	10.7	6.6	6.6	6.9	0.3
18		30	8.7	5.5	5.5	5.7	0.2

Impacts are predicted to be lower on the western approach to the site which passes through residential areas, as this route will only be used by cars. At the residential properties on Hale Gate Road and Hale Road, concentrations of annual mean nitrogen dioxide and PM_{10} as a result of the proposed development are predicted to increase by a maximum 0.2 μgm^{-3}.

In relation to the previously permitted development the proposed development results in slightly higher impacts, in particular on Desotto Road and to a lesser extent on Queensway. This is due to the increase in HGV movements predicted to arise due to the proposed development in comparison to the movements predicted with the permitted scheme.

Assessment of Significance

The significance of the predicted impacts has been assessed using the NSCA guidance provided in Section 7.2.

The maximum impact is predicted to arise on Desotto Road, where annual mean nitrogen dioxide concentrations are predicted to increase by 1.5 μgm^{-3} as a result of the development. This is an increase of 4.7% from the do nothing predicted concentration of 32.0 μgm^{-3}. In the same location annual mean PM_{10} concentrations are predicted to increase by 2.2% and the number of days exceeding 50 μgm^{-3} is predicted to increase by 1. Using the guidance provided in *Table 7.1* these increases are considered to be very small. Existing air quality in the vicinity of the site is predicted to meet the current air quality objectives, although hotspots have been identified close to the site and in particular close to Queensway. From the guidance provided in *Table 7.2*, it is therefore concluded that impacts from the development should be considered to be slightly adverse.

The development is for industrial uses and therefore it is not considered that it will result in the introduction of new receptors that would be sensitive to air quality.

Mitigation

There are limited options to mitigate impacts arising from the operational traffic associated with the proposed development. However, a green travel plan will be developed to encourage the workforce to adopt sustainable methods of travel to and from the development thereby reducing the number of car movements.

7.4.5 Operational Impacts – Loading and Unloading Operations

There is the potential for site vehicles, plant and machinery to give rise to pollutant emissions, however due to the location of the site and the separation distance between the site boundary and locally sensitive receptors impacts from these sources is likely to be low. The site is also known to have good conditions for the dispersion of pollutants due to its open nature and close proximity to the Mersey, where strong westerly prevailing winds occur.

Furthermore, it is understood that trains will generally be loaded and unloaded from siding bays within the adjacent O'Connor's facility which would prevail whether or not this development proceeded. Additionally, it is understood that HGV's will be loaded in docking bays, where their engines will be switched of whilst stationary. Pollutant emissions from loading and unloading operations will therefore be controlled so far is practicable.

Based on the information above impacts from loading and unloading operations on the site are considered to be negligible.

Mitigation

No mitigation measures are required over and above those discussed already.

7.5 SUMMARY AND CONCLUSIONS

A baseline assessment has been carried out of the site and the surrounding area through the review of HBC air quality review and assessment documents, through the use of available monitored data and with regards to UK pollutant objective limits. The objective limits are set with regard to the protection of human health to ensure that even the most vulnerable members of society will not be unduly affected by ambient air pollutant concentrations. This has concluded that there will be no breaches of the UK objective limits within HBC and there is no requirement to declare an AQMA.

Impacts of the construction phase on both nuisance dust and local air quality have been assessed with regards to the location of locally sensitive receptors. Impacts are predicted to be low at all receptors and insignificant with the implementation of common practice (and often mandatory) mitigation measures.

Impacts from the operation of the development have been predicted as low. The location and nature of the site, being open and adjacent to the Mersey, promotes the dispersion of pollutants, reducing any possible impacts on local air quality. Data from the national atmospheric emissions inventory indicates that rail transport contributes less than 2% of all pollutant emissions in the vicinity of the proposed development. A maximum increase in rail movements of 4 trains per day would have an insignificant impact on local air quality.

Freight will also be delivered and removed from the site by HGVs. Changes in road traffic emissions along links in close proximity to identified receptors have been predicted and the impacts on local air quality assessed. It is predicted that the proposed development will cause an increase in annual mean nitrogen dioxide and PM_{10} concentrations of no more than 1.5 and 0.5 μgm^{-3} respectively. Given the existing ambient concentrations of pollutants this equates to a very small increase in pollution concentrations and is therefore considered to have a slight adverse impact on local air quality, based on the guidance provide by the NSCA.