N4 Collooney to Castlebaldwin
Oral Hearing

Compulsory Purchase Order

and

Environmental Impact Statement
Oral Hearing

Brief of Evidence

Dr. Edward Porter
Of
AWN Consulting

1.0 INTRODUCTION

Name and Qualifications

My name is Edward Porter. I hold a Bachelor of Science degree (1st Class (Hons)) in Chemistry (1991) from the University of Sussex and a Ph.D. in Chemistry (Air Quality) from University College Dublin (1997). I am a Charter Chemist, a member of the Institute of Air Quality Management (MIAQM) and a full member of the Royal Society of Chemistry (C Chem MRSC), a requirement of membership being that I am active in the field of professional chemistry and satisfy the Society's requirements with regard to level of qualifications and experience.

Experience

I have been active in the field of air quality for over 20 years, the last 16 as an Environmental Consultant. I have considerable experience in the areas of planning of proposed developments with regard to air quality and climate, assessment of air quality for compliance purposes and air quality mitigation measures in relation to both construction sites and operational developments.

I am currently Director of Air Quality and Climate with AWN Consulting.

2.0 METHODS

AWN Consulting was commissioned to conduct a detailed appraisal of the air quality and climate impacts associated with both the construction and operation of the N4 Collooney to Castlebaldwin proposed road development.

The assessment was carried out using guidance from the National Roads Authority document *"Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes"* and other current published national and international guidance and standards as required.

The approach to the assessment was, firstly, to quantify the existing ambient air quality by means of a baseline air quality survey and a review of long-term representative monitoring data compiled by the EPA. Thereafter, the likely levels of air pollutants associated with both the construction and operational phases of the proposed development were assessed.

The impact of the proposed road development on air quality was determined using the UK Design Manual for Roads and Bridges (DMRB) air dispersion model in conjunction with published guidance by the UK Highways Agency and the National Roads Authority.

The impact of nitrogen oxides (NO_x) emissions from the proposed road on the Unshin River NHA / cSAC was determined using the DMRB air dispersion model.

Ambient air quality standards have been set for a range of pollutants which are potentially damaging to human health. Statutory Instrument S.I. 180 of 2011 (Air Quality Standards Regulations 2011) has set ambient limit values for a range of local air pollutants including nitrogen dioxide (NO_2), carbon monoxide (CO), benzene, PM_{10} (particles measuring 10 micrometers or less) and $PM_{2.5}$ (particles measuring 2.5 micrometers or less). The local air quality impact assessment thus focussed on

determining the impact of the proposed development on the levels of these regulated air pollutants.

Carbon dioxide (CO_2) is a non-toxic gas at the local scale. However, CO_2 has global impacts as a result of its greenhouse gas potential. Ireland's greenhouse gas (GHG) emissions are regulated through the Kyoto Protocol and at EU level by the EU Commission's *Climate and Energy Package*. Under the *Climate & Energy Package*, Ireland is required to deliver a 20% reduction in non-ETS greenhouse gas emissions by 2020 (relative to 2005 levels). This limit is set at 37.5 Mtonnes of CO_{2eq}. The regional impact of the proposed road on national emissions of carbon dioxide (CO_2) was determined using the DMRB air dispersion model.

3.0 RESULTS

Baseline Air Quality

The baseline air quality along the route of the N4 Collooney to Castlebaldwin proposed road development was assessed by means of air quality measurements at sensitive locations close to the proposed road development, by an analysis of representative EPA monitoring data for the region and by comprehensive air dispersion modelling of the existing road infrastructure.

The baseline survey measured roadside and rural background levels of these pollutants in the region of the proposed development as outlined in Chapter 9, Section 9.2.3 of the EIS.

The results obtained from the monitoring of NO_2, PM_{10} and benzene and the review of EPA monitoring data for the region indicate that the route of the proposed road currently experiences good air quality.

The assessment of the "do nothing" scenario has been undertaken using the UK DMRB air dispersion model. The key inputs into the model are year of operation, annual average daily traffic (AADT), average vehicle speed and receptor locations. Air dispersion modelling was performed at twenty-three worst-case receptors located close to the proposed road development. The predicted pollutant levels (including background) for both the "do nothing" and "do something" scenarios in the opening and design years were used to determine the air quality impact at these receptors.

The air dispersion modelling study carried out for the "do minimum" scenario in the opening year (2017) and design year (2032), indicated that the predicted pollutant levels of CO, benzene, NO_2 , PM_{10} and $PM_{2.5}$ at worst-case receptors along the route of the proposed road development are below their respective limit values.

4.0 PREDICTED IMPACTS

Operational Phase – Local Air Quality Impacts Along The Route

The assessment has been undertaken using the UK DMRB air dispersion model. The key inputs into the model are year of operation, annual average daily traffic (AADT), average vehicle speed and receptor locations. Air dispersion modelling was performed at 23 worst-case receptors located along the existing and proposed route of the N4 Collooney to Castlebaldwin proposed road development.

The impact of traffic-derived emissions from the proposed road development on ambient air quality has been extensively assessed using air dispersion modelling of the proposed road infrastructure for the opening year (2017) and design year (2032).

The screening air dispersion modelling study found that predicted concentrations of CO, benzene, NO_2 , PM_{10} and $PM_{2.5}$ were below their respective limit values with the proposed road development in place as outlined in Chapter 9, Section 9.4.3.2.

Operational Phase - Regional Air Quality Impacts

The regional air quality assessment investigated the impact of the proposed road development on national emissions of the following pollutants: nitrogen oxides (NO_x), volatile organic compounds (VOCs) and carbon dioxide (CO_2).

With regard to NO_X and VOCs, results indicate that the impact of the proposed road on national emission levels is negligible being less than 0.005% of the relevant emissions ceiling in either the opening or design year.

With regard to climate, EPA guidance states that a development may have an influence on global climate where it represents *"a significant proportion of the national contribution to greenhouse gases"*. Based on an analysis of the increase in traffic resulting from the proposed development, CO_2 emissions resulting from the development will be insignificant in terms of national emissions and Ireland's agreed limit under both the Kyoto Protocol and Ireland's commitments under the EU Commission's *Climate and Energy Package*. Thus the impact of the proposed road development on climate will be negligible.

Operational Phase – Screening Air Quality Impacts on Sensitive Ecosystems

An annual average limit for both NO_x (NO and NO_2) of 30 µg/m^3 is applicable for the protection of vegetation in highly rural areas away from major sources of NO_x such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex III of EU Directive 2008/50/EC identifies that monitoring to demonstrate compliance with the NO_X limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway,
- 5 km from the nearest major industrial installation,
- 20 km from a major urban conurbation.

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

The impact of NO_x (i.e. NO and NO_2) emissions resulting from the proposed road at the Unshin River cSAC/pNHA was assessed. The screening assessment was carried out using the DMRB model. The inputs to the model are year of assessment, AADT levels, percentage of HGV traffic and distance from road centreline.

The screening model prediction for the annual average NO_X level at the Unshin River cSAC/pNHA is below the limit value of 30 µg/m^3 for the "do something" scenario in the opening year of 2017 and the design year of 2032 at the closest point of the proposed road development to the cSAC/pNHA. Levels with the proposed road development in place reach 50% of the limit in the opening year of 2017 and will decrease to 35% of the limit in the design year of 2032 at the closest point of the proposed road development to the cSAC/pNHA due to improvements in vehicle

engine technology. The impact of the N4 Collooney to Castlebaldwin proposed road development, based on the results of the screening model, leads to an increase in NO_X concentrations of less than 2 µg/m^3 within the Unshin River cSAC/pNHA in both 2017 and 2032.

The road contribution to the NO_2 dry deposition rate along the 200m transect within the cSAC/pNHA has also been calculated. The maximum NO_2 dry deposition rate will increase by no more than 0.002 Kg (N)/ha/yr in 2017 and 0.003 Kg (N)/ha/yr in 2032 relative to the "do nothing" scenario. Thus, the impact of the road scheme will be to increase the NO_2 dry deposition rate by no more than 0.06% of the critical load for inland and surface water habitats of 5-10 Kg (N)/ha/yr.

Construction Phase

Construction activities associated with the proposed road development are likely to generate dust emissions. However, construction dust nuisance can be mitigated by the implementation of dust mitigation measures.

It is estimated that the construction of the proposed road development could potentially generate the movement of approximately 735,000 m^3 of soft geological material to identified locations predominantly with the CPO. The emissions from the spoil repository processes within the CPO will lead to an annual average dust deposition level including background of 89.5 mg/(m^2*day) at the worst-case receptor which is only 26% of the TA Luft Limit Value of 350 mg/(m^2*day). Predicted PM_{10} and $PM_{2.5}$ concentrations are also significantly lower than the ambient air quality standards at the nearest residential receptors to the repository sites. Further details of this modelling can be found in Appendix 9.2.

Although unlikely, there is a potential for surplus spoil to be deposited and treated at sites external to the CPO line, this is a possible cumulative and indirect impact of the Proposed Road Development. To this end, a range of possible sites which appear to be broadly suitable have been identified within the Spoil Management Report.

The emissions from the spoil repository processes for these potential sites would lead to an annual average dust deposition level including background of 99.1 mg/(m^2*day) at the worst-case receptor which is 28% of the TA Luft Limit Value of 350 mg/(m^2*day). Predicted PM_{10} and $PM_{2.5}$ concentrations are also significantly lower than the ambient air quality standards at the nearest residential receptors to the deposition sites. Further details of this modelling can be found in Appendix 9.3.

The emissions from peat removal and deposition for sites within the CPO have been compared with non-ETS greenhouse gas emissions target of 37.5 Mtonnes of CO_{2eq} to be achieved by 2020 as set out in the EU Commission's *Climate and Energy Package*. The contribution to the total GHG emissions is 0.0001% of the total in Ireland in 2020 and thus is an insignificant source of greenhouse gas emissions. Further detail of this modelling can be found in Appendix 9.2.

The emissions from peat removal and deposition for those already discussed potential sites outside the CPO have been compared with the non-ETS greenhouse gas emissions target of 37.5 Mtonnes of CO_{2eq} to be achieved by 2020 as set out in the EU Commission's *Climate and Energy Package*, The impact of the Proposed development will be to increase greenhouse gas emissions by 0.001% of this 2020 Target Level and thus is an insignificant source of greenhouse gas emissions. Further detail of this modelling can be found in Appendix 9.3.

5.0 MITIGATION MEASURES AND RECOMMENDATIONS

Construction Phase

An Environmental Management Plan (EMP) plan will be formulated for the construction phase of the project, as part of the implementation of the mitigation strategy.

Measures to be implemented to mitigate the effects of dust emissions from construction activities will include the following:

- Vehicles exiting the site to make use of a wheel wash facility, prior to entering onto public roads;
- Vehicle speeds on site roads with a temporary soil finish will be restricted to 15 kph with all other site roads restricted to 30 kph;
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind;
- Water misting or sprays will be used during dry and / or windy periods.

Operational Phase

In relation to design and operational aspects of road developments, emissions of pollutants from road traffic can be controlled most effectively by either diverting traffic away from heavily congested areas or ensuring free flowing traffic through good traffic management plans and the use of automatic traffic control systems. Moreover, as the flow of traffic will be smoother and a steady speed maintained, vehicle emissions on the proposed road development will be lower than those experienced in more built-up areas, where higher emissions result from frequent stop-start motions and queuing.

Mitigation along the route will also be enhanced by the planting of vegetation. Vegetation planting is proposed as part of the Landscape and Visual mitigation measures. However, the planting of trees, woodland planting and native scrub planting will also have a beneficial impact on air quality. Recent studies have found that a 7m wide tree canopy can lead to a reduction in particulate matter concentration of approximately 5%[(1)].

Summary

In relation to CO, benzene, PM_{10}, $PM_{2.5}$ and NO_2, the results of the air dispersion modelling study show that predicted ambient concentrations at the worst-case sensitive receptors near the proposed road development will be well below the ambient air quality limit values. Legislation-driven technical improvements will ensure that pollutant levels will remain well below the limit values in future years.

The air dispersion modelling results demonstrate that pollutant concentrations will be below 42% of the air quality limit values for all pollutants. Thus the impact of the proposed road development will be negligible.

[1] Fuller, M et al (2009) Particulate Matter Modelling In Near-Road Vegetation Environments, U.C. Davis-Caltrans Air Quality Project

With regard to CO_2 and Ireland's obligations under the Kyoto Protocol and the EU Commission's *Climate and Energy Package*, the regional impact of traffic emissions resulting from the proposed development is insignificant.

The levels of dust emissions during the construction phase will be minimised through the implementation of a dust minimisation plan.

6.0 RESPONSE TO SUBMISSIONS

Objections received in respect of air quality, without offering detailed comment in relation to specific scenarios, express concern that dust mitigation and monitoring proposals during the construction phase are inadequate.

Response:

An Environmental Management Plan (EMP) plan will be formulated for the construction phase of the project, as part of the implementation of the mitigation strategy which will include the specific measures set out in Section 5 above.

The dust minimisation procedures put in place will be monitored and assessed by the Environmental Assurance Officer appointed by the Local Authority. In the event of dust nuisance occurring outside the site boundary, the effectiveness of existing measures will be reviewed and further mitigation will be implemented to rectify the problem.

Provided the dust minimisation measures outlined above are adhered to, the air quality impacts during the construction phase will be not be significant.

Mullaney Solicitors on behalf of Markee Castle Ltd.

7) "The roadway, the subject matter of the proposed CPO will impinge upon and seriously damages/compromises the integrity and structure of our clients' ….air quality….."

Response:

As outlined in Section 9.4 of the EIS the impact of the Proposed Scheme on CO, benzene, PM_{10}, $PM_{2.5}$ and NO_2 levels were assessed relative to "Do nothing" levels in years 2017 and 2032. Relative to baseline levels, some increases and decreases in pollutant levels are predicted as a result of the Proposed Scheme. However, using the assessment criteria outlined in Tables 9.2 – 9.4 of the EIS, the impact of the Proposed Scheme in terms of CO, benzene, PM_{10}, $PM_{2.5}$ and NO_2 is negligible at all 23 worst-case receptors assessed.

Thus, although some increases in the maximum pollutant concentrations may occur at the nearest sensitive receptors as a result of the development, no significant increase in pollutant levels will occur and ambient levels of regulated air pollutants will remain well below the relevant ambient air quality limit values.