8. AIR

8.1 Introduction

MKO prepared the Air Chapter of this Environmental Impact Assessment Report (EIAR) for the Proposed Development at Roadstone Ballyquin Quarry, Ballyquin, Co. Clare.

This Chapter identifies, describes and assesses the potential significant direct and indirect effects on air quality arising from the construction, operational and decommissioning phases of the Proposed Development. Where required, appropriate mitigation measures to mitigate any identified significant effects to air quality are recommended.

8.1.1 Statement of Authority

This section of the EIAR has been prepared by Eoin O'Sullivan and reviewed by Michael Watson, both of MKO. Eoin is an experienced geo-environmental scientist and has over fifteen years' experience in the design, implementation and interpretation of all phases of geo-environmental and geotechnical site investigations. Eoin has also got extensive experience in the preparation of air and climate assessments and reports for EIAs, particularly relating to wind energy. Eoin is also proficient in undertaking detailed quantitative risk assessments for the protection of controlled waters and human health. Eoin holds an MSc in Environmental Engineering and is a Chartered Member of the Chartered Institute of Water and Environmental Management (CWEM) and Chartered Environmentalist (CEnv) with the Society of Environment. Michael has over twenty years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

8.1.2 Background

The Proposed Development site is located approximately 8 kilometres southwest of the town of Killaloe and 1.5 kilometres to the northwest of the village of Bridgetown and is accessed from an existing entrance on the R466 Regional Road. The Grid Reference co-ordinates for the approximate centre of the site are 562676, 669333 in Irish Transverse Mercator (ITM). Current land-use on the subject site comprises quarrying and ancillary activities. Land-use in the wider landscape comprises agriculture, forestry, quarrying and one-off housing.

8.1.3 Relevant Guidance

The assessment has been undertaken with reference to the following sources of information:

- Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107' (Transport Infrastructure Ireland, December 2022).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports – June 2022 (EPA, 2022).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017).
- Air Quality in Ireland Report 2023 (EPA 2024).
- EPA Guideline Document entitled Environmental Management in the Extractive Industries (April 2006).
- Department of Environment, Quarries and Ancillary Activities, Guidelines for Planning Authorities 2004.

- Review of dust monitoring results obtained for Roadstone Ballyquin for the period November 2022 to October 2023.

8.1.4 Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of the Air Quality Chapter of the EIAR.

8.2 Air Quality

8.2.1 Relevant Legislation

In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) addresses sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- The third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive (2004/107/EC), published in 2004, relates to polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air and was transposed into Irish law by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2009 (S.I. No. 58 of 2009) as amended by the Air Quality Standards (Amendment) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016).

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality and cleaner air for Europe) (as amended by Directive EU 2015/1480) which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for $PM_{2.5}$ (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM_{10}) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 8-1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ($\mu g/m^3$) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) as amended by the Air Quality Standards (Amendments) and Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2016 (S.I. 659 2016). The 2011 Regulations superseded the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999). The Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011) was revoked on 31 December 2022 and has been replaced by the Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022).

8.2.2 Air Quality Standards

The recently implemented Ambient Air Quality Standards Regulations 2022 (S.I. No. 739/2022) remains aligned to the CAFÉ Directive and diverts to the CAFÉ Directive for the limit values outlined in Table 8-1, the assessment thresholds in Table 8-2, the ozone limits and assessment thresholds in Table 8-3 and Table 8-4 respectively.

Table 8-1 Limit values of the CAFE Directive 2008/50.EC, Source: https://airquality.ie/information/air-quality-standards)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (ug/m^3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	7.5	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	7.5	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean	1st Jan 2010

Pollutant	Limit Value Objective	Averaging Period	Limit Value (ug/m^3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005
Particulate matter 10 (PM_{10})	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1st Jan 2020
Lead	Protection of human health	calendar year	0.5		Annual mean	1st Jan 2005
Carbon Monoxide	Protection of human health	8 hours	10,000	8620	Not to be exceeded	1st Jan 2005
Benzene	Protection of human health	calendar year	5	1.5	Annual mean	1st Jan 2010

Table 8-2 Assessment Thresholds from CAFE Directive 2008/50/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu g/m^3$)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Upper assessment threshold for the protection of Human Health	24 hours	75	Not to be exceeded more than 3 times in a calendar year

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m^3)	Basis of Application of Limit Value
Sulphur dioxide (SO_2)	Lower assessment threshold for the protection of human health	24 hours	50	Not to be exceeded more than 3 times in a calendar year
Nitrogen dioxide (NO_2)	Upper assessment threshold for the protection of human health	1 hour	140	Not to be exceeded more than 18 times in a calendar year
Nitrogen dioxide (NO_2)	Lower assessment threshold for the protection of human health	1 hour	100	Not to be exceeded more than 18 times in a calendar year
Particulate matter 10 (PM_{10})	Upper assessment threshold	24 hours	35	Not to be exceeded more than 35 times in a calendar year
Particulate matter 10 (PM_{10})	Lower assessment threshold	24 hours	25	Not to be exceeded more than 35 times in a calendar year
Lead (Pb)	Upper assessment threshold	Calendar Year	0.35	-
Lead (Pb)	Lower assessment threshold	Calendar Year	0.25	-
Carbon Monoxide (CO)	Upper assessment threshold	8 hours	7000	-
Carbon Monoxide (CO)	Lower assessment threshold	8 hours	5000	-
Benzene (C_6H_6)	Upper assessment threshold	Calendar Year	3.5	-
Benzene (C_6H_6)	Lower assessment threshold	Calendar Year	2	-

Ozone is set out differently in the CAFE Directive in that it sets target values and long-term objectives for ozone rather than limit values. Table 8-3 presents the target values and long-term target value for ozone and Table 8-4 details the threshold values for Ozone.

Table 8-3 Target values for Ozone defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Long-term Target Value from 2020
Protection of human health	Maximum daily 8-hour mean	120 µg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 µg/m^3
Protection of vegetation	AOT40* calculated from 1-hour values from May to July	18,000 µg/m^3.h averaged over 5 years	6,000 µg/m^3.h

* AOT40 is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 µg/m3 and is expressed as µg/m3 hours.

Table 8-4 Threshold for Ozone Defined in Directive 2008/50/EC (source: https://airquality.ie/information/air-quality-standards and Directive 2008/50/EC)

Pollutant	Averaging Period	Threshold
Information Threshold	1-hour average	180 µg/m^3
Alert Threshold	1-hour average	240 µg/m^3

8.2.2.1 Air Quality and Health

In September 2024, the EPA published 'Air Quality in Ireland 2023'[1] which reports that although Ireland met the current EU legal air quality limits in 2023, monitoring results were higher than the more stringent health-based World Health Organization air quality guidelines for a number of pollutants including: particulate matter (PM), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and ozone (O_3). The main sources of these pollutants are the burning of solid fuel in our towns and villages and traffic in our cities. People's health and the health of our environment is impacted by these pollutants. Ireland's ambition in the 'Clean Air Strategy for Ireland' (discussed below) is to move towards alignment with the World Health Organisation (WHO) Air Quality guidelines, this will be challenging but will have a significantly positive impact on health. Despite comparing favourably with many of our European neighbours, Ireland's 2023 monitoring results would exceed the soon-approaching 2026 targets,

The European Environmental Agency (EEA) Report, 'Air Quality in Europe – 2022 Report' highlights the negative effects of air pollution on human health across the EU. The report assessed that poor air quality accounted for premature deaths of approximately 238,000 people in the 27 EU Member States in 2021 and in 2020 in the European Union, 96% of the urban population was exposed to levels of fine particulate matter above the health-based guideline level set by the World Health Organization. Furthermore, in 2020, damaging levels of nitrogen deposition to ecosystems were exceeded in 75% of the total ecosystem area in the EU-27. This represents a fall of 12% since 2005.

These emissions, along with others including sulphur oxides (SO_x) are produced during fossil fuel-based electricity generation and traffic in various amounts, depending on the fuel and technology used.

[1] *Environmental Protection Agency: Air Quality in Ireland 2023. Available at: https://www.epa.ie/publications/monitoring--assessment/air/air-quality-in-ireland-2023.php#:~:text=Summary%3A%20Air%20quality%20in%20Ireland,based%20WHO%20guidelines%20in%202023.*

Whilst there is the potential of such emissions to be generated from the construction, operational and decommissioning phases of the Proposed Development, a number of mitigation measures will be implemented at this site to reduce the effect from dust and vehicle emissions, which are discussed in Section 8.4 below.

8.2.2.1.1 Clean Air Strategy for Ireland 2023

Irelands Clean Air Strategy 2023[2] sets out the detail of seven strategic frameworks that will be used to ensure that Air Quality continues to improve. The aims of these key strategic frameworks are:

- To set the appropriate targets and limits to ensure continuous improvements in Air Quality across the country, to deliver health benefits for all.
- To ensure the integration of clean air considerations into policy development across Government.
- To increase the evidence base that will help us to continue to evolve our understanding of the sources of pollution and their impacts on health, in order to address them more effectively.
- To enhance regulation required to deliver improvements across all pollutants.
- To improve the effectiveness of our enforcement systems.
- To promote and increase awareness of the importance of clean air, and the links between cleaner air and better health.
- To develop the additional targeted/specific policy measures as required to deal with national or local Air Quality issues.

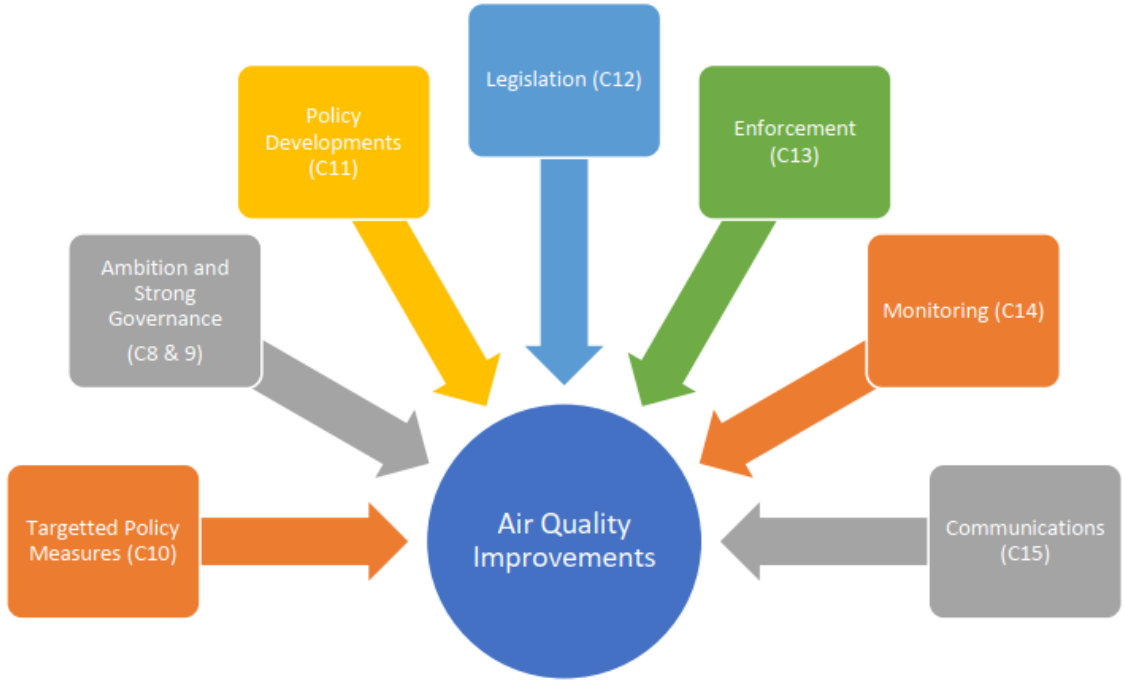


Figure 8-1 Seven Strategic Frameworks for Air Quality, with associated chapters in brackets. Reproduced as Figure 1 from Clean Air Strategy 2023

Chapter 11 of the Clean Air Strategy discusses Air Quality Policy Development. The chapter discusses energy policy and acknowledges how the States accelerated transition to renewable electricity will be critical to successfully meeting the ambitious renewable energy and greenhouse gas emission reduction targets outlined in the European Green Deal and Ireland's Climate Action Plan 2023, as well as to protecting against security of supply risks and removal of fossil fuels from power generation. Wind

[2] *Rialtas na hÉireann Clean Air Strategy April 2023. Available at: https://www.gov.ie/en/publication/927e0-clean-air-strategy/#:~:text=The%20Clean%20Air%20Strategy%20provides,delivering%20on%20wider%20national%20objectives.*

(offshore and onshore) and solar energy will be the leading cost-effective technologies to achieve our energy and emissions targets, as well as displacing emissions in other sectors, including household heating and vehicle transport, including household heating and vehicle transport. In the Clean Air Strategy the Climate Action Plan 2023 is referenced, while Climate Action Plan 2024 is currently the latest revision. The targets of the Climate Action Plan 2024 and the Green Deal are to deliver net-zero GHG emissions by 2050 and reduce GHG emissions to at least 55% by 2030, compared to 1990 levels

8.2.3 Air Quality Zones

The EPA has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs.
- Zone B: Cork City and environs.
- Zone C: 16 urban areas with population greater than 15,000.
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the CAFE Directive, Framework Directive and Daughter Directives. The site of the Proposed Development lies within Zone D, which represents rural areas located away from large population centres.

8.2.4 Existing Air Quality

The air quality in the vicinity of the Proposed Development site is typical of that of rural areas in the west of Ireland, i.e., Zone D. Prevailing south-westerly winds carry clean, unpolluted air from the Atlantic Ocean onto the Irish mainland. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, 'Air Quality in Ireland 2023' was published by the EPA in September 2024. The EPA reports provide SO_2, PM_{10}, NO_2 and O_3 concentrations for areas in Zone D. Values for each of these elements recorded within the Zone D monitoring stations listed in the report, have been averaged to give representative values for Zone D. Similar measurement values for all air quality parameters would be expected for the Proposed Development site as it lies in a rural location, within Zone D.

8.2.4.1 Sulphur Dioxide (SO_2)

Sulphur dioxide data for Edenderry, Kilkitt, Cork Harbour, Shannon Estuary/Askeaton and Letterkenny in 2023 is presented in Table 8-5.

Table 8-5 Average Sulphur Dioxide Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	4.3 µg/m^3
Hourly values > 350	0
Hourly max	80.9 µg/m^3
Daily values > 125	0
Daily max	23.2 µg/m^3

During the monitoring period there were no exceedances of the hourly and daily limit values for the protection of human health. As can observed from Table 8-5 the average maximum hourly value recorded during the assessment period was 80.9 µg/m^3. In addition, there were no exceedances of the

annual mean limit for the protection of ecosystems. It is expected based on professional judgement that SO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

8.2.4.2 Particulate Matter (PM_{10})

Sources of particulate matter include vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. The EPA report[1] provide annual mean PM_{10} concentration for sixteen Zone D towns, Carrick-on-Shannon/Askeaton, Birr, Castlebar, Kilkitt, Claremorris, Enniscorthy, Roscommon Town, Cobh Carrignafoy, Cobh Cork Harbour, Macroom, Cavan, Edenderry, Mallow, Longford, Killarney and Tipperary Town. Particulate matter (PM_{10}) data for 2023 is presented in Table 8-6.

Table 8-6 Average Particulate Matter (PM_{10}) Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	11.0 µg/m^3
% Data Capture (Average)	90.8%
Values > 50 ug/m^3	Max 6
Daily Max (Average)	45.4 µg/m^3

Notes: [1-] PM_{10} daily limit for the protection of human health: No more than 35 days >50 µg/m^3

The daily limit of 50 µg/m^3 for the protection of human health was exceeded on 13 days, which is less than the PM_{10} daily limit for the protection of human health of a max 35 days >50 µg/m^3 applicable from 2005. The greatest number of exceedances occurred at Edenderry where the PM_{10} daily limit was exceeded on 6 no. occasions. In the EPA 2023 report, it notes that there were breaches in the levels of particulate matter (PM), which in Ireland, mainly comes from the burning of solid fuel, such as coal, peat, and wood to heat our homes. It is expected based on professional judgement that PM_{10} values at the Proposed Development site is similar or lower than those recorded for the Zone D sites above.

8.2.4.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide data for Emo Court, Birr, Castlebar, Carrick-on-Shannon, Kilkitt and Edenderry in 2023 is presented in Table 8-7.

Table 8-7 Average Nitrogen Dioxide Data for Zone D Sites in 2023

Parameter	Measurement
Annual Mean	8.1 µg/m^3
NO_2 Values >200	0
Values > 140 (UAT)	0
Values >100 (LAT)	4
Hourly Max.	67.6 µg/m^3

The annual NO_2 value was below the annual mean limit value for the protection of human health of 40 µg/m^3. The lower assessment threshold of 100 µg/m^3 was exceeded 4 no. times during the monitoring period in Briarhill and the upper assessment threshold of 140 µg/m3 was not exceeded during the monitoring period. The 18 days limit during the monitoring period was not exceeded. In 2023, no

other monitoring locations in Zone D had exceedances in the lower and upper assessment thresholds of 100 and 140 µg/m^3. The average hourly max. NO_2 value of 67.6 µg/m^3 measured during the monitoring period was below the hourly max threshold of 200 µg/m^3. It would be expected that NO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

It is expected based on professional judgement that NO_2 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites above.

8.2.4.4 Carbon Monoxide (CO)

The EPA Report[1] provides rolling 8-hour carbon monoxide concentrations for Birr, a Zone D site. Carbon Monoxide data for 2023 is presented in Table 8-8 below.

Table 8-8 Carbon Monoxide Data for Birr – Zone D Site in 2023

Parameter	Measurement
Annual Mean	0.6 mg/m^3
Median	0.6 mg/m^3
% Data Capture	99.8%
Values > 10	0
Max	2.2 mg/m^3

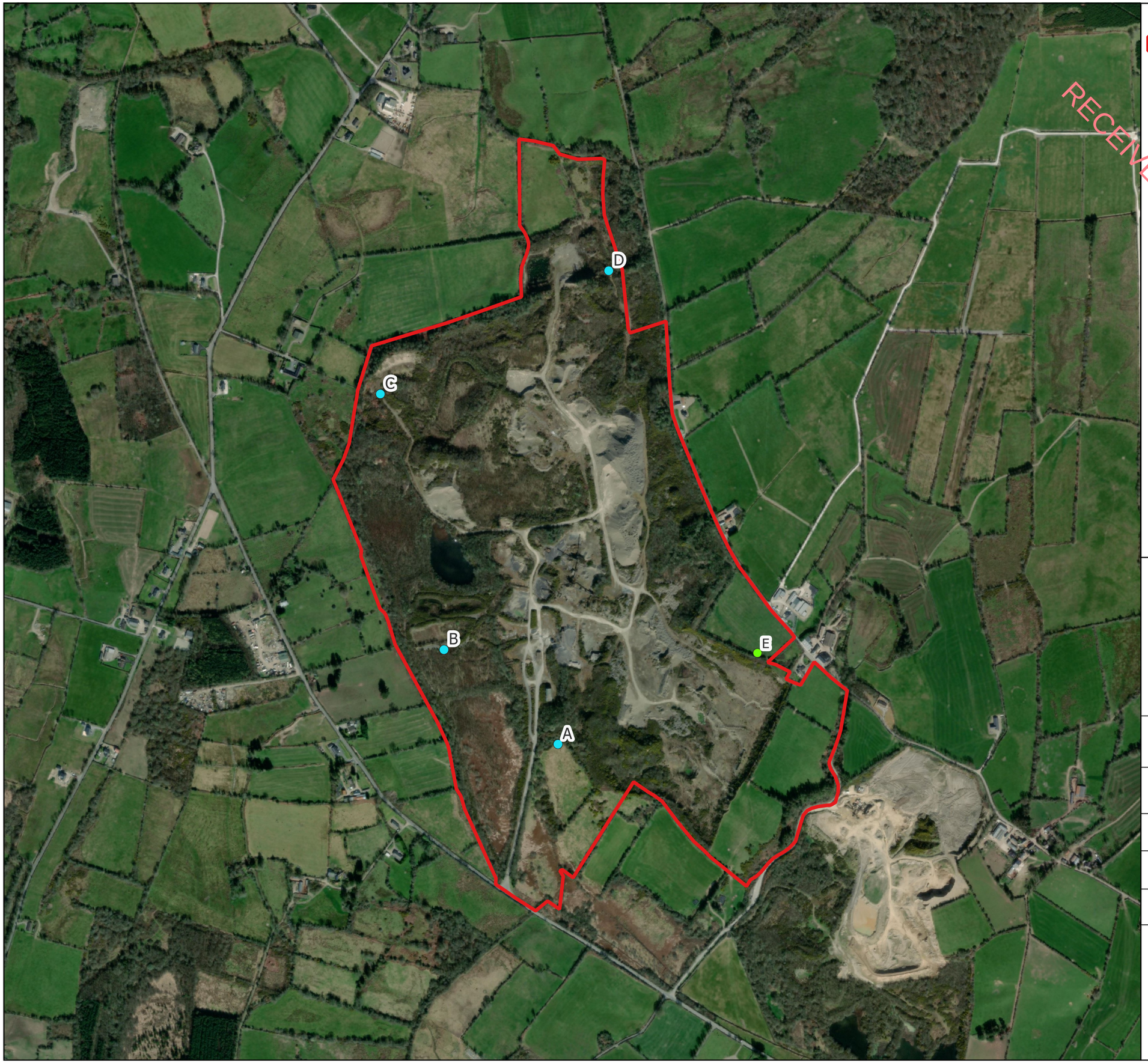
The average concentration of carbon monoxide was 0.6 mg/m^3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m^3 (or 10 mg/m^3). On no occasions were values in excess of the 10 mg limit value set out in Directive 2008/69/EC. It is expected based on professional judgement that CO values at the Proposed Development site would be similar or lower than those recorded for the Zone D site above.

8.2.4.5 Ozone (O_3)

The EPA report[1] provide rolling 8-hour ozone concentrations for seven Zone D sites, Emo Court, Kilkitt, Carnsore Point, Mace Head, Castlebar, Valentia and Malin Head. Ozone (O_3) data for 2023 is presented in Table 8-9. As can be observed from Table 8-9 there were 10 no. exceedances of the maximum daily eight-hour mean limit of 120 µg/m^3. The CAFÉ Directive stipulates that this limit should not be exceeded on more than 25 days. It is expected based on professional judgement that O_3 values at the Proposed Development site would be similar or lower than those recorded for the Zone D sites below.

Table 8-9 Average Ozone Data for Zone D Sites in 2022

Parameter	Measurement
Annual Mean	61.5 µg/m^3
Median	72.8 µg/m^3
% Data Capture	95.5%
No. of days > 120	10 days



Map Legend

- Application Boundary
- Existing Dust Monitoring Locatios
- Proposed Dust Monitoring Location

N

Drawing Title
Dust Monitoring Locations

Project Title
Proposed Ballyquin Quarry

Drawn By	Checked By
CJ	EOS
Project No. 211137	Drawing No. Figure 8-2
Scale 1:8,000	Date 2024-11-14

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8.3 Dust Monitoring

8.3.1 Background

The extent of dust generation at any site depends on the type of activity undertaken, the location, the nature of the dust, i.e., soil, sand, etc., and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather.

There are no statutory limits for dust deposition in Ireland. However, EPA guidance suggests that a deposition of 10 mg/m^2/hour can generally be considered as posing a soiling nuisance. This equates to 240 mg/m^2/day. The EPA recommends a maximum daily deposition level of 350 mg/m^2/day when measured according to the TA Luft Standard 2002.

8.3.2 Receiving Environment

There are 33 no. dwellings located within 500 metres of the Proposed Development site. A map of these dwellings located within 500 m is shown in Figure 4-2 of Chapter 4: Population and Human Health. The closest occupied dwelling (Dwelling ID no. 27) is located approximately 15 metres from the Proposed Development site at its closest point.

The site is accessed from the R466 Regional Road which runs southeast-northwest from the R445 at Birdhill, County Tipperary to the R352 in East Clare.

8.3.3 Dust Monitoring

Dust monitoring at the existing quarry site is undertaken monthly by BHP Laboratories on behalf of Roadstone. The dust monitoring records are submitted to Clare County Council to ensure compliance with Condition 9 of the planning permission no. P17/552 for the importation of inert materials for the purpose of restoration. MKO has reviewed dust monitoring records for the period November 2022 to October 2023 for the purposes of this assessment. Dust deposition was measured using Bergerhoff dust gauges, which were generally exposed over a 30-day period to collect bulk dust deposition. Dust monitoring records are presented in Appendix 8-1.

8.3.4 Monitoring Locations

Samples were collected at four fixed locations at the site (A to D as shown on Figure 8-2) over a 30-day sample period. A is located in the south of the site. B is located to the west of the site. C is located to the northwest of the site. D is located to the northeast of the site.

8.3.5 Results

The results of dust monitoring for A to B are presented in Appendix 8-1. In general, the results show that total depositional dust levels measured at all monitoring locations were below the 350 mg/m^2/day limit value over the monitoring period. Whilst there were elevated levels recorded at monitoring C in July 2023, it is noted that the elevated levels were in most instances due to contamination with organic material. It is noted that the inorganic particulate faction of the sample which is representative of site activities was well below the 350 mg/m^2/day limit value in all samples.

8.4 Likely and Significant Effects and Associated Mitigation Measures

8.4.1 Characteristics of the Proposed Development

The Proposed Development will utilise the existing quarry infrastructure including internal roads, site office, weighbridge, wheel-wash, welfare facilities and other ancillaries to complete the works. A quarantine area and refuelling area will also be constructed as part of the development of the site. The weighbridge will be upgraded as part of the development proposals. A quarantine area and refuelling area will be provided as part of the Proposed Development. The quarantine area will comprise of a concrete foundation slab and inspection shed. Drainage from the refuelling areas will be routed through a full hydrocarbon interceptor, a wetland, and then a soakaway for final discharge to ground. The Proposed Development will include for upgrades to the drainage network and the addition of settlement ponds.

The operational phase of the Proposed Development will involve the extraction, processing and washing of sand and gravel from an area measuring approximately 16.3 ha which will allow for the extraction of approximately 1,428,571 tonnes of material. It is intended to extend the extraction area of the existing quarry horizontally and vertically using mechanical excavation techniques. The depth of gravel varies across the extraction area, as a result levels of excavation will vary from approx. 76 metres above ordnance datum (mAOD) in the north of the site to 57.5mAOD in the south of the site. The zone of sand/gravel ranges from 7 to 14m in thickness.

It is proposed to construct earth berms around the southern perimeter of the extraction area in order to assist in screening the quarry and assimilating into the landscape. The berms will be planted with native species to assist in screening the quarry and to prevent erosion of soil. This will supplement the existing berms and vegetation located on the western and northern boundaries.

It is also proposed to import approximately 4,471,200 tonnes of inert soil and stone material or stone by-product, or river dredge spoil for the infilling and restoration of an existing and future quarry void in order to return the land to a beneficial use. The infilling will commence in the current void and proceed as extraction takes place and therefore infilling and extraction will run concurrently.

8.4.2 “Do-Nothing” Scenario

If the Proposed Development is not permitted, the site would remain largely unaltered as a result of the Do-Nothing Scenario. The potential for additional investment and employment in the area in relation to the Proposed Development would be lost.

8.4.3 Likely Effects and Mitigation Measures – Construction Phase

8.4.3.1 General Air Quality

The construction of the inspection shed, berms, refuelling area, settlement ponds, weighbridge upgrades and drainage network will require the operation of construction vehicles and plant on site. Exhaust emissions associated with vehicles and plant will arise as a result of construction activities. This potential effect will not be significant and will be restricted to the duration of the construction phase which is anticipated to be less than 1 month. Therefore, this is considered a Temporary Slight Negative Effect.

Mitigation measures to reduce this effect are presented below.

Mitigation

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- When stationary, delivery and on-site vehicles will be required to turn off engines.
- The methods of working will comply with all relevant legislation and best practice guidelines in reducing the environmental effects of the works. A detailed Construction Environmental Management Plan (CEMP) has been prepared and included as Appendix 3-1.

Residual Effect

Following implementation of mitigation measures as outlined above, residual effects of the Proposed Development on general air quality will have a Temporary Imperceptible Negative Effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

8.4.3.2 Dust Emissions

The construction of the inspection shed, berms, refuelling area, settlement ponds, weighbridge upgrades and drainage network may give rise to dust emissions during the construction phase. This potential effect will not be significant and will be restricted to the duration of the construction phase. Therefore, this is a Temporary Slight Negative Effect. Dust suppression mitigation measures to reduce this effect are presented below.

Mitigation

- The hardstanding/roads adjacent to the site will continue to be regularly inspected by the Site Manager for cleanliness and cleaned as necessary.
- If necessary, sporadic wetting of loose stone and soil surface will be carried out during the construction phase to minimise movement of dust particles to the air.
- Any hardstanding areas/site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- The transport of material, which has significant potential to cause dust, will be undertaken in tarpaulin-covered vehicles.
- Water spraying of stockpiles will be carried out when necessary to reduce the production of dust.
- Water sprays will be used as required during transfer and loading activities, during dry and/or windy conditions.
- All vehicles required to pass through the wheel wash on exiting the site.
- All plant and machinery will be maintained in good operational order while onsite.
- All plant and shall be stored in the dedicated area.
- It is proposed that dust deposition monitoring using the Bergerhoff Method, be carried out in line with the existing monitoring requirements.

Residual Effect

Temporary Imperceptible Negative Effect

Significance of Effects

Based on the assessment above there will be no significant effects.

8.4.4 Likely Effects and Mitigation Measures – Operational Phase

8.4.4.1 General Air Quality

The extraction of sand from the site will require the use of machinery and plant, thereby giving risk to exhaust emissions. The soil and stone material that will be delivered to the site by road going vehicles also has the potential to generate exhaust emissions. The restoration process will also require the use of machinery and plant that has the potential to generate exhaust emissions. This is likely to have a Long-term Slight Negative Effect, which will be reduced through the use of the best practices mitigation measures as presented below.

The following mitigation measures will however be implemented at the site:

Mitigation

- All on-site plant and vehicles will be maintained in good operational order, thereby minimising any emissions that arise.
- When stationary, delivery and on-site vehicles will be required to turn off engines.
- Users of the site will be required to ensure that all plant and vehicles are suitably maintained to ensure that emissions of engine generated pollutants is kept to a minimum.

Residual Effect

The number of plant items to be used on site is relatively small in the context of the general air quality of the site and surrounds.

Long-term Imperceptible Negative Effect

Significance of Effects

Based on the assessment above there will be no significant effects.

8.4.4.2 Dust Emissions

Dust can be generated from many on-site activities such as sand extraction, infilling, traffic movements and restoration works. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Pre-mitigation, the potential dust emission effects could have a Long-term Moderate Negative Effect.

The following mitigation measures will however be implemented at the site:

Mitigation

- The hardstanding/roads adjacent the site will continue to be regularly inspected by the Site Manager for cleanliness, and cleaned as necessary.
- The site access roads will be checked weekly for damage/potholes and repaired as necessary.
- Any hardstanding areas/site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions. Water bowser

movements will be carefully monitored, as the application of too much water may lead to increased runoff.
- Water spraying of conveyors and stockpiles will be carried out when necessary to reduce the production of dust.
- Water sprays will be used as required during transfer and loading activities, during dry and/or windy conditions.
- The transport of material, which has significant potential to cause dust, will be undertaken in tarpaulin-covered vehicles.
- All vehicles required to pass through the wheel wash on exiting the site.
- Following reinstatement, the area will be reseeded to facilitate immediate revegetation of the site and prevent dust generation.
- All plant and machinery will be maintained in good operational order while onsite.
- All plant and shall be stored in the dedicated area.

Residual Effect

The Proposed Development is located with the boundary of the existing infill and quarry boundary and the management of the activity will occur within the environmental management framework in place and which has proven to be effective. In addition, the existing dust monitoring programme has shown that the infilling operations did not generate dust deposition above unacceptable levels at the nearest sensitive receptors. Following implementation of mitigation measures as outlined above, residual effects of dust generation from the restoration works will have a Long-term Imperceptible Negative Effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

8.4.4.3 Dust Monitoring

It is proposed that dust deposition monitoring using the Bergerhoff Method, be carried out in line with the existing monitoring requirements for the infilling operation.

8.4.5 Health Effects

Whilst the operational phases of the Proposed Development are likely to lead to increases in dust and vehicle emissions, the implementation of the mitigation measures discussed above, and good management practices can prevent or minimise potential effects off-site. Good management practice consists of good site design and layout, adopting appropriate working methods, choosing the right equipment and ensuring that the workforce understands the company's responsibilities and is familiar with good working practice and dust suppression techniques. The potential for health effects are considered negligible as the potential for both exhaust and dust emissions will be limited and controlled through site layout design and mitigation measures.

8.4.6 Cumulative Effects

Potential cumulative effects on air quality between the Proposed Development and other developments in the vicinity of the site were also considered as part of this assessment. It is noted that the other land use activities in the area and proposed developments in the planning system include Jim Bolton Sand & Gravel, Ryan Plant and Equipment, the proposed Fahy Beg Wind Farm and agriculture related activities.

8.4.6.1 General Air Quality and Dust

During the construction phase of the Proposed Development and considering the potential cumulative effect with other proposed projects listed in Section 8.4.6 above, there will be exhaust emissions from construction plant and machinery and potential dust emissions associated with all construction activities. Should these other projects be constructed at the same time as the Proposed Development there will be a Temporary Slight Negative cumulative effect on air quality due to vehicular and dust emissions.

During the operational phase of the Proposed Development and considering the potential cumulative effect with other activities listed in Section 8.4.6 above, there will be exhaust emissions from operational plant and machinery and potential dust emissions associated with the operational activities. Should the Proposed Development be operational at the same time as these other activities there will be a Long Term Slight Negative cumulative effect on air quality due to vehicular and dust emissions.