Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Transport Infrastructure Ireland's Environmental Strategy

February 2019

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1 | Introduction

Transport Infrastructure Ireland (TII) is tasked with improving Ireland's quality of life and national economic competitiveness by developing, maintaining and operating the national road, light rail, and metro network in a safe, cost effective and sustainable manner.

TII is keenly aware of the potential environmental impacts that may arise during the development and operation of national road, light rail and metro projects. TII has a proactive approach to the protection of the environment which is vital to ensuring that the national road, light rail and metro projects do not have a significant negative impact on the natural environment.

Every effort is made to protect the natural and built environment when progressing and operating such projects, so the next generation can enjoy the same benefits as we do from the countryside and towns. Stakeholder engagement and collaboration is key to this process.

TII recognises the importance of meaningful consultation and collaboration in all stages of standards and policy development, research and project lifecycles. Stakeholder engagement is a key ingredient for successful policy, programme and project delivery. To that end, TII works collaboratively with government departments, local government, semi-state organisations, other statutory bodies and community groups. The importance of robust engagement and collaboration is fundamental to achieving successful outcomes.

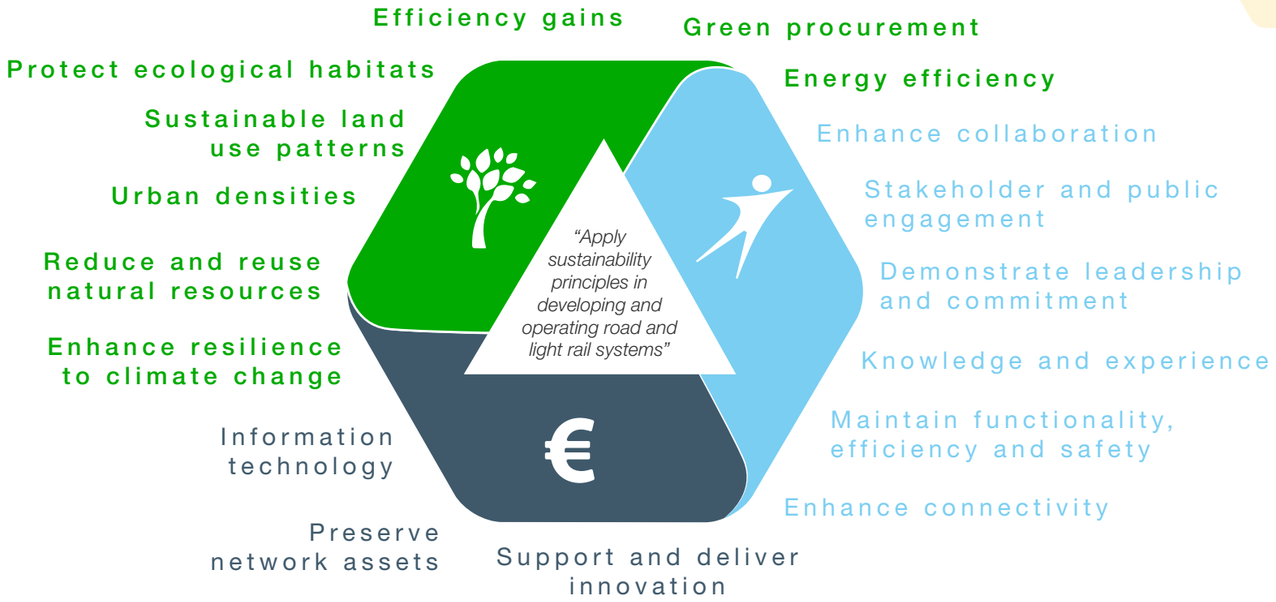
> ***One of TII's Key Values is Collaboration – We fulfil our mission through effective teamwork, communication and partnership***
>
> (Statement of Strategy 2019-2023)

2 | Sustainability Statement

2.1 Sustainability Statement

TII commits to strive to incorporate sustainability principles into the development and operation of the national road, light rail and metro networks; therefore, contributing to social well-being, supporting economic efficiency, and protecting, restoring and enhancing environmental systems for future generations.

The diagram below illustrates the extent of areas that are addressed in TII's Sustainability Statement.



Stakeholder and public engagement is one of the key aspects of the Sustainability Statement and two of the actions included are:

- Demonstrate leadership and commitment to sustainability through guidance to staff and supply chain partners
- Undertake dialogue with stakeholders and the wider community through the planning process

The diagram below illustrates that sustainability (including environmental sustainability) is fundamental to TII's Statement of Strategy 2019-2023.

(Statement of Strategy 2019-2023)

2.2 TII's Statement of Strategy

The TII Statement of Strategy states that TII's mission is to *"provide high quality transport infrastructure and services, delivering a better quality of life and supporting economic growth"*. Part of the vision outlined in the strategy is to ensure that Ireland's national road and light rail infrastructure **is safe, sustainable and resilient**, delivering better accessibility and mobility for people and goods.

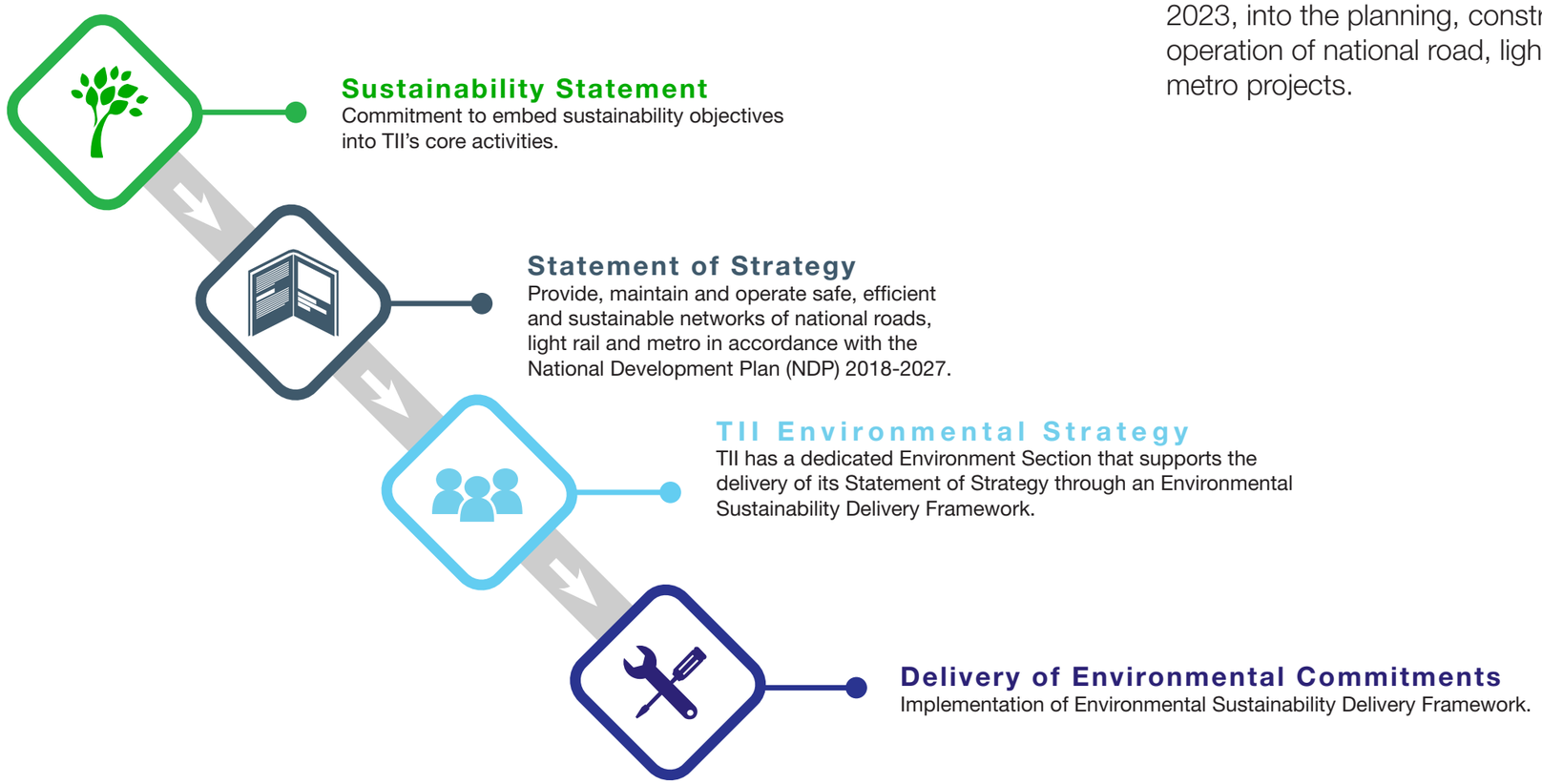
One of the key values of the strategy is **Collaboration:** *"We fulfil our mission through effective teamwork, communication and partnership."*

The strategy identifies strategic objectives in the context of its core remit. The objectives state that TII:

- Lead the delivery of national road, light rail and metro elements of the National Development Plan
- Apply sustainability principles in developing and operating road and light rail systems
- Promote values of collaboration, innovation and integrity
- Continue its commitment to effective communication, teamwork and partnership with external parties

TII's Environment Section supports the delivery of this strategy (as illustrated in the diagram below).

TII is continually evolving and developing its response to the challenge of integrating environmental sustainability issues as identified in the Sustainability Statement and the Statement of Strategy 2019-2023, into the planning, construction and operation of national road, light rail and metro projects.

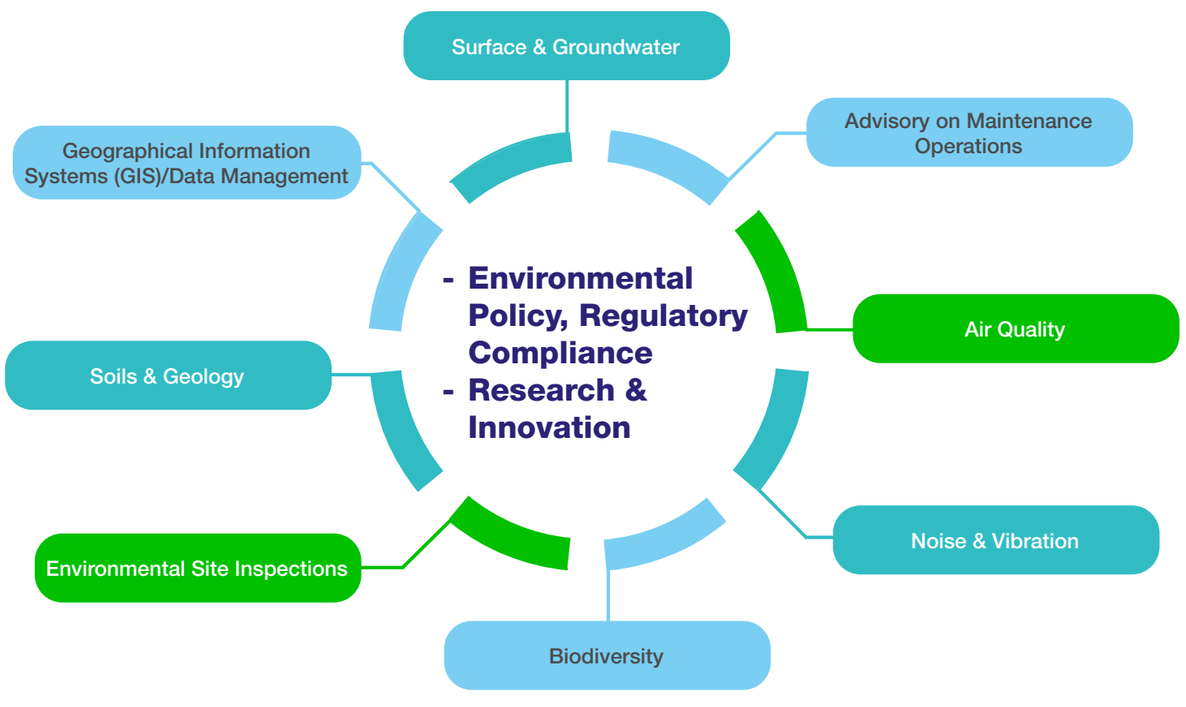


3 | Organisation

3.1 Environment Section and Core Functions

TII's Environment Section has a number of specialists (refer to diagram below) whose core functions are:

1. Support TII's project development by providing technical advice on all matters related to the environment
2. Ensure TII is compliant with national and EU environmental legislation and policies
3. Promote current and future best practice in project design and execution, through project reviews, research, standards development and participation in international working groups



3.2 Standards, Policy and Guidelines

TII recognises its role in promoting transport sustainability and is at the forefront of developing standards, policy and guidance.

A suite of standards and guidance documents has been published in relation to environmental issues such as biodiversity which include ecology, ecological surveying techniques, and invasive alien plant species (IAPS), air quality, noise and vibration, soils and geology, surface and groundwater, otters, bats and watercourses, etc.

TII mandates the implementation of standards and guidance documents. The standards and guidelines span the full lifecycle of national road, light rail and metro projects and all of the disciplines of relevance to EU and national legislation (refer to Section 4). These standards and guidelines provide an important role for the industry, setting out common requirements, guidance and methods, ensuring that national road, light rail and metro projects are approached in a consistent manner.

TII has also developed a number of policy documents in the areas of climate change, Environmental Impact Assessment (EIA) and carbon proofing of projects.

After final publication, all standards/ guidelines and policy documents are kept up to date in order to maintain a cutting-edge and progressive approach on how environmental issues are addressed on national road, light rail and metro projects.

All new environmental standards, policies and guidelines are available on TII publications (http://www.tiipublications.ie/).

3.3 Environmental Research and Evaluation

In order to strengthen and develop new standards, TII participates in a range of transnational environmental research programmes run through the Conference of European Directors of Roads (CEDR), Infra Eco Network Europe (IENE) and other EU working groups. Participation in such international working groups ensures that TII Standards/Guidelines incorporate exemplar international environmental practices, related to the development of transport infrastructure.

As well as participating in transnational research programmes, TII also undertakes research at a national level. The findings of this research are often used as a driver in how environmental mitigation measures are implemented on national road, light rail and metro projects.

Research activities centre primarily on post EIA evaluation studies. These studies are intended to compare EIA predicted impacts to actual impacts and to determine the effectiveness of various environmental mitigation measures.

Research is conducted primarily through a stakeholder alliance with academic institutions and industry partners focusing on a wide range of areas such as air quality and noise, environmental noise mapping, flooding, bat mitigation measures, ecological mitigation, roadside drainage, groundwater impacts, watercourse crossings and their impacts on sensitive habitats.

CEDR Roads and Wildlife Manual

This project addresses the effectiveness of various mitigating strategies in order to solve the conflict between wildlife and roads.

Assessment and Management of Flood Risks on the National Road Network

This project defines flood probability for the national road network, to gain a more detailed understanding of which areas are at the highest risk of flooding and to develop management techniques to mitigate impacts.

Assessment of Potential Impact of Major Roads on Barn Owl Populations

This project was undertaken to assess the potential impacts of major roads on Barn Owl populations and to develop evidence based mitigation recommendations to reduce such impacts.

> ***Use research, knowledge and experience to provide guidance and standards for industry to ensure common alignment of our sustainability goals and to enhance collaboration in the provision of road and light rail networks.***
>
> (TII's Sustainability Statement, 2018)

4 | Environmental Sustainability Delivery Framework

TII embraces the challenge of integrating the environmental pillar of sustainability into the planning, construction and operation of national road, light rail and metro projects. TII recognises that an integrated approach is necessary to ensure that environmental considerations are central to the overall national road, light rail and metro development process. The processes followed in the planning, design and implementation of national road, light rail and metro projects are outlined in TII's Project Management Guidelines (PMGs) and the National Transport Authority's (NTA's) PMGs. A key objective of the TII and NTA PMGs is to ensure the efficient delivery of national road, light rail and metro projects in a manner that minimises adverse environmental effects and respects all applicable legislation.

To support the planning and EIA legal framework, a four-stage **environmental integration model (EIM)** has been adopted to facilitate the incorporation of environmental issues into the planning, construction and operation of national road, light rail and metro projects.

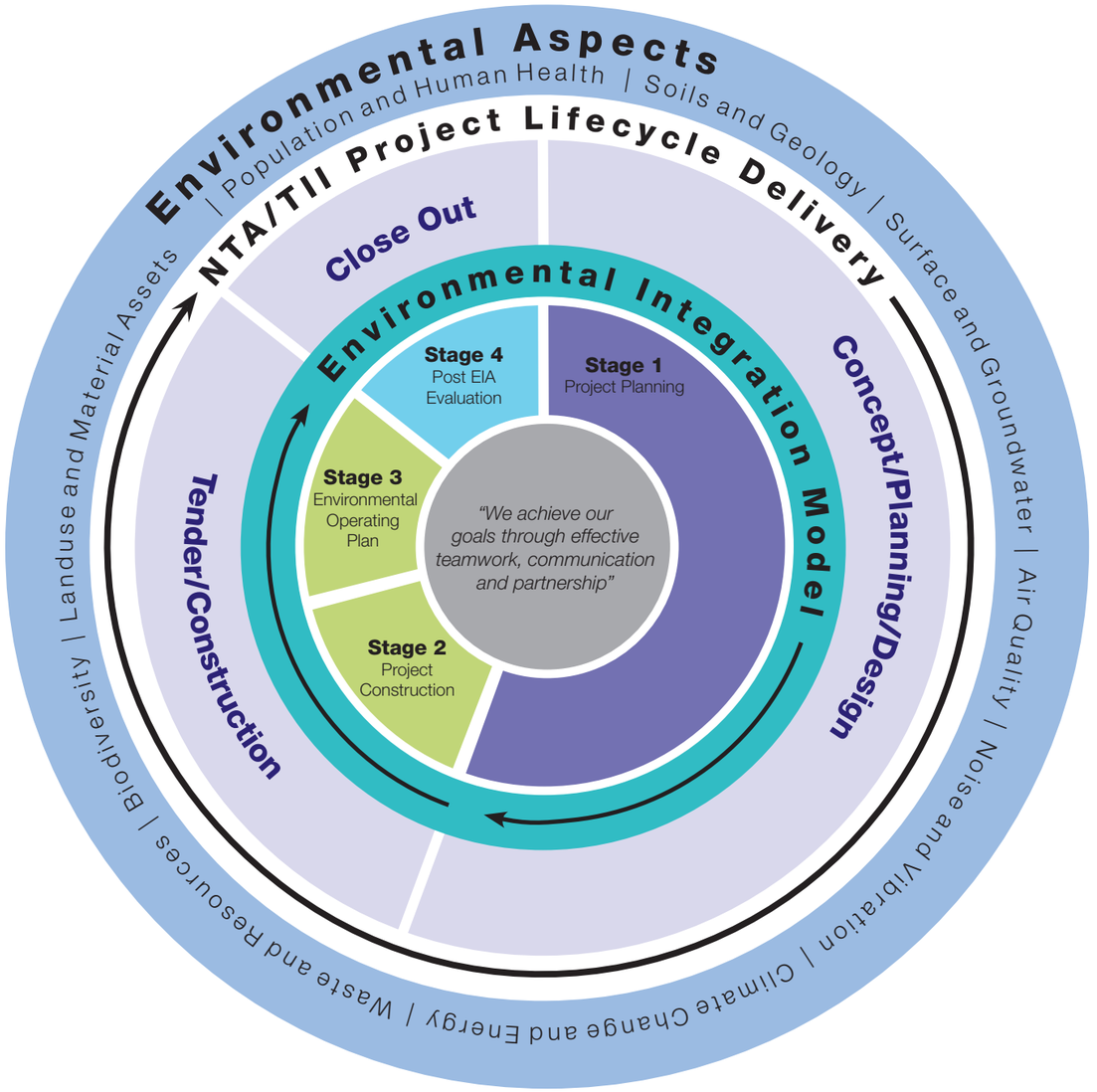
The model (refer to diagram opposite) comprises the following stages:

1. **Planning of national road, light rail and metro projects**
2. **Construction activities and the development of an Environmental Operating Plan (EOP)**
3. **Implementation and review of environmental measures on national road, light rail and metro projects, and**
4. **Post EIA evaluation studies**

The model incorporates all legislative requirements and, where feasible, national and international policy. Implementation of the model requires the development of best practice technical standards and guidance documents that are supported by research (refer to Section 3).

All environmental discipline areas are engaged in implementing the model such as biodiversity, noise and vibration, and air quality (by way of example).

The following sections outline the approach taken by TII in each of the four stages of the environmental integration model.



5 | Environmental Integration Model – Stage 1, Planning

The overall approach to the planning of national road, light rail and metro projects is to identify likely significant effects arising from a proposed project on a range of environmental issues such as water and air quality, biodiversity, soils and geology, noise and vibration, etc., as well as social, cultural, and health impacts. Also, during this process, consideration is given to the assessment of alternatives, mitigation by avoidance, and other appropriate mitigation measures to reduce any identified impacts.

TII's Environment Section provides technical environmental input and guidance at all stages of the planning process, from the initial concepts and feasibility stage, through to route options and selection, during the design and environmental evaluation stage (EIA), and then throughout the statutory planning process.

This input involves:

1. Reviewing the various specialist environmental reports for different environmental aspects such as ecology, air and noise (by way of example)
2. Responding to environmental queries, as required
3. Participating in the stakeholder consultation process and attending workshops, meetings and presentations with both prescribed bodies and other stakeholders as required

In order to ensure consistency in this process, TII has overseen the development of a range of standards/guidelines which are specifically designed to integrate fully the consideration of environmental issues into the planning stages of national road, light rail and metro projects (first stage of the EIM).

A sample of typical issues arising across different environmental areas are outlined below:

Biodiversity

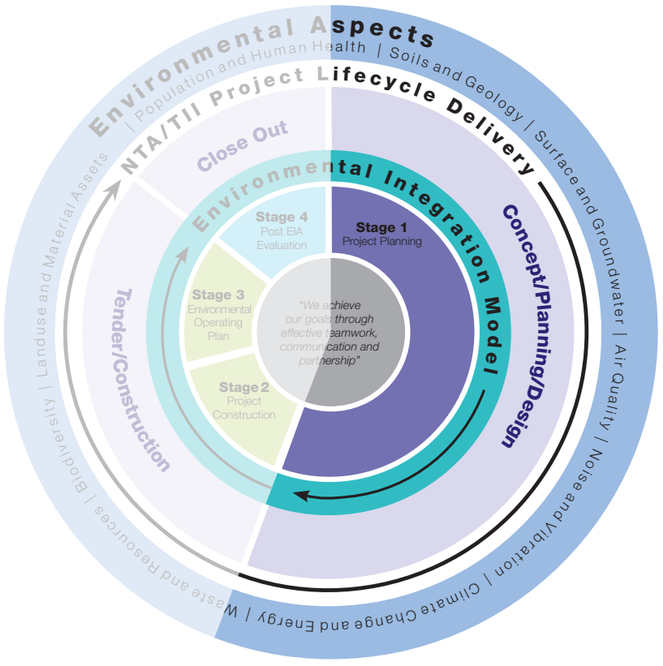
The key focus is the long-term preservation and enhancement of biodiversity in the Irish landscape. TII takes a holistic view of the long-term sustainable management of the environment by having regard to the quality of the entire landscape.

Air Quality

The key focus is to ensure that air quality for communities adjoining national road, light rail and metro projects is not significantly impacted. TII continues to work with stakeholders and partners to explore opportunities to manage the operation of major roads and to provide a road network that will allow a more flexible approach to the adoption of Ultra Low Emission Vehicles and new emerging vehicle technologies.

Noise & Vibration

The key focus is to improve the noise environment for the communities adjoining national road, light rail and metro projects.



Undertake dialogue with stakeholders and the wider community through the planning process.

(TII's Sustainability Statement, 2018)

6 | Environmental Integration Model – Stage 2 & 3, Project Construction and Environmental Operating Plan

During the construction lifecycle of a project, a range of environmental issues can arise from the protection of mammals to sediment control on the construction site.

TII has a range of construction standards and standard construction details in relation to environmental issues such as drainage, mammal underpasses and mammal-resistant fencing, noise barrier foundations, etc., to clearly and consistently set out the required standard for such mitigation. TII also reviews tender documentation to ensure that the content reflects all environmental standards and guidance. It is very import to the Environment Section to see evidence that the implementation of standards, guidance and committed mitigation measures form part of all accepted proposals from tenderers (EIM Phase 2).

TII's EOP relates to the construction phase of the project lifecycle. The concept of the plan was developed by TII to ensure the implementation of mitigating measures identified, and compliance with other environmental obligations specified in the Environmental Impact Assessment Report (EIAR). The Plan addresses impacts that potentially may arise during the construction phase and mitigation devised to address issues such as construction noise, water runoff, dust and waste arisings (EIM Phase 3).

The Environment Section provides support and advice to TII colleagues in the field, who engage with the employer's site representative on site, by responding to and advising on any environmental non-conformances that may arise.

A sample of typical issues arising across different environmental areas are outlined below:

Landscape

When addressing landscape treatments, the objective is to ensure consistent, cost effective and adaptable design and management practices are achieved in accordance with best practice international and national policies, guidelines and standards on biodiversity and native tree planting.

Geology, Surface and Groundwater

Here the focus is to maintain and improve the quality of natural resources in the form of rivers, streams and acquifers. Geology principally relates to the protection of geological heritage features (historic mines/caves) and geological resources (quarry aggregates/ mineral resources) during construction and operation.

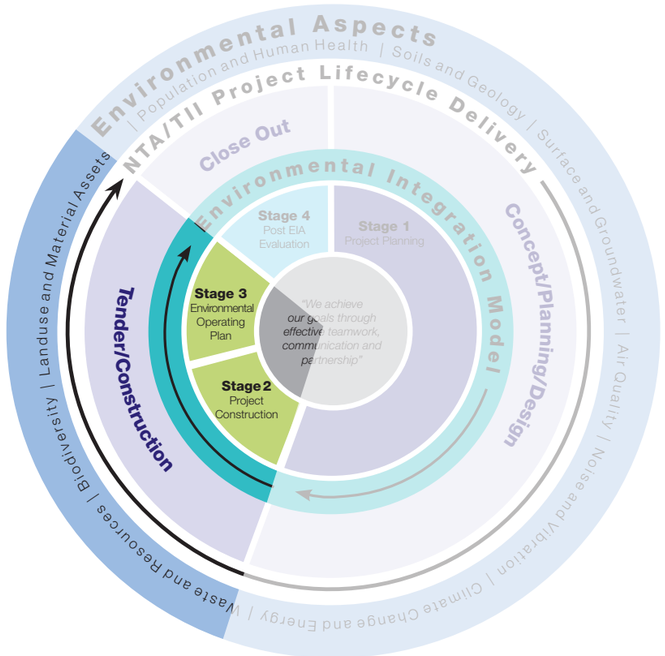
Water Quality (hydrology and hydrogeology) relates to the protection of surface and groundwaters during the construction and operational phases.

Waste

TII's waste management standards ensure that waste management issues are appropriately addressed throughout the lifecycle of its projects. The standards are designed to assist all parties, e.g. designers, local authorities, contractors, etc., on how the challenge of effective waste management is to be met in a road and light rail building context.

Drainage

Drainage entails the speedy removal of surface water on national roads in order to ensure safety and to provide effective sub-surface drainage to maximise the longevity of the pavement and its associated earthworks as well as minimising the impact of road runoff on the receiving environment.



Deliver innovation in road and light rail network design, construction and maintenance, including the reduction and reuse of natural resources, protection of ecological habitats and green procurement.

(TII's Sustainability Statement, 2018)

7 | Environmental Integration Model – Stage 4, Post EIA Evaluation

TII has a well-established programme of post-EIA evaluation studies to assess actual impacts of national road, light rail and metro projects on a range of environmental aspects and to validate and revise prediction methodologies used in the EIAR to further reduce such impacts.

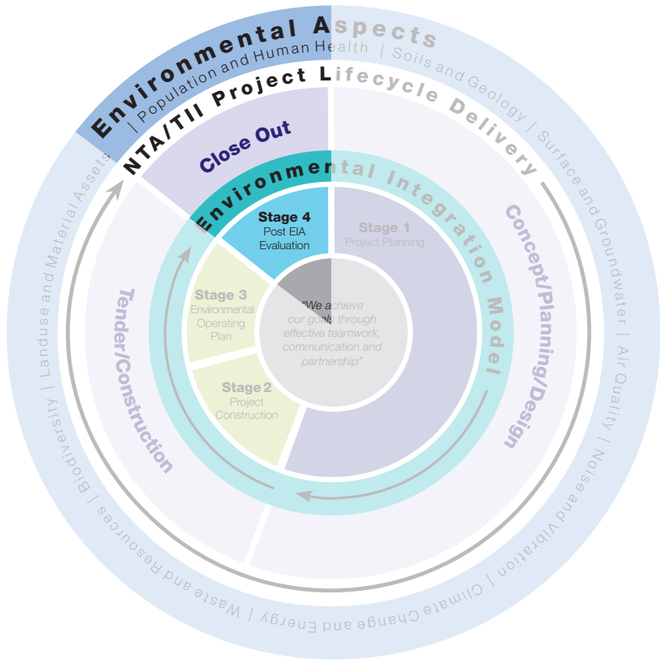
The research also assesses the effectiveness of mitigation measures adopted to minimise significant environmental impacts identified due to national road and light rail project development. Studies entail compiling and assessing EIAR data predicted for various environmental issues and focus on recently completed projects to establish the relationship between the predicted and actual data. These studies target the noise and air quality components of the EIA process.

Undertaking post-EIA evaluation studies enables TII to refine methodologies and procedures, understand lessons learnt and ensures a cycle of continual improvement.

Climate Change Adaptation and Transport Decarbonisation

TII is adapting to climate change and is developing strategies for various climatic events that will increase the resilience of the national road, light rail and metro networks. Extensive flood prediction and forecasting is undertaken on the national road network and climatic factors such as increases in rainfall have been factored into the design of attenuation and conveyance systems on national road projects for the past decade.

TII's country specific carbon assessment tool for assessing embodied and operational carbon for national road and light rail infrastructure projects assists TII support the wider agenda for Ireland to decarbonise the transport sector by acting as a decision-making tool that facilitates and promotes lower carbon infrastructure.



"Periodically evaluate the effectiveness of our sustainability approach in the delivery of our core activities."

(TII's Sustainability Statement, 2018)

8 | TII's Environmental Vision for the Future

Future Transport Trends

TII is aware of the need to move beyond the day-to-day focus on current trends and issues, and to think about the future forces that will shape the development of transport infrastructure in Ireland. Identifying future trends provides the context in which transport of the future will operate and will help in developing efficient and effective transport systems, solutions and services which should deliver positive environmental, social and economic benefits. While specifics may be difficult to forecast, the following illustration demonstrates some of the trends and issues that TII believes will shape transport in the future, and the diagram overleaf outlines how TII proposes to respond to such trends.

Seamless Mobility
Intelligent transport systems will pave the way for truly integrated transport solutions and experiences.

Infrastructure
Smarter infrastructure enables faster response times and the proactive management of infrastructure assets.

Decarbonisation
Concerns around climate change, coupled with uncertainty about oil supplies and prices, are likely to underpin the shift towards alternative forms of fuel.

Autonomous Vehicles
Technological advances, cost reductions, public attitudes and legal responses will influence how quickly autonomous vehicles enter the market in large numbers.

Congestion Cost
A wide range of solutions to congestion will need to be considered in the effort to maintain acceptable levels of service and minimise congestion costs on public and private transport networks.

Regional Connectivity
Better linkages between people, places and resources can drive economic activity and boost regional productivity.

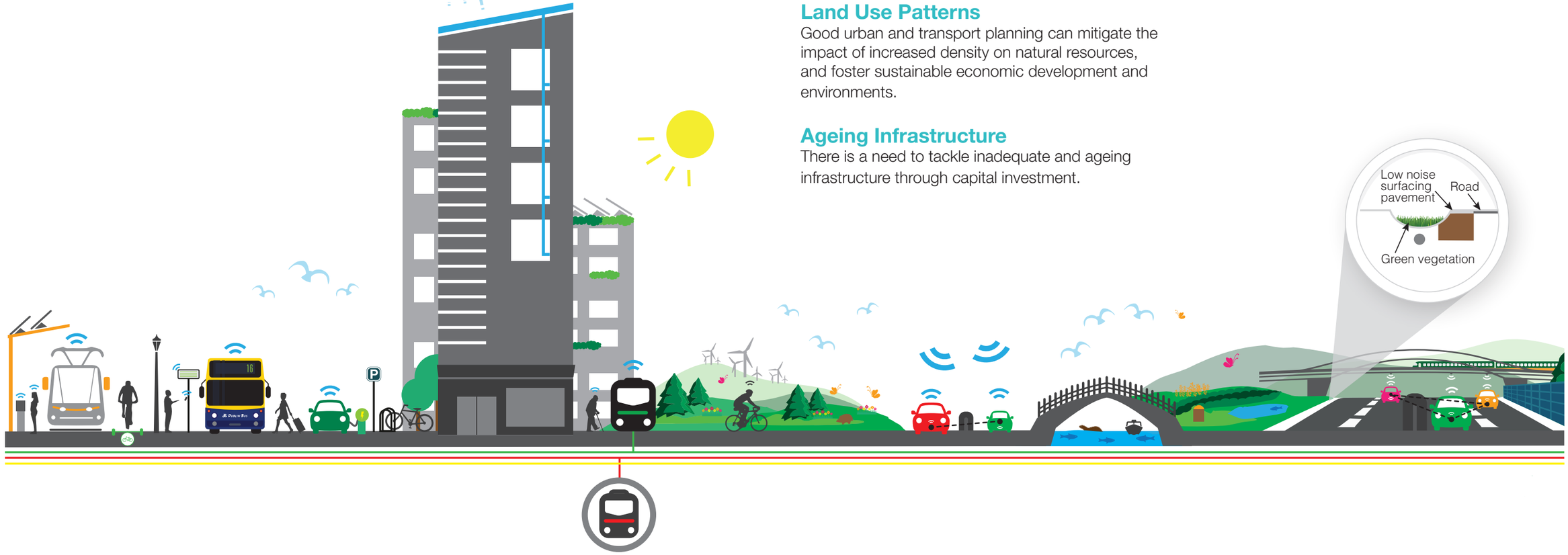
Land Use Patterns
Good urban and transport planning can mitigate the impact of increased density on natural resources, and foster sustainable economic development and environments.

Ageing Infrastructure
There is a need to tackle inadequate and ageing infrastructure through capital investment.

Ecosystem Services
Ecosystem degradation and use will continue to be tackled. The impact of transport on the environment is significant and includes climate change, air quality, noise, water quality, soil quality, biodiversity and land take.

Resilience & Extreme Weather Events
Changes in temperature, rainfall intensity, more intense storm activity and sea level rises may have important implications for transport infrastructure design, operation and maintenance.

Enhance Biodiversity
Transport corridors can be designed and managed to protect and nurture the natural biodiversity that the landscape supports.



8 | TII's Environmental Vision for the Future

The following outlines areas of particular focus for TII's Environment Section in the short, medium and long

SHORT

- Ensure rigorous compliance and oversight of environmental planning and implementation of TII transport projects
- Assist in the adaptation of the road and light rail networks to climate change by undertaking new studies
- Support national initiatives on transport decarbonisation by implementing TII's Carbon Assessment Tool
- Support the development of environmental standards by continued participation in CEDR transnational research projects
- Ensure a more robust implementation of best practice, by continually updating environmental standards
- Comply with TII's Sustainability Statement across all aspects of TII's work
- Manage and control the spread of IAPS

MEDIUM

- Improve resilience into the existing network, accounting for extreme weather events and climate change
- Work towards meeting EU 2030 targets for energy efficiency
- Progress compliance inspection/monitoring in relation to noise and vibration, and air quality
- Develop an environmental asset inventory of the national road network's noise barriers and undertake condition surveys and in situ acoustic testing
- Ensure air quality standards are not exceeded at residential areas by monitoring air quality along the M50 Motorway
- Maximize recycling of non-hazardous construction and demolition waste
- Develop a design methodology to reduce the carbon footprint of major road, light rail and metro projects
- Assess environmental impacts of asset renewal projects, e.g. rail replacement and national road network resurfacing
- Undertake targeted research to enable updating of standards refinement and enhance prediction modelling undertaken during the EIA process
- Strive for no net loss of biodiversity and restore where feasible important ecological habitats
- Develop a methodology for assessing the performance of noise-reducing pavements
- Develop real-time noise and air quality maps using sensor technology

LONG

- Manage all non-hazardous waste materials as a resource
- Assess how plug-in hybrid electric vehicles and electric vehicles alter the characteristics of noise emissions on Irish roads
- Embed climate change requirements into the procurement process and promote sustainable procurement
- Develop an environmental accreditation scheme for new road, light rail and metro projects
- Promote asset renewal of noise barriers with secondary innovative functions

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