9. AIR, DUST AND CLIMATIC FACTORS

TMS Environment Ltd prepared this section of the Environmental Impact Assessment Report (EIAR). It considers the potential air quality and climate impacts associated with the proposed development. Impacts of site operations are considered by taking account of the existing baseline, the projected impacts and compliance with relevant standards.

The application site is located to the southwest of the centre of the main UCD Campus and occupies an area of approximately 12.95ha. The proposed development for which planning permission is sought in this application comprises student accommodation of up to 10 storeys, landscaping and associated underground services.

9.1 Existing Environment

9.1.1 Meteorological conditions

The magnitude of potential impacts of the proposed development on air and climate will largely be influenced by the local meteorological conditions, in particular by wind speed and direction and by precipitation rates. An evaluation of the climatic conditions at the site is therefore useful for an assessment of the type required for this study.

Met Éireann operate a Synoptic Network of weather stations at Belmullet, Malin Head, Rosslare (closed since 2008), Johnstown Castle, Birr, Clones, Kilkenny and Mullingar while the Aviation Division of Met Éireann maintains observing stations at Shannon Airport, Knock Airport, Casement Aerodrome, Dublin Airport and Cork Airport. There is no continuous meteorological monitoring on the site but the general guidance on selection of meteorological data for air quality impact assessments is to choose representative data, recently acquired, which best represents conditions at the site. At least three years of recently acquired data is preferred. Comprehensive monitoring data is available for Dublin Airport (approximately 13 km north of the site) which would be indicative of the meteorological conditions that are experienced at the site. Therefore for the purpose of obtaining reliable information about the climatological conditions at the site of the proposed development, a full set of meteorological data for the period 2011 – 2014 recorded at Dublin Airport was analysed.

Wind speed and direction in particular is important in determining how emissions associated with the activity are dispersed. The prevailing wind direction determines which areas are most significantly affected by the emissions from the activity and wind speed determines in part the effectiveness of the dispersion of the emissions.

The windroses for Dublin Airport are presented in Figure 9.1 for each of the years 2011 – 2014. The dominant wind direction for Dublin Airport is from the west. The wind speed is below 5.14m/s for 64% of the time. The average long-term wind speed over the period 1985 – 2010 is 5.3m/s.

9.1.2 Influences on Ambient Air Quality

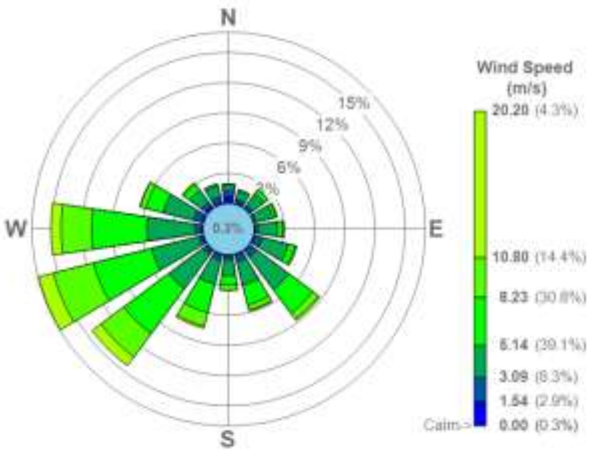
The existing activities at and in the vicinity of the site have the potential to exert an influence on ambient air quality by release of emissions to atmosphere as follows:

- emissions of fine particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) from domestic, commercial and industrial heating;
- emissions of particulate matter (PM_{10} and $PM_{2.5}$), SO_2, NO_x, CO and benzene from traffic on adjoining roads;

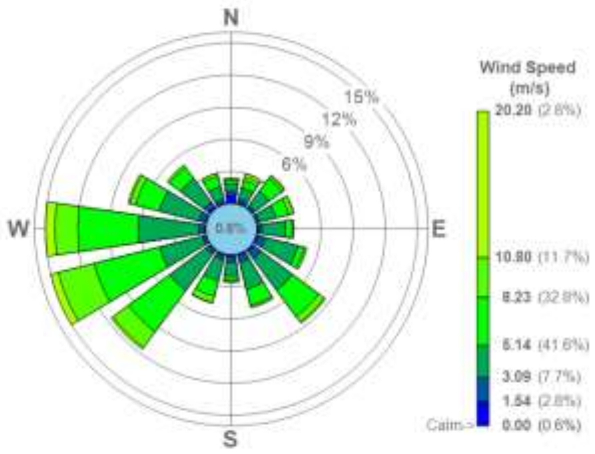
Overall, the contribution of heating systems to air quality in the area is considered to be a dominating influence on air quality in the immediate vicinity of the site.

The main substances which are of interest in terms of existing air quality are sulphur dioxide, nitrogen oxides, particulate dusts including PM_{10} and $PM_{2.5}$ which could originate from combustion sources and traffic. There are no new substances expected to be present in emissions released from the proposed development. A description of existing levels of the various substances in ambient air is required to allow completion of the evaluation of air quality impacts associated with the development and is presented in the following section.

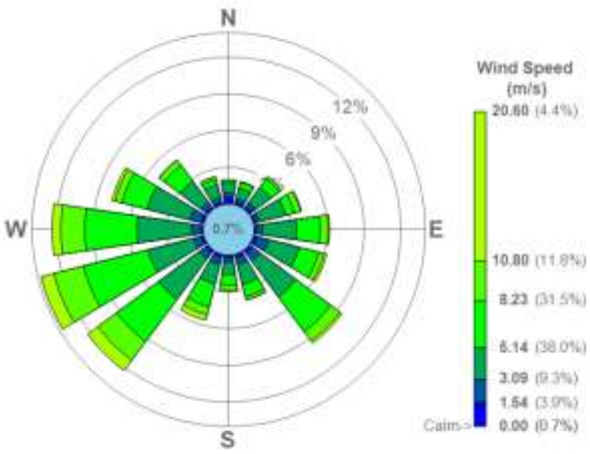
Dublin Airport 2011



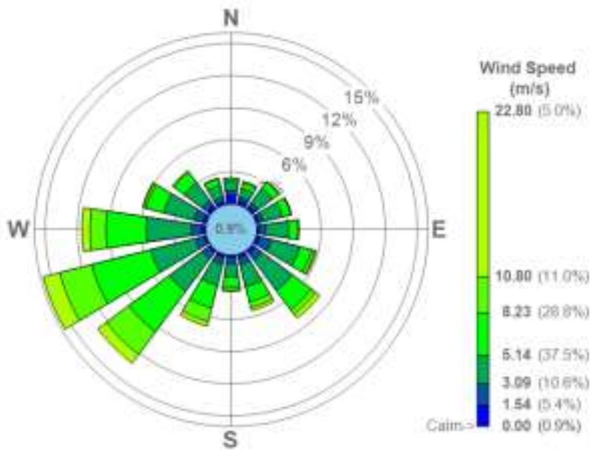
Dublin Airport 2012



Dublin Airport 2013



Dublin Airport 2014



Annual Average data for Dublin Airport 1981 - 2010

Temperature, oC	9.8
Rainfall, mm	758
Mean num. of days with >= 0.2mm	191
Average wind speed, m/s	5.3

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Figure 9.1 Windroses for Dublin Airport 2011 - 2014

9.1.3 Existing Ambient Air Quality

The site is located in a suburban area near the south-west boundary of the UCD campus. Belgrove and Ashfield Residences are located immediately to the north-west; the UCD Quinn School of Business and the UCD Sutherland School of Law lie to the north; Merville Student Residences lie to the east; Roebuck Hall Residences and Roebuck Road to the south and existing residential development Roebuck Castle (outside the campus) lies to the west.

The dominant influences on air quality in the area are emissions from commercial energy and heating sources, domestic heating and traffic. Emissions from heating sources are expected to be the principal contributors to ambient air quality in the vicinity of the site.

The main substances which are of interest in terms of existing air quality are sulphur dioxide, nitrogen oxides (nitric oxide, NO and nitrogen dioxide NO_2, collectively referred to as NO_x), fine particulate matter including PM_{10} and $PM_{2.5}$ which could originate from combustion sources, traffic and the existing commercial activities in the area. Carbon monoxide is also potentially of interest, and benzene may also be of interest from traffic sources. There are no significant new substances expected to be present in emissions released from the proposed development relative to the existing situation.

Particulate matter is made up of tiny particles in the atmosphere that can be solid or liquid and is produced by a wide variety of natural and manmade sources. Particulate matter includes dust, dirt, soot, smoke and tiny particles of pollutants. Particulate matter of 10 microns in aerodynamic diameter or less are also referred to as **PM_{10}** or more strictly, particles which pass through a size selective inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter. Similarly, **$PM_{2.5}$** refers to particulate matter of 2.5 micrometers or less in aerodynamic diameter. In the past domestic coal burning was a major source of particulate matter in Irish cities during winter months. Levels of particles have decreased significantly since then following the introduction of abatement strategies including Special Control Areas and other Regulations regarding the use, marketing, sale and distribution of certain fuels. The significance of particulate matter is predominantly related to human health and respiratory effects.

Nitrogen oxides (NO_x, which is the sum of NO and NO_2), are generated primarily by combustion processes. The main anthropogenic sources are mobile combustion sources (road, air and traffic) and stationary combustion sources (including industrial combustion). The main source of nitrogen oxides in the vicinity of the site is traffic. The significance is health-related for nitrogen dioxide (NO_2) and ecological for nitrogen oxides (NO_x).

Sulphur dioxide also originates from combustion but predominantly from heating sources and not traffic. The trend in ambient SO_2 concentrations in Ireland is very clearly downward and this pollutant is not a matter for concern in Ireland. This reduction can be attributed to fuel switching from high-sulphur fuels, such as coal and oil, to natural gas and to decreases in the sulphur content of oil.

Carbon Monoxide (CO) is a colourless and odourless gas, formed when carbon in fuel is not burned completely. It is a component of motor-vehicle exhaust, which accounts for most of the CO emissions nationwide. Consequently, CO concentrations are generally higher in areas with heavy traffic congestion.

A description of existing levels of the various substances in ambient air is required to allow completion of the evaluation of air quality impacts associated with the development. The available data from the National Ambient Air Quality Network is a reliable data set for consideration in this study.

The Environmental Protection Agency (EPA) and local authorities maintain and operate a number of ambient air quality monitoring stations throughout Ireland in order to implement EU Directives and to assess the country's compliance with national air quality standards. Ireland's small population and generally good air quality means that a relatively small number of monitoring stations are sufficient across the country for the purposes of implementing the EU Air Directives. For ambient air quality management and monitoring in Ireland, four zones, A, B, C and D are defined in the Air Quality Standards (AQS) Regulations (S.I. No. 180 of 2011) and are defined as follows:

Zone A: Dublin Conurbation.

Zone B: Cork Conurbation.

Zone C: 24 cities and large towns. Includes Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Newbridge, Mullingar, Letterkenny, Celbridge and Balbriggan, Portlaoise, Greystones and Leixlip.

Zone D: Rural Ireland, i.e. the remainder of the State excluding Zones A, B &C.

The UCD Roebuck site is considered to be located in Zone A and is a suburban site. Air Quality Data from representative air monitoring stations in Zone A that are designated Suburban Stations is therefore considered representative of air quality at the site. The EPA publishes Ambient Air Quality Reports every year which details the air quality in each of the four zones. The most recent report, published by the EPA in 2016, is the Air Quality Monitoring Annual Report 2015, which contains monitoring data collected during 2015. Best practice requires that an average of at least three years of recent monitoring data is used for assessments of this type so data for 2013 – 2015 has been reviewed.

The EPA maintains monitoring stations in a number of areas to monitor urban and suburban background air quality as well as some traffic-oriented monitoring stations. The network of 33 air quality monitoring stations operated by the EPA in 2013 – 2015 includes 15 monitoring stations in Zone A as shown in Table 9.1. The urban background monitoring station is in Rathmines and suburban monitoring stations are located in Dun Laoghaoire, Blanchardstown, Swords and Phoenix Park. The Urban Traffic oriented monitoring stations are at Winetavern Street and Coleraine Street, and the suburban traffic orientated stations are at Dun Laoghaoire and Blanchardstown. Other monitoring stations have operated at various times and some new stations have been added to the network, but long term data is available for the above stations.

The suburban monitoring stations at St Anne's Park and Swords provide data relevant to the description of background air quality at the site. For those parameters not measured at either of those two sites, data from Tallaght, Marino and Phoenix Park stations is appropriate. This data gives a reliable indicator of air quality at the UCD Campus. Data from Dun Laoghaire is more appropriate for areas where traffic exerts a dominant influence on air quality which is not the case for this site.

Data from the Air Quality Monitoring Annual reports for 2013, 2014 and 2015 was reviewed and a summary of the data for representative stations for the three most recent years is presented for each parameter of interest in Table 9.2. In particular it is noted that wherever available, data from the designated suburban background monitoring stations is chosen as this would best describe the existing ambient air quality in the vicinity of the sites. The approach taken is to take the average of the three most recent years (2013 – 2015) for each of the designated suburban stations as appropriate and the averages of the values for the stations are reported in Table 9.2. This is the data set which we use in our assessment of the potential impact of the proposed development on air quality. For comparison, the suburban traffic data is also shown in Table 9.2. A graphical presentation comparing the data with the relevant Air Quality Standards is presented in Figure 9.2.

It is noted from the data that existing ambient air quality is good for all health-related pollutants. Although NO_x levels are approaching the EU Standard, these levels apply to the protection of vegetation and are not applicable in the suburban context.

Table 9.1 EPA Ambient air monitoring stations in Dublin

Monitoring station	Area Classification	Station Classification	Pollutants monitored (2015)
Ballyfermot Library	Suburban	Background	NO_2, NO_x, PM_{10}
Blanchardstown River Road	Suburban	Traffic	NO_2, NO_x, PM_{10}
Clonskeagh Road Richview	Suburban	Not applicable	O_3
Coleraine Street	Urban	Traffic	SO_2, CO, NO_2, NO_x, PM_{10}, $PM_{2.5}$
Davitt Road	Suburban	Not applicable	PM_{10}
Dun Laoghaire The Glen	Suburban	Traffic	NO_2, NO_x, PM_{10}
Finglas	Suburban	Not applicable	$PM_{2.5}$
Marino Brian Road	Suburban	Not applicable	$PM_{2.5}$
Phoenix Park Ordnance Survey Road	Suburban	Not applicable	PM_{10}
Rathmines Wynnefield Rd	Urban	Background	SO_2, O_3, NO_2, NO_x, PM_{10}, $PM_{2.5,}$ BTEX
Tallaght Old Bawn Road	Suburban	Not applicable	SO_2, PM_{10}
Winetavern Street	Urban	Traffic	SO_2, CO, NO_2, NO_x,
Swords Watery Lane	Suburban	Background	NO_2, NO_x, O_3
St Anne’s Park	Suburban	Background	NO_2, NO_x, PM_{10}
Clonskeagh Rosemount	Suburban	Not applicable	Metals

Figure 9.2 Comparison of baseline air quality data with Air Quality Standards

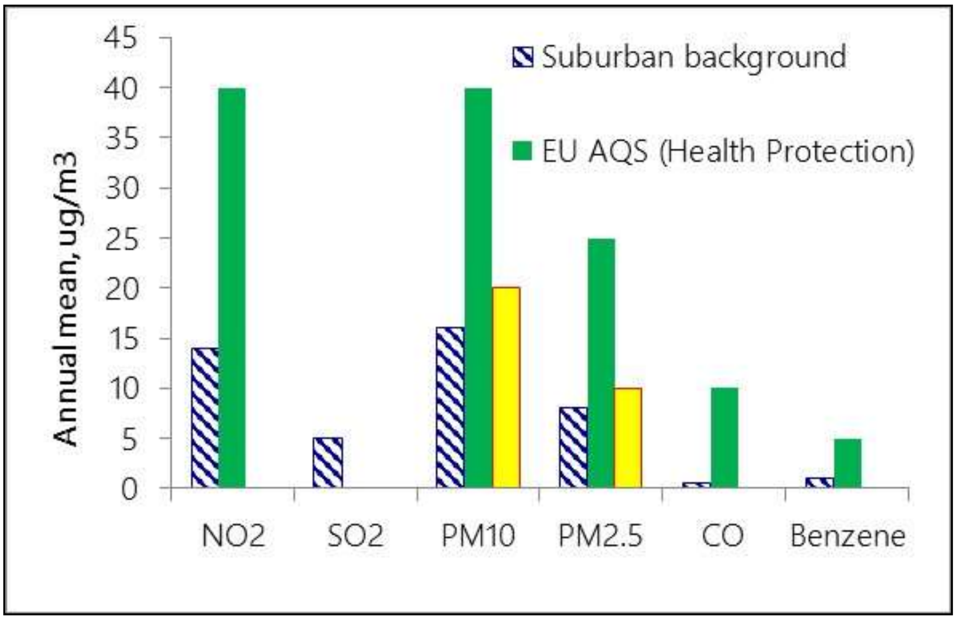
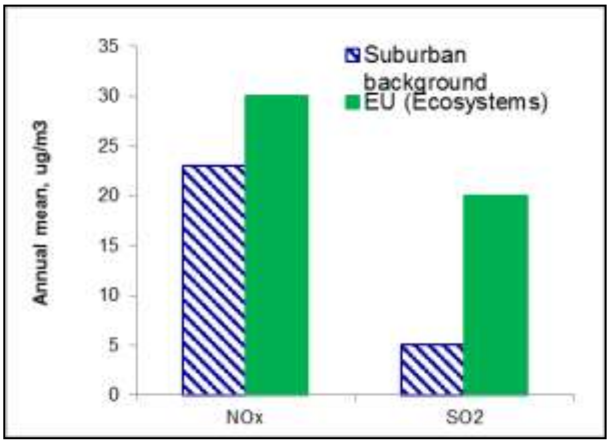


Figure 9.3 Comparison of baseline air quality data with Air Quality Standards



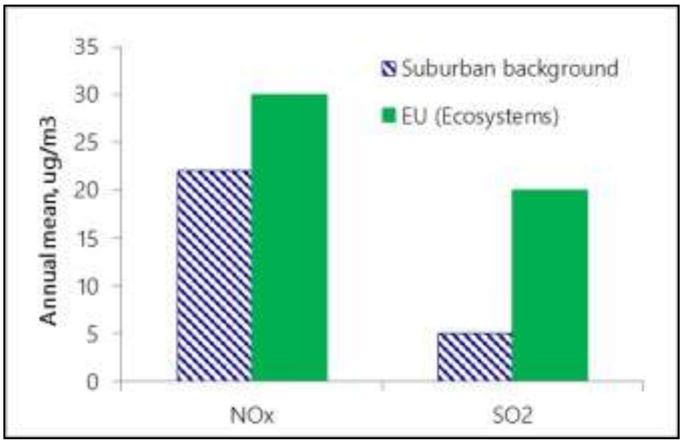


Table 9.2 Summary baseline air quality data (2013 – 2015)

Data set	Parameter and averaging interval		Concentration μg/m^3
Suburban background	Nitrogen dioxide NO_2	***Annual Mean, μg/m³***	14
Suburban including traffic		***Annual Mean, μg/m³***	16
Suburban background	Nitrogen oxides, NO_x	***Annual Mean, μg/m³***	22
Suburban including traffic		***Annual Mean, μg/m³***	27
Suburban background	Particulate Matter PM_{10}	***Annual Mean, μg/m³***	16
Suburban including traffic		***Annual Mean, μg/m³***	14
Suburban background	Particulate Matter $PM_{2.5}$	***Annual Mean, μg/m³***	8
Suburban including traffic		***Annual Mean, μg/m³***	10
Suburban background	Sulphur dioxide, SO_2	***Annual Mean, μg/m³***	5
Suburban including traffic		***Annual Mean, μg/m³***	3
Suburban background	Carbon Monoxide CO	***Annual Mean 8-hour, μg/m³***	500
Suburban including traffic		***Annual Mean 8-hour, μg/m³***	500
Suburban background	Benzene	***Annual Mean, μg/m³***	0.97
Suburban including traffic		***Annual Mean, μg/m³***	0.97

NOTE

1. Data summarised from the EPA Annual Ambient Air Quality Monitoring Reports
2. Traffic data is for Dun Laoghaire

9.2 Air Quality Impact Identification

9.2.1 Existing Activities

The existing activity at the site of the proposed development has the potential to exert an influence on air quality by release of emissions associated with the activity as follows:

- emissions of particulate matter (PM_{10} and $PM_{2.5}$), Sulphur dioxide (SO_2), nitrogen oxides (NO_x) and carbon monoxide CO from heating sources in the area;

- emissions of particulate matter (PM_{10} and $PM_{2.5}$), SO_2, NO_x, CO from traffic

The magnitude of the emissions from the existing activity is small relative to the dominant influence on air quality in the surrounding area which is traffic from the adjoining road network.

9.2.2 Impact Identification of proposed Activities

9.2.2.1 Construction Impacts

The potential air quality impacts during Construction are summarised as follows:

a) Dust emissions associated with excavations and demolition works

The most significant of the potential air quality impacts associated with the construction site is dust. Dust can be generated as a result of disturbance of materials, as a result of wind blowing across exposed surfaces and as a result of construction vehicle movements across exposed surfaces.

There are three potential impacts on air quality of the dust / particulate matter emissions. Dust deposition on surfaces is the main potential impact associated with the larger particles, nuisance effects such as reduced visibility could be associated with excessively high levels of suspended particulate matter and respiratory effects could occur as a result of excessive levels of fine particles such as PM_{10} and $PM_{2.5}$.

Dust emissions associated with the Construction Phase of the proposed development are expected to be predominantly in the 10 – 75µm particle size range so these particles, because of their size, will generally be deposited within 100m of the emission source. Only under exceptional meteorological conditions would the dusts be carried further downwind. The majority of the dust associated with construction activity is in the 10 – 75µm particle size range.

Suspended particulate matter (SPM) may also be released and this matter may remain suspended in the air. The main effect would be on visibility but this type of material could also be a respiratory nuisance if present at excessive levels. Emissions of dust in the form of fine particulate matter, PM_{10} and $PM_{2.5}$, may also occur, primarily as a result of materials handling and storage since the dominant particle size of the main construction materials is in the lower size ranges. There may also be some emissions of particles in these size ranges from the general site activities.

b) Construction transport emissions

Emissions of dust raised by vehicle movement on the roads near the site and also on site are considered under the general construction phase emissions in section (a) above. Emissions from the construction vehicles as a result of fuel combustion are considered here. The emissions include PM_{10} and $PM_{2.5}$, NO_2 and NO_x and CO and benzene.

9.2.2.2 Operational Impacts

The most significant potential impacts remain the same as those associated with existing activities at and in the vicinity of the site - emissions of particulate matter and combustion gases such as CO, SO_2 and NO_2 from heating and traffic. These are the same substances which are potentially the most significant substances in emissions from the existing activity.

Sulphur dioxide emissions originate from the sulphur in the fuel used in the combustion process. Since natural gas (heating) is the fuel to be used sulphur dioxide emissions will be negligible. Nitrogen oxides are present in the emission stream as a result of the combustion process. Much of the emissions are in the form of nitrogen oxide (NO) which is expected to be substantially oxidised to nitrogen dioxide in the atmosphere. Nitrogen oxide emissions from boilers using natural gas as fuel are significantly lower than the emissions associated with other fuels.

Particulate matter and carbon monoxide may also arise from the combustion process in the emission stream but only in minor amounts. Again, natural gas is a very clean fuel and particulate emissions from the boilers are predicted to be very low.

There is the potential for a number of greenhouse gas emissions to atmosphere from the boilers which may give rise to CO_2 emissions. However the level of emissions will be insignificant compared to national greenhouse gas emissions, and the levels will be the same as the existing situation.

9.2.2.3 Traffic Impacts

There will be an insignificant change in traffic movements and this will not result in a quantifiable change in the emissions. These emissions will remain the same as the current situation. The principal substances that are associated with transport activity are particulate matter, nitrogen oxides and carbon monoxide. Dust emissions associated with construction traffic is also possible.

9.2.3 Do Nothing Impact

There will be no change in air quality impacts if no change takes place. In the absence of the development proposal, the air quality is unlikely to change.

9.3 Air Quality Impact Assessment

9.3.1 Assessment Methodology

The assessment follows a well-established scheme involving identification and characterisation of the air quality impacts that must be addressed, characterisation of the receiving environment to benchmark the existing situation, quantitative prediction of air quality impacts and assessment of the impacts against recognised Air Quality Standards and Guidelines. From this assessment comes a definition of the Management Plans and environmental solutions that are required to ensure that all aspects of the impacts of the development proposal through Construction and Operation Phases are managed and controlled to protect human health, the environment and amenity.

The EPA Revised Draft Guidelines on the Information to be Contained in Environmental Impact Statements were published in May 2017. These draft Guidelines take account of the revised EIA Directive (2014/52/EU) and are considered in this assessment. Impacts are described in the draft Guidance in terms of quality, significance, magnitude, probability, duration and type. A description of the significance of effects is presented in Table 9.3, and Table 9.4 presents the description of the duration of effects as shown in the Draft Guidelines.

Table 9.3 Describing the Significance of Effects

"Significance" is a concept that can have different meaning for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
Imperceptible	An effect capable of measurement but without noticeable consequences
Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

Table 9.4 Describing the Duration of Effects

'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	
Momentary Effects	Effects lasting from seconds to minutes.
Brief Effects	Effects lasting less than a day.
Temporary Effects	Effects lasting less than a year.
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.
Reversible Effects	Effects that can be undone, for example through remediation or restoration.

In addition to considering the above guidance, the general approach adopted for the air quality impact assessment is summarised as follows.

(i) Describe the existing baseline air quality at the site and in the vicinity of receptors – addressed in Section 9.1;

(ii) Describe the potential impacts of the development on air quality – addressed in Section 9.2;

(iii) Identify appropriate criteria against which to assess the significance of the impacts associated with the proposed development – addressed in Section 9.3.2;

(iv) Propose mitigation and avoidance measures where required.

(v) Identify and assess all cumulative impacts with potential to impact upon the receiving environment.

9.3.2 Impact Assessment Criteria

The assessment of impact significance is based on a comparison of predicted impacts with air quality standards and guidelines, and consideration of the magnitude and duration of the potential impact.

Air Quality Standards in Ireland have been defined to ensure compliance with EC Directives; they are developed at different levels for different purposes. European legislation on air quality has been framed in terms of two categories, limit values and guide values. Limit values are concentrations that cannot be exceeded and are based on WHO guidelines for the protection of human health. Guide values are set as a long-term precautionary measure for the protection of human health and the environment. The WHO guidelines differ from EU air quality standards in that they are primarily set to protect public health from the effects of air pollution, whereas Air quality standards are recommended by governments, and other factors such as socio-economic factors, may be considered in setting the standards.

The Clean Air for Europe (CAFE) Directive (Council Directive 2008/50/EC) is an amalgamation of the Air Quality Framework Directive and its subsequent daughter Directives and sets out limit and target values for named air quality parameters. The fourth daughter Directive (European Parliament 2004) also sets out limit values to be met for certain air quality parameters. The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I. no. 58 of 2009).

The air quality standards and guidelines referenced in this report are summarized in Table 9.5. The Clean Air for Europe (CAFE) Directive (Council Directive 2008/50/EC) was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). This Directive and the Irish Regulations set out the main standards against which the potential impact of the development on air quality are assessed.

In addition to the Air Quality Standards Regulations and the Directive Standards, it is also appropriate to consider the World Health Organisation (WHO) Guidelines. These guidelines were developed by the WHO to provide appropriate air quality targets worldwide, based on the latest health information available. The air quality guidelines for particulate matter (PM_{10}), nitrogen dioxide and sulphur dioxide, and $PM_{2.5}$ are considered in this report (WHO, 2005; updated in 2008). While the WHO Guidelines are not mandatory, they represent current informed opinion on the levels to which we should be aspiring in order to minimise adverse health impacts of air pollution.

There are no national or European Union air quality standards with which dust deposition can be compared. However, a figure of 350 mg/m2-day based on the German Standard TA Luft Regulations is commonly applied by Local Authorities and the EPA (Environmental Protection Agency) to ensure that no nuisance effects will result from specified industrial activities.

Table 9.5 Air Quality Standards Regulations 2011 (based on EU Clean Air For Europe [CAFE] Directive 2008/50/EC)

Pollutant	EU Regulation	Limit Type	Margin of Tolerance	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	None	200 µg/m^3 NO_2
		Annual limit for protection of human health	None	40 µg/m^3 NO_2
		Annual limit for protection of vegetation	None	30 µg/m^3 NO +NO_2
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	150 µg/m^3	350 µg/m^3
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	None	125 µg/m^3
		Annual & Winter limit for the protection of human health and ecosystems	None	20 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50%	50 µg/m^3
		Annual limit for protection of human health	20%	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health (Stage 1)	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m^3
		Annual limit for protection of human health (Stage 2)	None. To be achieved by 2020	20 µg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m^3 (8.6 ppm)
Benzene	2008/50/EC	Annual limit for protection of human health	0% by 2010	5 µg/m^3

NOTE

The Air Quality Standards Regulations 2011 (SI 180 of 2011) transposed EU Directive 2008/50/EC (CAFE) into Irish law.

9.3.3 Existing Activities

Section 9.1.3 describes the existing air quality at and in the vicinity of the site. The data supports the conclusion that heating and traffic emissions are the dominant influence on air quality in the area. The existing air quality complies with the Air Quality Standards and indicates that existing activities are not exerting an unacceptable effect on air quality.

9.3.4 Construction Phase Impacts

Guidance on assessment of dust from demolition and construction was published in 2014 by the Institute of Air Quality Management. This Guidance describes a five-step approach to the assessment which is summarised as follows.

(i) Screen the development to determine if there is a requirement for a more detailed assessment.

(ii) Assess the risk of dust impacts for each of the four activities (demolition, earthworks, construction and construction traffic) and take account of the scale and nature of the works, and the sensitivity of the area.

(iii) Determine the site-specific mitigation for each potential activity.

(iv) Examine the residual effects and determine whether or not these are significant.

(v) Prepare the dust assessment report.

This approach has been applied to the development at the UCD Campus and is summarised below. A detailed assessment is required when there are human receptors within 350m of the boundary of the site and since the closest human receptors to the site boundary are within this distance, a detailed assessment is required. There are no European or designated sites within 50m of the site boundary which is the threshold distance for ecological sensitivity, so there are no significant construction impacts predicted for ecological sites. The Guidance advises that most projects will require a detailed assessment as the approach adopted is conservative.

The risk of dust being emitted in sufficient quantities to cause a nuisance or health impacts is evaluated by considering the scale of the works programme. The IAQM Guidance Note gives advice on classifying the magnitude of the potential dust impacts and using the advice and information derived from the Construction and Demolition Plan for the site, the magnitude of the dust emissions is estimated as shown in Table 9.6.

Table 9.6 Assessment of Magnitude of dust emissions for Construction Programme

Activity	Magnitude of Dust Emission
Demolition	Negligible
Excavations	Medium
Construction	Medium
Construction Traffic	Medium

The proposed development consists of a minor demolition and a significant construction programme. There are minor structures to be demolished which will result in some minor dust emissions. The construction programme is significant and therefore significant emissions could be expected.

The significance of the dust emissions and impacts is evaluated in terms of the sensitivity of the receptors in the area that could be affected by the emissions. In general, receptors located close to the construction site boundary are considered high sensitivity with sensitivity decreasing with increasing distance from the source reflecting the exponential decrease in dust levels as distance increases. The receptor sensitivity in the immediate vicinity of the site is Low to Medium depending on proximity of the Receptor to the construction activity.

The potential air quality impact arises from emissions of particulate matter and may result in deposition of dust around the site, and trackout onto the roads in the vicinity of the site. The magnitude of the potential emissions associated with Construction is assessed as medium using the above criteria. The Construction Phase Environmental Management Plan will include a specific Dust Minimisation Plan which will ensure that dust impacts are prevented or minimized during the Construction Phase of the development.

Using the alternative assessment approach outlined in the Draft Guidelines on Environmental Impact Assessment as outlined in Section 9.3.1, the significance of potential dust emissions during construction is summarized in Table 9.7.

Table 9.7 Assessment of Significance of Dust Emissions for Construction Programme

Activity	Magnitude & Significance of Dust Emission	Duration of Dust Emission
Demolition	None	None
Excavations	Slight	Brief
Construction	Slight	Temporary
Construction Traffic	Slight	Short-term

This assessment shows that the most significant potential impacts are those associated with Construction activity and construction traffic. There is predicted to be a temporary slight adverse impact on the closest receptors during the Construction Programme with potential short-term impacts from traffic on the surrounding roads within about 50m of the site. There will be no lasting impact and the short-term impact can be managed by means of an effective Construction Management Plan incorporating the mitigation measures outlined in Section 9.4.

9.3.5 Operation Phase Impacts

The only predicted air quality impacts associated with operation of the development are emissions to atmosphere from heating sources and traffic associated with the development. The change in traffic movements will have no quantifiable impact on air quality. There are no adverse impacts on ambient air quality predicted as a result of the Operation Phase of the proposed development.

9.3.6 Climate Impact

Due to the size and nature of the development, greenhouse gas emissions resulting from the development will be imperceptible in the national context. There will therefore be no adverse impacts on climate and no significant contribution to Irelands greenhouse gas budget.

The size and nature of the development and the nature and volume of emissions will lead to an imperceptible change in atmospheric conditions. There will be no change to the heat balance in the immediate area.

9.3.7 Unplanned Events

There is no meaningful potential for unplanned events to cause a significant adverse impact on the air climate in the area.

9.4 Mitigation Measures

A Dust Management Plan will be formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions. The principal objective of the Plan is to ensure that dust emissions do not cause significant nuisance at receptors in the vicinity of the site. The most important features of the Dust Management Plan are summarised as follows:

- A designated Site Agent will be assigned overall responsibility for Dust Management;
- The design of the site and Construction programme considers dust impact management and chooses design approaches to minimise dust emissions;
- An effective training programme for site personnel will be implemented for the duration of the Construction Programme;
- A strategy for ensuring effective communication with the local community will be developed and implemented;
- A programme of dust minimisation and control measures will be implemented and regularly reviewed;
- A monitoring programme will be implemented.

The design of the construction programme and the location and layout of the construction compound and the storage of materials will be carefully planned to ensure that air quality impacts are minimised. The following is a summary of the main mitigation features of the project and the specific mitigation measures which will be employed in order to minimise emissions from the activity and the associated impacts of such emissions.

- Activities with potential for significant emissions will wherever possible be located at a position as far as possible removed from the nearest residential and commercial receptors;
- The areas on site which vehicles will be travelling on will generally be hard-surfaced thus significantly reducing the potential for dust emissions from the vehicles;

- The construction compound area will have hard standing areas to minimize dust generation from windblow.
- In order to minimise the potential for wind-generated emissions from material storage bays, these bays will be oriented away from the dominant wind direction to minimise the effects of wind on release of dust and particulate.
- The relatively coarse particle size (10 – 75µm) associated with the activity means that the particles will generally be deposited close to the emission source and will not travel significant distances away from the site.
- Fixed and mobile water sprays will be used to control dust emissions from material stockpiles and road and yard surfaces as necessary in dry and/or windy weather.
- A daily inspection programme will be formulated and implemented in order to ensure that dust control measures are inspected to verify effective operation and management.
- A dust deposition monitoring programme will be implemented at the site boundaries for the duration of the construction phase in order to verify the continued compliance with relevant standards and limits.

9.5 Conclusions

In conclusion, the proposed development will not have any significant adverse impacts on the air quality or the climate of the region. A comprehensive Dust Management programme will be implemented at the site to ensure that construction dust does not cause lasting nuisance. Operational impacts will be imperceptible as shown in this assessment.