Chapter 23
Human Health

CONTENTS

23. HUMAN HEALTH

23.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) assesses the impact of the DART+ Coastal North project ("the 'Proposed Development") on Human Health during the Construction and Operational Phases. This assessment is based on the draft Railway Order, Chapter 4 (Description of Proposed Development) and Chapter 5 (Construction Strategy).

This chapter identities, describes and assesses the likely direct, indirect, secondary, and cumulative significant impacts of the Proposed Development on Human Health. The assessment is based on the reasonable worst-case scenario health impacts arising from the Proposed Development as described in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction Strategy) in Volume 2 of this EIAR. The Proposed Development description is based on the design prepared to inform the planning stage of the project and to allow for a robust assessment as part of the Environmental Impact Assessment (EIA) process.

A reasonable worst-case scenario describes the most significant potential environmental impacts arising from the Proposed Development based on the project information available at this stage of the project, advised by an experienced and competent project design team. In the event where it is required to make assumptions as the basis of the assessment presented here, these assumptions are based on advice from competent project designers and are clearly outlined within the chapter.

The Proposed Development will modify the current rail network between Dublin City Centre (north of Connolly Station) and Drogheda MacBride Station. The Proposed Development extends across four local authority areas including Louth, Meath, and Fingal County Council, as well as Dublin City Council. The total length of the Proposed Development is approximately 50 kilometres.

23.2 Legislation, Policy and Guidance

23.2.1 Legislation

The Transport (Railway Infrastructure) Act 2001 (as amended) ("the 2001 Act") provides for the making of a Railway Order application by Córas Iompair Éireann ("CIÉ") to An Bord Pleanála (the Board). The European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743 of 2021) gives further effect to the transposition of Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (as amended by Directive 2014/52/EU) ("the EIA Directive")) by amending the 2001 Act. The 2001 Act as amended (including by Statutory Instrument No. 743 of 2021) at Section 37 requires, *inter alia*, that the application be made in writing and be accompanied by:

- A draft of the proposed Railway Order;
- A plan of the proposed railway works;
- A book of reference to a plan describing the works which indicates the identity of the owners and of the occupiers of the lands described in the Plan; and
- A report on the likely effects on the environment of the proposed railway works.

A report of the likely effects on the environment of the proposed railway works is addressed by the preparation of this Environmental Impact Assessment Report (EIAR) (previously referred to as an Environmental Impact Statement in Section 39 of the 2001 Act prior to the amendments effected by S.I. No. 743 of 2021). As mentioned, this EIAR is based on a coordinated approach in order to facilitate An Bord Pleanála carrying out a coordinated assessment with any assessment under Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora ("the Habitats Directive") or Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds ("the Birds Directive").

By virtue of Section 38 of the 2001 Act development which is the subject matter of a Railway Order is deemed to be exempted development and the provisions of Part IV of the Planning and Development Act 2000 are disapplied where the works involved are authorised by a Railway Order.

An examination, analysis and evaluation is carried out by the Board in order to identify, describe and assess, in the light of each individual case, the direct and indirect significant effects of the proposed railway works, including significant effects derived from the vulnerability of the activity to risks of major accidents and disasters relevant to it, on: population and human health; biodiversity, with particular attention to species and habitats protected under the Habitats and Birds Directives; land, soil, water, air and climate; material assets, cultural heritage and the landscape, and the interaction between the above factors.

In accordance inter alia with Section 39 of the 2001 Act and the provisions of the EIA Directive, CIÉ, as the Applicant for this Railway Order, has ensured that the EIAR is prepared by competent experts; contains a description of the proposed railway works comprising information on the site, design, size and other relevant features of the proposed works; contains a description of the likely significant effects of the proposed railway works on the environment; contains the data required to identify and assess the main effects which the proposed railway works are likely to have on the environment; contains a description of any features of the proposed railway works, and of any measures envisaged, to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment; contains a description of the reasonable alternatives studied by the applicant – here CIÉ – which are relevant to the proposed railway works and their specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the railway works on the environment; contains a summary in non-technical language of the above information; takes into account the available results of other relevant assessments under European Union or national legislation with a view to avoiding duplication of assessments; in addition to and by way of explanation or amplification of the specified information referred above, the EIAR contains such additional information specified in Annex IV to the EIA Directive relevant to the specific characteristics of the particular railway works, or type of railway works, proposed and to the environmental features likely to be affected and in this regard Annex IV sets out the information which is referred to in Article 5(1) of the EIA Directive. Further the EIAR includes the information that may reasonably be required for reaching a reasoned conclusion in accordance with section 42B of the 2001 Act on the significant effects of the proposed railway works on the environment, taking into account current knowledge and methods of assessment. This assessment has been undertaken in accordance with the above legislative and regulatory regime.

23.2.2 Policy and Guidance

The following policy and guidance have been reviewed and referenced as appropriate, within this assessment:

- Addressing Human Health in Environmental Impact Assessment As per EU Directive 2011/92/EU amended by 2014/52/EU CONSULTATION DRAFT November 2019 (IAIA, 2019);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, May 2022);
- Air Quality Standards Regulations 2011 (SI No. 180 of 2011);
- British Standard (BS) 5228-1:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites Part 1: Noise;
- Department of Housing, Planning and Local Government (2018) Guidelines for Planning Authorities and an Bord Pleanála on carrying out Environmental Impact Assessment, (Government of Ireland, August 2018);
- European Public Health Association (EUPHA) (2019) Addressing Human Health in Environmental Impact Assessment (EUPHA, 2019);
- Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (EPA, 2017);
- Guidelines for treatment of tourism in an Environmental Impact Statement (Fáilte Ireland, 2011);
- Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (EU Commission 2017);
- Health Impact Assessment (Institute of Public Health Ireland, 2009);
- Health Impact Assessment Resource and Tool Compilation (US EPA, 2016);
- Health in Environmental Impact Assessment - A Primer for a Proportionate Approach (IEMA, 2017);
- Impact Assessment Outlook Journal (Volume 8: October 2020)- Health Impact Assessment in Planning (IEMA, 2020);
- Institute of Public Health (IPH) (2021) Health Impact Assessment Guidance (IPH, 2021);
- International Association for Impact Assessment (IAIA) 2020 Human Health Ensuring a High Level of Protection;
- World Health Organisation (WHO) Night-time Noise Guidelines for Europe (WHO, 2009);
- World Health Organisation (WHO) Environmental Noise Guidelines for the European Region 2018; (WHO, 2018);
- World Health Organisation (WHO) Air Quality Guidelines (WHO, 2006);
- World Health Organisation (WHO) Air Quality Guidelines (WHO 2021); and
- World Health Organisation Guidelines for Community Noise (WHO,1999).

23.3 Methodology

23.3.1 Study Area

The Proposed Development extends for approximately 50km along the existing railway line which runs through County Dublin (Dublin City and Fingal) into counties Meath and Louth, which are mostly urban, suburban, and agricultural areas.

As outlined in Chapter 4 (Description of the Proposed Development), the Proposed Development has been divided into five zones (Zones A to E), which are summarised below:

- Zone A – North of Connolly Station to south of Howth Junction & Donaghmede Station (refer to Chapter 4, Section 4.6);
- Zone B – South of Howth Junction & Donaghmede Station (Including Howth Branch) to north of Malahide Viaduct. (refer to Chapter 4, Section 4.7);
- Zone C – North of Malahide viaduct to south of Gormanston Station (Fingal boundary) (refer to Chapter 4, Section 4.8);
- Zone D – South of Gormanston Station (Fingal border) to Louth/Meath border (refer to Chapter 4, Section 4.9); and
- Zone E – Drogheda MacBride Station and surroundings (refer to Chapter 4, Section 4.10).

The population who have the highest potential to experience effects arising from the Construction and Operational Phases of the Proposed Development will be those primarily living within a relatively short distance of the Proposed Development infrastructure. Those individuals have the potential to be exposed to various emissions such as noise and vibration and emissions to air which are predicted to occur in both the Construction and Operational Phases. It is important to note that not everybody within the study area would be equally affected by the same level of emissions, from a human health perspective.

Individuals living within 500m from the Proposed Development will be potentially most affected, given the way noise and vibration and air emissions attenuate with distance. Therefore, the study area for the human health assessment will be predominantly within 500m of the Proposed Development, although it is recognised that some potential effects could extend beyond this including impacts on human health from traffic and waste disposal and these will be considered if deemed relevant to this assessment.

While the study area is 500 metres those closest may have the greatest potential effects. Those at the outer limit of the study area, outside 250 metres may have imperceptible effects from some emissions such as impact on air quality and noise and may be scoped out if the evidence is of no effect.

It is predicted that those most likely to experience positive effects during the Operational Phase will be the population using the Proposed Development on completion, which will extend well beyond 500m from the alignment.

23.3.2 Assessment Methodology

Health Impact Assessment (HIA) is defined by the Institute of Public Health in Ireland, as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme, or project on both the health of a population and the distribution of those effects within the population. A Health Assessment in the context of EIA focuses the attention of the assessment on likely significant effects, i.e. on effects that are deemed likely to occur and, if they were to occur, would be expected to be significant (as per the requirements of the EIA Directive).

The Institute of Environmental Management and Assessment (IEMA) Health in Environmental Impact Assessment – A Primer for a Proportionate Approach (IEMA, 2017) (hereafter referred to as the IEMA discussion document) notes that HIA and EIA are separate processes and that, whilst a HIA can inform EIA practice in relation to human health, a HIA alone will not necessarily meet the EIA human health requirement. HIAs are not routinely carried out for major infrastructure schemes in Ireland, nor are they required to be.

The recitals to the 1985 and 2011 EIA Directives refer to 'human health' and the operative texts refers to 'human beings' as the corresponding environmental factor. The most recent amendment of the EIA Directive in 2014 changed this factor to 'Population and Human Health'.

The new 2022 EPA guidelines on the information to be contained in Environmental Impact Assessment were issued in May 2022.

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) note that this health assessment approach is consistent with the approach set out previously in the 2002 EPA Guidelines, where health was considered through assessment of the environmental pathways through which it could be affected, such as air, water, or soil. The current Guidelines state:

> *'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'.*

In terms of human health protection, emissions during the Construction or Operational Phase of the Proposed Development will need to be identified and compared against reliable Health Based Standards. Reliable sources of the standards may be regulatory such as the EU, such as Air Quality Standards, or based on expert opinion such as is provided by the WHO as is the case with noise guidelines.

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) also note that in an EIAR:

> *'The assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc.', and that,*
>
> *'assessment of other health & safety issues are carried out under other EU Directives, as relevant. These may include reports prepared under the Integrated Pollution Prevention and Control, Industrial Emissions, Waste Framework, Landfill, Strategic Environmental Assessment [SEA], Seveso III, Floods or Nuclear Safety Directives. In keeping with the requirement of the amended Directive, an EIAR should take account of the results of such assessments without duplicating them'.*

The IEMA discussion document is a primer for what a proportionate assessment of the impacts on health should be in EIA and is a useful document when considering what can and should be assessed. Regard has been given to the general approach advocated in this document when compiling this Chapter.

The IEMA discussion document states that there should be a greater emphasis on health outcomes, as opposed simply to the health determinants or the agents or emissions (e.g. dust) which could have the potential to have health effects, which has previously been the focus of EIA. This change in emphasis does not mean a complete change in practice. The IEMA discussion document recommendations are entirely consistent with the EPA guidelines (EPA, 2022) on what should be contained in an EIAR.

The IEMA discussion document notes that public health has three domains of practice that should be considered in the assessment of health in EIA:

- Health protection (including chemical and radiation exposure, health hazards, emergency response and infectious diseases);
- Health improvement (including lifestyle, inequalities, housing, community, and employment); and
- Improving services (including service planning, equity, and efficiencies).

The WHO defined health in its broader sense in its 1948 constitution (WHO, 1948) as:

> *"a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."*

Therefore, whilst the EPA guidance is useful in terms of health protection, for a more holistic assessment as per the IEMA discussion document, it is also worthwhile to look at broader health effects in terms of opportunities for improvement of health and for improvement of access to services. While it is important to do this, it is also important not to attribute every conceivable event as being a health effect. To further rely on the WHO definition, a health effect would be something that would have a material impact on somebody's physical, mental, and social well-being be that positive or negative. As outlined in the International Association on Impact Assessment IAIA Document of 2020 Human Health within EIA (IAIA, 2019), the public health perspective is underpinned by five principles:

- A comprehensive approach to health: Physical, psychological, and social wellbeing is determined by a wide range of factors across society and consideration of these wider determinants and their interrelationships will inform the assessment of human health. Inter-sectoral collaboration, between public health and other sectors, should be a feature of coherent coverage of health in EIA;
- Equity: The distribution of health impacts across the population must be considered, paying specific attention to vulnerable groups.
  Where impacts that are unfair and avoidable are identified, appropriate measures must be included to avoid or reduce adverse health outcomes, or to improve health outcomes for affected groups;
- Transparency: A transparent EIA process facilitates cooperation and communication, external to the organisation conducting the EIA. It enhances the process and improves effectiveness. The reporting of the EIA must demonstrate a clear and consistent method and reasoned conclusions;
- Proportionality: The scoping of human health issues into EIA will focus on whether the potential impacts are likely to be significant. Effort is then focused on identifying and gaining commitment to avoiding or reducing adverse effects and to enhancing beneficial effects. The assessment findings should be presented clearly and aim to be concise and precise and to give appropriate weight to health as a material consideration; and
- Consistency: The assessment should be based on evidence and on sound judgment. The assessment process should follow an acceptable, explicit logic path and retain common sense in applying relevant guidance. Divergence from accepted practice should be explained. The assessment, its process, and conclusions, should be in accordance with up-to-date policy, guidance and scientific consensus. This acknowledges the potential for conflict between policy and emerging evidence.

The assessment of potential impacts resulting in health effects on the population is undertaken by way of the following assessments as detailed further below:

- Risk Assessment: to identify the potential risk to human health in response to identified hazards;
- Socioeconomic impacts on human health;
- Impacts on amenity resources and subsequent effects on human health; and
- Potential for psychological effects.

23.3.2.1 Importance

In terms of Human Health, all human beings are considered to be equally important and as such there is only one level of importance.

However, the use of the term “importance” in this context refers to areas or buildings occupied by people. Their importance is considered to increase as the number of people increases and the duration of time spent there increases.

The EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports May 2022 indicates that neighbouring occupied premises and land uses that should be considered include the following:

- Homes;
- Hospitals;
- Healthcare facilities;
- Hotels and hotel accommodation;
- Schools and rehabilitation workshops;
- Tourism and recreational facilities; and
- Visitor attractions.

Residential areas, public and private health facilities, workplaces, commercial areas and educational facilities are considered to be 'very important' areas because a number of persons usually spend significant time at these locations. Places of worship and recreational areas are considered to be 'important areas' of the baseline environment because they are used in a more transient way and people usually spend less time in these places.

Agricultural areas are considered of 'medium importance' in human health terms because of the limited numbers of persons present and limited time spent in these areas. The farm residences themselves are however considered to be 'very important'.

23.3.2.2 Sensitivity

The sensitivity of an area or building in this context refers to the vulnerability of the population. Reasons for this include inherent vulnerability such as is the case for the very young or old. Locations where there are higher numbers of vulnerable individuals such as hospitals and nursing homes are considered to be 'very highly sensitive' and require special consideration where potential effects are possible. Where it is clear however that very highly sensitive receptors have negligible effects, perhaps because of their distance from the line, these are scoped out.

Residences, schools, workplaces, commercial areas, and places of worship are considered 'highly sensitive'. This is because these areas will include populations of elderly, young people, and people with health conditions. However, the majority of the population in these locations are likely to be less vulnerable than those in the very highly sensitive locations.

Areas where recreational activities are carried out are considered to be 'sensitive' as these locations are typically only occupied during the day, and not necessarily continually. They will be used by children and the elderly but usually only for limited periods of time.

Sensitivity is also considered to increase with increased duration of exposure to emissions. It is true that those indoors, for example, are less sensitive to emissions than those outdoors, as potential exposures are less. However, this is balanced by the fact that people tend to spend much more time indoors. Therefore, no major distinction has been made between indoors and outdoors.

23.3.2.3 Functional Value

In Human Health terms there is some overlap when one considers sensitivity and functional value. The functional value of the baseline environment is evaluated to take into account the importance and sensitivity of different features of the environment and the greater the functional value, increased attention may be required in the assessment.

The functional value assigned is a product of the importance and sensitivity and a 'very high' functional value is assigned when either or both the sensitivity or importance of a location is considered to be very high as shown in Table 23-1 below.

Table 23-1 Criteria for Baseline Categorisation

Criteria	Functional Value
Residential areas Health facilities Educational facilities Workplaces Commercial/ retail facilities	Very high (V)
Recreational areas Places of worship	High (IV)
Agricultural areas Open green spaces Brownfield sites	Medium (III)
Not applicable	Low (II)
Not applicable	Very low (I)

Of the 'very high' functional value locations, health facilities and educational facilities merit special attention given the numbers of people there, for significant periods of time, and their potential vulnerability and this is reflected in this Chapter.

23.3.2.4 Data Sources

There are difficulties in performing a quantitative health assessment for EIA as outlined by the Institute of Public Health. Not least of these is the difficulty in getting baseline health data (due to patient confidentiality, GDPR (General Data Protection Regulation) and other reasons), to accurately determine levels of even relatively common medical conditions in a defined population that might be affected by such a project. Qualitative and quantitative baseline health data are a vitally important part of the appraisal section of the HIA and in the absence of an accurate baseline, it is very difficult to assess qualitative and quantitative changes that might occur. Generalised data may exist for larger areas such as a city or county, but this would at most, provide an estimate of the local baseline and not be accurate enough to allow for meaningful interpretation.

Such data collection would only be necessary if it was proposed to perform a HIA and it is appropriate to consider if a HIA is necessary or event appropriate. It is still entirely possible to perform an appropriate and in-depth assessment of human health impacts in the absence of a HIA, using the methodology in the EPA guidelines 2022 as outlined above and used for this assessment.

The IEMA discussion document notes that the WHO provides an overview of health in different types of impact assessment (Fehr et al. 2014) and presents the WHO's perspective on the relationship of HIA to other types of impact assessment as follows:

> *"The health sector, by crafting and promoting HIA, can be regarded as contributing to fragmentation among impact assessments. Given the value of impact assessments from a societal perspective, this is a risk not to be taken lightly ... The need … and justification for separate HIA cannot automatically be derived from the universally accepted significance of health; rather, it should be demonstrated whether and how HIA offers a comparative advantage in terms of societal benefits…"*

"Health issues can, and need to, be included [in impact assessment] irrespective of levels of integration. At the same time, from a civic society perspective, it would be unacceptable for HIA to weaken other impact assessments. A prudent attitude suggests optimising the coverage of health along all three avenues:

- *Better consideration of health in existing impact assessments other than HIA;*
- *Dedicated HIA; and*
- *Integrated forms of impact assessment."*

It is clear therefore that the WHO does not support a stand-alone HIA unless it could be demonstrated to be of advantage over an EIAR. It is therefore clearly appropriate that this health assessment is part of the EIAR. In addition, there is no Competent Authority in Ireland who can assess a HIA as there clearly is for an EIAR. For these reasons it was deemed most appropriate to deal with Human Health impacts as is statutorily required, that is in the EIAR and that a stand-alone HIA was deemed unnecessary and inappropriate.

23.3.2.5 Magnitude of Impacts

The main tool used to assess the potential impacts on human health is the risk assessment process. This process identifies a hazard and assesses the potential effects on human health. A hazard is something that has the potential to cause harm and the risk is the likelihood that harm will occur. A risk assessment therefore determines the likelihood of harm occurring. The likelihood of harm occurring is, in most instances, related to the amount or dose to which a human being may be exposed.

23.3.2.5.1 Dose Response Risk Assessment

A dose response relationship indicates that the higher the dose the more likely a response is to occur, and in many instances the more severe a response. Even psychological risks show this dose response relationship as the more stress and annoyance people experience, the more likely there is to be an actual impact on psychological health.

This knowledge that the risk to human health is usually associated with the magnitude of the exposure to the hazard allows an assessment of likely effects on human health to be determined given the likely exposure. That is, we can assess risk if the likely exposure is predicted.

The first step is therefore to identify the hazards, then the magnitude of exposure and then to assess the likely health effects. Within this EIAR, the potential impacts which could affect human health have been identified (Hazard Identification). The scale of these potential impacts (Dose-Response Assessment) and their duration (Exposure Assessment) is assessed and the significance of the potential effect on human health determined (Risk Characterization).

When using a recognised Health Based Standard for a particular hazard, the dose response assessment is included in the standard. This means that the authorities or expert committees which recommended the level of the standard will have taken into account the health problems at the different exposure levels and set the level within the standard to prevent these problems from occurring.

23.3.2.5.2 Socioeconomic impacts on human health

Improved socioeconomic status is associated with improved health measures such as longevity. People who work, live longer, and enjoy better health than the unemployed, who generally suffer poorer physical and psychological health outcomes. Indeed, providing and encouraging employment and with it improved financial means is one of the most important contributors to public health. Whilst socioeconomic gains may be worthwhile in themselves, it is important to realise that they are also associated with an improvement in health status.

Projects that provide environmental benefits, protect the population from public health dangers, support regeneration, reduce unemployment and improve socioeconomic circumstance can contribute to improving the health and wellbeing of communities. Some of the ways these goals can be achieved is that they can make an area more attractive to investment, increase tourism and facilitate sustainable travel. Although negative effects on socioeconomic development may also be possible, the link between socioeconomic conditions and positive health outcomes is so strong that improving socioeconomic situations can be used as a surrogate for human health effects. In other words, by predicting an improving socioeconomic situation one can anticipate an improvement in health outcomes.

This was reinforced by the 2019 publication by the HSE, Population Health and Demographics, where the following observations were made:

> *"There is a strong link between poverty, socio-economic status and health"*

The assessment of human health for the Proposed Development, in terms of health improvement, includes an assessment on how the Proposed Development would impact on the socioeconomics of the community.

23.3.2.5.3 Impacts on amenity resources and subsequent effects on human health

Amenity can be described as a desirable or useful feature of a place. It is something that helps provide comfort, convenience, or enjoyment for people. In human health terms amenity can relate to factors such as the ability to exercise using sporting facilities, parks, pathways, and roads. Amenity also extends to the ability for individuals to relax, which has definite human health benefits.

The human health assessment of impacts on amenity primarily relate to opportunities for exercise for all including able bodied and disabled individuals. The assessment covers potential loss and gains of amenity.

The key criterion in relation to general amenity is community wellbeing. Direct effects on communities due to loss of facilities, amenity space and natural areas can impact on community wellbeing and interaction. Indirect effects may result from changes in environmental quality, for instance, from noise or visual intrusion and are cross-referenced where applicable with relevant chapters of the EIAR. Impact levels are defined in Table 23-2 below.

Table 23-2 Criteria used in the Assessment of Amenity Impacts

Impact Level	Significance Criteria
Imperceptible	No noticeable change in the character of the environment
Not significant	An effect which can cause noticeable changes in the character of the environment, but without significant consequences for the community's well-being, amenity or health
Slight	A small impact on community wellbeing can be attributed to the Proposed Development
Moderate	A moderate impact on the community wellbeing can be attributed to the Proposed Development
Significant	An effect which has the potential to impact on community wellbeing such as to affect people's behaviour and quality of life
Very significant	An effect which has the potential to substantially impact on community wellbeing such as to affect most people's behaviour and quality of life
Profound	Effects of a scale to significantly impact on community wellbeing to an extent that people's behaviour or quality of life is substantially changed, for example where significant health issues arise or where people may wish to relocate

23.3.2.5.4 Potential for psychological effects

In the EIA process, potential adverse effects on psychological health are often mentioned, for example, anxiety and stress experienced by people worried that they would experience a change in the environment in which they live.

Human beings may experience annoyance from the temporary effects of any construction activity, such as noise or dust. Annoyance is not in itself a health effect, although it is recognised that there can be potential impacts on a person's overall psychological well-being. If someone develops a psychological illness such as anxiety or depression this becomes a medical impact.

There are various degrees of psychological impact, and these can be both positive and negative. Although identifying the potential impacts is possible, quantifying them is difficult as there are no direct measurements available, and the same impacts may have different effects on different people. For example, for some individuals demolishing an old building could be viewed as removing an eyesore or making way for something better but alternatively for others, it can be seen as a loss of heritage or in some instances their homes.

Another example of this is how people reacted to the Covid pandemic. Many had very significant concerns about contracting Covid, with increased levels of anxiety and even leading to increased psychological ill health, whereas others were anxious because of movement restrictions or requirements to wear masks in public. While some impacts on health are very predictable, such as the impacts of increasing noise or decreasing air quality, the impacts on psychological health from the same situation can differ very significantly between people depending on their perspectives.

An example of a positive impact could be those looking forward to increasing employment opportunities; both directly, in the potential for employment in construction and operation of the Proposed Development, and indirectly by improved public transport during the Operational Phase.

There will also be negative effects of varying degrees. These can be minimised by construction and operational mitigation measures and also by communication and provision of regular factual information.

In terms of assessing the psychological impact, an impact is assessed as either positive or negative, if it is likely that the overwhelming majority of people will experience that effect. Where different psychological impacts are anticipated from the same scenario the assessed psychological impact is neutral.

23.3.3 Consultation

Public consultation was conducted as part of the early-stage design of the Proposed Development. The following organisations were also consulted:

- Dublin City Council;
- Fingal County Council;
- Louth County Council;
- Meath County Council; and
- Environmental Protection Agency (EPA).

23.3.4 Difficulties Encountered / Limitations

No significant difficulties were encountered in performing the Human Health assessment.

23.4 Receiving Environment

The receiving environment is a combination of a standard urban and a sub-urban environment with intervening stretches through rural areas. There are residential, commercial, and industrial land uses, along with educational facilities, buried utilities and telecommunication equipment. Outside of the urban environment, the Proposed Development passes mostly through farmland.

23.4.1 Health Profile

From a human health perspective, the assessment focused on those that are considered the most likely to be affected and includes people who live or work within 500m of the Proposed Development. Impacts beyond this area will also be reviewed to ensure more distant effects are also taken in account.

Health in Ireland Key Trends 2022 is the most recent health statistics report published by the Department of Health. It provides a summary of health and healthcare statistics for the country over the past ten years. In 2015, County Health Profiles were published on the HSE website under the Healthy Ireland Strategy, which is a national framework to improve the health and wellbeing of the people of Ireland. A group made up of the Health Services Executive, and Lenus the Irish Health Research Repository have published these health profiles for all local authorities in Ireland. These reports have been used to establish a community health profile for the Proposed Development.

In Ireland, there has been an increase in life expectancy and a decrease in mortality rates. Mortality rates in Ireland have declined 15.8% since 2012. In 2021, 81.7 % of males and 81.3% females rated their health as being good or very good. This is the highest in the EU and compares with an average of 71.5% and 66.6% for males and females respectively across the EU, with those in higher income brackets tending to report better health than those in lower income brackets.

The Proposed Development is located within the local authority administrative areas of Louth, Meath and Fingal, Dublin City Councils. There the relevant health profiles for those local authority areas are considered.

The most recent health profile for Louth is from 2015. A further one is expected in 2024 after analysis of 2022 Census data.

The Louth Health Profile showed that:

- Louth has above average lone parent households of 12.4% (national rate 10.9%);
- Births to females aged under 20 at 17.4 is higher than the national rate of 12.3;
- Breast feeding rates are lower than the national average at 35.0% (national rate 46.6%);
- Deaths rates for all ages, respiratory and injury and poisoning are higher than the national rates, whilst heart disease in those aged under 65 years is lower than the national rate; and
- Immunisation uptake at 24 months for the 3rd 6 in 1 of 93% and MMR1 of 91% are lower than the national rates.

A map showing the levels of deprivation in Louth from the same Lenus report is included below in Image 23-1. This shows the area for the Proposed Development to be marginally above or below average in terms of deprivation, when compared to the rest of Ireland.

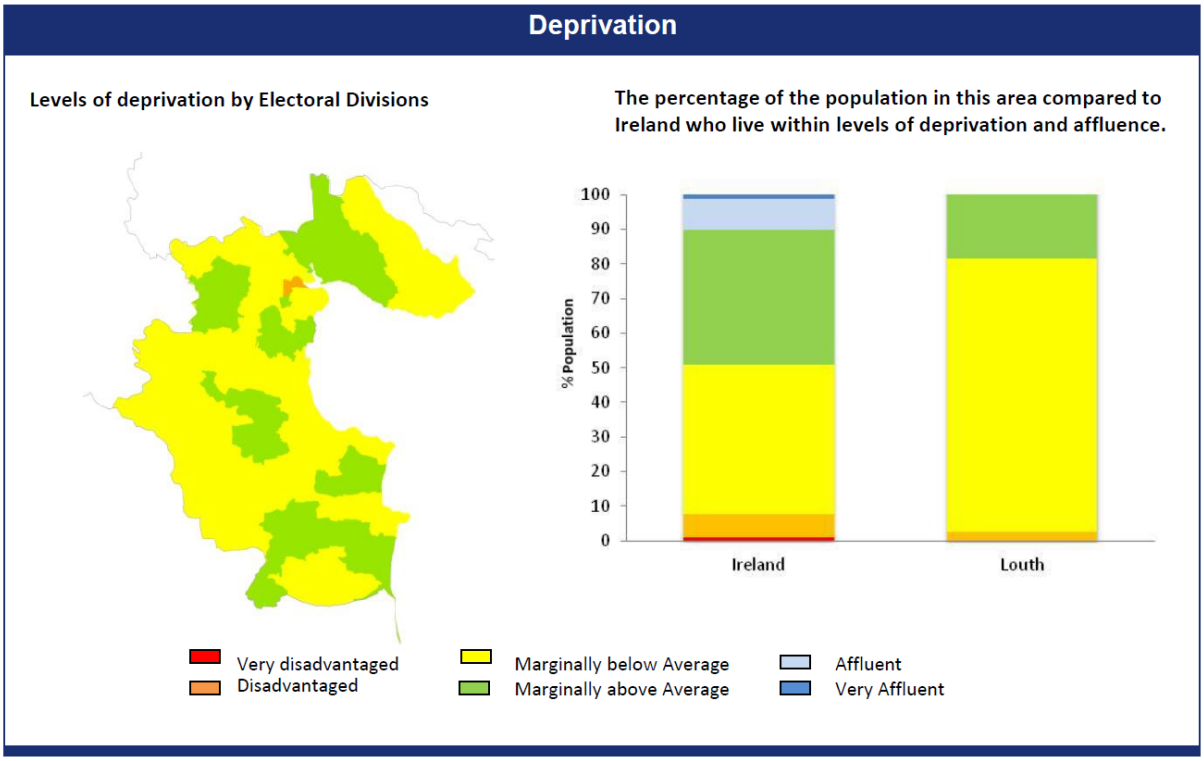

Image 23-1 Levels of Deprivation – County Louth (Source: Lenus)

Likewise, for County Meath, the most recent health profile is from 2015. A further one is expected in 2024 after analysis of 2022 Census data.

The Meath health data showed that the county:

- Has the second highest rate nationally of 9.5% in those aged 0-4 and the highest for those aged 5-14 of 15.7% (national 7.8% and 13.6% respectively);
- Has the lowest percentage of those who report their health as being bad or very bad at 1.1% (national rate 1.5%), and a low percentage of those with disability of 10.7% (national 13.0%);
- Birth rate for all ages at 17.2 is higher than the national rate of 15.8, births to those aged under 20 at 9.1 is lower than the national rate of 12.3;
- Cancer incidence rate for the main causes of cancer are average except for female malignant colorectal cancer which is the second highest nationally;
- Has below average death rate for all causes and all ages; and
- Immunisation uptake at 24 months for 3rd 6 in 1 of 95% and MMR1 of 91% are lower than the national rates.

In terms of levels of deprivation the area of the Proposed Development is largely marginally above or marginally below the average for the rest of Ireland, as illustrated in Image 23-2 below.

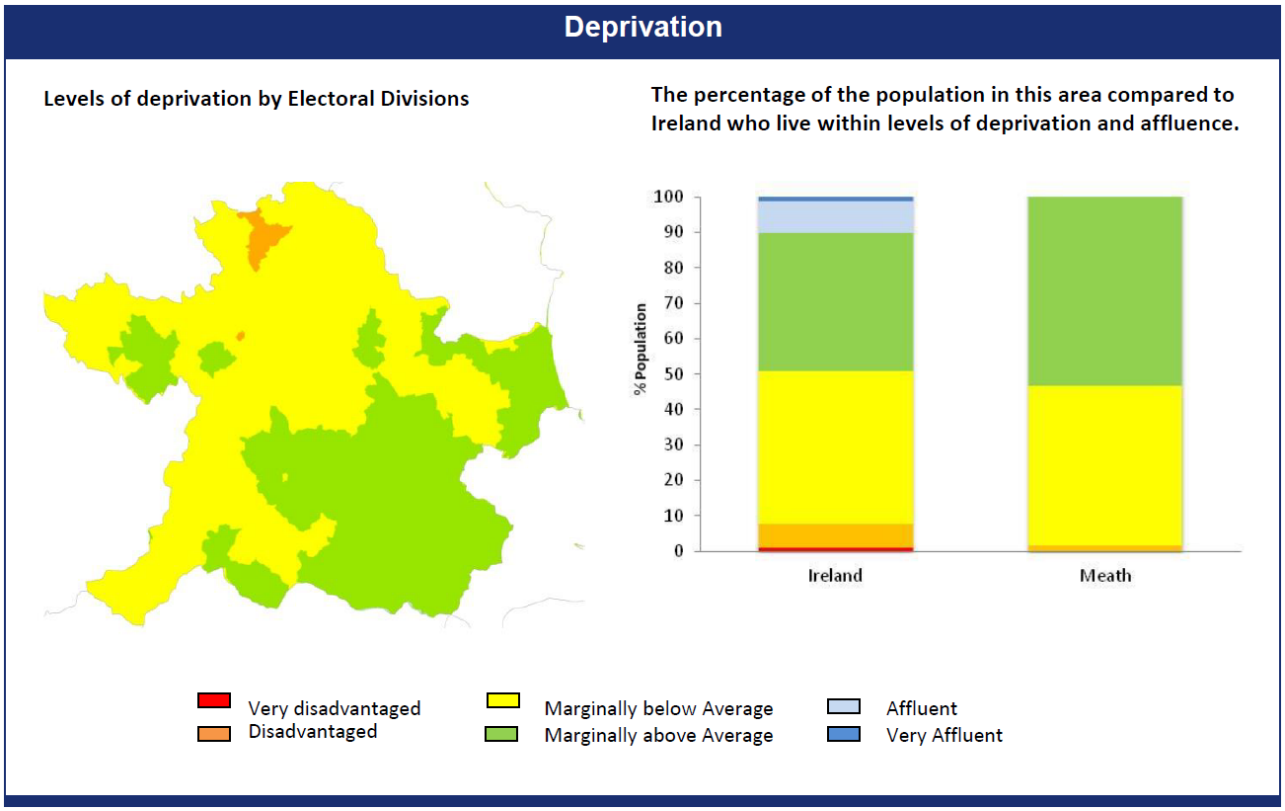

Image 23-2 Levels of Deprivation - County Meath (Source: Lenus)

In terms of Fingal (Dublin Fingal as per the Health Profile), the 2015 data for this area showed that it:

- Is the second most affluent Local Authority in Ireland, 85% of its population are either above average or affluent;

- Has a low dependency ratio of 46.0% (i.e. Those aged 0-14 and 65 years and over as a proportion of those aged 15-64)-national rate 49.3%;
- Is the most diverse population nationally with 24.5% of its population being of ethnicity other than white Irish;
- Has the lowest percentage nationally of those who report their health being bad or very bad at 1.1%, or persons with disability at 10.2% (national 1.5% and 13.0% respectively);
- Has the highest birth rate population nationally at 20.2/100,000 population and the second highest rate for breast feeding of 53.7% (national 46.6%); and
- Cancer incidence rates are higher than average for female malignant melanoma, male colorectal cancer and male and female lung cancers (County data) Has the lowest suicide rate nationally of 5.6/100,000 population.

In terms of levels of deprivation, from the 2015 Health Profile for Dublin Fingal, the area of the Proposed Development, as illustrated in Image 23-3, is largely average or marginally above average, when compared to the rest of Ireland.

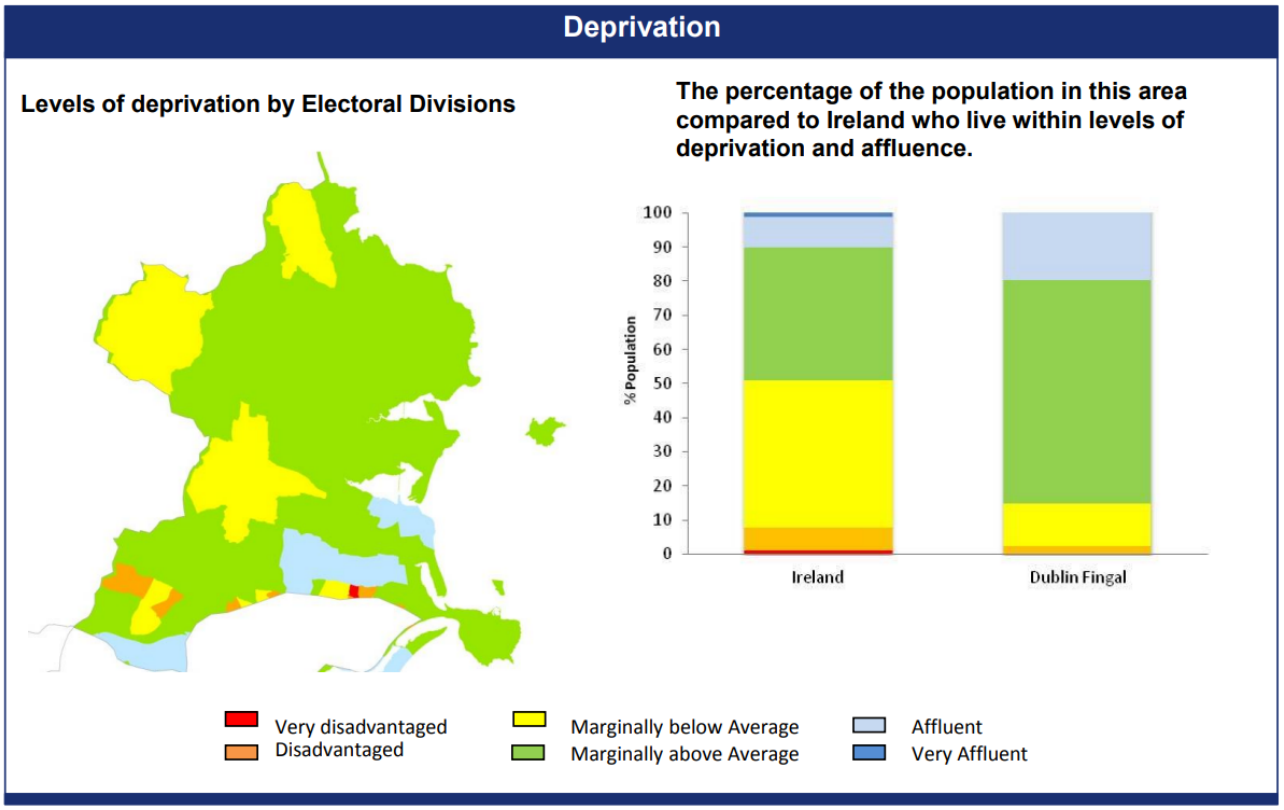

Image 23-3 Levels of Deprivation - Dublin Fingal (Source: Lenus)

Finally, in respect of Dublin City administrative area, the 2015 Health Profile for this area shows that it:

- Has a dependency ratio of 38.4% (i.e. those aged 0-14 and 65 years and over as a proportion of those aged 15-64) - national rate 49.3%;
- Has a high level of households which are local authority rented at 11.5% (national 7.8%);
- Has a diverse population with 21.3% of the population who are not white Irish;

- Has a higher than average of persons who report their health as being bad or very bad 2% (national 1.5%) or who have a disability 14.9% (national 13.0%);
- Has a greater than average birth per 1,000 rate for those aged under 20 of 19.0 (national rate 12.3);
- Cancer incidence rates are higher than average for female malignant melanoma, male colorectal cancer and male and female lung cancers (County level data); and
- Mortality rates are above national average for heart disease and stroke in those aged under 65 years (County level data).

In terms of levels of deprivation, the Health Profile data, as illustrated in Image 23-4 shows that the area of the Proposed Development includes some of the most affluent and least affluent/ most deprived areas in the state.

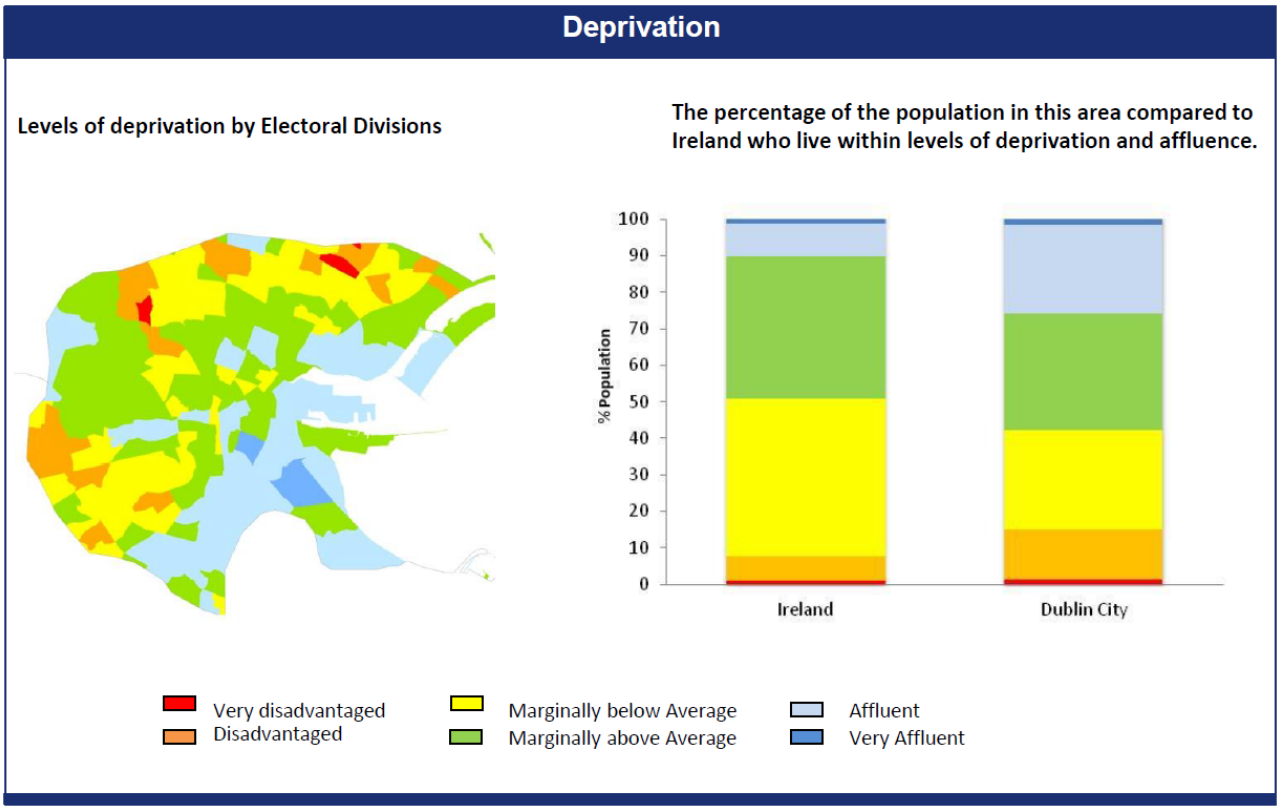

Image 23-4 Levels of Deprivation - Dublin City (Source: Lenus)

23.5 Description of Potential Impacts

As outlined in Section 23.3, in terms of human health protection, emissions during the Construction or Operational Phase of the Proposed Development need to be identified and compared against reliable Health Based Standards. As detailed herein, reliable sources of the standards may be regulatory such as the EU, such as Air Quality Standards, or based on expert opinion such as is provided by the WHO as is the case with noise guidelines.

23.5.1 Characteristics of the Proposed Development

As detailed in Section 23.3.1, the proposed DART + Coastal North development consists of electrification of the existing railway line, between Malahide and Drogheda, including the Howth Branch as well as infrastructural interventions between Dublin City Centre and Drogheda McBride Station to enable an increased capacity and frequency of service. The total length of the Proposed Development is approximately 50 kilometres (km).

The Proposed Development has been divided into five geographical zones (A-E) from south to north, which are detailed in Chapter 4 (Description of the Proposed Development) and summarised below:

- Zone A – North of Connolly Station to Howth Junction & Donaghmede Station;
- Zone B – Howth Junction & Donaghmede Station to North of Malahide Viaduct;
- Zone C – North of Malahide Viaduct to south of Gormanston Station (Finger border);
- Zone D – South of Gormanston Station (Fingal border) to Louth/Meath border; and
- Zone E – Drogheda Station and surrounds (boundary of Louth approximately 1.5km southeast of Drogheda Station).

While the line already exists, it's electrification and the infrastructural interventions proposed (including turn backs) will allow for increased frequency and capacity of trains in an environmentally sustainable manner. It will also reduce the dependence on fossil fuels for public transport.

23.5.1.1 Do Nothing Scenario

In the Do Nothing scenario there is likely to be a continued growth in private transport including private cars as there are limitations on alternatives. This will lead to a gradual change, which for example can lead to increased traffic jams and consequently increased annoyance. This could in turn lead to psychological health impacts if persistent. This will also likely lead to an increase in greenhouse gas emissions with adverse climate impacts. This in turn is likely to lead to adverse human health effects not just locally but also globally.

23.5.1.2 Do Minimum Scenario

In the Do Minimum Scenario, there is likely to be a continued growth in private transport including private cars as there are limitations on alternatives. In the Do Minimum scenario there will be the introduction of battery electric multiple units (BEMU) on the Northern Line, which will allow electrified trains to operate on the railway line north of Malahide, ahead of the implementation of DART+ Coastal North.

23.5.1.3 Do Something Scenario

23.5.1.3.1 Construction Phase

The Do Something scenario assumes that the Proposed Development is constructed and operated as detailed in the EIAR. As detailed in various chapters in the EIAR some nuisance is predicted during the Construction Phase. This will be a direct impact of construction activities on emissions such as noise and dust, for example, and indirect impact, such as may occur, may be from necessary traffic diversions and controls. These have the potential to cause annoyance in some instances.

However significant controls to minimise the direct effects are detailed in the relevant chapters in the EIAR and within Appendix A5.1 (CEMP) in Volume 4 of this EIAR. Chapter 27 (Summary of Mitigation and Monitoring Measures) summarises the mitigation and monitoring measures for each individual topic. These mitigation measures include controls during the Construction Phase for noise and vibration to minimise potential impacts, dust suppression to minimise impacts on air quality, incident response plans, to ensure procedures are in place to respond in an efficient manner should an incident occur, and stakeholder management and communication procedures to ensure that residents and businesses within the vicinity of works are aware of what works are planned prior to them occurring.

23.5.1.3.2 Potential Impacts

Noise and vibration impact during construction are minimised by strict controls as outlined in Chapter 14 (Noise and Vibration) in Volume 2 of this EIAR. Construction works will be undertaken in compliance with DMRB noise and vibration guidance (UKHA 2020). While some construction work necessarily has to occur at nighttime impacts will be mitigated. In simple terms while noise emissions could and probably would be significant in the absence of the described mitigation, it is not likely to be significant in human health terms with the proposed mitigation.

That is not to say that there will be no effects. Inevitable night-time work will likely cause annoyance and will likely have some impacts for example on sleep. These however will be minimised by the mitigation designed into the construction methodology and described in Chapter 14 (Noise and Vibration). The individual receptors will also be able to further mitigate this, by for example, closed windows.

Dust mitigation measures are outlined in Chapter 12 (Air Quality) in Volume 2 of this EIAR. These measures will significantly reduce dust levels outside the immediate construction area. Mitigation measures noted within Appendix A5.1 (CEMP) will be complied with by the contractor during the Construction Phase to minimise potential impacts on nearby sensitive receptors. In simple terms while dust emissions could and probably would be significant in the absence of the described mitigation, it is not likely to be significant with the proposed mitigation.

Nevertheless, some noise and dust escape from the construction site is inevitable. This however will be at levels which would not affect human health in physical terms but could potentially cause annoyance, with for example dust on cars, noise affecting sleep quality, particularly for those who are trying to sleep, and annoyance as a result of the above but also things like traffic delays due to controls put in place which are necessary to allow for the construction. The actual impacts however are minimised by the various mitigation measures proposed.

23.5.1.3.3 Assessment of Potential Impacts on Receptors

In summary, while some impacts on human health are possible as outlined above none of these are assessed to reach a level of significance. This is particularly so when the controls and mitigations outlined are enforced. Therefore, no significant adverse human health effects are predicted during construction.

23.5.1.4 Operational Phase

23.5.1.4.1 Potential Impacts

The Proposed Development, once operational will provide more regular and reliable public transport to the area in an environmentally efficient manner. The health effects of an operational scheme are assessed as significantly positive for Human Health. It provides for a speedy and efficient means of transport which includes a means of getting to work and leisure facilities but also improving access to other services including health services.

The fact that this is provided in an efficient and environmentally friendly manner and provides people options for getting out of their cars will encourage exercise as outlined in Get Ireland Active.

23.5.1.4.2 Assessment of Potential Impacts on Receptors

As outlined in Chapter 14 (Noise and Vibration) in Volume 2 of this EIAR, no receptors will be significantly adversely affected by noise or vibration from the operational aspects of the scheme. Similarly with air quality as noted in Chapter 12 (Air Quality).

While there are significant benefits for the population of the greater Dublin area (including Dublin City and Fingal), Meath and Louth and indeed people visiting the area, from having a rapid and efficient public transport system, the individuals who will have the greatest benefit are those who are living in the vicinity of the line itself. These will have greater opportunities to use the line and it will be an option for many further transport needs. This convenience is predicted to have a significant positive psychological impact on the receptors during the Operational Phase.

23.6 Mitigation

23.6.1 Construction Phase

No additional human health mitigation measures are proposed other than those outlined in other chapters of this EIAR. These are summarised in Chapter 27 (Summary of Mitigation and Monitoring Measures) in Volume 2 of this EIAR.

23.6.2 Operational Phase

No additional human health mitigation measures are proposed other than those outlined in other chapters of this EIAR. These are summarised in Chapter 27 (Summary of Mitigation and Monitoring Measures) in Volume 2 of this EIAR.

23.7 Monitoring

23.7.1 Construction Phase

No additional human health monitoring measures are proposed other than those outlined in other chapters of this EIAR. These are summarised in Chapter 27 (Summary of Mitigation and Monitoring Measures) in Volume 2 of this EIAR.

23.7.2 Operational Phase

No additional human health monitoring measures are proposed other than those outlined in other chapters of this EIAR. These are summarised in Chapter 27 (Summary of Mitigation and Monitoring Measures) in Volume 2 of this EIAR.

23.8 Residual Effects Assessment of Human Health Impacts

23.8.1 Air Quality Environment

Air Quality is assessed in Chapter 12 (Air Quality) in Volume 2 of this EIAR. The conclusions are that because the Construction Phase is relatively short-term, in any single location, and with mitigation it is not expected to pose any risk to human health.

This is not to say that there will not be any impact. As outlined in Chapter 12, emissions to air during the construction activity will occur, as with any construction activity. These will be most noticeable very close to the construction activity. It is likely that this will cause some degree of annoyance. Some emissions will also occur from construction traffic. An extensive mitigation plan however is outlined, and this will ensure that no Air Quality Standards will be exceeded. These are health-based standards and in keeping with the methodology outlined above, this means that there will be no significant human health effects.

For the Operational Phase, no significant adverse air quality impacts associated with the operation of the proposed project have been identified. No air quality standards will be exceeded. These are health-based standards and in keeping with the methodology outlined above, this means that there will be no significant human health effects.

Even with the significant increase in capacity and frequency of service enabled by the DART+ Coastal North project, given the shift from diesel units to Electrically Powered Units (EMUs), operational effects on air quality are neutral.

23.8.2 Noise and Vibration Environment

Noise and Vibration are assessed in Chapter 14 (Noise and Vibration) in Volume 2 of this EIAR. The conclusions are that the Construction Phase is relatively short-term in any one location and therefore any elevated levels of noise will be of limited duration and, as a result, are not expected to pose any risk to human health following the implementation of mitigation measures presented in the Chapter. This includes the construction methods compatible with BS 5228 and DMRB noise and vibration guidance (UKHA 2020).

This is not to say that there will not be any impact. As outlined in Chapter, 14 Noise and Vibration, emissions from the construction activity will occur, as with any construction activity. These will be most noticeable very close to the construction activity. It is likely that these will cause some degree of annoyance. Some noise and vibration emissions will also occur from construction traffic. An extensive mitigation plan however is outlined, and this will ensure that these effects are minimised and so there will be no significant human health effects.

For the Operational Phase, no significant noise or vibration impacts associated with the operation of the railway have been identified. The greater frequency of trains means that there will be some extra noise sources during the operational stage but with the addition of mitigation measures outlined as well as lower noise emissions from electric engines will mitigate any effect. Therefore, no residual significant human health, noise or vibration effects are predicted.

23.8.3 Hydrological Environment (including Flood Risk)

Water is assessed in Chapter 10 (Water) in Volume 2 of this EIAR. This concludes that with the implementation of the mitigation measures described in the chapter, no adverse effects during either the Construction or Operational Phases are predicted and therefore no adverse effects on human health are predicted.

23.8.4 Hydrogeology (including Drinking Water) Environment

Hydrogeology is assessed in Chapter 11 (Hydrogeology) in Volume 2 of this EIAR. This concluded that with the implementation of the mitigation measures described in the chapter, no adverse effects during either the Construction or Operational Phases are predicted and therefore no adverse effects on human health are predicted.

23.8.5 Land and Soils (including Contaminated Land) Environment

Lands and Soils is assessed in Chapter 9 (Lands and Soils) in Volume 2 of this EIAR. This concluded that with the implementation of the mitigation measures described in the Chapter, no significant residual impacts during either the Construction or Operational Phases are predicted and therefore no adverse effects on human health are predicted.

23.8.6 Electromagnetic Effects & Stray Current

Electromagnetic Effects and Stray Current was assessed in Chapter 22 (Electromagnetic Effects and Stray Current) in Volume 2 of this EIAR.

No significant effect is predicted during the Construction Phase.

The assessment concluded that the operation of the electrified line including the OHLE (Over Headline Equipment), and support systems will be in-line with current best practices in relation to design and installation. Similar projects such as the existing DART and Luas currently operate well inside the guideline limits on human exposure to EMF. No impacts on human health from EMF are envisaged during the Operational Phase of the Proposed Development.

23.8.7 Psychological Impacts

As outlined in the methodology section, potential adverse effects on psychological health are often mentioned, for example, anxiety and stress experienced by people worried that they will experience a change in the environment in which they live.

Human beings may experience annoyance from the temporary effects of the Construction Phase, such as noise or dust as a nuisance. Annoyance is not in itself a health effect, although it is recognised that there can be potential impacts on a person's overall psychological well-being.

If someone develops a psychological illness such as anxiety or depression this becomes a medical impact.

In terms of assessing the psychological impact, an impact is assessed as either positive or negative, if it is likely that the overwhelming majority of people will experience that effect. Where different psychological impacts are anticipated from the same scenario the assessed psychological impact is neutral.

Many people will utilise Proposed Development when operational to meet their transport needs. This includes getting to work, accessing services or any other reasons. This means they will not be in cars, and they will not be dealing with issues associated with traffic and traffic jams. This means that there is expected to be positive psychological impact on those people.

There may be increased opportunities for exercise because of the easier, more frequent access to beaches and other areas of physical activity. This in turn would also have a positive effect on psychological health, as well as physical health.

While some might experience annoyance for a variety of reasons during the operational phase there is no reason to believe that this would exceed the positive psychological effects. Overall, the impact on human health is deemed as probably positive, in that the overwhelming majority will experience positive effects, but at worst neutral.

23.8.8 Physical Activity

Anything that leads to potential increase in physical activity has the potential to lead to improvement in health outcomes, both for physical health and psychological health, as already outlined. By facilitating a mode shift from car to rail transport, a resultant increase in physical activity will occur. When people travel by car, they usually travel the entire distance by vehicle. The car is parked as close to their home as possible, and they will typically park as close to their destination as possible. When people travel by public transport the mode of travel from home to station and station to destination would often be by walking or cycling. The facilitation of such a public transport network therefore facilitates additional physical activity with resultant human health benefits.

By improving access to places of exercise including beaches and other areas more people will be able to exercise more frequently.

23.8.9 Socioeconomics effects on health

A review of the benefits of improved public transport in Ireland was published by PublicPolicy.ie in July 2020 by Hynes and Malone entitled *the utility of public transport in Ireland Post Covid 19 Lockdown and Beyond*. The following is an abstract.

> "*Investment in public transportation has positive direct and indirect induced effects on job creation and retention, business output, GDP and increased tax returns (Weisbrod & Reno, 2009). Social benefits include improved communal cohesion with public transport often serving peripheral, isolated and deprived communities thus reducing the effect on social fragmentation and social exclusion (Li & Deng, 2016; Lucas, 2012). It also offers opportunities for developing and enhancing social capital (Hall, 2010; Mattisson, Håkansson, & Jakobsson, 2015).*

> *Public transport can aid public health as it complements the use of active travel modes as walking to and from stops and stations helps physically inactive populations attain some necessary daily physical activity (Le & Dannenberg, 2020; Patterson, Webb, Millett, & Laverty, 2019; van Soest, Tight, & Rogers, 2020). A good public transport system can also help improve air quality and, thus, general health."*

Whilst these comments relate to public transport, in general, rather than specifically to the Proposed Development, it is reasonable to extrapolate that this important improvement in public transport for one of the most populated areas in the country will bring social economic and health benefits.

23.8.9 Access to Services

An improved public transport system will also assist those who wish to access services. This includes accessing health services, including hospitals, clinics, and other providers of health-related services. This can only have positive effect on human health by removing, or at least decreasing, any obstacles into accessing health services early when any interventions may be most effective. A positive human health effect is predicted from increased access to services.

23.9 Summary of Effects

23.9.1 Construction Phase

With the implementation of the mitigation measures proposed in Chapter 27 (Summary of Mitigation and Monitoring Measures) of this EIAR, no significant residual human health effects are predicted during the Construction Phase.

23.9.2 Operational Phase

As outlined previously the impacts on human health during the Operational Phase are positive. It brings a modern and sustainable means a public transport to Dublin City, Fingal and Counties Meath and Louth, which will be used by the residents and visitors. It will be used as a means to travel to and from work, school, college and recreational activities. It also enhances access to services including health services. No significant residual human health adverse effects are predicted during the Operational Phase.

Through a combination of benefits including socio-economic benefits, access to services, access to exercise and potential psychological benefits, an overall positive impact on human health is predicted.

23.10 Cumulative Effects

The cumulative assessment of relevant plans and projects is undertaken separately in Chapter 26 (Cumulative Effects) in Volume 2 of this EIAR.

23.11 References

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