Department for Regional Development - TransportNI

YORK STREET INTERCHANGE

Public Inquiry

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Proof of Evidence:

Air Quality

by

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1. INTRODUCTION

1.1 Introduction

1.1.1.1 My name is Garry Gray and I am an Associate with URS. I was the lead author of the air quality chapter of the Environmental Statement for the Proposed Scheme.

1.1.1.2 URS was acquired by AECOM in October, 2014. Together AECOM and URS are one of the world's premier, fully integrated infrastructure and support services firms. For the purpose of this Proof of Evidence, any reference to URS may include reference to its former legacy companies, including Scott Wilson.

1.1.1.3 I have engaged in research, training or consultancy work in the field of air pollution continuously since 1990. I was awarded a PhD for research on urban air quality. I am a Member of the Institution of Environmental Science and a Member of the Institute of Air Quality Management.

1.1.1.4 I have provided air quality advice to Belfast City Council since URS were appointed in 2008. I lead a team of air quality specialists that have assisted me in evaluating the effects of the Proposed Scheme on air quality.

1.1.1.5 I have fulfilled the role of air quality expert for Highways Agency sponsored schemes in England and assisted the Highways Agency with revisions to the air quality assessment advice in the Design Manual for Roads and Bridges (DMRB). I have also fulfilled the role of air quality expert for schemes on behalf of Transport Scotland, Transport for London, Transport for Greater Manchester (then GMPTE) and have undertaken technical reviews of air quality impact assessments of road schemes in continental Europe on behalf of the European Bank of Reconstruction and Development.

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2. SCOPE AND STRUCTURE OF THE EVIDENCE

2.1 Introduction

2.1.1.1 The evidence relates to the air quality effects of the Proposed Scheme.

2.1.1.2 The evidence is drawn on data produced by the Traffic Assessment function. The calculated emissions of air pollutants are based on reported flows of road vehicles for the Proposed Scheme and other public roads. Details of the Transport Assessment are provided in the Traffic and Economic Proof of Evidence prepared by my colleague, Mr. Russell Bissland of URS.

2.1.1.3 The evidence also draws on information presented in Chapter 4 of the Environmental Statement relating to the construction schedule and plans of the Proposed Scheme, when assessing the impact of dust emissions from construction activities. The design of the proposed road improvements are described in the Proof of Evidence prepared by my colleague, Mr. Michael Megarry of URS.

2.1.1.4 A glossary of abbreviations and technical terms forms Appendix A and Appendix B. Figures illustrating the location of air quality receptors referred to in this proof are presented in Appendix C.

2.1.1.5 The structure of the evidence is described below:

- Section 3: The Elements of the Air Quality Assessment

This section describes the structure of the air quality elements of the environmental assessment of the Proposed Scheme and the methods used.

- Section 4: Construction Phase Particulate Matter Emissions

This section considers construction phase effects in relation to emissions of airborne particulate matter (PM).

- Section 5: Road Traffic Exhaust Emissions

This section considers both operational and construction phase effects of road traffic exhaust emissions.

- Section 6: Conclusions

This section presents a summary of the conclusions to the evidence.

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3. ELEMENTS OF THE AIR QUALITY ASSESSMENT

3.1.1.1 The construction and operation of the Proposed Scheme has the potential to generate emissions of air pollutants, such that sensitive receptors are exposed to airborne concentrations of particulate matter and gaseous substances at concentrations that are different to the concentrations that the receptors would be exposed to without the Proposed Scheme. There are two main elements to the assessment of air quality impacts due to a major road scheme and these are:

- the effect of construction activities that have the potential to generate emissions of airborne particulate matter, such as fine particulate matter (represented by the size fractions known as PM_{10} and $PM_{2.5}$) and coarse dust particles; and
- the effect of changes in the quantity and distribution of road traffic exhaust emissions on local and regional air quality.

3.1.1.2 The effects of road traffic exhaust emissions require consideration with respect to different types of receptors and to achieve this, the impacts of road traffic exhaust emissions have been assessed in the following ways:

- the assessment of impacts at individual local air quality sensitive receptors; and
- the assessment of regional air quality impacts, based on the magnitude of emissions from road traffic with and without the Proposed Scheme.

3.1.1.3 The approach to the air quality assessment presented in Sections 8.6.1 and 8.6.2 of the Environmental Statement (DRD-YSI-4-04) followed the current guidance set out in the DMRB (Volume 11, Section 3, Part 1) within Advice Note HA207/07 (DRD-YSI-6-06).

3.1.1.4 Since the Environmental Statement (DRD-YSI-4-04) was published in January 2015, the Proposed Scheme's effects on individual local air quality sensitive receptors and regional air quality, due to operational phase changes in road traffic emissions, has not been re-assessed as there have been no significant changes to the Proposed Scheme nor to published guidance.

3.1.1.5 Chapter 8 of the Environmental Statement (DRD-YSI-4-04) is the source of information referred to in this proof for the predicted impacts of emissions oxides of nitrogen (NOx), PM_{10}, $PM_{2.5}$, carbon monoxide and total hydrocarbons on regional air quality. The detailed dispersion modelling methods used to predict the impacts within Belfast AQMA No.1 remain

as reported in Chapter 8 of the Environmental Statement (DRD-YSI-4-04). A copy of Figure 8.1 from the Environmental Statement (DRD-YSI-4-04), that illustrates the location of the air quality study area, has been reproduced in Appendix C of this proof as Figure C1.

4. CONSTRUCTION PHASE PARTICULATE MATTER EMISSIONS

4.1 Construction Phase Particulate Matter Emissions – Impacts

4.1.1.1 Chapter 8 of the Environmental Statement (DRD-YSI-4-04) identifies the location of potentially sensitive receptors in the area surrounding the proposed works. The potential for construction works, which employ standard mitigation measures, to adversely affect these receptors has been assessed with respect to dust deposition rates and exposure to 24 hour mean concentrations of fine particulate matter (based on the size fraction PM_{10}).

4.1.1.2 The precise construction sequence within the 38 month construction period and the location of activities with greater potential to generate emissions of airborne particulate matter, will be determined in the future by the contractor appointed to deliver the construction of the Proposed Scheme. It is understood that as part of the construction contract, the appointed Contractor would be required to implement all committed mitigation measures including those set out in the Environmental Statement (DRD-YSI-4-04), and incorporate these into their methods of working.

4.1.1.3 The impact assessment reported in Section 8.6.2 of the Environmental Statement (DRD-YSI-4-04) reported that there was the potential for short term impacts at all receptors. It concludes that with appropriate mitigation in place there is the potential for slight adverse effects on amenity and negligible impacts on short term PM_{10} concentrations, to occur at properties. Section 8.9 para 2 of the Environmental Statement (DRD-YSI-4-04) concludes that with the application of mitigation measures it would be possible to mitigate such that any occasional impacts occurring would not result in any significant effects.

4.1.1.4 The locations of the receptors are illustrated in Figure C1 in Appendix C.

4.1.1.5 The potential for dust to be transferred off site, to affect PM_{10} levels or to cause significant amenity effects, is likely to be limited to less than one hundred metres from a construction process of this scale. Due to the nature of construction works, construction dust impacts are temporary and intermittent in nature. It is estimated that the construction process will be completed in approximately three years (38 months).

4.1.1.6 The impacts at any effected receptor would take the form of repeated short-term episodes, during which particulate matter would become deposited onto the surface of property, at a faster rate than would be observed for the baseline scenario. It is likely that the property owner would be able to perceive the increased rate of soiling associated with such episodes. The majority of the depositing particulate matter would be composed of coarse dust particles

(between 10 to 75 µm in diameter) that had become airborne during the disturbance of soil like material by machinery or the wind. A small percentage of the mass of particulate matter emitted would be composed of finer particles (less than 10 µm in diameter) and these particles would contribute to the short-term concentrations of PM_{10} that receptors would be exposed to.

4.1.1.7 The 24 hour mean concentration of PM_{10} is the statistic used to quantify short term exposure to airborne fine particulate matter. The EU and the UK have adopted a limit value for the protection of human health that is currently set at not more than 35 exceedances per year, of a 24 hour mean PM_{10} concentration of 50 µg/m^3. The adoption of an acceptable number of exceedances of the limit value is in acknowledgement of the fact that natural processes including; synoptic scale wind flow patterns, the long range transport of fine particulate matter and the creation of secondary particulate matter from some gaseous emissions can all be contributory factors in exceedances of the 50 µg/m^3 threshold. In practice this means that an increase in the contribution of background sources of fine particulate matter can cause local exceedances of the 24 hour mean concentration limit value for PM_{10}, even if the contributions from local sources of fine particulate matter remain constant. It is also possible for contributions from local sources to cause an exceedance of the 24 hour mean concentration limit value for PM_{10}, without a significant change in the contributions from background sources of fine particulate matter.

4.1.1.8 The construction works are to be phased and therefore the period in which an adverse impact could occur at any particular receptor are restricted to the duration of the dust generating activities in its vicinity. During this period any particulate matter that becomes airborne due to the Proposed Scheme works will only be transported towards a given receptor if the meteorological conditions enable this to occur. Receptors will continue to experience a similar variety of rates of surface soiling and a similar number of exceedances of the 24 hour mean PM_{10} concentration limit value as for the baseline situation, during those hours when meteorological conditions would not transport particulate matter from dust generating works towards them.

4.2 Construction Phase Particulate Matter Emissions – Mitigation Measures

4.2.1.1 A range of standard measures are available for the Contractor to incorporate into the Construction Environmental Management Plan (CEMP) for the Proposed Scheme. These measures have the potential to minimise the potential for generating emissions of airborne particulate matter at source. These measures are summarised in Section 8.7.2 of the Environmental Statement (DRD-YSI-4-04).

4.3 Construction Phase Particulate Matter Emissions – Assessment of Significance

4.3.1.1 For any construction activity there is the potential of generating emissions of airborne particulate matter that could potentially cause an impact at a receptor. The climate of the UK is such that the wind blows from every direction at some point during a year and contains variable amounts of airborne particulate matter emitted from background (up wind) sources. In order to reduce the overall effect at a receptor it is necessary to minimise the magnitude or frequency of the impacts experienced. This can be achieved by:

- minimising the duration of the works near to the receptor, so that emissions are less likely coincide with meteorological conditions that could transport them to a receptor;
- minimising the magnitude and frequency of emissions at source by applying emission control measures or adopting working practices with inherently less potential to generate emissions; and
- locating potential sources of emissions as far as practicable from potential receptors to increase the probability of particles being deposited or becoming dispersed before they reach the receptor.

4.3.1.2 Future meteorological conditions cannot be predicted at this time for the proposed construction period and consequently the Environmental Statement (DRD-YSI-4-04) refers to the potential impacts, rather than the predicted impacts. Given this unavoidable degree of uncertainty, the prevention of emissions at source provides the most reliable means of minimising the magnitude and frequency of adverse impacts on nearby receptors. It is considered that this can be best achieved through the development and application of a CEMP that integrates measures to control and monitor air quality impacts into the management procedures for the construction works themselves.

4.3.1.3 On those occasions when emissions from mitigated activities, coincide with the meteorological conditions necessary for the airborne particulate matter to be transported to a sensitive receptor, individual impact episodes will be for a short period of time (minutes to hours). The potential for such impacts to occur would remain whilst the dust generating activity was being undertaken at any location. Receptors within 100 m of a soil storage compound, bridge or embankment works would be at risk of experiencing adverse impacts over the longest periods, with works likely to last more than 6 months.

4.3.1.4 The effect of such impacts will primarily take the form of increased rates of surface soiling, although the deposited material would be removable by washing. Mitigation measures would

be in operation to control the mass of airborne particulate matter generated at source and fine particulate matter (PM_{10}) would only represent a small fraction of the total mass of the dust emission. Therefore it is considered unlikely that 24 hour mean concentrations of PM_{10} would be increased sufficiently at any receptor, by emissions generated by the Proposed Scheme construction works, to result in a significant number of additional exceedances of the 24 hour limit value for PM_{10}.

4.3.1.5 There are no statutory threshold values for maximum acceptable dust deposition rates or for acceptable surface soiling rates. However there comes a point when perceived impacts will cause the owner of the affected property to register the fact, that the effect has become unacceptable to them. The CEMP would include a mechanism by which the receipt of complaints of dust impacts would initiate measures to address the generation of the responsible emissions at source. The CEMP would also include proactive measures by which construction staff would monitor visible emissions of dust on the site, so that the required measures could be implemented before any potential impact became unacceptable.

4.3.1.6 The Proposed Scheme construction works have the potential to generate sufficient emissions, of dust and fine particulate matter, to cause repeated short term moderate adverse effects at residential properties, within approximately 100 m of the works. However, in my professional opinion the proposed mitigation measures in Section 8.7.2 of the Environmental Statement (DRD-YSI-4-04) represent accepted best practice for the control of construction phase emissions to air. Furthermore it is considered that, with the proposed mitigation measures applied appropriately, the adverse effect of the works as a whole would be reduced to a level that can reasonably be considered to be acceptable.

5. ROAD TRAFFIC EXHAUST EMISSIONS

5.1 Road Traffic Emissions – Impacts

5.1.1.1 Chapter 8 of the Environmental Statement (DRD-YSI-4-04) reports on an assessment of impacts on local and regional air quality that is consistent with the methods and criteria set out in the Highways Agency Advice Note HA207/07 (DRD-YSI-6-06) that gives guidance on the assessment of the impact that road projects may have on local and regional air quality.

5.1.1.2 Two assessments have been carried out to determine how these emissions would affect both local air quality sensitive receptors and the wider environment. This section describes the magnitude of the impact of each of the elements of the assessment in turn:

- the local air quality assessment focuses on the concentrations of the pollutants; nitrogen dioxide (NO_2), particulate matter (PM_{10}), carbon monoxide, benzene and 1,3-butadiene; and
- the regional assessment calculates, the total quantity of oxides of nitrogen (NOx), PM_{10}, carbon monoxide and total hydrocarbons (THC) produced with and without the Proposed Scheme. The total quantity of carbon dioxide (expressed as carbon) that would be produced by the Proposed Scheme has been used as an indicator of the impact on climate change.

5.2 Local Air Quality Impacts

5.2.1.1 Concentrations of PM_{10}, carbon monoxide, benzene and 1,3 butadiene are not at risk of exceeding the respective air quality limit value or national air quality objective value at any receptor with or without the Proposed Scheme. The remainder of this evidence will therefore focus on the local air pollutant nitrogen dioxide.

5.2.1.2 The predicted baseline annual mean concentrations are reported in Section 8.5.3.1 of the Environmental Statement (DRD-YSI-4-04) and the corresponding operational impacts are reported in Section 8.6.1.1 of the Environmental Statement (DRD-YSI-4-04).

5.2.1.3 Belfast City Council has identified that the annual mean limit value for nitrogen dioxide is currently at risk of being exceeded at relevant receptors within the Belfast Air Quality Management Area (AQMA) No. 1 and at three other locations within locations within Belfast but distant from the Proposed Scheme. The Environmental Statement (DRD-YSI-4-04) also reported annual mean concentrations of nitrogen dioxide in the current baseline scenario above the objective value of 40 $\mu g/m^3$ at Garmoyle Street, North Queen Street and Donegall

Street. Elsewhere within the study area there is no evidence that the annual mean limit value for nitrogen dioxide is at risk of being exceeded.

5.2.1.4 Pollutant concentrations to the east of the Proposed Scheme have been reported in the Environmental Statement (DRD-YSI-4-04) for a residential property located along Garmoyle Street, at the junction with Dock Street (labelled as R10 in Figure C1). Current concentrations of nitrogen dioxide are reported to be 49 µg/m^3, and are reported to decline in the future Do-Minimum scenarios, to 30 µg/m^3 by 2021 and reduce further to 26 µg/m^3 by 2035. In the 2021 Do-Something and 2035 Do-Something scenarios, there is reported to be a reduction in annual mean concentrations of nitrogen dioxide of 1 µg/m^3 compared to the Do-Minimum scenarios.

5.2.1.5 Concentrations of nitrogen dioxide for the Base year scenario are reported to exceed the national limit value at a number of receptors, with concentrations ranging from 56 µg/m^3 at a receptor adjacent to the existing Westlink overbridge at North Queen Street (labelled as R3 on Figure C1) to 40 to 45 µg/m^3 on North Queen Street (labelled as R14, R5, R7, R8 on Figure C1) and at receptors within the AQMA that are close to the Westlink (labelled as R1 on Figure C1). Further from the Westlink concentrations decrease to 34 µg/m^3 at residential properties. Concentrations are reported to decline in the 2021 Do-Minimum and 2035 Do-Minimum scenarios, such that annual mean concentrations are less that 34 µg/m^3 at all receptors in this area without the Proposed Scheme.

5.2.1.6 At properties within the boundary of the AQMA but set back further from the Westlink (labelled as R2, R6, R11, R12, R13, R16 and R18 on Figure C1) the annual mean concentrations of nitrogen dioxide is reported to achieve the air quality objective in the current baseline scenario and all of the future Do-Minimum and Do-Something Scenarios. The change in annual mean nitrogen dioxide concentrations are small to imperceptible in magnitude, with improvements at R11, R12 and R2 and increases at other locations.

5.2.1.7 The impact of the Proposed Scheme on annual mean concentrations at receptors in the Belfast AQMA No.1 that are closest to the interchange (labelled as R1 in figure C1) is an improvement with the Proposed Scheme of 3 µg/m^3 in 2021 and 2 µg/m^3 in 2035. The air quality limit value is predicted to be achieved at all relevant receptor properties within the Belfast AQMA No.1 with or without the Proposed Scheme in 2021 and 2035.

5.3 Regional Impacts

5.3.1.1 The emissions calculation method used to calculate the total annual emissions of oxides of nitrogen, PM_{10}, carbon monoxide and total hydrocarbons remains unchanged since the publication of the Environmental Statement (DRD-YSI-4-04 8.5.3.2 and 8.6.1.2). In 2021, carbon emissions decrease by 1111 tonnes per annum (-2.9%) with the Proposed Scheme relative to the baseline scenario. By 2035 carbon emissions are projected to decrease by 1691 tonnes per annum (-4.5%) relative to the 2013 baseline scenario. The reductions in total emissions would result from reductions in emissions per vehicle kilometre, due to increased average speeds, outweighing the effect of an increase in total vehicle kilometres travelled within the study area.

5.4 Road Traffic Emissions – Mitigation Measures

5.4.1.1 The Environmental Statement (DRD-YSI-4-04 para 13.5.2.11) identified that outside of Belfast AQMA No.1 the adverse impacts of the Proposed Scheme were not significant and as such there was no need for air quality related mitigation measures to be developed.

5.4.1.2 During the construction phase emissions from road traffic would be minimised by measures contained within the traffic management plan, that seeks to minimise road user journey times through the junction.

5.4.1.3 In summary, no specific measures are proposed to mitigate the predicted impacts of the Proposed Scheme on local air quality, as none of the predicted adverse impacts are great enough to justify mitigation. The Proposed Scheme has a beneficial effect on regional air quality without mitigation measures.

5.5 Road Traffic Emissions – Assessment of Significance

5.5.1.1 The Proposed Scheme would reduce total emissions of carbon in 2021 by 2.9%, and improving further to 4.5% in 2035, relative to current baseline values. There would be increases relative to 2013 baseline conditions, in the magnitude of the other vehicle exhaust emissions in 2035, of 20% for carbon monoxide and total hydrocarbons. The corresponding increase in PM_{10} emissions would be 7.1% and 0.8% for oxides of nitrogen. The predicted change in total emissions are primarily due to the 15% increase in road link length in the atmospheric dispersion model between Baseline and Do-Something scenarios and the relatively small size of the transport study area. In terms of the tonnage of emissions they are considered to represent minor effect on regional air quality.

5.5.1.2 The Proposed Scheme is predicted to generate some additional exhaust emissions of oxides of nitrogen, that would make a small (up to 0.7 µg/m^3) to imperceptible additional contribution to future (Do-Something) annual mean concentrations of nitrogen dioxide within the AQMA. The magnitude of the impact is such that it would not cause a breach of an air quality limit value (i.e. there would be no new exceedances) nor prevent the successful implementation of any air quality action plan strategy aimed at delivering sustained compliance with the annual mean nitrogen dioxide objective. It is considered that there would be a slight adverse effect on local air quality within the Belfast AQMA No.1 in the year of opening (2021) and this would reduce to a negligible effect as emission rates per vehicle kilometre reduce further in the years following the opening of the Proposed Scheme up to the design year (2035).

5.5.1.3 Outside of the Belfast AQMA No.1 the change in annual mean concentrations of nitrogen dioxide would be small to medium in magnitude. The air quality objective is reported to achieve the objective value in 2021 and 2035 with or without the Proposed Scheme.

5.5.1.4 In summary, the Proposed Scheme would not have a significant effect on regional air quality. However, there would be minor effects on local air quality with the operation of the Proposed Scheme. It is considered that the minor adverse effect of the Proposed Scheme at receptors within the Belfast AQMA No.1 and at a small number of properties located alongside North Queen Street, is counter balanced by the medium sized reductions in annual mean concentrations of nitrogen dioxide at receptors within the AQMA closest to York Street Interchange and the minor beneficial effect on air quality at a other properties. On balance, it is considered that the Proposed Scheme has a neutral effect with respect to air quality overall.

6. CONCLUSIONS

6.1.1.1 The Proposed Scheme construction works have the potential to generate emissions, of dust and fine particulate matter. However, it is considered that, with the proposed mitigation measures applied appropriately, the adverse effect of the works as a whole would be reduced to a level that can reasonably be considered to be acceptable.

6.1.1.2 The Proposed Scheme would not have a significant effect on regional air quality. However, there would be minor effects on local air quality with the operation of the Proposed Scheme, due to the increased flow of traffic and the additional road link length.

6.1.1.3 It is considered that the minor adverse effect of the Proposed Scheme at receptors within the Belfast AQMA No.1 and at a small number of properties located alongside North Queen Street is counter balanced by the magnitude of the reductions in annual mean concentrations of nitrogen dioxide at other receptors in the Belfast AQMA No.1.

6.1.1.4 The Proposed Scheme would not prevent the successful implementation of strategies for the sustained achievement of air quality objectives in Belfast. On balance it is considered that the Proposed Scheme has a neutral effect with respect to air quality overall.

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APPENDIX A ABBREVIATIONS

AADT	Annual Average Daily Total flow
AQMA	Air Quality Management Area
BCC	Belfast City Council
CAFE	Clean Air For Europe
CEMP	Construction Environmental Management Plan
CO	Chemical formula for Carbon Monoxide
CO_2	Chemical formula for Carbon Dioxide
DEFRA	Department of Environment Food and Rural Affairs
DETR	Department of the Environment Transport and the Regions
DMRB	Design Manual for Roads and Bridges
EC	European Commission
EU	European Union
HA	Highways Agency
HC	Hydrocarbons
HDV	Heavy Duty Vehicle
km	Kilometres

km/hr	Kilometres per hour
LDV	Light Duty Vehicle
LAQM	Local Air Quality Management
mg/m^3	Milligrammes (of pollutant) per cubic meter (of air)
$mg/m^2/day$	Milligrammes (of depositing material) per square meter (of surface) per day
NO_2	Chemical Formula for Nitrogen Dioxide
NO_x	Oxides of Nitrogen
$PM_{2.5}$	Fine Particulate Matter with an aerodynamic diameter of less than 2.5 µm
PM_{10}	Fine Particulate Matter with an aerodynamic diameter of less than 10 µm
SO_2	Chemical Formula for Sulphur Dioxide
TG	Technical Guidance
THC	Total Hydrocarbons
$\mu g/m^3$	Microgrammes (of pollutant) per cubic meter (of air)
UK	United Kingdom
UKAQIA	UK National Air Quality Information Archive
UNECE	United Nations Economic Community for Europe

APPENDIX B GLOSSARY OF SELECTED TERMS

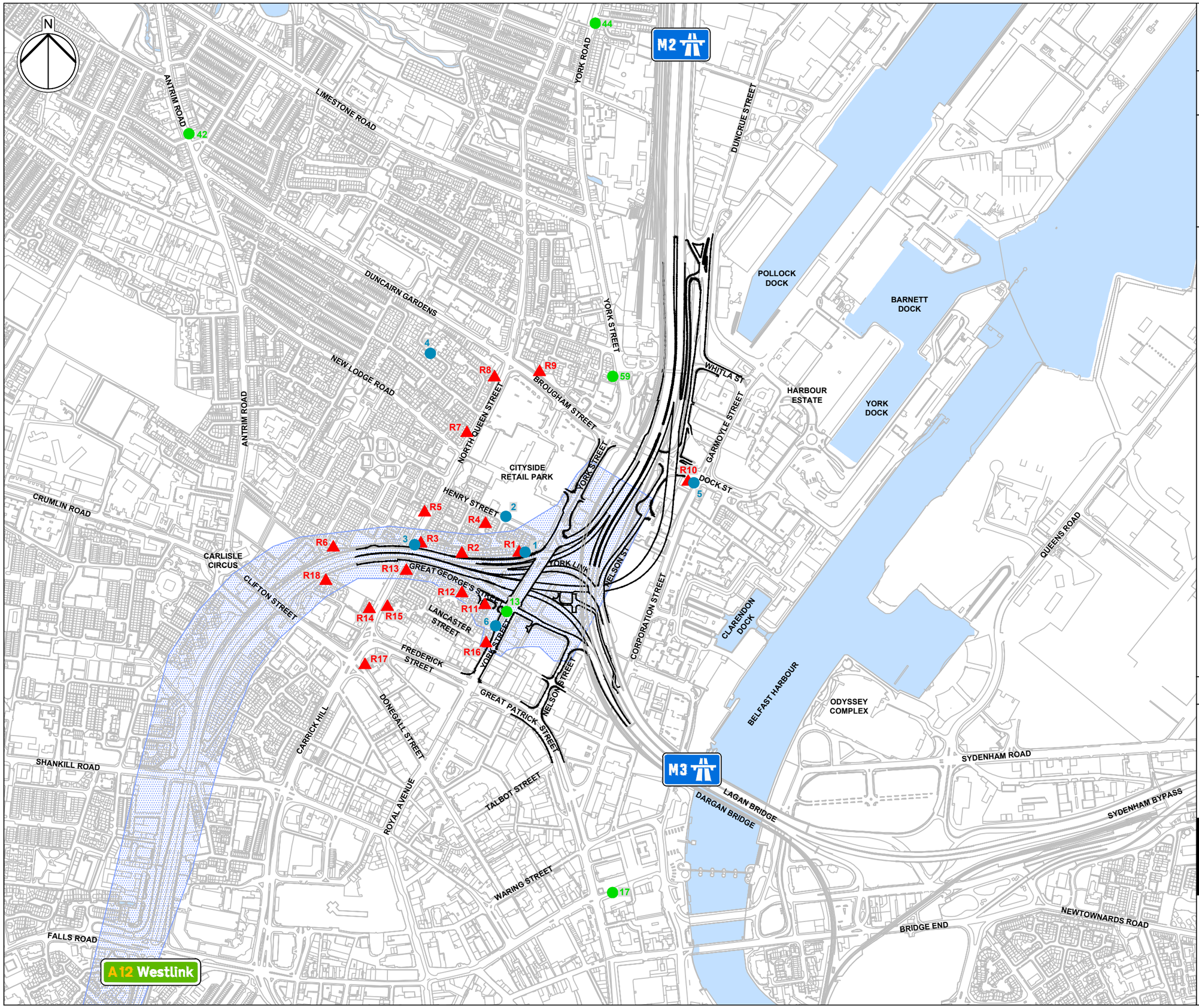
Air pollutants	Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects on humans, animals, vegetation and/or materials
Air quality sensitive receptors	People, property or designated sites for nature conservation that may be at risk from exposure to air pollutants that could potentially arise as a result of the proposed development/project
Air quality study area	The area assessed for air quality impacts during the Environmental Assessment
Ambient air quality	The concentrations of gases and particles in the atmosphere (troposphere) to which the general population would be exposed, as opposed to the concentration of pollutants emitted by a specific source
Annual average daily total flows	A daily traffic flow (24hrs), expressed as a mean daily flow across all 365 days of the year (AADT) in units of vehicles per hour
Annual mean concentration	The average (mean) of the hourly pollutant concentrations measured or predicted for a one year period
Baseline scenario	Scenarios with the proposed development/project not in operation
Construction Environmental Management Plan	A framework developed to address and manage the environmental aspects and impacts related to the construction of the proposed development/project
DMRB screening tool	An empirical computer modelling tool that predicts future air quality levels as a result of road traffic characteristics under different scenarios
Dust deposition rates	The rate at which particulate matter is deposited on to surfaces typically expressed in units of $mg/m^2/day$
Dust emissions	Airborne coarse particulate matter produced as a result of abrasive activities such as occur during the construction phase of a development/project
Emission factors	The average emission rate of a given pollutant for a given source, relative to units of activity. Used to model future pollution concentrations under different scenarios

EU limit values	Limits set by the European Union on air quality to be achieved by member states. In Northern Ireland this EU Directive is prescribed under the Air Quality Standards Regulations (NI) 2010. For nitrogen dioxide the annual mean limit value and the annual mean objective value are set at the same concentration
Fine particulate matter	Particulate matter with an aerodynamic diameter equal to or less than 2.5 µm
Greenhouse gases	Atmospheric gases that slow the passage of re-radiated heat through the Earth's atmosphere by absorbing infrared radiation
Heavy Duty Vehicle	A vehicle type classification, including rigid and articulated heavy goods vehicles, plus buses and coaches, that is used by air quality dispersion models
Imperceptible impact	A change in the annual mean concentration of a pollutant equivalent to 1% of the relevant air quality limit value or less
Light Duty Vehicle	A vehicle type classification, including motorcycles, cars and light goods vehicles, that is used by air quality dispersion models
Local air quality assessment	A section within the air quality chapter of the Environmental Statement where local air quality was assessed under different scenarios
National air quality objectives	A series of objectives set by the Government's Expert Panel on Air Quality to be achieved either without exception or with a permitted number of exceedances within a specific timescale. For nitrogen dioxide the annual mean limit value and the annual mean objective value are set at the same concentration
Particulate Matter	Solid particles or liquid droplets suspended or carried in the air with an aerodynamic diameter equal to or less than 10 µm
Road links	Individual sections of the road network, usually divided by junctions, used in the modelling of scenarios
The Proposed Scheme	The proposed York Street Interchange
24 hour mean concentration	The average (mean) of the hourly pollutant concentrations measured or predicted for 24 consecutive hours in one day

APPENDIX C FIGURES

List of Figures

Figure No.	Description
C1	Air Quality Study Area



Project Title

YORK STREET INTERCHANGE

Client

transportni

Drawing Title

AIR QUALITY

Air Quality Study Area

KEY

Proposed Scheme

Belfast City Council (BCC) Diffusion Tube Locations

URS Diffusion Tube Locations

Receptor Locations

Belfast Number 1 Air Quality Management Area (AQMA)

Scale @ A3

1:8000

FIGURE C1

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