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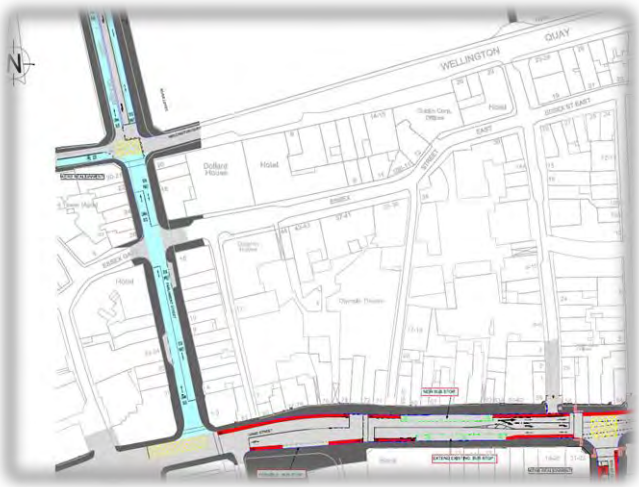
PROPOSED COLLEGE GREEN

TRAFFIC MANAGEMENT MEASURES CONSULTATION



AIR QUALITY SUBMISSION

PREPARED FOR

PARLIAMENT STREET BUSINESSES & RESIDENTS

Report Ref 23233
22nd May 2016
Dr Imelda Shanahan

Contents

Executive summary

The businesses and residents of Parliament Street represented in this submission welcome the opportunity to contribute to the public consultation on the proposed College Green Traffic Management Measures and to highlight their significant concerns about the impact of the proposal on their homes and businesses. The Public Consultation documents do not present any evidence that an assessment of the air quality impacts of this significant proposal on Parliament Street has been carried out, which is a cause for concern.

Our clients' are very concerned about the traffic, environmental and commercial impact of the proposed traffic management scheme on Parliament Street and the wider Temple Bar area. In particular, there are significant concerns about the severe adverse impact on air quality of the proposal due to the massive increase in bus traffic as a result of the scheme. The principal air quality concerns of the businesses and residents on Parliament Street about the proposal to designate the street as the primary north-south bus corridor through the city are as follows:

- the significant adverse impact on air quality and the noise climate of the area as a result of the 1,853% increase in the number of public buses that would use the street [data sourced from Traffic Insights Ltd report on this Consultation];
- the significant effect of poor air quality on businesses, workers, residents, cyclists and pedestrians in the area;
- the potential damage to commercial viability of many businesses due to air and noise pollution.

This assessment of the air quality and noise impact of the proposed scheme on Parliament Street has determined that extremely significant adverse air quality and noise impacts on Parliament Street will occur if this proposal proceeds. The principal findings are as follows:

- levels of traffic-related pollutants nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$) are already high in the city centre and will increase by up to 46% if this proposal proceeds;
- levels of nitrogen dioxide expressed as annual mean concentration are predicted to exceed the statutory EU Air Quality Standard as a direct result of the proposal;

- The impact on air quality will be **profound** and **permanent** and a **substantial adverse impact** is predicted;
- A **major adverse** noise impact is predicted.

The effect of these adverse impacts on tourism, commercial viability for the businesses in the area, residential amenity and the working environment for the workers does not appear to have been assessed or considered by Dublin City Council in their proposals. The businesses and residents are justifiably concerned about the effects of this proposal on Parliament Street and urge the Council to re-evaluate the proposal in the light of the significant adverse impacts identified in this assessment. As recommended in this report, a much more detailed air quality impact assessment is warranted due to the significance of the potential impacts.

1.0 Introduction and scope

We have been instructed by Businesses and Residents of Parliament Street to prepare an assessment of the air quality impact of the proposed College Green Traffic Management Measures. Our clients' position is that they do not object to the principle of creating a civic space at College Green, but they are very concerned about the traffic, environmental and commercial impact of the proposed traffic management scheme on Parliament Street and the wider Temple Bar area. In particular, there are significant concerns about the severe adverse impact on air quality of the proposal due to the massive increase in bus traffic as a result of the scheme.

The principal air quality concerns of the businesses and residents on Parliament Street about the proposal to designate the street as the primary north-south bus corridor through the city are as follows:

- the significant adverse impact on air quality and the noise climate of the area as a result of the 1,853% increase in the number of public buses that would use the street [this data is sourced from the Traffic Insights Ltd report on this consultation on behalf of the Parliament Street businesses and residents];
- the significant effect of poor air quality on businesses, workers, residents, cyclists and pedestrians in the area;
- the potential damage to commercial viability of many businesses due to air and noise pollution.

Our clients welcome this opportunity to contribute to the public consultation and to highlight their significant concerns about the impact of the proposal on their homes and businesses. The Public Consultation documents do not present any evidence that an assessment of the air quality impacts of this significant proposal on Parliament Street has been carried out, and therefore our clients commissioned this assessment. The Public Consultation period is short, so only a limited assessment was possible on this timeframe. Notwithstanding this limitation, there is sufficient information available to ensure that a robust assessment of the impacts of the scheme on Parliament Street is executed to allow reliable advice to be offered to our clients.

2.0 College Green Traffic Management Measures proposal

The proposed scheme is described in two documents published as part of the public consultation process:

- College Green Traffic Management Measures Consultation Document, April 2016; and
- College Green Presentation 11th April 2016

These documents were reviewed to identify the main elements of the proposal in respect of potential impact on Parliament Street. In this regard, the principal elements of the proposed scheme are the introduction of a bus-only lane on Parliament Street, a contra-flow bus lane on Parliament Street, and various changes relating to left / right hand turns at the junctions with the South Quays, Lord Edward Street and Dame Street. The proposal will see 19 Dublin Bus routes using Parliament Street rather than 4 routes at present and the number of Dublin Bus buses using the street would increase from 85 to 1,660 per day, an increase of 1,853%. Traffic projections relating to the proposed Scheme were sourced from the Traffic Insights Ltd report prepared for this group of businesses and residents.

The key elements of the proposed development which require assessment in respect of potential air quality impacts are as follows:

- The change in air quality associated with an 1,853% increase in bus traffic on the street;
- The potential for breach of statutory Air Quality Standards as a result of the proposed change;
- The change in noise climate associated with the increased bus traffic on the street.

3.0 Scheme Impact assessment approach

The assessment approach involves the 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.

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 1. 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. The WHO Guidelines are summarised in Table 2.

Table 1 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.

Table 2 WHO Air Quality Guidelines

Pollutant	**Limit Type**	**Value**
Nitrogen Dioxide	Hourly limit for protection of human health	200 µg/m^3 NO_2
	Annual limit for protection of human health	40 µg/m^3 NO_2
Sulphur dioxide	Daily limit for protection of human health	20 µg/m^3
	10-minute limit for protection of human health	500 µg/m^3
Particulate Matter (as PM_{10})	24-hour limit for protection of human health	50 µg/m^3
	Annual limit for protection of human health	20 µg/m^3
Particulate Matter (as $PM_{2.5}$)	24-hour mean for protection of human health	25 µg/m^3
	Annual mean for protection of human health	10 µg/m^3

4.0 Baseline air quality in the receiving environment

Parliament Street is located in the city centre in an urban area. The dominant influences on air quality in the area are emissions from traffic with minor contributions from emissions from any residential or industrial activities in the area. The main substances which are of interest in terms of existing air quality are nitrogen oxides (nitric oxide, NO and nitrogen dioxide NO_2, collectively referred to as NO_x) and fine particulate matter including PM_{10} and $PM_{2.5}$ which could originate from traffic in the area.

Particulate matter is made up of tiny particles in the atmosphere that can be solid or liquid (except for water or ice) 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).

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.

Parliament Street is considered to be located in Zone A and is Urban. Air Quality Data from representative air monitoring stations in Zone A that are designated Urban Stations is therefore considered representative of air quality in the area.

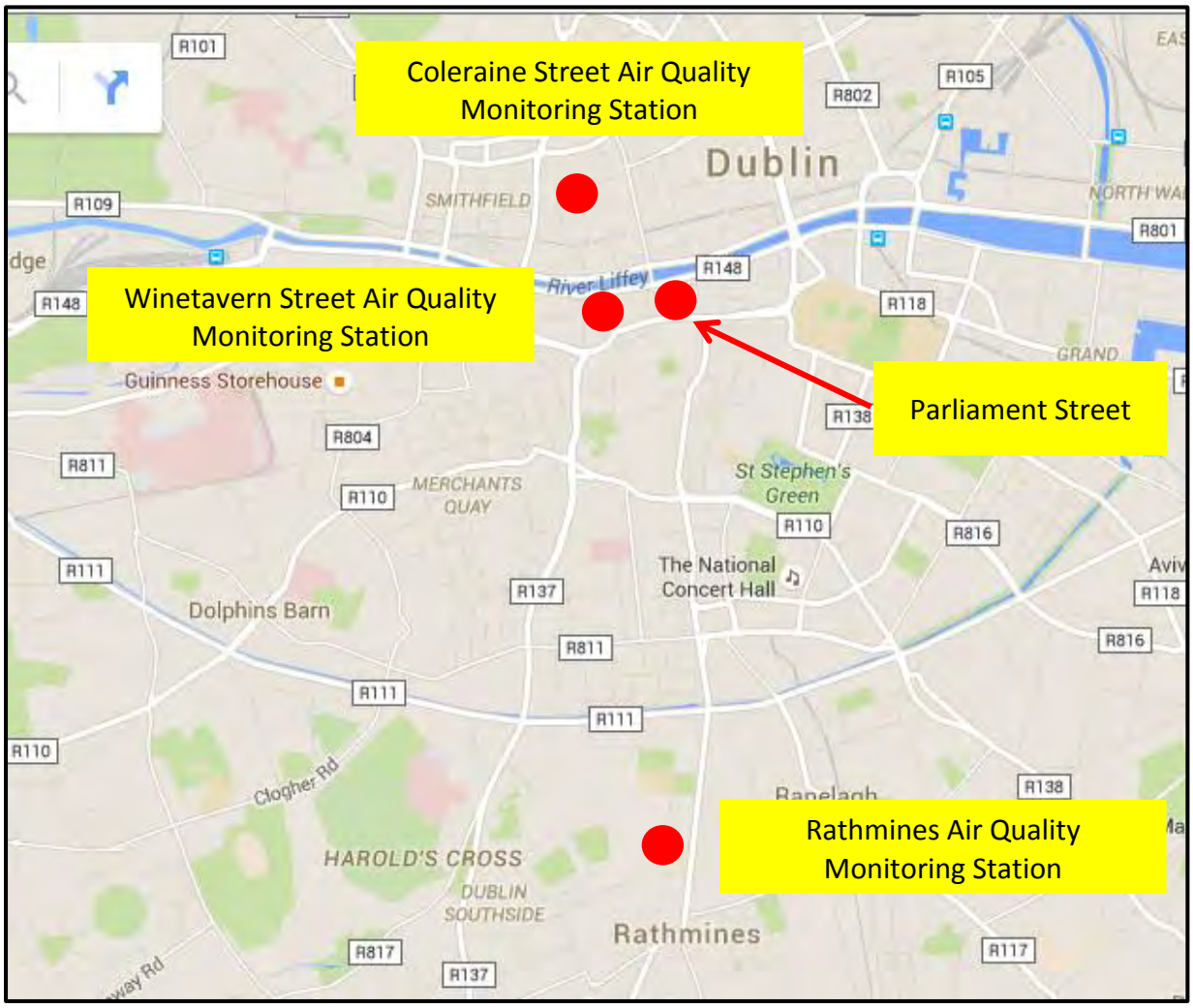
The EPA publishes Ambient Air Quality Reports every year which details the air quality in each of the four zones. The most recent report, published by the EPA in 2014, is the *Air Quality Monitoring Annual Report 2013*, which contains monitoring data collected during 2013. Best practice requires that an average of at least three years of recent monitoring data is used for assessments of this type so data for 2012 – 2014 has been reviewed[1]. 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 urban background monitoring station is in Rathmines and the Urban Traffic oriented monitoring stations are at Winetavern Street and Coleraine Street. 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.

In particular it is noted that wherever available, data from the designated Urban monitoring stations is chosen as this would best describe the existing ambient air quality in the urban Parliament Street location. There are urban monitoring stations located at Rathmines,

[1] EPA, "EPA Ireland Archive of Nitrogen Oxides Monitoring Data". Datasets Available At: Secure Archive For Environmental Research Data managed by Environmental Protection Agency Ireland http://erc.epa.ie/safer/resource?id=216a8992-76e5-102b-aa08-55a7497570d3 (Last Accessed: 2015-09-25)

Winetavern Street and Coleraine Street as shown in Figure 1. The Rathmines station is oriented towards monitoring background urban concentrations whereas the Winetavern Street and Coleraine Street stations are traffic oriented stations. The data from Winetavern Street and Coleraine Street would be considered representative of the Parliament Street baseline, as the dominant influences on air quality in both areas is traffic. Data from the background monitoring station in Rathmines has also been considered for comparison.

Figure 1 Air Quality monitoring locations relative to Parliament Street



Data from the Air Quality Monitoring Annual reports for 2012, 2013 and 2014 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 3 of this report. The most representative data set is chosen for each parameter.

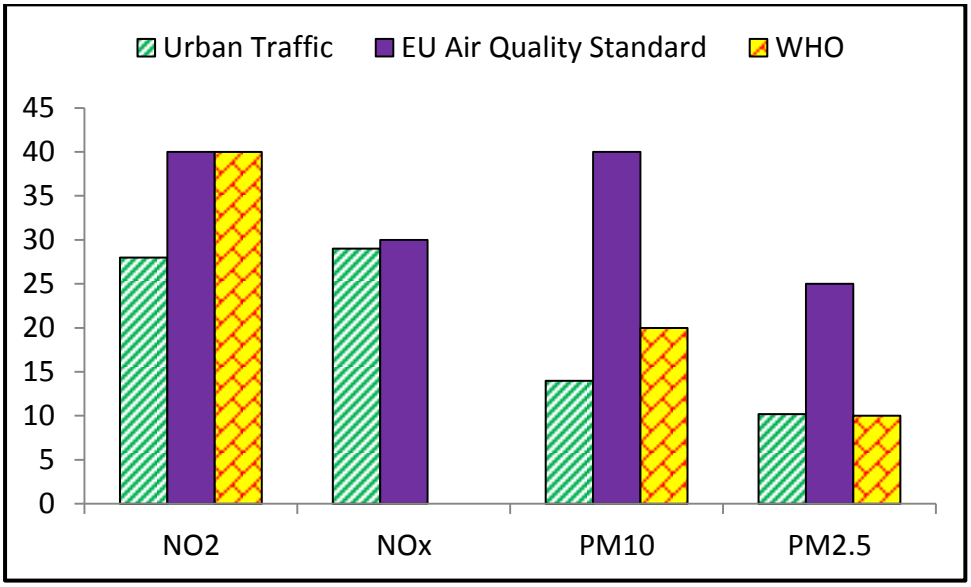
It is necessary to consider the influence of traffic-derived pollutants on air quality for the city centre. We therefore recommend that the urban Traffic data should be chosen because air quality in the Parliament Street location is mainly influenced by traffic. The approach we have taken is to take the average of the three most recent years (2012 – 2014) for each of the designated Urban stations in Winetavern Street and Coleraine Street and the average of the values for the two stations are reported in Table 3 and in Figure 2. This is the data set which we use in our assessment of the potential impact of the proposed development on air quality.

It is noted that the existing air quality in respect of both NO_2 and PM_{10} is approaching the WHO Guideline value at ca. 75%, and the existing air quality for $PM_{2.5}$ exceeds the WHO Guideline. As noted earlier, the WHO Guideline is not a mandatory value.

Table 3 Summary baseline air quality data

Data set	Parameter and averaging interval		Concentration µg/m^3
Urban background	Nitrogen dioxide NO_2	***Annual Mean, µg/m^3***	19
		Max 1-hour, µg/m^3	119
Urban including traffic		***Annual Mean, µg/m^3***	28
		Max 1-hour, µg/m^3	146
Urban background	Nitrogen oxides, NO_x	***Annual Mean, µg/m^3***	29
		Max 1-hour, µg/m^3	743
Urban including traffic		***Annual Mean, µg/m^3***	48
		Max 1-hour, µg/m^3	985
Urban background	Particulate Matter PM_{10}	***Annual Mean, µg/m^3***	15
Urban including traffic		***Annual Mean, µg/m^3***	14
Urban background	Particulate Matter $PM_{2.5}$	***Annual Mean, µg/m^3***	8
		Max 24-hour, µg/m^3	47
Urban including traffic		***Annual Mean, µg/m^3***	10.2
		Max 24-hour, µg/m^3	43

Figure 2 Comparison of existing air quality with Air Quality Standards



5.0 Air quality impact assessment

5.1 Identification of impacts

Pollutant emissions from road traffic may cause impacts at both the local and national / international level. For the proposed College Green Scheme, the pollutants of greatest concern at the local Parliament Street level are nitrogen dioxide (NO_2) and fine particulate matter (both PM_{10} and $PM_{2.5}$). Research has shown that there is no risk of emissions from road traffic leading to exceedances of the relevant air quality standards for any other pollutants, at even the busiest locations. Attention in this assessment is therefore focused on these two pollutants.

5.2 Impact significance assessment

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. The assessment methodology adopted for this study considers the best practice Guidance published by the Environmental Protection Agency and the National Roads Authority as well as a number of international reference publications referenced below.

The EPA *Revised Guidelines on the Information to be Contained in Environmental Impact Statements* was published in September 2015. 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 4, and Table 5 presents the description of the duration of effects as shown in the Draft Guidelines.

The NRA *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (2011)* also contain detailed and specific Guidance on the assessment of air quality impacts of Road Schemes. The Guidelines describe an assessment approach that involves the application of descriptors for magnitude of change; the description of the impact at each sensitive receptor; and then the assessment of overall significance of the scheme. The ***impact magnitude*** is related to the degree of change in pollutant concentrations, expressed in microgrammes per cubic metre. . ***Impact description***

takes account of the impact magnitude and of the absolute concentrations and how they relate to the air quality standards or limit values. These descriptors are listed in Tables 6 and 7.

Table 4 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 significantly alters the majority of a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

Table 5 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.

Table 6 Air Quality Impact for Changes in Ambient Pollutant Concentrations

Pollutant	Magnitude of Change			
	Large	**Medium**	**Small**	**Imperceptible**
Annual mean NO_2	Increase/decrease ≥4 µg/m^3	Increase/decrease 2 - <4 µg/m^3	Increase/decrease 0.4 - <2 µg/m^3	Increase/decrease <0.4 µg/m^3
Annual Mean PM_{10}	Increase/decrease ≥4 µg/m^3	Increase/decrease 2 - <4 µg/m^3	Increase/decrease 0.4 - <2 µg/m^3	Increase/decrease <0.4 µg/m^3

Table 7 Air Quality Impact for Changes in Pollutant Concentrations at a Receptor

Absolute Annual Mean concentration in relation to Limit Value	Change in concentration		
	Small	**Medium**	**Large**
Above Limit Value (≥40µg/m^3 NO_2 or PM_{10}, or ≥25 µg/m^3 $PM_{2.5}$)	Slight adverse	Moderate adverse	Substantial adverse
Just below Limit Value (36 to 40µg/m^3 NO_2 or PM_{10}, or 22.5 to 25 µg/m^3 $PM_{2.5}$)	Slight adverse	Moderate adverse	Moderate adverse
Below Limit Value (30 to 36µg/m^3 NO_2 or PM_{10}, or 18.75 to 22.5 µg/m^3 $PM_{2.5}$)	Negligible	Slight adverse	Slight adverse
Well below Limit Value (<30µg/m^3 NO_2 or PM_{10}, or <18.75 µg/m^3 $PM_{2.5}$)	Negligible	Negligible	Slight adverse

5.3 Impact predictions

The prediction of air quality impacts associated with the College Green proposal involved air dispersion modelling using the UK Design Manual for Roads and Bridges (DMRB) Screening Model (UK Highways Agency 2007) (Version 1.03c, July 2007) and following the guidance issued by the NRA (NRA 2011). In the first instance, a screening Model is run and the NRA Guidance recommends that a detailed dispersion modelling assessment is carried out if any of the following arises:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

Concentrations of the key pollutants (nitrogen dioxide NO_2 and PM_{10}) were calculated at sensitive receptors which have the potential to be affected by the proposed development. Inputs to the air dispersion model consist of road layouts, receptor locations, annual average daily traffic movements (AADT, obtained from Traffic Insights Submission for this Consultation), percentage heavy goods vehicles, annual average traffic speeds and background concentrations. This Screening Assessment focused on the ***change*** in air quality associated with the Scheme which will see Dublin Bus numbers increase from 85 to 1660 per day if it proceeds. No other traffic contributions were considered, so it is likely that the assessment underestimates the potential air quality impact that will arise if the scheme proceeds.

The UK DMRB Screening Model predicts the contribution of emissions from the projected Dublin Bus traffic to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the Proposed Scheme with these ambient air quality standards.

For this assessment, only the proposed Dublin Bus traffic associated with the proposed College Green Scheme has been considered in the Screening Model. The predicted air quality impacts are summarised in Table 8. For this assessment, the worst-case scenario in respect of annual average speed was used – this is not unreasonable given the congestion in the city centre and the fact that there is a relatively low speed limit of 30km/hour in force.

The predicted impacts are summarised in Table 8 together with an assessment of significance using (a) the NRA Guidelines, (b) comparison with EU Air Quality Standards and (c) comparison with WHO Guidelines. A **Substantial Adverse** impact is predicted for nitrogen dioxide and a **Moderate Adverse** impact is predicted for PM_{10}. In both cases, the assessment indicates that more detailed dispersion modelling should be carried out to evaluate the significance of the proposals and the likelihood of Air Quality Standards being exceeded.

There is no information presented with the Consultation documents that demonstrates that Dublin City Council evaluated the air quality impact of the proposed College Green traffic measures on Parliament Street. ***The assessment presented here clearly shows that significant adverse impacts on air quality are predicted as a result of the proposal, that the EU Air Quality Standard and WHO Guideline for nitrogen dioxide will be exceeded in Parliament Street if the proposal proceeds and that the proposed Scheme requires a detailed assessment to be undertaken.***

Table 8 Predicted annual mean concentrations of NO_2 and PM_{10}

Prediction / Assessment	Pollutant		
	NO_2	**NO_x**	**PM_{10}**
Predicted Annual mean Concentration µg/m^3	40.9	77.9	17.9
Baseline µg/m^3	28	29	14
Impact Significance Table 6 Magnitude of change	Large	Large	Large
Impact Significance Table 7	Substantial adverse	Substantial adverse	Moderate adverse
Comparison with EU Air Quality Standards Table 1	Exceeds Standard	Exceeds Standard	45% 0f Standard
Comparison with WHO Guidelines Table 2	Exceeds Guideline	Exceeds Guideline	90% of Guideline

6.0 Noise impact assessment

The most widely used method for road traffic noise prediction in Ireland is the UK Calculation of Road Traffic Noise (CRTN) prediction method (UK Department of Transport, 1988). This is the methodology recommended by the National Roads Authority in their Guidelines on Noise and Vibration Impact Assessment for National Roads Schemes. This Guidance allows the calculation of noise levels associated with the proposed Scheme.

A change in road traffic noise of 1dB $L_{A10,18h}$ in the short term (e.g. when a project is opened) is the smallest that is considered perceptible. In the longer term (typically 15 years after project opening), a 3dB $L_{A10,18h}$ change is considered perceptible. The magnitude of impact associated with changes in road traffic noise are defined in the Design Manual for Roads and Bridges (DMRB) as shown in Table 9.

Table 9 Classification of magnitude of impact of changes in noise

Magnitude of Impact	Change in Noise Level $L_{A10,18hr}$	
	Short term (1 year)	Long term
No change	0	0
Negligible	0.1 – 0.9	0.1 – 2.9
Minor	1 – 2.9	3 – 4.9
Moderate	3 – 4.9	5 – 9.9
Major	> 5	> 10

The indicator $L_{A10,18hour}$ is an indicator of road traffic noise. It is the noise level exceeded for 10% of the 18hour period expressed as the arithmetic average of the 18 one-hour L_{10} values between the hours of 06:00 and 24:00hours.

The 18-hour L_{10} is calculated using standard acoustic formulae specified in the DMRB and is determined for the existing 85 Dublin Buses that use Parliament Street each day and the 1,660 that will use the street if the College Green proposal proceeds. The predicted $L_{A10,18hour}$ for the proposed Scheme for Dublin Bus traffic alone is 61.3dB(A) whereas the existing value for 85 buses is $L_{A10,18hour}$ 48.4dB(A). The change in noise level is therefore 12.9dB(A) which as shown in Table 9 is a **Major Adverse** impact using any of the available

assessment criteria. This indicator is averaged over 18 hours so the magnitude of the impact will be greater at peak times during the day when traffic movements are at a peak.

The Businesses and Residents of Parliament Sreet are justifiably concerned about the effect of this significantly increased noise level on their businesses, residential amenity and on the wider population using the area.

In accordance with the Environmental Noise Regulations 2006 (S.I. No. 140 of 2006), Dublin City Council has prepared noise maps for all road sound sources within their area (Dublin City Council, accessible at http://www.dublincity.ie/main-menu-services-water-waste-and-environment/noise-maps-and-action-plans). The revised individual maps were reported in 2012 and the existing day time noise levels for Parliament Street are shown in Figure 3 and night time levels are shown in Figure 4. These figures clearly show that Parliament Street already experiences noise levels in excess of acceptable levels during the daytime (75-80db(A)) and night time (55 – 60dB(A)). Acceptable target noise levels are defined by the World Health Organisation as 55dB(A) daytime and 45dB(A) at night time to avoid excessive nuisance and sleep disturbance. These levels are already exceeded in Parliament Street and noise levels are set to increase significantly if the proposal proceeds.

Figure 3 Daytime Noise levels in Parliament Street

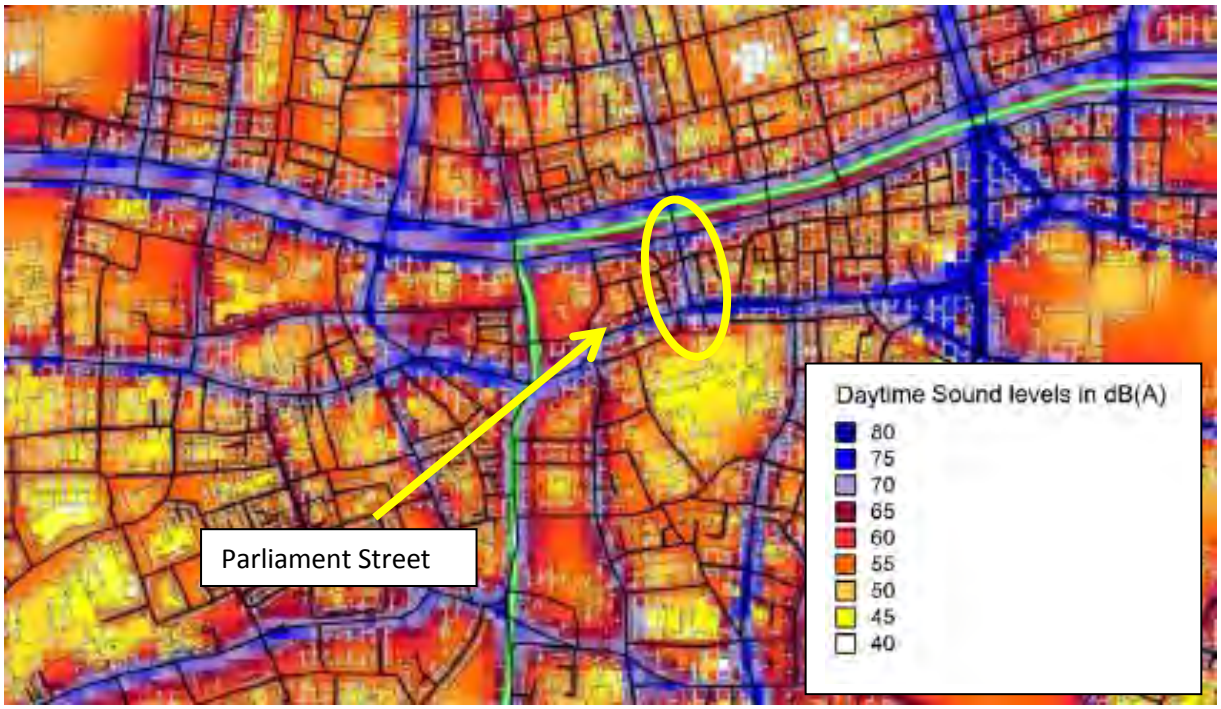


Figure 4 Night time Noise levels in Parliament Street