Galway Harbour Company

Galway Harbour Extension

Response to An Bord Pleanála Sept. 2024

EIS Addendum Chapter 9

Air Quality

An Bord Pleanála (Ref: 61.PA 0033)

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9. Air Quality

9.1. Introduction

Chapter 9 of the Environmental Impact Statement ("EIS") summarises the impacts of the proposed development on air quality in the vicinity of Galway Harbour. The chapter outlined the air quality impacts of dust, odour and gaseous emissions that may arise as result of:

- The construction of the industrial park and deep water dock;
- Operation of the Galway Harbour Enterprise Park;
- Operation of the new Port.

AXIS environmental services were commissioned to review the EIS and associated documents as submitted to An Bord Pleanála for the preparation of this addendum.

Mark Mc Garry BSc has over 25 years working in the field of environmental consultancy and field measurement. Mark began his career in a laboratory and consultancy where he developed his foundation in environmental monitoring and field work before moving on and opening his own consultancy, AXIS Environmental Services Ltd., in 2008. Mark has acted as lead environmental consultant on many projects, liaising with management, EPA, and Planning authorities to investigate and report on environmental issues. AXIS are accredited by the Irish National Accreditation Board for air monitoring.

Reviews of current legislation, air quality standards and guidance have been carried out to determine if information in the original EIS remains valid, as well as a review of any new information that could add to the data already submitted.

The submitted chapter identified all the key impacts associated with this proposed development and the emissions associated with vessels on site, odours generated by dredging and dust generated by construction.

9.2. Report Format

The purpose of this report is to review the ongoing validity of the data that was used in the original EIS and also to update the report will additional relevant results and data where appropriate.

This report contains updated ambient air quality data for Galway City, that was not in existence at the time of writing the original EIS. The Environmental Protection Agency ("EPA") have since installed two ambient air quality monitoring stations in Galway City. One air quality station was installed at Eyre Square in January 2022 to measure ambient concentrations of Nitrogen Dioxide [Station No. 105, 53.2740ºN, -9.0485ºE].

A second air quality station was installed in Briarhill, [Station 109, 53.2921ºN, -8.9870ºE] in December 2022 to measure nitrogen dioxide and particulate matter in the form of PM_{10} and $PM_{2.5}$.

While the data downloaded from these analysers has not yet been validated, they are EPA analysers that are calibrated monthly and the data from these, once validated, will be used in submissions in line with the Ambient Air Quality for Europe ("CAFE") Directives (2004/107/EC and 2008/50/EC). An amalgamated Directive is provisionally agreed to amend the air quality standards but has not yet been approved by member states.

Data pertaining to both EPA Stations has been summarised in this report. One station is located roadside in Eyre Square which would be impacted by local traffic movements. This is the closest analyser to Galway Harbour. The second analyser is located on the outskirts of Galway City on the N6 at Briarhill. This would be impacted by passing traffic on the N6 throughout the day.

The EIS has dealt adequately with odour emissions from the installation which would potentially be generated during the dredging process. There are no changes required to the report.

The emissions from shipping existing and proposed, have been modelled to determine the local impact on air quality in the vicinity of the Port during a range of scenarios between 2012 and 2035. These results are then directly compared to the Air Quality Standards as outlined in the CAFE Directive for compliance purposes.

9.3. Review Of Chapter 9 of the EIS

The original EIS Chapter 9 submitted along with an Addendum Chapter 9 (January 2015) outlines the potential impacts of the proposed development on air quality in the vicinity of the Galway Port. It identifies the key air pollutants associated with construction and operation of the Port during a range of scenarios between the current situation and proposed activities at the installation.

The report includes a review of air quality legislation, combined with actual ambient monitoring results completed for the area at the time of the report, reviewing potential impacts associated with dust, combustion and dredging activities in the area.

In order to protect human health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other EU member states for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality.

The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008. It replaced the Framework Directive and the first, second and third Daughter Directives. The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). In 2024, the Council of the EU and the European Parliaments representatives reached a provisional agreement on a proposal to set amended air quality standards. This provisional agreement is yet to be formally approved, after which member states will have two years after entry into force to transpose the Directive into national law. At the time of writing, this has not been approved and dates have not been set for publication of the Directive.

The following table summarises the proposed changes to Air Quality Standards:

Table 9-1: Quality Standards in EU Directive 2008/50/EC v Proposed Air Quality Standards

	Current Air Quality Standards			Proposed Air Quality Standards		
Pollutant	**Concentration**	**Averaging period**	**Permitted exceedances each year**	**Concentration**	**Averaging period**	**Permitted exceedances each year**
Fine particles ($PM_{2.5}$)	n/a	n/a	n/a	25 µg/m^3	24 hours	18
	20 µg/m^3	1 year	n/a	10 µg/m^3	1 year	n/a
Particulate matter (PM_{10})	50 µg/m^3	24 hours	35	45 µg/m^3	24 hours	18
	40 µg/m^3	1 year	n/a	20 µg/m^3	1 year	n/a
Nitrogen dioxide (NO_2)	200 µg/m^3	1 hour	18	200 µg/m^3	1 hour	1
	40 µg/m^3	1 year	n/a	20 µg/m^3	1 year	n/a
	n/a	n/a	n/a	50 µg/m^3	24 hours	18
Sulphur dioxide (SO_2)	350 µg/m^3	1 hour	24	350 µg/m^3	1 hour	1
	125 µg/m^3	24 hours	3	50 µg/m^3	24 hours	18
Lead (Pb)	0.5 µg/m^3	1 year	n/a	0.5	1 year	n/a
Carbon monoxide (CO)	10 mg/m^3	Maximum daily 8 hour mean	n/a	10 mg/m^3	Maximum daily 8 hour mean	n/a
	n/a	24 hours	n/a	4 mg/m^3	24 hours	18
Benzene	5 µg/m^3	1 year	n/a	3.4	1 year	n/a
Arsenic (As)	6 ng/m^3	1 year	n/a	6 ng/m^3	1 year	n/a
Cadmium (Cd)	5 ng/m^3	1 year	n/a	5 ng/m^3	1 year	n/a
Nickel (Ni)	20 ng/m^3	1 year	n/a	20 ng/m^3	1 year	n/a
Polycyclic Aromatic Hydrocarbons	1 ng/m^3 (expressed as concentration of Benzo(a)pyrene)	1 year	n/a	1 ng/m^3 (expressed as concentration of Benzo(a)pyrene)	1 year	n/a

9.4. Summary of previous conclusions of the EIS Chapter

The conclusions of the original EIS have outlined that the overall impact of the proposal will be to retain the 'Good' air quality status in the Galway Bay area.

There will be a decrease in air emissions per tonne of goods transported at the new harbour area due to the use of larger more efficient vessels, fewer numbers required and reduced turnaround capability.

Future shipping traffic will be of shorter duration as docking, entering and leaving the port will be quicker and fewer vessels will be required for the same throughput of cargo.

It is also proposed that there will be "Shore to Ship" power units installed which means that the power consumed by the vessels alongside the quay will be from the national grid rather than combustion engines on the ships using less efficient generation. As the proposed new harbour extension is located further away from the city than the existing, this will reduce the overall impact of emissions from activities on air quality in the city.

Air pollutants from the proposed development are within the standards set by European air quality guidelines as transposed into Irish law and no deterioration in air quality is anticipated, even in the long-term high growth scenario. The pollutants from the proposed shipping emissions have been modelled to determine the likely impact and cumulative impact when considering the background concentrations for NO_2 in the city.

Significant mitigation measures will be employed during the construction phase to avoid potential impacts to air quality including a detailed construction management plan and the installation of continuous analysers to monitor ambient air quality in the area during the construction period to ensure that air quality standards are not exceeded at any stage of the project. A dust management plan has been attached in Appendix 9-1 to overview the actions that will be implemented to ensure dust nuisance is not an issue during construction or operational phase of the project.

The potential odours generated by proposed dredging activities to be carried out have been modelled by SCREEN3 software and odours will not be detected beyond a range of 650 meters of the dredging activity. An odour management plan will be developed for the activity to ensure odours are controlled and do not impact outside the boundary of the installation for the duration of this process.

9.5. Additional Surveys and Up to Date Data

9.5.1 Air Quality Standards

A review of Air Quality Standards (AQS) and Regulations indicates that the CAFE Directive (2008/50/EC) as transposed into legislation under S.I. No. 180 of 2011 is still the current legislation in place for air quality in Europe.

A review of the AQS for Europe is currently in progress. On formal approval, member states will have two years to transpose the Directive into national law. The proposal has not yet been formally approved; however, it is anticipated to be agreed in 2024. The CAFE Directive (2008/50/EC) is the most current legislation to work with, at present.

9.5.2 Current Ambient Air Quality

The EPA have installed an air quality monitoring station in Eyre Square for Nitrogen Dioxide assessment in 2022. A second station in Briarhill was installed in December 2022 which monitors for both Nitrogen Dioxide and Particulate Matter in the form of PM_{10} and $PM_{2.5}$.

Nitrogen Dioxide (NO_2) is classed as both a primary and a secondary pollutant. As a primary pollutant NO_2 is emitted from all combustion processes (such as a gas/oil fired boiler, a car engine etc). As a secondary pollutant NO_2 is derived from atmospheric reactions of pollutants that are themselves, derived mainly from traffic sources.

Particulate Matter (PM10 and PM2.5) may be emitted as a primary pollutant from road vehicle exhausts, which is the main source in urban areas. In rural areas, sources will include traffic, agricultural activities and natural processes such as sea salt aerosol. Also point sources such as combustion, i.e. domestic fires, industrial boilers etc. are primary sources of PM_{10}. PM_{10} may also be formed as secondary pollutants from the condensation or reaction of chemical vapours in the atmosphere. Particulate Matter ($PM_{2.5}$) has similar effects on health as PM_{10}, however, $PM_{2.5}$ is a better indicator of anthropogenic (man-made) emissions.

The results of the EPA Eyre Square network monitoring for 2022 - 2023 are presented below. Results from the monitors to date indicate that the city centre and Briarhill are compliant with the limits and conditions always applied by the CAFE Directive, since they were installed.

The following data outlines ambient air concentrations in each specific area. It must be noted these results are published by the EPA, but only 2022 has officially been validated by the EPA. Validation would typically remove any outliers, equipment issues or calibration data that would have been recorded by the instrument.

Table 9-2 Summary of EPA Air Quality Monitoring – Annual Average

Year	Nitrogen Dioxide NO_2	Annual Average Limit	Particulate Matter PM_{10}	Annual Average Limit	Particulate Matter $PM_{2.5}$	Annual Average Limit
Eyre Square						
2022	17.60	40 µg/m^3	No data	40 µg/m^3	No data	20 µg/m^3
2023	17.42		No data		No data	
2024	17.54		No data		No data	
Briarhill						
2022	No data	40 µg/m^3	No data	40 µg/m^3	No data	20 µg/m^3
2023	16.51		12.09		7.12	
2024	15.61		13.03		7.94	

Note 1: 2022 is the only EPA validated data currently available. 2023 and 2024 is not yet validated - included for indicative purposes.
Note 2: 2024 consists of data from 01st January 2024 – 01st May 2024.
Note 3: No data indicates the equipment was not in place for measurement at this time of reporting.

Table 9-3: Summary of EPA Air Quality Monitoring – 1 hour / 24 hour Compliance

Year	Nitrogen Dioxide NO_2	Hourly Exceedance	Particulate Matter PM_{10}	24 hour Exceedance
Eyre Square				
2022	0	Number of exceedances above 200 µg/m^3	No data	Number of exceedances above 50 µg/m^3
2023	0		No data	
2024	0		No data	
Briarhill				
2022	No data	Number of exceedances above 200 µg/m^3	No data	Number of exceedances above 50 µg/m^3
2023	0		0	
2024	0		0	

Note 1: Not to be exceeded on more than 18 occasions in any calendar year.
Note 2: Not to be exceeded on more than 35 occasions in any calendar year.
Note 3: No data indicates the equipment was not in place at this time of reporting.

9.5.3 Updated Impact Assessment

The EIS contained information pertaining to estimated emissions produced on an annual basis from shipping activities, existing and proposed. A model of the data to estimate the cumulative impact of these emissions with the background air quality monitoring at Eyre Square has been summarised in the tables below.

NOx has been modelled to assess compliance utilising background data from the EPA analyser to demonstrate emissions from the proposed installation would not exceed air quality standards. NOx emissions were estimated between 19 – 72 tonnes per year depending on the scenario modelled. The results of the model are summarised in the following tables.

The results indicate that all levels of pollutant for different scenarios proposed are predicted to remain with the limits for the protection of human health.

Table 9-4: Impact Assessment – Annual Average – Nitrogen Dioxide

Location	Shipping Process Contribution µg/m³	Avg. EPA Background Concentration µg/m³	Predicted Environmental Concentration µg/m³	Limit The limit for NO_2 under 2008/50/EC for an annual limit	Compliance Statement
2012					
Harbour Apartments	0.51	17.5	18.01	40 µg/m³	Compliant
Grattan Road	0.32		17.82		Compliant
Eyre Square	0.40		17.90		Compliant
Mellows Park	0.55		18.05		Compliant
Ballyloughane Beach	0.33		17.83		Compliant
2018 – Do Nothing Scenario					
Harbour Apartments	0.58	17.5	18.08	40 µg/m³	Compliant
Grattan Road	0.36		17.86		Compliant
Eyre Square	0.46		17.96		Compliant
Mellows Park	0.63		18.13		Compliant
Ballyloughane Beach	0.38		17.88		Compliant
2018 – Highest Emissions Estimation Scenario					
Harbour Apartments	0.72	17.5	18.22	40 µg/m³	Compliant
Grattan Road	0.43		17.93		Compliant
Eyre Square	0.58		18.08		Compliant
Mellows Park	0.80		18.30		Compliant
Ballyloughane Beach	0.49		17.99		Compliant
2023 – Do Nothing Scenario					
Harbour Apartments	0.47	17.5	17.97	40 µg/m³	Compliant
Grattan Road	0.29		17.79		Compliant
Eyre Square	0.36		17.86		Compliant
Mellows Park	0.50		18.00		Compliant
Ballyloughane Beach	0.29		17.79		Compliant
2023 – Highest Emissions Estimation Scenario					
Harbour Apartments	1.05	17.5	18.55	40 µg/m³	Compliant
Grattan Road	0.60		18.10		Compliant
Eyre Square	0.92		18.42		Compliant
Mellows Park	1.22		18.72		Compliant
Ballyloughane Beach	0.82		18.32		Compliant

Table 9-4: Impact Assessment – Annual Average – Nitrogen Dioxide (contd)

Location	Shipping Process Contribution µg/m³	Avg. EPA Background Concentration µg/m³	Predicted Environmental Concentration µg/m³	Limit The limit for NO_2 under 2008/50/EC for an annual limit	Compliance Statement
2028 – Do Nothing Scenario					
Harbour Apartments	0.45	17.5	17.95	40 µg/m³	Compliant
Grattan Road	0.28		17.78		Compliant
Eyre Square	0.35		17.85		Compliant
Mellows Park	0.48		17.98		Compliant
Ballyloughane Beach	0.28		17.78		Compliant
2028 – Highest Emissions Estimation Scenario					
Harbour Apartments	1.07	17.5	18.57	40 µg/m³	Compliant
Grattan Road	0.61		18.11		Compliant
Eyre Square	0.95		18.45		Compliant
Mellows Park	1.25		18.75		Compliant
Ballyloughane Beach	0.85		18.35		Compliant
2035 – Do Nothing Scenario					
Harbour Apartments	0.45	17.5	17.95	40 µg/m³	Compliant
Grattan Road	0.28		17.78		Compliant
Eyre Square	0.35		17.85		Compliant
Mellows Park	0.48		17.98		Compliant
Ballyloughane Beach	0.28		17.78		Compliant
2035 – Highest Emissions Estimation Scenario					
Harbour Apartments	1.11	17.5	18.61	40 µg/m³	Compliant
Grattan Road	0.63		18.13		Compliant
Eyre Square	0.99		18.49		Compliant
Mellows Park	1.29		18.79		Compliant
Ballyloughane Beach	0.89		18.39		Compliant

Table 9-5: Impact Assessment – 1 hour – Nitrogen Dioxide

Location	Shipping Process Contribution µg/m³	Avg. EPA Background Concentration µg/m³	Predicted Environmental Concentration µg/m³	Limit The limit for NO_2 under 2008/50/EC for a 1 hour limit	Compliance Statement
2012					
Harbour Apartments	30.7	35	65.72	200 µg/m³	Compliant
Grattan Road	28.0		62.95		Compliant
Eyre Square	21.9		56.91		Compliant
Mellows Park	31.5		66.50		Compliant
Ballyloughane Beach	16.1		51.07		Compliant
2018 – Do Nothing Scenario					
Harbour Apartments	34.64	35	69.64	200 µg/m³	Compliant
Grattan Road	32.60		67.60		Compliant
Eyre Square	26.17		61.17		Compliant
Mellows Park	33.83		68.83		Compliant
Ballyloughane Beach	18.79		53.79		Compliant
2018 – Highest Emissions Estimation Scenario					
Harbour Apartments	42.12	35	77.12	200 µg/m³	Compliant
Grattan Road	38.29		73.29		Compliant
Eyre Square	34.62		69.62		Compliant
Mellows Park	41.85		76.85		Compliant
Ballyloughane Beach	25.29		60.29		Compliant
2023 – Do Nothing Scenario					
Harbour Apartments	26.85	35	61.85	200 µg/m³	Compliant
Grattan Road	24.39		59.39		Compliant
Eyre Square	19.12		54.12		Compliant
Mellows Park	27.49		62.49		Compliant
Ballyloughane Beach	14.02		49.02		Compliant
2023 – Highest Emissions Estimation Scenario					
Harbour Apartments	53.93	35	88.93	200 µg/m³	Compliant
Grattan Road	48.74		83.74		Compliant
Eyre Square	48.67		83.67		Compliant
Mellows Park	53.31		88.31		Compliant
Ballyloughane Beach	43.84		78.84		Compliant
2028 – Do Nothing Scenario					
Harbour Apartments	25.89	35	60.89	200 µg/m³	Compliant
Grattan Road	23.13		58.13		Compliant
Eyre Square	18.13		53.13		Compliant
Mellows Park	26.12		61.12		Compliant
Ballyloughane Beach	13.30		48.30		Compliant
2028 – Highest Emissions Estimation Scenario					
Harbour Apartments	54.35	35	89.35	200 µg/m³	Compliant
Grattan Road	49.37		84.37		Compliant
Eyre Square	50.31		85.31		Compliant
Mellows Park	53.64		88.64		Compliant
Ballyloughane Beach	45.86		80.86		Compliant

Table 9-5: Impact Assessment – 1 hour – Nitrogen Dioxide (contd)

Location	Shipping Process Contribution µg/m³	Avg. EPA Background Concentration µg/m³	Predicted Environmental Concentration µg/m³	Limit The limit for NO_2 under 2008/50/EC for a 1 hour limit	Compliance Statement
2035 – Do Nothing Scenario					
Harbour Apartments	25.89	35	60.89	200 µg/m³	Compliant
Grattan Road	23.13		58.13		Compliant
Eyre Square	18.13		53.13		Compliant
Mellows Park	26.12		61.12		Compliant
Ballyloughane Beach	13.30		48.30		Compliant
2028 – Highest Emissions Estimation Scenario					
Harbour Apartments	55.29	35	90.29	200 µg/m³	Compliant
Grattan Road	50.23		85.23		Compliant
Eyre Square	50.84		85.84		Compliant
Mellows Park	54.09		89.09		Compliant
Ballyloughane Beach	48.26		83.26		Compliant

9.5.4 Dust

There is no legislative air quality standard for total dustfall. There are no Irish Statutory Standards relating to deposition of dust from construction activities or activities at the Port. VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with collecting pots made of glass (Bergerhoff Method) remains the appropriate method recommended by the Environmental Protection Agency for licensable activities to measure dustfall.

During the construction phase, dust is still considered the principal risk of pollution to the atmosphere. Given the absence of a legislative limit currently for total suspended particles, the guidelines presented by the German Government TA Luft guidance are employed. Under this guidance it is a requirement to maintain monthly dust levels below the guideline of 350mg/m^2/day as an annual average at sensitive receptors.

It is considered that the site will be deemed compliant with guideline values of 350mg/m^2/day during construction and future operation, given the mitigation measures proposed in Appendix 9.1 to control dust emissions from the installation during both construction and future operations.

During the construction stage, the greatest potential for air quality impacts will be from fugitive dust emissions impacting nearby sensitive receptors. Any potential dust impacts during the construction and operational stages will be mitigated through the use of best practice and minimisation measures.

9.6. Cumulative Impact Assessment

9.6.1 Construction Phase

The main impact associated with construction of this development would be in the form of fugitive dust. This could have a cumulative impact with other construction works within 250 m of the development site (IAQM 2104).

A comprehensive review of all planning permissions with 250m of the installation has been assessed.

There are no other major developments with An Bord Pleanála within 250 meters of the boundary of this installation.

There are planning applications for smaller developments submitted that are considered within 250 meters from the Port red line boundary.

The dust management plan included in Appendix 9.1 will ensure that the proposed development will avoid the potential for cumulative dust impacts with any sensitive receptor in the vicinity.

9.6.2 Operational Phase

Cumulative impacts from operation of the Port have been assessed for a range of different scenarios. The results of the modelled data show that there would not be a significant impact to background air quality in the vicinity of the Port.

From review of planning applications for the region, there are no development projects of significance that would generate a meaningful cumulative impact.

Any future developments that have not applied for planning permission would need to conduct and EIAR to ensure that there are no impacts on air quality because of those developments.

9.7. Conclusion

This EIS Addendum has provided a comprehensive review of the original environmental impact assessment and concurs with its findings that the air quality in Galway will not be negatively impacted significantly by the construction or operation of the improved Galway Harbour facility.

The current state of the environment in terms of baseline air quality has been determined from data obtained from the EPA monitoring network to determine compliance with relevant ambient air legislation. Results from both analysers located in Galway City indicate air quality is well below the statutory limits for the protection of human health.

A screening model of the potential impacts of the proposed operations on site were not considered significant in terms of impact on the air quality. Shipping emissions associated with the proposed development have been quantified based on the projected increases in shipping numbers at the Port. Shipping emissions are predicted to generate a long term and permanent slight adverse impact for climate and air quality; however, the impact from the proposed highest emissions scenario resulted in c. 26% of the AQS would be consumed at the closest sensitive receptor by 2035. This will be reduced by the installation and operation of shore to ship power access. Using this facility would mean the engines are not used on the ships once they have docked, significantly reducing local emissions.

In addition to the EPA monitoring stations, it is proposed to carry out a series of ambient air quality monitoring tests within the environs of the Port during construction and operation of the installation. A dust management plan in accordance with Appendix 9.1 will be implemented at the installation. Construction dust does have the potential to cause local impacts through dust nuisance. Given the nature of the Port, the mitigation measures proposed and the distance to sensitive receptors, it is concluded that construction dust from the Galway Harbour expansion project will be negligible outside the boundary of the installation for the duration of the works and during the operation of the installation thereafter.

9.8. References

EPA, 2002. Guidelines on the Information to be contained in Environmental Impact Statements.

EPA 2003. Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.

Department of Housing, Planning and Local Government's *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* (August 2018)

European Commission Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017)

Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107 (December 2022).

Technical Instructions on Air Quality Control - TA Luft in accordance with art. 48 of the Federal Immission Control Law (BImSchG) dated 15 March 1974 (BGBI. I p.721), German Federal Ministry for Environment, (1986).

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Air Quality Standards Regulations 2011 (S.I. 180 of 2011).

Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I. No. 58/2009);

EPA Air Quality Reports – Air Quality In Ireland (2020, 2021, 2022);

EPA Air Quality Maps, https://airquality.ie/station/EPA-105 and https://airquality.ie/station/EPA-109

SI 155 of 2011 - European Communities Act, 1972 (Environmental Specifications for Petrol, Diesel Fuels and Gas Oils for use by non-road mobile machinery, including inland waterway vessels, agricultural and forestry tractors, and recreational craft) Regulations 2011;

SI No. 119 of 2008 - Sulphur Content of Heavy Fuel Oil, Gas Oil and Marine Fuels; and

SI 156 of 2011 - European Communities Act 1972 (Sulphur Content of Heavy Fuel Oil, Gas Oil, and Marine Fuels) (Amendment) Regulations 2011.

Institute of Air Quality Management (IAQM) (2024) Guidance on the Assessment of Dust from Demolition and Construction Version 2.2

Directive of the European Parliament and of the Council on Ambient Air Quality and Cleaner Air for Europe (recast) COM(2022) 542 final/2 2022.

Transport Infrastructure Ireland (2022) Air Quality Assessment of Proposed National Roads – Standard PE-ENV-01107 .