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Bradbury Farm

Air Quality Assessment

April 2024

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Mott MacDonald
10 Livery Street
Birmingham B3 2NU
United Kingdom

T +44 (0)121 234 1500
mottmac.com

Bradbury Farm

Air Quality Assessment

April 2024

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1 Introduction

1.1 Overview

Mott MacDonald has been appointed by Monmouthshire County Council (MCC) to provide an air quality report as part of MCC's Gypsy and Traveller Accommodation Assessment (GTAA) identification study for the Bradbury Farm site in Crick, Monmouthshire (hereafter referred to as "the proposed Gypsy and Traveller site") one of the three council-owned identified sites for potential development. The proposed Gypsy and Travellers site is understood to comprise the construction of up to six pitches that will include parking and a collective utility block with access gained via St Bride's Road which runs along the eastern boundary of the site.

This report provides a summary of existing air quality information around the proposed Gypsy & Travellers Site and an assessment of the suitability of the site for the proposed users. The energy demand for the proposed Gypsy & Travellers Site is unknown at the moment, but it is expected to be of a typical bricks and mortar dwelling, with electricity and water supply at the minimum. It is expected that this would not extend to gas supply.

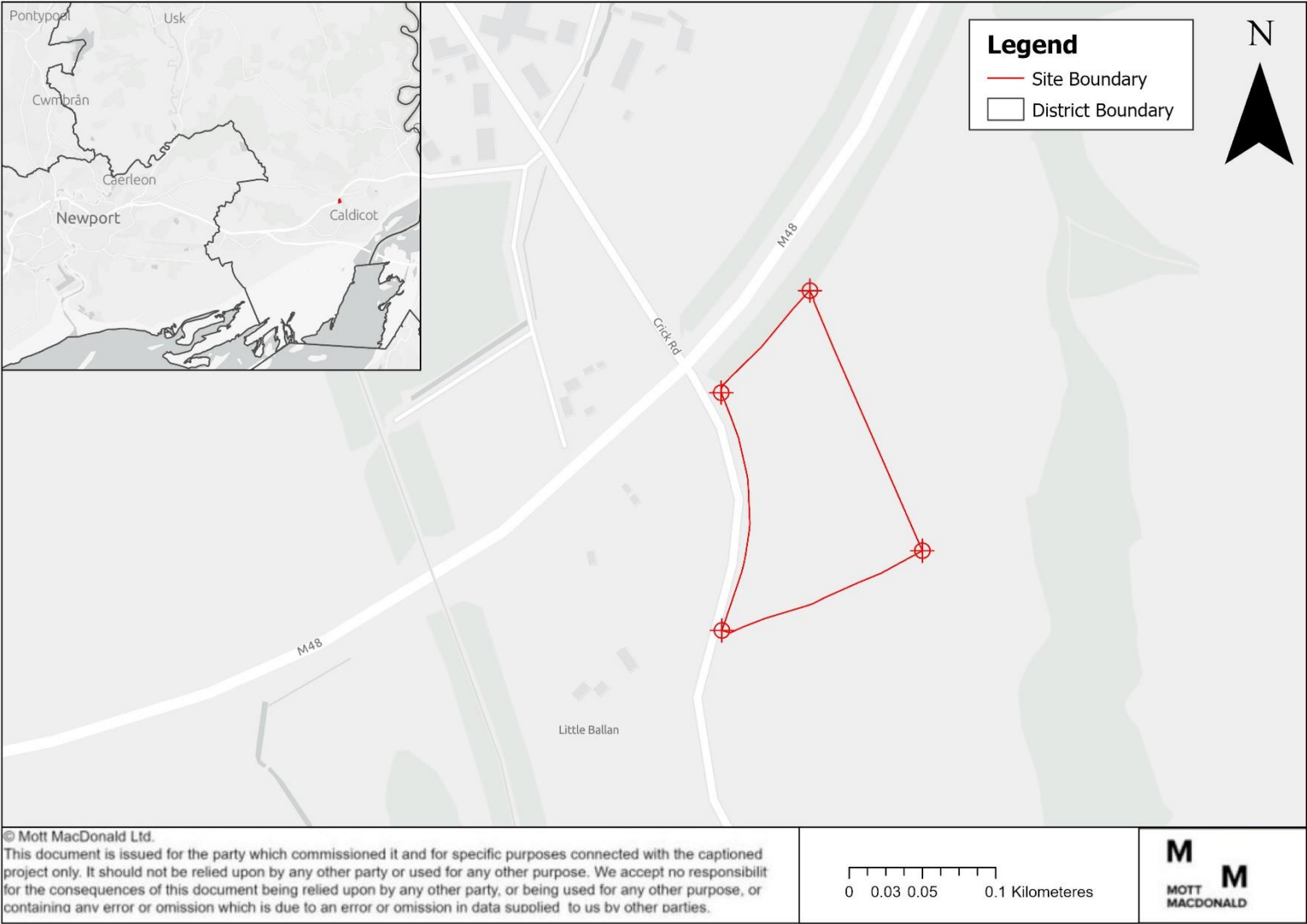
In order to assess site suitability, we have undertaken two types of assessment. Firstly, a qualitative review of local and national air quality monitoring data and secondly, a quantitative Design Manual for Roads and Bridges (DMRB) calculation spreadsheet assessment, using the latest Department for Transport (DfT) traffic count data from 2022 for the M48. In addition, the assessment considers the suitability of air quality at the proposed development for the introduction of additional receptors in accordance with Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM) guidance .by considering the location of the Proposed Gypsy & Travellers Site in relation to existing emission sources. No site-specific monitoring has been undertaken due to existing local authority and national monitoring data already being available.

No assessment of the potential impacts associated with the construction of the Proposed Gypsy & Travellers Site, such as nuisance, loss of amenity and health impacts caused by construction dust, have been undertaken at this stage. Construction impacts are likely to be temporary and can be controlled using appropriate mitigation in a Construction Environmental Management Plan (CEMP). An assessment of construction impacts is therefore not required at the feasibility stage.

1.2 Proposed development location

The Proposed Gypsy & Travellers Site is located to the west of Leechpool, Monmouthshire. The Proposed Gypsy & Travellers Site is bound by fields to the south. Crick Road bounds the Proposed Gypsy & Travellers Site to the west, with residential property to the north, adjacent to M48. An undulating bank of trees separate the Proposed Gypsy & Travellers Site from the motorway, which is approximately 12 metres (m) at its narrowest point. The Proposed Gypsy & Travellers Site is located within the administrative area of MCC. The Proposed Gypsy & Travellers Site is also located 4.5km to the east of the boundary of Newport City Council (NCC), therefore has also been taken into consideration. The location of the Proposed Gypsy & Travellers Site is presented in Figure 1.1.

Figure 1.1: Site location



2 Legislation and policy

2.1 Overview

This section summarises the relevant international and national legislation, policy and planning guidance in relation to air quality. In addition, local planning policy guidance has been reviewed in order to identify air quality policy implications related to the Proposed Gypsy & Travellers Site.

2.2 Legislation

2.2.1 Wales

The European Union Directive on ambient air quality and cleaner air for Europe (2008/50/EC)¹ sets legally binding limits for pollutant concentrations. This directive was made law in the Wales through The Air Quality Standards (Wales) Regulations 2010² (amended by The Air Quality Standards (Wales) (Amendment) (EU Exit) Regulations 2019³ and the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁴).

This Directive defines limit values and times by which they are to be achieved for the purpose of protecting human health and the environment by avoiding, reducing or preventing harmful concentrations of air pollutants. The Limit Values within the Directive are intended to apply everywhere with the exception of:

- any locations situated within areas where members of the public do not have access and there is no fixed habitation
- in accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply
- on the carriageway of roads, and
- on the central reservations of roads except where there is normally pedestrian access to the central reservation.

Part IV of the Environment Act 1995⁵ (as amended in Schedule 11 of the Environment Act 2021⁶) requires that every local authority shall carry out a review of air quality within its designated area, including predictions of likely future air quality. The air quality objectives specifically for use by local authorities in carrying out their air quality management duties are set out in The Air Quality (Wales) Regulations 2000⁷ and The Air Quality (Wales) (Amendment) Regulations 2002⁸. In most cases, the air quality objectives are set at the same pollutant concentrations as the limit values transposed into UK law although compliance dates differ.

As part of the review of air quality, the local authority must assess whether air quality objectives are being achieved or are likely to be achieved within the relevant periods and identify the relevant sources of emissions it considers responsible for the failure to achieve the objectives. Any parts of a local authority's area where the objectives are not being achieved or are not likely

¹ The European Parliament and the Council of the European Union (2008) Directive 2008/50/EC of the European Parliament and of the Council

² Statutory Instrument (2010) The Air Quality Standards (Wales) Regulations

³ Statutory Instrument (2019) The Air Quality Standards (Wales) (Amendment) (EU Exit) Regulations

⁴ Statutory Instrument (2020) Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, No. 1313.

⁵ Department for Environment Food and Rural Affairs. (2009). Part IV of the Environment Act 1995 Local Air Quality Management Policy Guidance (PG09). London: Defra.

⁶ Statutory Instrument. (2021) Chapter 30, Schedule 11 Local Air Quality Management Framework of Environment Act 2021

⁷ Statutory Instrument (2000) The Air Quality (Wales) Regulations, No. 1940 (W.138).

⁸ Statutory Instrument (2002) The Air Quality (Amendment) (Wales) Regulations, No. 3182 (W.298).

to be achieved within the relevant period must be identified and declared as an Air Quality Management Area (AQMA). Once such a declaration has been made, local authorities are under a duty to prepare an Action Plan which sets out measures to pursue the achievement of the air quality objectives within the AQMA.

The Environment Act 1995 requires the UK Government to produce a national Air Quality Strategy (AQS). The AQS establishes the UK framework for air quality improvements. Measures agreed at the national and international level are the foundations on which the strategy is based. The first AQS, first adopted in 1997⁹ and its subsequent iterations, have now been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS).¹⁰

The CAS does not set legally binding objectives, the CAS instead has targets for reducing total UK emissions of NO_x and fine particulate matter (PM_{2.5}) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery (NRMM)).

Further to this, the UK Government has produced a draft AQS revision in 2023. This revision replaces the 2007 strategy and compliments the CAS. The 2023 revision sets out the actions the government expects local authorities in England to take in support of achieving the Government's long-term air quality goals, including their two new long-term PM_{2.5} targets. The AQS does not mention local authorities in Wales and as such the long-term PM_{2.5} targets currently only apply to England. Therefore, the revised draft AQS and new targets are not applicable to this project at the time of writing. However, the Welsh Government have published their own 'Clean Air Plan' for Wales in 2019 to provide a framework and actions for air quality improvements within Wales.

2.3 Policy

2.3.1 Air Quality Strategy

Part IV of the Environment Act 1995¹¹ (as amended in Schedule 11 of the Environment Act 2021¹²) places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality. The Air Quality Strategy provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment and sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives.

The first Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in 2007¹³ and has now been superseded as of the 14th January 2019 with the Clean Air Strategy 2019 (CAS)¹⁴. Although the CAS has been developed at a UK level, the Welsh Government have also published their own 'Clean Air Plan' for Wales in 2019 to provide a framework and actions for air quality improvements within Wales. The CAS has targets for reducing total UK emissions of nitrogen oxides (NO_x) and fine particulate matter (PM_{2.5}) from sectors such as road transport, domestic sources and construction plant (non-road mobile machinery or NRMM).

⁹ Department for Environment Food and Rural Affairs. (March 1997), 'The United Kingdom National Air Quality Strategy', Cm 3587, Department for Environment Food and Rural Affairs.

¹⁰ Department for Environment Food and Rural Affairs. (January 2019), 'The Clean Air Strategy'

¹¹ Department for Environment Food and Rural Affairs (2003) Part IV of the Environment Act 1995 Local Air Quality Management.

¹² Statutory Instrument. (2021) Chapter 30, Schedule 11 Local Air Quality Management Framework of Environment Act 2021.

¹³ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

¹⁴ Defra (2019) The Clean Air Strategy

2.3.2 Statutory nuisance

Section 79(1)(d) of the Environmental Protection Act 1990¹⁵ defines one type of 'statutory nuisance' as "any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance". Where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, it must serve an abatement notice. Failure to comply with an abatement notice is an offence. 'Best practicable means' is a widely used defence by operators, if used to prevent or to counteract the effects of the nuisance.

2.3.3 National policy

2.3.3.1 Planning Policy

The current air quality planning policies for the Welsh Government are set out in Planning Policy Wales Edition 11 (February 2021)¹⁶. Those relevant to air quality are:

- Chapter 3 'Strategic and Spatial Choices', which highlights the importance of promoting healthier places through the planning system. This includes enabling opportunities for outdoor activities, good design in planning to minimise exposure to poor air quality, reduction of health inequalities and making positive contributions to environmental protection and improvement, including air quality.
- Chapter 4 'Active and Social Places', which states that the Welsh Government is committed to supporting modal shift from private cars to walking, cycling and public transport and that local authorities must adopt an integrated approach to traffic management, also considering wider planning objectives such as improvement in air quality.
- Chapter 5 'Productive and Enterprising Places' details that planning authorities should take into account the need to minimise impacts on local communities and the natural environment and that any minerals proposals must set out criteria to prevent adverse impacts upon these receptors.
- Chapter 6 'Distinctive and Natural Places' states that development plan strategies, policies and development proposals should look to the long-term protection and enhancement of the built and natural environment in order to achieve Wales's wellbeing goals. This includes considering effects of development proposals on air quality with the aim to reduce population exposure to air pollution in Wales.

Planning Policy Wales (PPW) is supplemented by a series of topic-based Technical Advice Notes (TANs). TAN 18 Transport details the importance of good air quality, and states: "*well designed and implemented traffic management can help secure planning objectives...[by]... reducing...local air pollution...*".

In June 2017, the Welsh Government set out further provisions in Policy guidance PG(W)(17)¹⁷, which adopts five ways of working set out in the Well-being of Future Generations (Wales) Act 2015¹⁸ with the intention to improve the economic, social, environmental and cultural well-being of Wales in accordance with the sustainable development principles. The five ways of working are:

- "*looking to the long term so we do not compromise the ability of future generations to meet their own needs;*

¹⁵ Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.

¹⁶ Welsh Government. (2021) Planning Policy Wales. Edition 11. [online] Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

¹⁷ Welsh Government (2017) Local air quality management in Wales. Part of the Environment Act 1995. Policy guidance PG(W)(17)

¹⁸ Welsh Government (2015) Well-being of Future Generations (Wales) Act 2015.

- *taking an integrated approach;*
- *involving a diversity of the population in the decisions affecting them;*
- *working with others in a collaborative way to find shared sustainable solutions; and*
- *acting to prevent problems from occurring or getting worse.”*

Welsh local authorities are expected to follow these ways of working when carrying out their LAQM duties.

The Welsh Government published The Wales Transport Strategy¹⁹ in 2021, which sets out the Government’s main transport development aims and how these will be achieved. The strategy contains long-term health and environmental outcomes for transport in Wales; “*Chapter 03. Well-being ambitions*” aims to improve air quality *through “encouraging more active travel, greater use of public transport and low emissions vehicles, and by creating closer links between land-use planning and transport in line with our commitments in the Clean Air Plan for Wales.”*

2.3.3.2 Air Quality Plan for Nitrogen Dioxide in the UK

The latest plan for tackling roadside NO₂ concentrations was published by Defra in July 2017 and details the government’s plan to reduce NO₂ concentrations within statutory limits within the shortest possible time²⁰. Within this plan, several named local authorities with exceedances of the NO₂ limit values are required to undertake a local assessment to consider the best options to achieve compliance with this limit value. The Welsh Government published a supplemental plan²¹ to the UK plan in November 2018 to provide additional information of which measures would ensure compliance with the limit values for NO₂ within Wales in the shortest possible time.

The Proposed Gypsy & Travellers Site is within the South Wales Zone (UK0041), which is covered by a zone-specific Air Quality Plan²². Baseline model projections of South Wales from 2017 to 2030 in the Air Quality Plan shows that maximum modelled annual mean NO₂ concentration is predicted to drop to 42µg/m³ by 2025. No specific measure is Monmouthshire County Council or Newport City Council.

2.3.4 Local policy

2.3.4.1 Monmouthshire County Council Adopted Local Development Plan

The Monmouthshire Adopted Local Plan²³ was adopted in 2011 and set out frameworks for development across Monmouthshire up to 2021. The main policy of relevance is Policy EP1 ‘Amenity and Environmental Protection’, which states that:

- Development, including proposals for new buildings, extensions to existing buildings and advertisements, should have regard to the privacy, amenity and health of occupiers of neighbouring properties.
- Development proposals that would cause or result in an unacceptable risk /harm to local amenity, health, the character /quality of the countryside or interests of nature conservation,

¹⁹ Welsh Assembly Government (2008). One Wales: Connecting the Nation. The Wales Transport Strategy. [online] <https://gov.wales/sites/default/files/publications/2017-09/wales-transport-strategy.pdf>

²⁰ Defra (2017) UK plan for tackling roadside nitrogen dioxide concentrations: Detailed Plan [online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633270/air-quality-plan-detail.pdf

²¹ Welsh Government. 2018. Welsh Government supplemental plan to the UK plan for tackling roadside nitrogen dioxide concentrations 2017: Tackling roadside nitrogen dioxide concentrations in Wales. [online] Available at: <https://gov.wales/sites/default/files/publications/2019-04/tackling-roadside-nitrogen-dioxide-concentrations-in-wales.pdf>

²² Defra (2017) Air Quality Plan for tackling roadside nitrogen dioxide concentrations in North Wales (UK0042). [online] https://uk-air.defra.gov.uk/assets/documents/no2ten/2017-zone-plans/AQplans_UK0041.pdf

²³ Monmouthshire County Council (2014) Adopted Local Development Plan (2011-2021)

landscape or built heritage importance due to the following will not be permitted, unless it can be demonstrated that measures can be taken to overcome any significant risk:

- Air pollution;
- Light pollution;
- Noise pollution;
- Water pollution;
- Contamination;
- Land instability;
- Or any identified risk to public health or safety

2.3.4.2 Replacement Local Development Plan Overview

The Replacement Local Development Plan (RLDP)²⁴ is in progress by the MCC to improve the Local Development Plan mentioned in Section 2.3.2. for implementation up to 2033. The two main RLDP points of relevance are Objective 17 'Climate and Nature Emergency' which states that:

- To strive to limit the increase in global temperatures to 1.5°C, supporting carbon reduction through a variety of adaptation measures including facilitating resilient ecosystems and nature recovery, the use of renewable energy, net zero ready homes, the design and location of new development, encouraging balanced job and population growth to reduce out-commuting, the provision of broadband connectivity to reduce the need to travel, the provision of ultra-low emission vehicle charging infrastructure to reduce emissions and improve air quality, and the provision of quality Green Infrastructure.

And Strategic Policy S4 'Climate Change' Point VII which states:

- Providing ultra-low emission vehicle charging infrastructure to reduce emissions and improve air quality.

2.3.4.3 Newport City Council Local Development Plan

The Newport Adopted Local Plan²⁵ was adopted in 2015 and set out frameworks for development across Newport up to 2026. The main policies of relevance are Policy SP14 'Transport Proposals' Point IX which states:

- Transport proposals will be supported where they result in other environmental improvements including air quality, noise reductions, sustainable drainage and enhanced biodiversity.

And Policy GP2 'General Development Principles – General Amenity' which states that:

- Development will be permitted where, as applicable:
 - there will not be a significant adverse effect on local amenity, including in terms of noise, disturbance, privacy, overbearing, light, odours and air quality;
 - the proposed use and form of development will not be detrimental to the visual amenities of nearby occupiers or the character or appearance of the surrounding area;
 - the proposal seeks to design out the opportunity for crime and anti-social behaviour;
 - the proposal promotes inclusive design both for the built development and access within and around the development;

²⁴ Monmouthshire County Council (2023) Replacement Local Development Plan

²⁵ Monmouthshire County Council (2014) Adopted Local Development Plan (2011-2021)

- adequate amenity for future occupiers.

And Policy GP4 ‘General Development Principles – Highway and Accessibility’ which states that:

- Development proposals should:
 - provide appropriate access for pedestrians, cyclists and public transport in accordance with national guidance;
 - be accessible by a choice of means of transport;
 - be designed to avoid or reduce transport severance, noise and air pollution; iv) make adequate provision for car parking and cycle storage;
 - provide suitable and safe access arrangements;
 - design and build new roads within private development in accordance with the highway authority’s design guide and relevant national guidance;
 - ensure that development would not be detrimental to highway or pedestrian safety or result in traffic generation exceeding the capacity of the highway network.

And Policy GP7 ‘General Development Principles – Environmental Protection and Public Health’ which states that:

- Development will not be permitted which would cause or result in unacceptable harm to health because of land contamination, dust, instability or subsidence, air, heat, noise or light pollution, flooding, water pollution, or any other identified risk to environment, local amenity or public health and safety.

2.3.5 Summary

Air quality objectives and limit values are summarised in Table 2.1.

Table 2.1: Relevant air quality objectives and limit values

Pollutant	Averaging Period	Concentration	Allowance	Attainment Date	
				Air Quality Objectives	Limit Values
Nitrogen dioxide (NO ₂)	Annual	40 µg/m ³	-	31 December 2005 ^(a)	1 January 2010 ^(c)
	1 Hour	200 µg/m ³	18	31 December 2005 ^(a)	1 January 2010 ^(c)
Particulates (PM ₁₀)	Annual	40 µg/m ³	-	31 December 2004 ^(a)	1 January 2005 ^(c)
	24 Hour	50 µg/m ³	35	31 December 2004 ^(a)	1 January 2005 ^(c)
Fine particulates (PM _{2.5}) ^(d)	Annual	20 µg/m ³	-	-	1 January 2020 ^(c)
		25 µg/m ³	-	2020 ^(b)	-

Notes: ^(a) Air Quality (Wales) Regulations 2000 as amended
^(b) Air Quality Strategy 2007
^(c) EU Directive 2008/50/EEC on ambient air quality and cleaner air for Europe, as transposed into UK Law
^(d) As the Air Quality Strategy 2007 and EU Directive 2008/50/EC have a different numerical standard for PM_{2.5}, the more stringent standard of 20µg/m³ has been adopted for this assessment.

Table 2.2 provides details of where the respective objectives should and should not apply and therefore the types of receptors that are relevant to the assessment of air quality.

Table 2.2: Locations where the air quality objectives apply

Averaging Period	Objectives should apply at:	Objectives should not apply at:
Annual	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building façades 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	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	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations, etc., which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: Defra TG22²⁶.

²⁶ Department for Environment, Food and Rural Affairs and Devolved Administrations (August 2022). Local Air Quality Management – Technical Guidance LAQM.TG22

3 Methodology

3.1 Overview

This Section provides the approach taken to consider the suitability of the Proposed Gypsy & Travellers Site, key elements of which include model choice, traffic data, emission factors and dealing with uncertainty.

3.2 Traffic data used in assessment

The Gypsy & Travellers Site has the potential to affect air quality by increasing traffic by increasing the number of vehicles on the road network and by affecting existing traffic through the introduction of more people visiting the site.

The traffic data used in this assessment was obtained from the Department for Transport (DfT)²⁷, providing data on vehicle flows in annual average daily traffic flows (AADT), including heavy duty vehicle²⁸ (HDV) percentages and speeds (km/hr). The 2022 data has been used as the base year and for model verification as it is considered to be most representative. The data has been presented in Table 3.1.

Table 3.1: Traffic data

Road ID	Location Reference	AADT	%HDV	Speed (kph)
1	M4	104164	9.7	112
2	M48 Crick	14148	12.3	112

3.3 Model selection

The DMRB calculation spreadsheet formulas have been used for this assessment in conjunction with the latest Local Air Quality Management (LAQM) tools provided by Defra. Only NO₂ has been considered within this assessment as ambient concentrations of PM₁₀ and PM_{2.5} are well below the respective objectives (as indicated in Section 4.4.2). The emission factors for PM₁₀ and PM_{2.5} are lower than NO₂, therefore, the change in concentrations and associated impact magnitude associated with PM₁₀ and PM_{2.5}, as a result of the Gypsy & Travellers Site would be less than assessed for NO₂.

3.4 Emissions data

Pollutant emissions from vehicles have been estimated using vehicle emission factors calculated from Defra's Emission Factor Toolkit (EFT), based on traffic flows, speeds and vehicle emission factors. The latest EFT (Version 12.0.1, released December 2023)²⁹ has been used within this assessment.

3.5 Receptors

The air quality objectives only apply in locations of relevant exposure, as presented within Table 2.2: . There are no plans currently available highlighting the exact location of the facades of the

²⁷ Road traffic statistics - Manual count point: 74081 (dft.gov.uk)

²⁸ A HDV is any vehicle with a gross weight greater than 3.5 tonnes. This typically includes heavy goods vehicles (HGVs), buses and coaches

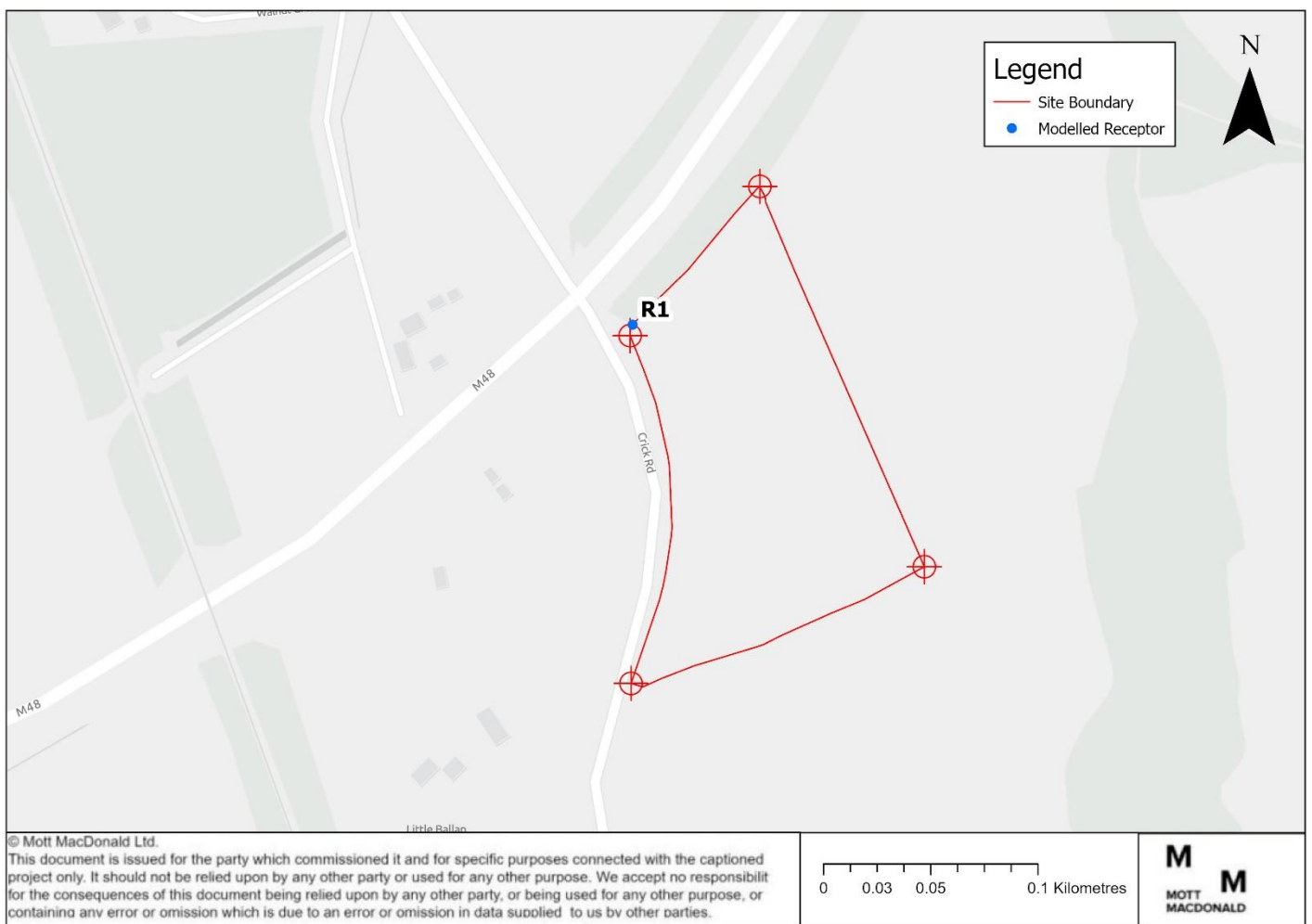
²⁹ https://laqm.defra.gov.uk/wp-content/uploads/2023/12/EFT2023_v12.0.1.xlsb

proposed structures within the Gypsy & Travellers Site. A Receptors point has therefore been chosen at the boundary of the Gypsy & Travellers Site to represent a worst-case location. The chosen receptor is presented within Table 3.2 and displayed in Figure 3.1.

Table 3.2: Modelled receptor

Receptor ID	National Grid reference		Height (m)
	X	Y	
R1	348931	189904	1.5

Figure 3.1: Location of modelled receptor



3.6 NO_x to NO₂ relationship

The DMRB calculation spreadsheet formulas used for this assessment provides outputs for NO_x which need to be converted to NO₂ to allow comparison with the relevant air quality objectives. Defra provides a spreadsheet-based method³⁰ for calculating annual mean NO_x to NO₂

³⁰ Department for Environment Food and Rural Affairs (2021). Local Air Quality Management (LAQM) website, available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/>

conversions. This method has been used within the assessment and is the most appropriate way of determining NO₂ concentrations from road NO_x contributions.

3.7 Predicted 1-Hour concentrations

Guidance from Defra's TG22 indicates that the hourly NO₂ air quality objective of 200µg/m³ (not to be exceeded more than 18 times per year) is unlikely to be exceeded at roadside locations where the annual mean concentration is less than 60µg/m³. Results presented in Section 5 will be screened using this criteria.

3.8 Assessment criteria

No formal significance criteria has been used for this assessment, results will however be compared against Table 2.1.

3.9 Assumptions and limitations

The air quality modelling predictions are associated with an inherent level of uncertainty, primarily a result of:

- Uncertainties with traffic data
- Uncertainties with vehicle emission predictions
- Uncertainties with background air quality maps

Model uncertainty can be addressed through the process of model verification. Model verification is a two-step process. Firstly, modelled concentrations are compared with monitored concentrations to identify any disparity. Where disparity occurs, the model inputs are revisited to identify any potential errors or opportunity for improvement of the model. Where disparity remains following the first step, model results can be adjusted to account for systematic bias.

A requirement of model verification is air quality monitoring data in a location that is similar, in terms of road traffic and layout, to the dispersion site and where traffic data for a proposed development is available. In this instance, although NCC do undertake air quality monitoring adjacent to the M4 there was uncertainty of their true locations which could not be clarified by a desk-based study. On this basis, it has not been possible to carry out a quantitative model verification with the process described above. For the purposes of this assessment, NO₂ model outputs, presented in Section 5.2, have been increased by a factor of 2. A factor which is considered to be considered highly conservative based on previous project experience and is therefore considered to be robust.

4 Baseline

4.1 Overview

Information on air quality in the UK can be obtained from a variety of sources including local authorities, national network monitoring sites and other published sources. For the purposes of this assessment, data has been obtained from Defra³¹ and MCC³².

The most recent full year of monitoring data available for the monitoring sites operated by MCC and Defra is 2021 and 2022 respectively. The monitoring data for 2021 however is unlikely to be representative of 'normal' conditions at the monitoring sites, due to the effects associated with the coronavirus (Covid-19) pandemic during those years when England was subject to periods of lockdowns and the influences this had on traffic. Therefore, the data for 2021 is presented for reference only and the most recent year with representative data for MCC and Defra is 2019 and 2022 respectively.

4.2 Local authority review and assessment

4.2.1 Air Quality Management Areas

MCC has declared two AQMAs in its administrative area, Usk AQMA and Chepstow AQMS, both located over 5km away from the Proposed Gypsy & Travellers Site. NCC has declared over 13 AQMAs in its administrative area. The closest AQMA in NCC is located approximately 14km away from the site. All AQMAs located in MCC and NCC are in urban locations and therefore not representative of our site. The proposed development will not impact any of the AQMAs and therefore are not considered further.

4.2.2 Local authority monitoring

4.2.2.1 Automatic monitoring

MCC undertook automatic monitoring at one site within its administrative area in 2022. The monitoring site is located approximately 12km northeast to the Proposed Gypsy & Travellers Site but is not considered to be representative of the site as it is located near the urban area of Chepstow. However, the NCC undertook automatic monitoring at two sites within its administrative area in 2021. Both AN1 and AN2 are located 10km to the west of the Proposed Gypsy & Travellers Site. Both are considered to be more representative due to their location next to the M4 motorway. AN1 measured NO₂, PM₁₀, and PM_{2.5} and AN2 measured NO₂ only, as seen in Table 4.1. However, The Annual Progress Report (2022) for NCC is missing annual mean NO₂ automatic data for both sites, therefore the automatic monitoring that is undertaken at a monitoring station that is part of the Automatic Urban and Rural Network (AURN) operated by Defra has been used. The location of the AURN monitoring site (UKA00380) is in a similar location to AN1. The monitoring station is located over 10km to the west of the Proposed Gypsy & Travellers Site. The locations can be seen in Figure 4.1.

³¹ Department for Environment Food and Rural Affairs. Air Quality Information Resource (Air) Website. Available at: <http://uk-air.defra.gov.uk/>

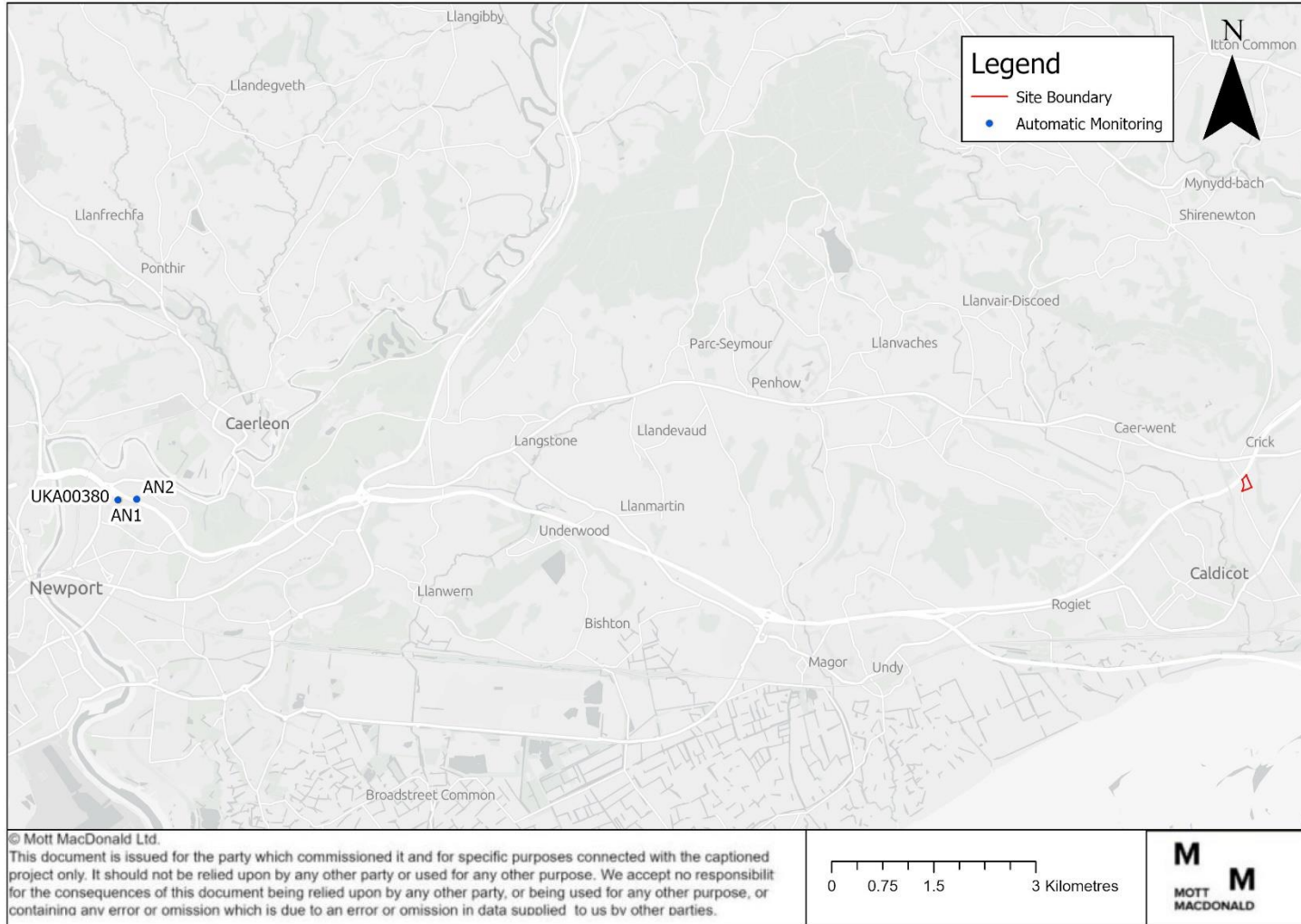
³² Monmouthshire County Council (2022) Air Quality Annual Status Report

Table 4.1: Automatic monitoring results

Site ID	Site Type	Council Name	Approx. distance from the proposed development (km)	National Grid Reference		Pollutant	Annual mean NO ₂ concentration (µg/m ³)/ Exceedances of Short-Term Objective (-) * or Annual mean PM ₁₀ concentration (µg/m ³)/ Exceedances of Short-Term Objective (-) #				
				X	Y		2018	2019	2020	2021	2022
UKA00380 / AN1	Urban Background	NCC	16	332418	189603	NO ₂	15 (-)	35 (-)	33 (-)	21 (-)	21 (-)
UKA00380 / AN1	Urban Background	NCC	16	332418	189603	PM ₁₀	14 (0)	15 (0)	13 (0)	12 (0)	-
UKA00380 / AN1	Urban Background	NCC	16	332418	189603	PM _{2.5}	8 (0)	10 (0)	8 (0)	7 (0)	-

Source: Newport City Council, LAQM Annual Progress Report (2022) Local Authority Details - Defra, UK
Note: Dash (-): no monitoring data available.

Figure 4.1: Automatic monitoring location



Note: Although not data is presented within Table 4.1 relating to Site AN2, it has been added to the figure for reference only

4.2.2.2 Diffusion tube monitoring

MCC undertook in NO₂ diffusion tube monitoring at 49 tubes across their administrative boundary in 2022. However, these are located on the roadside within the urban area of Chepstow, therefore not representative of our site. However, NCC undertook in NO₂ diffusion tube monitoring at 81 tubes across their administrative boundary in 2021. The closest diffusion tubes have been selected as shown in Table 4.2. These are considered to be representative of the site due to their location near the M4 motorway. The location of these diffusion tubes is shown in Figure 4.2. The results show that there were no exceedances at any of the monitoring sites between 2018 and 2021 except for NCC21d, NCC23e which had exceedances in 2018, 2019, and 2020.

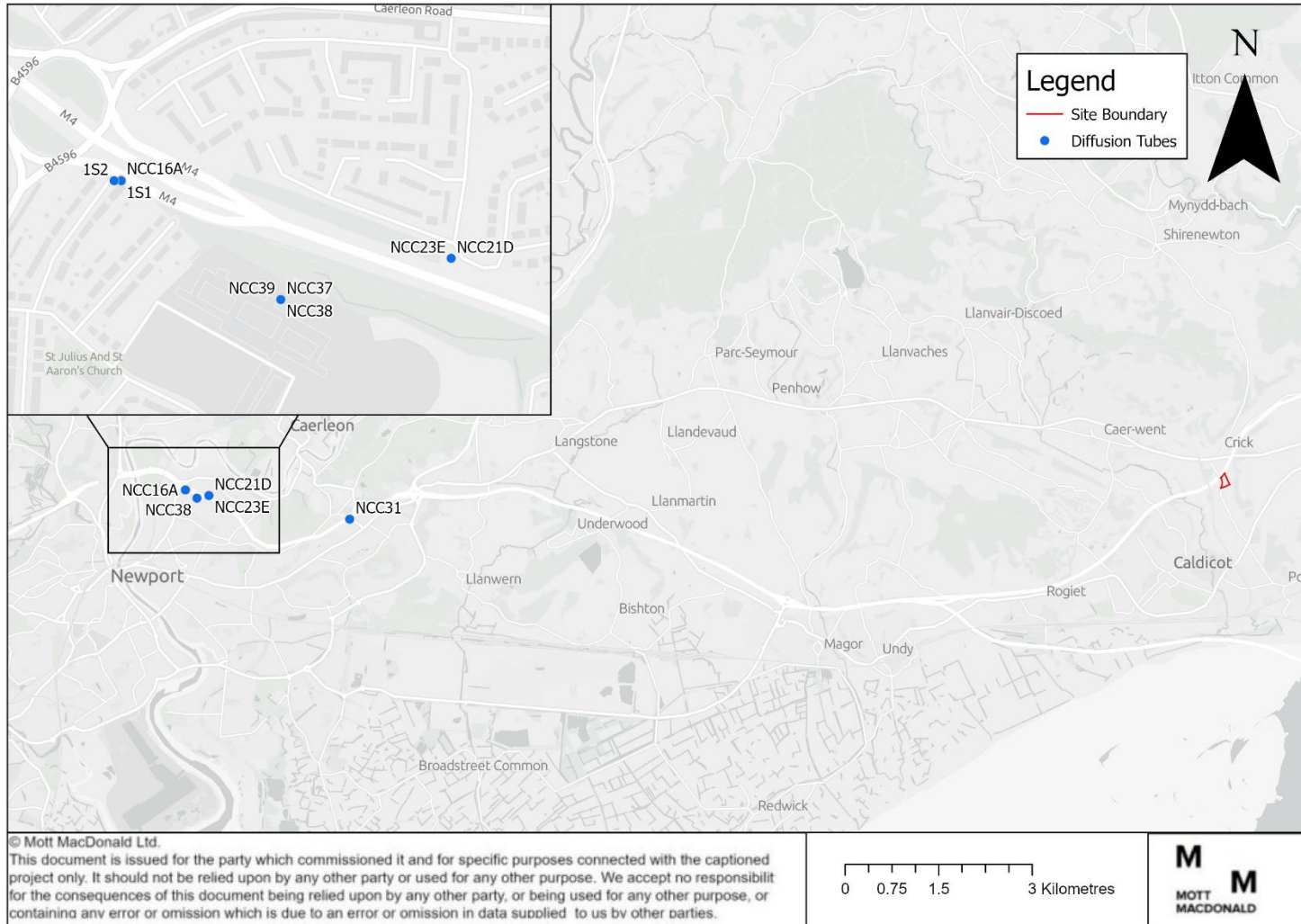
Table 4.2: Diffusion tube monitoring results

Site ID	Site Type	Council Name	Approx. distance from the proposed development (km)	National Grid Reference		Annual mean NO ₂ concentration (µg/m ³)				
				X	Y	2018	2019	2020	2021	2022
NCC16a	Roadside	NCC	16.5	332320	189703	28.2	27.5	22.6	21.8	-
NCC21d, NCC23e	-	NCC	16.5	332690	189615	<u>54.6</u>	<u>48.5</u>	<u>46.7</u>	34.7	-
NCC37, NCC38, NCC39	Background	NCC	16.5	332499	189569	18.6	18.5	14.4	13.5	-
NCC31	Façade	NCC	14	334951	189237	36.7	35.6	29.9	26.6	-
1S1	-	NCC	16.5	332320	189702	-	-	-	20.6	-
1S2	Roadside	NCC	16.5	332312	189702	-	-	-	18.9	-

Source: Newport City Council, LAQM Annual Progress Report (2022)

Note: Dash (-): no monitoring data available.
Exceedances shown in bold and underlined

Figure 4.2: Diffusion tube locations



4.3 Defra projected background concentrations

Defra provides mapped future year projections of background pollution concentrations for NO_x, NO₂, PM₁₀ and PM_{2.5} for each 1km grid square across the UK for all years between 2018 to 2030³³. The maps include a breakdown of background concentrations by emission source, including road and industrial sources, which have been calibrated against 2018 (the baseline year) UK monitoring data. Table 4.3 presents the background concentrations for the 1km grid square containing the Proposed Gypsy & Travellers Site in the current year of 2024. The background concentrations at the Proposed Gypsy & Travellers Site are all within the relevant objectives. Table 443 presents the background concentrations for the 1km grid square containing the Proposed Gypsy & Travellers Site in the baseline year of 2019.

Table 4.3: Defra projected background concentrations of NO_x, NO₂, PM₁₀, PM_{2.5}, for proposed development in 2024 (µg/m³)

1km Grid Square Location (OS Grid Reference)		2024 background concentration (µg/m ³)			
X	Y	NO ₂	NO _x	PM ₁₀	PM _{2.5}
348500	189500	6.1	8.5	11.7	7.4
349500	189500	6.7	7.7	11.3	7.1

Source: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

Table 4.4: Defra projected background concentrations of NO_x, NO₂, PM₁₀, PM_{2.5}, for proposed development in 2019 (µg/m³)

1km Grid Square Location (OS Grid Reference)		2019 background concentration (µg/m ³)			
X	Y	NO ₂	NO _x	PM ₁₀	PM _{2.5}
348500	189500	8.2	10.8	12.5	7.9
349500	189500	8.4	9.5	12.1	7.7

Source: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

4.4 Pollution Climate Model (PCM)

Defra uses the Pollution Climate Model (PCM) to report compliance with the limit values transposed into UK law from the Air Quality Directive³⁴. PCM projections of NO₂ concentrations are available for all years from 2018 to 2030 from the base year of 2018. In general, predicted NO₂ concentrations decline into the future, mainly in response to cleaner vehicles and technologies, and actions in Air Quality Action Plans by local and combined authorities. The most recent PCM model results were published in 2020 and the projections represent the projected concentrations assuming no further action beyond the air quality measures that were committed by the reference year (2018).

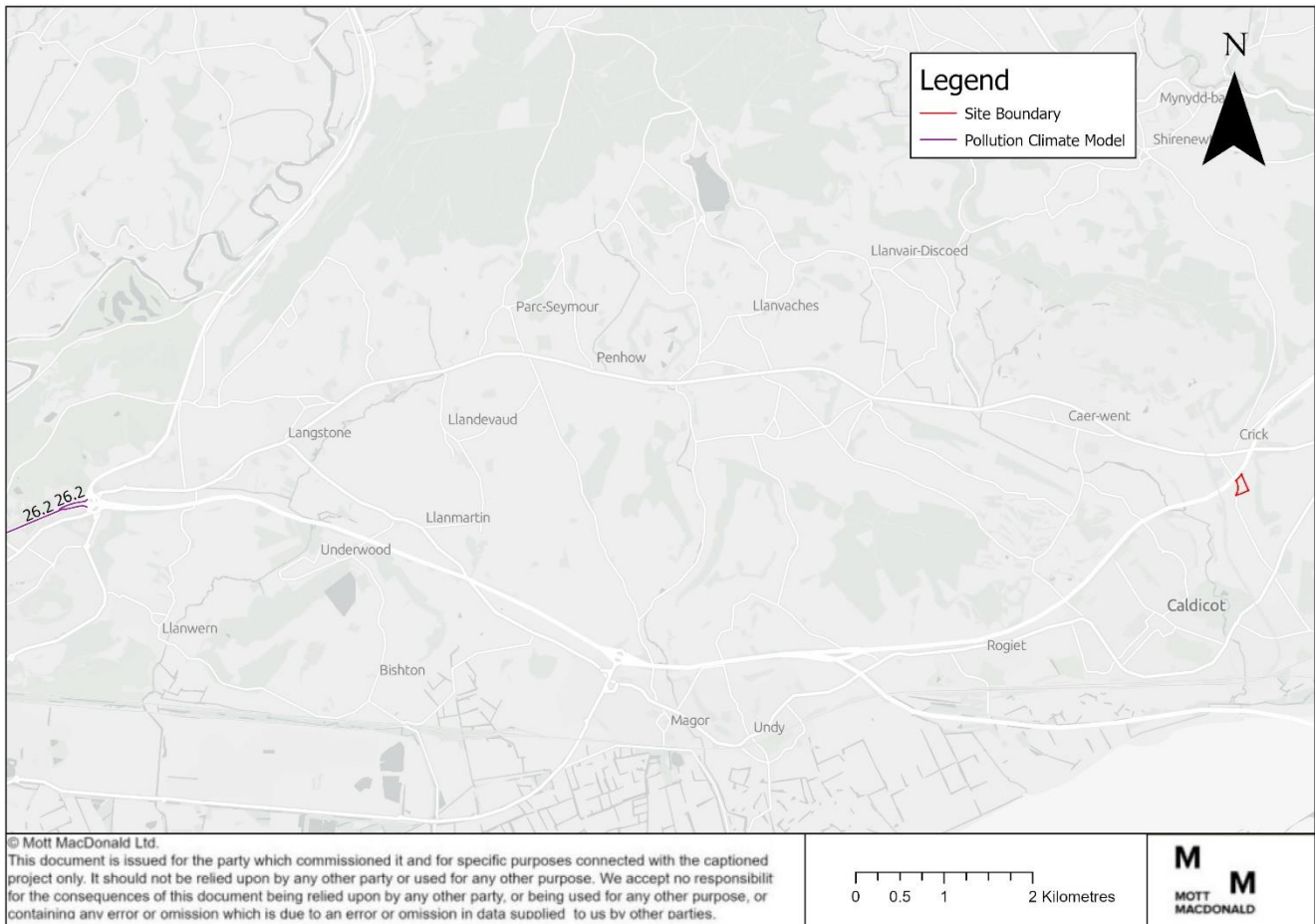
The PCM links located closest to the Proposed Gypsy & Travellers Site are displayed in Figure 4.3 below. The PCM model predicts the greatest 2024 annual mean NO₂ concentration of 26.2 µg/m³, located at census ID 802010500. This is well below the annual mean limit value of

³³ Defra Background maps (2018) [Online]. Available at: <https://uk-air.defra.gov.uk/data/laqm-background-maps>

³⁴ 2. European Union. (April 2008) Directive on Ambient Air Quality and cleaner Air for Europe, Directive 2008/50/EC Official Journal, vol. 152, pp. 0001-0044

40µg/m³ for NO₂. On this basis, the risk of a limit value non-compliance or delaying compliance with limit values is low and is therefore not considered further.

Figure 4.3: Nearby PCM links



4.5 Local emission sources

The main source of local emissions that could adversely impact the Proposed Gypsy & Travellers Site is the M48 motorway immediately surrounding northwest of the Proposed Gypsy & Travellers Site and the A48 to north of the Proposed Gypsy & Travellers Site. An existing rail line is located 2km south to the Proposed Gypsy & Travellers Site. It is not expected that there will be any significant impact from diesel train movements on ambient air quality. In accordance with guidance produced by Defra (TG22)²⁶, exceedances of the NO₂ annual mean objectives nearby to rail line are unlikely if the background annual mean NO₂ concentration is well under 25µg/m³, as is the case here. A review of the Defra's UK Pollutant Release and Transfer Register public register³⁵ shows there are no permits issued within 1km of the Proposed Gypsy & Travellers Site.

4.6 Summary

The Proposed Gypsy & Travellers Site is a roadside background location given that it is located approximately 20m away from the nearest motorway, the M4 motorway. As such, the urban

³⁵ Defra. Available at: [Search by map - Defra, UK](#)

background monitoring site AN1 and AN2 are considered to be representative as they are located next to M4 motorway. Further, the roadside diffusion tubes selected in Section 4.2.2.2 were also considered to be the most representative due to the Proposed Gypsy & Travellers Site location next to the motorway. Both automatic sites show data that is far below the objective of $40\mu\text{g}/\text{m}^3$. As such, it is unlikely that the addition of roadside NO_2 concentrations associated with the Proposed Gypsy & Travellers Site would lead to an exceedance of the annual mean NO_2 objective.

The annual mean PM_{10} concentration recorded at AN1 are also well below the objective of $40\mu\text{g}/\text{m}^3$. The $\text{PM}_{2.5}$ concentration recorded at both of the monitoring sites is also far below the applicable standard of $20\mu\text{g}/\text{m}^3$. Given that recorded PM_{10} and $\text{PM}_{2.5}$ monitored concentrations are well below the relevant objectives these pollutants have not been considered further within this report.

4.7 Mitigation

As the site is considered suitable for the proposed users, no additional mitigation measures are expected to be required. However, it should be ensured that the policies relating to air quality outlined in the Monmouthshire Local Plan and Newport Local Plan, as detailed in Section 2.3.2, are considered within the design and operation of the Proposed Gypsy & Travellers Site.

5 Potential Impacts

5.1 Overview

This section presents the air quality impacts predicted to occur at sensitive receptor locations due to the construction of the Proposed Gypsy & Travellers Site. Results are presented for 2024 as this is the baseline year and considered to be most presentative.

5.2 Site suitability

Table 5.1 presents the predicted changes and resultant annual mean NO₂ pollutant concentrations at the worst-case receptor for the Proposed Gypsy & Travellers Site, presented within Table 3.2.

Table 5.1: Predicted impact on NO₂ concentrations at the Proposed Gypsy & Travellers Site and sensitive receptor

ID	2024 annual mean NO ₂ (µg/m ³)	Annual mean NO ₂ objective (µg/m ³)
R1	10.1	40.0

Table 5.1 highlights that results are well below the NO₂ annual mean objective of 40 µg/m³ at the worst-case receptor. It can therefore be considered that the Proposed Gypsy & Travellers Site is suitable, in terms of air quality, for the introduction of additional receptors.

5.3 Mitigation

Considering the predicted air quality impact of the Proposed Gypsy & Travellers Site are predicted to be suitable for the introduction of additional receptors, no additional mitigation measures are expected to be required.

6 Conclusions

This report provides an assessment of the suitability of the Proposed Gypsy & Travellers Site for the future proposed users.

A review of the existing air quality information indicates that exceedances of the 1-hour mean NO₂, 24-hour mean PM₁₀ and annual mean NO₂, PM₁₀ and PM_{2.5} objectives are unlikely at the Proposed Gypsy & Travellers Site. At a receptor, chosen to represent the worst-case location on the Gypsy & Travellers Site, is predicted to be well below the NO₂ objective. The Proposed Gypsy & Travellers Site is therefore considered suitable for the proposed users in terms of long-term and short-term exposure to pollutant concentrations.

Results presented within this report are not considered to conflict with any national, regional or local planning policy.

