Pledge to Net Zero

Research Piece

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Formerly JB Barry & Partners who became part of Egis in 2023.

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1 INTRODUCTION

Greenhouse gases (GHGs) which include carbon dioxide, methane, nitrous oxides, and fluorinated gases, are primarily emitted through human activities such as burning fossil fuels for electricity, heating, and transportation. These emissions have been the main drivers of climate change observed since the mid-20th century (EEA, 2022). The world is currently warming at an unprecedented rate, posing significant risks to humans and all life forms on Earth (UN, 2023a). To avoid the worst impacts of climate change, it is widely acknowledged that urgent action is needed to reduce emissions. In 2023 the transport sector was responsible for 21.4% of Ireland's GHG emissions.

In 2015, the Paris Agreement committed to substantially reducing global greenhouse gas (GHG) emissions to limit global warming to well below 2°C and to pursue efforts to limit it to 1.5°C (UN, 2022). To meet our 2030 targets and achieve net zero emissions by 2050, global carbon dioxide (CO2) emissions need to fall by about 45% compared to 2010 levels (UN, 2023b). The transition to a climate-neutral society by 2050 presents both an urgent challenge and an opportunity to build a better future for all.

According to preliminary estimates by the EU, transport emissions increased by 7.7% in 2021 due to the economic rebound and the lifting of Covid-19 restrictions. Despite trends towards more efficient vehicles such as battery electric (BEVs) and plug-in hybrid electric (PHEVs) vehicles and the adoption of climate mitigation policies, the growing demand has continued to drive up GHG emissions (O'Riordan, et al., 2022). In many European towns and cities, private cars are the single greatest polluters of CO_2 emissions. Passenger cars and vans are responsible for approximately 12% and 2.5% respectively of total EU emissions of carbon dioxide (EC, 2023).

According to Ireland's Climate Action Plan 2024 (CAP24), transport sector emissions for the period 2021-2022 were recorded at 22.6 Mt CO2eq. In 2022, there was a 6% increase in emissions compared to 2021, attributed to economic recovery and a surge in transport demand following the lifting of public health restrictions, returning transport activity to typical levels. During 2021-2022, 41.9% of the first sectoral carbon budget was expended. Although this usage could align with the sector being compliant with its carbon budget through 2025, a consistent annual decrease in emissions from 2023 to 2025 is essential to achieve this compliance.

The key performance indicators from CAP24 outline the required changes to meet a 50% compliant pathway. The key targets include a 20% reduction in total vehicle kilometres travelled relative to business-as-usual, a 50% reduction in fuel usage, and significant increases in sustainable transport trips and modal share (Government of Ireland, 2024). The transport sector remains one of the largest contributors to climate change in Ireland, with greenhouse gas emissions continuing to grow. Modal shifts from car journeys to active travel (e.g., cycling and walking) in urban areas hold substantial potential for reducing greenhouse gas emissions, with additional benefits for air quality and public health.

The increase in emissions in 2023 was somewhat limited resulting from a significant increase in public transport use (up 24% on 2022 levels (CCAC, 2024)).

1.1 Importance of Active Travel

Active travel, which includes walking and cycling, plays a crucial role in lowering Ireland's carbon emissions. By encouraging more people to switch to these sustainable modes of transportation, we can significantly reduce reliance on fossil fuel-powered vehicles, thereby cutting down on GHG emissions. Active travel not only lowers the carbon footprint associated with daily commutes but also contributes to less traffic congestion and reduced air pollution, creating healthier urban environments. Furthermore, investing in infrastructure that supports active travel, such as safe pedestrian pathways and dedicated cycling lanes, promotes a shift towards more sustainable lifestyles. This shift is essential for Ireland to meet its climate targets, improve public health, and build resilient, low-carbon communities (SDCC, 2024).

Shorter car journeys have the most potential for replacement by active travel, particularly in urban areas, many of these short journeys involved travel to school and for shopping and errands.

There is considerable potential to reduce short car journeys, especially when other sustainable transport options are accessible and practical. Substantial investment in active travel infrastructure persisted across Ireland in 2024, with €290 million allocated to local authorities in both 2023 and 2024. Evidence shows that enhancing infrastructure can promote active travel, particularly when it is well-connected, safe, and conveniently located near residential areas (CCAC, 2024).

With the right policies, funding and public buy in, car dependent systems can be redesigned so that the most environmentally friendly modes, such as walking, cycling, micro-mobility and shared modes (including public transport) would be the most attractive and therefore the most used. Prioritising policies with a high transformative potential to redesign the how we travel, such as road space reallocation, can trigger large-scale behavioural change to achieve what was previously considered unattainable (OECD, 2022)

According to the National Transport Authority (NTA) the economic benefit of cycling, walking and wheeling in Ireland is +€3bn every year, saving approximately 160,000 tonnes of GHG emissions and preventing a total of 5,844 serious long-term health conditions in Irish people every year (NTA, 2024a). The 2023 Walking and Cycling Index, which assesses walking, wheeling and cycling in urban areas in both the UK and Ireland, records that 25% of residents in the Dublin Metropolitan Area cycle at least once a week (NTA, 2024b). The urgency to transition to active travel has never been greater as the world grapples with the escalating climate crisis. By shifting to active travel modes, we can significantly reduce emissions while also reaping health, economic, and social benefits. Active travel is a practical and sustainable solution that aligns with global commitments to cut carbon emissions and achieve climate targets. Investments in safe, well-connected infrastructure can accelerate this transition, making it more accessible and appealing for communities to adopt environmentally friendly transport habits.

2 PLEDGE TO NET ZERO

The 'Pledge to Net Zero' (PTNZ), initiated in 2019, represents the global environmental industry's commitment to addressing greenhouse gas emissions within their organizations. This pledge underscores the necessity for environmental sector leaders to actively mitigate the severe impacts of climate change. Egis Engineering Ireland (formally JB Barry & Partners) (EEI) joined PTNZ in 2021, affirming its dedication to reducing greenhouse gas emissions in accordance with 'Science Based Targets' for the 1.5°C climate change scenario and demonstrating its leadership in striving to meet Ireland's emissions reduction goals.

EEI acknowledges the critical role decarbonization plays in safeguarding our environment from the detrimental effects of climate change. The engineering sector is pivotal in working towards lowering GHG emissions by creating innovative and sustainable solutions that minimize industrial environmental impacts. Therefore, low carbon solutions and eco-design are central to our design philosophy.

With 21.5% of Ireland's GHG emissions in 2023 originating from transportation (up from 17.1% in 2022, see Figure 2-1), it is imperative to rapidly change our design practices to achieve net zero targets. EEI contributes to this objective by designing Eco-friendly active travel for the transportation sector. This includes developing walking and cycle infrastructure, enhancing public transportation integration, and reducing carbon in the design through the use of sustainable and innovative building materials.

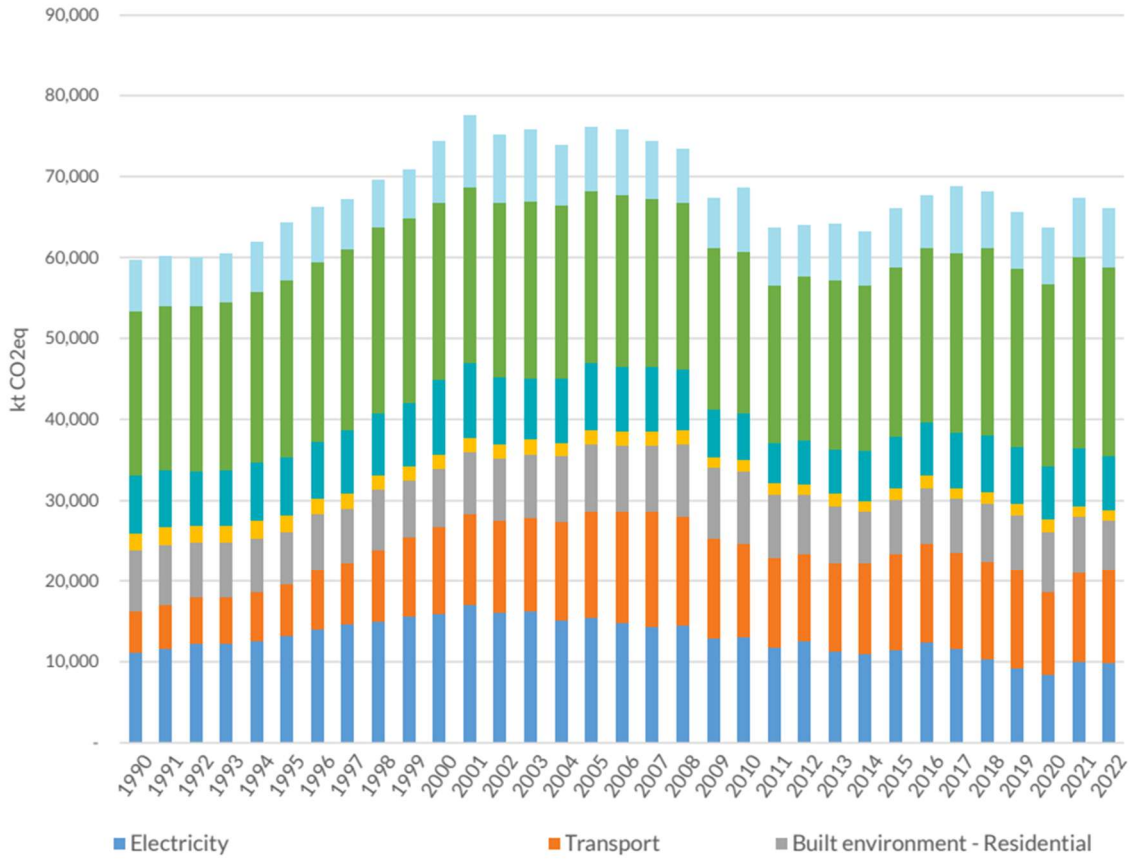

FIGURE 2-1 IRELAND'S GHG EMISSIONS INVENTORIES 1990-2022 (CAP24)

The majority of operational carbon emissions in the transportation sector are linked to energy consumption, specifically fuel and electricity used for vehicle propulsion, and infrastructure maintenance. Operational carbon is typically the largest contributor to total emissions. There is a clear connection between design choices and operational carbon performance, limiting private vehicles and integrating active forms of travel will result in significantly lower CO2 emissions. Achieving optimal performance necessitates a holistic consideration of all design aspects, including route planning, active travel integration, and community engagement.

The following section of this report demonstrates EEIs commitment to reducing GHG emissions by providing innovative and sustainable design solutions in a community active travel project in Dublin which will facilitate sustainable and equitable mobility options and urban realm improvements through the provision of:

- Pedestrian Pathway Enhancements;
- Bicycle Infrastructure Development; and
- Public Transportation Improvements.

3 ACTIVE TRAVEL PROJECT – LIVING STREETS: DÚN LAOGHAIRE

Living Streets Dún Laoghaire is a mobility and public realm enhancement project designed to improve the attractiveness, liveability, connectivity, and economic vitality of Dún Laoghaire Town in Dublin. Building on the temporary measures introduced during the summer of 2021, the scheme aims to permanently upgrade the urban environment in Dún Laoghaire.

Dún Laoghaire is a vibrant town and consists of a variety of residential and commercial areas, with different land uses, including educational, retail, business, local amenities, health, community and social services, and recreational facilities.

FIGURE 3-1 LIVING STREETS SCHEME EXTENTS

The overall scheme aims to deliver the following objectives:

- To make walking, cycling, and public transport more convenient, safer, and enjoyable for all.
- Improve connections between bus, rail, and active travel facilities to make it easier for people of all ages and abilities to get around.
- Enhance the economic vibrancy of Dún Laoghaire as a mixed-use town and its attractiveness as a destination by facilitating the sustainable and efficient movement of people and goods, and by creating an environment that people want to spend time in.
- Improve the environment by reducing traffic and related noise and air pollution and increasing planting in public spaces.
- Promote equitable travel options and urban design that creates a safe and welcoming experience for all members of society, regardless of age, gender, ability, or income.

3.1 Pedestrian Infrastructure and Street Transformation

The Scheme includes an upgrade of 1.2 km of George's St. Footpaths on both sides of the road will be repaved with high-quality, durable granite paving. The road carriageway will be narrowed to a maximum width of 6m, allowing for wider footpaths, seating, and planting in the remaining space. Continuous footpaths across all side roads will emphasize pedestrian priority along this route. The scheme will feature high-quality surfaces free of clutter and trip hazards, eliminating any level differences between pedestrian areas. Permanent in-ground planting, including approximately 100 new trees and areas of low-level planting, will be incorporated into the works. Rain gardens will be introduced to catch and store rainwater during heavy rainfall, reducing the burden on water treatment facilities. Additionally, a new public lighting system will be installed.

The plan will pedestrianise 220m of George's St Lower. The street will remain open to traffic in the morning to allow for loading but will be fully closed to traffic outside of these hours. Two clear areas will be maintained

on either side of the street, while the central area will feature new seating, planting, and loading zones (Figure 3-2). Casual seating for local businesses will also be accommodated in this area. Additionally, sections of Convent Road and Sussex Street will be pedestrianised, with the creation of two small enclosed parklets in these areas. Continuous footpaths will be provided across all side roads and accesses, ensuring uninterrupted pedestrian priority.

These street improvements will make the town more accessible, welcoming, and vibrant, enhancing its appeal as a destination. They will boost the economic vitality of Dún Laoghaire as a major town centre by facilitating the sustainable and efficient movement of people and goods, and by creating an inviting environment where people want to spend time. This will encourage multi-purpose trips for shopping, business, and leisure. Additionally, the urban design will create a safe and welcoming experience for all members of society, regardless of age, gender, ability, or income. These street improvements will also encourage forms of active travel to and from the town centre, thus reducing GHG emissions. An increase in the number of people walking in the Dublin Metropolitan Area enhances air quality by reducing 630,000 kg of NOx and 25,000 kg of particulates. Additionally, walking and wheeling contribute to mitigating the climate crisis by saving 69,000 tonnes of greenhouse gas emissions each year (SDCC, 2024).

FIGURE 3-2 TYPICAL LAYOUT OF THE PEDESTRIANIZED SECTION OF GEORGE'S ST LOWER

3.2 Creation of a Low Traffic Pedestrian and Cyclist Priority Area

Modal filters are traffic management tools designed to restrict access for motor vehicles while allowing passage for pedestrians, cyclists, and sometimes public transport. Modal filters can be implemented through the use of barriers such as bollards, boom barriers and planters. By preventing through traffic, modal filters help create quieter, safer, and more pleasant streets. They encourage residents to opt for walking, cycling, or using public transport instead of driving, thereby reducing the number of vehicles on the road. This reduction in vehicular traffic directly contributes to lower carbon emissions, as fewer cars mean less exhaust pollution. The implementation of modal filters not only improves air quality but also promotes healthier, more sustainable modes of transport, fostering an environmentally friendly urban environment.

The placement of modal filters in this scheme (Figure 3-3) through the use of successfully removes all through traffic from the area between George's St Lower and Tivoli Road. No through routes would remain accessible, leading to a significant reduction in car traffic, and all through trips for HGVs would be eliminated as well. This quieter street network enhances the appeal for walking and cycling, encouraging a shift towards

more sustainable modes of transport. Additionally, the inclusion of a modal filter on Clarinda Park West supports the redevelopment of the park. The modal filters in this Scheme will be implemented through three new parklets, with permanent in ground planting and new seating areas. An example of these modal filter designs can be seen in Figure 3-4.

A mobility study was undertaken to assess the impacts of the traffic management changes, all destinations will still be reachable by car (except for those located within the pedestrianised zone), although some trips would take slightly longer, (2-4 mins) after the modal filters are in place. The modal filters will improve the environment by significantly reducing traffic and related noise and air pollution, including removal of all HGV through trips, and will create three new parklets with new planting and seating in public spaces. By significantly reducing traffic and all HGV trips and encouraging more people to walk and cycle the scheme will reduce GHG emissions in Dún Laoghaire town.

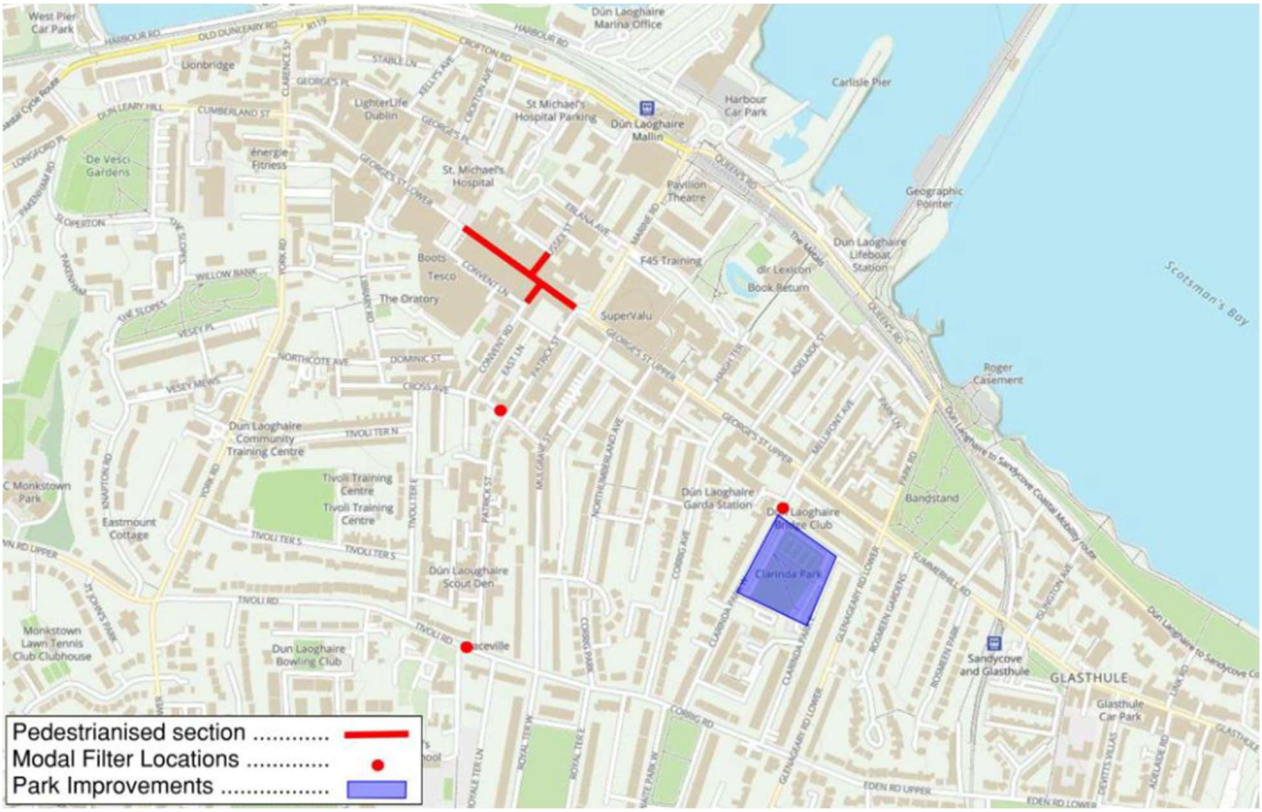

FIGURE 3-3 LOCATION OF MODAL FILTERS WITHIN THE SCHEME

FIGURE 3-4 EXAMPLE OF MODAL FILTER DESIGN WITHIN THE SCHEME

3.3 Urban Greening

The new urban revitalisation scheme for George's Street introduces a comprehensive approach to green infrastructure and public space enhancement. This ambitious project features new planting and Sustainable Urban Drainage Systems (SUDS) along the entire length of George's Street, promoting biodiversity and effective water management. Rain gardens will be strategically implemented along the main street to catch, store, and treat rainwater, contributing to sustainable urban drainage. These rain gardens will mitigate flooding risks and improve water quality by filtering pollutants, creating a more resilient urban environment. Additionally, the planting of native species and wildflowers will enhance the area's ecological value while providing an improved environment for recreation and leisure. The incorporation of diverse plant species will attract pollinators and other wildlife, fostering a thriving urban ecosystem.

Furthermore, two new pocket parks will be established, providing residents and visitors with accessible green spaces for relaxation and recreation. These pocket parks will serve as vital community hubs, offering areas for social interaction, play, and respite from urban life. The design of these parks will include seating areas, walking paths, and native plantings to create a welcoming and engaging atmosphere. By integrating these green spaces into the urban fabric, the project aims to improve the mental and physical well-being of the community. The pocket parks will also act as micro-habitats, supporting local wildlife and enhancing urban biodiversity.

A major improvement to Clarinda Park is also a cornerstone of this scheme, which includes the development of a dense urban woodland with proposed additional native tree planting. This transformation aims to create a lush, green oasis within the city, fostering a healthier environment and enhancing the overall aesthetic and ecological value of the area. The dense urban woodland will not only serve as a carbon sink but also provide shade, reduce urban heat island effects, and improve air quality, making the city a more sustainable and pleasant place to live. By creating more diverse habitats and promoting carbon sequestration, the project contributes to building a climate-resilient community. The urban woodland will offer a serene retreat for residents, encouraging outdoor activities and fostering a deeper connection with nature.

Overall, the revitalization scheme will transform George's Street and its surrounding areas into vibrant, green, and sustainable spaces that support both human and environmental health.

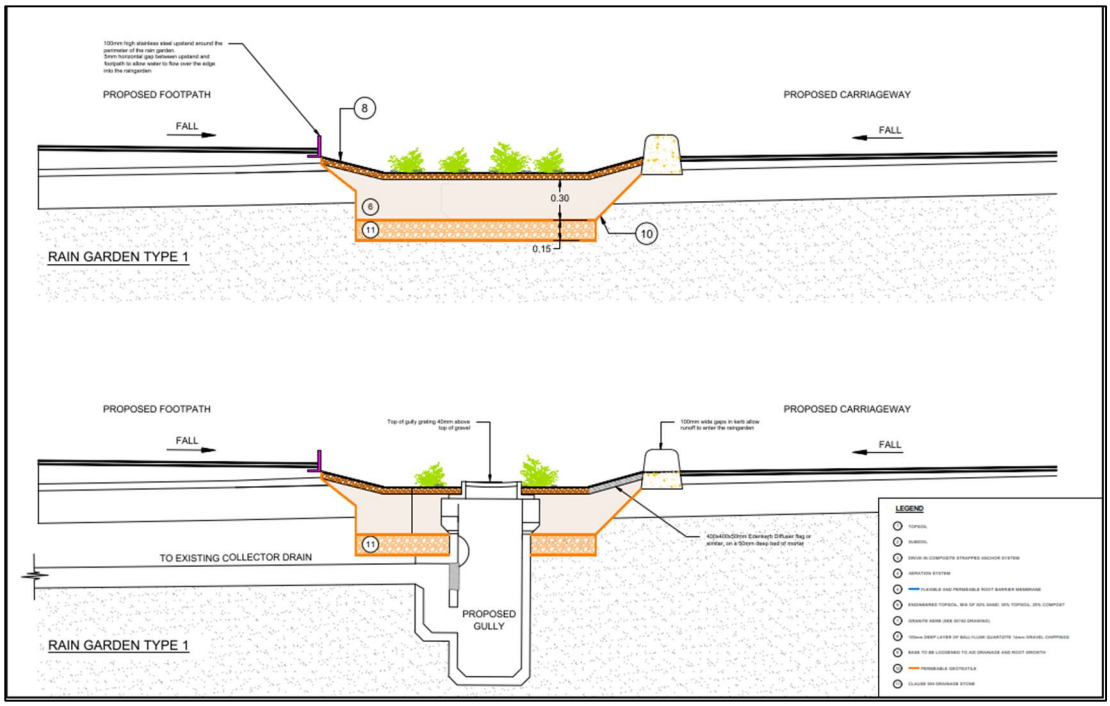

FIGURE 3-5 DESIGN OF TYPICAL RAIN GARDEN TO BE FOUND IN THE SCHEME

3.4 Emission Improvements

The effects of the scheme on emissions within the area were assessed using the NTA's Environment Module, which employs ENEVAL, a calculation tool that determines emissions based on traffic volume, speed, and vehicle type. The ENEVAL database contains profiles for 1249 different vehicle types. Modelled traffic flows are proportionally assigned to these various vehicle types according to a fleet profile. It is important to note that ENEVAL is not an air quality tool; rather, it provides data on the volumes of vehicle tailpipe emissions generated on a link-by-link basis.

The emissions maps indicate a significant improvement in emission levels within the Living Streets Neighbourhood, showing a 26% reduction in NOx compared to the Do Minimum scenario and Georges Street Lower, with a 37% reduction along the length of the street (Figure 3-6). The decreased emission levels within the neighbourhood contributes to a healthier environment for active mode users in the area.

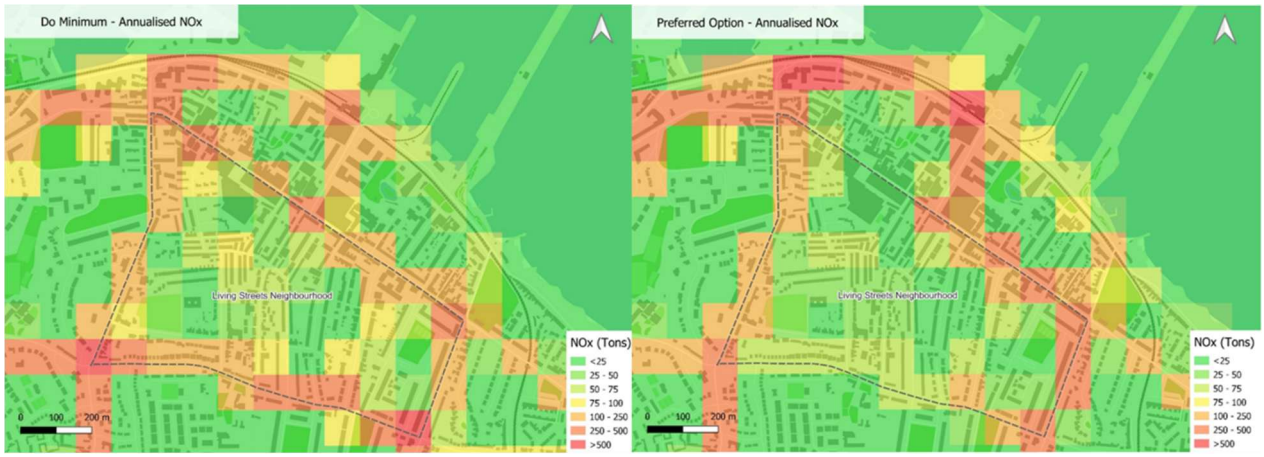

FIGURE 3-6 DO MINIMUN VS SCHEME NOX EMISSIONS

4 CONCLUSIONS

Pedestrianizing George's St Lower in Dún Laoghaire Town creates a safe, pleasant, accessible, and attractive environment for pedestrians, encouraging more foot traffic to the town. This initiative results in safer and quieter streets for pedestrians and cyclists on approach routes to the town and the two schools in the area, promoting a shift towards walking and cycling. The plan significantly enhances road safety, reduces noise pollution, and improves air quality by removing through traffic, including all HGV trips, from the area. Additionally, it proposes mitigation measures to allow the traffic network to operate more efficiently and reduce delays for bus passengers. The project enables substantial new tree planting and landscaping, increasing urban greening, biodiversity, and the town's overall attractiveness. Sustainable urban drainage measures are introduced, improving the quantity and quality of water discharged to the stormwater network.

The Scheme's improvements not only enhance the overall infrastructure but also actively promote various forms of active travel, such as walking and cycling, to and from the town centre. By encouraging residents and visitors to opt for these more sustainable modes of transportation, the initiative will significantly reduce greenhouse gas (GHG) emissions. This shift towards active travel will contribute to a healthier environment, decrease traffic congestion, and improve the overall quality of life in the community. Additionally, the improved streetscape will make the centre more accessible and attractive, fostering a vibrant and sustainable urban environment.

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