

Technical Note

Project:	Next Generation Data DC3		
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1. Air Quality Statement

1.1. Introduction

A new data centre facility, Data Centre 3 (DC3) is proposed by Next Generation Data (NGD) in Newport, South Wales. The proposed development will be located to the south east of an existing data centre, DC1, also operated by NGD. The proposed site lies approximately three kilometres to the south west of Newport within the local authority area of Newport City Council. It sits within Plot 4 of the Imperial Park commercial and business park. The site is accessed via North Lake Drive and Celtic Way, from the junction with the A48 to the north west.

In order to guarantee constant power supply to the data centre, even in the event of a catastrophic power outage, the site power backup will comprise 60 standby diesel generator sets (Kohler type KD1650, 3 MW_{th}). These gensets will operate on a very short-term basis during the year, typically for testing purposes only, or in the very rare event of a loss of power.

The operator will be required to apply for an industrial permit from Natural Resources Wales, due to the total thermal capacity of the proposed standby generators exceeding the Part A (1) criterion of 50 MW_{th}. At planning determination, it must be assumed that the facility, once operational under a permit, will be appropriately controlled by the regulator, Natural Resources Wales (NRW), under the industrial pollution permitting regime.

Newport City Council has published Development Management Air Quality Supplementary Planning Guidance (2018) which focuses predominantly on the potential for traffic impacts from new development. On that basis, it is not considered that air quality is of significance to the current planning application since:

- It will not result in a significant increase in traffic volumes
- It will not generate more than 10 HGV movements per week once operational
- It is over two kilometres from the nearest air quality management area (AQMA)

However, in recognition of the potential for air quality impacts, including construction dust, an air quality statement has been prepared. It sets out:

- Existing air quality in the area
- Sensitive receptors (human health and ecology)
- Construction dust risk to identify required mitigation
- Potential traffic impacts (construction and operation)
- Potential generator impacts (operation) on human health and ecology

1.2. Existing conditions

1.2.1. Air pollutants

The principal pollutants associated with combustion engine emissions (standby generators, vehicles, construction plant) are oxides of nitrogen, which forms nitrogen dioxide in the atmosphere, and particulate matter. Air quality objectives for the protection of human health are set out in the National Air Quality Strategy for England, Wales, Scotland and Northern Ireland (DEFRA, 2007) and presented in Table 1-1.

Table 1-1 - Relevant Air Quality Strategy Criteria for Human Health

Pollutant	Criteria
NO ₂	Long-term statutory air quality objective is 40 µg/m ³ as an annual mean concentration
	Short-term objective is an hourly average concentration of 200 µg/m ³ , not to be exceeded more than 18 hours per year
PM ₁₀	Long-term statutory air quality objective is 40 µg/m ³ as an annual mean concentration
	Short-term objective is a daily average concentration of 50 µg/m ³ , not to be exceeded more than 35 times per year
PM _{2.5}	Long-term statutory air quality objective is 25 µg/m ³ as an annual mean concentration

Long term air quality objectives are less relevant to this particular study due to the very restricted generator run time over the year and the short-term nature of emissions from the test regime. The number of permissible “exceedances” of short-term objectives is considered when determining compliance over an annual period.

There are no air quality management areas (AQMA) in proximity to the site; the nearest is on the M4 at Glasllwch, 2.3 km to the north of the site, and Caerphilly Road, 2.5 km to the north. The site does not lie within any AQMA “planning buffers”¹. The nearest planning buffer is over 5 km to the north east in the centre of Newport.

There is an urban background air quality continuous monitoring station in Newport (UKA00380) which forms part of the UK monitoring network. The monitoring station is located 6.4 km to the north east of the NGD facility in an urban residential setting (at St Julian’s School approximately 60 metres south of the M4). The annual average nitrogen dioxide and particulate matter (PM₁₀) concentrations measured at the urban background site from 2014-2019 are shown in Table 1-2. These are likely to be slightly conservative estimates to represent baseline conditions near to the proposed development within the Imperial Park business park, given the proximity of the analyser to the M4.

Table 1-2 – Newport AURN site NO₂ and PM₁₀ annual mean concentrations*, µg/m³

Year	2014	2015	2016	2017	2018	2019
NO ₂	22	21	22	20	19	20
PM ₁₀	16	16	16	15	14	15

* Data capture <50% for NO₂ in 2017 and 2018; < 85% for PM₁₀ in 2015, 2017 and 2018

An additional source of baseline air quality information is the publicly available DEFRA database of background maps. The NO₂ and PM₁₀ concentrations for the one kilometre grid square encompassing the site (grid reference 328500; 184500), are 12.42 µg/m³ and 14.49 µg/m³ respectively for the year 2021. These concentrations are less than half the respective air quality objective values.

For ecological sites, background data are available from APIS. The annual average NO_x concentration (2016 to 2018) for the five kilometre grid square encompassing the site is 23.86 µg/m³. This is below the air quality objective (critical level) of 30 µg/m³ for the protection of vegetation and ecosystems.

1.2.2. Sensitive receptors

To the north, east and south east of the proposed development site are commercial buildings, including offices, while to the northwest is the IQE semiconductor facility and NGD’s existing data centre DC1.

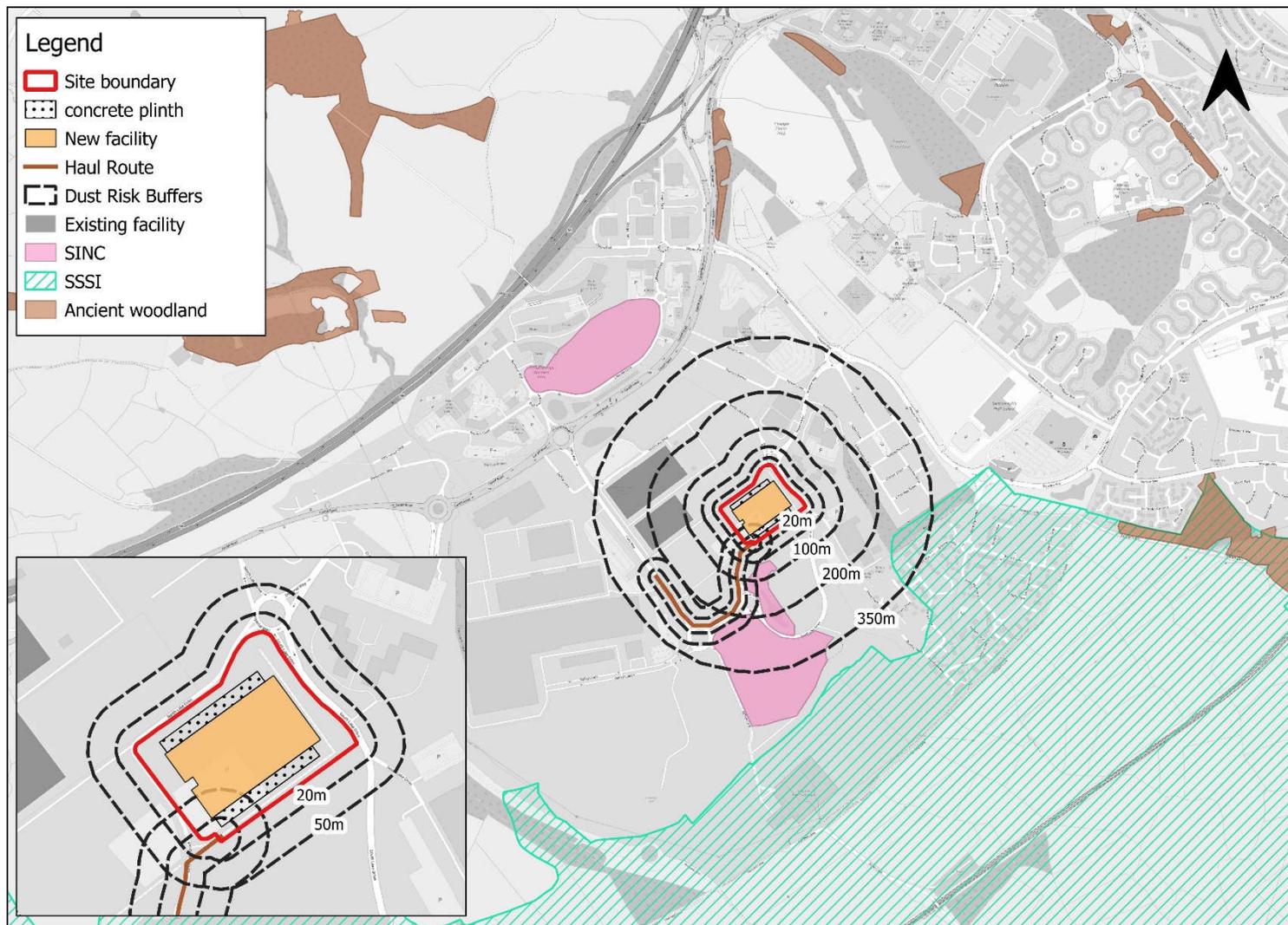
The nearest residential properties to the proposed development are on Pencarn Avenue, approximately 190m north of the red line boundary. Residential properties are also located approximately 210m to the east on Edmundsbury Road and approximately 240m to south east on Powis Close. There are several parking areas associated with commercial warehouses, offices and residential properties within 350m of the site, the closest being approximately 10m to the west and 30m to the east.

The site is located approximately 280 m north west of the Gwent Levels-St Brides Site of Special Scientific Interest (SSSI), 2.5 km north west of the Severn Estuary SSSI/Ramsar site and 3.2 km north west of the River Usk (Lower Usk) / Afon Wysg (Wysg Isaf). These habitats are classified as standing open waters, canals and estuaries so are not considered to be sensitive to oxides of nitrogen (although there is vegetation within the site boundary, it is not described as an interest feature). There are, in addition, two local wildlife sites (Sites of Importance for Nature Conservation, SINC) within 1 km: Celtic Springs 450 m to the north and Duffryn Pond SINC 50 m to the south, as well as several areas of ancient woodland.

The sensitive receptors are shown in Figure 1-1.

¹ These zones define the local road network which is considered to directly feed into and thus potentially affect the AQMA. The AQMAs and buffer zones are available online on My Maps at www.newport.gov.uk

Figure 1-1 - Air quality constraints



1.3. Construction impacts

The main construction phase is expected to commence in June 2021 and will last approximately 12 months. Works will comprise site clearance, ground works, installation of infrastructure, substructures, construction of the main building and four of the 10 data halls. The subsequent construction of the remaining six data halls is estimated to last approximately four months, with no overlapping works anticipated.

1.3.1. Traffic emissions

The peak number of HGV movements will be during initial site clearance / preparation activities and initial deliveries / concrete pour activities. The peak daily average is expected to be 60 two way HGV movements per day. During other periods there will be lower number of HGVs required.

It is estimated there will be 250 construction staff on site at the peak of construction. The peak number of car/van movements is estimated at 200 per day as a two way flow. There will be two peak periods (site clearance and concrete pour), each of approximately eight weeks' duration.

The AADT during the peak construction period is therefore not expected to exceed 100 HGVs or 500 LDVs (two way flow) IAQM planning guidance (2017) screening criteria for further assessment². When vehicle flow is below the IAQM screening assessment criteria, air quality impacts can be screened out as not significant and there is no requirement for further assessment.

To avoid residential areas, all site traffic will approach via the A48 exiting at the roundabout south along Celtic Way. Traffic will then proceed east along Dyffryn Lane and the proposed new road North Lake Drive accessing the proposed development site at the south western entry point via the junction with Duffryn Lane and North Lake Drive. No construction traffic will use the routes along Pencarn Way and Imperial Way and, as far as practicable, will not need to pass through any local AQMAs (i.e. unless they form part of the strategic road network).

A Construction Traffic Management Plan will be developed to manage the delivery of materials in a sustainable manner, and steelwork and panels will be sourced locally.

Non-road mobile machinery (NRMM) used on site will be fitted with a type approved engine which meets the emission standards set in the Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) Regulations 1999 (SI 1999/1053) (as amended). The placement of diesel / petrol powered mobile generators will consider proximity to nearby receptors and exhausts will discharge vertically and unimpeded.

1.3.2. Dust emissions

A qualitative assessment of the potential for construction dust impacts has been undertaken in line with IAQM construction dust guidance (2014)³ based on current available information.

The total site area is approximately 2.5 hectares (25,000 m²). No demolition works are envisaged as part of the construction phase and no basement works are proposed. Some excavation work will be required for the formation of road pavements and a small amount of regrading to level the site. The foundations are expected to be concrete and piling will not be undertaken. A concrete plinth will be constructed as the base for the standby generators on either side of the building.

Site clearance and earthworks in preparation for the construction phase have the potential to generate dust emissions beyond the site boundary. Potential earthworks include provision of a 2,000m³ attenuation tank (10m deep), four rainwater harvesting tanks approx. 600m³ (3m deep), 300-400m length of open cut trenches for drainage (1-3m deep) and excavation to form swales (<1.5m deep). No bunds are currently proposed. Stockpiling of excavated material may be involved during the construction phase.

The earthworks dust source is classified as to be of large magnitude (based on a total site area of 25,000 m², estimated 8,800 tonnes of material to be moved and 30 HGV outbound movements at peak).

The total area of the building will be approximately 15,000 m², extending to approximately 19.6 m in height. The new building will have a steel structure fitted with a proprietary metal cladding panel system. Overall, despite use of a low dust potential construction material, construction activities are classified as large dust emission magnitude due to the total building volume exceeding 100,000 m³ and the use of concrete for the generator plinth.

² <https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>, v1.2, January 2017.

³ <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf-version-1.1>, 2016 (supersedes the information in BRE 2003 with more up to date research and current best practice)

There is potential for track out of dust onto the local road network from vehicles leaving the site. All construction vehicles will access the site from the west and will travel several hundred metres over hard road surfaces before passing adjacent to any sensitive properties. The maximum number of outward HGV movements (30 per day) means the dust magnitude is classified as medium.

The dust receptor distance buffers are shown in Figure 1-1.

There are no sensitive residential properties within 100 metres of the site boundary. There are in excess of 100 human health receptors located within 200-350m of the site boundary. There is a car park within 20 metres of the red line boundary which, on a precautionary basis, is considered to be a high sensitivity receptor. There are an additional two car parks within 50 m of the haul route.

The local wildlife site, LG Duffryn Site 2, is located just over 50m from the proposed development site boundary but is within 20m of the haul route.

Overall, in accordance with IAQM guidance the surrounding area is deemed to be:

- Dust Soiling Effects - medium sensitivity for earthworks, construction and trackout.
- Human Health Impacts - low sensitivity (PM₁₀ annual mean concentration is below the 24 µg/m³ classification threshold);
- Ecological Impacts - negligible sensitivity for earthworks and construction, medium sensitivity for track out.

Having defined the dust magnitude and area sensitivity, the final step in IAQM guidance is to define the risk of dust impacts by combining dust magnitude and area sensitivity. The risk of dust impacts is:

- low to medium risk for dust soiling effects.
- low risk for human health impacts.
- Negligible to low risk for ecological impacts.

IAQM recommends taking the highest of these outcomes for non-activity specific measures, and therefore the “highly recommended” measures for medium risk sites are set out in Appendix A. However, as trackout poses a low risk, only the desirable mitigation measures have been selected. By adopting these measures and ensuring they are applied correctly through effective management and monitoring, the effect of dust emissions is likely to be not significant.

A construction environmental management plan (CEMP) will incorporate appropriate measures for dust and emissions mitigation during construction. A specific dust management plan (DMP) will be developed and agreed with Newport City Council based on the construction methods, programme and extent of works.

Table 1-3 – Summary of dust risks to define site specific mitigation

	Potential impact	Earthworks	Construction	Trackout
Dust magnitude		Large	Large	Medium
Area sensitivity	Dust soiling	Medium	Medium	Medium
	Human health	Low	Low	Low
	Ecology	Negligible	Negligible	Medium
Potential impact	Dust soiling	Medium	Medium	Low
	Human health	Low	Low	Low
	Ecology	Negligible	Negligible	Low

1.4. Operational impacts

1.4.1. Traffic emissions

This section considers the potential traffic generation from the proposed site when operational (net change in traffic and vehicle types).

The building will have a maximum occupancy of 40 staff. A small team of NGD technical support staff and the customer's operatives will be present on site during standard working hours. A small team of maintenance staff and site security will work shifts throughout the day and night. Approximately 50% of employees will work remotely, either part-time or full-time. It is conservatively estimated that there would be 80 two way vehicle movements per day during peak operation (i.e. once all 10 halls open).

The impact of the development in terms of traffic movements in the operational phase is well below the IAQM planning guidance (2017) assessment screening criterion of 500 AADT and thus the impact on local air quality is not deemed to be significant. There is no requirement for further assessment.

1.4.2. Generator emissions

The proposed data centre facility will incorporate 60 standby diesel generators for use during a national grid failure, with 30 located along the north facade of the building and 30 along the south. The engines are arranged in banks of six. Each of the 10 sets of combined outer flues will extend 1m above the top of the building to a total height of 20.6m. The minimum distance between source and residential receptor is 180 metres and the distance to the nearest office building is over 70 metres.

The thermal input of each of the diesel generators engines is approximately three megawatts (MW_{th}). Emissions from the standby generators will be discharged vertically at an appropriate height above ground to avoid any significant building effects. The generators are designed to meet the industry good practice for new data centres, i.e. TA Luft/USEPA Tier II standard for NO_x of $2,000 \text{ mg/Nm}^3$ (i.e. normalised to reference conditions of 0°C , 5% oxygen and 0% moisture)..

The generator testing regime is the main potential source of emissions when the site is operational, given that the likelihood of a loss of off-site power event is extremely low.

There will be no monthly testing of individual engines, reducing the number of operational hours in a year compared to the existing DC1 facility.

Quarterly servicing will be undertaken as per the existing NGD facility, where practicable at separate times of the day:

- Minor and major services in alternating quarters
 - Minor service involves running the engines individually for up to 15 minutes and conducting inspections.
 - The major services additionally include a 2-hour load bank test of each engine.
- No more than one engine within DC3 would operate at any time for the quarterly tests (i.e. no concurrent running of these tests) and no tests would overlap (i.e. no test runs would be carried out at the same time as other test runs).

Black Building tests will, as per the existing NGD facility, be undertaken twice a year, for each bank of engines, to simulate a controlled mains failure and prove the system's response:

- A single data hall powertrain is isolated, all engines are fired up
 - A maximum of six engines would operate simultaneously;
 - Load shedding down to the required output within 10 minutes of start-up;
 - As in a real emergency scenario, the number of engines which would continue to operate after load shedding would vary;
 - The duration of the test would be one hour.

The air quality impacts during operation of the standby generators will be fully addressed in a permit application to Natural Resources Wales. An atmospheric dispersion modelling study will examine in detail the impact of emissions of oxides of nitrogen to atmosphere and the resultant concentrations of nitrogen dioxide at nearby sensitive receptors for human health and ecology.

A detailed modelling study undertaken for the permit for the existing NGD facility did not identify any exceedances of the nitrogen dioxide hourly standard at sensitive receptors during routine testing (operation of individual engines). Only for black building tests were maximum hourly nitrogen dioxide concentrations at the closest sensitive human health receptors found to exceed the hourly standard, with the highest results to the east on Pencarn Avenue. Further statistical analysis was undertaken to confirm the low probability that exceedances of the hourly standard could occur given the low number of tests per year. The study showed an extremely limited potential for the hours of black building testing to coincide with adverse meteorological conditions, such that testing would not result in failure to meet the hourly nitrogen dioxide objective (no more than 18 exceedances per year). The contribution of the total 24 hours of black building tests in a year to the annual mean criterion of $40 \mu\text{g/m}^3$ would also be insignificant.

The risk of a loss of power event occurring is reduced by installation of two separate grid connections. An air quality management plan was prepared in response to a request for further information from the regulator regarding the management of risks to air quality during an emergency power outage. Newport City Council have been provided with a copy of this document as part of the consultation.

For ecological sites closest to the existing NGD facility an assessment was undertaken for black building testing for comparison to the daily average guideline concentration. The maximum daily average concentrations were found to be below the non-statutory guideline at the closest non statutory receptors and even lower at SSSIs and the Severn Estuary. The modelled contribution of the total 24 hours of black building tests in a year to the annual mean criterion of 30 µg/m³ was insignificant.

A notable element of the design for DC3, which substantially enhances dispersion, is the proposal to discharge engine emissions vertically at a height of 1m above the top of the main building and grouping the individual engine flues together. This means that the findings of the detailed modelling for DC3 for human health and ecology are expected to be at least similar to, if not lower, in magnitude to those for the existing facility described above.

The DC3 generators are located a similar distance from the nearest residential properties as DC1. However, there are unlikely to be cumulative effects of engine emissions during routine testing due to the different orientations of the new engines to the nearest residential properties and the increased stack heights. The wind conditions that would be responsible for transport of the plume from each facility towards the same receptor would be different. Given the limited hours of operation of the individual engines for quarterly testing and the 20 hours' total testing per year of the banks of engines, it is concluded the emissions are not likely to have significant adverse effects on human health and vegetation. A full assessment will be provided to the regulator with the permit application.

1.5. Mitigation

A dust management plan will be developed for inclusion within the CEMP. This will incorporate the IAQM recommended dust mitigation measures for a medium risk construction site (and low for trackout) as set out in Appendix A.

A Construction Traffic Management Plan will be developed to manage the delivery of materials in a sustainable manner, and steelwork and panels will be sourced locally.

Stacks will be designed to ensure effective dispersion. Each of the 10 sets of combined outer flues will extend 1m above the top of the building to a total height of 20.6m.

Provision is made for 40 car parking spaces of which three will be for charging of electric vehicles. There will also be four short-term secure bicycle stands, a space for 20 bikes in a covered cycle shelter and changing facilities for staff and visitors to encourage non-motorised forms of transport.

A total of 27 trees will be planted within the site boundary in line with Newport City Council guidance.

1.6. Summary

This air quality statement has identified that:

- Existing air quality in the area of the proposed development is good, comfortably meeting air quality objectives;
- A CEMP will be developed, incorporating appropriate dust mitigation for a medium risk construction site (noting the low trackout risk);
- The additional traffic movements generated during construction and operation are below IAQM screening thresholds and thus will not have a significant impact on air quality;
- The proposed development design incorporates enhanced mitigation by providing 20.6m high combined standby generator flues, to improve pollutant dispersion and reduce ground level impacts;
- The occasional testing of the standby diesel generators has an extremely low probability of coinciding with adverse meteorological conditions, in relation to impacts at specific sensitive receptors, so the air quality objectives are likely to continue to be met;
- The developer will undertake detailed dispersion modelling of generator emissions as part of the application for an industrial permit from Natural Resources Wales;

Appendices



Appendix A. Construction Mitigation Measures

A.1. Proposed dust control measures

A.1.1. Communications

- A stakeholder communications plan including community engagement will be produced before work commences on site;
- The name and contact details of person(s) responsible for responding to air quality and dust concerns on the site boundary (environment manager/engineer or the site manager) plus head or regional office contact information will be displayed;
- Interactions of the off-site transport/deliveries which might be using the same strategic road network routes will be considered;
- A dust management plan will be developed for approval by the local authority.

A.1.2. Dust Monitoring

- Regular (as a minimum on a daily basis) on-site and off-site visual inspections, where receptors (including residential property and roads) are nearby, to monitor dust.
- Inspection results will be recorded, and the log book made available to the local authority when asked. This will include regular dust soiling checks of surfaces such as street furniture, cars and window sills.
- All dust and air quality complaints will be recorded, cause(s) identified and appropriate measures applied to reduce emissions in a timely manner, and the measures taken recorded.
- A complaints log will be made available to the local authority. Any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation will be recorded in the log book.
- Regular site inspections will be carried out to monitor compliance with the DMP, record inspection results. Inspection log will be made available to the local authority when asked.
- Frequency of site inspections by the person responsible for air quality and dust issues on site will be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Dust deposition monitoring will be conducted one month prior to commencement of the construction phase and for the first three months using dust deposition gauges.

A.1.3. Preparing and Maintaining Site

- Site layout will be planned so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Dust suppression equipment will be made available.
- Site specific operations with a high potential for dust production and where the site is active for an extensive period will be enclosed where feasible.
- Site runoff of water or mud will be avoided.
- Site fencing, barriers and scaffolding will be kept clean using wet methods in accordance with an agreed cleaning regime.
- Materials that have a potential to produce dust from site will be removed as soon as possible, unless being re-used on site. If they are being re-used on-site, they will be covered as described below.
- Material stockpiles will be covered, seeded or fenced to prevent wind whipping.

A.1.4. Construction Operations

- Cutting, grinding or sawing equipment only to be used where fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- An adequate water supply on the site will be maintained for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Where appropriate, chutes and conveyors will be enclosed and skips covered.
- Drop heights and other loading or handling equipment will be minimised and fine water sprays on such equipment applied wherever appropriate.
- Equipment will be readily available on site to clean any dry spillages, and spillages cleaned up as soon as reasonably practicable after the event using wet cleaning methods.
- No bonfires and burning of waste materials on site.

A.1.5. Measures Specific to Earthworks

- Where feasible, soil cover will only be removed in small areas during work and not all at once
- Earthworks and exposed areas/soil stockpiles will be re-vegetated to stabilise surfaces as soon as practicable (Hessian, mulches or “tackifiers”⁴ will be used where it is not possible to re-vegetate or cover with topsoil)

A.1.6. Measures Specific to Trackout

- Water-assisted dust sweeper(s) will be used on the access and local roads, to remove, as necessary, any material tracked out of the site.
- Dry sweeping of large areas will be avoided.
- Vehicles entering and leaving sites to be covered to prevent escape of materials during transport.
- Wheel washing facilities such as a jet wash will be implemented for vehicles leaving the site.
- All inspections of the haul routes and any subsequent actions will be recorded in the site log book.
- Hard surfaced haul routes will be regularly damped down and cleaned.
- Access gates will be located at least 10 m from receptors.

A.1.7. Construction Traffic and NRMM Emissions

- All vehicles to switch off engines when stationary - no idling vehicles.
- The use of diesel or petrol powered mobile generators to be replaced with use mains electricity or battery powered equipment where practicable.
- A maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas will apply.

⁴ A type of “glue” to keep seed, mulch and straw from blowing or washing away.