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Air Quality Assessment

Plots 4 and 5 Central Square, City Centre, Cardiff

August 2025

Air Quality Assessment

Project: PLOTS 4 AND 5 CENTRAL SQUARE, CITY CENTRE,
CARDIFF

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1. EXECUTIVE SUMMARY

- 1.1 This report has been prepared by Cass Allen to inform the detailed planning application being submitted by REAP 3 Limited ('the Applicant') to Cardiff Council ('the Council') for the development of Plots 4 and 5, Central Square, City Centre, Cardiff ('the site'). The assessment was carried out with regard to relevant local and national planning policy and guidance.
- 1.2 The site is located 90m south-west of the 'Cardiff City Centre Air Quality Management Area' (AQMA), which was declared due to exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). Air quality in the vicinity is primarily influenced by vehicle emissions on the local road network, including the adjacent Wood Street. Emissions from diesel trains along the railway line, 120m south of the site are also likely to contribute to background pollutant levels.
- 1.3 Potential construction phase dust soiling and particulate matter (PM: PM₁₀) health effects were assessed qualitatively, resulting in Medium and Low risks being identified, respectively, in the absence of mitigation. Suitable best practice mitigation measures have been recommended, and no significant residual air quality impacts are expected.
- 1.4 A detailed atmospheric dispersion model was utilised to predict NO₂ and PM (PM₁₀ and PM_{2.5}) concentrations at relevant sensitive receptor locations within the study area during the operation of the development. A detailed atmospheric dispersion model was utilised to predict NO₂ and PM (PM₁₀ and PM_{2.5}) concentrations at relevant sensitive receptor locations within the study area during the operation of the development. The results indicate that pollutant concentrations at proposed sensitive receptors will be below the relevant AQOs during the operational phase, with no requirement for additional mitigation.
- 1.5 Furthermore, no significant impacts on local air quality as a result of development-generated traffic are anticipated. Accordingly, the overall effect of the development is considered 'not significant' with regard to air quality.
- 1.6 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

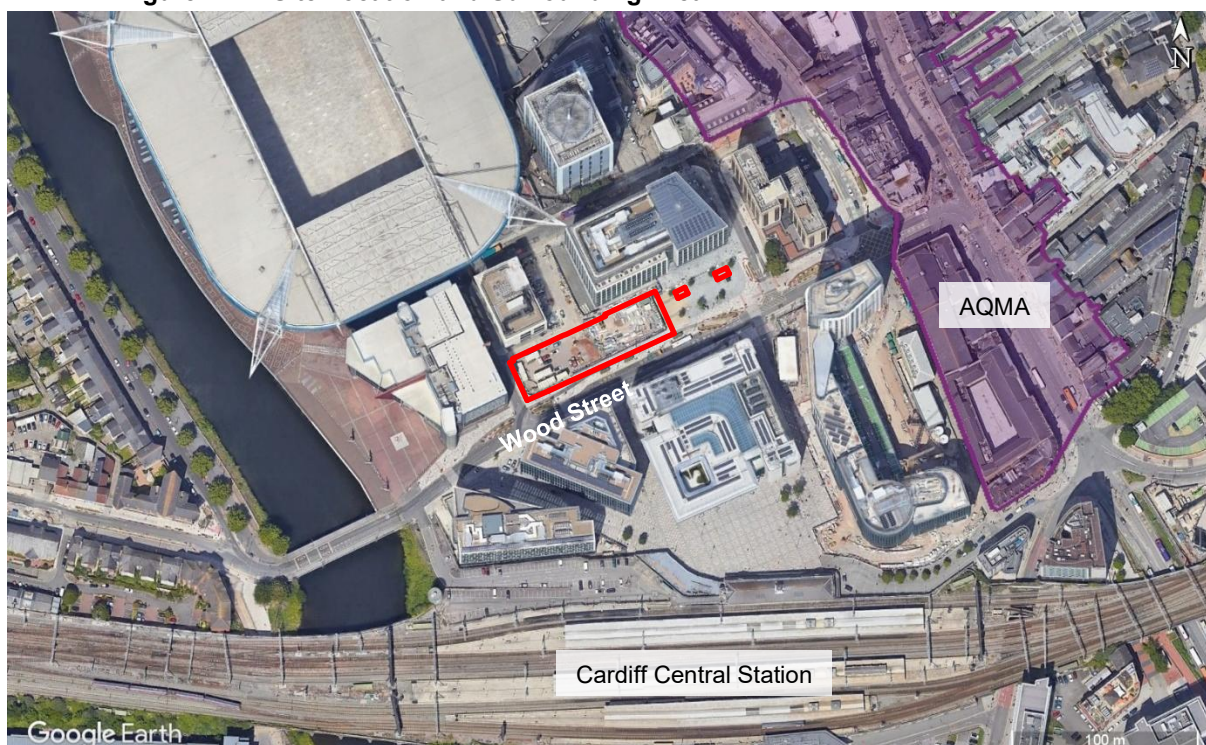
2. INTRODUCTION

- 2.1 This report has been prepared by Cass Allen to inform the detailed planning application being submitted by the Applicant to the Council in support of a full planning application for the development of the site. The assessment was carried out with regard to relevant local and national planning policy and guidance.
- 2.2 The aim of the assessment is to consider air quality conditions, and their potential to influence the development in terms of its design, scale and layout, taking into account the following aspects:
- Dust and PM emissions generated by construction phase activities;
 - Exhaust emissions from construction plant and traffic;
 - The exposure of new sensitive receptors to elevated pollutant concentrations; and
 - Emissions from traffic generated by the operation of the development.
- 2.3 Subsequently, where required, appropriate measures are identified to minimise the impacts.
- 2.4 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

3. PROJECT DESCRIPTION AND SITE CONTEXT

- 3.1 The mixed-use development will provide residential accommodation and flexible non-residential uses within a 50-storey building, a pavilion building with commercial uses, plus cycle parking, landscaping and other associated works.
- 3.2 The site is 0.21ha and comprises a cleared rectangular plot of land, alongside two smaller parcels of land located to the north of Wood Street within the public realm (these smaller parcels will accommodate public cycle parking spaces). The site is bounded by Wood Street to the south, Scott Road to the west, Rose Lane to the north-west and Park Street further north, and a public square to the east.
- 3.3 The Media Wales office building is located at 6 Park Street, immediately adjacent to the north-west of the site. The HMRC building is located immediately adjacent to the north-east of the site. The Millennium Plaza leisure complex is located immediately to the west. To the south cross Wood Street lies the Cardiff University School of Journalism, Media and Culture, and the BBC Cymru building. The Principality Stadium is located further to the north and can be accessed via Central Square. These surrounding uses have the potential to be affected by emissions generated by the construction and operation of the development, though there are few existing highly sensitive uses (e.g. residential) in the vicinity.
- 3.4 The site is located 90m south-west of the Cardiff City Centre AQMA, which was declared due to exceedances of the annual mean AQO for NO₂. Air quality in the vicinity is primarily influenced by vehicle emissions on the local road network, including the adjacent Wood Street. Emissions from diesel trains along the railway line, 120m south of the site are also likely to contribute to background pollutant levels. The site location is shown in Figure 1.

Figure 1 Site Location and Surrounding Area



4. LEGISLATION AND PLANNING POLICY

Air Quality Legislation

- 4.1 The wider air quality legislation underpinning national, regional and local planning policy, is summarised in Appendix 1.
- 4.2 The National AQOs and Air Quality Standards Regulations limit and target values for the UK are summarised in the Air Quality Strategy. These limits, for ten key air pollutants, are based on both European Union directives and World Health Organization (WHO) guidelines. They are periodically updated, informed by the latest scientific evidence, to protect public health, vegetation and ecosystems. The Local Air Quality Management (LAQM) regime requires local authorities to regularly evaluate the air quality in their areas based on these AQOs.
- 4.3 The Environment (Air Quality and Soundscapes) (Wales) Act 2024 establishes a new legislative framework for air quality in Wales. It enables Welsh Ministers to set legally binding targets for air pollutants, including fine particulate matter (PM_{2.5}), and places a statutory duty on Welsh Ministers to publish an Air Quality Strategy for Wales. The Act also introduces duties to promote awareness, take action on vehicle idling, and strengthen controls over domestic burning and emissions from non-transport sources. This legislation complements and enhances existing UK-wide air quality objectives by providing a Wales-specific statutory mechanism for improving air quality and soundscapes, in line with national public health and environmental priorities.
- 4.4 PM_{2.5} is a key pollutant associated with adverse health effects. As a regional pollutant, its sources often extend beyond local authority boundaries, and it is not currently included as a statutory objective under the LAQM regime in Wales. However, reducing PM_{2.5} concentrations is a priority for the Welsh Government, as set out in the *Clean Air Plan for Wales* (2020) and supported by forthcoming targets expected under the 2024 Act. Local authorities are encouraged to take account of PM_{2.5} in policy decisions and planning assessments, particularly in areas where vulnerable populations may be exposed.
- 4.5 The National AQOs for the pollutants most associated with vehicle emissions, and therefore applicable to this assessment, are detailed in Table 1.

Table 1 UK National Air Quality Objectives

Pollutant	Objective	Averaging Period
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
	200µg/m ³ not to be exceeded more than 18 times per year	1-hour mean
Particulate Matter (PM ₁₀)	40µg/m ³	Annual mean
	50µg/m ³ not to be exceeded more than 35 times per year	24-hour mean
Particulate Matter (PM _{2.5})	20µg/m ³	Annual mean

- 4.6 The above AQOs are typically applied where there is 'relevant exposure', i.e. where members of the public are likely to be present for the relevant averaging periods, or regularly exposed, and not in workplaces where relevant provisions concerning health and safety at work apply.

National Policy

- 4.7 Outline guidance for the assessment of air quality affecting new developments is given in Planning Policy Wales (PPW) (February 2024). Relevant sections in this case are included in Appendix 1.

Local Policy

- 4.8 The Cardiff Local Development Plan 2006 – 2026 was adopted by the Council in January 2016 and provides the statutory framework for development and use of land within the city, setting out the policies to guide development. Policy KP18 is particularly relevant to this report:

Policy KP18: Natural Resources

In the interests of the long-term sustainable development of Cardiff, development proposals must take full account of the need to minimise impacts on the city's natural resources and minimise pollution, in particular the following elements:...

iii. minimising air pollution from industrial, domestic and road transportation sources and managing air quality...

- 4.9 To address the requirements of the national and local policies, the following key air quality matters have been considered:
- Construction phase fugitive emissions of dust and PM impacts at existing receptors;
 - Construction phase plant and vehicle emissions impacts at existing receptors;
 - Operational phase vehicle emissions exposure at proposed receptors; and
 - Operational phase vehicle emissions impacts at existing receptors.

5. ASSESSMENT METHODOLOGY

- 5.1 The scope and methodology for this assessment has been determined with regard to:
- Defra 'LAQM Technical Guidance' (August 2022) (LAQM.TG22);
 - Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM), 'Land Use Planning & Development Control: Planning for Air Quality' (January 2017) (LUPDC).

5.2 Reference has also been made to other relevant technical guidance, where applicable.

Construction Phase

5.3 The assessment of potential air quality impacts during the construction phase has focused on the generation and dispersion of dust and PM₁₀, following the IAQM 'Guidance on the Assessment of Dust from Demolition and Construction' (January 2024) methodology, summarised as follows:

- Step 1 – screen the need for an assessment: consider impacts to sensitive human and ecological receptors within 250m or 50m of the site boundary, respectively (indicated on Figure 2), and within 50m of a route used by construction vehicles up to 250m from the site entrance.
- Step 2A – estimate the dust emission magnitude for each of the main construction activities – demolition, earthworks, general construction, and trackout.
- Step 2B – determine the sensitivity of the receiving environment, through consideration of factors such as meteorological conditions, the number of nearby receptors, their proximity and their sensitivity. Other factors to consider are detailed in Box 9 of the guidance. A wind rose for nearby Cardiff weather station is included in Appendix 2.
- Step 2C – define the risk of impacts.
- Step 3 – identify site-specific mitigation requirements (in addition to basic project controls).

5.4 In addition, exhaust emissions from construction vehicles and plant may impact local air quality. The potential for significant effects resulting from these emissions has also been considered with reference to screening and significance criteria in LUPDC.

5.5 A review of the Multi-Agency Geographic Information for the Countryside (MAGIC) website did not identify any statutory designated ecological sites within the relevant screening distances, and therefore these have been excluded from the construction phase assessment.

Operational Phase

5.6 Concentrations of NO₂, PM₁₀ and PM_{2.5} have been considered in the operational phase assessment as road traffic is a major source of these pollutants and their concentrations are often close to, or in exceedance of, the relevant AQOs in urban locations.

Air Quality Impacts

- 5.7 The LUPDC guidance indicates the magnitude of change in traffic flows that is potentially significant, and therefore likely to require further assessment, as follows:
- 5.8 For locations within or near (as applicable for the site) an AQMA:
- Light Duty Vehicle (LDV) flows of >100 Annual Average Daily Traffic (AADT); and/or
 - Heavy Duty Vehicle (HDV) flows of >25 AADT.
- 5.9 Where these thresholds are not exceeded, a detailed assessment of air quality impacts is not normally required, and the resulting effect can be considered 'not significant'.

Site Suitability

- 5.10 The development also has the potential to expose future users to elevated pollutant concentrations.

Modelled Receptors

- 5.11 Cambridge Environmental Research Consultants' (CERC) ADMS-Roads (version 5.0.1.3) atmospheric dispersion model has been used to predict pollutant concentrations the development in place at proposed receptor (PR) locations, as detailed in Table 2.

Table 2 Modelled Receptor Locations

ID	Description	Grid Reference (OSGB)	Height (m)*
PR1	Western Site Boundary (Scott Road)	318072.1, 176007.2	1.5 (Level 0), 13.5 (Level 3)
PR2	Western Site Boundary (Scott Road)	318079.6, 175991.0	1.5 (Level 0), 13.5 (Level 3)
PR3	Southern Site Boundary (Wood Street)	318086.3, 175989.8	1.5 (Level 0), 13.5 (Level 3)
PR4	Southern Site Boundary (Wood Street)	318110.7, 176000.7	1.5 (Level 0), 13.5 (Level 3)
PR5	Southern Site Boundary (Wood Street)	318132.8, 176010.9	1.5 (Level 0), 13.5 (Level 3)
PR6	Southern Site Boundary (Wood Street)	318159.3, 176023.2	1.5 (Level 0), 13.5 (Level 3)

* To represent the average adult breathing zone above floor level and to align with Defra national background modelling used within this assessment.

- 5.12 Receptors were modelled on the site boundary and therefore closer to the pollution sources, rather than the building façades, as a robust case. Worst-case ground floor (Level 0) receptors were also modelled in addition to Level 3 receptors, this being the lowest residential floor of the tower.
- 5.13 A review of the MAGIC website did not identify any statutory designated ecological sites in the vicinity, and therefore these have been excluded.
- 5.14 To assess the site suitability of the development, the following scenarios have been modelled:
- 2023 – Model Verification; and
 - 2028–Assumed Opening Year, With Development.

- 5.15 The study area, including modelled road links and receptors, is shown in Figure 2 below.
- 5.16 Details of the traffic data used in the model are included in Appendix 3, and other model inputs such as emission factors, verification and adjustment, in Appendix 4.

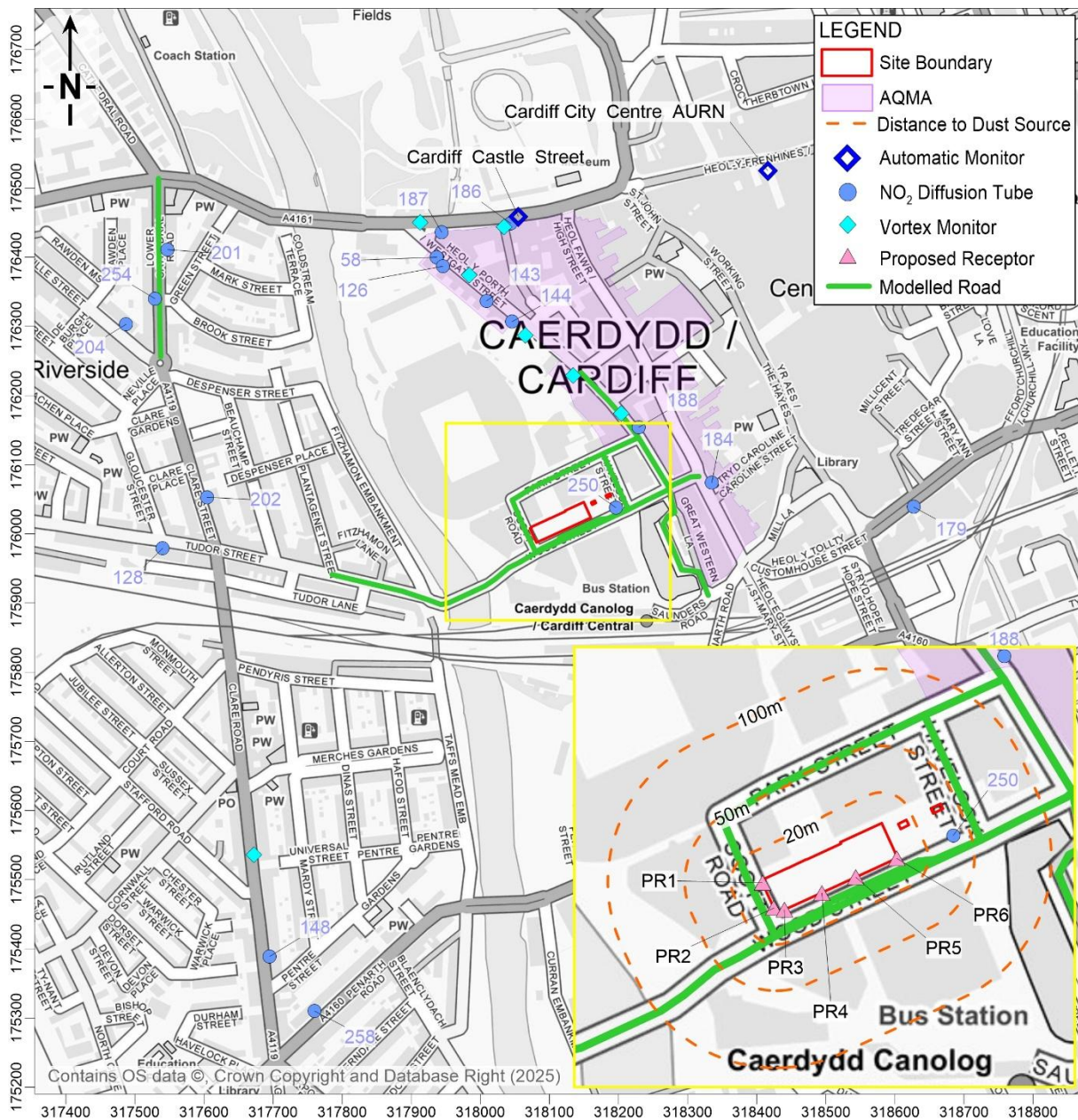
PM_{2.5} Targets

- 5.17 Additionally, Defra's 'PM_{2.5} Targets: Interim Planning Guidance' (October 2024), prompts developers to consider:
- 1. How has exposure to PM_{2.5} been considered when selecting the development site?*
 - 2. What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?*
- 5.18 Accordingly, these aspects are also considered in the operational phase assessment.

Significance Criteria

- 5.19 For proposed receptors, predicted pollutant concentrations have been compared to the relevant AQOs to determine the potential for exceedance, and therefore, the suitability of the site for the proposed use.

Figure 2 Study Area



6. BASELINE CONDITIONS

- 6.1 Air quality conditions in the vicinity of the site have been reviewed to provide a baseline for consideration. The collected data are included in the tables below and were obtained from the Council and Defra. Monitoring locations are indicated on Figure 2.

Table 3 Cardiff Council Monitored Concentrations Across Study Area – NO₂

ID	Location	Type	Distance to site (m)	Monitored Annual Mean (µg/m ³)				
				2019	2020	2021	2022	2023
-	Cardiff Castle St (automatic)	Roadside	430	-	-	25.0	34.0	33.0
-	Cardiff City Centre (automatic)	Background	550	12.0	16.0	16.0	17.0	16.0
58	Westgate Street	Kerbside	410	41.2	30.0	30.8	31.0	30.7
126	Westgate St Flats	Roadside	400	33.3	22.3	24.0	25.3	25.6
128	117 Tudor Street	Roadside	530	29.8	25.0	25.0	27.2	26.9
143	Windsor House	Roadside	320	35.6	23.5	25.7	25.7	25.4
144	Marlborough House	Roadside	280	33.9	25.0	26.4	27.9	27.6
148	161 Clare Road	Roadside	715	25.6	21.3	23.9	24.0	20.7
179	Altolusso, Bute Terrace	Roadside	470	33.1	32.4	37.6	31.7	36.0
184	Hophouse, St Mary Street	Roadside	180	40.5	28.3	27.5	28.3	24.7
186	Dempsey's PH, Castle St	Roadside	420	42.7	23.1	24.5	31.6	30.8
187	Angel Hotel	Roadside	135	43.9	25.7	26.1	31.5	27.6
188	Westgate Street (45 Apartments)	Roadside	140	43.7	32.5	26.8	28.5	26.7
201	23 Lower Cathedral Road	Roadside	660	28.9	22.1	24.0	27.0	23.1
202	22 Clare Street	Roadside	470	27.6	23.3	24.5	26.3	22.9
204	53 Neville Street	Roadside	660	22.1	18.7	20.1	20.9	20.3
250	Central Square	Roadside	40	-	26.7	28.4	26.3	24.7
254	Giraffe Nursery Cathedral Rd	Roadside	635	-	-	27.7	30.2	26.6
258	Lamp post Penarth Road	Roadside	750	-	-	29.4	29.5	26.7

Note: **Bold** denotes exceedance of the AQO. Data obtained from the Council Air Quality Annual Status Report (ASR) (2024). 2020 / 2021 results are likely to be atypical due to COVID-19 travel restrictions.

Table 4 Cardiff Council Monitored Concentrations Across Study Area – PM₁₀

ID	Location	Type	Distance to site (m)	Monitored Annual Mean (µg/m ³)				
				2019	2020	2021	2022	2023
-	Cardiff Castle St (automatic)	Roadside	430	-	-	12.0	20.0	18.0
-	Cardiff City Centre (automatic)	Background	550	23.0	14.0	13.0	16.0	16.0

Note: Data obtained from the Council's Air Quality ASR (2024). 2020 / 2021 results are likely to be atypical due to COVID-19 travel restrictions.

Table 5 Cardiff Council Monitored Concentrations Across Study Area – PM_{2.5}

ID	Location	Type	Distance to site (m)	Monitored Annual Mean (µg/m ³)				
				2019	2020	2021	2022	2023
-	Cardiff Castle St (automatic)	Roadside	430	-	-	9.0	10.0	8.0
-	Cardiff City Centre (automatic)	Background	550	12.0	7.0	9.0	11.0	10.0

Note: Data obtained from the Council's Air Quality ASR (2024). 2020 / 2021 results are likely to be atypical due to COVID-19 travel restrictions.

- 6.2 As indicated in Table 3, Table 4 and Table 5 above, pollutant concentrations in the vicinity of the site were below the relevant AQOs in the most recent monitoring years (2020-2023), after a small number of exceedances for NO₂ in 2019. Whilst a slight rebound has been observed post-COVID-19, pollutant concentrations generally remained lower in 2023 than in 2019. The Council also started monitoring NO₂, PM₁₀ and PM_{2.5} using low-cost 'vortex' monitors across the city in 2023 (as indicated on Figure 2). None of these monitors recorded exceedances of the relevant AQOs 2023.
- 6.3 Furthermore, annual mean NO₂ concentrations were consistently 'well below' (defined by the IAQM as less than 75% of) the AQO at the Central Square diffusion tube (no. 250), close to the site's eastern boundary.

Table 6 Mapped Background Annual Mean Concentrations Across Study Area (µg/m³)

2023				2028			
NO _x	NO ₂	PM ₁₀	PM _{2.5}	NO _x	NO ₂	PM ₁₀	PM _{2.5}
18.2 - 22.9	13.5 - 16.5	13.9 - 14.9	8.4 - 8.8	14.1 - 19.5	10.7 - 14.3	13.3 - 14.3	7.9 - 8.2

Note: Data obtained from <https://uk-air.defra.gov.uk/data/iaqm-background-home>. A range is given as the study area spans multiple grid squares.

- 6.4 Defra-predicted background concentrations for 2023 and 2028 are well below (defined by the IAQM as less than 75% of) the relevant AQOs. These background concentrations are later combined with roadside modelling results to provide total 'predicted environmental concentrations' at receptor locations.

7. CONSTRUCTION PHASE ASSESSMENT

- 7.1 The IAQM methodology has been used to assess the potential impact of dust and PM₁₀ arising from on-site activities. As indicated within the guidance, the use of professional judgment is necessary, due to the diverse range of projects that are subject to dust impact assessment, meaning that it is not possible to be prescriptive as to how to assess the impacts.
- 7.2 As sensitive receptors were identified within the relevant IAQM screening distances, the assessment progressed to Step 2, which has been summarised in the tables below.

Table 7 Step 2A – Dust Emission Magnitude for Construction Activities

Activity	Magnitude	Explanation
Demolition	N/A	Site is currently vacant, previous buildings demolished in 2018.
Earthworks	Small	Total site area <18,000m ² , <5 heavy earth-moving vehicles active at any one time
Construction	Large	Total building volume >75,000m ³ , high structure
Trackout	Small	<20 outward HDV movements per day, surface material with low potential for dust release, no unpaved road

Table 8 Step 2B – Sensitivity of the Area

Potential Impact	Details	Construction Activity		
		Earthworks	Construction	Trackout
Dust Soiling: Amenity	>1 Medium sensitivity receptors within 20m of site	Medium	Medium	Medium
PM ₁₀ : Health	1-10 Medium sensitivity receptors within 20m of site and low background PM ₁₀ concentration	Low	Low	Low

Table 9 Step 2C – Summary of Impact Risks to Define Site-Specific Mitigation

Potential Impact	Construction Activity		
	Earthworks	Construction	Trackout
Dust Soiling	Low	Medium	Low
Human Health	Negligible	Low	Negligible

- 7.3 It should be noted that the prevailing winds (as shown in Appendix 2) are westerly and thus, locations downwind of the site, to the east, are most at risk of construction dust impacts. As a robust case, the development is considered Medium Risk for dust soiling effects and Low Risk for PM₁₀ health effects, in the absence of mitigation. Following implementation of the recommended mitigation measures for the relevant activities' risk levels in Appendix 5, it is anticipated that the residual effect of the construction phase will be not significant.
- 7.4 With regard to construction traffic, the construction phase flows are not expected to exceed the criteria detailed in paragraph 5.8 and therefore, significant residual effects are not anticipated.

8. OPERATIONAL PHASE ASSESSMENT – SITE SUITABILITY

- 8.1 To consider the suitability of the site for the proposed use, the potential for future occupants of the development to be exposed to exceedances of the relevant AQOs has been assessed. Modelled predicted pollutant concentrations at proposed receptors are detailed in Table 10.

Table 10 Predicted Pollutant Concentrations at the Development in 2028

Receptor	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)					
	NO ₂	% of AQO (40 $\mu\text{g}/\text{m}^3$)	PM ₁₀	% of AQO (40 $\mu\text{g}/\text{m}^3$)	PM _{2.5}	% of AQO (20 $\mu\text{g}/\text{m}^3$)
<i>Level 0</i>						
PR1	16.2	40.6	14.9	37.1	8.3	41.7
PR2	19.1	47.9	14.2	35.5	8.4	41.8
PR3	20.2	50.4	14.2	35.6	8.4	41.9
PR4	20.1	50.3	15.1	37.8	8.5	42.5
PR5	20.7	51.7	15.1	37.9	8.5	42.5
PR6	20.8	52.1	15.2	37.9	8.5	42.6
<i>Level 3</i>						
PR1	14.1	35.2	14.4	35.9	8.1	40.4
PR2	15.2	37.9	13.4	33.6	8.0	39.8
PR3	15.2	37.9	13.4	33.6	8.0	39.8
PR4	14.2	35.4	14.4	36.0	8.1	40.4
PR5	14.2	35.6	14.4	36.0	8.1	40.4
PR6	14.2	35.6	14.4	36.0	8.1	40.4

Note: Results are reported to the nearest 0.1 $\mu\text{g}/\text{m}^3$. Any apparent discrepancies are due to rounding.

- 8.2 The data in Table 10 show that pollutant concentrations were predicted to be below the relevant annual mean AQOs at all proposed receptor locations. The highest predicted NO₂, PM₁₀ and PM_{2.5} concentrations were 20.8 $\mu\text{g}/\text{m}^3$, 15.2 $\mu\text{g}/\text{m}^3$, and 8.5 $\mu\text{g}/\text{m}^3$, at receptor PR6 on Level 0. Furthermore, at the residential uses where these concentrations will reduce further, with much lower concentrations predicted on Level 3 (the lowest residential floor), and anticipated to be trending towards background concentrations at higher levels.
- 8.3 The annual mean NO₂ concentrations predicted by the model were all below 60 $\mu\text{g}/\text{m}^3$. As indicated in LAQM.TG22, a breach of the hourly mean AQO for NO₂ is unlikely where this is the case. Equally, exceedances of the 24-hour mean AQO for PM₁₀ are not anticipated, as all predicted annual mean concentrations fall below the 32 $\mu\text{g}/\text{m}^3$ proxy value.
- 8.4 Accordingly, it is not anticipated that proposed receptors would be exposed to exceedances of the relevant AQOs; therefore, the site is considered suitable for the proposed use, with no requirement for additional mitigation.
- 8.5 In addition to the above, Defra guidance now requires consideration of how a development will reduce exposure to PM_{2.5}. In terms of selecting this development site, which is in an area where PM_{2.5} concentrations are expected to be well below the AQO and where there is no requirement to reduce exposure further, exposure to PM_{2.5} has been considered. Furthermore, the site provides new amenity areas for existing and future residents, including a new playing field, away from significant emissions sources.

9. OPERATIONAL PHASE ASSESSMENT – DEVELOPMENT IMPACTS

- 9.1 The potential for the development to impact local air quality during its operation as a result of generated vehicle trips was discussed with the project's transport consultant, WSP.
- 9.2 It was confirmed that the development will be 'car free', with only nominal trips generated for servicing, deliveries, etc. Accordingly, it is not anticipated that any of the LUPDC screening criteria detailed in paragraph 5.8 would be exceeded and therefore, no significant impacts are anticipated. Therefore, the residual effect of the development's operational phase vehicle trip generation on existing sensitive receptors in the vicinity is expected to be not significant.
- 9.3 Additionally, the site is well served by public transport, being located adjacent to several bus stops, and within 200m of both Cardiff Central railway station and the new Cardiff Bus Interchange. Additionally, 528 cycle parking spaces will be provided within the proposed building, including 5% accessible spaces, and a publicly accessible bike hub and café. Additionally, 52 public cycle spaces are provided within the adjacent square in the form of Sheffield stands.
- 9.4 Based on the nature of the development and baseline air quality conditions in the vicinity of the site, no significant operational phase air quality impacts are anticipated.
- 9.5 In addition to the above, Defra guidance now requires consideration of how a development will reduce emissions of PM_{2.5}. The above measures and the project's Travel Plan are intended to encourage the transition to more sustainable modes of transport and therefore, will reduce local emissions of PM_{2.5}.

10. CONCLUSIONS

- 10.1 This report has been prepared by Cass Allen to inform the detailed planning application being submitted by the Applicant' to the Council in support of a full planning application for the development of Plots 4 and 5, Central Square, City Centre, Cardiff. The assessment was carried out with regard to relevant local and national planning policy and guidance.
- 10.2 The site is located 90m south-west of the Cardiff City Centre AQMA, which was declared due to exceedances of the annual mean AQO for NO₂. Air quality in the vicinity is primarily influenced by vehicle emissions on the local road network, including the adjacent Wood Street. Emissions from diesel trains along the railway line, 120m south of the site are also likely to contribute to background pollutant levels.
- 10.3 Potential construction phase dust soiling and particulate matter (PM: PM₁₀) health effects were assessed qualitatively, resulting in medium and low risks being identified, respectively, in the absence of mitigation. Suitable best practice mitigation measures have been recommended, and no significant residual air quality impacts are expected.
- 10.4 A detailed atmospheric dispersion model was utilised to predict NO₂, PM₁₀ and PM_{2.5} concentrations at relevant sensitive receptor locations within the study area during the operation of the development. The results indicate that pollutant concentrations at proposed sensitive receptors will be below the relevant AQOs during the operational phase, with no requirement for additional mitigation.
- 10.5 Furthermore, no significant impacts on local air quality as a result of development-generated traffic are anticipated. Accordingly, the overall effect of the development is considered 'not significant' with regard to air quality.
- 10.6 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

Appendix 1 Air Quality Legislation and Policy

Legislation

Defra and the Devolved Administrations (2007) - The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

The Air Quality Strategy provides a framework for reducing air pollution in the UK, with the aim of meeting the requirements of European Union (EU) legislation. This has been brought into UK law via the EU (Withdrawal) Act 2018 (as amended) and is referred to as 'retained EU law'.

The air quality standards set within the Air Quality Strategy are recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO), based on current scientific knowledge regarding the effects of each pollutant on health and the environment.

The AQOs are medium-term policy-based targets set by the government, taking into account economic efficiency, practicability, feasibility and timescales. Whilst some of the AQOs correspond with the EPAQS / WHO limits, others have a margin of tolerance, by specifying a number of permitted exceedances of the standard over a given period.

Many of the AQOs in the Air Quality Strategy have been made statutory in Wales through the Air Quality Standards (Wales) Regulations 2010 (as amended) and The Air Quality Standards (Amendment) Regulations, 2016 (Statutory Instrument 2016 No. 1184).

Environmental Protection Act (1990)

Section 79 of the Environmental Protection Act 1990 defines statutory nuisance relevant to dust and particles as:

'Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance'; and

'Any accumulation or deposit which is prejudicial to health or a nuisance'.

Furthermore, Section 80 states that where a statutory nuisance is shown to exist, the Local Authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the Local Authority may abate the nuisance and recover expenses. However, there are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist and nuisance is a subjective concept, its perception being highly dependent upon the existing conditions and the change which has occurred.

Environment Act (2021)

The Act mandates that local authorities review and document local air quality within their jurisdiction by way of staged appraisals and respond accordingly, with the aim of meeting the AQOs defined in the Regulations. There is a requirement for local authorities to identify relevant sources of emissions that are likely to be responsible for any failure to achieve the AQOs, or to identify relevant sources within neighbouring authorities' areas. Where the objective(s) are not likely to be achieved within the relevant period(s), the authority is required to designate an AQMA. For each AQMA the Local Authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality, in order to work towards achieving air quality standards in the future.

Clean Air Plan for Wales (2020)

The Clean Air Plan for Wales: Healthy Air, Healthy Wales outlines the Welsh Government's approach to improving air quality across the country. It sets out a wide range of actions involving national and local government, industry, and the public, with the aim of reducing air pollution and protecting public health and the environment.

While previous UK strategies primarily focused on NO₂ from road traffic, the Welsh Plan takes a broader approach. It addresses emissions from multiple sources, including transport, industry, agriculture, and domestic combustion (such as wood-burning stoves), and links air quality improvements with clean growth and climate action.

Policy

Planning Policy Wales (Edition 12, February 2024)

The Planning Policy Wales (PPW) document sets out the land use planning policies of the Welsh Government, and is supplemented by a series of Technical Advice Notes (TANs). As stated in its introduction, *'the primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the... environmental... well-being of Wales'*.

The document includes Key Planning Principles intended to deliver the 'right development in the right place'. Particularly relevant to this report are:

Facilitating accessible and healthy environments

Our land use choices and the places we create should be accessible for all and support healthy lives. High quality places are barrier-free and inclusive to all members of society. They ensure everyone can live, work, travel and play in a way that supports good physical and mental health. Our built and natural environments should be planned to promote mental and physical well-being...

Maximising environmental protection and limiting environmental impact

Natural, historic and cultural assets must be protected, promoted, conserved and enhanced. Negative environmental impacts should be avoided in the wider public interest. This means acting in the long term to respect environmental limits and operating in an integrated way so that resources and/or assets are not irreversibly damaged or depleted. The polluter pays principle applies where pollution cannot be prevented and applying the precautionary principle ensures cost effective measures to prevent environmental damage.

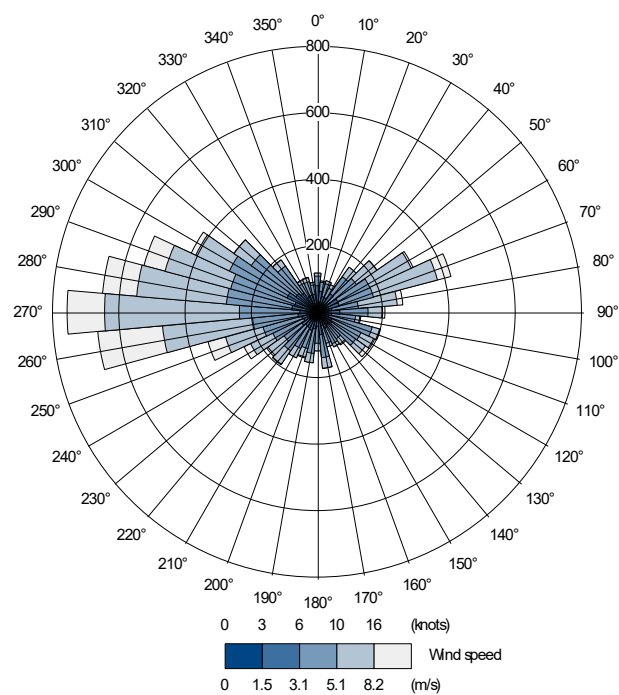
Additionally, in Chapter 6 'Distinctive and Natural Places', PPW states *'a Healthier Wales can be achieved by... tackling airborne pollution and other environmental risks... with the benefit of improving physical and mental well-being'*. Furthermore, it states: *'relevant considerations in making planning decisions for potentially polluting development are likely to include:... the risk and impact of potential pollution from the development, insofar as this might lead to the creation of, or worsen the situation in, an air quality management area... or an area where there are sensitive receptors'*.

Future Wales: The National Plan 2040 (February 2021)

Future Wales is the national development framework and forms part of the statutory development plan in Wales. It provides a spatial strategy for sustainable growth across Wales to 2040, supporting compact, efficient development that contributes to environmental resilience and public wellbeing. The document promotes the development of well-connected urban centres and supports high-density housing in appropriate locations, provided it aligns with placemaking principles and reduces reliance on car travel.

While Future Wales does not contain specific air quality targets, it reinforces the importance of planning decisions that minimise emissions and contribute to climate and health goals, supporting the aims of PPW.

Appendix 2 Wind Rose for Cardiff (2023)



Appendix 3 Traffic Data

Traffic data for the dispersion model were obtained from various sources, including Department for Transport traffic counts and the Environmental Statement for Cardiff Bus Interchange. A number of robust assumptions were made, including the double-counting of bus traffic using the bus stops adjacent to the site.

Road Link Details

Link ID	Description	Road Type	Speed (km/h)
1	A 4119 Lower Cathedral Rd, approaching roundabout	Urban (not London)	10
2	A 4119 Lower Cathedral Rd, central section	Urban (not London)	30
3	A 4119 Lower Cathedral Rd, approaching A4161	Urban (not London)	10
4	Wood Street, East of Westgate St	Urban (not London)	10
5	Wood Street, Westgate St to Havelock St	Urban (not London)	10
6	Wood Street, adjacent to site	Urban (not London)	10
7	Wood Street / Tudor Street	Urban (not London)	10
8	Scott Road	Urban (not London)	20
9	Park Street, west of Havelock St	Urban (not London)	10
10	Havelock Street	Urban (not London)	10
11	Park Street, east of Havelock St	Urban (not London)	10
12	Westgate Street, south of Park St	Urban (not London)	10
13	Westgate Street, north of Park St	Urban (not London)	20
14	Bus Station	Urban (not London)	5
15	Wood Street, adjacent to site, EB buses only	Urban (not London)	5

Traffic Data

Link ID	2023 Model Verification		2028 With Development	
	AADT	%HDV	AADT	%HDV
1	14,870	1.61	-	-
2	14,870	1.61	-	-
3	14,870	1.61	-	-
4	8,123	20.47	8,714	20.47
5	8,123	20.47	8,714	20.47
6	8,123	20.47	8,714	20.47
7	8,123	20.47	8,714	20.47
8	3,871	1.80	4,016	1.80
9	3,871	1.90	4,016	1.90
10	2,340	83.70	2,428	83.70
11	5,212	24.00	5,408	24.00
12	4,050	100.00	4,202	100.00
13	6,831	31.40	7,087	31.40
14	-	-	2,193	100.00
15	-	-	799	100.00

Appendix 4 Dispersion Model Details

Model Details and Input Parameters

Parameter	Value
Emissions Factors	Defra Emissions Factors Toolkit v13.1 using the traffic data in Appendix 3
Emissions Year	2023 for verification, 2028 for future scenario
Background Concentrations	Defra 2021 background maps – 2023 for verification, 2028 for future scenario/s
Surface Roughness	Site – 1.0m; Meteorological Station – 0.3m
Monin-Obukhov Length	Site – 30m; Meteorological Station – 10m
Meteorological Data	Hourly sequential, Cardiff (airport) (2023)
Road-contribution Adjustment Factor	1.5 – see Model Verification, below
NO _x to NO ₂ conversion	Defra NO _x to NO ₂ Calculator v9.1 and Defra-mapped background concentrations
Gradient	Not applicable to this study area

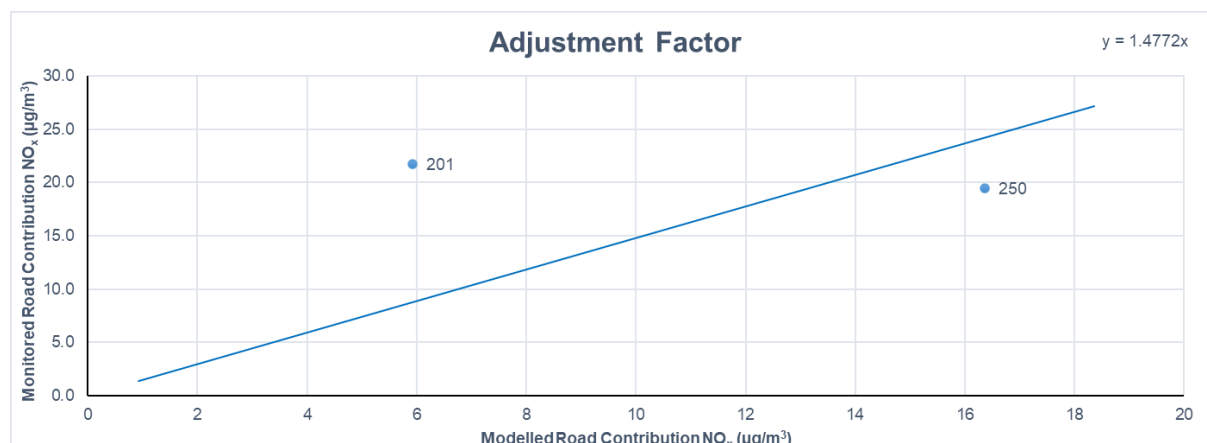
Model Verification

The model has been verified using the LAQM.TG22 methodology. The model has been used to predict 2023 annual mean road-NO_x contributions at roadside monitoring locations within the study area. The modelled road-NO_x concentrations have been compared with the 'measured' road-NO_x utilising the Defra NO_x to NO₂ Calculator. Due to the lack of local PM monitoring data in the vicinity of the site, the adjustment factor for NO₂ was also utilised for PM₁₀ and PM_{2.5}, following the LAQM.TG22 methodology.

Model Verification (all concentrations in µg/m³)

Monitor ID	Monitored NO ₂	Background NO ₂	Monitored Road NO _x	Modelled Road NO _x	Ratio
201	23.1	13.5	21.7	5.9	3.674
250	24.7	16.2	19.5	16.4	1.190

Comparison of Measured Road-NO_x with Modelled Road NO_x



Calculation of Model Uncertainty

To assess model uncertainty, the Root Mean Square Error (RMSE) of the above data was calculated to provide an estimate of the average error of the model. The overall weighted RMSE value calculated following model verification was 4.14µg/m³ (10%), which is within the acceptable range specified in LAQM.TG22.

Appendix 5 Recommended Construction Phase Mitigation

Recommended Mitigation Measures for Medium-Risk Sites

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences onsite.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information, where applicable.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this Appendix. Further, 'desirable' measures from IAQM guidance should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.
- Make complaints log available to the Local Authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite should be recorded, and the action taken to resolve the situation, in the logbook.

Monitoring

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues onsite when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences onsite or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan the 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 onsite.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active 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 reused onsite. If they are being reused onsite cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicle operators 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.

Operations

- 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 is available on the site for effective dust/PM suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes/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 onsite to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Construction (Medium)

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case make sure that that appropriate additional control measures are in place.



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