IN THE MATTER OF AN APPLICATION TO

AN BORD PLEANALA

For Approval of the Railway (Metrolink – Estuary to Charlemont via Dublin Airport) Order [2022]

ABP-314724-22

ORAL HEARING

STATEMENT OF EVIDENCE

on

Climate and Air Quality

by

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19 February 2024

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STATEMENT OF EVIDENCE

1. My name is Dr. Avril Challoner. I am employed by AWN Consulting as a Principal Air Quality and Climate Consultant. I hold a BEng (Hons) in Environmental and a PhD in Environmental Engineering. I am a Chartered Environmentalist (CEnv), Chartered Scientist (CSci), full Member of the Institute of Environmental Management and Assessment, full Member of the Institute of Air Quality Management.

2. My role within the Metrolink project is as the Project Air Quality and Climate Consultant and I have worked on the project since 2018.

3. The Oral Hearing Agenda sets out matters that An Bord Pleanála wishes TII to address in Appendix 1, which include the implications of any relevant legislative or guidance updates since lodgement of the application. The Agenda refers, by way of example, to the TII Carbon Tool and Ambient Air Quality Standards Regulations 2023. The Inspector has also requested that TII address the implications of any policy changes since lodgement of the application, including the Climate Action Plan.

4. In my evidence, I will address the updates relative to:

   (1) Climate; and

   (2) Air Quality

   I have provided a summary of my evidence below, and further detail in relation to Climate is set out in Appendix 1, and for Air Quality in Appendix 2.

Climate
Climate Action Plan (CAPs) updates

The most recent Climate Action Plan (CAP) at the time of the submission of the EIAR was the 2021 CAP (CAP21). Since the submission of the EIAR, two more CAPs have been published. They are:

- the 2023 Climate Action Plan (CAP23); and
- the draft 2024 Climate Action Plan (CAP24), which has been published and is due to be adopted shortly.

Both CAP23 and CAP24 recognise that MetroLink is a crucial infrastructure project that is required to improve capacity within our public transport system, and shift behaviour as part of the efforts to achieve a modal shift, and an associated reduction in fossil-fuelled vehicle use. CAP24 states that MetroLink is one of the significant new public transport infrastructure elements that "*is required to deliver on our carbon emissions reduction targets, and to provide people with the sustainable alternatives to private car usage".*

CAP21, CAP23 and CAP24 have clear alignment of purpose, which is to ensure Ireland achieves its net carbon zero target for 2050. This is identified as the national climate objective in section 3 of the Climate Action and Low Carbon Development Act 2015 (as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021) as follows:

"*3. (1) The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy…"*

Each CAP builds on the last, refining the targets and actions that needs to be put in place in order to active our 2030 and 2050 carbon objectives and seeks to establish a clear roadmap for how Ireland can achieve/comply with its climate obligations.

Key elements in CAP23 and CAP24 that are pertinent to MetroLink are:

- Adoption of the 'Avoid-Shift-Improve' framework for Transport:
    - *developing services, communities, and infrastructure in such a manner as to **AVOID** the need to travel as much as we do today;*
    - *improving the relative attractiveness of sustainable travel modes such as Public Transport, Cycling and Walking, to **SHIFT** away from car use; this will facilitate increased use of lower-carbon modes and reduce the percentage of total journeys that are made by private car (modal share) from over 70% (today) to just over 50% in 2030; and*
    - *complement these measures by increasing the proportion of EVs in our car fleet to 30% by 2030, which will **IMPROVE** the efficiency of the national car fleet; electrification of the freight and public transport sector will also be key.*
- There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030;
- A public sector requirement of low carbon construction methods and low carbon cement material will be specified as far as practicable;
- An action for public sector procurement contracts for delivery and haulage should specify zero-emissions vehicles where possible.

Implications of CAP

CAP requires that TII will comply with the targets set out for public bodies in CAP23 and CAP24 (once adopted), including the requirement of low carbon construction methods and low carbon cement material as far as practicable.

The MetroLink project will be an important driver of achieving the modal shift outlined as part of CAP23 and CAP24. This project will contribute to the Shift and Improve mechanisms of the CAP23 and CAP24 framework for addressing transport emissions.

- *SHIFT by providing a frequent (up to every 90 seconds at peak time), reliable (no road* congestion to deal with) and high-capacity rail service, which removes 800,000 annual private car trips and
- *IMPROVE* by providing electrification of the public transport system with a system powered by renewable energy.

The MetroLink project will help to move people away from cars and facilitate a broader uptake of public transport options, through its range of interchange options. CAP also drives wider industry change in the materials which will be used in construction projects. This will help the MetroLink project, as the level of embodied carbon in those source materials will continue to reduce as the construction industry seeks to meet its own lower targets for embodied carbon in construction materials.

CAP23 and CAP24 sets a decarbonisation target of 50% renewable energy on the national energy grid by 2025, increasing to 80% by 2030.This will mean that the national electricity grid will gradually be decarbonised, and each unit of electricity used will have a lower carbon intensity. This will have a positive impact during the construction phase, as electricity is tied to the production of materials and activities associated. MetroLink is consistent with the approach mandated by CAP23 and CAP24.

TII Commitments

In addition to the climate impact mitigation measures set out in the EIAR, TII is prepared to commit to the following:

- Corporate Power Purchase Agreement (CPPA) to use electricity generated from renewables for 100% of construction stage power which includes the energy to power the tunnel boring machine;
- CPPA to use electricity generated from renewables for 100% of operational power (the EIAR committed to 90%);
- The use, where practicable, during construction of low carbon concrete with an embodied carbon equivalent to a 50% GGBS replacement;
- The use in construction plant and equipment of sustainably sourced Hydrotreated Vegetable Oil (HVO) as a 100% replacement of fossil fuels;
- Procurement only from suppliers that meet the industry reduction requirements within the CAP for 10% reduction in embodied carbon by 2025.

The result of these mitigation measures, which go above and beyond the required commitments in the CAP and clearly illustrate TII's commitment to Ireland's trajectory to Net Zero by 2050, is a saving of up to 51.7% compared the total figure of 1,016.5 $ktCO_2$ related to embodied carbon calculated in the EIAR.

Further, and in addition to the commitment to use HVO rather than fossil fuels, TII will also, where feasible, mandate the use of electric construction plant and equipment so as to increase the potential saving. This has not, however, been taken into account in calculating the saving of embodied carbon because the extent to which this will be feasible is not clear.

Further details on these measures can be found in Appendix 1.

Other policy updates

In addition to the updated CAPs, there have been a number of other climate-related policy updates, which are summarised in greater detail in Appendix 1. These include:

1. **The Government's Long-term Strategy on Greenhouse Gas Emissions Reductions** (published in April 2023): This sets out indicative pathways, beyond 2030, towards achieving carbon neutrality for Ireland by 2050. It builds on the decarbonisation pathways set by the carbon budgets, sectoral emissions ceilings and Climate Action Plan 2023, to ensure coherent and effective climate policy. MetroLink will help to achieve this strategy. The project has been purposefully designed to interact with other sustainable transport modes, opening a much wider network for MetroLink users to transfer to additional final destinations and enabling a smooth transition across a complex network. MetroLink provides connectivity and integration with other public transport services (Luas, DART, Bus, Active Travel Network) leading to more people availing of public and active transport. This aligns with the Long-term Strategy.

2. **Dublin City Council Climate Neutral Dublin 2030 Draft Plan:** This plan was published in September 2023 and explains the 2030 vision that the Council have for the city. This is set around four foundations: a Creative City, a Resource-Full City, a Resilient City and a Social City. These foundations aim to deliver the overall target of a 51% reduction in greenhouse gas emissions in line with our National Climate Objective by 2030 (2018 baseline), while striving for neutrality before 2050 as per Dublin City's participation in the EU Mission for 100 Climate Neutral and Smart Cities (Net Zero Cities). Action OS7 states that Dublin City Council should

promote active travel and public Transport. Promotion of public transport projects such as MetroLink fits with this aim. In addition, the measures set out in the plan have the potential to assist MetroLink in the construction and operational phases due to the Networks for Knowledge Exchange with universities to develop creative solutions to battle climate change and Innovation Districts, where innovation projects are fast-tracked, and technology is used to help address climate change.

3. **Fingal County Council Draft Climate Action Plan 2024-2029:** This plan was published in September 2023, and it aims to show how FCC can contribute towards the Irish goal of net zero no later than 2050 and the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy. 45% of GHG emissions in Fingal are related to transport. FCC's support of MetroLink, and other public transport projects such as BusConnects and DART+, are specifically called out in this section as an action (Action T20). Regarding the Park and Ride facility, the Action Plan states that they should be strategically located, in accordance with NTA strategy and design for inclusion of EV charging and cycle park facilities. FCC intends that the implementation of the Action Plan will facilitate a Just Transition across the County, protecting the most vulnerable within society. MetroLink has the potential to support this through provision of local construction jobs during the 2024 to 2029 period and a public transportation facility once in operation.

In summary, MetroLink is supported by policy set out in the CAPs, the long-term strategy for GHG emissions, and also the local authority climate action plans. This is explained further in Appendix 1.

TII Carbon Tool

The Inspector has asked for an update on the implications of any relevant legislative or guidance updates since lodgement of the application, and referenced TII's Carbon Tool (Appendix1, Section 13). I have summarised this below and explained its implications.

TII's Carbon Tool was published in December 2022, alongside new guidance documents (which supersede the 2011 TII '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes'*, which covered climate assessments) and standards for the EIAR with respect to Climate:

- PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (offline & Greenways) – Overarching Technical Document, and
- PE-ENV-01105: Climate Assessment of Proposed National Roads – Standard.

TII's Carbon Tool (2022) is an online carbon tool for assessing lifecycle carbon emissions for national road and light rail infrastructure projects in Ireland. This online tool is substantially similar to the Carbon Tool that I used in my assessment for the EIAR chapter, which was a previous iteration of the TII Carbon Tool. Because it is an online tool, this allows TII to update emission factors and add new materials into the database for use. For context, the carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase. The emission factor is the amount of carbon per unit for that material/activity i.e. excavation of tunnels through rock has an emission factor of 208 $kgCO_2e$ per m^3 but the same volume excavated through non rocky soil has a much lower emission factor of 70 $kgCO_2e$ per m^3 as it requires less energy to do it.

The goal of the tool is to assist project development as a decision-making tool that drives lower carbon infrastructure and to facilitate the integration of environmental issues into transport infrastructure planning, construction and operation. All emission factors are clearly shown in a database within the tool. In the EIAR, a previous iteration of the TII carbon tool was utilised (V2.1). This tool was an offline excel workbook. The main difference between the online version of the tool and version 2.1 used for MetroLink is the requirement for the tool to be held centrally by TII (rather than excel workbooks on users' computers). This allows TII to update the tool regularly with new emission factors and to not have

uncontrolled versions with outdated databases. The headings of the online tool are the same as the version used for MetroLink and the two tools are very closely aligned.

I have used TII's updated Carbon Tool to update my assessment. This updated assessment is included in Appendix 1. In short, the result of this update is a change of less than 1% in the overall emissions due to the updated tool.

Compliance with the Climate Action and Low Carbon Development Act 2015

Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended by the Climate Action and Low Carbon Development (Amendment) Act 2021) provides that a relevant body (An Bord Pleanála in this case) shall, in so far as practicable, perform its functions in a manner consistent with:

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

The MetroLink project is:

- consistent with the most recent approved climate action plan and national long term climate action strategy and furthers the national climate objective;
- consistent with the most recent approved national adaptation framework and approved sectoral adoption plans, ensuring that the impact of future climate change has been considered and adaptation has been applied to reduce vulnerability to such impacts, and
- consistent with the objective of mitigating GHG emissions and adapting to the effects of climate change in the State.

A GHG emissions assessment has been carried out as part of the EIAR. This assessment has been updated and is set out in Appendix 1. The assessment considers the quantification of the GHG emissions from a project over its lifetime and compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.

A Climate Change Vulnerability Assessment was also carried as part of the EIAR out to assess the project's resilience/adaptation to climate change. This remains unchanged but contextual updates are set out in Appendix 1. The vulnerability assessment considers a project's vulnerability to climate change and identifies adaptation measures to increase project resilience.

Air Quality

With respect to Air Quality, the Board has asked the MetroLink team to address the implications of any relevant legislative or guidance updates since lodgement of the application, citing the Air Quality Standard Regulations 2023 (Appendix 1(4))

Ambient Air Quality Standards Regulations 2022

In the EIAR, the air quality impacts of the Proposed Project were assessed for compliance with the mandatory limit values outlined in the Air Quality Standard Regulations 2011 (the 2011 Regulations) which were introduced to transpose the requirements of Directive 2008/50/EC on ambient air quality and cleaner air for Europe (as amended) (the CAFE Directive) which has a focus on the protection of human health.

The 2011 Regulations were replaced by the Ambient Air Quality Standards Regulations 2022 (the 2022 Regulations) came into effect on 31 December 2022 which also give effect to the requirements of the CAFE Directive. The scope of the 2022 Regulations, as set out in Regulation 4, is to:

> *(a) make provisions necessary for the implementation of the [CAFE] Directive;*
>
> *(b) establish limit values and, as appropriate, alert thresholds for concentrations of certain pollutants in ambient air intended to avoid, prevent or reduce harmful effects on human health and the environment as a whole;*
>
> *(c) provide for the assessment of concentrations of certain pollutants in ambient air on the basis of methods and criteria common to the Member States of the European Communities;*
>
> *(d) provide for the obtaining of adequate information on concentrations of certain pollutants in ambient air and ensure that it is made available to the public; and*
>
> *(e) provide for the maintenance of ambient air quality where it is good and the improvement of ambient air quality in other cases with respect to certain pollutants.*

The 2022 Regulations set limit values and alert thresholds for air pollution for particular pollutants and also specify the requirements for monitoring and reporting air quality data. Regulation 27, which concerns public information, introduces a requirement that the public be informed “in good time” of ambient air quality, changes of limit values and air quality plans.

Another change to the Regulations is the addition of a requirement in the 2022 Regulations for air quality plans to be submitted by local authorities to the Minister for approval no less than sixteen months after the end of the year of a first exceedance. Once approved, the plan is to be communicated to the European Commission no later than two years after the end of the year of the first exceedance. This two-year time frame is in line with the 2011 Regulations.

A key change of relevance to construction projects is that, under the heading Short-Term Action Plans, Regulation 25(5) provides:

> *“The short-term action plans referred to in paragraph (1), may, depending on the individual case, provide for effective measures to control, and, where necessary, reduce or suspend activities which contribute to the risk of the respective limit values, or target values or alert thresholds being exceeded. Those action plans may include measures in relation to motor vehicle traffic, construction works, ships at berth and the use of industrial plants or products and domestic heating.”*

The reference to construction works is not included in the 2011 Regulations. Another new requirement contained in Regulation 25(4) is that such short-term action plans must be submitted to the Minister and the EPA for evaluation no less than 3 months from the date of notification by the EPA of the risk of an exceedance.

The implication of this for MetroLink is the potential for a short-term action plan to be put in place by DCC or FCC to protect sensitive receptors should EPA monitoring data indicate the risk of the respective limit values, or target values or alert thresholds being exceeded.

As part of the MetroLink Construction Dust Management Plan, MetroLink will be monitoring construction phase dust, PM_{10}, $PM_{2.5}$ and NO_2 in order to ensure on-site mitigation measures are being successfully implemented. The dust mitigation measures aim to ensure that no significant impacts occur at sensitive receptors. The monitoring locations will be chosen with consideration with the prevailing wind direction and proximity of sensitive receptors. MetroLink aims to complete 6-months of pre-construction monitoring at all sites to establish a baseline prior to construction works. The data will assist in confirming if the construction of MetroLink has the potential for any air quality impacts which contribute to the risk of the respective limit values, or target values or alert thresholds being exceeded. During construction, trigger levels will be used to alert TII and the contractor to a potential peak in particulate concentrations. These trigger levels were successfully used at Rotunda Hospital during Luas Cross City works. Any updates to the trigger levels can be agreed with DCC and FCC prior to construction. In the event that a trigger level is breached:

- SMS text messages and/ or emails will be sent to the Employer's Representative and the Contractor from monitoring equipment.
- The Employer's Representative and the Contractor will review the construction activities in the vicinity to determine the cause.
- The Employer's Representative will be entitled to stop the Works. Where activities outside the control of the Contractor may have had an influence on a trigger level being breached, these will be identified, and works can recommence following agreement with the Employer's Representative.
- The Contractor will review the monitoring data, including the most recent air quality data.
- The Contractor will identify and agree with the Employer's Representative appropriate engineering controls and management procedures to reduce dust levels resulting from the works activities identified as the cause of the trigger level being reached.
- The Contractor will confirm to the Employer's Representative that controls and management procedures have been implemented.

In addition, the climate mitigation measures such as the use of HVO and electric plant as an alternative to diesel, will also have beneficial effects on air quality pollutants including NO_x and PM.

Future Updates to the Air Quality Directive

On 26th October 2022, the EU published a proposal (COM/2022/542) for an updated Air Quality Directive which contains limit values for the protection of human health to be attained by 1 January 2030 that more closely aligns with WHO limit values published in 2021. The EU Ambient Air Quality Directive will propose updates to adapt to the priorities of the European Green Deal and in particular to its zero-pollution pillar. The zero-pollution pillar states that, by 2050, pollution should be reduced to levels no longer considered harmful to health.

The briefing note by the European Parliamentary Research Service in October 2022 "Revision of the EU Ambient Air Quality Directives" for the European Parliament describes the difference between the EU air quality standards and the WHO air quality guidelines as follows: *"the air quality reference values for a number of pollutants, defined by the WHO, are intended as policy guidance only, while the EU standards, as defined by the Ambient Air Quality Directive, are mandatory."*

The WHO guidelines are based solely on health considerations, while the EU standards reflect broader considerations, such as technical feasibility and the political, economic and social aspects of achieving these standards.

The proposed updated Air Quality Directive reinforces the need for public transport measures to improve air quality and move people away from private fossil fuel vehicles.

Clean Air Strategy

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland, which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target (IT) 3 by 2026, the IT4 targets by 2030 and the final targets by 2040. Details of this are set out in Appendix 2. The strategy acknowledges that "meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2". More than 35% of emissions of nitrogen oxides, and more than 10% of $PM_{2.5}$ emissions, come from the transport sector with private vehicles being the most significant source. The plan acknowledges the synergies between air and climate measures which means that the Climate Action Plan targets for electrification of the road transport fleet will benefit air quality.

The implications for MetroLink of the movement of the EU and Ireland towards the WHO guidelines by 2040 is considered in detail in Appendix 2.

In December 2022, Transport Infrastructure Ireland (TII) issued new guidance documents and standards for the EIAR with respect to air quality:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects;
- PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads.

These updated Guidelines (which are discussed in Appendix 2) allow for future changes in air quality limit values within the significance criteria when considering the impact of a project. This is an update to the previous 2011 TII Guidance which had significance criteria based on set concentrations (i.e. 40 $\mu g/m^3$ for annual mean NO_2). The updated TII Guidelines state that:

"A neutral effect is a change in concentration at a receptor of:

- *5% or less where the opening year, without the proposed development annual mean concentration is 75% or less of the standard; or*
- *1% or less where the opening year, without the proposed development annual mean concentration is 94% or less of the standard."*

With the transition towards WHO standards, which are lower than the current legal limit values, this results in a smaller change due to a project, at a lower overall concentration, having the potential for a non-neutral effect.

Appendix 2 contains a review of the construction and operational phase traffic modelling with respect to the likely WHO standards. Overall, while there are some additional slight and moderate adverse impacts in both operational phase opening year (2035) scenarios, there are also additional moderate and substantial beneficial impacts. Effects are considered to be long-term and localised.

When considering these results, it should be noted that the background air quality, which is based on 2019 levels, is kept consistent with the value included in the EIAR for all modelled years. This background is added to the emissions from the modelled traffic data. The implementation of the Clean Air Strategy for Ireland and Climate Action Plans should result in a reduced background for future year assessments and potentially therefore reduced significance of impacts. However, the extent of the reduction is currently unknown and, therefore, worst-case assumptions (no improvement in background air quality) have been made.

APPENDIX 1

Climate Updates

1. Scheme Overview and Policy Context

1.1. Metrolink will comprise a high-capacity, high-frequency, modern and efficient metro railway, with 16 new stations running from Swords to Charlemont. The alignment will link Dublin Airport, Irish Rail, DART, Dublin Bus and Luas services and create a fully integrated public transport network for the Greater Dublin Area (GDA).

1.2. The overall project objective for Metrolink, as established by the National Transport Authority (NTA) and TII and as informed by planning policy context is: '*To provide a sustainable, a safe, efficient, integrated and accessible public transport service between Swords, Dublin Airport and Dublin city centre*'.

1.3. The soon to be adopted Climate Action Plan 2024 (CAP24) states that MetroLink is one of the significant new public transport infrastructure elements that *"is required to deliver on our carbon emissions reduction targets, and to provide people with the sustainable alternatives to private car usage".*

1.4. The currently adopted 2023 Climate Action Plan (CAP23) speaks to MetroLink as being one of the major infrastructure projects that is needed to significantly improve the attractiveness, capacity and frequency of public transport services which are necessary to achieve modal shift and associated reduction in fossil-fuelled vehicle kilometres travelled.

1.5. The ultimate aim of the carbon emission reductions target within the Climate Action Plans is assisting in Ireland's net carbon zero target for 2050, which is set out as the national climate objective in Section 3 of the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015);

"*3. (1) The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy*"

1.6. Achieving this target is vital to stabilise climate change and avoid the worst effects of it in future. MetroLink is part of this wider climate action plan to achieve Net Zero by 2050 for Ireland and will support the delivery of government strategies, as outlined in all four of the published National Climate Action Plans (2019, 2021, 2023 and 2024) by enabling sustainable mobility, a Just Transition and an integrated sustainable transport.

1.7. CAP24, and previous iterations, applies three key transport actions, using a 'Avoid-Shift-Improve' framework. MetroLink contributes towards the Shift and Improve mechanisms of the CAP24 framework for improving transport emissions.

- *SHIFT* by providing a **frequent** (up to every 90 seconds at peak time), **reliable** (no road congestion to deal with) and **high-capacity** rail service, which removes 800,000 annual private car trips and

- *IMPROVE* by providing electrification of the public transport system with a greater use of renewable energy.

1.8. Modal shift away from private cars is also noted as having a key role in the Government's *Long-term Strategy on Greenhouse Gas Emissions Reductions* published in April 2023. This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050. MetroLink has been purposefully designed to interact with other sustainable transport modes, opening a much wider network for MetroLink users to transfer to additional final destinations

and enabling a smooth transition across a complex network. MetroLink provides connectivity and integration with other public transport services (Luas, DART, Bus, Active Travel Network) leading to more people availing of public and active transport. The European Commission's *Technical Guidance on the Climate Proofing of Infrastructure* (European Commission 2021) acknowledges that not all projects can be considered standalone, but can also be part of a wider plan, each enabling the others with one overall aim, stating,

"Most projects will have an impact on GHG emissions, compared to the Baseline, through their construction, operation, and eventual decommissioning and through indirect activities that occur because of the project. This should be seen in the context of the project not as an isolated event but as a set of different and complementary interventions – in particular stemming from a plan. This might mean that a certain specific project does not have an individual net GHG reduction effect but is integral part of an overall plan that reduces emissions".

1.9. Metrolink's ability to transport people will be significant. In the Operational Phase Opening Year passenger demand was estimated in the EIAR at 53,416,170 passengers boarding annually, rising to 91,318,389 passengers boarding annually by 2060. These figures have only grown since the publication of the EIAR, with the new *Greater Dublin Area (GDA) Transport Strategy 2022-2024,* which aims to increase the numbers using public transport in the GDA over a 24-hour period increase by 39%. MetroLink will be more flexible at meeting increased demand because of its driverless system, which is not constrained by drivers' availability. MetroLink can respond to fluctuating levels of demand, increasing the frequency of service to accommodate significant high demand events.

1.10. The operational phase traffic modelling detailed in Section 17.5.3.2 and 17.5.3.3 of the EIAR show that in the opening year the savings from the modal shift to public transport are between 12.12 kt CO_2eq to 12.88 kt CO_2eq annually, however updates to this are detailed in Section 12. This is a result of removing 800,000 private car trips to MetroLink. While this emission saving from Shifting people to public transport are significant, Table 17.23 of the EIAR indicates once the annualised construction phase embodied carbon and operational power are included, the project is not beneficial (i.e. it is not one that actively reverses the risk of severe climate change accordance to the definition of "Beneficial" in the IEMA Guidance) (based on a 60-year[1] lifespan). MetroLink is a transformative project and due to the significant construction required it does have a large, embodied carbon. Updated mitigation that TII are committing to since the publication of the EIAR is detailed in Section 12. As noted in the Climate Chapter of the EIAR, once operational the proposed project is predicted to beneficially impact the transport sector carbon emissions annually compared to a scenario where it is not built.

2. Policy Changes

2.1. Since submission of the EIAR in September 2022 there have been a number of policy updates. This is in keeping with the focus of Ireland achieving Net Zero by 2050. The most important of these (from a climate perspective) are as follows:

- Two new Climate Action Plans in Ireland (2023 and 2024);
- Ireland's Long-term Strategy on Greenhouse Gas Emissions Reduction;
- Dublin City Council Climate Neutral Dublin 2030 Draft Plan;
- Fingal County Council Draft Climate Action Plan 2024-2029;

[1]See Section 12 for updates.

- EU Fit for 55% Package: The EU has set itself the goal of reaching climate neutrality by 2050 and of cutting net greenhouse gas emissions by at least 55% compared to 1990 levels by 2030. This package includes alternative fuels infrastructure regulations.

2.2. An updated National Adaptation Framework, as per the 5-year phases, is due to published in 2024. However, at the time of writing this is not yet published.

2.3. The IPCC's Sixth Assessment (AR6) Synthesis Report 2023 emphasises that accelerated action to address climate change is needed without delay, with global warming already reaching 1.1°C above pre-industrial levels.

3. The Climate Action Plan

3.1. The soon to be adopted Climate Action Plan 2024 (CAP24) states that MetroLink is one of the significant new public transport infrastructure elements that *"is required to deliver on our carbon emissions reduction targets, and to provide people with the sustainable alternatives to private car usage".* The existing 2023 Climate Action Plan (CAP23) states that MetroLink is one of the major infrastructure projects that is needed to significantly improve the attractiveness, capacity and frequency of public transport services which are necessary to achieve modal shift and associated reduction in fossil-fuelled vehicle kilometres travelled.

3.2. The Climate Action Plan 2023 (CAP23) has been published since the publication of the EIAR. This is the first CAP since the publication of the carbon budgets and sectoral emissions ceilings, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030 (2018 baseline), with transport reducing emissions from 12 $MtCO_2eq$ to 6 $MtCO_2eq$. Key transport actions in CAP23 are considered using a 'Avoid-Shift-Improve' framework:

- developing services, communities, and infrastructure in such a manner as to AVOID the need to travel as much as we do today;

- improving the relative attractiveness of sustainable travel modes such as Public Transport, Cycling and Walking, to SHIFT away from car use; this will facilitate increased use of lower-carbon modes and reduce the percentage of total journeys that are made by private car (modal share) from over to 70% (today) to just over 50% in 2030; and

- complement these measures by increasing the proportion of EVs in our car fleet to 30% by 2030, which will IMPROVE the efficiency of the national car fleet; electrification of the freight and public transport sector will also be key.

3.3. MetroLink will aid with the SHIFT and IMPROVE policies by providing electrified public transport system.

3.4. CAP23 calls for a significant cut in transport emissions by 2030 to meet the sectoral emission ceiling. It acknowledges that meeting our 2030 transport abatement targets will require transformational change and accelerated action across all key decarbonisation channels. While MetroLink will not be in operation by 2030, the changes required will only increase as Ireland works towards its trajectory to net zero by 2050. MetroLink can facilitate significant modal shift with a high-capacity service.

3.5. CAP23 aims to reduce the dependency on private cars and reduce the total distance driven across all car journeys by 20%. The MetroLink Project is one of the key Major Public Transport Infrastructure elements discussed in CAP23, with the advancement of it as a key action for 2023 (Action TR/23/36).

3.6. CAP24 was also published in December 2023 but has not yet been formally adopted. CAP24 is consistent with CAP23, and it recognises that significant investment in new public transport infrastructure is required to deliver on Ireland's carbon emissions reduction targets, and to provide people with sustainable alternatives to car usage (15.2.4.2 of the CAP 24). CAP24 remains consistent on transport policy and retains an emphasis on the Avoid-Shift-Improve' framework. A public consultation on the Plan will commence on CAP24 early in 2024.

4. Long-term Strategy on Greenhouse Gas Emissions Reductions

4.1. In April 2023 the Government published a Long-term Strategy on Greenhouse Gas Emissions Reductions. This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan. The strategy will be updated based on a second round of public consultation throughout 2023 with an updated strategy published after this is complete. The plan states that investment in areas such as renewable electricity generation, retrofit and public transport are essential for Ireland to meet its climate targets. Modal shift will play a key role in decarbonisation of the transport network and Ireland. It states one of the key issues with decarbonisation of the transport network is the significant lead times on the delivery of major transport infrastructure and rollout of additional public transport services. The additional services are essential in making public transport as an attractive compelling alternative to private car use. It also states that Ireland must decouple its *"cultural mindset has been embedded over decades whereby only car ownership is associated with perceptions of freedom* and *convenience*". The long-term strategy states that cities can be the leaders in transport innovation. The strategy states that decarbonisation of the industry sector is also key and will be driven by material efficiency in construction to reduce embodied energy in materials employing heat pumps for low-temperature heat and zero emissions gas/ bioenergy for high-temperature heat; fully switching fuel used for cement (e.g., waste, bioenergy) and alumina, and; utilising CCS and innovative binders in cement. In addition, the use of fuel substitution including alternative fuels in cement and lime will also aid with decarbonisation.

5. Local Authority Climate Action Plans

5.1. In addition to the national CAP, Dublin City Council and Final County Council have published Draft Climate Action Plans for 2024-2029. MetroLink is also called out as part of the Fingal County Council Draft Climate Action Plan 2024-2029 (Action T20) and strongly aligns with policies such as Action OS7 of Dublin City Council Climate Neutral Dublin 2030 Draft Plan which states that Dublin City Council should promote active travel and public Transport. Promotion of public transport projects such as MetroLink fits with this aim.

8.1. The Dublin City Action Plan is based on four foundations (A Resilient, Resource Full, Creative and Social City) and sets out the 2030 vision that Dublin City Council have for the city. The four foundations can be described as: a Creative City, a Resource-Full City, a Resilient City and a Social City. These foundations aim to deliver the overall target of a 51% reduction in greenhouse gas emissions in line with our National Climate Objective by 2030 (2018 baseline), while striving for neutrality before 2050 as per Dublin City's participation in the EU Mission for 100 Climate Neutral and Smart Cities (Net Zero Cities). While achieving this, DCC want the city to also ensure it remains climate resilient and that the transition to its 2030 is Just. Action OS7 states that Dublin City Council should promote active travel and public Transport. Promotion of public transport projects such as MetroLink fits with this aim. Dublin City Council CAP 2024-2029 identifies Ballymun as a "Decarbonisation Zone" requiring "Use of systems thinking that promotes exploration, co-creativity, innovation and new learnings; be test beds for portfolio of actions, projects, technologies and interventions to achieve our targets and; address energy and non-energy related issues (adaptation, biodiversity and just transition)" The construction and operation of a MetroLink station at Ballymun will be an important element

of infrastructure that will assist in the decarbonisation of transport in the area in the long-term. The Ballymun launch construction site will align with the decarbonisation zone as it will be operated on 100% renewable energy and have diesel site requirements replaced with sustainable sourced Hydrotreated Vegetable Oil (HVO).

5.2. The Fingal County Council Draft Climate Action Plan 2024-2029 aligns with the national target of net zero no later than 2050 and specifically calls out its support of the delivery of MetroLink. The plans aim for a transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy with four overarching targets:

- 50% improvement in the Council's energy efficiency by 2030;
- 51% reduction in the Council's greenhouse gas emissions by 2030;
- To make Dublin a climate resilient region, by reducing the impacts of future climate change-related events; and
- To actively engage and inform our communities on climate action.

5.3. Fingal County Council support of MetroLink, and other public transport projects such as BusConnects and DART+, are specifically called out in this section as an action (Action T20).

6. EU Fit for 55 Package'

6.1. At the time of the submission of the railway order the binding Irish reductions targets in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Since the publication of the EIAR, more ambitious targets have been set. Emission Trading Scheme (ETS) and non-ETS sectors increased to 62% and 42%, respectively to align with updated limits. EU-wide GHG emissions reduction target to at least 55% for 2030 to limit warming to 1.5^0C and align with the goal of the Paris Agreement, legislatively supported 'Fit for 55 Package' to align current laws with the 2030 and 2050 ambitions.

6.2. For non-ETS sectors, which includes emissions from agriculture, transport, buildings, and light industry, Member States' nationally binding targets (for the period 2021 to 2030) are covered by the Effort Sharing Regulation (ESR) (Initially adopted in 2018, the Regulation was amended in 2023). Under the ESR, Ireland is required to reduce its emissions from these sectors by 42% (~27.6 Mt CO_2eq. However this value is not firmly set, the 2023 revision of the Regulation maintained the emission limits for the years 2021 and 2022 and the annual emissions allocations for the years 2026-2030 will be determined in 2025, following a comprehensive review of the emission data.) by 2030, relative to 2005 levels. Together, the ETS and ESR will facilitate achievement of the EU-wide target of at least a 55% GHG emissions reduction by 2030 as set in the European Climate Law.

6.3. In addition, there will be a revision of the EU's ETS to include polluting sectors, such as buildings, road transport and maritime transport as of 2027, this will be known as ETS 2. ETS 2 is required due to the insufficient reductions in these sectors and has an aim to ensure the sectors realign with a trajectory to Net Zero by 2050. The carbon price set by the ETS 2 will provide a market incentive for investments in building renovations and low-emissions mobility. To protect a Just Transition, 20 million additional allowances will be released to stabilise the market should energy prices rise above exceptional levels. It will be fuel suppliers, rather than end users such as households or car users, that will be required to purchase and surrender allowances to cover their emissions.

6.4. To fight carbon leakage from the EU by the purchasing and importing of products from outside the EU using more carbon intensive methods, the EU Carbon Border Adjustment Mechanism (CBAM) has been developed. It is a tax that puts fair price on the carbon emitted during the production of carbon intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries. This will be achieved by obliging companies that import into the EU to purchase so-called CBAM certificates to pay the difference between the carbon price paid in the country of production and the price of carbon allowances in the EU ETS. The gradual introduction of the CBAM is aligned with the phase-out of the allocation of free allowances under the EU Emissions Trading System (ETS) to support the decarbonisation of EU industry. The CBAM will initially apply to imports of cement, iron and steel, aluminium, fertilisers, electricity and hydrogen as they are considered highly carbon intensive and at most significant risk of carbon leakage. This will be expanded 50% of the emissions in ETS covered sectors.

6.5. In February 2024 the European Commission stated its recommendation of a 90% net greenhouse gas emissions reduction by 2040 compared to 1990 levels, which is in line with recent scientific advice and the EU's commitments under the Paris Agreement. This target is under discussion with the European Parliament and the Member States, with legislative proposals to follow. Decarbonisation of industry will be a key part of this aim along with carbon capture, storage and re-use. The Commission published the 2040 climate target in order to also help European industry, investors, citizens and governments to make decisions in this decade that will keep the EU on track to meet its climate neutrality objective in 2050.

6.6. This emphasises the continued focus on reducing carbon emissions at an EU level and will continue to impact climate action in Ireland.

7. Changes to Guidance

7.1. In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Climate:

- PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (offline & Greenways) – Overarching Technical Document, and
- PE-ENV-01105: Climate Assessment of Proposed National Roads – Standard.

7.2. These guidance documents were issued in December 2022 and are now considered the best practice guidance. These guidance documents supersede the 2011 Transport Infrastructure Ireland '*Guidelines for the Treatment of Air Quality During the Planning and Construction of National* Road *Schemes'*, which covered climate assessments. The methodology for assessing national roads and other specified infrastructure projects, such as light rail, in PE-ENV-01106 is based on the methodology employed in the UK, namely Highways England 2019 guidance *'Design Manual for Roads and Bridges (DMRB) LA 114'* (an older version is referred to in the TII Air Quality Guidelines)'. LA 114 was used as the basis of the Climate assessment within the EIAR.

7.3. The updated TII guidance significance criteria and the significance criteria applied in the EIAR both rely on Institute of Environmental Management & Assessment (IEMA) *Assessing GHG Emissions and Evaluating their Significance* (2022) in order to determine significance.

7.4. Both the assessment in the EIAR (set out in Section 17.3) and the 2022 TII Guidance (PE-ENV-01104) recommend that the climate assessment is broken into two main headings:

- Greenhouse Gas Emissions Assessment – Quantifying the GHG emissions from a project over its lifetime.

- Climate Change Risk Assessment – Identifying the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

7.5. In short, the assessment conducted in the EIAR mirrors the assessment requirements in the updated TII Guidance (December 2022). While there are some differences, they are not substantive, and we have outlined these differences below.

7.6. In the EIAR the assessment methodology for the climate change was based on the 2019 United Kingdom (UK) Highway Agency (UKHA) Design Manuals for Roads and Bridges (DMRB) - LA 114 Climate (referred to as LA 114 Climate). This assessment aligns with the methodology that the 2022 TII Guidance (PE-ENV-01104) recommend.

- **Greenhouse Gas Assessment:** Both the EIAR and the 2022 TII Guidance (PE-ENV-01104) use a quantitative technique for the calculation of greenhouse gas emissions and have strong alignments across the methodology.

    - 2022 TII Guidance (PE-ENV-01104): recommend the use of the online TII Carbon Assessment Tool to calculate emissions arising from construction and maintenance. This tool builds on the previous iteration of the TII Carbon Assessment Tool (V2.1), putting it onto a website to allow for database updates. In order to calculate the impact of modal shift the TII Guidance recommends using the Roads Emission Model (in conjunction with the Air Quality Practitioner) or a strategic level using traffic data using available NTA tools. The TII Guidance recommends that emissions from power associated with running the Light Rail should be calculated using the power in the carbon tool. The power is based on grid electricity carbon intensity rates from SEAI.

    - EIAR: LA 114 – Climate' (UKHA 2019) was used as a methodology however the elements to be included mirror with those in the updated TII Guidance (2022). The most recently available TII Carbon Assessment Tool (V2.1) was used to calculate embodied carbon emissions arising from construction and maintenance. The Online Carbon Tool recommended in the updated TII Guidance was not yet available. Model shift and construction phase redistribution of traffic was calculated using the strategic level NTA tool ENEVAL. The emissions from power associated with running the Light Rail were calculated using the power in the carbon tool. The power is based on grid electricity carbon intensity rates from SEAI and ESB future projections.

- **Climate Change Risk Assessment:** Both the EIAR and the 2022 TII Guidance (PE-ENV-01104) use a similar risk assessment technique for the assessment of the vulnerability of the project to future climate change.

    - 2022 TII Guidance (PE-ENV-01104): recommend the use of the risk framework taken from the European Commission Technical guidance on the climate proofing of infrastructure in the period 2021-2027 however it also states that an alternative risk framework can be adopted for the assessment if the Climate Practitioner deems appropriate in Section 7.2.4 of the Guidance.

    - EIAR: LA 114 – Climate' (UKHA 2019) was used to complete the risk assessment. This assessment criteria are used as an example of an appropriate method in the IEMA EIA Guide to: Climate Change Resilience and Adaptation (IEMA 2020a) and therefore can be considered an industry standard. In addition, Section 17.4.3 of the EIAR states that *"Impacts as a result of climate change involve increases in global*

temperatures *and increases in the number of rainfall days per year. Therefore, it is expected that the baseline climate will evolve over time and consideration is needed with respect to this within the detailed design of the proposed Project as per the European Commission Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission 2021a) should the proposed Project proceed."*

7.7. In summary, as noted above, the assessment in the EIAR is substantially similar to that set out in the updated TII Guidance (2022).

8. Significance Criteria Updates

8.1. In the EIAR, the IEMA Guidance[2] was used to determine the significance criteria (Section 17.3.4). The updated TII Guidance (2022) (Section 6.7.1) also relies on the IEMA Guidance. Specifically at section 17.3.2 we quoted the IEMA Guidance:

"*The crux of significance regarding impact on climate is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050."*

8.2. This passage is also reproduced in the updated TII Guidance (2022) (Section 6.7.1)

8.3. Therefore significance is determined based on consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

8.4. These significance criteria align with the overall aim of the local and national Climate Action Plans is to achieve Net Zero Carbon by 2050 as set out as the National climate objective in *Section 3 of the 2015 Climate Action and Low Carbon Development Act (No. 46 of 2015)* which states;

"3. (1) The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy (in this Act referred to as the 'national climate objective')."

8.5. In line with the IEMA significance criteria set out in Section 17.3.5.1 of the EIAR the scenario, the overall residual likely effect of the proposed Project when Scenario A, which is the core business case scenario, is long-term, negligible, and not significant. When Scenario B, which is the Scenario where the National Development plan is considered, and for our assessment the worst-case scenario, the project has a likely effect that is minor adverse, not significant in the long term. The IEMA Guidance (which has been embraced by the updated TII Guidance (2022) in Section 6.7.2) states as follows:

A minor adverse not significant impact is described with: *A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is*

[2] Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA 2022)

doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[3] (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.

8.6. The updated TII Guidance (2022) (PE-ENV-01104) (Section 6.7.2) states that a minor adverse not significant impact is one in which:

- The project's GHG impacts are mitigated through 'good practice' measures.
- The project has complied with existing and emerging policy requirements; and
- The project is fully in line to achieve Ireland's trajectory towards net zero.

However, the impact of the project has been further considered in Section12 and the residual impacts updated on the basis of additional mitigation (see Section 18).

8.7. In assessing the significance of a project's GHG impact, the updated TII Guidance (2022) notes that the following must be assessed:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050.
- The level of mitigation taking place.

8.8. Therefore, crucial to a determination of significance is (a) how far the project can assist in the achievement of the Net Zero target by 2050 and (b) the level of mitigation applied. To provide further clarity on the meaning of significance, the updated TII Guidance (2022) includes a significance matrix, as set out in full in Table 1.

[3] *Carbon Neutral: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required."*

Table 1:GHGA Significance Matrix

Effects	Significance level Description	Description
Significant adverse	Major adverse	The project's GHG impacts are not mitigated.
		The project has not complied with do-minimum standards set through regulation, nor provide reductions required by local or national policies; and
		No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	The project's GHG impacts are partially mitigated.
		The project has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and
		Falls short of full contribution to Ireland's trajectory towards net zero.
Not significant	Minor adverse	The project's GHG impacts are mitigated through 'good practice' measures.
		The project has complied with existing and emerging policy requirements; and
		Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	The project's GHG impacts are mitigated beyond design standards.
		The project has gone well beyond existing and emerging policy requirements; and
		Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration.
		The project has gone well beyond existing and emerging policy requirements; and
		Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

8.9. TII updated Guidance (2022) also states that professional judgement must necessarily be exercised when contextualising and assessing the significance of a project's GHG impact (2022).

9. Climate Change Risk Assessment Updates

9.1. The updated TII Guidance (2022) utilises a different climate change risk assessment than that used in the EIAR (LA 114 Climate (UKHA 2019)).

9.2. The EIAR climate risk assessment approach was approved as an appropriate method in the IEMA EIA Guide to: Climate Change Resilience and Adaptation (IEMA 2020a). The approach to the risk assessment in the new TII guidance (TII 2022a) is based on the EU *Technical Guidance on Climate Proofing* (EU, 2021). This document has been referenced within the EIAR, but it is not utilised as the assessment methodology.

8.2. Nevertheless, the aim of both methodologies is to ensure that adaptation or mitigation measures are implemented in any proposed development in order to minimise risks due to

climate change. The risk assessment detailed in Section 17.3.5.2 remains. Metrolink has taken account of the potential risks of future climate change and adaptation has been put in place to ensure that the project is climate change resilient:

- The proposed Project is designed to ensure the pluvial flood (+ 20% for climate change) risk is reduced to 1 in 100 years with the risk of flooding from river/sea being lower at 1 in 1000 years.

- The proposed Project surface channel drainage for the track is designed to convey 1 in 100 years plus climate change design storm.

- The size of the channel is oversized by 20% is to allow for potential uncertainty in the runoff calculations and to mitigate the impact of an over-design event on the track drainage. The Viaducts are also designed for a 1000-year flood event + 20% climate change design flow conditions.

- Surface water runoff rates for the design storm for each track catchment taken as the 1 in 100-year storm plus 20% for climate change although the track drainage design was checked for the 1 in 1000 year plus climate change storm. Sustainable Drainage Measures including attenuation storage for each catchment was sized to contain the 1 in 100-year storm plus 20% for climate change plus 300mm freeboard allowance.

- The Electricity & Gas Networks Sector Climate Change Adaptation Plan Prepared under the National Adaptation Framework has been prepared by the Department of Communications, Climate Action and Environment (DCCAE 2019) which considers future climate change impacts on energy infrastructure and aims to reduce vulnerability by building resilience in the energy sector. This resilience will in turn provide indirect resilience to the proposed Projects power supply.

- The Transport Climate Change Sectoral Adaptation Plan (DTTAS 2019) was also prepared under the National Adaptation Framework used the six-step approach outlined in the Sectoral Planning Guidelines for Climate Change Adaptation. The plan aims to ensure that adaptation measures will enable continued services and maintained infrastructure from the impacts of future climate change for the transport sector.

- The risk due to changing temperatures with respect to heat or cold during operation can be mitigated through the use of a HVAC system which will ensure comfort and fresh air for passengers and staff and prevent over-heating of sensitive equipment.

- TII will prepare a Major Incident Management and Severe Weather Team Plan to ensure critical MetroLink infrastructure is protected during operation from the impacts of severe weather.

- Wind speeds are taken into account when setting the max distance between posts and foundations. In addition, the OHLE system are subject to regular maintenance and replacement cycles in accordance with European Design standards (Design Life for new civil engineering structures (IE Standard CCE-TMS-410 (2019)). Wind loads on bridge structures will be determined as defined in I.S. EN 1991: Eurocode 1, Action on structures, Part 1-4 General actions – Wind actions, and the associated Irish National Annex, or otherwise as detailed in the TII Standards. Buildings are designed to be robustly assembled, using building techniques designed to withstand wind loading, with reduced vulnerability to building elements becoming detached from facades in extreme wind events.

- A Vegetation Management Plan will be put in place in order to maintain vegetation in the vicinity of the proposed development. Vegetation clearance and management for the safe operation of the OHLE equipment shall ensure that vegetation is kept at least 1.5 m from the rear of the OHLE mast or 1.5 m from any wire running between masts. This vegetation management also had the potential to ensure the potential for wind related vegetation effects and wildfires is minimised.

- These increased temperatures have the potential to cause the temperature of materials, such as tracks / OHLE / asphalt / bitumen, to increase resulting in thermal movements. The design of these elements includes an allowance for expansion/thermal movements. The inclusion of the thermal joints prevents track buckling during extreme heat events.

- The overhead line equipment will be designed to take into account a range of minimum and maximum temperatures (-20oC to +40oC) and loads under current and future climate conditions. The contact and messenger overhead wires will be automatically tensioned which will adjust for additional loading from ice, snow or wind. Ice loading has been considered within the design and a 9.5 mm radial thickness of ice coating has been applied for protection. The mechanical tension in the contact and messenger wires will be maintained within the system design parameters.

- Monitoring will also include the ongoing management of adaptation and resilience of the Operational Phase in order to measure their effectiveness. If monitoring of adaptation and resilience measures indicates the measures are not effective and climate is impacting on the construction of the proposed Project, then they should be reviewed and updated."

9.3. The design working life of the proposed development is based on the current generation of Eurocodes which include climate data that is 10-15 years old. During the operation and maintenance of infrastructure, it will be essential to revisit the available climate data and any critical assumptions. This can be carried out at regular intervals (e.g. 5-10 years) as part of the asset management to address evolving climate risks.

10. Baseline Conditions - Greenhouse Gas Baseline Update

10.1. The EIAR included baseline data up to 2021, which was the latest available upon publication. Since the submission of the EIAR, there has been additional baseline data published by the EPA, most recently in July 2023.

10.2. According to this updated data, Ireland's GHG emissions are estimated to be 60.76 million tonnes carbon dioxide equivalent (Mt CO_2eq) this is an increase from the baseline data of 59,897 Mt CO_2eq in the EIAR.

10.3. For context, in 2022 emissions in the stationary ETS sector decreased by 4.3% and emissions under the ESR (Effort Sharing Regulation) decreased by 1.1%. When Land Use, Land-use Change and Forestry (LULUCF) is included, total national emissions decreased by 1.8%. The sector with the highest emissions in 2022 (excluding LULUCF) was agriculture at 38.4% of the total, followed by transport at 19.1%. Decreased emissions in 2022 compared to 2021 were observed in the largest sectors except for transport, waste and commercial services. These 3 sectors showed increases in emissions (6.0%, 4.9% and 0.2% respectively). For 2022, the total national emissions (excluding LULUCF) were estimated to be 68,069 kt CO_2eq as shown in Table 2 (which also includes a breakdown of carbon emissions by sector).

10.4. Ireland's ESR emissions annual limit, of which transport is included, for 2022 is 42.36 Mt CO_2eq. Ireland's provisional 2022 greenhouse gas ESR emissions are 46.08 Mt CO_2eq, this is 3.72 Mt CO_2eq more than the annual limit for 2022 (without the use of flexibilities). ESR emissions are the national total emissions (Table 2) less emissions generated by stationary combustion and aviation operators that are within the EU's emissions trading scheme. Agriculture and Transport accounted for 75.7% of total ESR emissions in 2022.

Table 2: Total National GHG Emissions In 2022[4]

Category	2021 Emissions (Mt CO_2eq)	2022 Emissions (Mt CO_2eq)	% Total 2022 (including LULUCF)	% Change from 2021 to 2022
Agriculture	23.626	23.337	34%	-2.1
Transport	10.978	11.634	17%	6.0
Energy Industries	10.262	10.076	15%	-1.8
Residential	6.992	6.105	9%	-12.7
Manufacturing Combustion	4.614	4.288	6%	-7.1
Industrial Processes	2.475	2.289	3%	-7.5
F-Gases	0.745	0.741	1%	-0.5
Commercial Services	0.765	0.767	1%	0.2
Public Services	0.672	0.659	1%	-1.9
Waste Note 1	0.726	0.867	1%	4.9
Land Use, Land-use Change and Forestry (LULUFC)	7.338	7.305	11%	-0.5
National Total excluding LULUFC	61.955	60.764	89%	-1.9
National Total including LULUFC	62.293	68.069	100%	-1.8

Note 1: Waste includes emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste.

[4]Reproduced from Latest Emissions Data on the EPA website https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/latest-emissions-data/#:~:text=In%202022%2C%20Ireland's%20GHG%20emissions,in%20emissions%20reported%20for%202021. Accessed 05/02/2024.

11. Baseline Conditions - Climate Change Baseline Update

11.1. Since the submission of the EIAR, additional data both for the existing climate baseline and predicted future baseline (Section 17.4.3 of the EIAR) has been published.

11.2. The EIAR relied on the Met Éireann weather station at Dublin Airport Metrological station published for the 30-year period from 1981 to 2010. This data had now been updated by Met Éireann weather to cover the 30-year period from 1991 to 2020.

11.3. The data for the 30-year period from 1991 to 2020 (Table 3)[5] indicates that the wettest months at Dublin Airport Metrological station were November and December, and the driest month on average was June. July was the warmest month with a mean temperature of 15.4 Celsius, this is slightly lower than the previous 30-year average (1981 to 2010) (Table 17.10 of the EIAR) of 15.6° Celsius. January was the coldest month with a mean temperature of 5.2° Celsius in the 1981 to 2010 averaging period and 5.3° Celsius in the 1991 to 2020 averaging period.

11.4. Met Éireann's 2023 Climate Statement, published in January 2024, states 2023's average shaded air temperature in Ireland is provisionally 11.20 °C, which is 1.65°C above the 1961-1990 long-term average. Previous to this 2022 was the warmest year on record, however 2023 was 0.38 °C warmer (see Figure 1). 2023 also had above average rainfall, the warmest June on record and the wettest March and July on record. Record high sea surface temperatures (SST) across the Atlantic were recorded since April 2023, which included a severe marine heatwave to the west of Ireland during the June 2023. This marine heatwave contributed to the record rainfall in July.

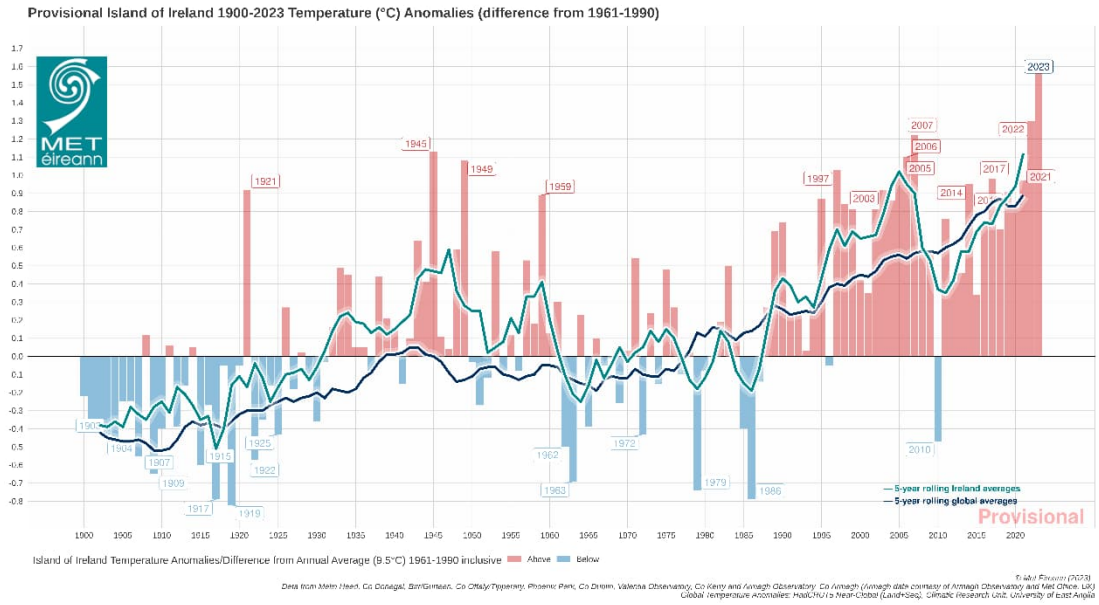

Figure 1: 1900-2023 Temperature (°C) Temperature Anomalies (differences from 1961-1990)

[5] https://www.met.ie/climate/30-year-averages Accessed 05/02/2024.

Table 3: Dublin Airport Metrological Station 30-Year Average Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
mean daily max	8	8.5	10.1	12.3	14.8	17.7	19.5	19.1	16.9	13.6	10.3	8.3	13.3
mean daily min	2.3	2.2	3	4	6.6	9	11.3	11.2	9.5	7.1	4.3	2.6	6.1
mean temperature	5.2	5.3	6.6	8.2	10.7	13.3	15.4	15.1	13.2	10.4	7.3	5.5	9.7
absolute max.	16.4	16.2	18.6	21.7	23.2	26.4	27.1	27.2	25	20.9	17.5	15.4	27.2
min. maximum	-3.2	-0.6	-0.6	4.2	6.3	10.3	11.8	13.8	9.6	5.2	-1.9	-4.8	-4.8
max. minimum	11.8	11.9	11.9	12.5	14.6	15.8	17.6	18.1	19.1	15.9	12.8	12.9	19.1
absolute min.	-9.5	-7.9	-7.9	-5.6	-3	0.7	3.9	2.4	0.4	-4.7	-8.4	-12.2	-12.2
mean num. of days with air frost	7.1	7.2	5.5	3.9	0.5	0	0	0	0	0.8	3.3	6.7	35
mean num. of days with ground frost	15.2	14.3	13.3	10.4	4.2	0.4	0	0.2	0.7	4.9	9.5	13.9	87
mean 5cm soil	4	4	5.4	8.5	12.4	15.5	16.7	15.7	13.2	9.6	6.4	4.5	9.7
mean 10cm soil	4.2	4.3	5.4	7.9	11.4	14.6	15.9	15.2	12.9	9.7	6.7	4.8	9.4
mean 20cm soil	4.8	4.9	6	8.4	11.6	14.7	16.1	15.6	13.5	10.5	7.5	5.5	9.9
RELATIVE HUMIDITY (%)													
mean at 0900UTC	87.9	87.9	84.7	79.8	77	76.2	78.6	81.1	84.1	86.5	89.4	88.8	83.5
mean at 1500UTC	81.6	76.9	71.6	68.7	67.8	67.7	69	69.8	71.9	75.8	81.6	83.9	73.9
SUNSHINE (hours)													
mean daily duration													
greatest daily duration	8.1	10	11.5	13.9	15.3	15.9	15.8	14.5	12.4	10.2	8.6	7.3	15.9
mean num. of days with no sun	8.6	5.4	4.2	2.5	1.6	1.7	1.5	1.3	2.2	4.6	6.6	9	49.2
RAINFALL (mm)													
mean monthly total	61.8	52.4	51.4	55	57	64	61	73.4	63.3	78.4	82.7	72.1	772.5
greatest daily total	27.1	28.1	35.8	37	42.1	73.9	39.2	68.3	42.1	71.3	62.8	42.4	73.9
mean num. of days with >= 0.2mm	17.7	16.1	16.5	15.8	15.3	14.8	16.9	17.1	15.5	17	18.3	18.6	200

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
mean num. of days with >= 0.1mm	12.5	11	10.7	11.1	10.5	9.8	11.6	11.8	10.7	11.6	12.5	13.3	137.1
mean num. of days with >= 5.0mm	3.8	3.2	3.5	3.5	3.6	3.9	3.8	4.4	4.1	5	5.2	4.8	48.8
WIND (knots)													
mean monthly speed	12.3	12	11.4	10.3	9.9	9.2	9.1	9.2	9.6	10.5	11.2	11.7	10.5
max. gust	80	67	66	54	57	53	49	44	56	69	66	76	80
max. means 10-minute speed	53	48	45	37	39	38	36	32	39	51	42	55	55
mean num. of days with gales	2.1	1.1	1.2	0.3	0.3	0.1	0	0.3	0.2	0.5	0.7	1.4	8.2
WEATHER (mean no. of days with.)													
snow or sleet	3.2	3.2	2.4	0.7	0.1	0	0	0	0	0	0.6	2.3	12.5
snow lying at 0900UTC	0.7	0.4	0.3	0	0	0	0	0	0	0	0.1	0.7	2.2
hail	1.1	1.5	1.8	2	1	0.1	0.2	0.1	0.1	0.2	0.4	0.7	9.2
thunder	0.2	0.2	0.3	0.2	0.7	0.6	0.9	1	0.2	0.3	0.3	0.2	5
fog	2.4	2.4	3.4	2.6	2.4	2.2	2.3	2.8	3.4	2.6	2.3	3.4	32.3

11.5. Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed. Considering the extraordinary 2023 data, met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters. The record temperatures mean the likelihood of extreme weather events occurring has increased. This will result in longer dry periods, heavier rainfall events and more storm surges and coastal flooding due to sea level rise. Compound events, where coastal surges and extreme rainfall events occur simultaneously will also increase. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

11.6. TII's 2022 Guidance document PE-ENV-01104[6] states that for future climate change a moderate to high Representative Concentration Pathways (RCP) should be adopted. RPC4.5 is considered moderate while RPC8.5 is considered high. Representative Concentration Pathways (RCPs) describe different 21st century pathways of GHG emissions depending on the level of climate mitigation action undertaken.

11.7. National Framework for Climate Services (NFCS) was founded in June 2022 to streamline the provision of climate services in Ireland and will be led by Met Éireann. The aim of the NFCS is to enable the co-production, delivery and use of accurate, actionable and accessible climate information and tools to support climate resilience planning and decision making. In addition to the NFCS, further work has been ongoing into climate projects in Ireland through research under the TRANSLATE project. TRANSLATE[7] has been led by climate researchers from University of Galway – Irish Centre for High End Computing (ICHEC), and University College Cork – SFI Research Centre for Energy, Climate and Marine (MaREI), supported by Met Éireann climatologists. TRANSLATE's outputs are produced using a selection of internationally reviewed and accepted models from both CORDEX and CMIP5. Representative Concentration Pathways (RCPs) provide a broad range of possible futures based on assumptions of human activity. The modelled scenarios include for "least" (RCP2.6), "more" (RCP4.5) or "most" (RCP8.5) climate change, see Figure 2.

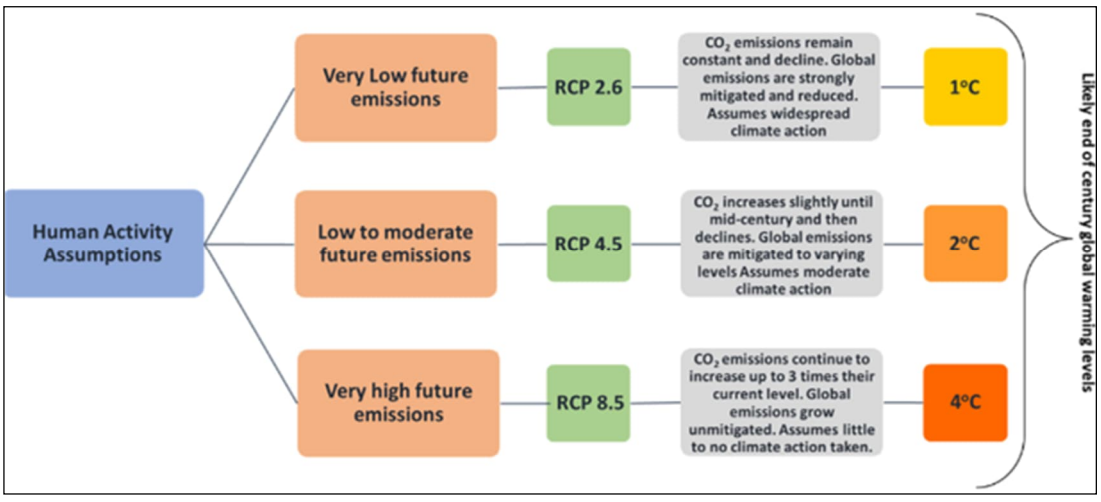

Figure 2: 1900- Representative Concentration Pathways Associated Emission Levels[7]

[6] Climate Guidance for National Roads, Light Rail and Rural Cycleways (offline & Greenways) – Overarching Technical Document
[7] https://www.met.ie/science/translate TRANSLATE Project Story Map

11.8. TRANSLATE[7] provides the first standardised and bias-corrected national climate projections for Ireland to aid climate risk decision making across multiple sectors (for example, transport, energy, water), by providing information on how Ireland's climate could change as global temperatures increase to 1.5˚C ,2˚C, 2.5˚C, 3˚C or 4˚C (see Figure 3). Projections broadly agree with previous projections for Ireland. Ireland's climate is dominated by the Atlantic Meridional Overturning Circulation (AMOC), a large system of ocean currents – including the Gulf Stream – characterised by a northward flow of warm water and a southward flow of cold water. Due to the AMOC, Ireland does not suffer from the extremes of temperature experienced by other countries at a similar latitude. Recent studies have projected that the AMOC could decline by 30 – 40 % by 2100, resulting in cooler North Atlantic Sea surface temperatures (SST)s (Met Éireann, 2023). Met Éireann projects that Ireland will nevertheless continue to warm, although the AMOC cooling influence may lead to reduced warming compared with continental Europe. AMOC weakening is also expected to lead to additional sea level rise around Ireland. With climate change Ireland's temperature and rainfall will undergo more and more significant changes e.g. on average summer temperature could increase by more than 2°C, summer rainfall could decrease by 9% while winter rainfall could increase by 24%. Future projects also include a 10-fold increase in the frequency of summer nights (values > 15°C) by the end of the century, a decrease in the frequency of cold winter nights and an increase in the number of heatwaves. A heatwave in Ireland is defined as a period of 5 consecutive days where the daily maximum temperature is greater than 25°C.

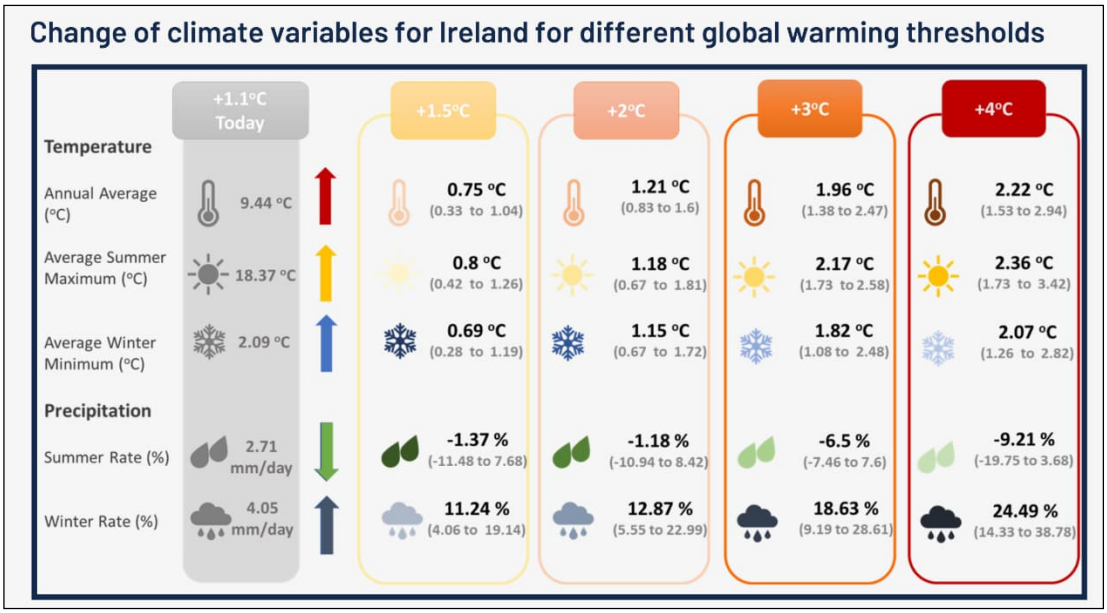

Figure 3: Change of Climate Variables for Ireland for Different Global Warming Thresholds[8]

[8] https://www.met.ie/science/translate TRANSLATE Project Story Map

11.9. In January 2024 the EPA published Ireland's Climate Change Assessment Synthesis Report[9] which contained four volumes:

- Volume 1: Climate Science: Ireland in a Changing World
- Volume 2: Achieving Climate Neutrality by 2050
- Volume 3: Being Prepared for Ireland's Future Climate
- Volume 4: Realising the Benefits of Transition and Transformation

11.10. This report reinforces the existing and future risks arising from climate change, specifically:

- Volume 1[10] states that under Early action, the temperature increase averaged across the island of Ireland relative to the recent past (1976–2005) would reach 0.91°C (0.44–1.10°C) by mid-century before falling back to 0.80°C (0.34–1.07°C) at the end of the century. Whereas under Late action, by the end of the century it is projected that the temperature increases could be 2.77°C (2.02–3.49°C). Heat extremes will become more frequent and more severe and cold extremes will become less frequent and less severe with further warming. Precipitation was 7% higher in 1991-2020 than in 1961-1990. The average future predicted increase in precipitation is < 10% in annual mean accumulated. By 2100 projected additional rises in sea level range from 0.32–0.6m under early action to 0.63–1.01m under late action scenarios. With greater storm surges potentially effecting critical infrastructure in Dublin.

- Volume 3 states that for transport, sea level rise and flooding are key climate change risks. The report references the EPA's Critical Infrastructure Vulnerability to Climate Change report (CIViC April 2021)[11] as the most substantial research project in Ireland to date on climate change and critical infrastructure which assesses the future performance of Irelands critical infrastructure when climate is considered. The CIViC report states that respect to rail infrastructure fluvial flooding and coastal inundation/coastal flooding are considered the key climate change risks with extreme winds and landslides being medium risks. Snowstorms and heatwaves/droughts are considered low risk to rail infrastructure. One of the key outputs of the research was a framework that will provide quantitative risk-based decision support for climate change impacts and climate change adaptation analysis for infrastructure.

- Volume 4 report[9] calls for system change, including a transformation of urban settings. Stating that meaningful urban transformation that can create a better living environment while simultaneously reducing emissions, this includes greater availability of public transport:

  "*In transport, these measures involve creating conditions where the need for motorised transport is minimised, for instance through proximity redesign and digitalisation ('avoid' actions), and then channelling the remaining travel demand towards sustainable options such as walking, cycling, shared mobility and public transport ('shift' actions).*

[9] https://www.epa.ie/publications/monitoring--assessment/climate-change/irelands-climate-change-assessment-synthesis-report.php
[10] https://www.epa.ie/publications/monitoring--assessment/climate-change/ICCA_Volume-1.pdf
[11] https://www.epa.ie/publications/research/climate-change/research-369-civic-critical-infrastructure-vulnerability-to-climate-change.php#:~:text=Part%20A%20of%20the%20CIViC,level%20climate%20change%20risk%20assessment.

These approaches offer more substantial benefits than maintaining the current car-centred system, even with the integration of electric vehicles ('improve' measures). The shift to more sustainable mobility cannot be achieved immediately; a long-term strategic commitment is needed."

11.11. The Climate Change Assessment Synthesis Report refers to (Volume 3 Section 7.1.1) four strategies to manage climate change risks to critical infrastructure:

- protect the infrastructure to reduce likelihood of failure;
- improve component performance, so assets can operate under a wider range of conditions;
- provide redundancy (back-up systems, increased capacity, more diverse components, alternative routings);
- train people and provide the technology needed to respond to, and recover from, infrastructure disruption.

11.12. These strategies already form part of the project's response to climate adaptation and the detail of this is set out in the EIAR [and this document in Section 17.5.2.3 and 17.5.3.7].

11.13. Engineering solutions are designed in to protect the infrastructure [Section 17.5.3.7]. Resilient infrastructures may be characterised by its ability to anticipate and absorb disruption, adapt and transform themselves in response to external changes, recover quickly and learn from past experiences.

11.14. Appendix 3 of the Dublin City Council (DCC) Climate Neutral Dublin 2030 Draft Plan Published in 2023 discusses historical weather and events which have occurred within the DCC boundary. The Action Plan highlights risks to the transport infrastructure due to power outages from windstorms, risks from flooding and overheating due to heatwaves. The action plan considers the average climatic conditions for the future scenario (RCP8.5[12]) that the level of risk associated with some hazards (e.g., river and pluvial flooding, heat waves and droughts) will increase while the level of risk will remain the same for others (e.g., severe windstorms and ground water flooding). Risks associated with some hazards are expected to decrease due to projected reductions in hazard frequency, such as cold spells and heavy snowfalls. This is illustrated in Figure 4. The climate hazards with the greatest potential for impact are Flood risk (coastal, pluvial and fluvial) and heat waves. Appendix 5 of the Action Plan details maps of future flood extends in Dublin City and areas which will be most subjected to heat Island effects. In association with the Dublin City Council Climate Neutral Dublin 2030 Draft Plan a Dublin City Climate Change Risk Assessment was produced by KPMG. This includes a review of historical impacts from severe weather events. The risk assessment flags flood risk, cold spells and heatwaves as being potential risks to rail.

11.15. Fingal County Council (FCC) Draft Climate Action Plan 2024-2029 was also published in 2023. KPMG have produced a Climate Change Risk Assessment for FCC which is contained within Appendix B of the Action Plan. The action plan considers the average climatic conditions for the future scenario and notes that risk associated with some hazards (e.g., river and pluvial flooding, heat waves and droughts) will increase while the level of risk will remain the same for others (e.g., severe windstorms and ground water flooding) (Figure 5). The predicted future

[12] RCP stands for Representative Concentration Pathway. RCP 8.5 refers to the concentration of carbon that delivers global warming at an average of 8.5 watts per square meter across the planet and is known as the high-risk future scenario. The RCP 8.5 pathway delivers a temperature increase of about 4.3˚C by 2100, relative to pre-industrial temperatures.

risks differ slightly from those of DCC. Risks associated with some hazards are expected to decrease due to projected reductions in hazard frequency, such as cold spells and heavy snowfalls.

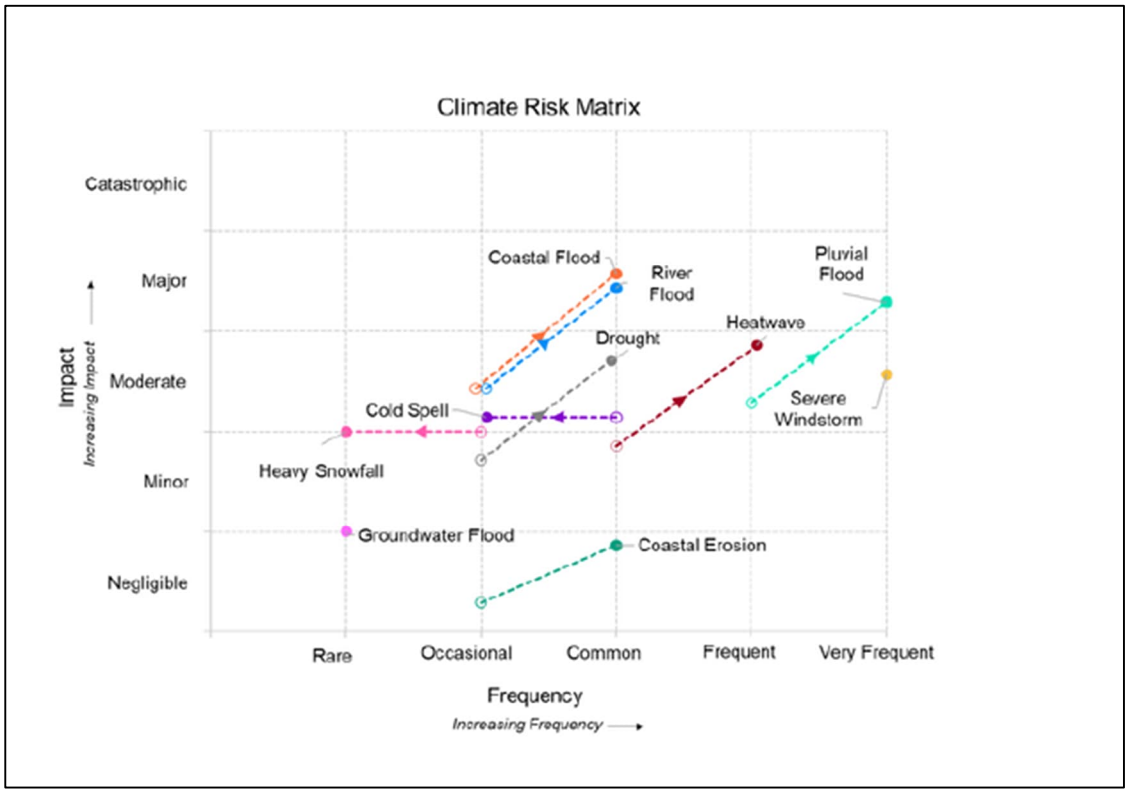

Figure 4: Current to Future Risk Matrix Dublin City Council (reproduced from figure A3.8 of Action Plan)

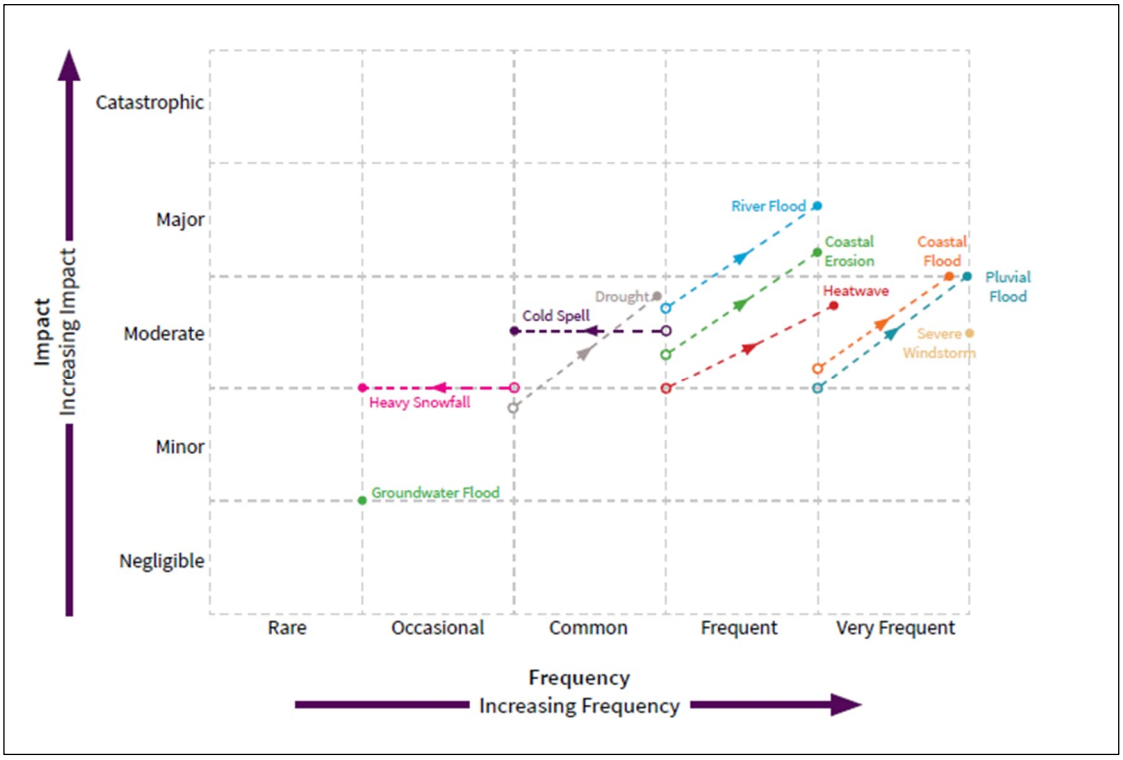

Figure 5: Current to Future Risk Matrix Fingal County Council (reproduced from figure A3.7 of Action Plan)

12. Updates to Predicted Impacts

12.1. While there is good alignment across the assessment technique used in the EIAR, there are some updates required to the assessment due to updated information available since the publication of the EIAR. These are set out in the following sections.

12.2. There are a number of updates to the carbon assessment since the publication of the EIAR:

- Updated TII Carbon Model;
- TII Construction Phase Commitments;
- Carbon Intensity of Construction and Operational Power; and
- Operational Phase Transport Strategy Updates Including the Greater Dublin Area (GDA) 2022-2042.

13. Updated TII Carbon Model

13.1. Section 17.3.4.1.1 of the EIAR discusses the inputs into the carbon tool. The TII Carbon Tool V2.1 (Published by TII in 2021) uses emission factors from recognized sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (2013). An emission factor is a coefficient which allows to convert activity data into GHG emissions. The carbon emissions are calculated by multiplying the emission factor by the quantity of the material that will be used over the entire construction / maintenance phase.

13.2. In December 2022 TII published an updated version of the Carbon Tool (GE-ENV-01106), which is now hosted on an online portal. This guidance is paired with a new online version of the TII tool which is available on the TII Web Application Portal. Compared to the methodology undertaken for the MetroLink project, which used the TII Carbon Tool Version 2.1, the approach is generally similar in the updated guidance.

13.3. The main difference between the online version of the tool and version 2.1 used for MetroLink is the requirement for the tool to be held centrally by TII. This allows TII to update the tool regularly and to not have uncontrolled versions with outdated databases. The headings of the online tool are the same as the version used for MetroLink.

13.4. The TII Carbon tool uses the lifespan to determine the embodied carbon within the material required to maintain the infrastructure over this lifespan, i.e. 25% of rail track needs replacing every 40 years. The maintenance period used in the carbon tool at the time of the EIAR included for 80 years of service within the modelled calculations. In the text of the document, this was incorrectly stated as 60 years of service and annualised on this basis. 80-years is the correct timeframe. When annualising the impacts the correct 80-year design period will be used going forward.

13.5. The updated embodied carbon is shown in Table 4 and compared with the embodied carbon detailed in the EIAR. Table 5 compares the annualised emissions to the appropriate 2030 carbon budgets for each sector. The largest changes related to waste disposal and transport. All material volumes were kept consistent with the EIAR.

13.6. The study found that the change in factors resulted in a reduction of 6,303 tonnes CO_2 or - 0.61% of the total embodied carbon, including 80 years of maintenance. The largest updates relate to a change in a waste disposal emission factor and an increase in the transport emission factor. The emission factor for soils and aggregates (i.e. excavated material) under waste was

updated for “offsite reuse” of soil, reducing it. The change to the waste emission factor is further discussed in Section 14.

13.7. The emission factor for an average HGV has increased between V2.1 and the new online carbon tool. This has resulted in increased emissions for the same number of km travelled for the materials required for construction and for waste transportation from the site.

- Online Carbon Tool: 1.07296 $kgCO_2$/km
- V2.1 Carbon Tool: 0.99784 $kgCO_2$/km

13.8. Both factors were taken directly from the 2021 BEIS emission factors using the Average laden weight, however the online carbon tool uses a factor for artic HGV and V2.1 uses a factor for rigid HGV. Therefore, while there is an increase in the emission factor this is due to a recategorization of the “average HGV” from rigids to artic within the tool.

13.9. The two carbon tools were consistent with the proportion of the embodied carbon being related to each element. This included 86% of the total embodied carbon being related to materials and energy use (diesel and electricity), see Figure 6.

Table 4: Predicted Differences between V2.1 and Online Tool

Carbon Tool Version	Before Use									Use	Total
	Embodied Carbon ($TonnesCO_2e$)		Construction Activities ($TonnesCO_2e$)					Construction Waste ($TonnesCO_2e$)			
	Materials	Material Transport	Clearance and demolition	Clearance and Demolition Water Use	Excavation	Construction Water Use	Plant Use	Construction Waste Disposal	Construction Waste Transport	Maintenance Material	
EIAR V2.1	474,663	4,634	45	0.07664	54,345	494	401,010	14,907	14,907	25,661	1,016,536
TII Online Carbon Tool	473,891	4,982	45	0.07660	54,345	494	401,010	5,730	43,848	25,888	1,010,233
Difference	-772	349	-0.0	-0.0	-0.0	-0.0	-0.0	5,730	28,941	227	-6,303
% Difference	-0.16%	7.52%	0.0%	0.0%	0.0%	0.0%	0.0%	-61.56%	194.15%	0.88%	-0.62%

Table 5: V2.1 and Online Tool Annualised and Compared to Carbon Budgets

Carbon Tool Version	Total Transport (Tonnes CO_2e)	Total Transport Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Transport	Total Industry (Tonnes CO_2e)	Total Industry Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Industry	Total Waste (Tonnes CO_2e)	Total Waste Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Waste	Total Electricity (Tonnes CO_2e)	Total Electricity Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Electricity
EIAR V2.1	45,411	567.64	0.009%	832,810	10,410.12	0.260%	14,907	186.33	0.019%	123,363	1,542.04	0.051%
TII Online Carbon Tool	48,830	610.37	0.010%	832,265	10,403.31	0.260%	5,730	71.62	0.007%	123,363	1,542.04	0.051%
Difference	3,419	42.73	0.001%	-545	-6.82	-0.0002%	-9,177	-114.71	-0.011%	0.0	0.0	0.000%

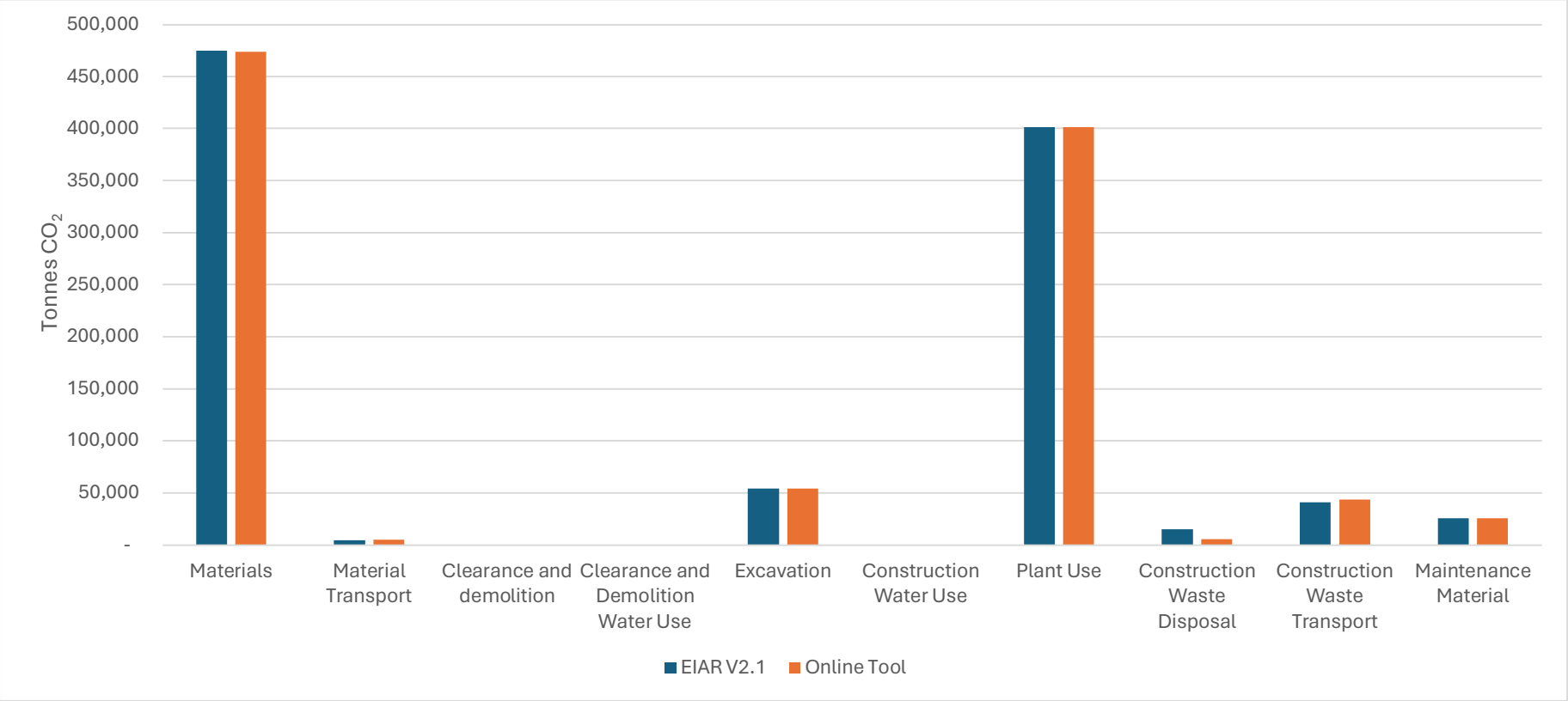

Figure 6: Embodied Carbon Comparison TII Carbon Tool V2.1 and Online Tool

14. Waste Assumption Updates

14.1. As noted in Section 13 there were some updates to the waste emission factors in the Online Carbon Tool, specifically the emission factor associated with “offsite reuse” of soils and aggregates (i.e. excavated material).

14.2. This previously had 50km of transport embedded within the emissions factor. However, this 50km for transport was inconsistent with the carbon tool which requires transport emissions to be added separately. This has now been corrected in the Online Carbon Tool. The updated emission factor in the Online Carbon Tool for “offsite reuse” of soils and aggregates is now 0 $kgCO_2$/tonne waste with the transport emissions added separately. As the transport element is now separated from the “reuse” emission factor for excavated material, this brings it into alignment with all other waste emission factors where the transport distance is added separately to the waste volume. The update to this emission factor required a consideration for a change to the reasonable worst-case input to the tool compared to the assumptions in the EIAR.

14.3. At the time of the EIAR, the emission factor for “offsite reuse” of excavated material was used as a conservative worst-case (as it was the highest emission factor for this type of materials) for 100% of excavated material. In the updated assessment as the factor for “reuse offsite” is no longer a worst-case scenario (to reflect the correction of this error), the calculation now assumes the worst case is that 80% of the excavated material goes to offsite reuse and 20% to landfill within 40km which is consistent with the waste assessment. Previously the material was assumed to travel ~9 km to Huntstown however due to capacity constraints the distance has been increased to allow for up to 40km transport of all excavated material as a worst-case assumption. The 50km travel distance that has been noted as previously being embedded within the emissions factor was not classed under transport, it was under the Construction Waste Disposal heading. Hence, from a waste transport perspective the travel distances for each load have increased from 9km to 40km. As noted in Section 13.7, there is also a slight increase in the transport emission factor which further increases the transport emissions.

14.4. The study found that the change in factors resulted in an increase of 5,396 tonnes CO_2 or 0.53% of the total embodied carbon from the EIAR, including 80 years of maintenance, as shown in Table 6. Table 7 compares the updated annualised emissions to the appropriate 2030 carbon budgets for each sector.

Table 6: Predicted Differences between V2.1 and Online Tool with Updated Waste Assumptions

Carbon Tool Version	Before Use									Use	Total
	Embodied Carbon (TonnesCO_2e)		Construction Activities (TonnesCO_2e)					Construction Waste (TonnesCO_2e)			
	Materials	Material Transport	Clearance and demolition	Clearance and Demolition Water Use	Excavation	Construction Water Use	Plant Use	Construction Waste Disposal	Construction Waste Transport	Maintenance Material	
EIAR V2.1	474,663	4,634	45	0.07664	54,345	494	401,010	14,907	40,778	25,661	1,016,536
TII Online Tool with Updated Waste Assumptions	473,891	4,982	45	0.07660	54,345	494	401,010	7,112	54,165	25,888	1,021,932
Difference	-772	349	0	-0.00004	-0	-0	0	-7,794	13,387	227	5,396
% Difference	-0.16%	7.52%	0.00%	-0.048%	0.00%	0.00%	0.00%	-52.3%	32.83%	0.88%	0.53%

Table 7: V2.1 and Online Tool Annualised and Compared to Carbon Budgets with Updated Waste Assumptions

Carbon Tool Version	Total Transport (Tonnes CO_2e)	Total Transport Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Transport	Total Industry (Tonnes CO_2e)	Total Industry Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Industry	Total Waste (Tonnes CO_2e)	Total Waste Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Waste	Total Electricity (Tonnes CO_2e)	Total Electricity Annualised (80 Years)	Annualised Total as % of 2030 Emission Ceiling Electricity
EIAR V2.1	45,411	567.64	0.009%	832,810	10,410.12	0.260%	14,907	186.33	0.019%	123,363	1,542.04	0.051%
TII Online Tool with Updated Waste Assumptions	59,147	739.34	0.012%	832,265	10,403.31	0.260%	7,112	88.90	0.009%	123,363	1,542.04	0.051%
Difference	13,736	171.70	0.003%	-545	-6.82	-0.0002%	-7,794	-97.43	-0.010%	0	0	-%

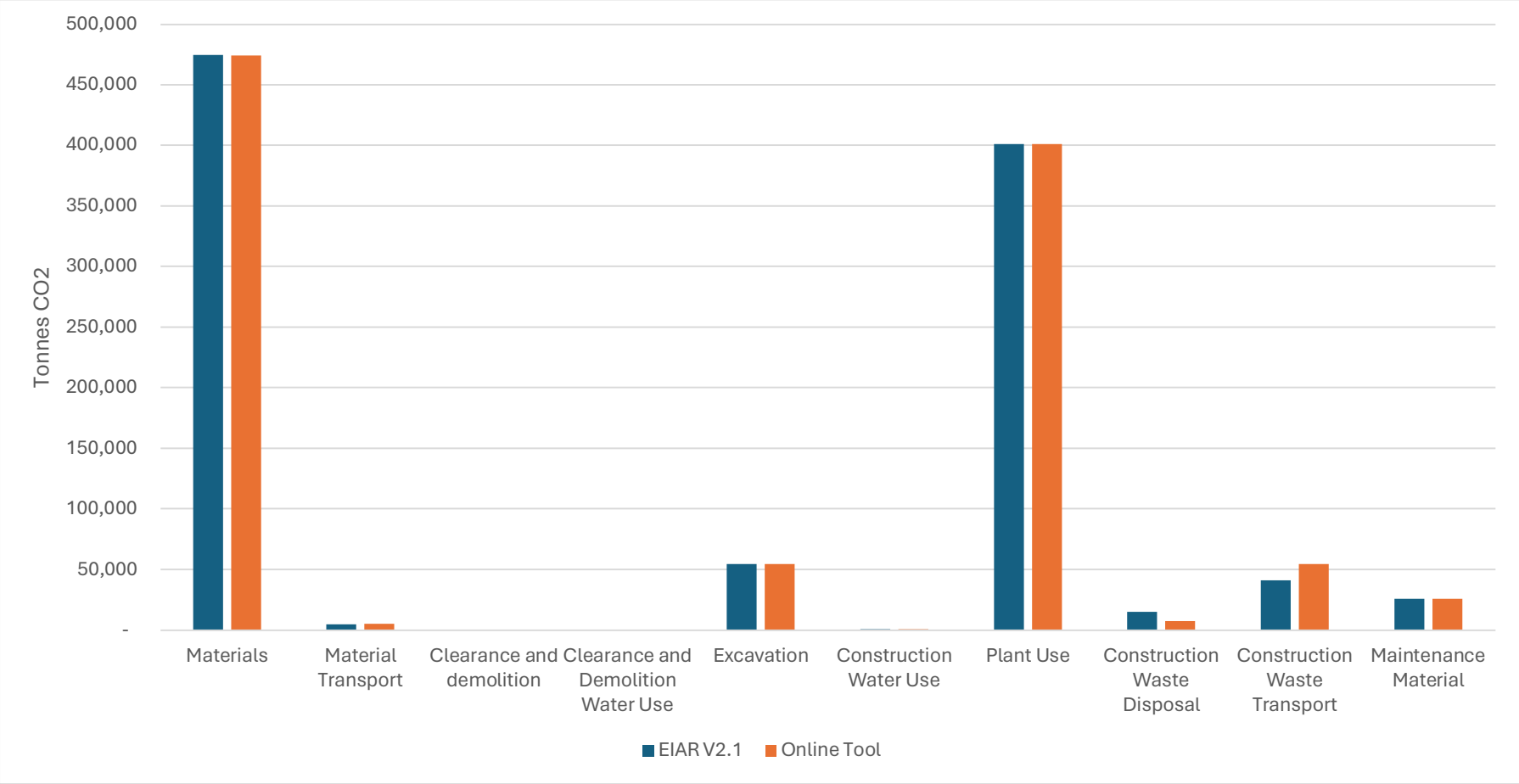

Figure 7: Embodied Carbon Comparison TII Carbon Tool V2.1 and Online Tool with Updated Waste Assumption

15. TII Construction Phase Commitments

15.1. A commitment of a 100% CPPA to power all construction phase (including the TBM) from renewable sources will be put in place. Use of renewable energy reduces the carbon intensity to 0 gCO_2/kW and results in 52.568 $ktCO_2$ of additional savings above the projected carbon intensity if it was supplied from the decarbonised grid.

15.2. In addition, the reduction associated with use of a lower embodied carbon concrete such as ground granulated blast furnace slag (GGBS), as far as practicable, has been quantified. The majority of concrete is assumed to be RC 32/40Mpa. GGBS is one example of a low carbon concrete and may not be the final option chosen. However, the effect of choosing a low carbon concrete, as specified within CAP24, with similar embodied carbon to the GGBS is as follows:

- 0% replacement embodied carbon 329 $kgCO_2e$ per m^3;
- 25% replacement embodied carbon 288 $kgCO_2e$ per m^3; or
- 50% replacement embodied carbon 212 $kgCO_2e$ per m^3.

15.3. TII are committing to using, as far as practicable, a low embodied carbon concrete which is equivalent to the 50% GGBS replacement or 212 $kgCO_2e$ per m^3 during construction.

15.4. Diesel use on site during construction to power cranes, generators, dumpers etc is associated with a significant percentage of the overall embodied carbon. Sustainably sourced HVO is an alternative to diesel which has up to 90% savings in CO_2 compared to diesel. HVO can be used directly with no alterations in diesel engines. It is considered to be a transition fuel rather than the long-term solution of hydrogen or electric plant. This is due to sustainability concerns of the sourcing of HVO. To further incentivise the supply of HVO in the transport sector in 2023, Renewable Transport Fuel Regulations were introduced to allow the award by the National Oil Reserves Agency (NORA) of additional renewable transport fuel obligation (RTFO) certificates for supply of HVO in the transport sector. This was done to contribute to further decarbonising the hard to abate HDV and road haulage sectors in the short-term. Minister Eamon Ryan stated[13] in a written response that HVO is expected to meet a large proportion of the increase in biofuel supply to decarbonise the transport sector in the short terms as a transition measure. The long-term goal is to transition towards electric or hydrogen vehicles. MetroLink has agreed to commit to a 100% replacement of the projected diesel requirement with HVO resulting in a saving of 249.8 $ktCO_2$. Given that HVO is considered a transition measure to electric construction plant, as electric construction plant becomes available, MetroLink will transition towards this equipment, further decarbonising construction.

15.5. TII are committing to only procuring from suppliers which achieve the target of a decrease by 10% embodied carbon for materials produced and used in Ireland by 2025 in accordance with the CAP23 and CAP24, as far as practicable. Due to this procurement commitment, a reduction factor has been applied to the construction materials. While some, such as steel, will not be sourced in Ireland it is known that other EU countries will have their own decarbonisation strategies and therefore the same procurement requirement can be applied. Steel for instance is likely, but not guaranteed, to come from Spain. In early 2023 the EU Commission approved a €460 million measure to support the Spanish manufacturer ArcelorMittal to decarbonise its steel production[14]. IDONIAL[15], a Spanish technological centre, is involved in "Green Steel for Europe". The project aims to develop a technology roadmap and define mid- and long-term

[13] https://www.oireachtas.ie/en/debates/question/2023-09-11/255/
[14] https://ec.europa.eu/commission/presscorner/detail/en/ip_23_849
[15] https://www.estep.eu/green-steel-for-europe/

pathways for the decarbonisation of the steel industry; analyse funding options; assess the economic, social, environmental and industrial leadership impacts of EU policy options; and ensure the dissemination of results and stakeholder engagement. By 2030, the 10% decrease in embodied carbon, increases to a 30% decrease and also the Implementation of a carbon capture, utilisation and storage (CCUS) framework product substitution for construction materials and reduction of clinker content in cement will assist in this. 2030 is halfway through the construction period so it is likely that between 2025 and 2030 the materials used in construction will decarbonise further than the 10%. In line with the procurement commitment, a 30% reduction in embodied carbon is applied material maintenance and 10% reduction applied to the construction stage materials.

15.6. CAP24 and the European Communities (Clean and Energy Efficiency Road Transport Vehicles) Amendment Regulations 2021 require public sector bodies to procure (purchase or lease) only "zero emission" vehicles by the end of 2022, there are some exceptions for Track-laying vehicles, Self-propelled vehicles designed to perform work and not carrying passengers or transporting goods, mobile cranes; vehicles designed and constructed for use principally on construction sites however as technology improves such vehicles may become more and more viable for construction.

15.7. TII commit to measures set out in the draft National Waste Management Plan for a Circular Economy (NWMPCE)[16] which requires an annual 2% reduction in waste.

15.8. The proposed aim of 25% reuse of grey water rather than mains water on site, as per the EIAR, has been applied.

15.9. Applying the above target mitigation results in an embodied carbon, including maintenance for 80 years, of 490,949 tCO_2. Comparing this to the EIAR embodied carbon (1,016,536 tCO_2), shows that up to **51.7% savings** in embodied carbon could be made by the application of the mitigation measures that TII is committing to. This is set out in detail in Table 8.

[16] The final 'National Waste Plan for a Circular Economy' is due to be published early March 2024

Table 8: Reduction in Embodied Carbon from EIAR Stage

Carbon Tool Version	Embodied Carbon ($tonnesCO_2e$)		Construction Activities ($TonnesCO_2e$)				Construction Waste ($TonnesCO_2e$)		Maintenance Material	Total (Tonnes CO_2e)	% saving made
	Materials	Material Transport	Clearance and demolition and excavation	Excavation	Construction Water Use	Plant Use	Construction Waste Disposal	Construction Waste Transport			
EIAR Carbon Tool V2.1	474,663	4,634	45	54,345	494	401,010	14,907	40,778	25,661	1,016,536	
Updated TII Online Carbon Tool (including updated waste assumptions)	473,891	4,982	45	54,345	494	401,010	7,112	54,165[17]	25,888	1,021,932	0.5%
Updating Concrete to 32/40 with GGBS 50%	360,206	4,982	45	54,345	494	401,010	7,112	54,165	25,888	896,547	-11.8%
Updated Carbon with GGBS Replacement and then other Mitigation Applied	324,185 (10% reduction due to procurement commitments)	4,982 -	45 -	54,345 -	371 (25% reduction due to grey water use)	330,215 (reduction due to decarbonisation of the grid)	6,970 (reduction due to draft raft NWMPCE compliance)	54,165 -	18,122 (30% reduction due to procurement commitments))	780,980	-23.2%
Updated to a 100% CPPA in Construction	324,185	4,982	45	54,345	371	277,647	6,970	54,165	18,122	740,831	-27.1%
100% reduction in Diesel – swapped to use of sustainable HVO	324,185	4,982	45	54,345	371	27,765	6,970	54,165	18,122	490,949	-51.7%
Final Mitigated Scenario Reduction from EIAR	-32%	8%	0%	0%	-25%	-93%	-53%	33%	-29%	-51.7%	
Annualised over 9.25-year construction and 80 Year lifespan	3,622	56	1	607	4	310	78	605	202	5,485	
Compared to Relevant 2030 Sectoral Carbon Budgets	0.091%	0.001%	0.000%	0.015%	0.0004%	0.008%	0.008%	0.010%	0.005%	0.016%	
	Industry Sectoral Budget	Transport Sectoral Budget	Industry Sectoral Budget	Industry Sectoral Budget	Other Sectoral Budget	Industry Sectoral Budget	Other Sectoral Budget	Transport Sectoral Budget	Industry Sectoral Budget	Total Budget 2030	

[17] Note increase discussed in Section 14**Error! Reference source not found.**

16. Carbon Intensity of Construction and Operational Power

16.1. The operational phase carbon intensity (see Section 17.3.4.2.2 of the EIAR) is based on a keynote speech for the EPA's Climate Change conference in June 2022 by the ESB Chief Executive that stated the projected carbon intensity figure for 2030 is 66 gCO2/kWh and 0 gCO2/kWh by 2036.

16.2. Since the publication of the EIAR, TII have increased this commitment to 100% of construction and operational power being generated from renewables, either through CPPAs or on-site generation of power. As a result, the carbon associated with the construction and operational power requirements have been updated to 0 tonnes CO_2.

17. Operational Phase Transport Strategy Updates Including the Greater Dublin Area (GDA) 2022-2042

17.1. Since the publication of the EIAR, the Transport Strategy for the Greater Dublin Area (GDA) 2022-2042 has been prepared and published by the National Transport Authority in accordance with Section 12 of the Dublin Transport Authority Act, 2008. The result of this update is an updated traffic model for the design year. Included in the updates to the GDA traffic model is the addition of new rail line to Navan and removal of the Dart Tunnel, additional orbital bus routes and an improved cycle network and a 50% reduction in free workplace parking and other demand management measures. A newer version of the NTA model was developed to better model the impact of the 2022-2042 Transport Strategy, including a tool to better represent the greatly improved cycle network and the policy support for cycling.

17.2. As a result of the updates to the model the modal shift from private car to public transport as a result of MetroLink is lower than previous modelling. This is due to a larger "menu" of public transport options being provided and the much greater percentage of people cycling in the Do Minimum model. Within the model, there is no reduction in the bus network provided as a result of MetroLink, although it is estimated that close to 60 additional buses would be required to accommodate the increase in public transport users provided by Metrolink and the transfers from bus to Metrolink would allow for reductions in bus services as well, up to 80 less in the AM peak on the Swords/Airport/Ballymun corridors.

17.3. The ENEVAL model has been updated for the design year (2050) with respect to the new GDA strategy. The results are shown in Table 9 and compared with those from Scenario B in the EIAR.

17.4. As a result of the new GDA strategy the beneficial CO_2eq impact of MetroLink has been reduced from -2.17 ktCO_2eq annually to -0.59 ktCO_2eq for the design year, a significant drop off. This is unexpected due to the expected modal shift. However by 2050 the model assumes that the model CO2 emissions only accounts for tailpipe emissions. The fleet assumptions within ENEVAL assumes that all private cars are electric by 2050 therefore have zero tailpipe CO_2eq emissions. This aligns with a vote taken in February 2023 by the European Parliament to phase out the sale of any new international combustion engine cars by, as well as committing to reduce overall car emissions by 55% by 2030. This will be compounded if a ban of fossil fuel cars receiving an NCT after 2045 is implemented as detailed in the Government of Ireland "Report on the Implementation of the Alternative Fuels Infrastructure Directive (2014/94/EU)". However, the electric cars will still require charging.

17.5. Therefore the difference between the DS and DM is purely associated with the change in HGV and Buses. In the modelling assumptions there is no increase in the number of HGVs or Buses {although it is estimated that Metrolink could allow for reductions in approximately 80 buses in the AM peak hour} associated with Metrolink. However, emissions can decrease due to less

congestion on the roads. The congestion effects the modelled speeds, which can increase emissions.

17.6. This traffic modelling is completed using actual flows predicted by the model, within these models the demand can actually be higher than the predicted actual flows. The choice model component of the ERM model produces a demand flow matrix and then the respective assignment module assigns the demands onto the relevant network, public transport/highway etc. When modelling future years, technical constraints such as zone connectors and junctions can become overloaded and not all the demand flow is assigned to the highways network within the required time period, i.e. the traffic is 'stuck'. In practice, future local network improvements, such as new local access roads or junction improvements, would be implemented and these would allow the networks to accommodate these future demands flows. It would be unfeasible to code in all these unknown local area changes into the model. When actual flows are used, the reductions in car flows provided by the Metrolink are just replaced by cars and goods vehicles that are 'stuck' in the model. This means that, in the Do Scheme model, there can be an increase in the number of goods vehicles and much less reduction in the number of cars. Using the demand flows, provides a better understanding of the impact of Metrolink project. It means that the reductions in car traffic provided by the Metrolink are not replaced by 'stuck' vehicles, and that the number of goods vehicles and bus numbers in the models remain unchanged between the Do Minimum and Do Scheme scenarios.

17.7. When the demand flows were investigated, as shown in Table 10, the overall emissions rise from the actual flows for the same scenario, which is illustrative of the higher demand on the road network than it can facilitate, hence the need for modal shift. The change between the actual and demand scenarios due to MetroLink for the Scenario B in 2050 with the old GDA strategy (as per EIAR) changes from -2.17 $ktCO_2$ modelling actual flows to -1.98 $ktCO_2$ for demand flows. Both showing an improvement. Using the new GDA 2022-2042 strategy, the CO_2 impact of MetroLink has been reduced from -0.59 $ktCO_2$ for actual to -2.66 $ktCO_2$ for the demand.

17.8. BOX 8 of the TII PE-ENV-01106 (Air Quality Assessment of Specified Infrastructure Projects Published in 2022 which the 2022 TII Climate Guidance (PE-ENV-01104) says should be referred to for traffic assessments) states that:

"The evaluation of significance for the operational phase should be undertaken for the opening year only, as the design year is likely to show lower total pollutant concentrations and change in concentration".

17.9. Therefore, while the 2050 data has been changed due to an updated GDA strategy, this should not influence the assigned significance of the project as it should be based on the opening year (2035). The drop off in overall emissions can be seen in Section 17.5.3.2 and 17.5.3.3 of the EIAR. For Scenario B in 2035 the DM are 4,315 $ktCO_2eq$ and in 2050 the DM are 1,794 $ktCO_2eq$, a 58% reduction. The drop-off in CO_2eq is associated with the decarbonisation of the fleet between 2035 and 2050.

17.10. All 2035 runs show improvements in CO_2 emissions with MetroLink in place with the demand flows show over a 20-fold improvement (-12.9k $ktCO_2$ to 274.8 $ktCO_2$ for Scenario A) (See Table 10) on the data included in the EIAR (actual), indicating a much greater potential for improvements in CO_2 emissions compared to those included in the EIAR. The reduction in CO_2 emissions in the opening year are 3% and 4.6% of the 2030 transport sector sectoral budget for 2030 for Scenario A and B respectively. Scenario B shows lower reductions due to MetroLink due to greater availability of other public transport options. However, while the change is smaller, the overall emissions are lower which is the aim of the integrated transport network.

17.11. The actual scenario, which was the scenario modelled in Chapter 17 of the EIAR, is a worst-case scenario for the beneficial impacts of MetroLink. The traffic team have confirmed that the demand scenario matrices better represent the impact of the Metrolink project. Therefore, the potential emissions saving during the operational phase are much more significant those included in the EIAR.

Table 9: *EIAR Scenario B 2050 Comparison with Updated GDA Strategy 2050*

	Vehicle Class	EIAR Scenario B 2050 ($KtCO_2eq$) (Actual Flows)	New GDA Strategy 2050 ($KtCO_2eq$) (Actual Flows)
DM	Car	-	0
DS		-	0
Change		-	0
% Change		0%	0%
DM	Bus	33	26.8
DS		33	26.8
Change		-0.14	-0.016
% Change		-0.44%	-0.06%
DM	Goods	1,761	2,295
DS		1,759	2,295
Change		-2.03	-0.57
% Change		-0.12%	-0.02%
DM	Total	1,794	2,322
DS		1,792	2,322
Change		-2.17	-0.59
% Change		-0.12%	-0.03%

Table 10: EIAR Demand Versus Actual Flows

DS- DM $ktCO_2$						
Scenario	2035		2050 Old GDA		2050 New GDA	
	Actual (EIAR)	Demand	Actual (EIAR)	Demand	Actual (EIAR)	Demand
Scenario A	-12.9	-274.8	-13.8	-16.6	No Update	
Scenario B	-12.1	-184.7	-2.2	-2.0	-0.6	-2.7
As % of 2030 Transport Carbon Budget						
Scenario	2035		2050 Old GDA		2050 New GDA	
	Actual (EIAR)	Demand	Actual (EIAR)	Demand	Actual (EIAR)	Demand
Scenario A	-0.21%	-4.58%	-0.23%	-0.28%		
Scenario B	-0.20%	-3.08%	-0.04%	-0.03%	-0.01%	-0.04%

18. Updates to Residual Impacts

18.1. The commitment to specific mitigation measures, including construction and operational power being 100% supplied by renewable energy, since the publication of the EIAR has significantly reduced the embodied carbon annualised residual impact. The previous EIAR residual impact, when annualised over the 80 years, is shown in Table 11. When annualised over an 80-year period of operation, the updated "actual" traffic scenario residual impact (Table 12) is beneficial, with even greater benefits being illustrated when the "demand" traffic model is considered (Table 13). TII aim to further reduce embodied carbon during detailed design, achieving alignment with PAS 2080, through lean design and modern construction methods.

Table 11: EIAR Residual Impacts Opening Year (annualised over 80 years)

Scenario A 2035 EIAR Data			Scenario B 2035 EIAR Data		
Activity	**Kilotonnes CO_{2eq} / Total**	**As % of Transport Carbon Budget**	**Activity**	**Kilotonnes CO_{2eq} / Total**	**As % of Transport Carbon Budget**
Operational Vehicle Emissions– Based on Scenario A in the Opening Year (2035)	-12.88		Operational Vehicle Emissions– Based on Scenario B in the Opening Year (2035)	-12.12	
Operational Power Opening Year (2035 SEAI Carbon Intensity Projection)	0.63		Operational Power Opening Year (2035 SEAI Carbon Intensity Projection)	0.63	
Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	12.88		Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	12.88	
Total	**0.62**	**0.010%**	**Total**	**1.39**	**0.023%**

Table 12: Updated Residual Impacts Opening Year (annualised over 80 years) using Actual Traffic Flows

Scenario A 2035 Updated Mitigation			Scenario B 2035 Updated Mitigation		
Activity	**Kilotonnes CO_{2eq} / Total**	**As % of Transport Carbon Budget**	**Activity**	**Kilotonnes CO_{2eq} / Total**	**As % of Transport Carbon Budget**
Operational Vehicle Emissions– Based on Scenario A in the Opening Year (2035) (Actual Traffic Data Scenario)	-12.88		Operational Vehicle Emissions– Based on Scenario B in the Opening Year (2035) (Actual Traffic Data Scenario)	-12.12	
100% Renewable Operational Power	0.00		100% Renewable Operational Power	0.00	
Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	6.85		Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	6.85	
Total	-6.03	**-0.101%**	**Total**	-5.27	**-0.088%**

Table 13: Updated Residual Impacts Opening Year (annualised over 80 years) using Demand Traffic Flows

Scenario A 2035 Updated Mitigation			Scenario B 2035 Updated Mitigation		
Activity	**Kilotonnes CO_{2eq} / Total**	**As % of 2030 Transport Carbon Budget**	**Activity**	**Kilotonnes CO_{2eq} / Total**	**As % of 2030 Transport Carbon Budget**
Operational Vehicle Emissions– Based on Scenario A in the Opening Year (2035) (Demand Traffic Data Scenario)	-274.76		Operational Vehicle Emissions– Based on Scenario B in the Opening Year (2035) (Demand Traffic Data Scenario)	-184.69	
100% Renewable Operational Power	0.00		100% Renewable Operational Power	0.00	
Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	6.85		Construction and Maintenance Annualised (80 Year Design Life) Including ENEVAL traffic model outputs (see EIAR)	6.85	
Total	-267.91	**-4.46%**	**Total**	-177.84	**-2.96%**

18.2. The EIAR states that the likely residual effect is minor adverse, long-term, and not significant in the long term due to the high embodied carbon associated with the Construction Phase.

18.3. IEMA significance criteria states that a minor adverse not significant impact is described with:

A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and 'good practice' reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A 'minor adverse' or 'negligible' non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral[18] *(i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A 'minor adverse' effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.*

18.4. TII Guidance (PE-ENV-01104) mirrors this stating that a minor adverse not significant impact can be describes as:

- *The project's GHG impacts are mitigated through 'good practice' measures.*
- *The project has complied with existing and emerging policy requirements; and*
- *Fully in line to achieve Ireland's trajectory towards net zero.*

18.5. Interpreting Table 11 illustrates that at the EIAR stage, that MetroLink had a residual impact due to the annualised embodied carbon and operational phase power requirements outweighing the beneficial impacts from traffic modal shift away from private vehicles. Since the publication of the EIAR, TII has committed to significant additional mitigation which has reduced the annualised embodied carbon. As well as embodied carbon mitigation, additional commitments include the use of 100% renewable energy during the operational phase, mitigating the operational power CO_2 emissions. The result of this is an annualised saving in the opening year as shown in Table 12. When the "demand" traffic scenario (see Section 17 for details) is considered in Table 13, the significant future potential saving when the full modal shift potential of MetroLink is unlocked.

18.6. MetroLink aligns with Ireland's GHG trajectory to net zero by 2050 during the operational phase and has gone well beyond existing and emerging policy requirements with its updated construction and operational phase commitments. These include the replacement of 100% diesel onsite with sustainably sourced HVO, 100% CPPAs for construction and operational phase and commitment to use of low carbon concrete, where practicable. In addition MetroLink will transition from HVO towards the use electric construction plant as they become available in the market. Operationally MetroLink will be powered through renewable energy and has a beneficial impact on transport emissions. With MetroLink therefore clearly shows compliance with the TII minor adverse not significant impact described above (Section 18.4). TII aim to further reduce embodied carbon during detailed design, achieving alignment with PAS 2080, through lean design and modern construction methods. PAS 2080 alignment has the potential to push the design on MetroLink beyond current design standards further reducing its impact on GHG emissions. This combined with the other committed mitigation, has the potential to

[18] *Carbon Neutral: "When anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period irrespective of the time period or magnitude of offsets required."*

push MetroLink into the neutral impact category. TII Guidance (PE-ENV-01104) describes a neutral impact as:

- *The project's GHG impacts are mitigated beyond design standards.*
- *The project has gone well beyond existing and emerging policy requirements; and*
- *Well 'ahead of the curve' for Ireland's trajectory towards net zero.*

18.7. This document, the Metrolink EIAR and documents submitted as part of the Railway Order, illustrates how MetroLink aligns with these significance criteria set out by IEMA and TII.

19. Compliance with the Climate Action and Low Carbon Development Act 2015

19.1. In 2015, the Climate Action and Low Carbon Development Act 2015 (the "2015 Act") was enacted. The Act was amended in 2021 by the Climate Action and Low Carbon Development (Amendment) Act 2021. The purpose of the 2015 Act, as set out in section 3(1), is to enable Ireland *"to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy"*. This is referred to in the Act as the 'national climate objective'.

19.2. Section 15 of the 2015 Act sets out the duty of a body, with respect to climate, stating that the relevant body (An Bord Pleanála in this case) must, in so far as practicable, perform its functions in a manner consistent with:

(a) the most recent approved climate action plan,

(b) the most recent approved national long term climate action strategy,

(c) the most recent approved national adaptation framework and approved sectoral adaptation plans,

(d) the furtherance of the national climate objective, and

(e) the objective of mitigating greenhouse gas emissions and adapting to the effects of climate change in the State.

19.3. Section 15 of the 2015 Act requires the Board to be satisfied that the MetroLink project is:

- consistent with the most recent climate action plan/strategies and in furtherance of the national climate objective (i.e. of achieving net zero by 2050 (subsections a, b, and d)) and
- consistent with the most recent national adaptation framework and plans, ensuring that the impact of future climate change has been considered and adaptation has been applied to reduce vulnerability to such impacts (subsections c), and
- is consistent with the objective of mitigating GHG emissions and adapting to the effects of climate change (subsection e).

19.4. The climate chapter, and this updated assessment has sought to demonstrate how this project is consistent with section 15 of the Act. The project has carried out a greenhouse gas emissions assessment and assessed the project's resilience/adaptation to climate change:

- Greenhouse Gas Emissions Assessment – This assessment considers the quantification of the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude. This covers subsections a, b, and d of Section 15 of the Act; and
- Climate Change Vulnerability Assessment – This assessment identifies the impact of a changing climate on a project and receiving environment. The assessment considers a project's vulnerability to climate change and identifies adaptation

measures to increase project resilience. This covers subsections c and e of Section 15 of the Act.

APPENDIX 2

Air Quality Updates

1. Scheme Overview and Introduction

1.1. Metrolink will comprise a high-capacity, high-frequency, modern and efficient metro railway, with 16 new stations running from Swords to Charlemont. The alignment will link Dublin Airport, Irish Rail, DART, Dublin Bus and Luas services and create a fully integrated public transport network for the Greater Dublin Area (GDA).

1.2. The overall project objective for Metrolink, as established by the National Transport Authority (NTA) and TII and as informed by planning policy context is: '*To provide a sustainable, a safe, efficient, integrated and accessible public transport service between Swords, Dublin Airport and Dublin city centre*'.

1.3. In addition to the updates provided in my Witness Statement, this Appendix presented updates to Guidance and sensitivity analysis of policy updates since the time of publication of the draft Railway Order (RO).

2. Ambient Air Quality Standards Regulations 2022

2.1. In the EIAR, the air quality impacts of the Proposed Project were assessed for compliance with the mandatory limit values outlined in the Air Quality Standard Regulations 2011 (the 2011 Regulations) which were introduced to transpose the requirements of Directive 2008/50/EC on ambient air quality and cleaner air for Europe (as amended) (the CAFE Directive) which has a focus on the protection of human health.

2.2. The 2011 Regulations were replaced by the Ambient Air Quality Standards Regulations 2022 (the 2022 Regulations) came into effect on 31 December 2022 which also give effect to the requirements of the CAFE Directive. Notice of the making of this Statutory Instrument was published on 10th January 2023.The scope of the 2022 Regulations, as set out in Regulation 4, is to:

> *(a) make provisions necessary for the implementation of the [CAFE] Directive;*
>
> *(b) establish limit values and, as appropriate, alert thresholds for concentrations of certain pollutants in ambient air intended to avoid, prevent or reduce harmful effects on human health and the environment as a whole;*
>
> *(c) provide for the assessment of concentrations of certain pollutants in ambient air on the basis of methods and criteria common to the Member States of the European Communities;*
>
> *(d) provide for the obtaining of adequate information on concentrations of certain pollutants in ambient air and ensure that it is made available to the public; and*
>
> *(e) provide for the maintenance of ambient air quality where it is good and the improvement of ambient air quality in other cases with respect to certain pollutants.*

2.3. The 2022 Regulations set limit values and alert thresholds for air pollution for particular pollutants and also specify the requirements for monitoring and reporting air quality data. The regulations have the greatest impact on the competent authority, the Environmental Protection Agency (EPA) and local authorities that may be instructed by the EPA in relation to monitoring, reporting and the implementation of measures necessary for effective pollution control and preservation of best ambient air quality.

2.4. The 2011 regulations included "schedules" (or appendices) which were copies of the annexes from the EU directive. The 2022 regulations refer directly to the annexes in the EU directive. This shortens the length of the 2022 regulations significantly but the main body of text of both

regulations are very similar. This change may be a measure to accommodate future updates to the Directive, which will be discussed in Section 3.

2.5. The updated 2022 Regulations put a greater emphasis on the Minister, the EPA and the local authority, to take all necessary measures, not entailing disproportionate costs, to ensure that concentrations of $PM_{2.5}$ in ambient air do not exceed the limit value laid down in Section E of Annex XIV of the Directive throughout the zones and agglomerations. While the limit value does not change as a result, the Regulations does direct attention to the mitigation of $PM_{2.5}$ to a greater extent than in the 2011 Regulations.

2.6. Regulation 27, which concerns public information, introduces a requirement that the public be informed "in good time" of ambient air quality, changes of limit values and air quality plans. Another change to the Regulations is the addition of a requirement in the 2022 Regulations for air quality plans to be submitted by local authorities to the Minister for approval no less than sixteen months after the end of the year of a first exceedance. Once approved, the plan is to be communicated to the European Commission no later than two years after the end of the year of the first exceedance. This two-year time frame is in line with the 2011 Regulations.

2.7. A key change of relevance to construction projects is that, under the heading Short-Term Action Plans, Regulation 25(5) provides:

> *"The short-term action plans referred to in paragraph (1), may, depending on the individual case, provide for effective measures to control, and, where necessary, reduce or suspend activities which contribute to the risk of the respective limit values, or target values or alert thresholds being exceeded. Those action plans may include measures in relation to motor vehicle traffic, construction works, ships at berth and the use of industrial plants or products and domestic heating."*

2.8. The reference to construction works is not included in the 2011 Regulations. Another new requirement contained in Regulation 25(4) is that such short-term action plans must be submitted to the Minister and the EPA for evaluation no less than 3 months from the date of notification by the EPA of the risk of an exceedance.

2.9. The implication of this for MetroLink is the potential for a short-term action plan to be put in place by DCC or FCC to protect sensitive receptors should EPA monitoring data indicate the risk of the respective limit values, or target values or alert thresholds being exceeded.

2.10. As part of the MetroLink Construction Dust Management Plan, MetroLink will be monitoring construction phase dust, PM_{10}, $PM_{2.5}$ and NO_2 in order to ensure on-site mitigation measures are being successfully implemented. The dust mitigation measures aim to ensure that no significant impacts occur at sensitive receptors. The monitoring locations will be chosen with consideration with the prevailing wind direction and proximity of sensitive receptors. MetroLink aims to complete 6-months of pre-construction monitoring at all sites to establish a baseline prior to construction works. The data will assist in confirming if the construction of MetroLink has the potential for any air quality impacts which contribute to the risk of the respective limit values, or target values or alert thresholds being exceeded. During construction, trigger levels will be used to alert TII and the contractor to a potential peak in particulate concentrations. These trigger levels were successfully used at Rotunda Hospital during Luas Cross City works. Any updates to the trigger levels can be agreed with DCC and FCC prior to construction. In the event that a trigger level is breached:

- SMS text messages and/ or emails will be sent to the Employer's Representative and the Contractor from monitoring equipment.
- The Employer's Representative and the Contractor will review the construction activities in the vicinity to determine the cause.
- The Employer's Representative will be entitled to stop the Works. Where activities outside the control of the Contractor may have had an influence on a trigger level being breached, these will be identified, and works can recommence following agreement with the Employer's Representative.
- The Contractor will review the monitoring data, including the most recent air quality data.
- The Contractor will identify and agree with the Employer's Representative appropriate engineering controls and management procedures to reduce dust levels resulting from the works activities identified as the cause of the trigger level being reached.
- The Contractor will confirm to the Employer's Representative that controls and management procedures have been implemented.

2.11. In addition, the climate mitigation measures such as the use of HVO and electric plant as an alternative to diesel, will also have beneficial effects on air quality pollutants including NO_x and PM.

3. Future Updates to the Air Quality Directive

3.1. On 26th October 2022, the EU published a proposal (COM/2022/542) for an updated Air Quality Directive which contains limit values for the protection of human health to be attained by 1 January 2030 that more closely aligns with WHO limit values published in 2021. The EU Ambient Air Quality Directive will propose updates to adapt to the priorities of the European Green Deal and in particular to its zero-pollution pillar. The zero-pollution pillar states that, by 2050, pollution should be reduced to levels no longer considered harmful to health.

3.2. The briefing note by the European Parliamentary Research Service in October 2022 "Revision of the EU Ambient Air Quality Directives" for the European Parliament describes the difference between the EU air quality standards and the WHO air quality guidelines as follows:

"The air quality reference values for a number of pollutants, defined by the WHO, are intended as policy guidance only, while *the EU standards, as defined by the Ambient Air Quality Directive, are mandatory."*

3.3. The European Council and European Parliament are currently negotiating on the shape of the legislation for the updated Directive.

3.4. The WHO guidelines are based solely on health considerations, while the EU standards reflect broader considerations, such as technical feasibility and the political, economic and social aspects of achieving these standards.

3.5. The proposed updated Air Quality Directive reinforces the need for public transport measures to improve air quality and move people away from private fossil fuel vehicles.

4. TII Guidance Updates

4.1. In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Air Quality:

- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII 2022a);
- PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads (TII 2022b).

4.2. These guidance documents were issued in December 2022 and supersede the 2011 Transport Infrastructure Ireland 'Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes', or 2011 TII Air Quality Guidelines. The methodology for assessing national roads and other specified infrastructure projects, such as light rail, in PE-ENV-01106 is based on methodology employed in the UK, namely Highways England 2019 guidance 'Design Manual for Roads and Bridges (DMRB) LA 105' (an older version is referred to in the 2011 TII Air Quality Guidelines) and the UK Department for Environment Food & Rural Affairs (DEFRA) 2022 'Local Air Quality Management, Technical Guidance LAQM.TG(22)'. LA 105 and the 2011 TII Air Quality Guidelines were used as the basis of the air quality assessment within the EIAR.

4.3. The TII guidance (TII, 2022a) states that the following scoping criteria shall be used to determine whether the air quality impacts can be scoped out or require an assessment, based on the changes between the Do Something traffic (with the Proposed development) compared to the Do Minimum traffic (without the Proposed development):

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

4.4. The above scoping criteria are in alignment with the previous LA 105 - Air Quality scoping criteria (UKHA 2019) set out in Section 16.3.6 of the EIAR. Therefore, no changes to the impacted traffic links are proposed as part of the updated Guidance.

4.5. In order to ensure no additional impacts occur as a result of the guidance update, AWN Consulting have conducted a sensitivity analysis comparing the number of impacted receptors presented in the EIAR which assesses significance against the current EU air quality Limit Values and using the updated significance outlined in PE-ENV-01106 in Section 55 in line with the April 2023 Clean Air Strategy.

4.6. Traffic has not been remodelled as part of this sensitivity analysis. The EIAR uses a detailed road dispersion model (Atmospheric Dispersion Modelling System (ADMS)) which aligns with the Updated TII Guidance. The EIAR used UK DEFRA Emission Factor Toolkit (EFT) Version 11.0 as a source for fleet emission inputs to ADMS (See Section 16.3.6.3 of the EIAR). In December 2022 TII released the TII Roads Emissions Model (REM) which can now be used to generate fleet emission inputs, replacing the need for the EFT. UK DEFRA Emission Factor Toolkit (EFT) Version 11.0 fleet emission inputs have also been used for other public infrastructure projects including BusConnects and the DART+West.

4.7. Section 1.9 of PE-ENV-01107 (Air Quality Assessment Standard for Proposed National Roads) states that:

4.8. 'where projects requiring approval under Section 51 (Roads Act 1993), Section 177AE (Planning and Development Act 2000) or Part 8 (of the Planning and Development Regulations 2001, as amended) have, at the date of publication of this SD, commenced planning and design, and in particular, where technical advisor contracts have been executed, this SD should be:

- treated as advice and guidance;
- employed to the greatest extent reasonably practicable; and
- applied in a proportionate manner, having regard to the characteristics and location of the project/maintenance works and the type and characteristics of potential impacts.'

4.9. The air quality competent expert was appointed in 2018, wherein scope and methodology were agreed. At the date of publication of the updated guidance all air quality assessments were complete, and the EIAR was submitted. As per Section 1.9 of PE-ENV-01107 given above, it was therefore considered reasonably practicable to retain the use of the EFT as the input fleet emissions.

4.10. In addition to the updated TII guidance (TII, 2022a), the Institute of Air Quality Management (IAQM) published updated Guidance on the assessment of dust from demolition and construction (IAQM 2024). This has been assessed is Section 15 to 18 of the Appendix.

5. WHO Limit values.

5.1. As noted in my Witness Statement, the Government of Ireland published the Clean Air Strategy for Ireland in April 2023, which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target (IT) 3 by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in Table 14). The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2". At the date of publication of the MetroLink EIAR the new Clean Air Strategy for Ireland was not published.

Table 14 WHO Air Quality Guidelines

Pollutant	Regulation	Limit Type	IT3 (2026)	IT4 (2030)	Final Target (2040)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50µg/m^3 NO_2	50µg/m^3 NO_2	25µg/m^3 NO_2
		Annual limit for protection of human health	30µg/ m^3 NO_2	20µg/ m^3 NO_2	10µg/m^3 NO_2
PM (as PM_{10})		24-hour limit for protection of human health	75µg/ m^3 PM_{10}	50µg/m^3 PM_{10}	45µg/m^3 PM_{10}
		Annual limit for protection of human health	30µg/ m^3 PM_{10}	20µg/ m^3 PM_{10}	15µg/m^3 PM_{10}
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5µg/m^3 $PM_{2.5}$	25µg/m^3 $PM_{2.5}$	15µg/m^3 $PM_{2.5}$
		Annual limit for protection of human health	15µg/m^3 $PM_{2.5}$	10µg/m^3 $PM_{2.5}$	5µg/m^3 $PM_{2.5}$

5.2. Interim target (IT) 3 will be applicable to the peak construction phase (2028) and IT4 will be applicable to the opening year operational phase (2035).

6. Significance Criteria Updates due to Updated Guidelines

6.1. The significance criteria given in the 2011 TII Air Quality Guidelines (Boxes A10.1, A10.2 and A10.3) were employed in the MetroLink air quality assessment (see Table 18). These criteria are based on absolute concentrations – both the magnitude of change due to the scheme and also the modelled concentration relative to the limit value. (reproduced from Boxes A10.1 and A10.2 of 2011 TII Air Quality Guidelines) demonstrates that a substantial adverse impact at a modelled receptor would occur if the modelled nitrogen dioxide (NO_2) concentration at that receptor was above the limit value of 40 µg/m^3 combined with a change in concentration due to the scheme of more than 4 µg/m^3.

Table 15: TII 2011 Air Quality Guidelines – Significance Criteria (reproduced from Boxes A10.1 and A10.2)

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration		
	Small (Increase of 0.4 - <2 µg/m^3)	**Medium (Increase of 2 - <4 µg/m^3)**	**Large (Increase of ≥4 µg/m^3)**
Increase with Scheme			
Above Objective/Limit Value with Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value with Scheme (36-<40 µg/m^3 of NO_2 or PM_{10}) (22.5-<25 µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value with Scheme (30-<36 µg/m^3 of NO_2 or PM_{10}) (18.75-<22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value with Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75 µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse

6.2. The updated significance criteria in PE-ENV-01106 are based on modelled concentrations as a percentage of the air quality limit value (AQLV), as shown in Table 16 below. The impact categories differ from those in the 2011 TII Air Quality Guidelines in that they relate to percentages of the AQLV and therefore have the potential to change with future changes to AQLVs. A neutral effect is a change in concentration at a receptor of:

- 5% or less where the opening year, without the proposed development annual mean concentration is 75% or less of the standard; or
- 1% or less where the opening year, without the proposed development annual mean concentration is 94% or less of the standard.

6.3. Substantial adverse impacts may now occur under more conditions, as shown in Table 16, relative to the one substantial impact category in the 2011 TII Air Quality Guidelines.

Table 16: TII 2022 PE-ENV-01107 Significance Criteria (reproduced from Table 3.21 Impact Descriptors)

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Limit Value (AQLV)			
	1	2-5	6-10	>10
75% or less of AQLV	Neutral	Neutral	Slight	Moderate
76 – 94% of AQLV	Neutral	Slight	Moderate	Moderate
95 – 102% of AQLV	Slight	Moderate	Moderate	Substantial
103 – 109% of AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQLV	Moderate	Substantial	Substantial	Substantial

7. Future Air Quality Background

7.1. Background NO_2, PM_{10} and $PM_{2.5}$ values included in modelling remain as per the MetroLink EIAR:

- Annual Mean NO_2 – 19.7 µg/m^3
- Annual Mean PM_{10} - 14 µg/m^3
- Annual Mean $PM_{2.5}$ – 10 µg/m^3

7.2. The reported values were assumed to apply to the modelling of the construction (2028) and operational phases (2035), with no to changes to future background air quality assumed. With the introduction of the new Clean Air Strategy and movement towards WHO limit values there is the potential for improvements in background air quality. However, the timelines and extent to which improvements may occur is unknown. The $PM_{2.5}$ annual mean concentration used in the modelling is equal to the IT4 target for $PM_{2.5}$, and the NO_2 annual mean background used in the modelling is just 0.3 µg/m^3 below the WHO IT4 target value. Therefore, exceedances are likely to occur due to the conservative background air quality values utilised.

8. Construction Phase Traffic Scenarios

8.1. For the Construction Phase, two traffic impact scenarios have been modelled representing the worst-case traffic impacts, as advised by the proposed Project traffic consultants. Traffic impacts occur due to construction vehicles going to and from sites as well as the redistribution of private road traffic. Traffic impacts will vary across the project and the modelled scenarios are based on a worst-case month with these emissions modelled as if the traffic continued in this state for an entire year. The resultant impacts are not representative of impacts over the entire construction period and are considered the worst-case conditions. The two construction scenarios are:

- Peak southern construction traffic impact which is predicted to occur in 2028; and
- Peak northern construction traffic impact which is predicted to occur in 2028.

8.2. The geographical extent of the scenarios is shown in Figure 16.4 of the EIAR for the southern peak and Figure 16.5 of the EIAR for the northern peak.

8.3. There have been no changes to the modelling from the EIAR for this Technical Note sensitivity test. The sections below compare the impact rating for two scenarios for each model run:

- The current EU limit values and 2011 TII Guidance
- The updated significance criteria in the 2022 TII Guidance using IT3 WHO target values.

9. Sensitivity Assessment for Construction Phase Northern Peak to WHO Limit Value

9.1. Table 17, Table 18 and Table 19 compare the current EU limit values and 2011 TII Guidance with the updated significance criteria in the 2022 TII Guidance and using IT3 WHO target values for NO_2, PM_{10} and $PM_{2.5}$ for the Northern Peak Construction Phase scenario.

9.2. For NO_2 there is an increase in the number of receptors which exceed the limit value in the Do-Something Scenario (see Table 17). This is as a result of the limit value reducing from 40 µg/m^3 to 30 µg/m^3. Due to additional receptors exceeding or being close to the limit value, there is a greater number of both adverse and beneficial effects. There is an increase of 9 slight averse and 9 slight beneficial, 21 moderate adverse and 1 substantial adverse. There is also an increase of 3 moderate and 3 substantial benefits.

9.3. For PM_{10} there are no changes. For $PM_{2.5}$ there is one new slight adverse effect due to the change in significance criteria and target value. See Table 18 and Table 19 for results.

Table 17: NO_2 Northern Peak Construction Comparison

Impact	EIAR (40 µg/m^3 and above)	WHO IT3 (30 µg/m^3 and above)	Change
Number of receptors predicted to experience operational NO_2 concentrations in excess of the air quality objective value	1	82	81
Number of receptors predicted to experience a negligible effect	778	732	-46
Number of receptors predicted to experience a slight adverse effect	2	11	9
Number of receptors predicted to experience a moderate adverse effect	0	21	21
Number of receptors predicted to experience a substantial adverse effect	0	1	1
Number of receptors predicted to experience a slight beneficial effect	2	11	9
Number of receptors predicted to experience a moderate beneficial effect	0	3	3
Number of receptors predicted to experience a substantial beneficial effect	0	3	3

Table 18: PM_{10} Northern Peak Construction Comparison

Impact	EIAR (40 µg/m³ and above)	WHO IT3 (30 µg/m³ and above)	Change
Number of receptors predicted to experience operational PM_{10} concentrations in excess of the air quality objective value	0	0	0
Number of receptors predicted to experience a negligible effect	782	782	0
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

Table 19: $PM_{2.5}$ Northern Peak Construction Comparison

Impact	EIAR (25 µg/m^3 and above)	WHO IT3 (15 µg/m^3 and above)	Change
Number of receptors predicted to experience operational $PM_{2.5}$ concentrations in excess of the air quality objective value	0	0	0
Number of receptors predicted to experience a negligible effect	782	781	-1
Number of receptors predicted to experience a slight adverse effect	0	1	1
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

10. Sensitivity Assessment for Construction Phase Southern Peak to WHO Limit Value

10.1. Table 20, Table 21 and Table 22 compares the current EU limit values and 2011 TII Guidance with the updated significance criteria in the 2022 TII Guidance using IT3 WHO target values for NO_2, PM_{10} and $PM_{2.5}$ for the Southern Peak Construction Phase Scenario.

10.2. For NO_2 there is an increase in the number of receptors which exceed the limit value in the Do-Something Scenario (see Table 20). This is due to the limit value reducing from 40 µg/m^3 to 30 µg/m^3. Due to additional receptors exceeding or being close to the limit value, there is a greater number of both adverse and beneficial effects. There is an increase of 10 slight adverse, 26 moderate adverse and 1 substantial adverse impact. There is also an increase of 20 slight adverse, 10 moderate and 1 substantial benefits.

10.3. There are no changes to PM_{10} or $PM_{2.5}$ impacts, see Table 21 and Table 22.

10.4. Overall there is a beneficial impact on the number of slight impacts, adverse impact on the number of moderate effects. There are no changes to the number of substantial impacts.

Table 20: NO_2 Southern Peak Construction Comparison

Impact	EIAR (40 µg/m^3 and above)	WHO IT3 (30 µg/m^3 and above)	Change
Number of receptors predicted to experience operational NO_2 concentrations in excess of the air quality objective value	5	112	107
Number of receptors predicted to experience a negligible effect	953	885	-68
Number of receptors predicted to experience a slight adverse effect	1	11	10
Number of receptors predicted to experience a moderate adverse effect	0	26	26
Number of receptors predicted to experience a substantial adverse effect	0	1	1
Number of receptors predicted to experience a slight beneficial effect	0	20	20
Number of receptors predicted to experience a moderate beneficial effect	0	10	10
Number of receptors predicted to experience a substantial beneficial effect	0	1	1

Table 21: PM_{10} Southern Peak Construction Comparison

Impact	EIAR (25 µg/m^3 and above)	WHO IT3 (15 µg/m^3 and above)	Change
Number of receptors predicted to experience operational $PM_{2.5}$ concentrations in excess of the air quality objective value	0	0	0
Number of receptors predicted to experience a negligible effect	954	954	0
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

Table 22 $PM_{2.5}$ Southern Peak Construction Comparison

Impact	EIAR (40 µg/m³ and above)	WHO IT3 (30 µg/m³ and above)	Change
Number of receptors predicted to experience operational PM_{10} concentrations in excess of the air quality objective value	0	0	0
Number of receptors predicted to experience a negligible effect	954	954	0
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

11. Operational Phase Scenarios

11.1. Whilst modelling scenarios are informed by traffic scenarios/modelling, are the likely significant air quality effects of MetroLink, on, identified and presented in the Air Quality EIAR chapter, these are:

- Scenario A: The Do Committed Minimum scenario includes additional transport schemes that are under construction or committed to be implemented post the base-year of the ERM base (2016). 'Committed' refers to schemes that have planning permission and also have a funding commitment.
- Scenario B: The Likely Future scenario presents an enhanced transport network scenario which has been developed to understand how usage of the proposed Project may change if other planned infrastructure schemes are delivered during the appraisal period. A scheme bundle approach has been developed to examine the impacts of the enhanced network, with one bundle representing the schemes within the National Development Plan (2018-2027) and the other bundle representing the full build out of the infrastructure and initiatives contained within the NTA's Transport Strategy for the Greater Dublin Area (2016-2035).

11.2. There have been no changes to the modelling from the EIAR for this Technical Note sensitivity test, including conservative modelling assumptions and background values. The sections below compare the impact rating for two scenarios for each model run:

- The current EU limit values and 2011 TII Guidance
- The updated significance criteria in the 2022 TII Guidance using IT4 WHO target values.

12. Sensitivity Assessment for Operational Phase Scenario A to WHO Limit Value

12.1. Table 23, Table 24 and Table 25 compare the current EU limit values and 2011 TII Guidance with the updated significance criteria in the 2022 TII Guidance using IT3 WHO target values for NO_2, PM_{10} and $PM_{2.5}$ for the opening year (2035) Operational Phase in Scenario A.

12.2. For NO_2 there is an increase in the number of receptors which exceed the limit value in the Do-Something Scenario (see Table 23). This is as a result of the limit value reducing from 40 µg/m^3 to 20 µg/m^3. Due to additional receptors exceeding or being close to the limit value, there is a greater number of both adverse and beneficial effects. There is a decrease of 1 slight adverse, an increase of 30 moderate adverse and 1 substantial adverse impact. There is also an increase of 36 moderate and 9 substantial benefits, and no change to slight beneficial impacts.

12.3. For PM_{10} is an increase of one moderate adverse impact. For $PM_{2.5}$ there is an increase of 3 moderate adverse and 2 moderate beneficial impacts due to the change in significance criteria and target value. See Table 24 and Table 25 for results. There are no other changes to the effects on PM_{10} or $PM_{2.5}$.

12.4. Overall there is a beneficial impact on the number of slight, moderate and substantial impacts.

Table 23: NO_2 Operational Phase Scenario A

Impact	EIAR (40 µg/m^3 and above)	WHO IT4 (20 µg/m^3 and above)	Change
Number of receptors predicted to experience operational NO_2 concentrations in excess of the air quality objective value	1	216	215
Number of receptors predicted to experience a negligible effect	218	143	-75
Number of receptors predicted to experience a slight adverse effect	1	0	-1
Number of receptors predicted to experience a moderate adverse effect	0	30	30
Number of receptors predicted to experience a substantial adverse effect	0	1	1
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	36	36
Number of receptors predicted to experience a substantial beneficial effect	0	9	9

Table 24 PM_{10} Operational Phase Scenario A

Impact	EIAR (40 µg/m^3 and above)	WHO IT4 (20 µg/m^3 and above)	Change
Number of receptors predicted to experience operational PM_{10} concentrations in excess of the air quality objective value	0	0	0
Number of receptors predicted to experience a negligible effect	782	782	0
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

Table 25 $PM_{2.5}$ Operational Phase Scenario A

Impact	EIAR (25 µg/m^3 and above)	WHO IT4 (10 µg/m^3 and above)	Change
Number of receptors predicted to experience operational $PM_{2.5}$ concentrations in excess of the air quality objective value	0	219	219
Number of receptors predicted to experience a negligible effect	219	214	-5
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	3	3
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	2	2
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

13. Sensitivity Assessment for Operational Phase Scenario B to WHO Limit Value

13.1. Table 26, Table 27 and Table 28 compares the current EU limit values and 2011 TII Guidance with the updated significance criteria in the 2022 TII Guidance using IT3 WHO target values for NO_2, PM_{10} and $PM_{2.5}$ for the opening year (2035) Operational Phase in Scenario B.

13.2. For NO_2 there is an increase in the number of receptors which exceed the limit value in the Do-Something Scenario (see Table 26). This is as a result of the limit value reducing from 40 µg/m^3 to 20 µg/m^3. Due to this, additional receptors exceeding or being close to the limit value, there is a greater number of both adverse and beneficial effects. There is an increase of 1 slight averse, 16 moderate adverse and no change to significant adverse impacts. There is an increase of 21 moderate and 5 substantial beneficial impacts, and no change to slight beneficial impacts.

13.3. There are no changes to PM_{10} impacts. For $PM_{2.5}$ there is an increase of 1 slight adverse impact due to the change in significance criteria and target value. There are no other changes to the effects on PM_{10} or $PM_{2.5}$. See Table 27 and Table 28 for results.

13.4. Overall there is a beneficial impact on the number of moderate and substantial impacts, adverse impact on the number of slight effects.

Table 26 NO_2 Operational Phase Scenario B

Impact	EIAR (40 µg/m^3 and above)	WHO IT4 (20 µg/m^3 and above)	Change
Number of receptors predicted to experience operational NO_2 concentrations in excess of the air quality objective value	1	181	180
Number of receptors predicted to experience a negligible effect	181	138	-43
Number of receptors predicted to experience a slight adverse effect	0	1	1
Number of receptors predicted to experience a moderate adverse effect	0	16	16
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	21	21
Number of receptors predicted to experience a substantial beneficial effect	0	5	5

Table 27 PM_{10} Operational Phase Scenario B

Impact	EIAR (40 µg/m^3 and above)	WHO IT4 (20 µg/m^3 and above)	Change
Number of receptors predicted to experience operational PM_{10} concentrations in excess of the air quality objective value	1	1	0
Number of receptors predicted to experience a negligible effect	181	181	0
Number of receptors predicted to experience a slight adverse effect	0	0	0
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

Table 28 $PM_{2.5}$ Operational Phase Scenario B

Impact	EIAR (25 µg/m^3 and above)	WHO IT4 (10 µg/m^3 and above)	Change
Number of receptors predicted to experience operational $PM_{2.5}$ concentrations in excess of the air quality objective value	0	181	181
Number of receptors predicted to experience a negligible effect	181	180	-1
Number of receptors predicted to experience a slight adverse effect	0	1	1
Number of receptors predicted to experience a moderate adverse effect	0	0	0
Number of receptors predicted to experience a substantial adverse effect	0	0	0
Number of receptors predicted to experience a slight beneficial effect	0	0	0
Number of receptors predicted to experience a moderate beneficial effect	0	0	0
Number of receptors predicted to experience a substantial beneficial effect	0	0	0

14. Conclusions to Sensitivity of Traffic Modelling to WHO Limit Values

14.1. In both the northern and southern peak construction phase (2028) scenarios there is an increase in the number of adverse (slight, moderate and substantial) impacts. However, due to the redistribution of traffic away from some areas there is also some increases in the beneficial impact on the number of moderate and significant impacts with some increases in the number of slight, moderate and substantial beneficial impacts. Therefore, the modelling outputs are worst-case. While the construction phase is predicted to last 9.25 years, the construction phase modelling took the worst-case month and conservatively model this month for a full year. Therefore, the effects set out here are likely to be temporary (effects lasting less than a year) rather than medium term (effects lasting seven to fifteen years) in accordance with the 2022 EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports.

14.2. Overall, while there are some additional slight and moderate adverse impacts in both operational phase opening year (2035) scenarios, there are also additional moderate and substantial beneficial impacts due to traffic redistribution. Effects are considered to be long-term and localised.

14.3. These changes are due to the new 2022 TII significance criteria and use of WHO interim targets as limit values. However, the background air quality is kept consistent with the EIAR for all modelled years. In addition to the new Air Quality Standard Regulations, in April 2023, the Government of Ireland published the Clean Air Strategy for Ireland, which provides a high-level strategic policy framework needed to reduce air pollution. They should result in a reduced background for future year assessments and therefore reduced significance; however the extent of the reduction is currently unknown and therefore worst-case assumptions (no improvement in background air quality) have been made.

15. Construction Phase Dust Assessment Guidance Updates

15.1. In January 2024 the Institute of Air Quality Management (IAQM) published updated Guidance on the assessment of dust from demolition and construction (IAQM 2024). This updated the previous IAQM guidance document, first published in 2014 with minor updates in 2016. While there are changes within the 2024 guidance document the outcome of the assessment and mitigation to be applied for low, medium and high-risk sites remains as per the previous guidance contained within Chapter 16 (Air Quality) of the EIAR.

15.2. The guidance changes include a reduction in the distance at which you can scope out the potential for impacts if there are no receptors from 350m to 250m. In addition, the potential dust emission magnitudes have changed for the impact assessment criteria. A summary of the new and old magnitudes is provided in Section 16 below.

16. Magnitude Changes between 2024 V2.2 and previous IAQM Dust Guidance

16.1. The following section sets out the changes between the previous iteration of the IAQM Dust Guidance and the updated 2024 publication of V2.2 of the Guidance.

16.2. In December 2022 Transport Infrastructure Ireland (TII) published new guidance documents and standards for the EIAR with respect to Air Quality; PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII 2022a) and PE-ENV-01107: Air Quality Assessment Standard for Proposed National Roads (TII 2022b). These documents refer to the use of an IAQM dust assessment as per the 2014/2015 guidance document as the appropriate methodology.

16.3. Potential Dust Emission Magnitudes from Demolition:

16.3.1. In the 2024 guidance, the demolition criteria increase the range of what a medium magnitude, allowing for a greater volume to be demolished prior it being a large magnitude. It also reduces the height above ground level that demolition actives are considered large in magnitude.

2024 Guidance Magnitudes for Demolition

- Large: Total building volume >75,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level;
- Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material, demolition activities 6-12 m above ground level; and
- Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months.

2014/2016 Guidance Magnitudes for Demolition

- Large: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- Medium: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- Small: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.

16.4. Potential Dust Emission Magnitudes from Earthworks

19.4.1. In the 2024 guidance a small magnitude is now more conservative, therefore a smaller site area will move you into medium but medium has a significantly larger scale.

2024 Guidance Magnitudes for Earthworks

- Large: Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height;
- Medium: Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height; and
- Small: Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.

2014/2016 Guidance Magnitudes for Earthworks

- Large: Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes;
- Medium: Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes; and
- Small: Total site area <2 ,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at a one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.

16.5. Potential Dust Emission Magnitudes from Construction

19.4.2. In the 2024 guidance a small is now more conservative, this means that a smaller site area will move you into medium magnitude. In addition, a smaller volume building will make you fall into a large magnitude that in the previous iteration of the guidance.

2024 Guidance Magnitudes from Construction

- Large: Total building volume >75,000 m^3, on site concrete batching, sandblasting;
- Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

2014/2016 Guidance Magnitudes from Construction

- Large: Total building volume >100, 000 m^3, on site concrete batching, sandblasting;
- Medium: Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

16.6. Potential Dust Emission Magnitudes from Trackout

19.4.3. In the 2024 guidance, a small magnitude is now less conservative (20 rather than 10), however the number of outward movements in one day for a large magnitude stays the same.

2024 Guidance Magnitudes from Trackout

- Large: >50 HDV (>3.5t) outward movements in any one day,10 potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
- Medium: 20-50 HDV (>3.5t) outward movements in any one day,10 moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
- Small: <20 HDV (>3.5t) outward movements9 in any one day,10 surface material with low potential for dust release, unpaved road length <50 m.

2014/2016 Guidance Magnitudes from Trackout

- Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;
- Medium: 10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and
- Small: <10 HDV (>3.5t) outward movements in any one

17. Changes to Recommendations for Dust Mitigation

17.1. The 2024 IAQM dust guidance (IAQM 2024) does not list any changes to recommended mitigation in the "*Record of Substantive Amendments*" set out in the end of the IAQM Guidance document. A review of the mitigation measures published confirms this.

17.2. While an assessment of the potential sensitivity, magnitude and potential risk due to construction dust was carried out within the Section 16.5.2 Chapter 16 (Air Quality) and Appendix 16.2 of the EIAR, the same mitigation has been applied across all areas where construction or construction related activities (i.e. storage compounds) occur. Applying dust mitigation for high-risk sites ensures the residual risk due to construction dust will be medium-term, localised, and not significant. Measures are contained within Appendix 16.4 (Dust Mitigation) to Chapter 16 (Air Quality) of the EIAR and the Construction Environmental Management Plan (CEMP). It is recommended this approach is applied to the updated

guidance document and all sites will be considered high risk to dust impacts in order to ensure robust and conservative mitigation is put in place.

17.3. No changes to the mitigation measures for the MetroLink are recommended based on the updated Guidance on the assessment of dust from demolition and construction (IAQM 2024) compared to the previous iteration of the guidance document.

18. Summary of Dust Guidance Updates

18.1. While there are changes within the updated 2024 publication of the IAQM Guidance document on the assignment of the potential magnitude of dust risk, the residual risk of the construction dust assessment and mitigation which is recommend by the IAQM to be applied for low, medium and high-risk sites remains as per the previous guidance contained within Chapter 16 (Air Quality) of the EIAR.

18.2. This is due to no changes in the mitigation recommended by the IAQM in the updated guidance. Within the EIAR it was stated (Chapter 16 (Air Quality) Section 16.6.1 and Appendix 14.4 (Dust Mitigation) to Chapter 16 (Air Quality) of the EIAR) that strict dust prevention will always be in place, to minimise any potential emissions and these procedures will be strictly monitored and assessed. Dust mitigation for high-risk sites will be applied across all construction activities in order to ensure the residual risk was short-term, localised, reversible and not significant.