

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 Human Health
Objection/Submissions
by
Dr Martin Hogan FRCPI FFOM
Corporate Health Ireland

20 February 2020

1 Qualifications and Experience

- 1.1 My name is Dr Martin Gerard Hogan and I hold a primary medical degree from University College Cork (1987). Among other qualifications, I am a Fellow of the Faculty of Occupational Medicine of the Royal College of Physicians of Ireland and I am also a Fellow of the Royal College of Physicians of Ireland (FRCPI) since 2009.
- 1.2 I am a registered specialist in occupational medicine with the Irish Medical Council. I am currently a full time Consultant Occupational & Environmental. I am a past Dean of the Faculty of Occupational Medicine of the Royal College of Physicians of Ireland. I am a Lecturer in Toxicology, University College Cork. I am a specialist trainer in occupational medicine since 1997. I am an examiner with the Faculty. I am a Member of the Board of the International Commission of Occupational Health.
- 1.3 My areas of special interest are, Toxicology, Environmental Health effects of Industry, Occupational Asthma, Health effects of Noise and Occupational Hygiene. I have prepared human health impact assessments for many projects, including road developments such as the M20, N5, Athy Ring Road, Naas Ring Road and M28.

2 Role in Proposed Road Development

- 2.1 My role in the N6 Galway City Ring Road Project involved undertaking the human health appraisal in respect of the proposed road development. I have been working on the project since 2016. I wrote the Human Health section of Chapter 18 of the EIAR on Human Beings, Population and Human Health.

3 Key issues in relation to Human Health

3.1 Chapter 18 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 human health assessment of the proposed road development detailed in Chapter 18 of the EIAR are summarised briefly below.

3.2 From a human health perspective, the receiving environment are human beings. A full description of the receiving environment is provided in Section 18.3 of Chapter 18 of the EIAR. This includes a description of:

- Identification of vulnerable groups, for example socially deprived, the disabled, elderly, children
- Community Profile as identified by the Lenus/HSE publications

3.3 As set out in the European Commission's "*Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report*" (2017), human health is a very broad factor that is highly project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects on vulnerable groups, exposure to traffic noise or air). The potential impacts of health due to the proposed road development were assessed. This focussed on three main areas: health protection, health improvement and improving services.

Health Protection

3.4 In terms of the protection of human health the pathways through which the proposed road development could impact on health was assessed, these pathways were primarily noise, air, soil and water although any areas where a potential effect on human health was considered.

3.5 The methodology used with regards to the protection of human health is detailed in Section 18.2.5 of Chapter 18 of the EIAR. In simple terms it can be summarised as using Health Based Standards to assess Health Protection as a result of environmental emissions. Health Based Standards are set to protect against negative human health effects. The level at which the standard is set is chosen to protect the vulnerable, not the robust. The standard measures of significance are set at levels where there will be no significant health effects. This "Standards based" approach is also consistent with the latest Irish EPA Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (August 2017).

3.6 The data collected in relation to the protection of human health for my assessment focussed on the results of technical assessments (such as noise, air, soil and water) dealt with elsewhere in the EIAR, in order to establish if there was any potential

effect on health directly attributed to what is proposed by the construction and operation of the proposed road development. See, for example:

- Chapter 9 – Soils and Geology
- Chapter 10 – Hydrogeology
- Chapter 11 – Hydrology
- Chapter 16 – Air Quality and Climate
- Chapter 17 – Noise and Vibration

3.7 The assessment detailed in Chapter 18 of the EIAR concluded that there will be no adverse health impacts as a result of the proposed road development through the pathways of noise and air emissions, soils or water quality.

Psychological

3.8 As noted in the European Commission's EIAR Guidance, potential environmentally-related health impacts may arise from changes in living conditions as a result of a project and these have been considered in Chapter 18 of the EIAR., including potential psychological impacts: see, for example, Section 18.5.6.1. Whilst some annoyance during the construction phase is to be expected, this will be of limited duration and is not usually considered to be a health effect. There are some benefits in psychological terms in terms of reduced journey times, unforeseen delays etc. as well as movement of traffic away from currently congested and more populated areas of the city.

3.9 The prospect of moving traffic to inherently safer roads and the prospect of reduced traffic accidents and fatalities is also an important benefit. This does not take away from the potentially adverse effects on individuals whose homes or lands are to be acquired. Whilst from the outset the proposed road development has been designed to try and avoid as many properties as possible, there remains a significant number of property acquisitions and although financially compensated, it is important to recognise that these individuals may experience stress and anxiety as a result of this process. The undoubted change in living conditions brought about by the acquisition of houses and lands and resulting from the construction and operation of the proposed road development, is a potential negative impact on human health for those individuals affected. This negative effect must be seen however in the context of the overall benefits of the proposed road development.

Health Improvement and Improvement of Access to Services

3.10 The data used to assess opportunities for health improvements and access to services included information gathered during the extensive public consultations including a meeting with University Hospital Galway and data extracted from the traffic model to identify accessibility to services.

3.11 From a community perspective there are clear benefits in terms of health protection, opportunities for health improvements and access to services. There are new facilities for pedestrians and cyclists included in the road design. This project will

also provide opportunities to effectively implement the full Galway Transport Strategy which will provide for improved public transport and increased pedestrian and cyclist use of the city centre roads previously occupied by heavy traffic.

- 3.12 In general, the project will lead to reduced journey times by all modes of transport and will improve accessibility to key locations within the city and importantly none of the more disadvantaged areas experience any disbenefits as a result of the proposed road development.
- 3.13 There will be more efficient access to emergency services including ambulances. Reduced access times for these services will help to save lives.
- 3.14 There are significant opportunities for improved access to services including education and healthcare. This will include those living within Galway City and its environs and those in the west of Galway. For those within Galway City and its environs, reduced traffic along city streets will facilitate accessing services including health centres.
- 3.15 Particularly for those living outside of Galway City there will be improved access to the national road network and thereby access to other services including national hospitals.
- 3.16 For those who need to cross the city centre to access services the proposed road development offers particular benefits. While this would be of benefit to all, it will be of particular benefit those living to the west of the River Corrib. Overall, therefore the impacts of the proposed road development on human health are primarily positive.
- 3.17 There is potential for socio-economic gain including economic growth and development of tourism. Improved socio-economic status is well recognised to have a positive impact on health outcomes. There is potential for increased employment and reduced unemployment particularly long-term unemployment. If this is achieved, there will also be benefits in terms of social health including decreased social inequality.

Overall

- 3.18 There are many potential benefits in terms of human health due to the proposed road development. It allows for more efficient road transport with all the potential socio-economic benefits as well as the access to services including healthcare and education that this brings. It will also bring benefits in accessing services to the more vulnerable in the community such as the disabled. The proposed road development will be safer and lead to fewer accidents. There are also potential benefits for the population in terms of emissions from traffic such as noise and emissions to air over the do minimum scenario. The existing city center road network will become more amenable to pedestrians and cyclist.
- 3.19 Whilst there are benefits to the population and the society this does not mean each and every individual will benefit equally. Indeed, even though there will be benefits in terms of transport, air quality and noise emissions for the community, some individual residences may have actually higher noise than they would otherwise

experience because of the proximity of their homes to the proposed road development. The human health impact assessment strikes a balance between benefit for the community/population in general terms and potential impact on the individual. There is a relatively large number of homes affected by acquisition/proposed road development because of the location. There must therefore be a balance between the provision of infrastructure necessary for socio economic development of the area and indeed quality of life of its residents and visitors, against the impact on the individual who has lived in a particular location all of their lives and finds a road development is now planned where the live.

- 3.20 As has been demonstrated in Chapter 18 of the EIAR, the impact of the proposed project on human health in the population is overall significantly positive. However, this benefit is not automatically distributed equally, and it required consideration of individuals to ensure mitigation is targeted to ensure maximal benefit and least adverse outcomes.
- 3.21 The EIAR concludes that the proposed road development will have no adverse effects on human health and as outlined above the proposed road development will have an overall positive impacts on human health, especially when one considers the totality of impacts on Human Health.
- 3.22 The proposed modification to the Parkmore Link Road will have no effect on human health assessment contained in the EIAR and RFI response document.
- 3.23 The current National University of Ireland (NUI) planning permission application (Ref 19/373) to construct additional playing pitches and the two proposed strategic housing development applications (Ob_229 and Ob_469 and S_003) do not change the conclusions of the cumulative impact assessment on Human Health contained in the EIAR.

4 Responses to Submissions/Objections

4.1 Overview

4.1.1 88 of the 296 submissions 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 directly relevant to human health. In addition, there were others, which are being dealt with by my colleagues which may be considered to have indirect effects, through noise or emissions to air for example. Submissions related to safety and construction works have been addressed by my colleague Eileen McCarthy, in her Statement of Evidence. Submissions related to water quality have been addressed by my colleagues Leslie Brown (Hydrogeology) and Tony Cawley (Hydrology), in their Statements of Evidence. Submissions related to road lighting and visual impacts have been addressed by my colleague Thomas Burns, in his Statement of Evidence on Landscape and Visual. Three of the 17 submissions made to ABP in respect of the Request for Further Information relate to human health. The items raised in relation to human health are listed below and each of the submissions is responded to separately:

- noise impacts on human health
- air quality impacts on human health
- psychological impacts
- adequacy of assessment of human health
- Loss of amenity for exercising
- Proximity of the proposed road development to schools
- Review by the Environmental Health Service of the HSE
- Health Implications from Waste

4.2 Noise Impacts on Human Health

Issues

4.2.1 It should be reiterated that the substantive consideration of potential noise impacts arising from the proposed development has been set out in Chapter 17 of the EIAR and in the statement of evidence in relation to Noise and Vibration delivered at the oral hearing. The consideration of potential human health impacts arising from noise have been based on the predicted noise levels appraised in the EIAR. There were a number of submissions/objections in relation to environmental noise during both the construction and operational phases. Most of these, including S_037, S_038, S_042, S_049, S_057, S_060, S_061, S_065, S_068, Ob_011, Ob_134,

Ob_135, Ob_136, Ob_532.2, Ob_511.06, Ob_584, Ob_108_125, Ob_131_132, Ob_145.1, Ob_141.2, Ob_141.3, Ob_145.1, Ob_152, Ob_195, Ob_199, Ob_201, Ob_204, Ob_213, Ob_222, Ob_229, Ob_238, Ob_239_Ob_252, Ob_261, Ob_272, Ob_298, Ob_312, Ob_457.2, Ob_468.501, Ob_485, Ob_486, Ob_498, Ob_505, Ob_507, Ob_512.2, Ob_216, 531.01 and Ob_155 are more appropriately, and have been addressed by my colleague Jennifer Harman, in her Statement of Evidence on noise and vibration, but I will deal specifically with the aspects directly impacting on human health. Indeed, several submissions mention the relatively recent WHO Noise Guidelines. These Guidelines were issued after the completion of the EIAR and, accordingly, it is necessary for the Board to consider those guidelines in conducting its Environmental Impact Assessment.

- 4.2.2 The following submissions/objections raised specific issues in relation to the potential impact of noise on human health: Ob_220, S_008, S_061, Ob_457.2, Ob_521 and Ob_517.14, Ob_523. These related to annoyance, impacts on sleep, impacts on vulnerable individuals as well as general impacts on human health.

Response

- 4.2.3 As set out in Chapter 17 of the EIAR, construction noise will be short term and the potential impacts of construction noise will be mitigated by suitable work practices and restricted working hours, which are 7am to 7pm Monday to Friday and 7am to 4pm on Saturdays. These are the maximum working hours and the actual times will be less than this for any individual receptor. Therefore, construction noise is expected to have negative effects on those in the immediate vicinity of the proposed road development under construction but given the duration of these activities and with the strict implementation of the mitigation measures, which are in line with best practice and BS 5228, adverse health effects due to noise during construction are not predicted to occur.
- 4.2.4 The results of the noise modelling carried out for the operational phase shows that there may be potential noise impacts on residential properties adjacent to the proposed road development, however, the implementation of low noise road surfacing and noise barriers will mitigate these potential impacts.
- 4.2.5 The noise assessment also shows that there will be a benefit for a significant number of people within the city due to current traffic being routed away from current roads and, from a community perspective, there are beneficial effects for the community, based on WHO night time noise guidelines, for those living along existing roads where traffic will be reduced. It is acknowledged that there are a few residences that may exceed the TII Guidelines, but do so by only small margins, i.e., 1 or 2 dB – which are barely perceptible to individuals, and these are not considered to have significant health impacts.
- 4.2.6 In October 2018 the WHO issued updated Environmental Noise Guidelines for the European Region and also issued specific guidelines for road noise, the principal provisions contents of which are summarised below.

- 4.2.7 For average noise exposure, they recommend reducing noise levels produced by road traffic below 53 decibels (dB) L_{den} , as road traffic noise above this level is associated with adverse health effects.
- 4.2.8 For night noise exposure, they recommended reducing noise levels produced by road traffic during night-time below 45dB L_{night} , as night-time road traffic noise above this level is associated with adverse effects on sleep.
- 4.2.9 It is noteworthy that the WHO provides the rationale for these guideline levels. The 53 decibels (dB) L_{den} level is based on annoyance criteria rather than more serious health effects. In fact, the Guidelines suggest, if a level was being set on Cardiovascular criteria alone that the level would likely be in the order of 59.3 decibels (dB) L_{den} . This closely corresponds to the TII Guidelines of 60 dB L_{den} . Again, it is worthwhile looking at how this is actually calculated. It is conservatively calculated at the level of noise that may be associated with a 5% increase in relative risk of a cardiovascular event. For the vast majority of people, the risk of a cardiovascular event in the next year is less than 1%. For an individual who has that risk of 1%, even allowing for the worst effects, the risk is 1.05%. The difference is therefore imperceptible on an individual basis. It is simply a far less significant effect than other risk factors, which is the reason that it is not considered one of the factors when calculating one's own cardiovascular risk. From an individual basis it simply is not significant. However, when one applies this across a large population, such as the population of Europe, even small changes can make a significant difference. This explains why the WHO guidelines are applicable for populations but not for individuals. The 45dB L_{night} level is based on sleep disturbance but it is perhaps surprising how conservative the levels are when one realises that this level represents only 3% of the population self-reporting highly sleep disturbed. To put this further in context even at levels of 55dB L_{night} , the level considered in the EIAR prior to the issuing of the current WHO Guidelines, the percentage of people self-reporting sleep disturbance is still only 6%.
- 4.2.10 The Guidelines specifically state that, *“to reduce health effects, the GDG (Guideline Development Group) strongly recommends that policymakers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.”*
- 4.2.11 One might ask how one can reconcile these guidelines with road traffic anywhere? The fact is that these guidelines are for populations. The WHO realise that every individual residence will not be below 45dB L_{night} . However, the question in relation to the assessment of the impact on health will be determined by the overall impact on the population. As the population impacts due to environmental noise, particularly in the operational phase, will be largely positive the proposed road development would be in keeping with the WHO Guidelines.

- 4.2.12 Another issue that can arise is the comparison between the WHO guidelines and the TII guidelines. It must be remembered, however, that they serve different purposes. It is readily acknowledged that the WHO guidelines cannot be reasonably achieved for each an individual residence. Data from previous WHO guidelines, for example, show that well over 50% of the population of Europe exceeds these levels. In one sense this means they are not achievable on an individual receptor basis but can be best understood as guidance for populations a whole. The TII guidelines however must be viewed as the achievable goal to protect individuals. It is also clear that the levels suggested are compatible with prevention of the more significant health effects of environmental noise such as cardiovascular effects. The TII and WHO guidelines should not be seen as competing with each other but rather complementing the other. In simple terms, TII guidelines should be used in relation to individual receptors such as residences whereas the WHO guidelines should be considered in terms of the population as a whole.
- 4.2.13 The TII guidelines are used to indicate when, for example, mitigation is advisable. There is for example very little difference in practice from the noise impact at just below the levels or just above them. They are however important and in the planning situation they are obviously the appropriate guidelines to be used. There is no contradiction between these respective guidelines when one realises the different purposes.

4.3 Air Quality Impacts

Issues

- 4.3.1 There were a number of submissions/objections which raise issues in relation to impacts on human health as a result of changes in air quality during both the construction and operational phases. Many of these, including Ob_011, Ob_131, Ob_155, Ob_534, Ob_584, S_007, S_037, S_038, S_041, S_042, S_045, S_046, S_048, S_055, Ob_136, Ob_511.06, Ob 532.2, S_068, Ob_131_132, Ob_141.2, Ob_199, Ob_311, Ob_505, Ob_507, Ob_512.2, Ob_523 and S_065 have been dealt previously by my colleague Sinead Whyte in her Statement of Evidence on air quality and climate, I will respond to specific issues that may directly impact on human health.
- 4.3.2 The following submissions/objections raised specific health impacts in relation to air quality: Ob_111, Ob_158, Ob_220, S_062, S_045, S_048, S_049, S_007, S_055, S_056, S_049.2, S_062.

Response

- 4.3.3 In relation to air quality, given the proposed mitigation measures detailed in Section 16.6 of Chapter 16 Air Quality & Climate of the EIAR, with regards to control of dust and other air emissions during the construction phase and the relative limited period of time duration there are no adverse effect on human health predicted to arise from impacts to air quality during the construction phase.

- 4.3.4 The detailed modelling (which will be discussed further by my colleague Sinead White in her Statement of Evidence) which has been undertaken confirms that Air Quality Standards will not be breached, even the worst-case receptors, which 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 µg/m³ is predicted. This is due to the high background concentration of 9.5 µg/m³ 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 µg/m³. There is therefore minimal change from the do-nothing scenario and the change is not at a level which would have an impact on human health. Therefore, both Air Quality Standards and WHO Air Quality Guidelines are not exceeded for pollutants, with the sole exception PM_{2.5} which in itself is due to baseline conditions, and thereby protecting the vulnerable such as asthmatics, the elderly, the very young or the sick in general during the operational phase. The Air Quality standards are presented in Table 18.6 (Pg. 1485-1486) of Chapter 18.
- 4.3.5 In relation to the submissions raising issues in relation to dementia and neurological conditions associated with living close to major roads (for example Ob_534), one of the references cited was the Chen article (Chen H et al *Living near major roads and the incidence of dementia, Parkinsons Disease and multiple sclerosis: a population based cohort study*. Lancet Volume 389 No 10070 pg. 718-736) which was previously considered in Section 18.2.5.2 in the EIAR, pages 1454/5. There are a number of observations which I will make in relation to this. While there is some evidence linking increasing levels of air pollution and, perhaps particularly particulate matter, with neurological conditions this is not in any way confined to road developments. Indeed, the impact identified in relation to the Chen article was identified within 50m of a very busy multilane highway. The important factor here is the actual air quality. Baseline air quality in the Galway region is very good. The impacts predicted in the construction and operational phase of this project show no significant impact and no air quality standards will be breached. In fact, some areas would see an improvement in air quality over and above the do-nothing scenario. No area will experience a significant adverse impact on air quality as a result of the proposed road development and as such there will be no adverse health effects including no increased risk of dementia or other neurological conditions.
- 4.3.6 Related issues are raised in some submissions/objections in respect of sensitive individuals suffering from asthma along with other lung conditions. A specific example is given of a child with respiratory problems. The subject of sensitive individuals was addressed in Section 18.3.4.1 of Chapter 18 of the EIAR. It is important to realise every population will have vulnerable individuals. Health based standards including air quality standards, as outlined in Table 18.6 of Chapter 18 of the EIAR are there to protect the vulnerable not the robust. As has been demonstrated, air quality standards will not be breached and therefore, everybody will be protected including the vulnerable.
- 4.3.7 As well as the vulnerability of individuals with existing medical conditions, a number of submissions/objections reference the possibility of inducing illness due to air quality concerns. The conditions mentioned in this context include lung

disease, cardiovascular disease, cancer and neurodevelopmental delay. While it is accepted that very high levels of air pollutants have the potential for significant adverse health effects (including for some of the conditions listed above), it is important to understand that this is not an issue at the levels which occur in Galway. Again, Health Based Standards are there to protect human health. Given that Air Quality Standards will not be exceeded, we can be confident that no new health conditions will occur. Indeed, in overall terms, there are predictions for some improvement in air quality as traffic is moved from congested city centre routes with relatively high population nearby. The air quality in Galway currently compares favourably, and will continue to compare favourably, with any urban areas in Europe and is far superior to that found in other parts of the world such as China or India which are associated with significant health effects.

4.4 Environmental impacts and Psychological Effects

Issues

- 4.4.1 A number of submissions/objections raise issues relating to potential stress and psychological impacts. Some of these submissions/objections cite general stresses related to the proposed road development but some cite specific stresses associated with the number of residences to be compulsorily acquired. These include stresses to the individuals directly involved but also those not directly affected but indirectly affected by loss of neighbours, friends and in some cases affected communities.
- 4.4.2 The following submissions/objections raised these points: Ob_136; S_004, S_027, S_065, Ob_141 Ob_613, S_037, S_010, S_020, Ob_531.01, Ob_532; S_025 and S_066.

Response

- 4.4.3 The topic of potential psychological impacts is assessed in Section 18.5.6.1 of Chapter 18 of the EIAR, as is appropriate in the context of the European Commission's EIAR Guidance, which considered that potential environmentally-related health impacts may arise from changes in living conditions as a result of a project. It is worth noting, firstly, that the proposed road development will remove congestion from the city centre and the potential for conflict between vehicular traffic and pedestrians and cyclists, thereby reducing the potential number of collisions and possible fatalities. The avoidance of fatalities and serious injuries have a very significant positive impact on an individual basis, any such injury or fatality would have a huge adverse impact on the individual's family, friends and colleagues such as that there can be a wider impact on the psychological health of the community. Indeed, the "Do-Nothing" scenario has potential for adverse psychological impacts. Progressively longer journey times and uncertainty will be associated with increased annoyance at least and at worst impact on psychological health.

- 4.4.4 However, as detailed in Section 18.5.3 and 18.5.4 of the EIAR, the proposed road development will cause a degree of physical and social severance. Where severance does occur there is potential for psychological impact. Loneliness can occur if someone feels cut off for example. As against this there may be positive psychological effects where improved connectivity permits greater ease of movement around the city. This would potentially facilitate closer connections with friends or relatives which might be deterred if journeys were perceived to be lengthy or difficult.
- 4.4.5 Overall, therefore, the assessment of the psychological impact on a population of community basis will be overall positive. However, certain individuals, particularly those whose homes are to be compulsory acquired, may not experience the community benefit. It is fair to say that any proposed change, particularly one as significant as the acquisition of a house of lands by a public authority for the purposes of road development can be met with some degree of anxiety or fear. This would be the same as for any project but the reality is that, in many cases, anticipated issues do not materialise to anything like the same extent as is feared. Indeed, the experience of other such projects, including road developments, is that, in very many cases, people adapt to the new reality. Whilst psychological impacts are still anticipated, these effects can be reduced, to some extent at least, by communication and early agreement with many of the affected individuals so to allow certainty, and certain measures have been put in place here as described by Ms. Eileen McCarthy. It is accepted that there will be significant negative psychological impact on those directly affected by compulsorily acquisition and, indeed, this is the greatest single adverse effect from a human health perspective arising from the proposed road development. However, this predicted effect can be minimised to some extent and the individuals concerned will recover and continue to live normal lives in circumstances where they will relocate, having been compensated for the acquisition of their houses or lands.

4.5 Adequacy of Assessment of Human Health

Issues

- 4.5.1 A number of submissions/objections suggested the human health impact detailed in Chapter 18 of the EIAR was inadequate.
- 4.5.2 The following submissions/objection raised this point: S_004, S_023, S_024 and S_070, including the submission made by the Environmental Health Service of the Health Service Executive with respect to the RFI Response further to their review of the EIAR, which commended the human health impact assessment.

Response

- 4.5.3 As stated in Section 18.2.5 of Chapter 18 of the EIAR the Human Health assessment adhered to the EPA guidelines in terms of content and methodology of assessment. Moreover, it is evident that the content of Chapter 18 includes issues identified in the the European Commission's EIAR Guidance, such as potential environmentally-related health impacts which may arise, for example, from

changes in living conditions as a result of a project. The methodology used Health Based Standards to assess Health Protection as a result of environmental emissions.

- 4.5.4 This “Standards based” approach is also consistent with the Draft EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (August, 2017): *The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment.*’ (Section 3, page 29). Moreover, Health Based Standards are set to protect against negative human health effects. The standard measures of significance are set at levels where there will be no significant health effects. An example is Air Quality Standards – which do not necessarily exclude each and every effect. An individual might notice a transient slight irritation in the throat slightly below an Air Quality Standard but fundamental health status would not change.
- 4.5.5 A review of current and emerging guidance on assessing health for Environmental Impact Assessments was undertaken in addition to a literature review, as outlined in Section 18.2.5.2 of Chapter 18 of the EIAR, on the impacts of health from road developments.
- 4.5.6 It should be noted that whilst adhering to the EPA guidelines, the Human Health assessment went much further and considered, as well as health protection, looked at health in a far more holistic manner and considered opportunities for health improvements as well as access to services. The assessment followed the most recent authoritative guidance. For example, the Institute for Environmental Management and Assessment (IEMA) in the UK issued a discussion document in 2017 entitled *Health in Environmental Impact Assessment - A Primer for a Proportionate Approach*, which it describes as a primer for discussion on what a proportionate assessment of the impacts on health should be in EIAR. The assessment used this as a template. In addition, as referenced above, the Human Health assessment is also consistent with the European Commission’s EIAR Guidance (2017).
- 4.5.7 The Human Health assessment for this project covered not only traditional areas such as health protection, considering emissions from the operational and construction phases, but also considered health in its broader sense in terms of impacts of socio-economic benefits as well as health benefits and access to services. It included a desktop review of potential impact but also considered the impact on human health using the relevant standards and Guidelines such as the Air Quality Standards, TII Noise guidelines as well as WHO guidelines. It considered potential impacts on both physical and psychological health.
- 4.5.8 While the submission from the Environmental Health Service of the HSE makes some recommendations, which are addressed by my colleagues, it is also clear that it considered the assessment performed in the EIAR as adequate and comprehensive.

- 4.5.9 I would therefore conclude that not only was the assessment adequate as indicated by EPA Guidelines but was very much in keeping with best practice in performing such an assessment and is more than sufficient for the Board, as competent authority, to carry out an Environmental Impact Assessment.

4.6 Loss of amenity for exercise

Issues

- 4.6.1 A number of submissions/objections raised the issue of loss of amenity for physical exercise during the construction phase of the proposed road development. These issues related particularly to closure of parts of NUIG sporting campus during construction.
- 4.6.2 The submissions which raised this included S_004, S_010, S_020, S_022, S_024, S_027, Ob_523 and S_049.

Response

- 4.6.3 The Board is referred to Section 18.5.3.3 of Chapter 18 of the EIAR, in particular and, while it is true that there is an impact on the NUIG Sporting Campus during construction of the viaduct, the impact is being minimised by the provision of alternative facilities. Again, these are outlined in Section 18.5.3.3 of Chapter 18 of the EIAR. However, once operational these impact will no longer prevail and there will be opportunities for exercise. Overall therefore in terms of amenity the effects in terms of opportunity is short term during construction only.

4.7 Proximity to schools

Issues

- 4.7.1 A number of submissions/objections raise issues arising from the proximity of schools to the proposed road development and in particular Bushypark School.
- 4.7.2 The submissions/objections which raised this issue are: S_028, S_074, Ob_151, Ob_510, Ob_5.11.06, S_003, Ob_531.2, Ob_523, Ob_049.2, S_076 and Ob_220.

Response

- 4.7.3 I will deal with health related issues, arising from noise and air quality. Submissions related to safety have been addressed by my colleague Eileen McCarthy, in her Statement of Evidence. The potential impacts on schools including Bushypark School but also Castlegar School including facilities for Children with Autism Spectrum Disorder as well as associated Beoga Preschool are outlined in Section 18.5.6.1 of Chapter 18 of the EIAR (pgs. 1538-1546) Impacts relating to noise, vibration, air quality, water, soils and psychological

effects are discussed in this section. Essentially there are no significant negative effects predicted on these facilities.

4.8 HSE Environmental Health Service Submission

Issue

- 4.8.1 The environmental Health Service of the Health Service Executive (HSE) made a submission with respect to the RFI Response following a review of the EIAR. This submission, S_078, makes recommendations for mitigation measures, in particular continued public consultation during construction it suggests that it considered the assessment performed in the EIAR as adequate and comprehensive.

Response

- 4.8.2 This submission is of particular importance on human health terms as HSE is the relevant statutory body in terms of human health assessment. The submission raises some recommendations which are more appropriately dealt by other experts but I would like to respond to parts of the HSE submission as they apply to the human health assessment in the EIAR. In section 1 of the submission it cites that the EIAR “provides a comprehensive description of the proposed project” and goes on to state that a “succinct summary of the proposed development is contained in the Non-Technical Summary”. This conclusion is noted.
- 4.8.3 Section 2 of the HSE submission states that “from the information provided in the EIAR relating to emissions to surface and groundwater, and emissions to air, including noise and vibration is not expected that any later consents will be required.” Again, this conclusion is noted.
- 4.8.4 The matter of consultation is dealt with in Section 3 and in this regard the submission is very clear that “based on the information contained in the EIAR the Environmental Health Service is satisfied that adequate consultation has been undertaken with regard proposed road development.”
- 4.8.5 In section 4 of the HSE submission, relating to the physical environment the submission notes that “*the Environmental Health Service notes the legislation, data sources and consultations referred to in the preparation of the chapter on population and human health. The proposed N6 Galway City Ring Rd development will involve a considerable number of residential and commercial demolitions and acquisitions, the impacts of which are assessed the EIAR.*” It is submitted that this statement is a recognition by the Environmental Health Service that this very difficult subject has been appropriately assessed.
- 4.8.6 There are recommendations in relation to hydrology and hydrogeology as well as air quality and noise and vibration which are being dealt with by my colleagues but, from a human health perspective, I believe that these recommendations are addressed.

- 4.8.7 In relation to the opportunities for health gain and health improvement the submission identifies the manner in which this was highlighted in the EIAR and that is in line with the Health for All Policy of the HSE.
- 4.8.8 In summary, therefore, it is clear that the submission is largely positive for the proposed road development and that the recommendations in relation to human health have been considered.

4.9 Health Implications from Waste

Issue

- 4.9.1 Ob_583.01 makes the following observation in relation to the health implications from waste.

“Can you confirm there will be no toxic back fill placed in the quarry area that will have a health implication for locals and the general public?”

Response

- 4.9.2 There will be no waste disposed of in Lackagh Quarry. The disposal of waste is addressed in Section 7.6.8 of Chapter 7 (Construction Activities) of the EIAR as follows:

“All waste removed from the site will be collected only by contractors with valid waste collection permits, under the Waste Management (Facility Permit and Registration) Regulations 2007 and (Amendment) Regulations 2008, 2014, 2015. All facilities to which waste will be taken will have appropriate waste licences or permits, under the Waste Management Act 1996, as amended, and the regulations thereunder, allowing them to accept the type of waste that is to be sent there. Hazardous waste generation will be minimised, and such waste will be recovered where feasible, and only disposed of if recovery is not feasible. Hazardous waste will be managed in accordance with the relevant legislation”.

Waste management has also been addressed by my colleague Eileen McCarthy, in her Statement of Evidence. The Material Deposition Areas in Lackagh Quarry are addressed by my colleague Juli Crowley, in her Statement of Evidence on Soils and Geology. Potential impacts to the soils and geology environment by construction activities are also addressed by Juli Crowley.

5 Conclusion

5.1 A comprehensive assessment of the potential effects of the proposed road development and acquisition of properties on Human Health has been performed in keeping with not alone with recent draft EPA guidelines and other guidance (including European Commission and UK Institute for Environmental Management and Assessment) but also best practice. While not considered in the original EIAR (as they had not been published at that time), the new WHO noise guidelines have been considered as detailed above. It is clear that, while these guidelines are designed for populations rather than individual receptors, moving traffic away from populations (as will happen with the proposed road development) will actually have a positive community effect. From a human health perspective, the assessed impact is largely positive, while accepting that this is not the case for each and every individual. The extent of the adverse effects, however, is limited by the mitigation measures proposed. In terms of Health Protection, there will be not significant adverse effects in terms of emissions – whether from noise and air - even the most sensitive individuals and receptors (such as schools). Psychological effects of the project have also been considered and, again, while it accepted that some individuals will experience adverse effects, particularly those who may have to move home, there are positive effects that from an overall community perspective. For example, there will be less day-to-day annoyance arising from being stuck in traffic and better opportunities for exercise and accessing services. There are major positive impacts, including but not limited to, reduced road accidents, improved access for emergency services as well allowing for socio-economic development – which will all have a positive effect on human beings and human health.

The issues raised in the submissions in relation to potential impacts on human health have been fully considered, and having considered those issues, the conclusions of the human health impact appraisal remain as set out in the EIAR, i.e., the impact on human health from the proposed road development is assessed as overall positive.