IN THE MATTER OF AN APPLICATION TO

AN BORD PLEANÁLA

FOR APPROVAL OF (I) THE N6 GALWAY CITY RING ROAD PURSUANT TO SECTION 51 OF THE ROADS ACT 1993 (AS AMENDED); (II) THE N6 GALWAY CITY RING ROAD MOTORWAY SCHEME 2018; and (III) THE N6 GALWAY CITY RING ROAD PROTECTED ROAD SCHEME 2018

ABP Ref. ABP-302848-18 and ABP-302885-18

ORAL HEARING

Statement of Evidence

Responses to Air Quality and Carbon Emissions and Climate Change

Objection/Submissions

by

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20 February 2020

1 Qualifications and Experience

1.1 My name is Sinéad Whyte. I hold a BSc in Experimental Physics and a Master's degree in Atmospheric Physics from University College Dublin.

1.2 I am a Chartered Member of the Institute of Water and Environmental Management. I have 20 years' experience in the completion of air quality and climate impact assessments for a large number of developments including major industrial and infrastructural projects, including Irish Cement Alternative Fuels Project, Pfizer Newbridge Expansion, DART Underground and M7 Osberstown Interchange and the R407 Sallins Bypass.

1.3 I am an Associate with Arup and have worked in the area of environmental assessment and management for over 20 years. I am supported in this statement of evidence by Andrew Archer and John O'Malley.

2 Role in Proposed Road Development

2.1 I am responsible for the preparation of Chapter 16, Air Quality and Climate of the EIAR. I have led the air quality and climate team that has undertaken the assessment and have had this role since the start of the project in 2014 from constraints, options assessment through to the environmental impact assessment.

3 Air Quality

3.1 Chapter 16 of the EIAR is to be taken as read in its entirety and is not replicated here. To assist the Board in its consideration of the applications for approval, and for the convenience of all participants at this hearing and to set the context for responding to the objections and submissions, the key items pertaining to the air quality assessment of the proposed road development detailed in Chapter 16 of the EIAR are summarised briefly below.

3.2 On 12 April 2011, the Air Quality Standards Regulations (AQS) 2011 (S.I. No. 180 of 2011) came into force and transposed EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe (the Air Quality Directive) into Irish law. The purpose of the 2011 Regulations is to establish limit values and alert thresholds for concentrations of certain pollutants. These standards were introduced to avoid, prevent or reduce harmful effects on human health and the environment as a whole. In 2018, the WHO[1] published revised guideline levels for a number of pollutants relevant to this assessment which are considered in the assessment in Chapter 16 of the EIAR along with the Irish AQS.

3.3 An assessment of the potential impact of the proposed road development on the air quality receiving environment was carried out for the construction and operational phases. The baseline air quality was determined from published long term data

[1] https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health

from the Environmental Protection Agency (EPA) and at four site specific monitoring stations in proximity to the proposed road development for a period of three months as detailed in Section 16.3.3 of Chapter 16 of the EIAR. Air quality in the region would be considered as good and is in compliance with air quality standards and WHO guidelines.

3.4 Pollutant concentrations are predicted and added to background concentrations for the Do-minimum (DM) and Do-something (DS) scenarios for the Opening Year 2024 and Design Year 2039. Background concentrations for future years are based on existing levels. This assumption ensures a worst-case background level in future years when improved vehicle technology and increased use of electric vehicles will reduce background levels.

3.5 An assessment of the potential impact on air quality due to construction activities and construction traffic was completed. Dust control measures will be implemented to minimise dust impacts, for example the implementation of dust screens and the provision of spraying as set out at Section 16.6.2 of the EIAR and as outlined in the Construction Environmental Management Plan (CEMP). Monitoring of PM_{10} and $PM_{2.5}$ (particulate matter of less than 2.5 microns) will be carried out at the nearest sensitive receptors upwind and downwind of the construction works where sensitive receptors have been identified within 25m of the works. At a minimum, dust deposition monitoring will be carried out at the two nearest sensitive receptors at locations where works of a 'major' scale is proposed while works are taking place in proximity. Measured levels of dust and particulate matter will be compared to relevant limit values. Construction traffic is projected to result in a negligible impact on air quality on affected roads. Construction mitigation measures are set out at Section 16.6.2 of Chapter 16 of the EIAR.

3.6 The potential impact on air quality during the operational phase was assessed using the UK DMRB spreadsheet[2] methodology as advised by TII guidance[3] and by using the ADMS[4] modelling software. An assessment of the potential impact on both residential receptors and ecological sites was completed. Under the 2024 and 2039 DS scenarios, predicted pollutant concentrations comply with air quality standards at all worst-case receptors selected. These worst-case receptors are the receptors likely to be most affected, i.e. those located in closest proximity. Predicted concentrations are in compliance with WHO guideline levels for all pollutants except for $PM_{2.5}$ for which a slight exceedance of the guideline value of 10 $\mu g/m^3$ is predicted. This is due to the high background concentration of 9.5 $\mu g/m^3$ used for $PM_{2.5}$. Although exceedances of the $PM_{2.5}$ WHO guideline level are predicted, all concentrations are in compliance with the statutory air quality standard of 20 $\mu g/m^3$.

3.7 Predicted changes in concentration of all pollutants are rated as negligible or imperceptible impacts at all receptors except at two receptors, where an impact of slight adverse is predicted for NO_2. These receptors are located at Castlegar (R16)

[2] UK Design Manual for Road and Bridges PART 1 HA 207/07 AIR QUALITY, UK Highways Agency, 2007)
[3] *'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*', 2011
[4] Cambridge Environmental Research Consultants (CERC) Air Dispersion Modelling Software

and Upper Dangan (R17). At R16, a NO_2 concentration of 13.9 µg/m^3 is predicted in 2024 and 14.3 µg/m^3 in 2039. These predicted concentrations are in good compliance with the air quality standard of 40 µg/m^3. At R17, a NO_2 concentration of 14.4 µg/m^3 is predicted in 2024 and 14.9 µg/m^3 in 2039. These predicted concentrations are in good compliance with the air quality standard of 40 µg/m^3. The predicted impact at three locations was deemed to be slight adverse using the ADMS model at R16, R17 and Letteragh (R20). A negligible impact was predicted at all other locations.

3.8 An assessment of the potential NO_x concentration and deposition due to the proposed road development on the Lough Corrib cSAC was carried out for 2024 and 2039 for the DM and DS scenarios. The potential impact of NO_x concentration and deposition was assessed at various distances from the edge of the proposed road development and this data was provided to the project ecologists to inform their assessment of potential impacts on the ecologically sensitive sites. All limits are complied with.

3.9 As all air quality standards for the protection of human health and vegetation will be complied with, no significant residual impacts are envisaged during the operational phase.

3.10 The proposed modification to the Parkmore Link Road will have no effect on the air quality and climate results contained in the EIAR and RFI response document.

3.11 The current National University of Ireland (NUIG) planning permission application (Ref 19/373) to construct additional playing pitches and the two proposed strategic housing development applications (Ob_229 and Ob_469) do not change the conclusions of the cumulative impact assessment on Air Quality and Climate contained in the EIAR.

4 Responses to Submissions/Objections relating to Air Quality

4.1 Overview

4.1.1 51 of the 296 submissions and objections made to An Bórd Pleanála (ABP) in respect of the N6 Galway City Ring Road (GCRR) Environmental Impact Assessment Report (EIAR), Natura Impact Statement (NIS), Motorway Scheme (MS) and Protected Road Scheme (PRS) include observations relevant to air quality. 1 of the 17 submissions made to ABP in respect to the Request for Further Information (RFI) Response submitted in August 2019 includes observations relevant to air quality. The items raised in these submissions/objections are:

- Pollution due to construction traffic
- Pollution due to construction activities
- Construction mitigation and monitoring
- Pollution from traffic during the operational phase

4.2 Pollution due to construction traffic

Issues

4.2.1 Two submissions/objections raise concerns in relation to the potential for pollution to be generated during the construction phase due to HGV accessing the construction site.

4.2.2 The following submissions/objections raised this point: S_008, Ob_584.

Response

4.2.3 The potential impact of construction vehicles was assessed through the UK DMRB spreadsheet[5] methodology as advised by TII guidance[6] to calculate emissions due to traffic, refer to Section 16.2.5 of Chapter 16 of the EIAR. In accordance with TII guidance[7], construction traffic impacts are assessed when traffic (AADT) of greater than 10% is predicted to occur due to the proposed road development. Only three links are predicted to experience traffic increases greater than 10% during the construction phase, i.e. R336 Bearna Moycullen Road, Cappagh Road and Menlough Road.

4.2.4 The increase in pollutant concentrations due to the proposed road development is predicted to be negligible at worst-case receptors with projected pollutant concentrations within air quality standards. These worst-case receptors are the receptors likely to be most affected, i.e. those located in closest proximity to affected roads.

4.3 Pollution due construction activities

Issues

4.3.1 20 submissions/objections raise concerns in relation to the potential for pollution to be generated during the construction phase due to works on site. These concerns relate to the following:

- Generation of dust during construction causing health impacts: Ob_158 Ob_569, Ob_584, S_055, S_063, S_066, S_068, Ob_457.2, Ob_511.07, Ob_583.01
- Inadequate construction mitigation measures: Ob_511.18, Ob_517.05. Ob_696.21, Ob_757, Ob_505, Ob_507, Ob_603
- Dust suppression during blasting Ob_511.18

[5] UK Design Manual for Road and Bridges PART 1 HA 207/07 AIR QUALITY, UK Highways Agency, 2007)
[6] *'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*', 2011
[7] *'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes*', 2011

- Inadequate monitoring measures: Ob_505, Ob_507
- Recommendation for including a cover on every truck accessing the site: S_078

Response

***Generation of dust during construction causing health effects* (Ob_158 Ob_569, Ob_584, S_055, S_063, S_066, S_068, Ob_457.2, Ob_511.07, Ob_583.01)**

4.3.2 A detailed assessment outlining the potential dust impacts during the construction phase of the proposed road development is contained in Section 16.5.3.1 of Chapter 16 of the EIAR in accordance with TII methodology. Section 16.6.2 of Chapter 16 of the EIAR outlines details of mitigation measures that must be implemented during the construction phase of the proposed road development. This includes the provision of dust screens where sensitive receptors are located within 100m of the works and at the locations of the overlap of the proposed road development and the Lough Corrib cSAC and the area of the proposed road development adjacent to Moycullen Bogs NHA. In addition, all trucks entering and exiting the site will be covered to ensure no windblow effects from the transfer of materials.

4.3.3 The residual impact on air quality as a result of the construction phase of the proposed road development will be not significant following the implementation of mitigation measures outlined in Section 16.6 of Chapter 16 of the EIAR to minimise the generation and dispersion of dust. These mitigation measures were developed in accordance with the British Research Establishment (BRE) document 'Controlling particles, vapour and noise pollution from construction sites' and the Institute of Air Quality Management (IAQM) 'Guidance on the assessment of dust from demolition and construction', 2016. Dust deposition and PM_{10}/$PM_{2.5}$ monitoring shall be carried out to ensure the proper implementation of the mitigation measures. The monitoring of PM_{10} and $PM_{2.5}$ and the compliance with limit values will ensure no significant impacts on human health. The Construction Site Monitoring Team will be responsible for the successful development, implementation and maintenance of measures outlined in the Construction Environmental Management Plan (CEMP) at Appendix A7.5 of the EIAR, including those measures relating to air quality.

Inadequate construction mitigation (Ob_511.18, Ob_517.05. Ob_696.21, Ob_757, Ob_505, Ob_507, Ob_603)

4.3.4 Emissions to air during earthmoving and construction will occur, although the prevailing weather, the size of the site and its distance from sensitive receptors will assist in facilitating the management of any effects. The focus of the control procedures will therefore be to reduce the generation of airborne material at source.

4.3.5 The assessment of potential construction impacts includes the implementation of 'standard mitigation', as stated in the TII Guidelines. This will include the following measures (refer to Section 16.6.2 of Chapter 16 of the EIAR):

- Spraying of exposed earthwork activities and site haul roads during dry weather
- Provision of wheel washes at exit points
- Control of vehicle speeds and speed restrictions. It is proposed that site traffic is restricted to 20km/hr. This will help to minimise the occurrence of dust re-suspension
- Sweeping of hard surface roads

4.3.6 In addition, the further measures will be implemented based on best practice as outlined in the BRE and IAQM documents These include (refer to Section 16.6.2 of Chapter 16 of the EIAR):

- A public communication strategy will include details of a complaints register which will be implemented during the construction phase
- There shall be no long-term stockpiling on site and storage time will be minimised
- Water suppression will be used during the demolition of buildings

4.3.7 As noted above, dust screens will be implemented at locations where sensitive receptors are located within 100m of the works. In addition, a 2m high dust screen will be provided at the locations in the areas of the overlap of the proposed road development and the Lough Corrib cSAC and the area of the proposed road development adjacent to Moycullen Bogs NHA.

4.3.8 It is considered that the mitigation measures proposed are adequate to mitigate the potential for offsite dust impacts at sensitive receptors. It is noted that mitigation measures will be applied across the proposed road development, not just in proximity to sensitive receptors.

Dust suppression during blasting (Ob_511.18)

4.3.9 There are concerns at the Heath estate, Dangan, in relation to mitigation measures to supress dust during blasting. As outlined in Section 16.6 of the EIAR, during dry periods when dust generation is likely or during windy periods, construction areas and vehicles delivering material with dust forming potential will also be sprayed with water.

Inadequate monitoring during construction (Ob_505, Ob_507)

4.3.10 As outlined in Section 16.6.2 of Chapter 16 of the EIAR, dust deposition monitoring will be conducted at a number of locations in the vicinity of the proposed road development. At a minimum, monitoring will be carried out at the two nearest sensitive receptors at locations where works of a ‘major’ scale is proposed while works are taking place in their proximity.

4.3.11 In addition, particulate monitoring (PM_{10} and $PM_{2.5}$) will be carried out at the nearest sensitive receptors upwind and downwind of the construction works where sensitive receptors have been identified within 25m of the works. This monitoring

programme will take place when works likely to generate dust are being carried out. The monitoring will allow direct comparison with the PM_{10} and $PM_{2.5}$ air quality standards on a daily basis.

4.3.12 EPA guidance[8] states that *it may be appropriate, where relevant, to propose monitoring to take place after consent is granted in order to demonstrate that the project in practice conforms to the predictions made during the EIA.*

Monitoring provides assurance that proposed systems are operating as intended. This allows adjustments of operations to be made to ensure continued compliance with consent conditions such as emission limit values, conditions of operation, performance criteria/ indicators and detection of unexpected mitigation failures.

4.3.13 Therefore, should limit values be approaching an exceedance or in the event of a complaint due to elevated dust, an investigation will subsequently be carried out by the Construction Site Monitoring Team to determine whether measures are being properly implemented and the options available to reduce the level of dust.

4.3.14 All potential causes for the high levels will be analysed. These will include the construction works taking place, potential off-site sources and meteorological conditions. Should the construction works taking place be identified as the primary cause of the high level, the contractor will ensure that the mitigation measures listed in the EIAR and Construction Environmental Management Plan (CEMP) are being properly and fully implemented. Should high dust levels continue to occur following this review, the contractor will modify the construction works and/or the measures taking place.

4.3.15 For the purposes of Appropriate Assessment (AA), as outlined in Section 10.5.1 of the NIS (in relation to Measures to control dust emissions during Construction) *these procedures will be strictly monitored and assessed on a daily basis. In the event that elevated levels of dust are noted to occur outside the site boundary, satisfactory procedures will be implemented to rectify the problem before the resumption of construction operations*.

4.3.16 As discussed in the AA Statement of Evidence from Aebhin Cawley, the following mitigation and monitoring measures will apply in the vicinity of Natura 2000 sites:

- The Construction Site Monitoring Team will include a Project Ecologist
- The importance of monitoring and the taking of timely and effective corrective action as problems arise is acknowledged in the successful delivery of the mitigation measures detailed in the Schedule of Environmental Commitments (SoCs)

4.3.17 In addition, as outlined in Section 16.6 of Chapter 16 of the EIAR, it is proposed to carry out particulate monitoring (PM_{10} and $PM_{2.5}$) at the nearest sensitive receptors upwind and downwind of the construction works where sensitive receptors have been identified within 25m of the works. This monitoring

[8] EPA Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports Draft August 2017

programme will take place when works likely to generate dust are being carried out. The monitoring will allow direct comparison with the PM_{10} and $PM_{2.5}$ air quality standards on a daily basis. The implementation of an early warning system and review of the implementation of measures will ensure that no exceedances of standards occur.

Recommendation for covering every truck accessing the site (S_078)

4.3.18 This submission recommends that every truck hauling construction material be covered with electric trailer covers or tarpaulin. This measure is already included in the) CEMP in Appendix A.7.5 of the EIAR as follows: *during movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to reduce the potential for dust emissions*. Therefore, no air quality impacts are likely due to the hauling of construction material.

4.4 Pollution from traffic during the operational phase

Issues

4.4.1 33 submissions/objections raise the issue of the potential increased pollution due to the proposed road development. This includes the following points:

- The proposed road development will result in unmitigated air pollution: Ob_220, Ob_511.18, S_004, S_008, S_009, S_011, S_037, Ob_111, Ob_155, Ob_457.2, Ob_512.2, Ob_457.2
- Severe impacts on air quality will result causing harmful effects on health and vegetation: Ob_136, Ob_158, Ob_216, Ob_220, Ob_511.06, Ob_523, Ob_534, Ob_569, S038, S_041, S_055, S_056, S_063, S_066, S_068, Ob_531.02, Ob_111, Ob_155
- Pollution will be generated from diesel cars: Ob_523, Ob_666.02
- Loss of air quality due to accelerating and braking at junction: Ob_311, Ob517_05
- Operational air quality impact not adequately assessed: Ob_311, Ob517_05
- Baseline monitoring is inadequate: S_029
- Air quality impact at Bushypark National School: Ob_511.06

Response

Unmitigated air pollution (Ob_220, Ob_511.18, S_004, S_008, S_009, S_011, S_037, Ob_111, Ob_155, Ob_457.2, Ob_512.2, Ob_457.2)

4.4.2 A detailed assessment of air quality impacts during the operational phase of the proposed road development is contained in Section 16.5.4 of Chapter 16 of the EIAR. The assessment predicts the changes in air quality due to the proposed road development in the opening and design year. These predicted concentrations are then compared to relevant air quality standards (S.I. No. 180 of 2011). The air quality standards '*establish limit values and, as appropriate, alert thresholds for concentrations of certain pollutants in ambient air intended to avoid, prevent or reduce harmful effects on human health and the environment as a whole'*.

4.4.3 The DMRB[9] spreadsheet was used to predict future levels of pollution due to the proposed road development. The spreadsheet allows for the calculation of pollutant levels based on typical fleet composition. In addition, detailed modelling using the ADMS model was used to validate the spreadsheet assessment. Predicted concentrations are all well below air quality standards with some exceedances of WHO $PM_{2.5}$ guideline level due to high background concentrations. The predicted impact at three locations was deemed to be slight adverse using the ADMS model at Castlegar (R16), Upper Dangan (R17) and Letteragh (R20). A negligible impact was predicted at all other locations.

4.4.4 Pollutant emissions from vehicles are regulated as a result of European led controls. Since 1992, increasingly strict emission controls have been introduced for both cars and HDVs (Heavy Duty Vehicles). These have been introduced in six stages to date and consequently are known as Euro 1-6 controls (for cars and Light Goods Vehicles (LGVs)) and Euro I-VI (for HDVs (Heavy Duty Vehicles)), Euro 6/VI are the most recent controls. Each new Euro stage requires reductions in emissions of NOx and PM_{10}. A summary of the controls for LGVs and HDVs is shown in Tables 1 and 2 below.

Table 1: Euro Emission standards for LGVs

Euro standard	Date for new type approval	NOx emissions (g/km)		PM emissions (g/km)	
		Petrol	Diesel	Petrol	Diesel
Euro 1	1992	0.97	0.97	n/a	0.14
Euro 2	1997	0.5	0.7	n/a	0.08
Euro 3	2000	0.15	0.5	n/a	0.05
Euro 4	2005	0.08	0.25	n/a	0.06
Euro 5	2011	0.06	0.18	0.005	0.005
Euro 6d	2020	0.06	0.08	0.005	0.005

[9] Part 1 HA 207/07 Air Quality

Table 2: Euro Emission Standards for HDVs

Euro standard	Date for new type approval	NOx emissions (g/kWh)	PM emissions (g/kWh)
Euro I	1992	8	0.612 (engines less than 85 kW) 0.36 (engines more than 85 kW)
Euro II	1996	7	0.25 0.15 (1998 regulation)
Euro III	2000	5	0.1
Euro IV	2005	3.5	0.2
Euro V	2008	2.0	0.2
Euro VI	2013	0.4	0.1

4.4.5 For cars, the Euro 6d emission controls are being introduced in stages and a new test cycle will be used to determine compliance using more "on the road conditions". As newer vehicles enter the Irish fleet, average emission rates of NOx and particulate matter will reduce and therefore there can be expected to be continuing improvement of air quality in future years. In addition, there is uncertainty regarding how quickly pollutant emissions will fall particularly as previous emission controls have not reduced NOx emissions as much as expected. Therefore, for the purposes of a conservative assessment, the existing baseline air quality has been applied to future assessment years.

4.4.6 In 2024, the highest concentration of pollutants is predicted (including the background concentrations) as a result of the DS scenario to be 36% of the AQS for NO_2 (of which the proposed road development contributes 13%), 48% of the AQS for PM_{10} (of which the proposed road development contributes 5%) 57% of the proposed AQS for $PM_{2.5}$ (of which the proposed road development contributes 9%).

4.4.7 In 2039, the highest concentration of pollutants is predicted (including the background concentrations) as a result of the DS scenario at the worst-case receptor (R17, Upper Dangan) to be 37% of the AQS for NO_2 (of which the proposed road development contributes 14%), 48% of the AQS for PM_{10} (of which the proposed road development contributes 5.7%) 54% of the proposed AQS for $PM_{2.5}$ (of which the proposed road development contributes 6.4%).

4.4.8 As no significant impacts are predicted to occur, no mitigation measures are required during the operational phase of the proposed road development.

Severe impacts on air quality will result causing harmful effects on health and vegetation (Ob_136, Ob_158, Ob_216, Ob_220, Ob_511.06, Ob_523, Ob_534, Ob_569, S038, S_041, S_055, S_056, S_063, S_066, S_068, Ob_531.02, Ob_111, Ob_155)

4.4.9 As stated in Section 3.7 above, predicted concentrations due to the proposed road development are all well below air quality standards for the protection of human health and vegetation with exceedances of the stringent WHO $PM_{2.5}$ guideline level at the majority of receptors due to elevated background concentrations. The predicted impact at two locations (R16 and R17 at Castlegar and Upper Dangan) was deemed to be slight adverse, using DMRB methodology. A negligible impact was predicted at all other locations. Chapter 18 of the EIAR (Human Beings, Population and Human Health) considers the health effects relating to air quality and Dr Martin Hogan in his Statement of Evidence considers the health effects relating to air quality as raised in certain submissions/objections.

4.4.10 The proposed road development will result in more free-flowing traffic by removing congestion from Galway City. As stated previously, there are a number of locations where traffic is predicted to reduce on the local road network. The proposed road development will improve air quality in areas where decreases in traffic volumes is predicted to occur. Table 16.28 of Chapter 16 of the EIAR provides details on these projected decreases. The reduction in traffic will result in a localised improvement of air quality in these regions, which will be particularly evident where sensitive receptors are adjacent to roadways and traffic reductions are substantial. On some routes, traffic volumes are predicted to decrease by over 70%. The following routes are projected to experience reductions in Annual Average Daily Traffic (AADT) of in excess of 40% in either 2024 or 2039:

- Existing N6 South of Briarhill – in proximity to the housing estate, An Sean Bhaile
- Existing N6 near Ballybrit Business Park – in proximity to housing estates in Ballybrit
- Existing N6 Between N84 and N83 – in proximity to housing estates and amenity areas
- R338 at Westside Playing fields - adjacent to housing estates and amenity areas
- R337 Kingston Road, Kingston -adjacent to housing estates and amenity areas
- R336. Bearna Road, Bearna Woods – adjacent to housing estates and amenity areas
- R336. Bearna Road, Bearna. Creagan bus stop - adjacent to housing estates and amenity areas
- Boleybeg Road. Between Cappagh Road and Ballymoneen Road – in proximity to a number of dwellings and a school

- Cappagh Road - North of the proposed road development - in proximity to a number of dwellings

These decreases in traffic volumes will result in improved air quality.

Pollution will be generated from diesel cars (Ob_523, Ob_666.02)

4.4.11 As outlined previously, worst-case assumptions for diesel and petrol vehicle emissions were included in the DMRB assessment. In addition, no improvement in background concentrations were assumed for future year projections, which are to be expected due to increases in EV and improved vehicle technologies. This represents a worst-case scenario, as some improvements are likely during this period. The results of the assessment show compliance with air quality standards even with those worst-case assumptions.

Loss of air quality due to accelerating and braking at junction (Ob_663.02)

4.4.12 For the purposes of the ADMS modelling assessment, and as recommended in TII Guidelines, traffic speeds were slowed at junctions to 20kph, for a distance of 50m from the yield/stop line. This takes into account the air quality effects of accelerating and braking at junction locations.

Operational air quality impact not adequately assessed (Ob_311, Ob517_05)

4.4.13 The operational air quality impact assessment was carried out in accordance with TII guidance which advises the use of the DMRB spreadsheet for the assessment. As stated previously the DMRB model was last updated in 2007 and accounts for modelled years up to 2025. The model does account for improvements in the national fleet in future years but does not account for this to 2039. Vehicle emission standards up to Euro V are included but since 2017 and, Euro 6d standards are now applicable for the new fleet. As a result of these developments, predictions to 2039 are not accurately reflected within the DMRB model and are conservative in nature. Predicted concentrations are all in compliance with air quality standards which were developed to protect human health and the environment as a whole. In order to verify the DMRB modelling results, the ADMS model was also used in the assessment. On this basis, the operational impacts of the proposed road development were adequately assessed.

Baseline monitoring is inadequate (S_029)

4.4.14 As outlined in TII guidance, *wherever possible, use should be made of existing air quality data. These may have been collected as part of national or local government programmes, or as part of air quality assessments related to other development schemes*. The EPA carry out longterm monitoring throughout Ireland at approximately 50 locations, including three stations in Galway. This long-term monitoring, in combination with three months of local air quality monitoring was used for the purposes of determining the background levels of air quality. This approach is deemed to be adequate and in accordance with TII guidance.

Air quality impact at Bushypark National School (Ob_511.06)

4.4.15 It is contended that the proposed road development will pose a significant health and safety risk to children at Bushypark National School with impacts on air quality. An assessment of the potential impact on air quality has been carried out at the location of the school, the results of the assessment (including background levels) are presented in the table below. The proposed road development is predicted to result in a negligible impact on air quality at Bushypark National School.

Table 3: Air Quality predictions at Bushypark National School

	NO_2	**PM_{10}**	**$PM_{2.5}$**	**PM_{10}**	**CO**	**Benzene**
	(µg/m³)	**(µg/m³)**	**(µg/m³)**	**(Days > 50 µg/m³)**	**(µg/m³)**	**(µg/m³)**
2024 DM	9.36	17.11	9.5	0.8	333	0.401
2024 DS	9.62	17.18	9.54	0.85	335	0.404
2024 DS-DM	0.27	0.07	0.04	0.05	2	0.003
Impact Description	Negligible	Negligible	Negligible	Negligible	n/a	n/a
2039 DM	9.4	17.11	9.5	0.8	333	0.401
2039 DS	9.6	17.19	9.6	0.85	336	0.405
2039 DS-DM	0.2	0.08	0.1	0.05	3	0.004
Impact Description	Negligible	Negligible	Negligible	Negligible	n/a	n/a

4.4.16 Air quality monitoring was carried out in the grounds of Bushypark National School between February and May 2017. Measured levels of NO_2 were all less than 10µg/m³, which is easily in compliance with the annual limit of 40 µg/m³.

5 Conclusion in relation to Air Quality

5.1 Mitigation measures will be implemented during the construction phase of the proposed road development to ensure no significant dust impacts off site. Dust deposition monitoring and PM_{10}/$PM_{2.5}$ monitoring will be carried out at the nearest sensitive receptors during the construction phase.

5.2 During the operational phase of the proposed road development, a worst-case impact of slight negative is predicted to occur at two of the sensitive receptors assessed using DMRB methodology. At all other receptors modelled, a negligible impact is predicted. Air quality standards are complied with at all locations for all scenarios. The proposed road development will have a positive impact on routes where reductions in road traffic volumes are projected to occur. In general, these routes are in proximity to residential areas which will experience improvements in air quality.

5.3 The issues raised in the submissions and observations in relation to potential impacts on air quality have been fully considered, and having considered those issues, the conclusions of the air quality impact appraisal remain as set out in the EIAR.

6 Climate

6.1 Carbon Emissions Update

6.1.1 The estimate of the carbon emissions from both the construction and operational phases of the N6 Galway City Ring Road (GCRR) have been updated since the publication of the EIAR with the result that the data presented in Chapter 16 of the EIAR for carbon emissions have been reduced for both the construction and operation stages. As noted in the Statement of Evidence of Eileen McCarthy, carbon generation was considered during the design evolution stage and measures were implemented into the design to minimise the impact on carbon emissions.

Construction carbon emissions update

6.1.2 The construction carbon assessment included in Chapter 16 of the EIAR was prepared using the UK Environment Agency Carbon Calculator, which bases emission factors on the 2010 Inventory of Carbon and Energy (ICE) database, which is one of the world's leading sources of embodied energy and carbon data. In November 2019, the University of Bath published an update to this database. Using the updated emission factors from the November 2019 ICE database and using the CESMM4 Carbon & Price Book 2013[10] database, the carbon emissions from the construction phase of the proposed road development have since been re-evaluated.

[10] Civil Engineering Standard Method of Measurement, Fourth edition.

6.1.3 The following table outlines the findings of the revised assessment which shows that the carbon emission at the construction phase is significantly lower (in the order of 123,000 CO_2e tonnes) than that set out in Chapter 16 of the EIAR.

Table 4: Carbon Emissions for the construction phase of the proposed road development

Construction Phase	Carbon Emissions (CO_2e Tonnes) (EIAR)	Revised Carbon Emissions (CO_2e Tonnes)
Year 1	150,000 worse case year	38,420
Year 2		52,254
Year 3		61,393
Total	275,000	152,067

6.1.4 The main reasons for the positive reduction is the update to the emission factors. As concrete is one of the larger contributors to the embodied carbon, a change to the emission factor associated with it influences the overall value. The revised calculations above include for the use of reinforced concrete with an emission factor of 0.0949 $KgCO_2e/Kg$ and hence the reduction in predicted carbon emissions.

Operational carbon emissions update

6.1.5 Table 16.39 in Section 16.5.4.5 of Chapter 16 of the EIAR presented predicted levels of CO_2e during the operational phase of the proposed road development of 26,059 tonnes per year in 2024 and 35,776 tonnes in 2039 above that of do-minimum scenario.

6.1.6 This was subsequently updated in the Request for Further Information (RFI) Response, Appendix A.8.3 Section 2.3.4.1 to take account of the National Planning Framework (NPF) population increases in 2039. These levels were based on calculations completed using the UK DMRB spreadsheet, produced in 2007. The carbon emission factors used in the spreadsheet were calculated from the fuel consumption values using average densities for petrol and diesel and carbon proportions by mass. The spreadsheet accounts for future improvements in vehicle technology and changes in fuel composition up to 2025. However, it did not account for the adoption of Electric Vehicles (EV).

6.1.7 The *Climate Action Plan 2019* proposes the introduction of new legislation to (i) ban the sale of new fossil fuel cars from 2030 and (ii) stop the granting of NCT certificates from 2045 to fossil fuel cars[11]. The Climate Action Plan, 2019 target is that by 2030, 840,000 EV will be in use on Irish roads.

[11] A Draft General Scheme of the Climate Action (Amendment) Bill 2019 in January 2020

6.1.8 The *National Transport Model Update December 2019* estimates that car ownership will amount to 2.64m by 2030 in Ireland. Based on this, approximately 32% of vehicles will be EV by 2030. However, for the purposes of the analysis that follows, on a conservative approach it is reasonable to assume that say 70% of this 32% target will be met, i.e. 22% of EVs are achieved. Both scenarios are assessed below.

6.1.9 The Eirgid Group Strategy 2020-2025 states that Ireland's target for electricity from renewable sources by 2030 is 70%. The strategy indicates that 70% of the electricity used to power EV in 2030 would be from renewable sources and have zero carbon emissions. This is reiterated in the Climate Action Plan; *Action 17: Ensure that ESB Networks and EirGrid plan network and deliver on connecting renewable energy sources to meet the 2030 70% RES-E target.* The Plan puts in place a decarbonisation pathway to 2030 which would be consistent with the adoption of a net zero target in Ireland by 2050. Applying an equal reduction annually between 2030 and 2050, results in an estimate of 83.5% of the electricity used to power EV in 2039 being from renewable sources and generate zero carbon emissions.

6.1.10 The results for operational carbon emissions which were presented in Table 5 of Section 2.3.4.1 of Appendix A.8.3 of the RFI Response, are further updated in Table 5 below.

Table 5: Total Estimated CO_2e produced as a result of the operation of the proposed road development, taking account of the NPF

Scenario	Year	Tonnes/annum CO_2e[12]
Do-minimum	2039	98,226
Do-something	2039	137,853
Increase		45,627

6.1.11 Applying the assumptions outlined above regarding the number of EV projected and the renewable source of the electricity supply, the following revised results were calculated.

Table 6: Total Estimated CO_2e produced as a result of the operation of the proposed road development, taking account of the NPF and Electric Vehicles (22% and 32%)

Scenario	Year	Percentage of EV (%)	Tonnes/annum CO_2e
Do-minimum	2039	22	75,038
		32	67,583
Do-something	2039	22	112,162
		32	101,018
Increase	2039	22	37,124
		32	33,435

[12] Updated from the data presented in the RFI response taking account of all affected roads within the model zone as opposed to the roads where there is a 5% increase in traffic predicted.

6.1.12 Therefore, it is estimated that a conservative approach to the projected increased use of EV (22%) and the powering of these vehicles by renewable sources would result in a reduction in CO_2e emissions of 8,503 tonnes per annum compared to those emissions estimated in the RFI Response, a reduction of 19%. The application of the 32% EV use would result in a reduction of 12,192t/a which equates to a percentage of 27%.

6.1.13 The impact of generating CO_2e emissions can be offset through the planting of trees which form part of the proposed road development. In total over 43.2 hectares of land within the proposed development boundary has been allocated to 'Screen Planting', 'Retention of Boundary', 'Hedgerow and/or edge of Retained Vegetation', 'Proposed Street Tree Planting', 'Tree and Shrub Planting and Grass Seeding' and 'Ecology-Related Landscape Measures'. At a sequestration rate of 2.4 tonnes of CO_2e per hectare per year[13] for beech (70%) and 1.4 tonnes of CO_2e per hectare per year for scots pine (30%), this equates to approximately 94 tonnes of CO_2e sequestered per year.

6.1.14 The re-evaluation of the carbon emissions from the operational phase taking account of the NPF and electric vehicles and the offset from the planting results in a total reduction of 8,597 tonnes/annum CO_2e applying the 22% EV factor and 12,286 tonnes/annum using the 32% factor.

6.1.15 It should also be noted that carbon emissions from cars are being continuously reduced at EU level. Since 2015, a target of 130g of CO_2 per km applies to new passenger cars. By 2021, all newly registered cars will need to achieve a target of 95g of CO_2 per km.

6.2 Climate Assessment Update

6.2.1 While there are, as set out above, reductions in the carbon emissions from what was contained in Chapter 16 of the EIAR as published in October 2018 and the RFI Response submitted in August 2019, a number of new policies and commitments have been introduced which are relevant to the climate impact assessment. These are as follows: (a) Climate Action Plan 2019; (b) the publication of Draft General Scheme of the Climate Action (Amendment) Bill 2019 in January 2020; (c) Ireland's declaration of a climate and biodiversity emergency in May 2019 and (d) in November 2019, the European Parliament approval of a resolution declaring a climate and environment emergency in Europe. As I explain later this has resulted in a much more sensitive baseline environment for the assessment of impacts.

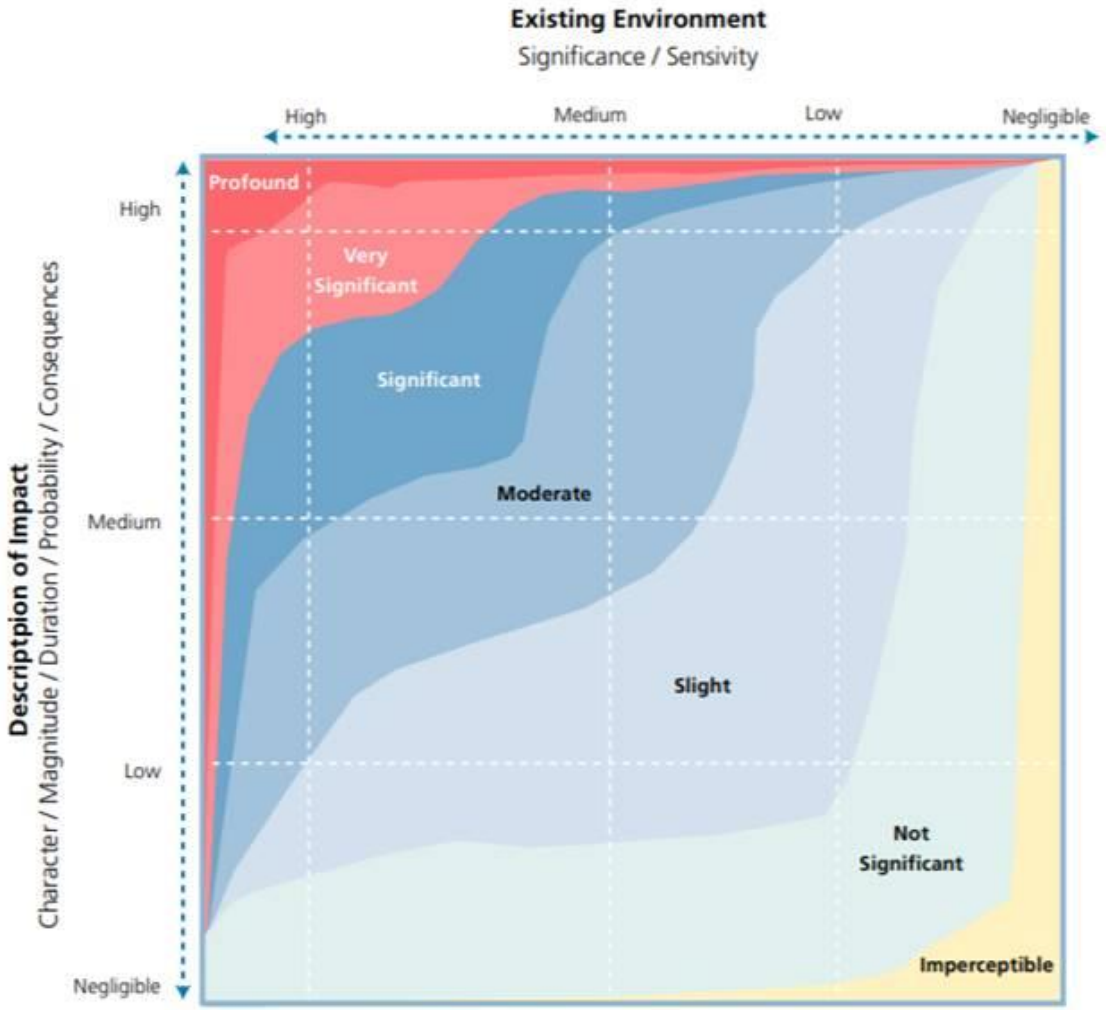
6.2.2 Regulation (EU) 2018/842 which became effective from 9 July 2018 sets binding annual greenhouse gas emission reductions by member states from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement. This regulation sets country-specific emission reduction targets which were not previously specified. Ireland was set a 30% reduction in emissions by 2030 compared to 2005 levels under this regulation which translates into a limit of

13 http://woodenergy.ie/media/coford/content/publications/projectreports/cofordconnects/CarbonSequestration.pdf

approximately 32 Mt CO_2 eq for Ireland's non-ETS emissions in 2030. This more stringent 2030 limit results in a higher level of impact than that previously assessed and in accordance with EPA guidance, the magnitude of the impact of this proposed road development is now deemed to be of a 'medium' level.

6.2.3 The rating of significance to determine the impact on climate is based on EPA draft Guidelines on Information to be Contained in EIAR (2017). The guidance states that '*significance is determined by a combination of (objective) scientific and subjective (social) concerns'*. It shows how a comparison of the character of the predicted impact to the sensitivity of the receiving environment can determine the significance of the impact (see Figure 1 below which is a copy of Figure 3.5 of the EPA Guidance[14]). This clearly shows that, in cases where the receiving environment is determined to have a high sensitivity, then even a low or medium-level impact could result in a classification of a significant impact.

Figure 1: Chart showing typical classifications of the significance of impacts (extracted from EPA Guidance)



[14] Guidelines on the information to be contained in environmental impact assessment reports, Draft August 2017

6.2.4 The policy changes mentioned above coupled with a significant increase in social concerns on climate change, together with the fact that Ireland's emissions have increased year on year from 2014 to 2019 and have exceeded the agreed targets since 2016 results in a much more sensitive baseline environment to that outlined in the EIAR. Therefore, in accordance with EPA guidance, for a highly sensitive existing environment, with a medium magnitude of impact, a significant impact can result.

6.2.5 Because of this more sensitive baseline environment and even though the updated figures show a reduction in carbon emissions at both construction and operational stages compared to the EIAR/NPF assessment, the proposed road development is regarded as likely to have a significant negative impact on carbon emissions and climate.

6.2.6 It is notable that the Institute of Environmental Management and Assessment (IEMA) guidance note on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance', which is considered to be the industry's best practice guidance in the UK, advises that all carbon emissions contribute to climate change and in the absence of a defined threshold (e.g. national sector specific targets and trajectories), any increase (or decrease) to carbon emissions may be considered as significant.

6.2.7 Therefore, based on this guidance, any increase at all in carbon emissions attract a "significant" impact rating. For instance, the construction of a fairly standard housing development of 100 units (a semi-detached house is estimated to generate 38.7 tonnes of CO_2e[15]) would result in 3,870 tonnes of CO_2e and this would also attract a rating of significant impact based on the same sensitive baseline environment.

[15] https://www.ecocem.ie/wp-content/uploads/2016/08/ECE008-Environmental-CO2-and-other-Polluntants-Embodied_CO2_of_housing_construction_in_Ireland.pdf

7 Responses to Submissions/Objections in relation to Climate

7.1 Overview

7.1.1 20 of the 296 submissions and objections made to An Bórd Pleanála (ABP) in respect of the N6 Galway City Ring Road (GCRR) Environmental Impact Assessment Report (EIAR), Natura Impact Statement (NIS), Motorway Scheme (MS) and Protected Road Scheme (PRS) relate to carbon emissions and climate change. The items raised in these submissions are on the issue of the potential increase in carbon emissions due to the proposed road development. One of the 17 submissions received in relation to the Request for Further Information Response related to carbon emissions and climate change. The issues raised in these submissions/objections are:

- The proposed road development is unsustainable as it results in an increase in carbon emissions which is at variance to Irelands' obligations to reduce emissions leading to fines by the EU;
- The carbon footprint of the proposed road development is unacceptable;
- The proposed road development results in unmitigated greenhouse gas impacts;
- Questions the adequacy of the climate assessment completed;
- Suggests that the traffic assessment failed to account for induced traffic and therefore the carbon emissions are underestimated.

7.2 Carbon Emissions and climate change

Issues

7.2.1 19 of submissions/objections raise concerns in relation to carbon emissions and climate change. They claim that the proposed road development will result in an increase in carbon emissions, which is at variance to Ireland's obligations to reduce emissions and leading to fines by the EU. The following submissions raised this issue: Ob_136, Ob_201 Ob_216, Ob_220, Ob_311, Ob_511.6, S_006, S_008, S_009, S_012, S_013, S_015, S_016, S_017, S_021, S_032, S_042, S_049.2 and S_070 as follows:

7.2.2 Ob_136 *"On top of that it is releasing harmful CO_2 emissions from this proposed motorway into the atmosphere in not just my region, the whole region of all the motorway plan from east Galway city to west Galway City. As of recent were we not told that Ireland as a country had to start reducing carbon emissions to reduce the effect of global warming by environmental agencies not just from Ireland but all over the world. Instead of reducing carbon emissions this proposed motorway does the opposite it will increase pollution making it worse."*

7.2.3 Ob_201 *"The climate change performance Index is produced annually on the basis of joint analysis by two organisations; Germanwatch and the New Climate Institute and as of Tuesday 11 of December Ireland has been rated 48th out of 56 countries worldwide and worst in Europe when it comes to action on climate change. The actual construction of the new road and the promotion of high speed vehicle movement along the road will add to world climate change and problems. We should be looking to alternative 'green' transport mechanisms."*

7.2.4 Ob_216 "*not to mention increased carbon dioxide at variance with Ireland's carbon dioxide reducing obligations under both EU and international law*."

7.2.5 Ob_220 "*The EIAR outlines that the project will not alleviate traffic congestion in Galway city and County but result in an increase in car dependence from 66.7% to 67.3% (Table 6.32), increase light, noise and air pollution and aid Ireland in missing both the EU 2020 and 2030 targets for reducing emissions as it will lead to an increase in our current emissions".*

7.2.6 *Galway will lead to an overall increase in our emissions as a country and will lead to massive fines from the EU if we do not deliver on our agreements by 2020 and again in 2030."*

7.2.7 Ob_311 *"Our clients are looking for further clarity and information on the studies carried out by the council and their experts as part of this application on air and water quality & pollution to same from the new scheme, effect of the new road on their families health, smells from the traffic, increase in carbon emissions, loss of light/ shadowing from the new road, speed limits on the new road relating to their home and retained property."*

7.2.8 Ob_511.06 *"sustainable development policy context 'achieving sustainable levels of transport energy use and reducing transport greenhouse gas emissions'…at a time when Ireland is faced with overwhelming challenges to meet environmental and climate change commitments, GCC has ignored the global and national imperatives for sustainable development and is missing an opportunity to plan this region for the future, instead relying on outmoded planning ideas about automotive-centric urban/regional development. Cities throughout the developed world are urgently adapting to the new realities of looming environmental and climate change catastrophes, by restricting automotive access and investing in sustainable public transport solutions, accompanied by higher-density urban living and working spaces."*

7.2.9 S_006 in Section 6 of the submission/objection questions the measures of mitigating greenhouse gas emissions.

7.2.10 S_008 *"The EIAR failed to provide any mitigation measures regarding traffic generation and climate emissions".*

7.2.11 S_009 raises concerns that the proposed road development is unsustainable development contributing to an increase in Carbon Emissions.

7.2.12 S_012 suggests that the proposed road development is in conflict with the NPF and sustainable development and in conflict with Ireland's "*commitments under*

climate change legislation which at a minimum obliges us to reduce our carbon emissions by 2020, 2030 and 2050".

7.2.13 S_013 "*The proposed road breaches Ireland's legally binding commitments to reduce greenhouse gas emissions and its commitments under the 2015 Paris Agreement to the United Nations Framework Convention on Climate Change"*.

7.2.14 S_015 "*The carbon footprint which will be created, unabated and uncontrolled, from this project will be irreversible and totally unacceptable, particularly considering our serious obligations under Climate Change Legislation*."

7.2.15 S_016 "*In this day and age with such an international human cry about reducing CO_2 emissions, and the over use of the car, what is this road going to do? It will just compound the whole problem, and create more space for more cars.*"

7.2.16 S_017 suggests there are more sustainable options that must be considered particularly in the context of the obligations under the Climate Action and Low Carbon Development Act 2015. Mitigation measures for the carbon emissions need to be considered and *"the proposal has an individual and cumulative impact on climate, principally because of continued unsustainable private motorised traffic generation."*.

7.2.17 S_021 suggests there are more sustainable options that must be considered particularly in the context of the obligations under the Climate Action and Low Carbon Development Act 2015.

7.2.18 S_032 "*increased road development runs counter to our climate change commitments*".

7.2.19 S_042 "*not to mention increased carbon dioxide at variance with Ireland's carbon dioxide reducing obligations under both EU and international law*."

7.2.20 S_049.2 *"The lack of a coherent public transport solution as an alternative to the N6 GCRR 2019 infrastructure proposal is shocking and is in serious contravention with regards to our national obligations in reducing carbon emissions. The prioritisation of a road motorway since the initiation of this project in 2013 is clear failure to understand the complex nature and varied solutions required to reduce car dependency in Galway City & surrounding environs".*

7.2.21 S_70 *"the recent climate change conference required the reduction in carbon emissions and therefore climatic impacts" and "The N6GCRR will add to Carbon Dioxide emissions. It is noteworthy that Ireland was seen to achieve least of all in CO_2 emission reductions among all our EU partners"* and *"there are no proposals for reducing carbon emissions and climate impacts"*.

Responses

7.2.22 We acknowledge that the proposed road development results in an increase in carbon emissions which, for the reasons explained above, is regarded as a significant adverse impact. However, it is important to provide some context, as carbon emissions arise from virtually all activities in which we engage.

7.2.23 The National Planning Framework (NPF) highlights the limitations of the "business as usual" approach and advocates a new region-focused strategy for managing growth to meet the projected population and employment growth in the next two decades. Compact growth, enhanced regional accessibility, sustainable mobility and transition to a low carbon and climate resilient society are National Strategic Outcomes in the NPF and are underpinned by the strategic investment priorities in the National Development Plan (NDP).

7.2.24 This planning framework is based upon compact connected urban growth to support ambitious growth targets in the four regional cities (including Galway) so that they become stronger accessible regional cities of scale. Section 2.6 of the NPF states that the physical format of urban development in Ireland is one of our greatest national development challenges resulting in 'a significantly higher carbon footprint than the EU average'. The NPF prefers a compact growth approach with a focus on the development of infill and brownfield sites to achieve a target of 50% of future housing being provided within the footprint of the existing built-up area in Galway. This development template together with the integration of transport and land use in the statutory development plans will facilitate the provision of improved public transport and other active modes thereby encouraging modal shift. The delivery of the Galway City Ring Road is listed as a key future growth enabler for Galway in the NPF.

7.2.25 The operational carbon emissions results presented in Table 2 of this Statement of Evidence focussed on the project-level impacts of the proposed road development across Galway City and its environs. In light of the planned expansion of Galway City and Galway County under the NPF, and with consideration to the impact footprint of the proposed road development in terms of traffic movements, a separate assessment has been undertaken of the operational impacts of the proposed road development at a County level, as the effects of the proposed road development are evidenced in a wider context than the project only assessment.

7.2.26 The update of the traffic assessment taking account of the NPF, revealed that, when comparing the-Do Minimum scenario to the Do-Something Scenario (both of which include the NPF growth targets), the inclusion of the proposed road development will result in a 5%-6% increase in vehicle kilometres travelled across the County. This is due to improved accessibility options and traffic diversion that is provided by the inclusion of the proposed road development.

7.2.27 At a county level, with the proposed road development in place, and all else being as per the Do-Minimum, the increase in vehicle kilometres travelled and other network operation characteristics will contribute to a growth in carbon emissions from transport estimated to be of the order of 2.9%. What these figures do not

reveal is the opportunity cost of not progressing with the proposed road development. The lack of investment in transport infrastructure, as set out in the Do-Minimum scenario, will result in a severe level of congestion experienced by all transport modes which would suppress travel movements either side of the River Corrib. This would ultimately result in the isolation of areas of the city and county, leading to further relocation of activities away from the city core, a reduction in the range of employment opportunities and an overall reduction in the quality of life of the residents of the city. This scenario fails to meet the proposed road development project objectives or the sustainable development goals of the NPF.

7.2.28 In contrast to this, and as presented in the induced traffic section of Andrew Archer's Statement of Evidence, the inclusion of the proposed road development will improve accessibility across the city and divert traffic from regional and national routes within the city centre onto the proposed N6 GCRR. These travel responses are intended functions of the proposed road development and will have the following benefits compared to the Do-Minimum scenario:

- Facilitate the sustainable development of Galway City and County as it grows to meet the NPF
- **Safer urban streets**: Up to 10% decrease in overall traffic levels in the city centre during peak times
- **Improved air quality**: 16% reduction in NOx, PM_{10} and $PM_{2.5}$ in city centre
- **Safer environment for vulnerable road users**: Up to 38% decrease in HGV traffic in centre during peak times
- **Quicker and more reliable Public Transport journey times**: 10% reduction in bus journey times into the city
- **Improved East-West connectivity of the city and region**: Journey times from east to west across the city on N6 are 31% quicker
- **Shorter travel times for all modes**: 17% reduction in average journey times in peak travel periods

7.2.29 Further analysis of the NPF growth scenario indicates that trip lengths from the proposed infill developments will be 15% shorter than the average for the city and 31% shorter than the average for the county. This shows that delivery of compact growth as set out under NPF will help reduce trip lengths in the city and associated carbon emissions. This demonstrates the benefit of delivering compact growth in the city and illustrates that the city will be able to develop in a sustainable manner under NPF policy, accommodating a 50% increase in population and a similar increase in employment in Galway City. As highlighted above, the proposed road development will play a critical role in the sustainable growth of the city as it will allow the transport network, and economy, to operate efficiently with the additional growth in place.

7.2.30 In isolation, the analysis indicates that the proposed road development will contribute to an increase in carbon emissions from transport. On the other hand, the inclusion of the proposed road development does result in a considerable reduction in traffic volumes in the city centre, creating a safer and healthier environment for pedestrians and cyclists, and more efficient network for public transport users. The proposed road development therefore creates an environment conducive to the investment in sustainable modes as set out in the Galway Transport Strategy (GTS). The delivery of these modes, in tandem with the NPF aligned land use policy, will help encourage more sustainable travel.

7.2.31 The Climate Action Plan 2019 recognises the challenge for the transport sector associated with the projected population and jobs growth in Project Ireland 2040 as is clear in the following extract from Section 10.1.

> *By 2040, the population of Ireland is expected to grow by over 1 million to 5.7 million people. This growth, along with other National Planning Framework (NPF) growth projections on the economy and employment rates, will drive greater demand for transport across various modes, with increased movement of people and goods. While this is a sign of a vibrant economy, it intensifies our decarbonisation challenge, in particular as transport accounted for 19.8% of Ireland's greenhouse gases in 2017.*
>
> *…While Project Ireland 2040 will drive more compact, connected development, and new public transport networks, they will not on their own reverse the growth of emissions which are projected to grow by 25%.*

7.2.32 Fiscal measures to promote the electrification of all forms of transport are emphasised in the Climate Action Plan because these measures offer the most cost-effective abatement opportunity in the sector. The Government proposes policies to reduce the transport intensity of future growth through the compact growth model in the NPF and the expansion of walking, cycling and public transport options to promote modal shift. Other measures to reduce the carbon intensity of travel include, inter alia, following:

- ensuring the EV charging network underpins public confidence
- accelerating steps to decarbonise the public transport fleet
- enhancing priority for public transport
- developing a strategy for the heavy freight sector

7.2.33 As noted above, taken in isolation and given the more sensitive baseline environment, the proposed road development will contribute to an increase in carbon emissions from transport. However, the inclusion of the proposed road development does result in a considerable reduction in traffic volumes in the city centre, creating a safer and healthier environment for pedestrians and cyclists, and more efficient network for public transport users. The proposed road development therefore creates an environment conducive to the investment in more sustainable

modes as set out in the GTS. The delivery of these modes, in tandem with the NPF aligned land use policy, will help encourage more sustainable travel.

7.3 Adequacy of climate assessment

Issues

7.3.1 One submission/objection, S_023, questioned the adequacy of the climate assessment completed of the proposed road development.

Response

7.3.2 The climate impact assessment in Section 16.2 of Chapter 16 of the EIAR, adhered to the EPA guidelines (2002, 2003, Draft, September 2015 and Draft, May 2017) in terms of content and methodology of assessment (ref. Section 16.2.1) and Climate change obligations and policy (ref. section 16.2.2), as available at the time of completion of the EIAR assessment. The assessment was carried out in accordance with TII guidance and is considered the best practice approach in assessing the impact of traffic on carbon emissions.

7.3.3 As mentioned above, since the publication of the EIAR, a number of new policies and commitments have been introduced. The climate impact assessment has been updated as detailed above.

7.3.4 The assessment of carbon emissions is deemed robust and in accordance with best practice. Further clarity on data used in the assessment and the methods used have been provided in this response.

7.4 Carbon emissions underestimated

Issues

7.4.1 One submission/objection, S_70, suggests that the traffic assessment failed to account for induced traffic and therefore the carbon emissions are underestimated.

"Failing to properly forecast traffic levels and failing to properly include induced traffic results in an underestimate of the full Environmental impact particularly in terms of noise and carbon dioxide emissions".

Response

7.4.2 As detailed in Andrew Archer's Statement of Evidence, induced traffic was included in the traffic assessment of the proposed road development and as such the carbon emissions due to the operation of the proposed road development are not underestimated.

8 Conclusion in relation to Climate

8.1 There are reductions in the projected carbon emissions from what was contained in the EIAR, both at construction and operational stage. However, a number of new policies and commitments were introduced which are relevant to the climate impact assessment and these coupled with a significant increase in social concerns on climate change, together with the fact that Ireland's emissions have increased year on year from 2014 to 2019 results in a more sensitive baseline environment to that outlined in the EIAR. Therefore, in accordance with EPA guidance, in the context of a highly sensitive existing environment, with a medium magnitude of impact, a significant impact can result. Because of this more sensitive baseline environment, and even though the updated figures show a reduction in carbon emissions at both construction and operational stages, the proposed road development is regarded as likely to have a significant adverse impact on carbon emissions and climate.

8.2 However, this impact has to be considered in context. Firstly, applying the same methodology, any significant construction project will result in a significant adverse impact on carbon emissions and climate. Secondly, the proposed road development creates an environment conducive to the investment in more sustainable modes as set out in the GTS, which will help encourage sustainable travel.