



1.0 Introduction	2
2.0 Energy and carbon	5
3.0 Biodiversity	14
4.0 Travel and transport	19
5.0 Water and effluents	23
6.0 Materials and waste	31
7.0 Training and education	37

Editor Frances O'Kelly

Contributors

Joe Kelly, Frances O'Kelly, John Daly, Claire Cable, Rico Raymundo, Bailey Thoresby, Aga Niedziela and Niamh Moore

1.0 Introduction

1.1 Executive summary

Roughan & O'Donovan (ROD) is pleased to present our second annual sustainability report, which outlines our progress towards meeting our corporate sustainability targets and actions, as set out in our sustainability plan. The report highlights our successes, our challenges and the areas in which we need to improve.

The findings of the 2023 Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report in relation to climate change are stark. February 2023 to January 2024 was the first 12-month period to exceed 1.5°C of warming as an average. According to the Copernicus Climate Change Service, the average global temperature was estimated to be 1.52°C higher than during the period 1850-1900.

In the 12 months to October 2024, our team has been working hard on all aspects of sustainability, further integrating it into how we operate as a business and in our approach to project design and delivery. To achieve our ambitious goals, we are focused on making real and lasting changes to how we work, providing sustainability training for our people and working closely with our clients to develop solutions that are environmentally, economically and socially sustainable.

Key milestones achieved

2008

Began implementing our Environmental Management System I.S. 14001:2004

2012

Launched our first annual Green Day

2017

Held our first annual Green Week

2020

Developed our Sustainability Policy

2021

Held our first annual Sustainability Month in place of our annual Green Week

2022

Developed our Sustainability Objective

2023

Published our first Sustainability Plan

Joined Pledge to Net Zero

Published our first annual Sustainability Report

2024

Developed our Carbon Reduction Plan

Developed an internal, whole life cycle carbon calculator for our bridges group

1.2 Sustainability plan overview

Our Sustainability Plan provides a blueprint for action and a monitoring framework that will be used to measure our progress towards achieving our sustainability goals.

Key sustainability goals

- Continue integrating sustainability across the company
- Develop a net-zero standard/science-based target (SBT) for the company to reach net-zero by 2050
- Promote training, development and/or research initiatives to support the delivery of design and environmental solutions that assist the transition to a climate resilient, biodiversity rich and climate neutral economy

Sustainability commitments

- Achieve net zero emissions and become a climate-neutral company by 2050
- Make financial and operational decisions to reduce our broader environmental impact
- Develop new ways of working including, for example, investing in new technologies and systems to help our clients and ourselves meet the required emissions reductions
- Continue to collaborate with staff, clients and industry



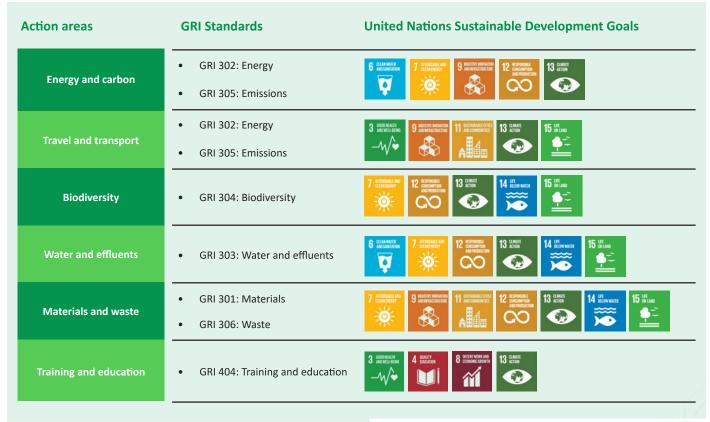
1.3 GRI standards

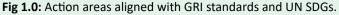
This report has been prepared with reference to the global reporting initiative (GRI) standards. GRI is an independent, not-for-profit organisation that leads a global, multistakeholder process to develop and refine rigorous yet practical sustainability reporting. The GRI standards cover a range of topics, including energy, emissions, water and effluents, biodiversity, and training and education.

Figure 1.0 below sets out our six areas for action together with the relevant GRI standards and United Nations Sustainable Development Goals (SDGs).

In the following sections, we provide a summary of our progress towards meeting our targets, within our six areas of action, over the past 12 months. The following symbols illustrate the status of each action:

	One-off action completed
\odot	Annual action completed
0	Progress made toward end goal
•	Action not started
NEW	New action identified in response to the changing environment





Energy and carbon

Goal

Relevant GRI Standards

Relevant UN SDGs

Deliver design and environmental solutions that support the transition to climate-resilient, biodiversity-rich and climate-neutral economies

GRI 302: Energy GRI 305: Emissions



2.1 Targets and actions

In 2023, ROD signed up to the Cambridge University Carbon Reduction Code for the Built Environment. It brings together and aligns sector-wide initiatives and facilitates cross-sectoral collaboration to reduce carbon emissions related to design, construction, maintenance, operation, and decommissioning of built assets.



In 2023, we became a signatory of Pledge to Net Zero, the environmental industry's global commitment, requiring science-based targets from its signatories to tackle greenhouse gas emissions

within their organisations. The Pledge To Net Zero initiative is a partner to the UN's Race to Zero campaign. As part of our pledge, we are developing a science-based target to meet the goals of the Paris Agreement and accelerate the transition to a net-zero carbon economy.

A summary of our progress towards achieving our sustainability goals in respect of energy and carbon emissions - together with our associated targets and actions - is outlined here.

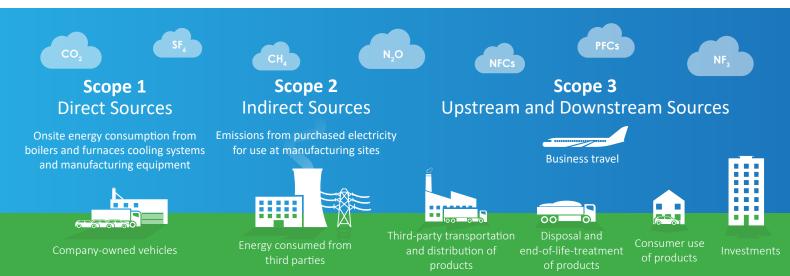
2.1.1 Target: Achieve net-zero emissions and become a climate-neutral company by 2050

Action: Develop a Carbon Reduction Plan (CRP)

Our CRP details our carbon footprint and affirms our commitment to achieving net zero by 2050. Developed with reference to the UK Cabinet Office PPN 06/21 and associated guidance, it serves as the baseline against which all future emissions will be measured.

• Action: Develop a science-based net-zero decarbonisation target (SBTi)

ROD is developing a science-based, net zero decarbonisation target to enable us to work towards our long-term goal of achieving net zero operational greenhouse gas (GHG) by 2050. It will support our commitment to delivering GHG reductions in line with a 1.5°C Paris Agreement climate change scenario and publicly reporting our progress against the target each year. Our target will be validated by the Science Based Targets Initiative (SBTi), a global body driving ambitious climate action in the private sector by enabling organisations to set robust and credible emission reduction targets.



2.1.2 Target: Promote the use of tools to understand and reduce operational carbon and embodied carbon on projects

Action: Use the following tools as part of the design and environmental assessment process:

Transport Infrastructure Ireland (TII) Carbon Tool

PAS 2080 Guidance

OneClickLCA Carbon Designer for Ireland

The Institution of Structural Engineers (IStructE) Structural Carbon Tool

Whole Life Cycle Analysis carbon calculator

The TII Carbon Tool

ROD has used the TII Carbon Tool on several projects in recent years and will continue to do so, where appropriate. In 2024, we used the tool at the options assessment stage of the N61 Tulsk to Gortnacrannagh Road Project, the Point Pedestrian and Cycle Bridge and Tom Clarke Bridge Widening Works Project, and the West Clare Railway Greenway. The tool was also used during the Environmental Impact Assessment Report (EIAR) and design stages of the DART+ West rail electrification project.

OneClickLCA Carbon Designer for Ireland

Carbon Designer for Ireland is a free, high-level carbon assessment tool that allows building designers to quickly assess and visualise the emissions linked to different types of construction techniques and materials choices at an early stage in a project. This is critical as the earlier carbon is measured and optimised, the more reductions can be achieved. The tool was developed by the Irish Green Building Council and OneClickLCA, with support from the Land Development Agency (LDA) and the Environmental Protection Agency (EPA). Carbon Designer for Ireland uses a large database of verified environmental product declarations (EPDs) and generates easy-to-understand graphics from the given inputs. Our buildings group has found it useful in helping us to effectively communicate the carbon cost and relative savings of different options to clients and stakeholders, which is vital when it comes to moving the needle on the adoption of more sustainable designs. As a result, its visualisations are being implemented as a core component of stage 1 reports.

IStructE Structural Carbon Tool

The IStructE Structural Carbon Tool is a free, spreadsheet-based carbon calculator that provides a relatively quick way to assess small parts of a project or a whole scheme. Several groups within ROD have used the tool to gain an initial understanding of carbon calculations or to complete calculations on parts of a project in isolation.

Implement the ROD-developed Whole Life Cycle Analysis Carbon Calculator

During 2024, ROD developed a Whole Life Cycle Analysis (WLCA) carbon calculator to address a gap in the market for a tool that met the requirements of bridge projects. The tool was developed with reference to the UK's PAS 2080 guidance and other best practice guidance in the industry. Designed for internal use only, it has resulted in improved and streamlined calculations for bridge projects. See Case Study (C) below for further information. Meanwhile, work has begun on developing a baseline carbon output for our bridge projects that will allow for target setting on future projects.



2.1.3 Target: Share knowledge and create systems change

Action: Develop an embodied carbon design checklist for projects

As the ROD embodied carbon calculation becomes embedded in our Stage 1 approach, we will use it to track embodied carbon in our projects and identify approaches that can deliver improvements. To validate any approaches proposed and quantify their carbon benefits, it will be applied to our current sustainable design opportunities register. This will allow a comparison to be made between it and more traditional construction design approaches.

The case studies presented in our 2023 and 2024 sustainability reports form the basis of an embodied carbon design checklist for projects. A dedicated task group, appointed to prepare a reference guide for designers working on projects, will expand the checklist for all sectors within the company over the coming 12 months. The checklist will serve as a knowledge register providing staff with access to information relating to all aspects of sustainable design on projects, past and present, and including insights gained through positive and negative project experiences.

Action: Hold knowledge-sharing workshops on how to reduce operational and embodied carbon on projects

Knowledge-sharing sessions on calculating embodied carbon on projects were held throughout 2024. These included:

a workshop on the specific workings of the TII carbon tool and the IStructE calculator

a presentation providing an overview of the carbon calculator options available in the marketplace

a presentation on the energy consumption across our offices

a presentation sharing tips on how to reduce carbon emissions both at work and in our personal lives

CPD sessions on the WLCA calculator for the bridges team

ROD will continue to hold knowledge-sharing workshops aimed at:

raising staff awareness of the strategies available to reduce embodied carbon on projects

encouraging carbon discussions in the early design stages to unlock greater opportunities for embodied carbon reductions

inspiring collaboration between team members to reduce embodied carbon on projects

training bridge team members on using the WLCA carbon calculator

sharing updates on the various carbon calculation solutions available in the marketplace



2.1.4 Target: Increase energy efficiency and renewable energy in projects and business activities

Action: Integrate energy efficiency into designs

A leading example of a project integrating energy efficiency into design is the Dublin Mountain Visitors Centre project. This multidisciplinary, recreational project comprises a visitor centre, road upgrades, environmental works, trail upgrades, a treetop walkway and conservation works to Massey's Estate and the Hellfire Club. While still at an early stage in the design process, our design team has committed to reusing, where possible, existing materials and employing sustainability practices and processes throughout. The visitor centre will be constructed as a Nearly Zero Energy Building (NZEB), with the use of timber structural members maximised. The earthworks associated with the project will remain local, so cut areas will be used as local fill to minimise transport of new and heavy material to and from site. The forest walkway will comprise timber elements, with steel connections used only where necessary, minimising the energy used in the production of these materials.

Action: Reduce the energy requirements of our offices to net zero by 2050

In 2023, we took a more robust approach to recording our GHG emissions than previously adopted and undertook an energy audit of our Sandyford office through the Sustainable Energy Authority of Ireland (SEAI) Support Scheme for Energy Audits (SSEA). We used the SEAI Energy Bill Tracker Tool to identify our greatest energy sources and potential opportunities for improvements across our offices. The audit's findings were captured in our Sustainability Report 2023. Chief among them was that our main use of energy is from servers and equipment (PCs, printers, AC and lights).

Over the past year, we have been applying the learnings we took from the audit to our three offices, tracking our energy usage through a close review of our electricity bills and working on opportunities to reduce our energy consumption. As our UK office in Otley is in a refurbished woollen mill with an energy performance certificate rating of D, we are considering undertaking an energy audit specifically for this office to measure our GHG emissions baseline and better understand how we can promote energy efficiency and reduce emissions. We are also seeking advice from the West Yorkshire Combined Authority on opportunities to reduce our carbon footprint in the office.

Our main challenge is that we do not own any of our three offices, and we have no control over how energy is delivered and operated within them. We continue to work with our landlords, however, to encourage and promote energy efficiency through a variety of means, including changing to renewable sources of energy and promoting sustainability generally across the management of our office buildings.

Action: Promote and support individual awareness and behavioural change

We continue to host regular knowledge-sharing sessions aimed at raising awareness of the steps individual staff members can take to help us reduce our energy consumption. Examples include turning off lights, air conditioners, printers, and PCs and monitors when leaving the office.

In August 2024, we conducted our annual audit of monitors left on overnight across our three offices. Designed to enable us to track progress and improvements in employee behaviour, it showed a reduction in the number of monitors being left on overnight across the offices when compared with the results of our 2023 and 2022 audits.

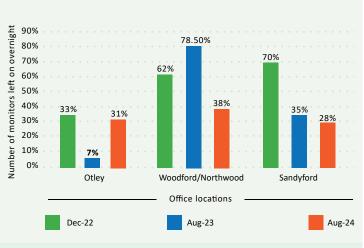


Fig: 2.0 Monitors left on standby overnight.

In September 2024, we conducted an audit of the PCs left on overnight across our offices. The results showed a positive trend in the Otley office, with no computers left on overnight. However, there is still some work to be done to encourage staff in our Dublin offices to switch off their PCs when they leave the office. To support change, we will continue sharing the results of our audits with our staff, tracking trends, and providing our people with energy saving tips.

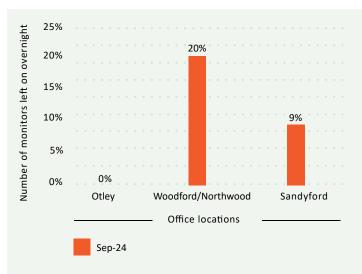


Fig: 2.1 PCs left on standby overnight.

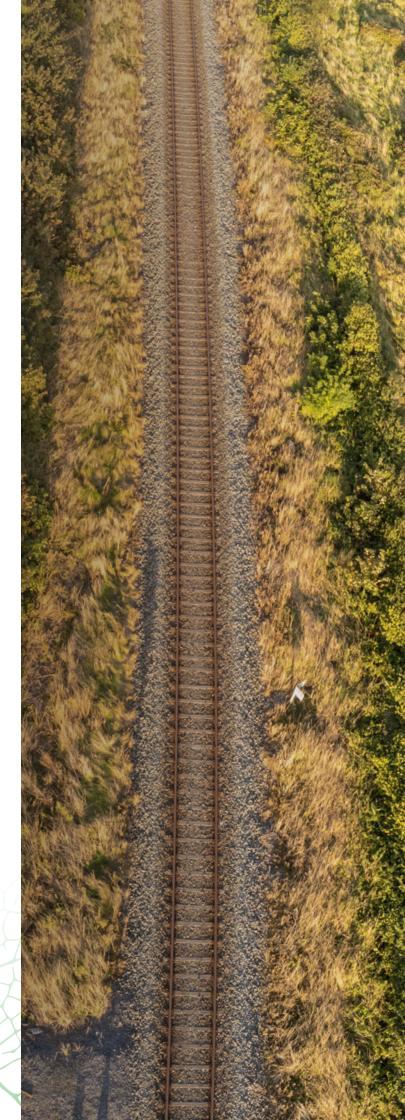
Action: Avoid, reduce and, if necessary, mitigate the environmental and climate impacts of projects

As part of our options assessment, design and environmental services, ROD seeks to avoid, reduce and, if necessary, mitigate the environmental and climate impacts of projects. We have worked on numerous projects that required carbon calculations, from options assessment to environmental impact assessment and at planning stage.

Our work on the DART+ West electrification project involved the preparation of an EIAR and included the assessment of climate impacts to support the railway order/planning process. Our climate specialists worked closely with the design team to review the design options and used the TII carbon tool to undertake the assessment. It included inputs from the design process, including the pre-construction (site preparation) stage, followed by an assessment of the embodied carbon associated with materials used in the construction of road interventions at level crossings and the electrification of the railway line. Emissions generated during the construction phase, such as those related to waste, were included in the assessment.

The TII carbon tool was used to assess ongoing maintenance associated with the default 60-year lifetime of the project and helped inform our mitigation strategies. The process prompted discussions with designers, resulting in changes to the design, construction and maintenance aspects of the scheme. For example, the design was revised to use less carbon-intense materials where it was structurally feasible to do so, which will result in reduced carbon emissions during the construction and operation stages of the project. Planning approval for the DART+ West project was granted in the summer of 2024.

DART+ West will help decarbonise the transport sector in the Greater Dublin Area (GDA), supporting the Irish government's Climate Action Plan and associated emission reduction targets for the transport sector. It will deliver a more comfortable, higher frequency service that is better-connected to the GDA transportation system, unlocking social and economic opportunities while supporting a healthier, climate-resilient environment.





2.2 Case Study (A) TII's maintenance depot, Ennis, Co Clare

As part of its efforts to achieve carbon neutrality, TII undertook to transform its maintenance depot in Ennis, Co Clare, into a carbon-neutral facility. ROD, with TII and the network maintenance contractor, Colas JV, developed and implemented several energy-efficient solutions to significantly reduce the depot's carbon footprint.

Solar PV installation: 338 PV panels were installed on the roofs of three salt barns, generating renewable electricity on site and reducing the depot's reliance on non-renewable energy sources.

Battery storage systems: Four 25kWh battery storage systems were integrated into the facility to store excess energy generated by the solar panels, ensuring a steady supply of clean energy during periods of low generation or peak demand.

Air-to-water heat pumps: The existing kerosene boilers were replaced with two 14kW air-to-water heat pumps, providing an efficient and sustainable heating solution.

Energy-efficient lighting: Luminaires were replaced with energy-efficient alternatives, resulting in an estimated 50% reduction in annual energy consumption for lighting.

Electric vehicles: The depot transitioned part of its fleet to electric vehicles and installed EV charging stations powered by renewable energy from solar panels.

The introduction of renewable energy sources and energyefficient technologies led to substantial reductions in energy consumption and carbon emissions for TII. Since implementing these solutions, the depot has eliminated its reliance on fossil fuels for heating and significantly reduced its electricity usage, bringing TII closer to reducing its net GHG emissions by at least 55% by 2030.



2.3 Case Study (B) Herring Bridge, Great Yarmouth, Norfolk, UK

ROD led the detailed design of Herring Bridge, Great Yarmouth, a nationally significant infrastructure project, on behalf of BAM Farrans, a joint venture between BAM UK & Ireland and Farrans Construction. Our design partners were H&H and Lanpro.

The scheme's main feature is a 50-metre clear span, twin-leaf, bascule bridge that links the A47 at Harfrey's roundabout to the port and the enterprise zone on the east side of the river. It carries two lanes of vehicular traffic in each direction and incorporates a footpath and a cycle way to provide pedestrians and cyclists with safe passage over the water.

The £121 million bridge project was officially opened on 1 February 2024. It has transformed travel across the town by connecting communities on either side of the harbour, easing traffic congestion, shortening journey times, and improving journey reliability. It has also enhanced the port's reputation as both an international gateway and a major UK offshore renewable energy, oil, and gas base, maximising opportunities for growth and investment in the area. Opportunities to reduce operational and embodied carbon were actively identified and implemented throughout the design process.

Careful optimisation of the layout of the forward leaf steelwork allowed for a significant reduction in steelwork tonnage, which directly reduced the capital carbon cost and indirectly reduced the operational carbon cost (moving a lighter structure requires less energy). This optimisation allowed for a complementary reduction in both the counterweight steelwork tonnage and the bascule chamber plan area and depth, further reducing the capital and operational carbon costs

The control/plant building is cantilevered from the bascule abutment, removing the requirement for building foundations and directly reducing the capital carbon costs through reduced material quantities

The integration of the bascule abutment permanent works foundations with most of the cofferdam temporary works reduced waste related to standalone temporary works. The reuse of existing piles in the foundations for the bascule bridge protection structure reduced the requirement for new concrete and brought down the capital carbon cost

The adoption of specific ground investigations and testing methods to better understand the ground conditions involved allowed for the development of a range of viable foundation solutions to suit the constraints local to the foundations. This optimisation resulted in material quantity savings, reducing the capital carbon cost of the project

Existing pavement foundations were reused, where feasible, further reducing the use of virgin materials and associated carbon emissions

The reuse of excavated soil from the scheme site and other local sites reduced the carbon emissions generated from the transport of heavy material



2.4 Case Study (C) WLCA carbon calculator for bridges

Embodied carbon and carbon calculation have been hot topics in the engineering world for several years. Mandatory reporting of carbon emissions is becoming increasingly common, while tenderers are frequently asked to confirm their sustainability and carbon calculation credentials as part of the tendering process for contracts.

While a multitude of carbon calculator tools exist across the industry, the calculation tools that facilitate the measurement and reduction of embodied carbon within the bridges sector are relatively immature. Consequently, our bridge team took the decision to develop the WLCA carbon calculator to provide robust and accurate calculations based on the data currently available, and incorporating the current guidance from IStructE, the Net Zero Bridges Group and PAS 2080 into its design.

Our WLCA calculator aims to cover the full range of lifecycle stages as identified in PAS 2080, which covers not just the cradle-to-grave process for construction materials but the 'beyond end of life,' encompassing reusability/recyclability, an important measure of circularity. Based on the IStructE spreadsheet calculator, this internal calculator will allow the development of a baseline SCORBS score, provides a measure of carbon emissions per area of usable space on a bridge for different types of bridge designs and will allow measurement of reductions in embodied carbon. See figure C.2. This is a vital point as the industry is lacking the baseline data with which to compare carbon efficient designs. Developing this baseline will allow ROD to move towards a quantitative evaluation of sustainability performance, and by sharing it with the wider industry, including the Net Zero Bridges group, we hope to foster further improvements in the measurement and reduction of embodied carbon in bridge design.

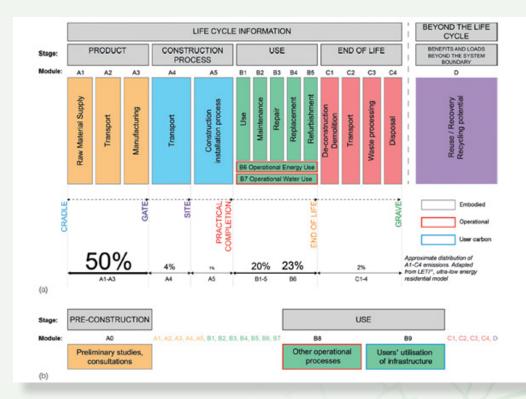


Fig: C.1 Lifecycle stages as defined by EN 15978 & PAS 2080 – "How to Calculate Embodied Carbon".



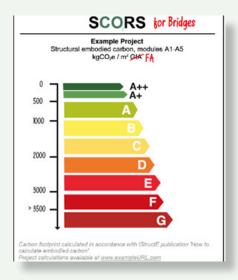


Fig: C.2 SCORBS rating – Archer-Jones, C. & Green, D. (2021) 'Carbon targets for bridges: a proposed SCORS-style rating scheme'. PAS 2080:2023 Carbon management in buildings and infrastructure



Fig: C.3 PAS 2080 – UK standard for managing infrastaructure carbon.

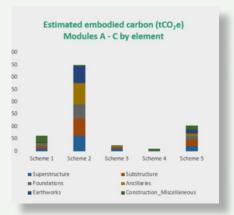


Fig:C.5 Visualisation from the ROD WLCA carbon calculator.



Fig:C.4 EPD Ireland – A program to help create and store verified Environmental Product Declarations in Ireland.



Deliver design and environmental solutions that support the transition to a biodiversity-rich environment

GRI 304: Biodiversity



3.1 Targets and actions

In 2023, ROD amended our Integrated Management System (IMS) procedures to make sustainability a core consideration in the delivery of our projects, from the inception phase, across the project review stages, through to project completion. This extends to consideration of the potential impact of our projects on biodiversity.

In 2024, the European Commission published the EU Nature Restoration Law, which proposes to restore at least 20% of the EU's land and sea areas by 2030 and repair all ecosystems in need of restoration by 2050, making it the first European-wide law to set legally binding targets. Land use change, including infrastructure and housing development projects of the type ROD is involved in across Ireland and the UK, is one of the main pressures on biodiversity, and we will need to consider the application of this law as it relates to our projects going forward.

Ireland's 4th National Biodiversity Action Plan (NBAP) was published in January 2024 and covers the period 2023-2030. It is the first NBAP to be backed by legislation (The Wildlife (Amendment) Act 2023) and imposes legal obligations on public bodies with regard to the objectives and targets in the plan. In February 2024, the UK introduced the mandatory requirement for Biodiversity Net Gain (BNG) for all Town and Country Planning Act developments. Exemptions apply for nonmajor developments from 2 April 2024. Implementation for nationally significant infrastructure projects (NSIPs) is planned for 2025. BNG is an approach to development and/or land management that aims to leave the natural environment in a measurably better state than it was beforehand. It requires a minimum 10% net gain in biodiversity units. A summary of our progress towards achieving our sustainability goals in respect of biodiversity - together with our associated targets and actions - is outlined below.

3.1.1 Target: Deliver solutions that support a biodiversity rich environment

Action: ROD will promote the implementation of no net loss (NNL) and/or biodiversity net gain (BNG–UK) on all major projects for which we have been engaged as environmental consultants

In the UK, a 10% BNG is mandatory on certain projects. In Ireland, there is no metric or guidance related to achieving NNL or BNG. TII is, however, developing a biodiversity accounting methodology for use on linear infrastructure projects. It is likely to be the first of its kind in Ireland. In December 2023, the Chartered Institute of Ecology and Environmental Management (CIEEM) published a briefing paper titled, 'Biodiversity Enhancement for New Developments in Ireland,' recommending adoption of a primarily qualitative approach to biodiversity enhancement until such time as a quantitative metric is developed for Ireland.

In the absence of any legislation, guidelines or metric for calculating BNG in Ireland, ROD is incorporating biodiversity enhancements into all projects, where feasible.

3.1.2 Target: Continue to use our integrated, multidisciplinary design approach to protect and enhance ecosystems services on projects

Action: Avoid, reduce and, where necessary, mitigate impacts on biodiversity during the Environmental Impact Assessment (EIA) and design stages of all projects

ROD is working on several projects at the early stages of planning and design including three greenways in Donegal, namely the Barnesmore Gap Greenway, the Burtonport to Letterkenny Greenway and the Buncrana to Carndonagh Greenway. All three greenways traverse European and nationally designated sites. In accordance with TII guidelines, ROD's environmental team compared the route corridor options, highlighting particularly sensitive areas to the design team. Certain corridors were adjusted to avoid Annex I habitats (Buncrana-Carndonagh) or design assumptions for the centreline were factored into the assessment (Burtonport to Letterkenny Greenway).

The O'Hanrahan Bridge Widening and Rehabilitation Project located in New Ross, Co Wexford, involves the widening of O'Hanrahan Bridge to accommodate active travel measures. The bridge spans the River Barrow, a Special Area of Conservation (SAC) and a Special Protection Area (SPA). Our ecologists worked closely with our engineering team to develop a design for the bridge that avoided the loss of intertidal mudflats on the banks of the river, which would have impacted the SAC. The design was approved by An Bord Pleanála in September 2024.

ROD's ecologists are progressing Phase 3 EIA habitat surveys on the N4 Mullingar to Longford (Roosky) Road Project to identify rare and/or protected habitats along the emerging preferred route corridor (EPRC). The surveys will inform the alignment of the proposed scheme by making clear to the design team— at the earliest stage possible— any ecologically sensitive habitats that should, where feasible, be avoided; the implication of the potential loss of these habitats; and potential impacts on species.



Fig: 3.0 An ROD ecologist undertaking N4 habitat surveys.

3.1.3 Target: Promote and raise awareness of the benefits of ecological design and nature-based solutions (NbS) during the design, construction and operation phases

Action: Consider and apply NbS on all designs, where appropriate

ROD's water group, which consists of hydrologists, hydrogeologists and drainage engineers, delivers a wide range of water and wastewater consulting services to clients across Ireland. The group promotes a wide range of solutions aimed at enhancing drainage and reducing the potential for flooding on projects. We incorporate a variety of sustainable urban drainage systems (SuDS) measures into the designs of our projects, such as restoring river corridors, installing rain gardens, and protecting and connecting, where feasible, natural habitats/ecosystems that serve to enhance biodiversity. See Section 5.0 Water and Effluents for examples of NbS on our projects.

Action: Deliver biodiversity and NbS CPD presentations to demonstrate practical solutions implemented on projects and lessons learned

In addition to availing of biodiversity and NbS CPD/training opportunities, our environmental team continues to deliver internal CPD presentations aimed at sharing their knowledge of the practical solutions implemented on past projects and the lessons learned for future projects.





L-R: ROD's Paul Kissane pictured with AECOM's Eoin Greene and John Holmes while discussing his poster presentation at the Transport and Research Arena conference in Dublin.

3.2 Case Study (A) Peatland rehabilitation presentation at Transport Research Arena 2024

In April 2024, ROD Associate Paul Kissane led the delivery of a research paper, poster and flash presentation at the Transport Research Arena (TRA) conference in Dublin. Paul sought to explore the opportunities to rehabilitate peatland and demonstrate how, with the right conditions in hydrogeology/ hydrology at infrastructure earthworks, peat drying out or degrading can be avoided, particularly at peat deposition areas. Where peat is already drying out, the earthworks for projects can potentially provide net benefits, reducing carbon emissions and improving biodiversity.

Paul is leading a peatland rehabilitation research project on behalf of TII, the objective of which is to provide a new technical guidance document for assessing—from the perspective of a wetland's long-term carbon sequestration capabilities—future interactions between national roads, greenways, motorway service areas and the landscapes adjacent to them. Paul is being supported by a team of specialists drawn from ROD's geotechnical, water and environmental teams; Arup; Wetlands Survey Ireland; and lecturers/ academic researchers from Atlantic Technological University, University College Dublin and Trinity College Dublin. Adopting a multidisciplinary approach to the delivery of the project has enabled the links between the water regime, ecology and carbon to be fully ingrained in the guidance, which has been under development since September 2022.

According to the National Peatlands Strategy, only 10% of the original raised bog and 28% of the original blanket peatland resources are suitable for conservation as natural peatlands. Vast areas of peat are therefore of degraded status and likely emitting carbon. As a wetland ecosystem, peatlands are dependent on the maintenance of near water-logged conditions. The drainage or drying out of peatlands leads to changes in flora and fauna, with wetland species being replaced by those more suited to drier habitats. This degradation typically damages the important acrotelm layer, resulting in organic decomposition of sequestered carbon when exposed to air over longer periods of time.

Water table and surface runoff conditions are fundamental to nurturing sphagnum (moss) growth in rewetting peatland areas. By maintaining higher water levels in proximity to road or greenway developments, we not only support the better growth of key species but we can be sympathetic to degraded peatlands.

Restoration can vary from minor works, such as blocking drains, to major rehabilitation works, with earthworks and acute detailing of site drainage amendments or planting requirements. Paradoxically, the research indicates that, in some cases, it may be better—for both carbon and biodiversity—for degrading peat to be removed and replaced as part of the delivery of infrastructure projects. Machair is a rare habitat remarkable for its colourful diversity of wildflowers and abundant birdlife

3.3 Case Study (B) Life on Machair: Improving the conditions of Ireland's machair habitats

ROD was commissioned by Fáilte Ireland to produce management plans for sustainable tourism on machair sites across Ireland, with a focus on nine Special Areas of Conservation (SACs) and four Special Protection Areas (SPAs) in counties Donegal, Mayo and Galway. Our work forms part of the EU-funded LIFE on Machair (LOM) project, which aims to improve the conservation condition of Ireland's machair habitats and the ecological conditions for breeding waders and pollinators within the target sites. Our work led to the development guidelines for machair sites, a first for such sites in Ireland or Europe.

Machair is a coastal habitat unique to the north and west of Ireland and Scotland. Characterised by a species-rich, grassland plain developed on wind-blown sand, it provides an important refuge for pollinators and threatened breeding wader bird species, such as Dunlin, Lapwing and Redshank. The typical flower-rich vegetation of machair is traditionally maintained through low intensity livestock grazing. It is, however, susceptible to pressures from recreational activities and overgrazing. Post Brexit, the entire EU land cover of machair occurs in Ireland. As such, its conservation is of significance on a European level. Farming and farmers play a important role in protecting and restoring machair systems, and they are central to the project.

The project is being coordinated by the Department of Housing, Local Government and Heritage in collaboration with the Department of Agriculture, Food and the Marine (DAFM), Fáilte Ireland and Teagasc. It will run for six years, from 2022 to 2028.

In late summer 2023, ROD ecologists carried out site visits at each of the nine machair sites. They also engaged in workshops, some of which were conducted largely as Gaeilge, i.e. the Irish language, with local community groups at each of the sites. The feedback gathered at the workshops was analysed and incorporated into the guidelines and site management plans.



Fig: 3.1 Healthy machair habitat.



3.2 Case Study (C) Fáilte Ireland Environmental Surveying and Monitoring Programme

As part of its National Surveying and Monitoring Programme, Fáilte Ireland commissioned ROD to undertake visitor and environmental monitoring at four key tourism sites in late 2023, namely Keem Bay on Achill Island, Co Mayo; Malin Head on the Inishowen peninsula in Co Donegal; Dursey Island on the Beara peninsula in west Cork, and Bray Head, Valentia Island, Co Kerry. By monitoring visitor sites and their usage, Fáilte Ireland hopes to facilitate tourism in a safe and sustainable manner.

In addition to recording visitor data, including dwell time, demographic data, transport modes, trail conditions, signage, and features of interest, our ecologists recorded habitats and habitat conditions along the trails.

Following the completion of the ecological and tourism surveys, ROD made several recommendations to Fáilte Ireland aimed at improving the visitor experience and ensuring the continued protection and preservation of the natural environment. These included providing way-marked trails, quality signage and formalising sections of trails where habitat degradation or erosion was problematic. Our ecologists also developed a revised methodology for undertaking the surveys at a further 19 sites across Ireland in late 2024, including Clonmacnoise Monastic Site, Co Offaly; Hook Head, Co Wexford; Portumna, Co Galway; Streedagh Beach, Co Sligo; and Shliabh Liag, Co Donegal.



Fig: 3.2 Keem Beach, Achill Island.



Fig: 3.3 Shliabh Liag, Co Donegal.



Fig: 3.4 Streedagh Beach, Co Sligo.



Fig: 3.5 Hook Head, Co Wexford.

4.0 Travel and transport

Goal

Relevant GRI Standards

Relevant UN SDGs

Design and promote cleaner, safer and sustainable mobility solutions.

GRI 302: Energy GRI 305: Emissions



4.1 Targets and actions

Over the past 12 months, ROD has made further strides towards achieving our sustainable travel and transportation goals. To reduce our GHG emissions from transport, we purchased an electric vehicle (EV) for the company and supported the installation of six EV charging stations, two at our head office in Sandyford and four at our Otley office in Leeds. We are continuing to work with TII to bolster the safety, resilience and sustainability of the Irish motorway network while providing it with the necessary tools, methods and data to make well-informed investment decisions in the future.

A summary of our progress towards achieving our sustainability goals in respect of travel and transport - together with our associated targets and actions - is outlined below.

4.1.1 Target: Support the decarbonisation of the transport system and reach net zero by 2050

Action: Design solutions that promote the use of safe, sustainable and active modes of transport

ROD is delivering several public transport, pedestrian and cycle priority projects across Ireland, all of which are underpinned by our strong commitment to sustainability and universal accessibility. In terms of design, the schemes not only serve present needs but they have been future-proofed to anticipate growing numbers of greenway and cycleway users.

Action: Integrate carbon sequestration and biodiversity gain into our designs, where possible

The challenges posed by climate change and biodiversity loss are deeply interconnected and, as such, integrated solutions are needed. Our multidisciplinary teams, comprising environmental scientists, planners, ecologists, hydrologists, hydrogeologists and engineers, collaborate to develop sustainable developments in a variety of urban and rural locations. Our collaborative approach ensures we deliver on the design requirements and on environmental protection, integrating climate resilience and addressing the urgent biodiversity crisis.

Action: Design to support positive behavioural change and future technological advances e.g. electric vehicles, autonomous vehicles, car sharing, ICT, ITS, etc.

ROD engages in cutting-edge research projects with academic and industry partners to ensure we adopt the latest technological advancements in our business and when advising clients on our projects. By advancing the integration of cooperative intelligent transport systems (C-ITS) across Ireland's road network on behalf of TII, we are seeking to not only enhance the safety and reliability of our transport network but improve environmental outcomes by reducing air and noise pollution, congestion and energy use.

Action: Continue using the TII Carbon Tool and PAS 2080 to assess life-cycle carbon emissions for road, highway and rail infrastructure projects

We have been using the TII Carbon Tool and PAS 20280 for several years, from the early stages of project initiation through to the final planning approval and EIAR phases. By leveraging these tools, we ensure embodied and operational carbon emissions are thoroughly evaluated, allowing us to make informed decisions regarding infrastructure design and the selection of preferred route options. See Action 2.1.2 in Energy and Carbon.

4.1.2 Target: Reduce transport and company travel emissions

Action: Undertake a staff travel survey and continue to encourage staff to choose walking, cycling, public transport, carpooling, EVs and hybrid/remote working

In 2024, we undertook our annual travel survey to better understand the travel patterns of our people and inform our mitigation strategies relating to staff travel, including actions to promote walking, cycling, public transport, car sharing, flexible working practices, and the use of technology in place of business travel, where appropriate.

To encourage more staff to choose sustainable transport modes when travelling to work, we made covered bike parking available across our three offices, actively promoted the Cycle to Work and Taxsaver schemes and promoted staff participation in the National Transport Authority's Walktober Step Challenge and Ready, Set, Cycle programmes.

Action: Quantify emissions from business travel and continue to hold virtual meetings, where possible

The way we work as an organisation has changed irrevocably since the COVID-19 pandemic. Virtual and remote working have become part of the norm in ROD, not just the exception. In 2023, we began tracking our air travel miles to better understand our air travel emissions and to take steps to offset the carbon emissions generated by our business flights. We continued these efforts in 2024.

Action: Develop a company sustainable transport and travel policy

To help achieve our target of reducing greenhouse emissions from company transport and travel activities by 51%, we consulted with staff across our offices to better understand the practical challenges they face in travelling more sustainably, and launched a staff travel policy. The policy supports and empowers staff to consider more sustainable modes when travelling to and from work and for work activities. Some of the suggestions made during its development will be actioned as part of the company carbon reduction plan. Examples include improving staff changing facilities for walkers and cyclists, promoting the financial incentives available to walkers and cyclists and making a pool bike available in Otley and Woodford.





Fig: 4.0 The transport hierarchy.



4.2 Case Study (A) Electric vehicle ownership, one year on

In January 2023, ROD purchased our first company EV in support of our commitment to becoming a carbon-neutral company by 2050. According to the SEAI, EVs offer several benefits over a petrol or diesel vehicles, including the potential to reduce an organisation's carbon footprint by up to 100g/ km CO2, which equates to 1.5t CO2 for an annual mileage of 15,000km; reduce noise pollution, particularly in cities; and reduce running costs, which are estimated to be 20% less than those of a similar size diesel engine.

An EV comes with some limitations, however, particularly in terms of km range and driveability. The battery range of an EV fresh from the factory is between 400 and 650km while the range of an equivalent diesel or petrol car is between 900 to 1100km. It is important to note that the battery range from factory represents the maximum distance that can be travelled on a single charge and does not consider the factors impacting the real-world range of an EV, including driving style, terrain and road topography, weather, weight of the vehicle, heating and air conditioning, condition of the tyres, and the battery.

Recharging an EV poses another challenge. While the number of charging stations in Irish cities has increased significantly in recent years, the rest of the country does not have the necessary infrastructure to support easy charging. Staff travelling long distances on site visits from our Dublin offices must factor proximity to a charging station into their travel plans or book overnight accommodation. Further complicating the issue is that the use of a particular charging station is contingent on having a subscription for its specific provider, such as ESB, Go Charge or Applegreen Recharge, and the recharge time can vary significantly depending on the power of the charging station.

While our EV clearly helps in reducing our carbon footprint for trips in the vicinity of Dublin, the barriers to its use for longer distance trips are such that we have retained our alternative fossil fuel vehicle for staff undertaking longer journeys. In the meantime, we welcome the ongoing roll-out of the supporting infrastructure to address the charging infrastructure deficiencies across Ireland.

Since purchasing our EV in 2023, it has travelled 21,589kms (as of September 2024), resulting in a saving of 2.16 tCO2e GhG emissions when compared with a diesel vehicle of the same size. When we consider the emissions reductions required for the transport sector, this is, undoubtedly, a drop in the ocean. Nevertheless, it is a small step in the right direction in terms of reducing carbon emissions and air and noise pollution.



4.3 Case Study (B) Artificial intelligence in the roads sector

The rise of artificial intelligence (AI) has created much excitement globally, particularly around its potential to assist us in achieving our sustainability targets. In 2024, ROD was commissioned by PIARC (the World Road Association) to investigate where AI technologies could bring benefits to the roads sector in the 2030 horizon. The study involved a detailed literature review and extensive stakeholder engagement with organisations from across the world to develop a comprehensive understanding of the challenges facing the roads sector. Particular emphasis was placed on understanding the challenges facing higher-income countries compared to those in lower-middle income countries. These comparisons allowed ROD to make suitable recommendations, on a global scale, for organisations adopting AI-based technologies in the roads sector. Applications of AI range across all life cycle stages in the road sector, from planning, feasibility, resilience planning, environmental impact assessment to traffic management and road infrastructure design.

At ROD, we are committed to providing a more sustainable future for the next generation, and the implementation of these novel AI technologies will assist us in achieving our sustainability targets and those of our clients. Two key areas where AI-based technologies are having a significant impact in the roads sector are inspection and maintenance and road safety.

Inspection and maintenance

Our infrastructure networks degrade with age and require ongoing maintenance to ensure they remain safe and operational. However, given budget constraints and labourintensive inspection and monitoring practices, it can be difficult to gain a holistic understanding of the overall condition of assets on the network, making it hard to know where and when to invest in maintenance works. This often results in defects in road infrastructure only being detected when they are at an advanced stage, at which point they usually require more expensive and carbon-intensive interventions. Al-based technologies, drones, vehicle-based cameras or other sensors can be used to quickly and automatically identify infrastructure defects, providing solutions which contribute to safer and more sustainable transport operations.



Computer vision ad AI predictive analytics have been used to optimise asset management and infrastructure inspections, resulting in improved predictive maintenance and budgeting in the road sector.

Fig: 4.1 Source: EyeVi Technologies.

Road safety

Various AI-based technologies are available in the marketplace to improve road safety, traffic management, incident detection and emergency response. These include camera-based solutions for the detection of 'distracted' drivers using mobile phones or driving without seatbelts. AI can also leverage floating vehicle data, along with data from fixed ITS equipment, as part of a 'data fusion' approach for detecting when incidents happen. This technology, which ROD has trialled on a section of the M1 and M6 motorways in Ireland, can facilitate quicker responses to incidents, which can be crucial in emergency scenarios.



Images processed by machine learning algorithms have been used to assess road safety risks. Computer vision has also been used to detect distracted driving or people not wearing seatbelts.

Fig: 4.2 Source: Acusensus.com

Water and effluents

Goal

Relevant GRI Standards

Relevant UN SDGs

Protect and improve water quality and ensure projects are resilient to climate change

GRI 303: Water and effluents



5.1 Targets and actions

Background

As many of our rivers, lakes and groundwater resources provide the drinking water we rely on for the health of our society, economy and environment, it is vital we play our part in protecting and preserving water quality, conservation and, where possible, improving water quality resources. In 2024, the Department of Housing, Local Government and Heritage published the Water Services Policy Statement 2024-2030 and Water Action Plan 2024: A River Basin Management Plan for Ireland. The action plan sets out a roadmap for restoring Ireland's waterbodies to the equivalent of 'good status' or better, and for protecting water from any further deterioration. The action plan will be achieved by ensuring the necessary resources are available and by making each implementing body accountable for delivering on the targets in the programme of measures through better governance. The policy and plan require each agency and authority to monitor and report publicly on its progress. It will mobilise a joint effort by the State, local authorities, public sector agencies, public and private sector companies, environmental organisations, farm organisations and the people living in each river catchment.

Recognising the potential impact development can have on water quality and quantity, ROD's water group offers sustainable, comprehensive solutions for water, wastewater and flood risk management across all stages of projects.

A summary of our progress towards achieving our sustainability goals in respect of water and effluents - together with the associated targets and actions - is outlined here.

5.1.1 Target: Promote sustainable water use, avoid pollution and improve water quality and aquatic eco-systems

Action: Integrate the requirements of the Water Framework Directive (WFD) on projects where we are involved in drainage design

ROD integrates the requirements of the WFD, where appropriate, on all projects. On the proposed Point Pedestrian and Cycle Bridge and Tom Clarke Bridge Widening Project, an assessment of the potential effect on the water environment was undertaken due to the requirement for major instream works in the River Liffey during the construction stage. The assessment identified that the proposed works would not cause a deterioration in the status of the Liffey Estuary Lower and the Dublin groundwater body, which were reported as 'moderate' and 'good' respectively (as defined under the WFD 2016-2021). We took a systematic approach to the assessment, considering each aspect of the project, identifying the potential impacts, and ensuring suitable mitigation measures were implemented as part of the design, construction and operation phases.

In 2024, ROD Associate John Paul Rooney delivered a full-day training course to Engineers Ireland members on integrated catchment management (ICM), including the importance of hydromorphology and WFD assessments for developments. The training was informed by guidance ROD prepared for South Dublin City Council (SDCC) on ICM.



Action: Continue to undertake hydrology and hydrogeology assessments on projects and work with multidisciplinary teams to avoid, reduce and, if necessary, mitigate impacts

ROD's water and environmental groups provide support across the organisation during all stages in the design and development of projects. We also support private developers and state bodies in undertaking the EIA process, highlighting and addressing potential environmental impacts, including those related to the hydrology and hydrogeological environment, and feeding into constraints studies, option selection reports and EIARs.

Action: Use Nature-based Solutions (NbS), including SuDS, as the default drainage design and/or flood management approach when designing infrastructure projects, public spaces, etc.

To manage water and support biodiversity, ROD designs projects with NbS, where possible. This includes implementing measures such as riparian restoration and wetland creation and/or as part of the flood compensatory storage. When combined with the WFD assessment of the subject water bodies, these measures will ensure NbS become the default design, with benefits in terms of delivery of the objectives of the WFD, as NbS can improve water availability, water quality and help with flood management.

ROD understands the importance of NbS and broader natural resilience in managing societal challenges. We provide solutions to conserve and protect available water resources, as evidenced by our innovative drainage designs for buildings, roads and bridges that change how water flows are absorbed and reduce its exposure to contaminants. By collaborating with ecology professionals and product suppliers, we promote a wider range of solutions, enhancing drainage and reducing the potential for flooding. Recent examples of our work in implementing SuDS on development projects include:

Water Rock, Midleton, Cork

ROD was commissioned to undertake water and infrastructure design works for two large residential development projects at Water Rock in Midleton, Co Cork. Our environmental team prepared an EIAR and Site-Specific Flood Risk Assessment (SSFRA) for the designated lands. In addition to providing civil, structural and traffic engineering advice to the design teams, we provided ecological assessment services. SuDS measures proposed included detention basins, blue/green roofs, permeable paving and swales. The project was granted planning permission in 2023.

Stokes Court, Dundrum, Co Dublin

ROD provided engineering planning services for a proposed residential apartment development, consisting of 20 apartments, at Main Steet, Dundrum, Co Dublin. SuDS measures proposed included flow control devices to limit surface water discharge from the development, permeable paving and a blue/green roof. The project was granted planning permission in 2024.

Bryanstown Wood, Drogheda, Co Meath

ROD provided engineering planning services for this residential development, consisting of 250 residential units and one childcare facility, at Bryanstown, Drogheda, Co Meath. The project was granted planning permission in 2019, and the scheme has since been constructed. SuDS measures proposed included swales, tree pits, permeable paving and underground attenuation structures.

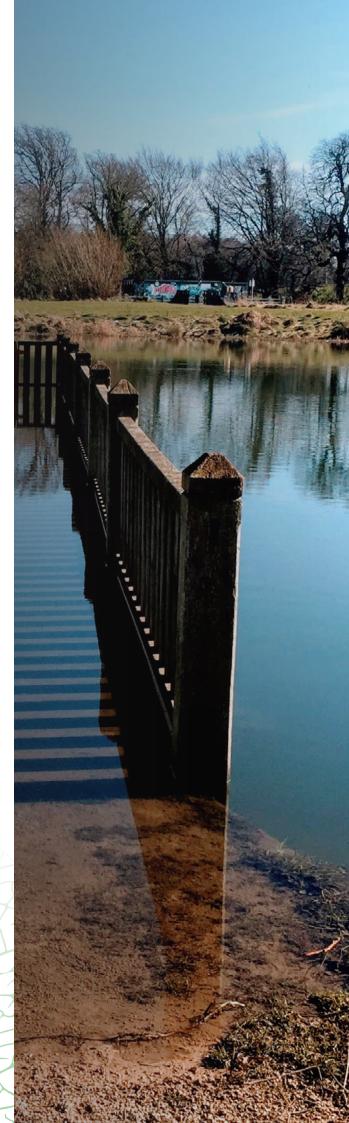
5.1.2 Target: Avoid flood risk and design resilient infrastructure that takes account of the effects of climate change

Action: Integrate flood risk assessments into design considerations and continue to design climate-resilient infrastructure

ROD's water team is committed to offering expert services for identifying and managing flood risk throughout the project lifecycle. This includes conducting both strategic and SSFRAs to facilitate developments across all planning and design stages. The team is dedicated to assisting clients in addressing climate change impacts by designing climate-resilient infrastructure and developments and promoting the extensive use of natural solutions for flood protection instead of relying solely on engineered alternatives.

In Ireland and the UK, flooding is one of the most obvious and damaging risks presented by climate change, with its associated impacts on built assets, communities and businesses. A FRA provides an assessment of the flood risks to a proposed development over its expected lifetime and the possible flood risks to the surrounding areas, estimating flood flows, flood storage capacity and runoff. As part of the preliminary design process for the BusConnects Cork project, ROD carried out an SSFRA in respect of the potential flood risk to the subject site and adjacent lands for the various options.

ROD continues to provide recommendations aimed at reducing future flood risk at proposed developments and proposes flood risk management options, where required. Allowances for the predicted effects of climate change are also considered when preparing an SSFRA. This is usually done by obtaining available modelled data or by conducting in-house hydraulic modelling to estimate the likely depth, speed and extent of flooding for each allowance of climate change over time, considering the allowances for the relevant epoch. Our flood risk management strategies are informed by a thorough understanding of the requirements of a project, local and national guidelines, codes of practice, commercial realities and local data.





5.1.3 Target: Promote water conservation across the company activities

Action: Continue to encourage staff to conserve water During Sustainability Month 2024, we encouraged staff to consider the myriad ways in which to live more sustainably including by conserving water. On 8 June 2024, our water team celebrated World Ocean Day by encouraging staff to think about how they can protect our oceans both in the work we do that affects the maritime area and in our personal lives.

Goal 14 of the UN SDGs is to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development.' Approximately 70% of the planet's surface comprises ocean water bodies while 97% of the Earth's water is found in our oceans. In addition to providing half of the oxygen in our atmosphere, our oceans regulate our climate and form valuable ecosystems. They also support social and economic development by providing a means of transportation for international trade, a source of food and recreation, and a place to live for many plant and animal species.

Considerable energy is required to filter, heat and pump water to our homes, hospitals, offices, gyms, restaurants etc. The average person uses 140 litres of water every day. Controlled drinking water dispensers have been provided throughout our three offices to improve water conservation. We have also retrofitted the taps within our offices' common service areas with simple pushbuttons and automatic cut off to save water.

Action: Procure appliances with lower water demand when upgrades are required

In addition to promoting water conservation among our staff, we only procure 'A' energy-rated appliances for our offices.



5.2 Case Study (A) Cherrywood Regional Attenuation Pond 2A

ROD undertook the preliminary design, Part VIII planning and detailed design stages of the Cherrywood Regional Attenuation Pond 2A, a critical piece of surface water infrastructure to facilitate the development of the Cherrywood Strategic Development Zone (SDZ) in south Co Dublin. In addition to the regional attenuation pond, the project included associated inlet/outlet surface water infrastructure, access tracks and approximately 370km of greenway (preliminary design only). ROD provided engineering and environmental services on the scheme, supported by specialist archaeological, arboriculture and landscape specialists.

Following appointment, we undertook a rigorous review of feasibility studies previously undertaken by the council to explore the design options for the proposed regional attenuation pond. These included several configurations of ponds in combination with underground attenuation tanks. Given the steep, difficult topography of the site, a nature-based solution incorporating a tiered cascading pond, with inlet and outlet vegetated swales, was determined by our design team to be the most appropriate solution. This ensured that excavation would be kept to a minimum, reducing the impact on the existing landscape and ecology, and negating the need for underground attenuation tanks. Each tier will contain floating aquatic planting, and the pond in combination with the inlet and outlet swale will provide the final level of treatment to surface water runoff prior to runoff ultimately discharging to the Cabinteely River.

The regional attenuation pond and associated inlet/outlet surface water infrastructure was designed to convey, attenuate and treat surface water run off from the public roads in the upstream catchment. The pond was designed to attenuate to 1l/sec/ha in accordance with the Cherrywood SDZ planning scheme. The infrastructure will convey attenuated flows from the upstream private development plots within the catchment to the Cabinteely River and will enhance biodiversity in the Cherrywood area. Allowance for climate change was made in accordance with the Greater Dublin Strategic Drainage Strategy.



5.3 Case Study (B) Waterford Flood Relief Scheme (Phases 2, 3 and 4)

In 2024, Waterford City and County Council commissioned ROD to carry out technical consultancy services for an integrated flood defence system along approximately 2.4km of railway at Waterford city's north quays. The site extends around Plunkett Train Station, where flooding has been recorded almost every year for the past 15 years. The tidal River Suir floods the railway lands by overtopping or penetrating the existing quay walls, which are inadequate in height and in poor repair. The flood water typically flows down the tracks to the station platforms, causing the suspension of passenger rail services, disruption to commuters' travel plans and loss of business to city centre retail businesses.

The integrated flood defence system will allow for the installation of signal, electrical and telecoms (SET) works by Irish Rail and the commissioning of a new transport hub within the North Quays Strategic Development Zone (SDZ). The development of the SDZ site will act as a catalyst for the regeneration of the city and region by transforming an 8.23 ha former industrial site into a vibrant, mixed-use development. It is expected to deliver high-quality retail, hotel, office, tourism and cultural facilities, up to 300 residential units, and a riverside walkway.

The protection and redevelopment of this brownfield city centre site into a mixed-use development supports the regeneration of Waterford City and the Irish government's objectives for population growth and development, as identified in the National Planning Framework supporting continued regional development.



5.4 Case Study (C) Rosetown, Rosslare, Co Wexford

In 2018, ROD was engaged by Wexford County Council to provide civil and structural engineering services for phases one and two of the Rosetown housing development in Rosslare, Co Wexford. Phase one comprised 23 houses and phase two comprised 12 houses. Works were completed on Phase 2 in 2024.

We carried out building control amendment regulations (BCAR) inspections throughout the construction period. Site works included a new estate road providing access from phase one to the north and the adjacent Cois Mara estate to the west of the new development.

The design incorporated several SuDS elements, including oversized pipework, swales, filter drains and an attenuation tank, to slow down surface water runoff from landscaped and paved areas and ensure the new development did not increase the flows in the neighbouring watercourses. A drainage model was completed for the proposed network to confirm the positive impacts of the proposals.

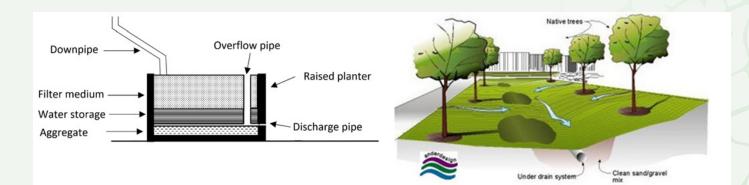


Fig: 5.2 Examples of nature-based solutions.



5.5 Case Study (D) TII Peatland Rehabilitation Project

ROD is leading a peatland rehabilitation research project on behalf of TII. Peatlands account for approximately 21% of Irelands land cover and represent a globally significant biodiversity resource. Of the approximately 1.4 million hectares of Ireland's peatlands, 82% has been degraded or drained, principally for peat extraction, agriculture, and commercial forestry activities.

While the last remaining examples of Annexe 1 habitats have been afforded statutory protection by designation as SACs and NHAs, the National Peatlands Management Strategy (National Parks and Wildlife Service, 2015) recognises that designated sites make up a small proportion of peatlands nationally. The strategy highlights that the restoration of non-designated degraded peatland sites represents an important climate change mitigation opportunity at national level, and that restoration of these sites provides an opportunity to preserve in-situ archaeological materials and paleo-climate records.

Ireland's peatlands represent increasingly rare ecosystems with high intrinsic conservation value. Growing environmental awareness has resulted in increased understanding of the contribution these areas provide in terms of ecosystems services, including carbon sequestration, biodiversity, water flow and water quality regulation.

The goal of the technical guidance is to provide project managers and designers with comprehensive methodological tools to enhance the sustainability of national roads, greenways and motorway service areas (MSAs) for projects located in or interacting with peatlands. The objective of the guidance is to establish a hierarchy of peatland conservation, rehabilitation and restoration outcomes for national road projects that protect and enhance peatland ecosystem services. ROD brought our experience of the design, construction and maintenance issues associated with national road construction together with our eco-hydrology expertise to the project. Our experience in road construction and earthworks will inform guidance on how earthworks can impact drainage conditions in affected peatlands while our eco-hydrological experience will inform guidance on assessing impacts on peatland hydrological and bio-geochemical cycles and on establishing feasible conservation, rehabilitation and restoration outcomes for peatlands impacted by road construction projects. There is a fundamental link between hydrology, biodiversity and the optimum solution in terms of carbon, whether currently decaying in poor or degraded peatlands or for future sequestration where rewetting is the objective.

The research determined that the options for excavating peat or not are best assessed once both the ecology and water levels are understood. A range of examples of peatland projects (i.e. those where peatland was excavated and those where peatlands were not excavated) were presented at the Transportation Research Arena 2024 conference. See Case Study (A) in the biodiversity section for more information.

6.0 Materials and waste

Goal

Relevant GRI Standards

Relevant UN SDGs

Embed the principles of the circular economy into our systems and services

GRI 301: Materials GRI 306: Waste



6.1 Targets and actions

Working to decarbonise our economy forms part of our continued shift to a more sustainable pattern of production and consumption and allows us to retain the value of resources in our economy for longer. The President of the European Parliament has called for a new Circular Economy Act. The proposed legislation aims to 'create market demand for secondary materials and a single market for waste', emphasising the importance of integrating circularity into Europe's economic model. This measure would support current policies (detailed in our sustainability plan) to support a sustainable, competitive, circular economy in Ireland and the UK.

A summary of our progress towards achieving our sustainability goals in respect of materials and waste - together with the associated targets and actions - is outlined below.

6.1.1 Target: Reduce resource requirements on projects

Action: Promote the use of recycled materials on projects, including, for example, recycled aggregates in concrete, road pavement, ground granulated blast-furnace slag

We use ground granulated blast-furnace slag (GGBS) as a substitute for cement as standard on our projects. We are also researching other low-carbon cement alternatives including recycled concrete aggregates (RCA).

Action: Promote awareness of our use of these recycled materials on projects

We use our website, social media channels and biannual company newsletter to raise client awareness of our use of recycled materials on projects. We also work hard to ensure our people understand the importance of circularity in design.

6.1.2 Target: Design for circularity

Action: Develop a concrete specification that incorporates recycled aggregates

Our buildings group is progressing a concrete specification incorporating recycled aggregates for non-structural uses, such as footpaths and internal road pavements.

Action: Develop a checklist of circular design measures that could reduce or prevent future waste/material usage

A sustainable design checklist for all sectors of the company is being developed. The checklist will serve as a knowledge register that provides staff with access to information related to all aspects of sustainable design, including circular design measures on projects, past and present. It will include insights gained through positive and negative experiences on projects.

An environmental product declaration (EPD), following ISO 14025 standards, details a product's environmental impact, including resource use, emissions and waste. While not universally mandated in Ireland, EPDs are increasingly encouraged, especially in the construction and building sectors, to support the sustainability goals and comply with environmental regulations such as the Climate Action Plan. They are often required for green building certifications, such as LEED and BREEAM, and help demonstrate environmental responsibility. In the context of the circular economy, EPDs are becoming significant for pavement contractors and infrastructure projects. They enable better tracking and management of materials used throughout the development process, promoting transparency and sustainability. ROD uses EPDs to support informed decision-making and to help integrate circular economy principles, focusing on resource efficiency and minimising waste, throughout a product's lifecycle.



6.1.3 Target: Influence downstream activities through contract documents

Action: Integrate circularity into construction activities through construction environmental management plans and waste management plans, as appropriate

Our design and environmental consultants collaborate with one another and with clients to develop solutions that minimise the use of resources, including natural resources, and potential environmental impacts. Our environmental team is highly skilled in the preparation of EIARs, construction environmental management plans (CEMPs) and construction waste management plans (CWMPs), which are adopted and further developed by contractors at the construction stage of projects. In this way, commitments made through the EIA process, policies or regulations, and planning conditions are met.

Action: Integrate circularity principles on projects through procurement and contract documents

ROD helps clients integrate circularity principles on projects through the development of procurement and contract documents. Examples include:

N5 Ballaghaderreen to Scramoge Road Design and Build (D&B) project, where we supported Roscommon County Council in developing requirements for the implementation of carbon saving opportunities by the contractor

N5 Westport to Turlough Road D&B project, where we supported Mayo County Council in developing technical merit criteria related to sustainability and circularity principles for tender award at procurement stage. Some tenderer commitments in response to the technical merit criteria were subsequently brought into the D&B contract

The Irish government's Green Public Procurement Strategy 2024-2027 will continue to inform requirements and contracts, including low carbon construction-related components, sustainable building processes and lifecycle costings.

6.1.4 Target: Continue our membership of and contribution to Europengineers

Action: Continue to contribute to the Europengineers (SEED) database

ROD is a member of Europengineers, a European network of independent engineering and consulting companies dedicated to best practice knowledge-sharing and collaboration. ROD has been heavily involved in the development of the network's Sustainability Europengineers Database (SEED), a platform for sharing best practice in the application of circular economy principles on building projects.

In April, two of our design engineers attended a Europengineers design sprint in Schuessler Plan's Dusseldorf office. The design sprint gathered engineers from the member companies together to explore the topic of modular bridge design principles across Europe towards optimisation in terms of construction time, dismantling and carbon reduction.

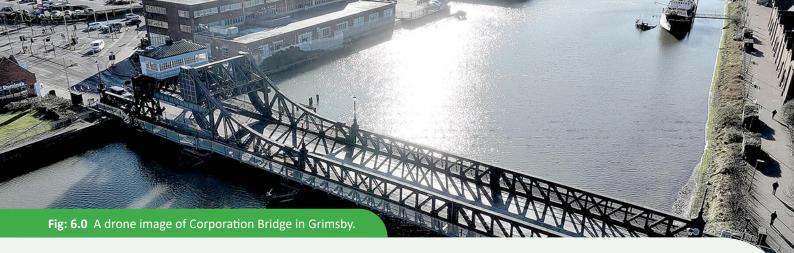
Supporting the Circular Economy Transition in the Irish Construction Sector, The need to understand and embed circular economy principles, A view from practitioners in the sector

As part of the Association of Consulting Engineers of Ireland (ACEI) Construction Sector Innovation and Digital Adoption SubGroup/Sustainability and Climate Action Consultative Committee, ROD Associate Frances O'Kelly contributed to the development of "Supporting the Circular Economy Transition in the Irish Construction Sector'. Launched by Minister of State Ossian Smith in July 2024, the document sets out a sectoral perspective on why the construction sector needs to embed circular economy principles in its projects. It provides recommendations for stakeholders across the sector, including industry; government departments and agencies; local authorities; non-governmental organisations (NGOs); academia; and others starting the process of bringing circular economy thinking into the mainstream of construction and demolition practices across buildings and infrastructure. The publication contains a series of recommendations that can be used by practitioners in undertaking their work and includes case studies. It can also be used by the DECC in the formulation of the statutory Circular Economy Roadmap for the Construction Sector (CERCS), in line with the provisions of the Circular Economy Act 2022. The document is available to download on the ACEI website: www.acei.ie

6.1.5 Target: Continue to reduce, reuse and recycle all waste streams in our offices

Our efforts to reduce, reuse and recycle our office waste streams have become more firmly embedded over the past 12 months. Waste management, staff engagement and collaboration with eco-conscious partners form key components of our waste reduction strategy. During Sustainability Month 2024, ROD Graduate Environmental Scientist, Emeline La Fortune, delivered a staff presentation on the impact of waste on the environment and how to reduce, reuse and recycle across our offices. She shared information related to recent changes in waste policy and useful tips on how to correctly dispose of waste, which can be confusing given the different bin colours and rules. Her overarching message was "waste not, want not".





6.2 Case Study (A) Refurbishment of Corporation Bridge, Grimsby, UK

Built in 1925, Corporation Bridge is a Grade II listed, six-span bridge that crosses the River Freshney in Grimsby, Lincolnshire. It is of early steel rivetted construction and incorporates a rolling bascule "Scherzer" moving span. ROD is supporting the contractor, Spencer Bridge Engineering Ltd, in carrying out refurbishment works to the bridge, including undertaking inspections and assessment, steelwork repairs, deck replacement design and several design studies.

The £5 million project aims to preserve the bridge's legacy while ensuring its functionality and sustainability. Its refurbishment is about more than maintaining a physical structure; it is about preserving a piece of Grimsby's cultural and social history. Beloved by the local community, it is protected for its special architectural and historical interest. In recognition of its importance, the North East Lincolnshire Council (the bridge owner), has directed the preservation of its opening function, a feature that remains central to its identity. Moreover, the bridge provides crucial connectivity across the River Freshney, supporting pedestrians and cyclists. This feature promotes sustainable transport options within Grimsby, reducing reliance on cars and lowering carbon emissions. By choosing to refurbish rather than replace the bridge, the project not only safeguards an iconic local landmark but continues to support the community's social and environmental needs.

The project reflects a strong commitment to environmental sustainability. One of the key principles guiding the refurbishment is maximising the use of existing materials and reducing the carbon footprint associated with new construction. Extending the bridge's lifespan through refurbishment effectively maximises the value of the materials and embodied carbon already present within the structure, which is a more sustainable option than demolishing and rebuilding. Environmental precautions were prioritised during the refurbishment. For instance, during blasting and painting activities the bridge was encapsulated to prevent dust and contaminants from entering the local environment or the River Freshney. ROD's bridge team implemented a responsive and pragmatic approach to the project. Regular site visits and close engagement with stakeholders were critical to maintaining momentum and ensuring all aspects of the refurbishment aligned with sustainability goals. Inspections were scheduled around the tidal levels of the river, and the team made use of underdeck scaffolding, boats and waders to conduct their work safely and efficiently. A key aspect of the team's strategy was to retain as much of the original steelwork as possible. Instead of removing existing elements, the team designed overplating repair details, which preserved the historical character of the bridge while minimising waste and material use. This decision underscores our commitment to sustainable construction practices that prioritise conservation over replacement.



6.3 Case Study (B) Convent Lands, Portlaoise, Co Laois

ROD has been engaged by Sophia Housing to provide civil and structural engineering services for the redevelopment of the Presentation Convent and Sacred Heart National School lands in Portlaoise. The Presentation Convent [listed on the National Inventory of Architectural Heritage (NIAH) no. 12505169] is situated in Portlaoise town centre and forms part of a larger complex of community buildings on Church Avenue. The convent was established in 1824 and was later extended into adjoining buildings, including a historic stone tower [NIAH no. 12505199] that dates from 1548. Several further extensions were added in the late nineteenth century and the twentieth century. The Sacred Heart National School [NIAH no. 12505168] is one of a group of buildings to the south of the convent building. The original national school dates from c.1880, and a new block and wing were added c.1930. The convent and school buildings are all protected structures.

The proposed development involves alteration, refurbishment and reuse of the vacant convent and school buildings. It has been designed for residential and mixed uses, providing flexibility for the future and ensuring the preservation of these protected structures. It comprises the construction of a 58unit residential development at the school site and adjacent grounds, sensitively designed so as not to detract from the character of the protected structures. To the south-west of the site, a new three-storey apartment block will replace the ancillary buildings, while to the north of the convent, the prefabs will be replaced by a five-unit terrace and a threestorey apartment block. A precast concrete framed structure is being used in preference to cast in-situ concrete. Precast concrete framed structures are structural elements cast in a factory and transported to site, where they are assembled and connected.

This material offers several advantages over traditional cast insitu concrete, including:

reduced construction time and cost, as the elements are produced in a controlled environment and can be installed quickly and accurately

improved quality and durability, as the elements are subjected to rigorous testing and quality control before delivery

enhanced design flexibility and aesthetics, as the elements can be customised and shaped to suit different architectural styles and requirements

increased safety and environmental performance, as the material reduces the need for scaffolding, formwork, and wet trades on site, and minimises waste and noise generated during construction

improved productivity and efficiency, as the components or modules are produced in a standardised and automated manner, and can be delivered and installed in a shorter time frame

reduced risk and uncertainty, as the components or modules are less affected by weather conditions, site constraints, and labour availability

lower environmental impact, as the components or modules reduce the need for material transportation, storage, and handling on site, and minimise the waste and emissions generated during construction



Fig 6.2: To reduce carbon emissions, the M20 pavement resurfacing works are focused on the trafficked road section only and do not extend to the hard shoulder.

6.4 Case Study (C) M20 Junction 2 to Junction 5 Pavement Renewal Scheme

The M20 Junction 2 to Junction 5 Pavement Renewal Scheme involved resurfacing approximately 8.5km of the M20 motorway, including ramps at junctions 2, 3, 4 and 5, during night-time hours. ROD managed the scheme on behalf of TII and it was executed by the MMaRC operation and maintenance contractor, Colas JV. It integrated several key initiatives aligned with circular economy principles and sustainability goals.

Replacing hot rolled asphalt with stone mastic asphalt

The project replaced hot rolled asphalt (HRA) with stone mastic asphalt (SMA 14), which significantly reduced noise pollution for residents along the M20 corridor. This shift not only improved the quality of life of nearby communities but also enhanced road safety and longevity.

Rehabilitation targeting trafficked road sections only

Our rehabilitation strategy targeted trafficked road sections only for replacement, leaving the non-trafficked sections of the hard shoulder in serviceable condition. This approach minimised waste and reduces the environmental impact of the project.

Recycling and repurposing the asphalt surface

Once removed, the asphalt surface was diverted back to the asphalt plant for recycling, a process that reduced the need for virgin materials, conserved natural resources and lowered the project's carbon footprint. The recycled material can be repurposed for future road schemes, allowing for the reuse of bitumen binder and aggregates.

Incorporating a warm-mix additive in the binder

Incorporating a warm-mix additive in the binder lowers the mixing temperatures at the asphalt plant by up to 35°C. This reduction in temperature decreases fuel consumption and significantly cuts carbon emissions, further supporting the project's sustainability goals.

Using an environmental product declaration

The use of an EPD, which is a document that transparently reports the environmental impact of a product or material based on a product life cycle assessment (LCA), was discussed with TII. The EPD is a means of providing transparency about used materials and information on the circular economy. ROD has developed a carbon reduction assessment for this project.

7.0 Training and education

Goal

Relevant GRI Standards

Relevant UN SDGs

Support training and innovation by combining people, processes and technology

GRI 404: Training and education



7.1 Targets and actions

ROD is committed to the continuing professional development (CPD) of staff, combining people, processes and technology to help our team reach their professional development goals. We conduct annual performance reviews and training reviews with all staff, across all levels, within the organisation.

Encouraging staff to upskill in new and emerging areas is a vital step in us building the knowledge and skills to not only deliver sustainable solutions for our clients but maximise our own sustainability performance.

7.1.1 Target: Continue investing in our people as leaders in climate action and sustainability

Action: Support our sustainability champions

Our sustainability champions continue to promote our sustainability plan, leading by example, highlighting and sharing best practice in sustainability, and creating links with others who champion the principles and practices of sustainable development.

Action: Support training, development and/or research initiatives aimed at reducing emissions, promoting climate resilience and adaptation

ROD continues to support and provide training and opportunities for research across a wide range of areas including sustainability.

For example, ROD has been actively involved in several sustainability-related research initiatives over the past 12 months, including:

INFRALINC: This one-year project, funded under Ireland's Environmental Protection Agency (EPA) Research Programme 2021-2030, developed a design for a full scale study to assess climate change risks for critical infrastructure (CI) in Ireland. Download the report here: <u>Research Report-450.pdf (epa.ie)</u>

Peatlands Rehabilitation Project (TII309 - Lot 1): ROD is working as part of a multidisciplinary research team to establish methodologies for the sustainable management of earthworks as a means of rehabilitating peatlands and enhancing the biodiversity of peatland habitats related to the construction of roads.

Action: Review and address sustainability gaps through annual performance reviews and training reviews

In 2023, we incorporated sustainability and climate change resilience objectives into our IMS procedures. Since then, our annual performance review and training review processes have helped us identify staff training needs in a range of areas, including carbon counting tools; nature-based solutions; designing for circularity; biodiversity enhancements; and environmental assessment techniques.

Action: Support and encourage further education in sustainability, including in embodied and operational carbon activities

As an EI CPD Accredited Employer, we provide training opportunities to staff in sustainability and embodied and operational carbon. Staff who attend training courses share new information/materials received as part of their training with their teams and, where relevant, across the wider company. See the Emissions and Carbon section of this report for more detailed information regarding our ongoing work in this area.

Action: Support advances in design, software and technological innovation

Our research group continues to bring greater understanding to some of the most pressing global and local challenges in engineering, the environment and climate action. The group is, for example, examining the impact of AI technologies in the civil engineering sector, as part of a research commission it is undertaking on behalf of the World Road Association (PIARC). The research will highlight the areas in which we can expect to see changes in the way civil engineers work over the next five years and beyond.

With our cutting-edge science and analytics expertise and our experience in condition surveying, rehabilitation and maintenance planning, we are well positioned to inform clients on how best to maximise the service life of infrastructure assets.

Areas of recent study include wind and dynamic effects on structures; climate change risk identification for critical infrastructure in Ireland; and peatlands rehabilitation studies.





In 2024, ROD joined Construct Innovate, Ireland's national Construction Technology Research Centre. We are now undertaking research on two projects, RIADA and PRODIGI, in partnership with University College Cork (UCC).

RIADA - Irish road network Rapid Impact Assessment for an efficient recovery after major disasters

Natural disasters are increasing in number and intensity due to climate change. They are impacting the environment, the economy and infrastructure. Road infrastructure is particularly affected by these natural disaster events and, as a principal lifeline in a community, its disruption can have significant consequences. The RIADA project aims to develop a consistent and systematic rapid impact assessment (RIA) framework to assess the condition of the road network in Ireland immediately after major natural disasters.

The RIA framework will improve stakeholders' ability to rapidly and effectively deal with emergency situations and provide road administrators with a tool for a rapid evaluation of the consequences post event, helping them to efficiently analyse the situation and make an informed decision on the best next steps. The tool will provide structure to the assessment process, allowing for a more accurate estimation of the resources required and a more conscious and efficient use of resources and funds, focusing on fast recovery of the infrastructure functionality and facilitating informed, optimised economic decisions.

PRODIGI - Probabilistic Digital Twins for Bridges

This project is dedicated to enhancing bridge maintenance through the development of a probabilistic digital twin, a sophisticated virtual model that mirrors the real-time behaviour of bridges and predicts future conditions using probabilistic algorithms. Bridge monitoring often relies on reactive measures that can be costly and inefficient, potentially leading to safety risks and infrastructure failures that disrupt daily life and incur significant repair expenses. The goal of the project is to integrate various types of real-time sensor data (strain, temperature, deflection, cable load cells, etc.) into a dynamic digital twin model that not only reflects the current state of the structure but also uses advanced probabilistic methods to forecast potential structural issues. This approach enables us to estimate the likelihood of future problems, allowing for proactive, data-driven decisions that can prevent costly repairs, enhance bridge safety and achieve sustainability of existing infrastructure.

The project will use an existing bridge as a test-case for the feasibility of a complex digital twin, with data facilitated by Transport Infrastructure Ireland (TII). By using the data available for the bridge, the project will not only advance our understanding and application of digital twin technology but also demonstrate the practical benefits of incorporating probabilistic models into the routine care of critical infrastructure, marking a significant advancement in public safety and infrastructure management. The expected outcomes include determining the feasibility of a fully scalable digital twin framework capable of probabilistic predictions and a set of tools for predictive maintenance decision-making. These tools are intended to reduce costs, extend bridge lifespans, and increase safety by allowing for timely interventions before structural issues escalate.

Bridge aerodynamics and use of computational fluid dynamics

ROD Design Engineer, Marko Duranovic completed his PhD studies in bridge aerodynamics at Trinity College Dublin in 2024. His research examined how engineers can use computational fluid dynamics (computer simulations) to assess a bridge's susceptibility to aerodynamic effects at the preliminary design stage. This can provide engineers with valuable information early in the design process, which may reduce the time needed in wind tunnel tests. While the wind tunnel tests are an essential part of the design process of long-span bridges, they adversely affect the environment through their high consumption of electric energy (the wind tunnel uses a lot of energy to operate the large turbines that are generating air flow). Marko's research contributed towards decreasing the amount of time spent on the wind tunnel tests while maintaining the integrity of the design process. Following his successful defence of his PhD, Marko is implementing these techniques in his work with ROD, including undertaking CFD on the Clyde Waterfront and Renfrew Riverside Project.



Action: Encourage think tanks and smaller counsels to address the challenges of carbon emissions reduction

- The energy group continues to progress opportunities presented by the climate transition and the green economy.
- Our buildings group's carbon management working group is identifying best practice for carbon management in the design, operation and maintenance of buildings by internally championing the tendering of decarbonisation projects, ensuring carbon calculation is carried out at Stage 1 of buildings projects and applying to participate in studies on carbon emission reduction measures, such as mass engineered timber and carbon assessment.
- Our bridges group has set up a carbon working group and joined the Net Zero Bridges voluntary organisation with the aim of reducing the carbon footprint of its projects.

7.1.2 Target: Maintain and improve affiliations with professional bodies

Action: Maintain our CPD Accreditation with Engineers Ireland and our approval to operate the Institution of Civil Engineers training scheme

In 2022, ROD's status as an EI CPD Accredited Employer was extended for the maximum re-accreditation period of three years. We continue to maintain our approval to operate the ICE training scheme.

Action: Maintain links with professional institutions through memberships

ROD continues to maintain its links with relevant professional institutions, including EI; ICE; ACEI; the International Association for Bridge and Structural Engineering (IABSE); the Institute of Environmental Management and Assessment (IEMA); the Chartered Institute of Ecology and Environmental Management (CIEEM); the Irish Planning Institute (IPI); the Chartered Institution of Highways and Transportation (CIHT); and the Chartered Institution of Water and Environmental Management (CIWEM). Over 60 ROD staff hold registered professional titles - from engineering technician to fellow - with respected professional institutions, including EI; the International Association for Bridge and Structural Engineering (IABSE); CIHT; ICE; IStructE; the Welding Institute; NEC; CIWEM; IEMA and IPI. Our staff are frequently invited to speak at industry conferences and events, the most recent of which include:

ITS, C-ITS and Smart Mobility

Delivered by Principal Engineer, Ciaran Carey, at Intertraffic Amsterdam, 2024.

Traffic Calming Gateway Layouts & Signage

Delivered by Technical Director, Edward Warren, at the TII Signage and Delineation Conference, Cavan, 2023.

Integrated Catchment Management: Mapping river corridors

A one-day training course delivered by Associate, John Paul Rooney, on behalf of El in 2024. The course focused on the methodologies developed to aid the delineation of floodplain boundaries. These methodologies use morphological features to identify functional riparian zones to support the basis for sustainable zoning policies that provide "room for the river". In time, this will allow river systems to return to a state of equilibrium, with rich biodiversity, developed ecosystem service provision and resilience to future shocks, such as climate change, while also supporting our efforts to meet our objectives under the Water Framework and Floods Directives and the new nature restoration law.

ROD was one of the silver sponsors of the International Association for Bridge and Structural Engineering (IABSE) Symposium Manchester, UK, in April 2024. IABSE is a scientific/technical association that aims to advance, through the exchange of knowledge, the practice of structural engineering in the service of the profession and society. The symposium was titled 'Construction's Role for a World in Emergency' and was attended by hundreds of people from around the world. ROD staff based in our Dublin and UK offices produced four papers for the event with input from colleagues in the wider industry.

Design of the Whitegates to Athlone Castle Pedestrian and Cycle Bridge Delivered by Associate, Pankaj Kumar Das.

Challenging prior decisions relating to existing bridges Delivered by Senior Engineer, Peter Campbell.

Hidden defects risk assessment at the Humber Bridge Delivered by Associate, John Collins.

Humber Bridge side span rocker bearings replacement Delivered by Associate, John Collins.

Action: Support staff aiming to achieve chartership

ROD is focused on attracting, developing, engaging and retaining talented individuals in the company. We have developed a supportive programme or pathway to help guide staff on their journey towards achieving their professional qualifications, such as incorporated or chartered membership of their relevant professional body, e.g. CEng, IEng, CIEEM, IEMA, CIWEM, IPI, CIHT, etc. The pathway provides staff with a combination of project experience, formal training and mentoring support to help build the technical experience and professional practice skills they need to achieve their chosen professional qualification.

The pathway to chartership initiative indirectly supports other management initiatives, such as career progression, development of technical and non-technical competencies, knowledge sharing and encouragement of business improvements. Our pathway to chartership programme is considered a suitable progression for those who have successfully completed our graduate development programme.

Action: Continue to promote engineering as a profession within schools and colleges in Dublin and Leeds

Every year, we send our younger technicians, scientists and engineers into primary and secondary schools local to our Ireland and UK offices to discuss the different routes into engineering, the projects we are involved in and the value of a career in STEM. We also attend careers fairs in third-level colleges to promote the oportunities for engineering graduates in our Ireland and UK offices.

ROD actively supports EI STEPS programme, Ireland's only STEM outreach programme with a focus on engineering. Our team also supports EI STEPS Young Engineers Award competition, which encourages 3rd and 4th class pupils and their teachers to explore the world of engineering by developing an engineering project to help improve their local community. See Case Study (A) for more information on this year's experience.

Action: Continue our membership and involvement with the Net Zero Bridges Group

Our bridges team joined the NZBG in 2024. The Net Zero Bridges Group (NZBG) mission is to 'to accelerate progress towards net zero carbon bridges by sharing knowledge and ideas and shaping best practice'. It is an international voluntary organisation of bridge specialists, including engineers and architects, committed to helping the bridge industry reduce its carbon footprint as quickly as possible. Membership of the group not only provides us with the opportunity to collaborate with leading industry professionals but helps us to stay at the forefront of carbon management in bridges thereby guiding our efforts to reduce our carbon output on bridge projects to net zero by 2050.



Since joining NZBG, ROD has:

- participated in regular meetings with the group;
- shared our experiences and challenges with respect to reducing carbon emissions on our bridge projects;
- helped to develop solutions to tackle carbon calculating;
- contributed to the development of practical guidance aimed at establishing best practice regarding reducing emissions in the bridge sector; and
- remained at the forefront of evolving carbon management in bridges.

As embodied carbon calculations are developed, ROD will continue to contribute to the bridge embodied carbon database being developed by the NZBG to help the industry establish a baseline against which to measure the carbon output of all future projects.

7.1.3 Target: Share knowledge and build capacity across the company

Action: Continue to hold in-house CPD sessions

Between November 2023 and October 2024, ROD hosted 26 lunchtime CPD presentations, nine of which were delivered by external speakers and 17 of which were delivered by ROD staff. The presentations covered a wide range of topics from technical products and new starter introductions through to project and research-related updates. There was even a presentation on the importance of spiders to our ecosystem. Sustainability was a recurring theme in the presentations, as social, economic and environmental issues permeate so much of what we do in our personal and professional lives.

Sustainability Month





To launch Sustainability Month 2024, ROD Design Engineer, Rico Raymundo, delivered a presentation on the work we have undertaken to develop our first **Carbon Reduction Plan** (CRP). The plan aims to measure and support the reduction of our carbon footprint so we can reach our net zero emissions target by 2050. See Section 2: Emissions and Carbon for more information.

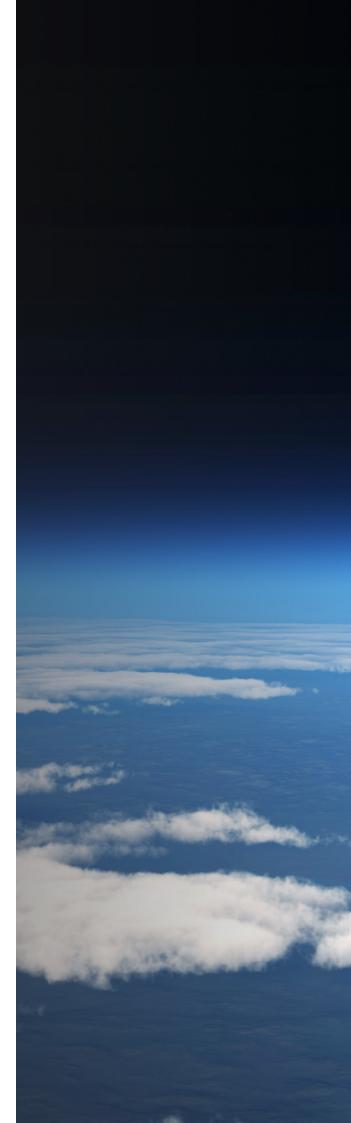
ROD Sustainability Manager and spatial planner, Frances O'Kelly, presented our draft sustainable transport and travel **policy** for staff consultation. The policy underscores our commitment to reducing our transport emissions and highlights the need to improve the measurement and calculation of our existing travel emissions (which is linked to our CRP reporting). Encouraging a shift to less carbon-intensive transport options, such as walking, cycling, car-sharing and public transport, was highlighted in the policy, as was the need to adopt more efficient technologies to support the net zero scenario and a clean energy transition. Staff participation was identified as essential to improving the monitoring of staff travel and helping to reduce emissions from company transport and travel by 51% by 2030 and net zero by 2050 as defined in our company sustainability plan. See Section 4: Transport and Travel for more information.

ROD Graduate Environmental Scientist, Emeline Lafortune, delivered a presentation titled **'Waste Not, Want Not: Segregation, Recycling, and Tips'**. It explored the critical link between waste management and climate change and emphasised the urgent need to address waste as a significant contributor to environmental damage. Emeline highlighted the importance of proper waste segregation in the office. She shared practical information to help individuals adopt sustainable habits and make informed choices to reduce their environmental footprint in the office and at home.

Business Sustainability Manager at West Yorkshire Combined Authority, Adrian Balcome, delivered a presentation titled **'How to reduce your carbon footprint'**. In addition to discussing climate science, Adrian delved into the four big levers to our personal carbon footprints i.e. energy, food, transport and 'stuff'. He shared carbon accounting information and highlighted the tools available to our staff wishing to take personal action to reduce their carbon footprint.



ROD Design Engineer, John Daly, delivered a presentation titled **'Carbon accounting across ROD'**, in which he shared the latest updates in relation to carbon calculations and accounting, two topics at the fore of the sustainability conversation within the construction industry. John introduced what carbon accounting means – a framework within which to undertake carbon calculations in accordance with recognised standards, including PAS 2080 and EN 15978 for EPDs. He highlighted the regulations likely to follow in the coming years, which will require measurement of carbon output and reduction targets. The presentation also provided some recent project examples demonstrating where carbon accounting is taking place within different departments in ROD and highlighting the advantages to the environment and our client.



ROD Senior Engineer, Peter Campbell, delivered a thoughtprovoking presentation titled, '**Use less stuff: Engineering in an emergency**,' which covered a mix of his personal as well as professional experience in engineering in a climate emergency. The presentation included considerations beyond carbon counting, highlighted the hierarchy of net zero design, the wider impacts of the construction sector and the principle of 'use less stuff'. See Figure 7.0 below.

Mark Gilligan and Evan Browne delivered a presentation titled 'An Overview of The Nature Restoration Law', which included an overview of the newly ratified Nature Restoration Law (NRL) (Regulation (EU) 2024/1991). While EU environmental policies have in the past focused on protecting nature, the NRL aims to address already degraded nature sites and restore them to a healthy condition. This new regulation legally binds EU member states to restoring at least 20% of the EU's land and sea areas by 2030, and all ecosystems in need of restoration by 2050. Ireland is required to prepare National Restoration Plans, detailing how it plans to deliver on the targets, for the European Commission within two years of the regulation coming into force i.e. by mid-2026. The likely effects to the development of engineering projects under the new law was discussed.

ROD Director, Joe Kelly, delivered a presentation titled, 'Integrated Management Systems (IMS): Progress Update'. IMS integrates the various internal processes within the organisation, including ISO Standards- QMS: ISO 9001, EMS ISO 14001 and OHSMS ISO 45001, and provides a structured and process approach for project execution including environmental and safety procedures.



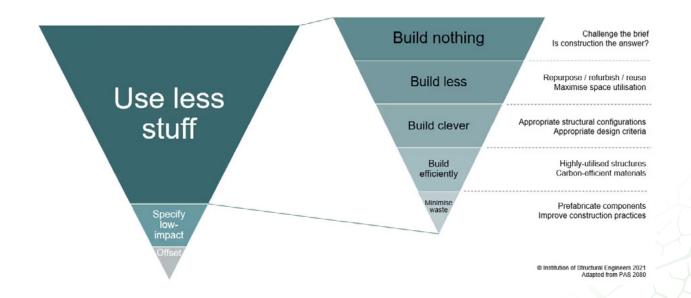


Fig: 7.0 Hierarchy of net zero design.

Action: Raise awareness of sustainability and climate action

ROD's Sustainability Committee ran weekly quizzes during Sustainability Month 2024 to test our people's understanding of the topics covered in our presentation series. For every quiz entry submitted, ROD donated €5 to two environmental charities, Sonairte and the Yorkshire Dales Millennium Trust. A total of €1000 was raised for the two charities.



Sonairte is an environmental charity established in Dublin in 1988. The charity runs Sonairte Visitor Eco-Centre, a visitor experience that aims to promote a love of the outdoors, organic produce, eco-awareness and sustainable living.



Yorkshire Dales Millennium Trust is a small charity doing big things in the Yorkshire Dales. It helps to look after some of the most spectacular and precious landscapes in England and support the communities that live here. The Trust works to conserve and restore native habitats and wildlife – like wildflower-rich meadows, wetlands and broadleaf woodlands. Its projects safeguard and celebrate the special landscape and its unique heritage – from limestone caves to dry stone walls.

Raising awareness of environmental damage due to textiles waste and promoting opportunities for reuse and recycling

As part of Sustainability Month 2024, ROD Graduate Environmental Scientist, Rebecca Bailey, coordinated our annual clothing donation drive in support of Enable Ireland. Enable Ireland provides services to over 13,000 children and adults with disabilities and their families from over 40 locations in 14 counties. Their mission is to work in partnership with those who use their services to achieve maximum independence, choice, and inclusion in their communities.

ROD staff donated 55 bags of clothing to Enable Ireland, supporting the circular economy and helping mitigate harmful greenhouse gas emissions associated with the clothing industry. We incentivised staff to get involved by donating €5 for each bag of clothing collected to Enable Ireland, before topping up their contribution to €300.

Quick facts

Only 1% of clothes are recycled into new clothes

The textile sector was the third largest source of water degradation and land use in 2020. In that year, it took on average nine cubic metres of water, 400 square metres of land and 391 kilogrammes of raw materials to provide clothes and shoes for each EU citizen

The fashion industry is estimated to be responsible for 10% of global carbon emissions, more than international flights and maritime shipping combined







7.2 Case Study (A) Engineers Week 2024 - Steps Programme School Visits

To celebrate Engineers Week 2024, Graduate Engineers Elaine Cogley, Muhammad Saad Masood, Niamh Moore and Fatima Quadri joined our University College Dublin and Trinity College Dublin interns, Ella Traas, Úna Cotter, James Brindley and Patrick Ryan, on visits to St. Raphaela's National School, an allgirls' national school in Stillorgan, and Gaelscoil Chnoc Liamhna in Knocklyon. Over the years, ROD has developed wonderful relationships with both schools by delivering hands-on, classroom-based engineering workshops aimed at encouraging its young students to engage with science, technology, engineering, and mathematics (STEM).

St. Raphaela's National School, Stillorgan, Dublin 16

James, Muhammad and Patrick began their workshop by discussing their own different paths into engineering and the exciting projects they are involved in at ROD. They followed this with an overview of various bridge types before setting the students the challenge of building a bridge that could support the weight of an apple using only paper, tape and string. The girls were encouraged to step back and think before jumping into the construction of their bridges, a strategy that worked extremely well, as not one of their bridges failed the apple test! And when the difficult task of judging the paper bridges was over, the winners were rewarded with ROD branded tote bags and various goodies for their efforts. Speaking after the event, Aine Rooney, a teacher at St. Raphaela's, said: 'The workshop was just super, and the excitement was palpable! We certainly expect engineers to come from our school in the future.

Gaelscoil Chnoc Liamhna in Knocklyon, Dublin 16

The 5th and 6th class students of Gaelscoil Chnoc Liamhna showed great creativity in developing their bridge designs and impressed us with their ability to construct everything from truss to tied-arch to bascule bridges. But the learning didn't stop there. In return for sharing their engineering knowhow, the students taught our interns and graduates some engineering terms as Gaeilge, just in time for Seachtain na Gaeilge.



Fig: 7.3 Muhammad Saad Masood, James Brindley and Patrick Ryan pictured judging the paper bridges, designed by the students of St. Raphaela's National School.



Fig: 7.4 Students from St. Raphaela's National School demonstrating their paper bridge project in action.



Fig: 7.5 Students from Gaelscoil Chnoc Liamhna pictured with their winning bridge design.



7.3 Case Study (B) SkillNet Ireland

ROD has been commissioned to oversee the maintenance of over 250km of Ireland's motorway and dual carriageway network under the MCAAS-2 (Motorway Contracts for Audit and Administrations Services –Second Generation) commission. The project is focused on ensuring the safety and sustainability of Ireland's high-speed road network and securing longterm infrastructure protection. Our responsibilities include supervision, monitoring, audits, design and asset management.

As ROD's project manager and civil engineer on the scheme, Aga Niedziela understands that staying updated on sustainability practices and effective leadership skills is crucial. In 2024, she undertook the Skillnet Ireland Sustainability Leadership Programme. The programme, which is delivered in partnership with the Climate Ready Academy, consists of workshops focused on sustainability leadership and biodiversity. Aga described the training she received as 'invaluable in translating sustainability principles into actionable strategies', adding that it boosted her confidence and enhanced her support for the MCAAS-2 project.

The Skillnet Ireland Sustainability Leadership Programme

The Skillnet Ireland Sustainability Leadership Programme equips leaders with tools to tackle environmental challenges confidently. This includes training on environmental impact assessments, developing mitigation plans, and employing SWOT analysis to evaluate the gains and risks of implementing sustainable practices. The program leaders, experienced in the field, provide guidance through the often confusing information and regulations, making complex topics more navigable. Understanding and complying with environmental regulations is another critical focus of these workshops

They offer comprehensive training on European and Irish regulations, such as the EU's Habitats and Birds Directives and Ireland's Climate Action Plan. Practical guidance is provided on integrating these requirements into project planning and execution, ensuring compliance while enhancing project outcomes. A significant benefit of these programs is their emphasis on collaboration. Effective sustainability leadership involves engaging stakeholders such as government bodies, local communities, and environmental organisations. The Skills Academy workshops share strategies for building partnerships and fostering open communication, which are essential for developing integrated solutions that meet both environmental and operational needs



Fig: 7.6 Robert Corbally presenting at the 2023 ITS Ireland Conference in Cork.

7.4 Case Study (C) ITS Ireland Conference

The annual Intelligent Transport Systems (ITS) Ireland conference took place in Rochestown Park Hotel in Cork in October 2023. The main theme of the conference was the transition to sustainable mobility. Sustainable mobility can be defined as the provision of services and infrastructure for the mobility of people and goods, advancing economic and social development to benefit present and future generations in a manner that is safe, affordable, accessible, efficient and resilient while minimising carbon and other emissions and environmental impact. The role of ITS in the delivery of sustainable mobility solutions was examined by several presenters at the conference, including ROD Senior Research Engineer, Robert Corbally, who addressed the topic in his presentation, 'Advanced Data Analytics for Enhancing Motorway Operations in Ireland.' Robert outlined how ROD is providing TII with advanced data analytics services to enhance its understanding of the complexities of the motorway network and to enable it to provide a more integrated road management service to road users.

By analysing large quantities of data, collected through ITS equipment installed on the M50 motorway, ROD's researchers have been able to provide TII with a deeper understanding of daily traffic conditions on the M50. This, in turn, has enabled us to support TII in developing suitable operational response procedures such that speed limits and warning messages reflective of real-time conditions on the motorway can be displayed to road users, for example, during periods of heavy congestion or when incidents occur on the network. In addition to providing an overview of the software tools we have developed to facilitate our analysis, Robert described how insights gained from large-scale data analytics play a central role in managing traffic flows and reducing the level of stopstart traffic behaviour on the motorway, resulting in a smoother driving experience for road users and a reduction in traffic-related emissions.

The figure below shows a heatmap visualisation of traffic speeds on part of the southbound carriageway of the M50 on Monday, 6 November 2023. Heatmaps help us to identify 'seed points'i.e. where congestion typically starts, and 'shockwaves' i.e. when a small disturbance in traffic flow causes a shockwave of traffic congestion to propagate along the carriageway, often for many kilometres. This occurs when one car brakes in response to a change in conditions in front, the following car brakes slightly harder, then the car behind harder again, and so on. Heatmaps help promote a deeper understanding of how congestion patterns typically develop on the M50 and support the development of appropriate variable speed limit plans to counteract congestion.

