DRAGONFLY

CONSULTING

Globe Innovation Centre Ltd

Globe Mills, Huddersfield

Air Quality Assessment

DC4470-AR1

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1.0 INTRODUCTION

1.1 Introduction

Globe Innovation Centre Ltd has appointed Dragonfly Consulting to carry out an air quality assessment for a proposed multi-storey car park at Globe Mills, Huddersfield, within the jurisdiction of Kirklees Council (KC).

This report assesses air quality impacts associated with the proposed development. Potential sources of emissions are identified and assessed in the context of existing air quality and emission sources and the nature and location of receptors.

A glossary of common air quality terminology is provided in Appendix A.

1.2 Scope of Assessment

The development would generate additional vehicle movements on the adjacent road network. The potential impacts of operational traffic have been assessed in accordance with current air quality planning guidance published by the Institute of Air Quality management (IAQM)[1].

The development proposals and trip generation data have been assessed against the criteria set out within the West Yorkshire Low Emissions Strategy Air Quality & Emissions Technical Planning Guidance (AQEPG)[2] which determines the scheme to be a 'medium' sized development. An assessment of operational traffic impacts is not therefore required and has been scoped out of the assessment. The assessment has concentrated on nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 µm and 2.5 µm (PM_{10} and $PM_{2.5}$), the pollutants most associated with traffic emissions and which can be harmful and cause discomfort to humans.

An assessment of air quality impacts associated with construction activities has also been undertaken to determine measures for inclusion within a Construction Management Plan (CMP), to be secured via planning condition.

The scope of the assessment has been discussed and agreed with relevant officers within the Kirklees Council (KC) Environmental Protection Team and a copy of the consultation is included in Appendix E.

[1] IAQM, Land-use Planning and Development Control: Planning for Air Quality, January 2017
[2] West Yorkshire Low Emissions Group, Air Quality & Emissions Technical Planning Guidance, Part of the West Yorkshire Low Emissions Strategy, 2016

2.0 SITE DESCRIPTION

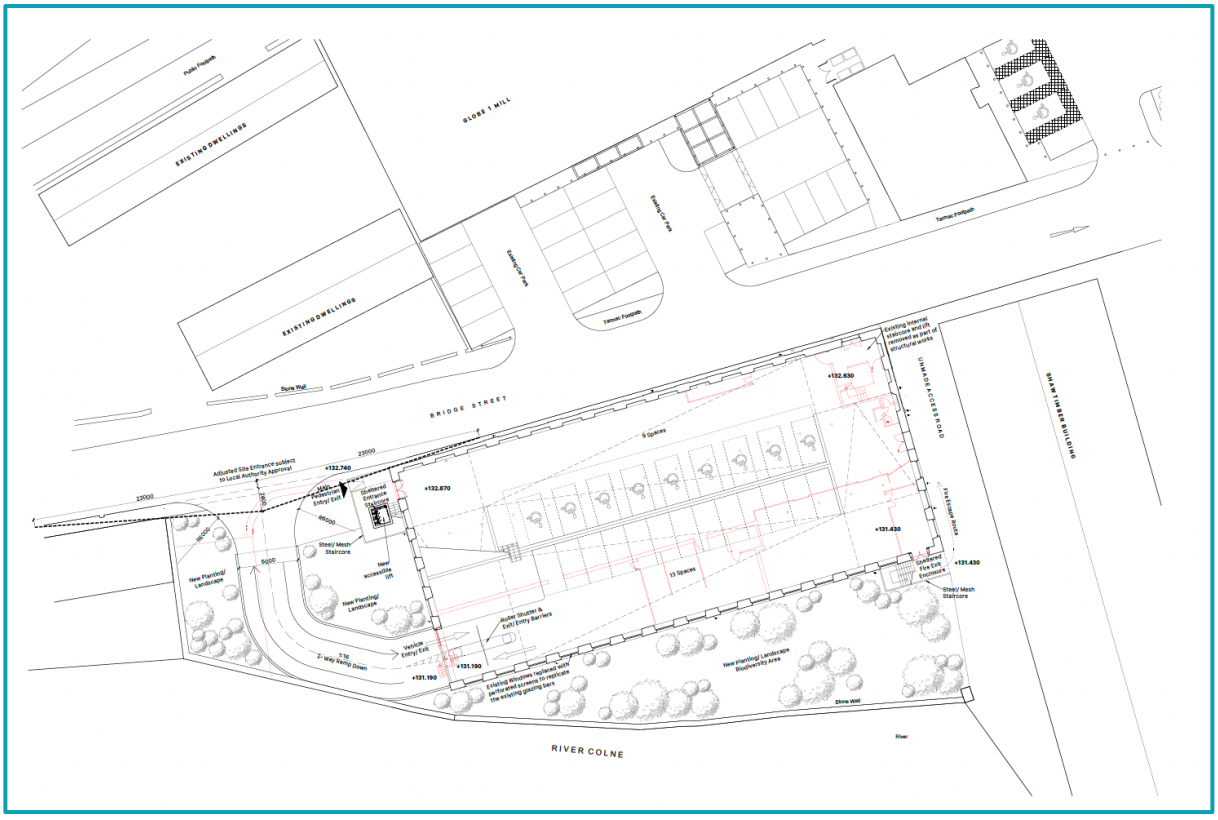
2.1 Existing Site

The Development site is a disused building at Globe Mills, Huddersfield. The site is bounded by Bridge Street to the north with residential properties further afield, residential properties to the west and existing industrial buildings to east and south.

2.2 Proposed Site

It is proposed that the site will be used as a multi-storey car park with 193 spaces over 15 levels. Figure 2.1 below shows the proposed layout of the site.

Figure 2.1
Proposed Site Location



3.0 LEGISLATION, POLICY AND GUIDANCE

3.1 International Air Quality Policy

3.1.1 European Directive on Ambient Air Quality and Cleaner Air for Europe

The EU Directive 2008/50/EC[3] on ambient air quality and cleaner air for Europe (the CAFE directive) sets out the ambient air quality standards for a number of pollutants and the dates by which these objectives should be met. The Air Quality Standards Regulations 2010[4] implements the requirements of the Directive into UK legislation. The Directive contains a series of limit values for the protection of human health and critical levels for the protection of vegetation. These limit values are legally binding, and the UK may incur infringement action if it does not meet the required objective limits within the agreed time limits. The UK is currently exceeding the objective limits for NO_2 and PM_{10} within London and a number of other air quality zones within the UK.

3.2 National Air Quality Policy

3.2.1 Air Quality Strategy for England, Scotland, Wales & Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007[5], pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation, and ecosystems. These are benzene (C_6H_6), 1,3-butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), particulate matter (PM_{10}, $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3) and polycyclic aromatic hydrocarbons (PAHs).

The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures

[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
[4] Air Quality Regulations 2010 – Statutory Instrument 2010 No. 1001
[5] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007

to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

Of the pollutants included in the AQS, NO_2 and PM_{10} would be particularly relevant to this project as these are the primary pollutants associated with vehicle emissions, the main source of pollutants in the vicinity of the Site.

The current statutory standards and objectives for NO_2 and PM_{10} in relation to human health are set out in Table 3.1.

In relation to $PM_{2.5}$ the 2019 Clean Air Strategy[6] includes a commitment to set '*new, ambitious, long-term targets to reduce people's exposure to $PM_{2.5}$*' which the Environment Act 2021[7] commits the Secretary of State to setting. As discussed in Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22)[8] issued by DEFRA, local authorities are expected to work towards reducing $PM_{2.5}$ in their area, setting this out as the current objectives within England for $PM_{2.5}$. Historically, limit values were established via the EU Directive with both a Stage 1 and Stage 2 limit value identified. For the purposes of this assessment the Stage 2 limit value for $PM_{2.5}$ (as provided in Table 3.1) is considered to be appropriate to use for assessing impacts of development proposals.

Table 3.1
Relevant Objectives set out in the Air Quality Strategy

Pollutant	Concentrations	Measured As	Date to be Achieved By
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	1 hour mean	31 December 2005
	40 µg/m^3	Annual mean	
Particulate Matter (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times per year	24-hour mean	31 December 2004
	40 µg/m^3	Annual mean	
Particulate Matter ($PM_{2.5}$)	Stage 1 – 25 µg/m^3	Annual mean	1st January 2020
	Stage 2 - 20 µg/m^3	-	-

The statutory standards and objectives apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within Local Air Quality Management Technical Guidance 2022 (LAQM.TG(22)) issued by DEFRA for Local Authorities on where the objectives apply, as detailed in Table 3.2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

[6] Defra. (2019). Clean Air Strategy. London: HMSO
[7] Secretary of State, The Environment Act 2021 HMSO
[8] DEFRA (2022) Local Air Quality Management. Technical Guidance (LAQM.TG(22)

Table 3.2
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, care home etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. 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 together with hotels. 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 be expected to spend 1-hour or more. Any outdoor locations where the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

3.2.2 Local Air Quality Management – The Environment Act 1995

Local authorities are seen to play a particularly important role. Section 82 of the Environment Act 1995 requires every local authority to conduct a review of the air quality from time to time within the authority's area. The DEFFA technical guidance, LAQM.TG(22), continues with the streamlined approach to the Local Air Quality Management (LAQM) regime, whereby every authority has to undertake and submit a single Annual Status Report/Annual Progress Report within its area, to identify whether the objectives have been or will be achieved at relevant locations by the applicable date. If the objectives are not being met, the authority must declare an Air Quality Management Area (section 83 of the Act) and prepare an action plan (section 84) which identifies measures that will be introduced in pursuit of the objectives.

3.2.3 National Air Quality Plan for NO_2 in the UK

The National Air Quality Plan[9] was written as a joint venture between the Defra and the Department for Transport (DfT) and aims to tackle roadside concentrations of NO_2 in the UK. It includes a number of measures such as those aimed at investing in Ultra Low Emission Vehicles (ULEVs) charging infrastructure, public transport and grants to help local authorities in improving air quality.

The plan requires all local authorities (LAs) in England with areas expected not to meet the Limit Values by 2020 (known as 'air quality hotspots') to develop plans to bring concentrations within these values in "the shortest time possible". These plans are to be reviewed by the government and suggestions included in the plan include actions such as utilising retrofitting technologies, changing road layout and encouraging public transport and ULEV use. Where these approaches are not considered sufficient, the LA may need to consider implementation of a Clean Air Zone (CAZ) which places restrictions on vehicle access to an area and may include charging certain (or all) vehicles or restrictions on the type of vehicle allowed to access an area.

3.2.4 Road to Zero Strategy

The Road to Zero strategy[10] sets out the government's plans to encourage zero emissions vehicles. These include the aim that by 2040 all new cars and vans will have zero tailpipe emissions and by 2050 almost every car will have zero emissions. Measures within the Strategy are aimed at encouraging the uptake of the cleanest vehicles and supporting electric charging infrastructure.

3.2.5 Clean Air Strategy

The Clean Air Strategy sets out policies to lower national emissions of pollutants in order to reduce background pollution and human exposure. It aims to create a strong framework to tackle air pollution and to reduce the number of people living in locations with $PM_{2.5}$ concentrations exceeding 10 µg/m^3 by 50% by 2025.

3.3 Planning Policy

3.3.1 National Planning Policy

National Planning Policy Framework

The National Planning Policy Framework (NPPF)[11] sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to 'protect and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

[9] Defra and DfT. (2017). UK plan for tackling roadside nitrogen dioxide concentrations. London: HMSO
[10] HM Government. (2018). Road to Zero Strategy. London: HMSO
[11] Ministry of Housing, Communities and Local Government: National Planning Policy Framework (July 2021)

Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 180) requires that *'planning policies and decisions should contribute to and enhance the natural local environment by …preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible help to improve local environmental conditions such as air and water quality.'*

In dealing specifically with air quality the NPPF (paragraph 192) states that *'planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'*

Paragraph 194 states that *'the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively'.*

3.4 Air Quality Guidance

3.4.1 Defra Technical Guidance, LAQM.TG(22)

LAQM.TG(22) sets out detailed guidance on how air quality should be assessed and monitored by local authorities. The document provides useful guidance on how air quality from specific sources should be screened and the approaches that should be used to undertake detailed assessment where potentially significant emissions are identified, including details on model verification and consideration of monitoring data for use in assessments.

3.4.2 IAQM Land-Use Planning and Development Control: Planning for Air Quality

The Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) have published joint guidance on the assessment of air quality impacts for planning purposes[12]. This includes information on when an air quality assessment is required, what should be included in an assessment and criteria for assessing the significance of any impacts.

3.4.3 IAQM Guidance on the Assessment of Dust from Demolition and Construction

Guidance produced by the IAQM on assessing impacts from construction and demolition activities includes a methodology for identifying the risk magnitude of potential dust sources associated with demolition, construction, earthworks and trackout. This is then used to identify the level of mitigation necessary in order for the impacts to be not significant. The London SPG 'The Control of Dust and Emissions during Construction and Demolition' is based on this guidance, however, the original document is more detailed and therefore it is used to provide additional information where necessary.

[12] EPUK & IAQM (2017) Land Use Planning & Development Control: Planning for Air Quality, January 2017

3.4.1 West Yorkshire Air Quality & Emissions Technical Planning Guidance

The West Yorkshire Low Emissions Strategy has published the AQEPG to provide a consistent and effective approach to dealing with air quality within the planning system. The guidance set out the approach that should be taken to assess air quality for developments, provides screening criteria to determine the scope of air quality issues that need to be considered and sets out details on mitigation measures that can be implemented to reduce emissions.

This guidance has been used to inform this assessment.

4.0 METHODOLOGY

4.1 Baseline Assessment

A baseline assessment of air quality in the vicinity of the Site has been carried out through a review of monitoring data available within the KC air quality review and assessment reports, predominantly the KC 2023 Air Quality Annual Status Report (ASR)[13]. Data has also been obtained from the UK Air Information Resource (UK-AIR) background pollution maps.

4.2 Construction Phase

During construction of the proposed development, lorries will require access to the Site to deliver and remove materials; earthmoving plant and other mobile machinery may also work on site including generators and cranes. These machines produce exhaust emissions; of particular concern are emissions of NO_2 and PM_{10}.

Based on the development proposals it is anticipated that there would be no more than 1-2 additional Heavy-Duty Vehicles (HDV) generated on any one road link on any given day during the construction phase.

The IAQM air quality planning guidance sets out criteria to determine when significant effects are likely to occur, and a more detailed assessment of traffic emissions is required. The criteria indicates that significant impacts on air quality are unlikely to occur where a development results in less than 25 HDV movements per day in locations within or adjacent to an AQMA and less than 100 HDV outside of an AQMA. It is therefore anticipated that construction traffic generated by the proposed development would result in a negligible impact on local NO_2 and PM_{10} concentrations and has not been considered any further in this assessment.

4.2.1 Construction/Fugitive Dust Emissions:

Construction phase activities associated with the Proposed Development may result in the generation of fugitive dust emissions (i.e. dust emissions generated by site-specific activities that disperse beyond the construction site boundaries).

If transported beyond the site boundary, dust can have an adverse impact on local air quality. The IAQM has published a guidance document for the assessment of demolition and construction phase impacts. The guidance considers the potential for dust nuisance and impacts to human health and ecosystems to occur due to activities carried out during the following stages of construction:

- Demolition (removal of existing structures);
- Earthworks (soil-stripping, ground-levelling, excavation and landscaping);
- Construction (activities involved in the provision of a new structure); and
- Trackout (the transport of dust and dirt from the construction site onto the public road network where it may be deposited and then re-suspended by vehicles using the network).

A qualitative assessment of air quality impacts due to the release of fugitive dust and particulates (PM_{10}) during the construction phase was undertaken in accordance with the methodology detailed in the IAQM guidance.

[13] Kirklees Council (2023) 2023 Air Quality Status Report, June 2023

The assessment takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels, thus enabling a level of risk to be assigned. Risks are described in terms of there being a low, medium, or high risk of dust impacts.

Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined.

A summary of the IAQM assessment methodology is provided in Appendix B.

4.2.2 Selection of Receptors

The IAQM assessment is undertaken where there are:

- Human receptors within 350m of the site boundary or within 50m of the route(s) used by construction vehicles on the public highway;
- Human receptors up to 500m from the site entrance(s);
- Ecological receptors within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway; and
- Ecological receptors up to 500m from the site entrance(s).

It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

4.2.3 Significance Criteria

The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

4.3 Operational Assessment

The air quality planning guidance published by IAQM sets out criteria for establishing when there is a risk of significant impacts on local air quality as a result of traffic generated by a proposed development. The guidance states that where the following criteria are exceeded a more detailed assessment is required:

- An increase in LGV of more than 100 vehicles per day within or adjacent to an AQMA, an increase of more than 500 per day elsewhere;
- An increase in HGV or more than 25 vehicles per day within or adjacent to an AQMA, an increase of more than 100 per day elsewhere.

Anticipated trip generation from the operational development has been assessed against the above criteria. Where this criterion is exceeded then a detailed assessment of operational impacts may be required.

5.0 BASELINE ASSESSMENT

5.1 Kirklees Council Review and Assessment

Monitoring data and local background information on the Development and surrounding area have been taken from the most recently available KC annual status report dated June 2023.

KC contains ten Air Quality Management Areas (AQMAs) with the closest, the Outlane aspect of the Kirklees AQMA's (2017) located approximately 3.2 km north of the Development.

5.2 Air Quality Monitoring

5.2.1 Nitrogen Dioxide

KC monitored NO_2 concentrations at three automatic monitoring locations with the closest location (KC Ref: RS6 (CM2) – Ainley Top) being located approximately 6.5 km to the northeast of the site. Given the distance between the automatic monitoring locations and the Development site, the data collected is not considered representative of the Development site.

Passive monitoring is carried out using diffusion tubes, which, due to their relative in-expense, allow for a much greater spatial coverage than with automatic monitoring sites. Diffusion tubes are acknowledged as a less accurate method of monitoring ambient air pollutants than automatic monitors, with diffusion tubes over or under estimating concentrations by as much as 30%.

KC monitored NO_2 concentrations at 104 non automatic monitoring locations with the closest location (K47) being located in the vicinity of Outlane approximately 3.2 km northeast of the site. Details of the monitoring sites and data recorded since 2018 are set out in Table 5.1.

To allow the results to be reliably compared with the AQ Objectives, the data should be bias corrected using data collected from tubes co-located with continuous monitoring sites. The data provided in Table 5.1 below has been adjusted by KC using national bias adjustment factors obtained from the Defra LAQM website[14].

Table 5.1
Diffusion Tube Annual Average NO_2 Concentrations (µg/m^3)

Site	Classification	Year 2018	2019	2020[1]	2021[1]	2022
K47	R	**44.9**	**40.5**	32.0	34.4	32.8

R – Roadside
Numbers in **BOLD** indicate an exceedance of the annual mean objective of 40 µg/m^3
[1] data for 2020 & 2021 has been included for consistency purposes only. Due to travel restrictions as a result of the COVID -19 pandemic, pollution levels during these years were significantly suppressed. Data from these years is therefore not considered representative of normal conditions and 2019 data has been used to inform the baseline assessment.

The data set out in Table 5.1 shows annual mean NO_2 concentrations above the objective limit of 40 µg/m^3 at all monitoring location in 2019 and has since been trending downwards. In general, KC monitoring data indicates a slight downward trend in concentrations over the period presented.

[14] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/

Monitoring data from K47 is not considered representative of the Development site as it is located more than 3 km from the site and is adjacent to a major pollutant source in the M62.

Guidance set out in LAQM.TG(22) indicates that where annual mean NO_2 concentrations are found to exceed 60 µg/m^3 there is a risk that the 1-hour objective is also being exceeded. Based on the data set out in Table 5.1 it is unlikely that concentrations are exceeding the 1-hour objective at the monitoring site.

5.2.2 Particulate Matter (PM_{10} and $PM_{2.5}$)

KC monitored PM_{10} and $PM_{2.5}$ concentrations at two monitoring locations within its jurisdiction however neither monitoring location is within 3 km of the development and as such the data collected is not considered representative of conditions at the site.

5.3 DEFRA Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the DEFRA background maps provided on UK-AIR, the Air Quality Information Resource (http://uk-air.defra.gov.uk).

Estimated air pollution concentrations for NO_2 PM_{10} and $PM_{2.5}$ have been extracted from the 2018 based background pollution maps for the UK for 2024. These maps are available in 1 km x 1 km grid squares. Concentrations have been taken from the grid square representing the Site.

The annual mean for each pollutant is provided in Table 5.2 for the assessment year 2024.

The data indicates that background concentrations at the site are estimated to be below the annual mean objectives for NO_2, PM_{10} and $PM_{2.5}$ in 2024.

Table 5.2
Annual Mean Background Air Pollution Concentrations at the Development Site

OS Grid Reference	2024		
	Nitrogen dioxide (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
419500, 441500	7.7	9.0	6.1

5.4 Air Quality at the Development Site

The proposed development is not set to introduce any sensitivity receptors. Therefore, the impact of the proposals in terms of new exposure is **negligible**.

6.0 ASSESSMENT OF IMPACTS

6.1 Construction Impacts

6.1.1 Site and Surroundings

A summary of the proposed development is provided in Section 2 of this report.

The total area of the Site being developed covers approximately 300 m^2 and there are residential properties located to the north of the Site within 350m. An assessment of construction related impacts in relation to human receptors has therefore been undertaken.

Dust emissions from construction activities are unlikely to result in significant impacts on ecologically sensitive receptors beyond 50m from the site boundary. A review of data held on the DEFRA MAGIC website shows no sites designated as important for wildlife within 50m of the Site, therefore impacts on ecological receptors have not been considered any further within this assessment.

As discussed in Section 5, the PM_{10} concentrations, taken from the DEFRA background maps, in the vicinity of the Site are expected to be below the relevant objective limits (Table 5.2). The data indicates background concentrations in the region of 9-10 µg/m^3. Based on professional judgment, it is anticipated that PM_{10} concentrations at the Site and at adjacent properties are unlikely to be much higher than background, therefore PM_{10} concentrations are expected to be below 24µg/m^3.

The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited would depend upon a number of factors. These include wind direction and strength, local topography, and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

6.1.2 Risk Assessment of Dust Impacts

Defining the Dust Emission Magnitude

With reference to the criteria detailed in Appendix B, the dust emission magnitude for each of the category's demolition, earthworks, construction and trackout have been determined. These have been summarised in Table 6.1.

Table 6.1
Dust Emission Magnitude

Activity	Criteria	Dust Emission Magnitude
Demolition	There are no building to be demolished	n/a
Earthworks	There are no earthworks to be undertaken	n/a
Construction	Building volume is approximately 32,000 m^3, main construction material metal and timber.	Medium
Trackout	1-2 HDV (<3.5t) movements per day	Small

Sensitivity of Surrounding Area

Using the criteria set out in Tables B2 to B4 in Appendix B, the sensitivity of the surrounding area to impacts from dust emissions has been determined and are set out in Table 6.2.

Dust Soiling

There are residential properties located to the north, the nearest being approximately 10m from the Site boundary. Given the proximity and number of sensitive residential receptors to the north of the Site, the overall sensitivity of the surrounding area is considered to be 'High'.

It is anticipated that there will be 1-2 HDV (>3.5t) movements per day during the construction phase which would travel along Bridge Street. The sensitivity of the area to dust soiling effects from trackout is therefore considered to be 'Medium' as this route moves through existing highly sensitive receptors.

PM_{10} Effects

As previously discussed, annual mean PM_{10} concentrations in the vicinity of the Site are expected to be below 24 µg/m^3. Based on the proximity of sensitive receptors to the site boundary and the local concentrations of PM_{10} the sensitivity of the surrounding area is considered to be 'Low' with regards human health impacts.

Table 6.2
Sensitivity of Receptors

Potential Impact		Sensitivity at Site
Dust Soiling (construction)	Receptor Sensitivity	High
	Number of Receptors	10-100
	Sensitivity of the area	High
Dust Soiling (trackout)	Receptor Sensitivity	High
	Number of Receptors	10-100
	Sensitivity of the area	High
Human Health (construction)	Receptor Sensitivity	High
	Annual mean PM_{10} Concentrations	9.0
	Number of Receptors	10-100
	Sensitivity of the area	Low
Human Health (trackout)	Receptor Sensitivity	High
	Annual mean PM_{10} Concentrations	9.0
	Number of Receptors	10-100
	Sensitivity of the area	Low

Defining the Risk of Impacts

The dust emission magnitude as set out in Table 6.1 is combined with the sensitivity of the area (Table 6.2) to determine the risk of both dust soiling and human health impacts, assuming no mitigation measures applied at site. The risk of impacts associated with each activity is provided in Table 6.3 below and has been used to identify site-specific mitigation measures, which are discussed in Section 8.1 and set out in Appendix C.

Table 6.3
Summary of Effects Without Mitigation

Source	Dust Soiling	PM_{10} Effect	Ecological
Demolition	N/A	N/A	N/A
Earthworks	N/A	N/A	N/A
Construction	Medium Risk	Negligible Risk	N/A
Trackout	Medium Risk	Negligible Risk	N/A

6.2 Operational Impacts

Trip generation data has been provided by the transport consultants for the project, Paragon Highways. The data shows that the Development would generate an additional AADT of no more than **292**. Additional information on traffic generation is detailed in the Transport Assessment to be submitted alongside the planning application.

As such, the IAQM screening criteria as set out in Section 4.3 will not be exceeded and impacts on local air quality across the main road network is therefore concluded as being negligible and further detailed assessment has been scoped out of the assessment.

Based on professional judgement and taking into account local monitoring showing NO_2 concentration comfortably meeting the relevant UK objective limits at locations where vehicle movements are significantly higher, the operational impact of the development is deemed to be **negligible**.

7.0 MITIGATION

7.1 Construction Phase

The control of dust emissions from construction site activities relies upon management provisions and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impacts to nearby properties.

The proposed development has been identified as a medium-risk site for dust soiling effects during earthworks and construction and a negligible-risk site during trackout. For human health, the Site has been identified as a negligible-risk site as set out in Table 6.3.

The developer should therefore implement appropriate dust and pollution control measures as set out within the IAQM guidance. A summary of these measures is set out in Appendix C. The proposed measures should be set out within a CMP and approved by KC prior to commencement of any work on site.

Following implementation of the measures recommended for inclusion within the CMP the impact of emissions during construction of the proposed development would be **negligible**.

7.2 Operational Phase

The assessment has shown that the operational development would have a negligible impact on local air quality.

In accordance with the requirements of the AQEPG the proposed development would also implement the following mitigation measures as required for ‘medium’ developments:

- Electric charging point provision for 10% of parking spaces.

8.0 CONCLUSIONS

Globe Innovation Centre Ltd has appointed Dragonfly Consulting to carry out an air quality assessment for a proposed multi-storey car park at Globe Mills, Huddersfield, within the jurisdiction of Kirklees Council (KC).

It is inevitable that with any development, demolition and construction activities will cause some disturbance to those nearby. Dust arising from most construction activities tends to be of a coarse nature, which through dispersion by the wind can lead to soiling of property including windows, cars, external paintwork, and laundry. However, as well as giving rise to annoyance due to soiling of surfaces from dust emissions, there is evidence of major construction activities causing increases in long term PM_{10} concentrations and in the number of days exceeding the short term PM_{10} objective of 50 μgm^{-3}.

The IAQM guidance on assessing impacts on air quality from construction activities and determining the likely significance has been used to determine the risk of impacts occurring during the construction of the development and to identify appropriate mitigation measures to be implemented on site to reduce dust emissions and associated impacts.

Due to the proximity and number of nearby residential receptors the Site is considered to have a medium risk of impacts with regards to dust soiling and PM_{10} concentrations. However, following the implementation of appropriate mitigation measures impacts associated with the construction of the development are likely to be insignificant.

The baseline assessment has predicted a negligible impact in terms of exposure to NO_2, PM_{10} and $PM_{2.5}$ concentrations. Furthermore, a review of predicted trip generation from the site has found that there will be a negligible impact on local air quality as a result of the operational development. Appropriate mitigation measures have been proposed in line with local air quality planning guidance.

Based on the above air quality does not pose a constraint to development of the site for employment purposes and the proposals meet the requirements of both national and local air quality planning policy.

Appendix A – Glossary of Terminology

Term	Definition
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O_3	Ozone.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
μgm^{-3} micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1ug/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix B – IAQM Construction Dust Assessment Procedure

In order to assess the potential impacts, the activities on construction sites are divided into four categories. These are:

- demolition (removal of existing structures);
- earthworks (soil-stripping, ground-levelling, excavation and landscaping);
- construction (activities involved in the provision of a new structure); and
- trackout (the transport of dust and dirt from the construction site onto the public road network where it may be deposited and then re-suspended by vehicles using the network).

For each activity, the risk of dust annoyance, health and ecological impact is determined using three risk categories: low, medium and high risk. The risk category may be different for each of the four activities. The risk magnitude identified for each of the construction activities is then compared to the number of sensitive receptors in the near vicinity of the site in order to determine the risks posed by the construction activities to these receptors.

Step 1: Screen the Need for an Assessment

The first step is to screen the requirement for a more detailed assessment. An assessment is required where there is:

- a 'human receptor' within 350m of the boundary of the site or 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- an 'ecological receptor' within 50m of the boundary of the site; or 50m of the route(s) used by the construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2A: Define the Potential Dust Emission Magnitude

This is based on the scale of the anticipated works and the proximity of nearby receptors. The risk is classified as small, medium or large for each of the four categories.

Demolition: The potential dust emission classes for demolition are:

- Large: Total building volume >50,000m^3, potentially dusty construction material (e.g. Concrete), on site crushing and screening, demolition activities >20m above ground level;
- Medium: total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: total building volume <20,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks: This involves excavating material, haulage, tipping and stockpiling. The potential dust emission classes for earthworks are:

- Large: Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;

- Medium: Total site area 2,500 m^2 – 10,000m^2, moderately dusty soil (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4m – 8m in height, total material moved 20,000 tonnes- 100,000 tonnes; and
- Small: Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.

Construction: The important issues here when determining the potential dust emission magnitude include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. The categories are:

- Large: Total building volume >100,000m^3, on site concrete batching, sandblasting;
- Medium: Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout: The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the Site as a result of trackout. The categories are:

- Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;
- Medium: 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content, unpaved road length 50-100m; and
- Small: <10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length >50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health (PM_{10}) and ecological receptors. The sensitivity of the area takes into account the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of receptors;
- in the case of PM_{10}, the local background concentration; and
- site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Table B1 is used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Based on the sensitivities assigned to the different receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification can be defined for each. Tables B2 to B4 indicate the criteria used to determine the sensitivity of the area to dust soiling, human health and ecological impacts.

Table B1
Examples of Factors Defining Sensitivity of an Area

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	Users can reasonably expect enjoyment of a high level of amenity The appearance, aesthetics or value of their property would be diminished by soiling' The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. E.g. dwellings, museums and other important collections, medium and long term car parks and car showrooms.	10 – 100 dwellings within 20 m of site. Local PM_{10} concentrations close to the objective (e.g. annual mean 36-40 $\mu g/m^3$). E.g. residential properties, hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red List for Great Britain. E.g. A Special Area of Conservation (SAC).
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home. The appearance, aesthetics or value of their property could be diminished by soiling The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. E.g. parks and places of work	Less than 10 receptors within 20m. Local PM_{10} concentrations below the objective (e.g. annual mean 30-36 $\mu g/m^3$). E.g. office and shop workers but will generally not include workers occupationally exposed to PM_{10} as protection is covered by the Health and Safety at Work legislation.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition E.g. A Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	The enjoyment of amenity would not reasonably be expected. Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. E.g. playing fields, farmland unless commercially sensitive horticultural, footpaths, short lived car parks and roads.	Locations where human exposure is transient. No receptors within 20m. Local PM_{10} concentrations well below the objectives (less than 75%). E.g. public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. E.g. Local Nature Reserve with dust sensitive features.

Table B2
Sensitivity of the Area to Dust Soiling on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table B3
Sensitivity of the Area to Human Health

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table B4
Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Define the Risk of Impacts

The final step is to combine the dust emission magnitude determined in step 2A with the sensitivity of the area determined in step 2B to determine the risk of impacts with no mitigation applied. Tables B5 to B7 indicate the method used to assign the level of risk for each construction activity. The identified level of risk is then used to determine measures for inclusion within a site-specific Construction Management Plan (CMP) aimed at reducing dust emissions and hence reducing the impact of the construction phase on nearby receptors. The mitigation measures are drawn from detailed mitigation set out within the IAQM guidance document.

Table B5
Risk of Dust Impacts from Demolition

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table B6
Risk of Dust Impacts from Earthworks/Construction

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table B7
Risk of Dust Impacts from Trackout

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Appendix C – Construction Mitigation Measures

It is recommended that the 'highly recommended' measures set out below are incorporated into a CMP and approved by KC prior to commencement of any work on site:

- develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information on the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- carry out regular site inspections to monitor compliance with the CMP, record inspection results and make inspection log available to LCC when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- fully enclose site or specific operations where there is a high potential for dust production and the activities are being undertaken for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If being re-used on site, cover as detailed below;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable;

- produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials;
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- avoid bonfires and burning of waste materials;
- avoid scabbling where possible;
- ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- use water-assisted dust sweepers on the access and local roads, to remove, as necessary, any material tracked out of the site;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving the site are covered to prevent the escape of materials during transport;
- record all inspections of haul routes and any subsequent action in a site log book;
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud);
- ensure there is adequate area of hard surfaced road between the wheel wash facility and the site exit where ever site size and layout permits