Bonneagar Iompair Éireann
Transport Infrastructure Ireland

NATIONAL ROADS AND GREENWAYS CONFERENCE 2024

Session 5: Protection & Renewal

Chair: Stephen Smyth, Senior Manager, Pavement Asset Management Programmes, TII

Programme: Session 5

Session 5: Protection & Renewal *Chair: Stephen Smyth, Senior Manager, Pavement Asset Management Programmes, TII*		
9.00am	**Sustainable Pavement Design and Construction: A case study**	*Dimitris Michailidis, CEng, Kilsaran*
9.15am	**Update on the new Road Safety Audit standard**	*Martin Deegan, CEng, TRAFFICO*
9.30am	**An introduction to Ireland's Supply Chain Sustainability School**	*Pamela Sheridan, Operations Manager, Supply Chain Sustainability School*
9.45am	**Speed Limit Review (2023) and implementation**	*John McCarthy, Senior Advisor, Roads, Department of Transport*
10.00am	**Strategic Asset Management Plan (SAMP) for National Roads.**	*Dr Kieran Feighan, PMS Ltd and Gerard O'Dea, TII*
10.15am	**Collaboration between ESB and Road Authorities**	*Cormac Collins, Delivery Manager, ESB Networks*
10.30am	**Q&A**	
10.40am	**Tea & Coffee**	
11.10am	**End of Session 5**	

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Sustainable Pavement Design and Construction: A case study

Dimitris Michailidis, CEng, Kilsaran

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An Roinn Iompair
Department of Transport

comhairle chontae na mí
meath county council

Kilsaran
ROAD SURFACING & CONTRACTING

Sustainable Pavement Design and Construction – A Case Study

Dimitris Michailidis (CEng MIEI)
Kilsaran Technical Manager – Road Surfacing & Operational Improvement

Towards Net Zero Sustainable Pavement Design

Targets

- ✓ The transport sector has been identified as one of the most Greenhouse Gas (GHG) emissions producing sectors and the **European asphalt industry has the potential to become a key tool in the decarbonisation process of Europe** and is already active in various fields to target a climate-neutral future.
- ✓ With the ambitious goal of achieving net zero GHG emissions by 2050, one objective is to identify the technologies and practices that can be readily adopted or expanded to reduce GHG emissions associated with asphalt pavements.

EAPA

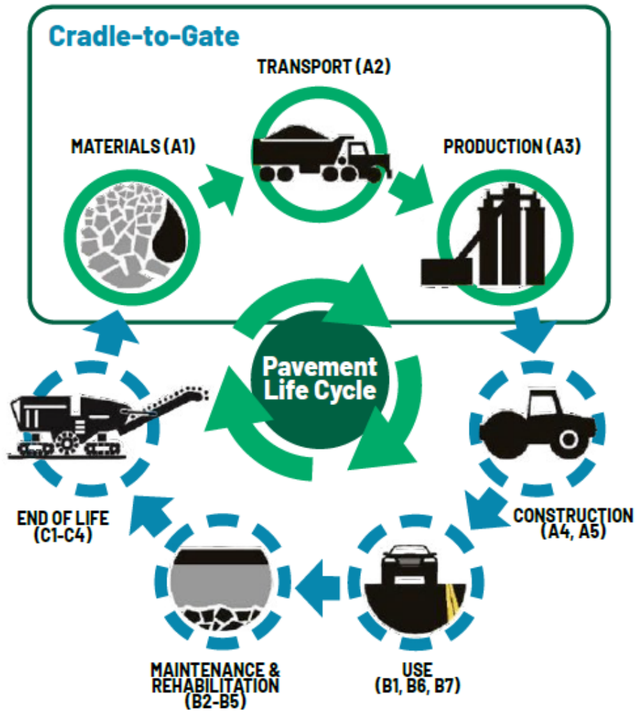
European Asphalt Pavement Association

- The asphalt paving industry accounts for **14 Mt of CO_2eq per year**, around 0,35% of total emissions in the EU.

Towards Net Zero Sustainable Pavement Design

- With the ratification of the Paris climate agreement to avoid the uncompensated effects of climate change, 197 countries will have to dramatically reduce their greenhouse gas emissions in half by 2030. For this reason, the reduction of the environmental impacts of road construction is becoming an urgent necessity.

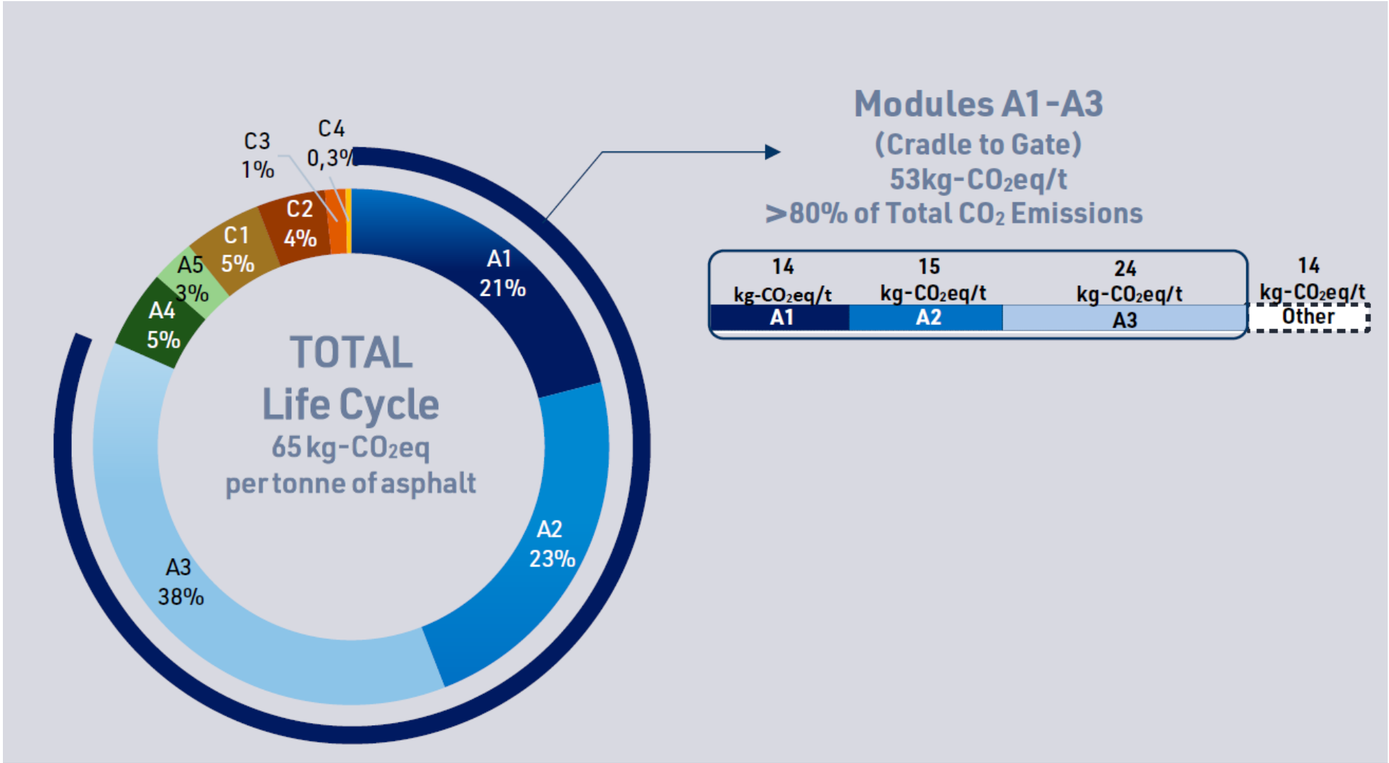
- ✓ GHG emissions occur during each stage of the pavement life cycle: production (A1-A3), construction (A4-A5), maintenance (B2-B5), use (B1, B6), and end of life (C2-C4).
- ✓ The production stage (cradle-to-gate) tends to have the most significant contribution to a pavement's embodied carbon emissions.



Towards Net Zero Sustainable Pavement Design

Targets

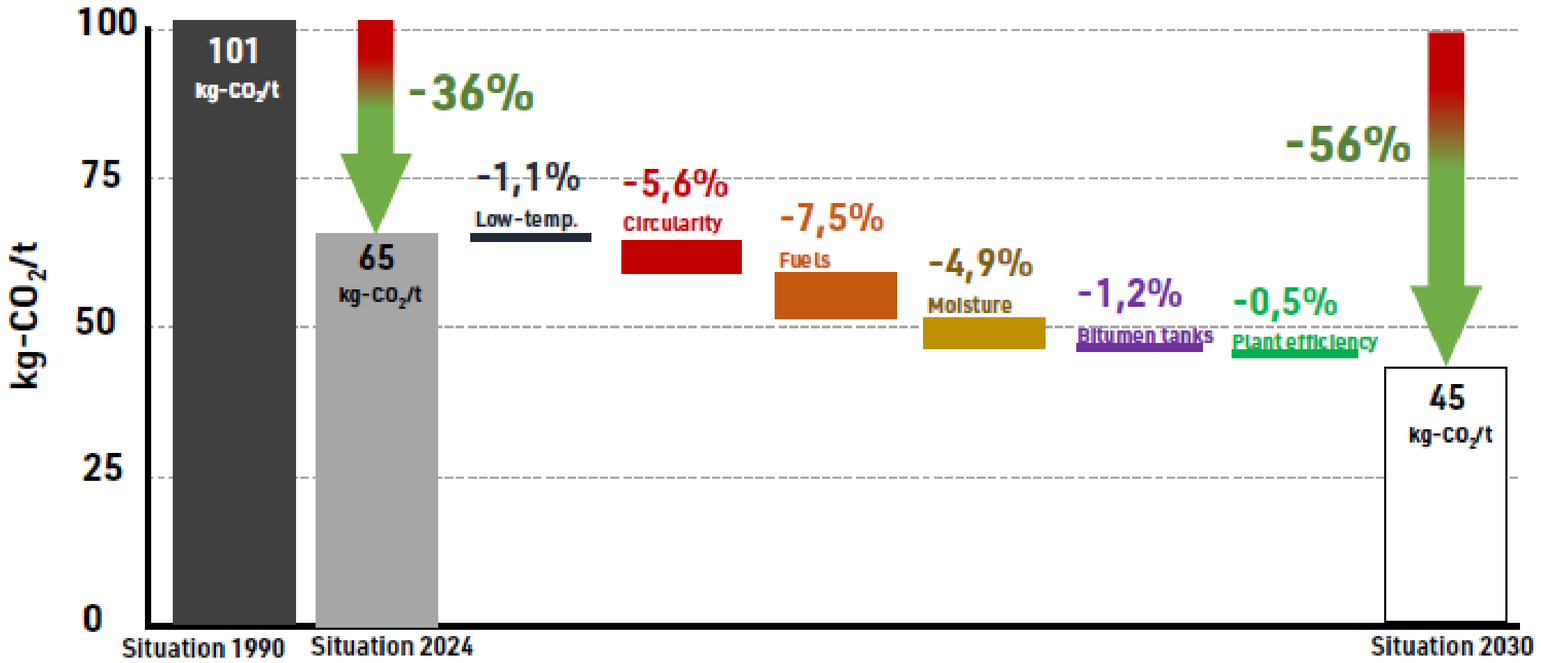
Calculations showed that the production of 1 ton of a reference asphalt results in the emission of 65 kg of CO_2eq during its whole life cycle, 53 kg of CO_2eq if emissions are already emitted before the product leaves the production plant (cradle-togate).



Towards Net Zero

A holistic strategy by the European Asphalt Pavement Association

Achieving the decarbonization objectives requires the implementation of a holistic strategy, with the main 2 milestones in 2030 and 2050.



Towards Net Zero

Impact reduction potential of different technologies in Ireland

Situation 2019

Efficient bitumen tanks

Situation 2022 - 2023

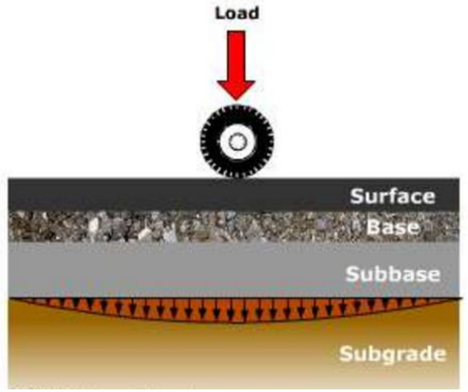
Low-temperature manufacturing

Moisture in aggregates

Circularity

Energy Efficient asphalt plants

IAPDM



Situation 2024 - 2030

Low-Carbon binders

Site efficiency

Decarbonised fuels at the plant

Decarbonised transport of materials

Situation 2050

Other

Towards Net Zero

Impact reduction potential of different technologies

Situation 2019

Efficient bitumen tanks

- Electrification of Bitumen Tanks

Environmentally Friendly: Electric heating is generally considered an environmentally friendly option compared to other heating methods. By eliminating fuel usage, it reduces emissions and minimizes environmental impact.

-1,2% Emissions by 2030 → -1,4% Emissions by 2050

✓ By 2030 only electric and gas heating will be used (no diesel), while for 2050, it is considered that only electric heating will be used.

Source: A Decarbonization Roadmap for the Asphalt Industry, June 2024

EAPA

Towards Net Zero

Impact reduction potential of different technologies

Situation 2022 - 2023

Low-temperature manufacturing

-1,1% Emissions by 2030 → -2,2% Emissions by 2050

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TII Publications

GE PE DN CC OP AM RE

Road Pavements – Bituminous Materials

CC-SPW-00900
October 2023

- Introduction of WMA in Series 900 – October 2023.
- WMA are produced at lower temperatures, typically 20-40°C lower, compared to equivalent Hot Mix Asphalts (HMA) but always above 100°C. WMA can either be produced using chemical additives or organic additives.

Pollutant	Emission factor (kg CO_2 equivalent)	Hot mix emission rates (kg CO2 equiv. / hr)	Warm mix emission rates (kg CO2 equiv. / hr)
Carbon monoxide	1.57	5.2	12.0
Oxides of nitrogen	1	2.9	2.8
Sulphur dioxide	0.44	0.04	0.1
Volatile organic compounds	1	0.2	0.2
Total Organic Carbon	1	2.2	3.0
Carbon dioxide	1.0	2,574.2	2,321.7
Totals (kg CO_2 equiv. / hr)	--	**2,584.7**	**2,339.8**
Net improvement (%)	--	**9.48**	

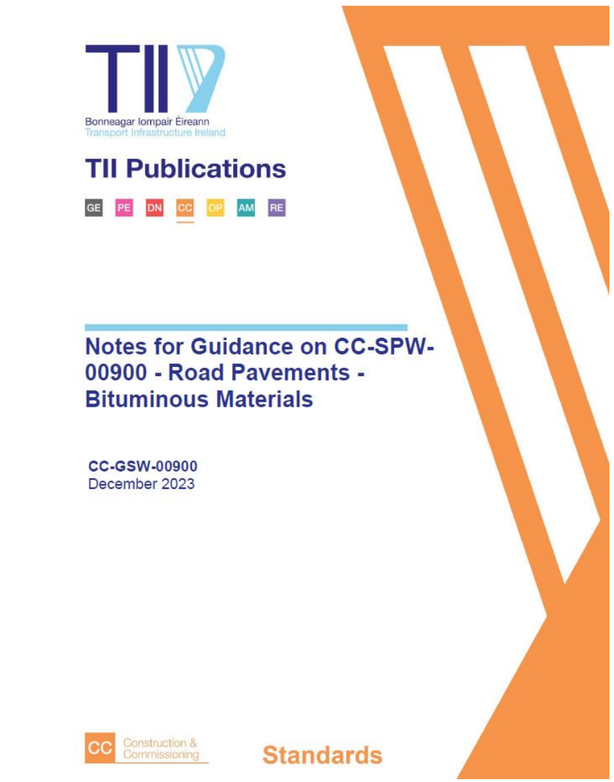
Towards Net Zero

Impact reduction potential of different technologies

Situation 2022 - 2023

-4,9% Emissions by 2030 → -4,9% Emissions by 2050

Moisture in aggregates



- Protecting aggregate and RA stockpiles from rain can help to reduce moisture content and, consequently, the energy needed to dry such materials.
- Scientific literature shows that every 1% reduction in moisture content leads to a reduction in drying energy consumption of around 8 kWh.

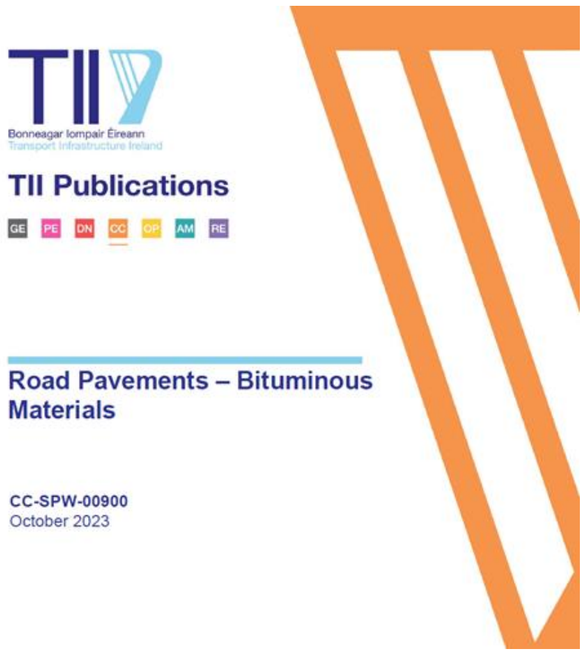
Towards Net Zero

Impact reduction potential of different technologies

Situation 2022 - 2023

-5,6% Emissions by 2030 → -12,3% Emissions by 2050

Circularity



Significant increase in allowable RA percentage introduced in Series 900 – October 2023.

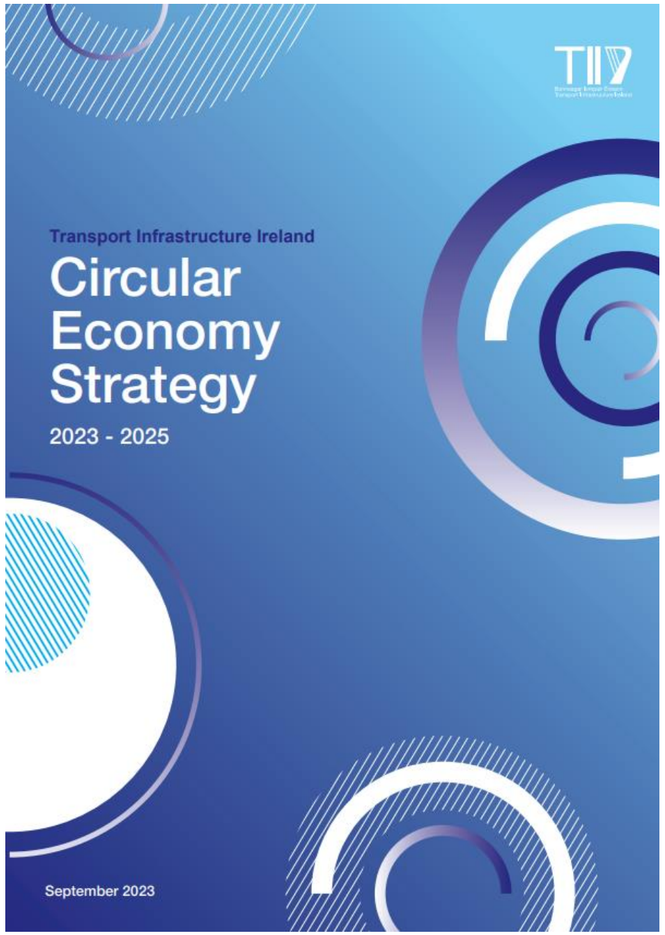
Reusing asphalt involves incorporating reclaimed asphalt from existing pavements into new mixtures, thus reducing the demand for virgin materials. This practice conserves natural resources, decreases emissions from transportation of raw materials, and cuts down emissions related to waste disposal.

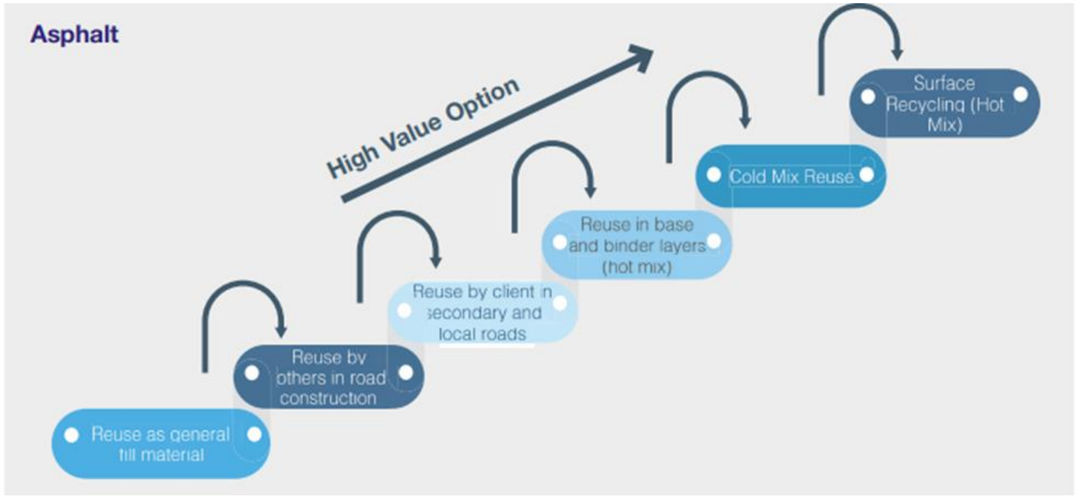
Towards Net Zero

Impact reduction potential of different technologies

Situation 2022 - 2023

Circularity





Life Cycle assessment (LCA) is a method to quantify & improve environmental impacts of products, processes or systems.

The use of LCA can promote environmental sustainability of products.

- The contribution of the addition of RAP in the bituminous mixtures towards the reduction of emissions is significant.
- The most significant environmental impact is observed during material production.

Towards Net Zero

Impact reduction potential of different technologies

Situation 2022 - 2023

-0,5% Emissions by 2030 → -1,1% Emissions by 2050

Energy Efficient asphalt plants

- ✓ Carbon emissions from asphalt plants can be reduced by implementing energy-efficient technologies, such as advanced burner systems, heat recovery, emission control technologies, automated control systems and mix storage systems to minimize inefficient plant starts and stops.

→ Innovative burners which use fuels made from renewable raw materials and have a neutral CO_2 balance. They include biomass to liquid fuels (BtL) and wood dust.

Towards Net Zero

Impact reduction potential of different technologies

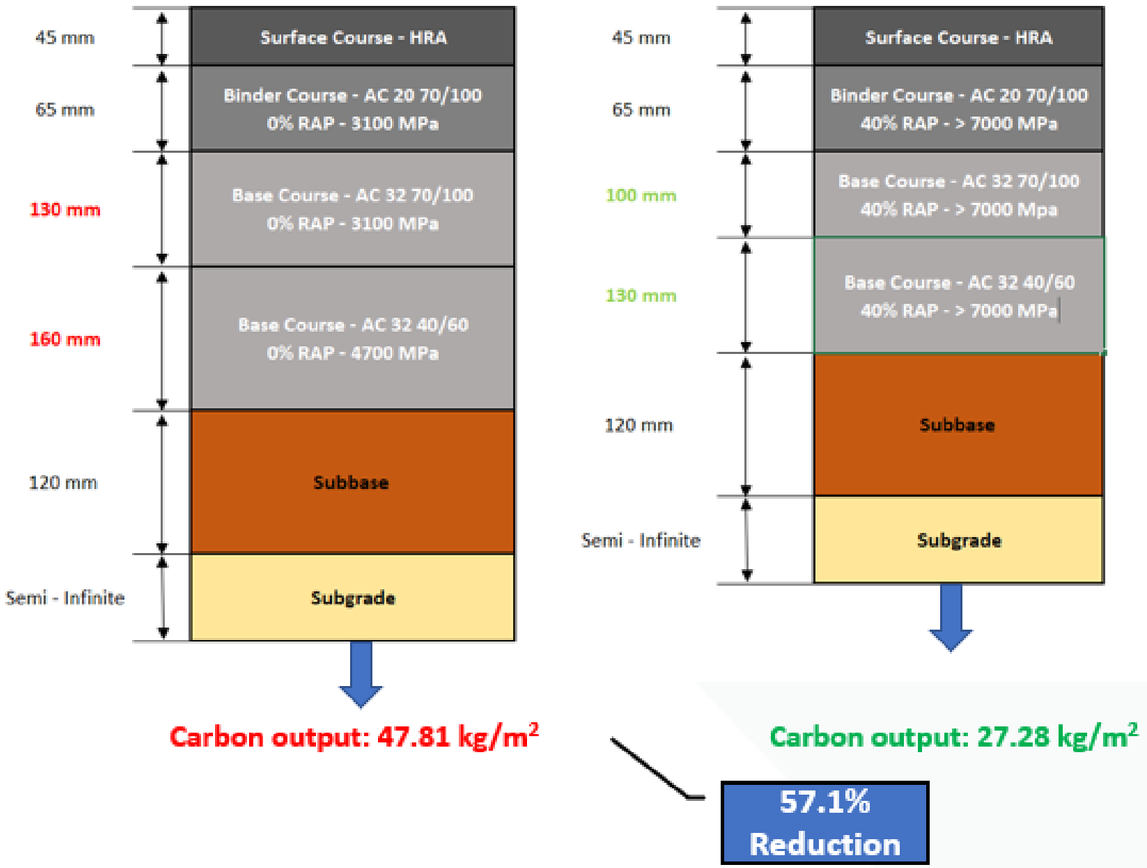
Situation 2022 - 2023

IAPDM

Although empirical procedures have performed reasonably, they are limited in their ability to benefit from the vast number of emerging new products, construction practices, and design innovations that optimize performance of the pavement system and minimize traffic interruptions and costly maintenance and rehabilitation activities.

The introduction of the Irish analytical pavement design has the potential to predict performance for different pavement design alternatives.

Development of a Sustainable Pavement Design



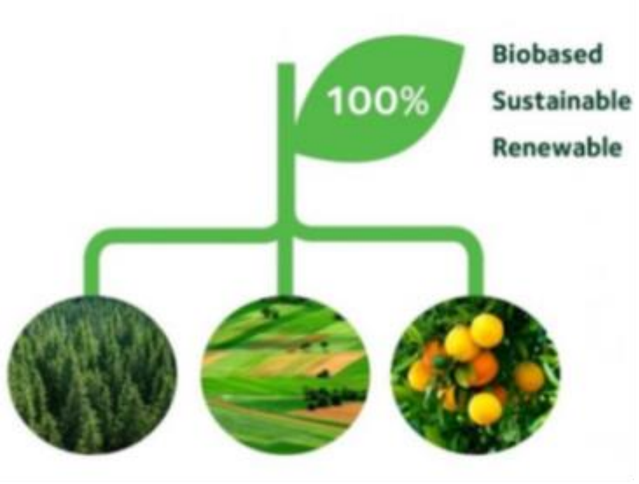
Towards Net Zero

Impact reduction potential of different technologies

Situation 2024 - 2030

Low-Carbon binders

-N/A Emissions by 2030 → -5,2% Emissions by 2050



- Replacing oil-based bitumen with alternative binders minimizes the environmental impact of extracting, transporting and refining crude oil for bitumen production.

Reduced Environmental Impact: The production process of bio binders generally emits fewer greenhouse gases compared to the production of conventional asphalt.

Performance and Durability: They offer good resistance to weathering, aging, and mechanical stresses. Bio binders can even enhance the lifespan of asphalt pavements by improving resistance to cracking and rutting

Towards Net Zero

Impact reduction potential of different technologies

Situation 2024 - 2030

Decarbonised fuels at the plant

-7,5%
Emissions
by 2030

→

-14,1%
Emissions
by 2050

Fuel substitution by hydrogen:
Hydrogen can be gradually introduced into the fuel mix without changing the standard equipment configuration (up to 30% vol. of hydrogen in the blend). However, equipment adaptations would be necessary for higher concentrations of hydrogen or full substitution.

In 2030, only gas (LNG), bio-fuels and electricity (either applied directly or in the production of fuels like hydrogen) will be used, eliminating other fuels like coal and diesel. In the 2050 scenario, gas is eliminated as well, remaining only green energy sources.

Source: A Decarbonization Roadmap for the Asphalt Industry, June 2024

EAPA

Towards Net Zero

Impact reduction potential of different technologies

Situation 2024 - 2030

Decarbonised transport of materials

-N/A Emissions by 2030 → -11,4% Emissions by2050

Adoption of electric or hybrid vehicles, utilizing alternative fuels like biofuels or hydrogen, and optimizing logistics to reduce empty miles and improve route planning.

Site efficiency

-N/A Emissions by 2030 → -4,0% Emissions by2050

<u>Sustainability through digitization</u>

- Smart construction vehicles equipped with digital systems can optimize their routes and workflows, thus reducing fuel consumption and carbon emissions.

Carbon emissions from machinery at the jobsite can be reduced by:

- Improving fuel efficiency,
- Minimize idle time and energy consumption,
- Adopt innovations in materials handling processes (conveyor systems)

Towards Net Zero

Impact reduction potential of different technologies

Situation 2050

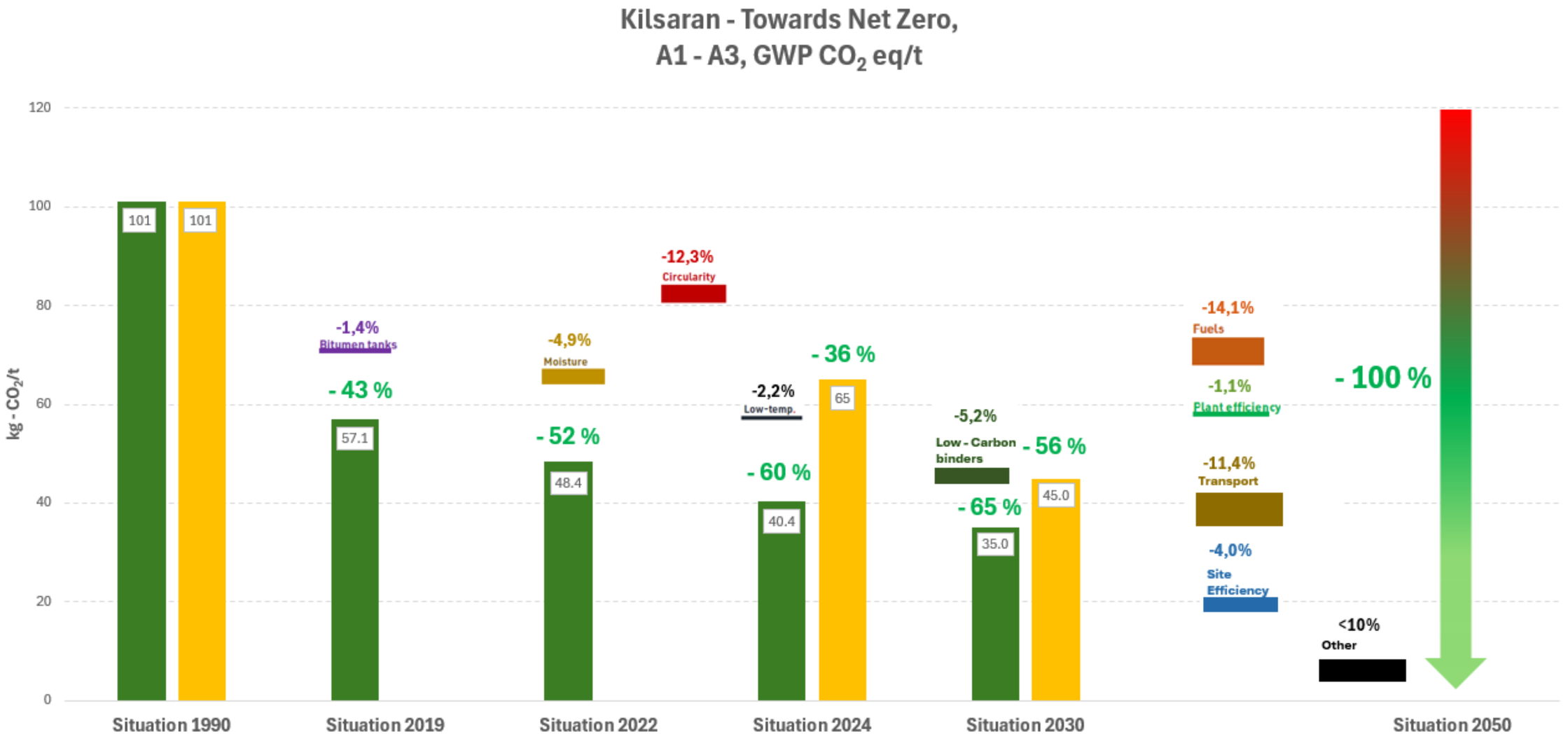
Other

After applying the previous strategies, less than 10% of CO2eq emissions remain.

The importance of enhanced material durability to reduce the number of maintenance interventions and minimize whole-life carbon emissions.

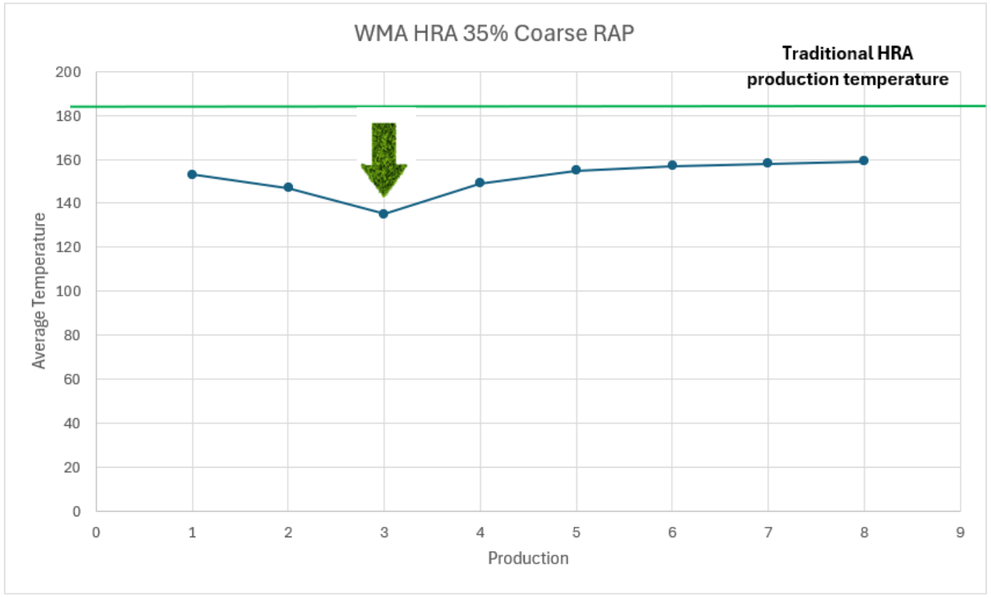
- The majority of surface course asphalts have a much higher proportion of carbon embodied in scope 3 – approximately double that of a typical base course – due to the raw materials used. This is because surface courses have higher bitumen contents, a greater use of polymer modified bitumen (PMB) and often contain high polished stone value (PSV) aggregates, which have generally travelled further to reach the asphalt plant.
- PMBs improve flexibility, strength and resistance to fatigue and deformation to extend the life of the asphalt.
- PMB has higher embodied carbon than standard bitumen but offers benefits such as enhanced durability through increased fatigue resistance, which extends the life of the asphalt and reduces whole-life emissions. Biogenic material, and other additives can also be included that can help further reduce embodied CO2.

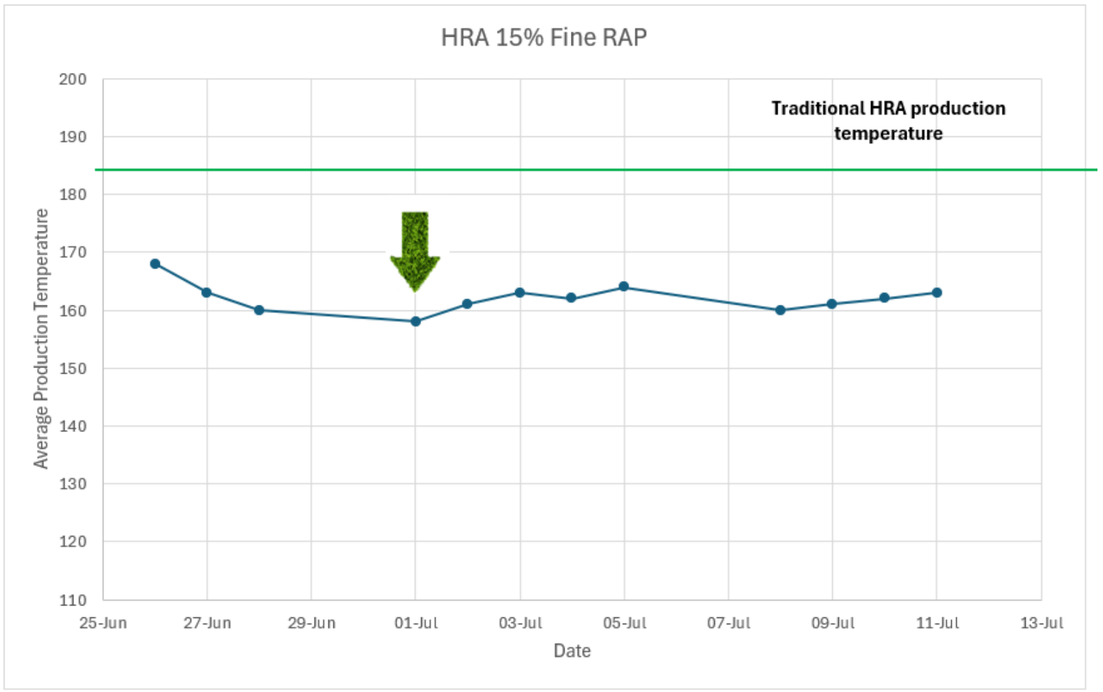
Towards Net Zero



Case Study – M7 Kildare Bypass Pavement Scheme

Sustainable Materials
HRA 35% RAP
HRA 15% RAP



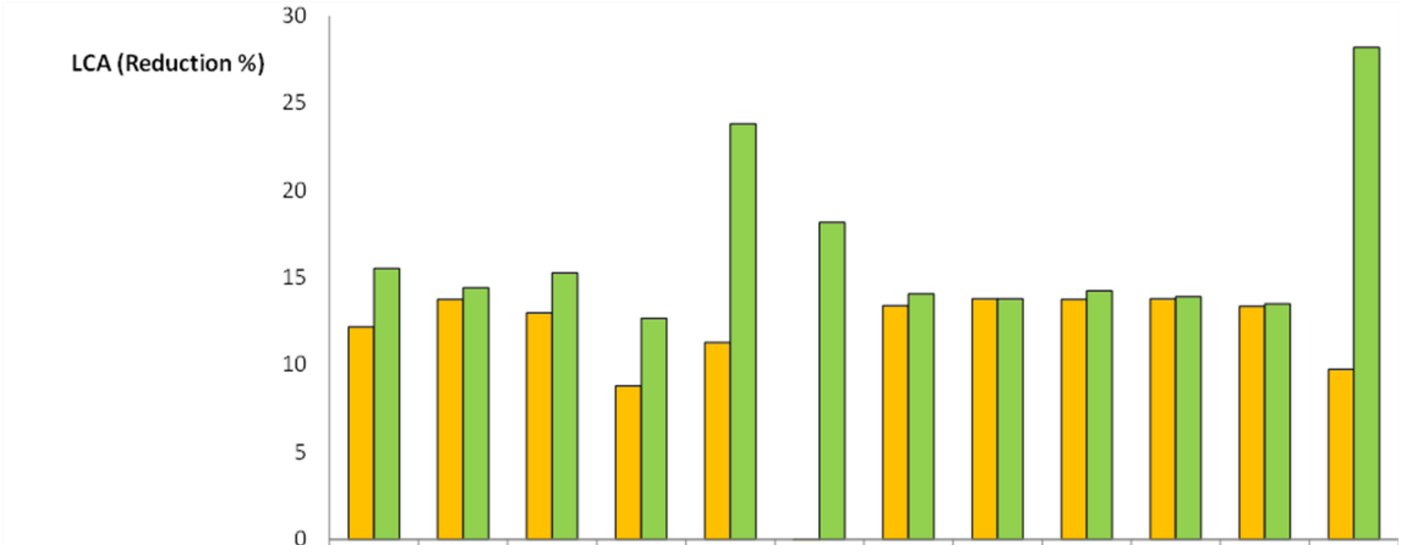


Towards Net Zero

Impact reduction potential of different technologies

Significant reduction in emissions due to the use of RAP. In most cases ranged from 13 % to 13.8 % for the “HMA 15% RAP” in comparison to the “Control” mix.

The use of WMA mixture with addition of 35% RAP resulted in more pronounced results in terms of reduced energy consumption and carbon emissions



	Energy	Water	CO2	NOx	PM10	SO2	CO	Hg	Pb	RCRA	HTP (Cancer)	HTP (Non-cancer)
Control vs. HMA15%RAP	12.2	13.8	13.0	8.8	11.3	-1.9	13.4	13.8	13.8	13.8	13.4	9.7
Control vs. WMA35%RAP	15.5	14.4	15.3	12.7	23.8	18.2	14.1	13.8	14.2	13.9	13.5	28.2

Case Study – M7 Kildare Bypass Pavement Scheme

EPD Comparison

What are EPD's?

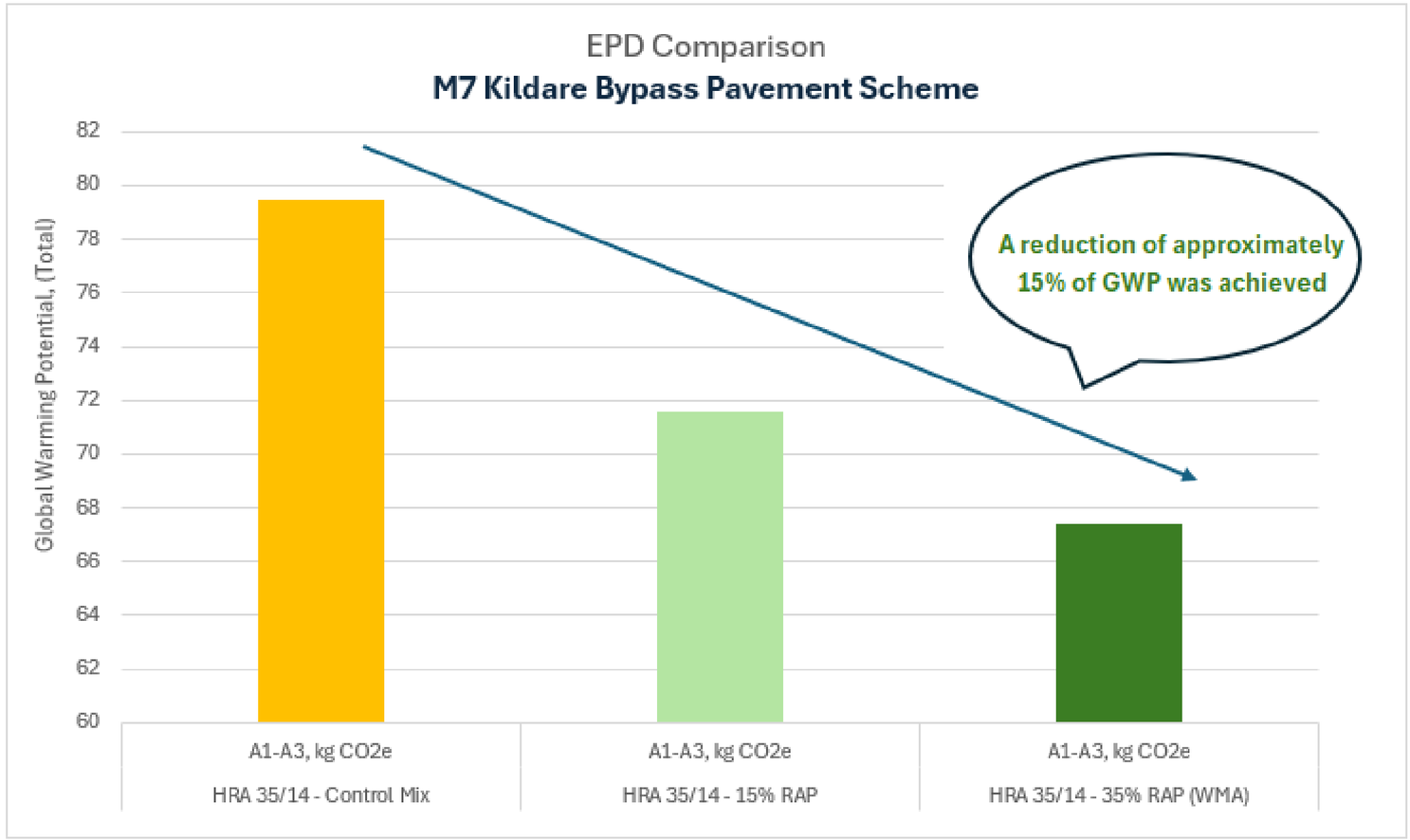
Environmental Product Declarations (EPD) are a standardized way of providing data about the environmental impacts of a product through the product life cycle.

What Are the Benefits of EPDs?

- Provide verifiable and transparent information on life-cycle environmental impact data for materials or products.
- Allow meaningful comparisons of the environmental performance of materials.
- Identify areas for environmental performance improvement, encouraging industry efficiency.

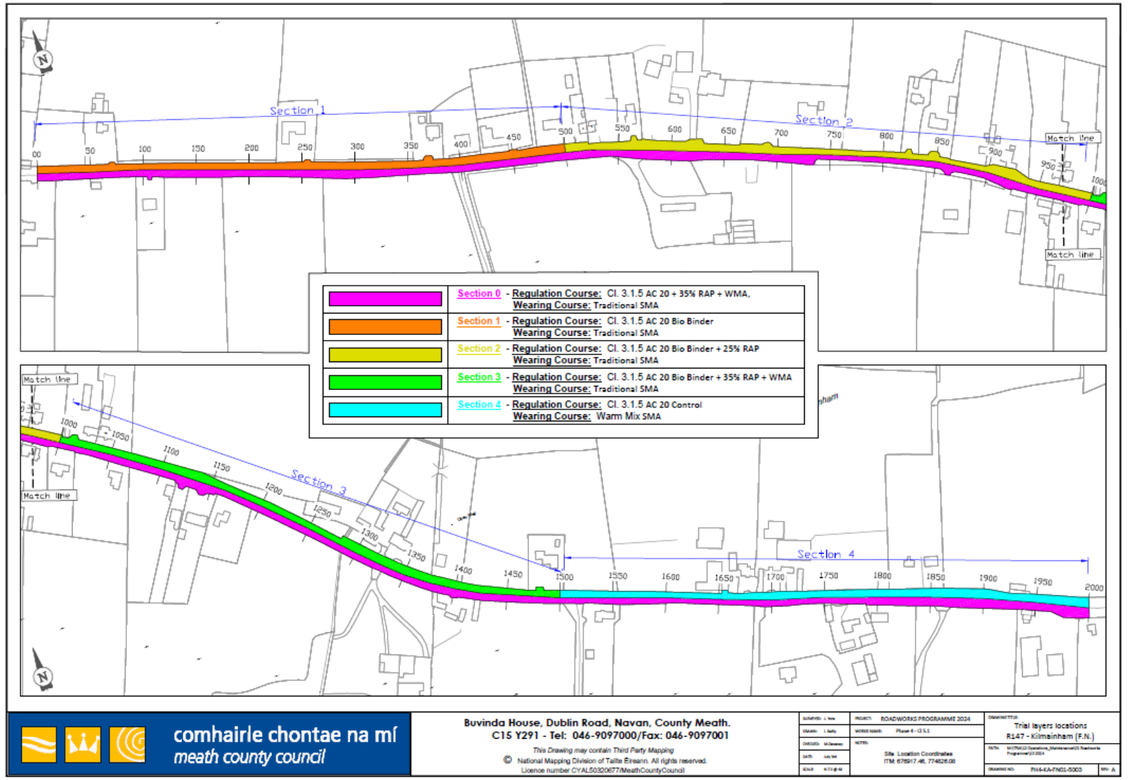
Case Study – M7 Kildare Bypass Pavement Scheme

EPD Comparison



Case Study – R 147 Kilmainham Trial

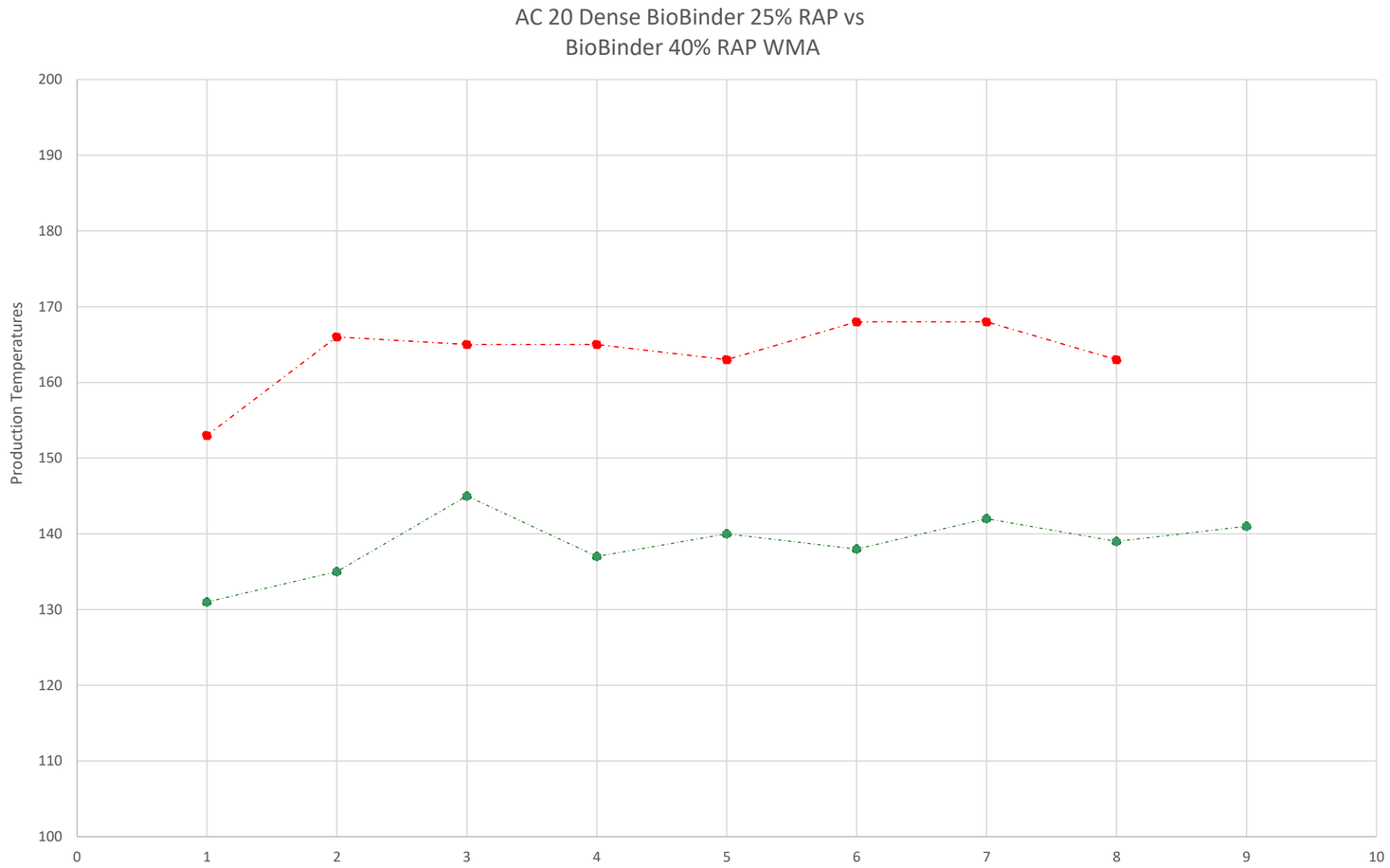
MATERIALS



	Section 1 - **Regulation Course:** Cl. 3.1.5 AC 20 Bio Binder **Wearing Course:** Traditional SMA
	Section 2 - **Regulation Course:** Cl. 3.1.5 AC 20 Bio Binder + 25% RAP **Wearing Course:** Traditional SMA
	Section 3 - **Regulation Course:** Cl. 3.1.5 AC 20 Bio Binder + 35% RAP + WMA **Wearing Course:** Traditional SMA
	Section 4 - **Regulation Course:** Cl. 3.1.5 AC 20 Control **Wearing Course:** Warm Mix SMA

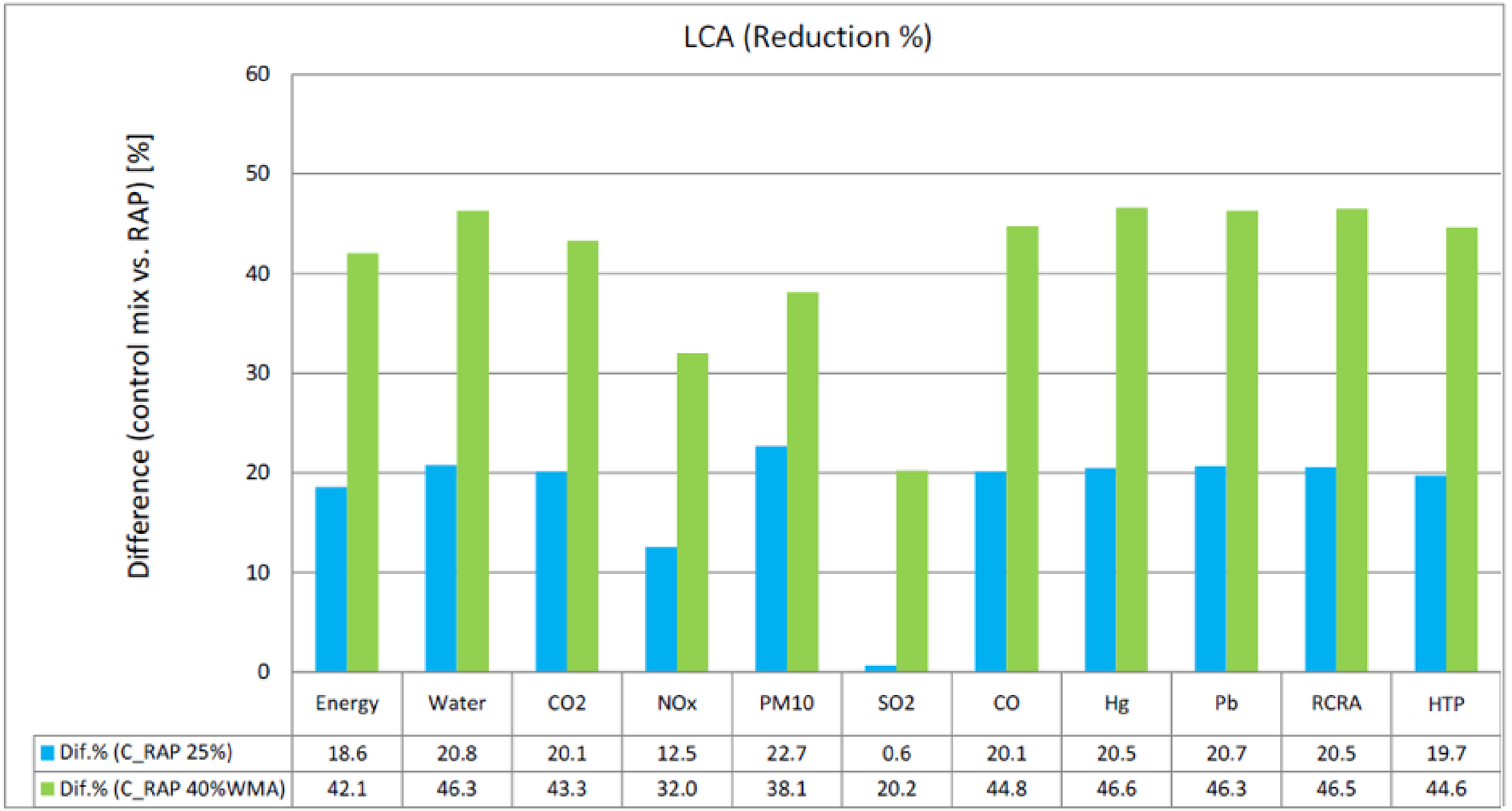
Case Study – R 147 Kilmainham Trial

Sustainable Materials



Case Study – R 147 Kilmainham Trial

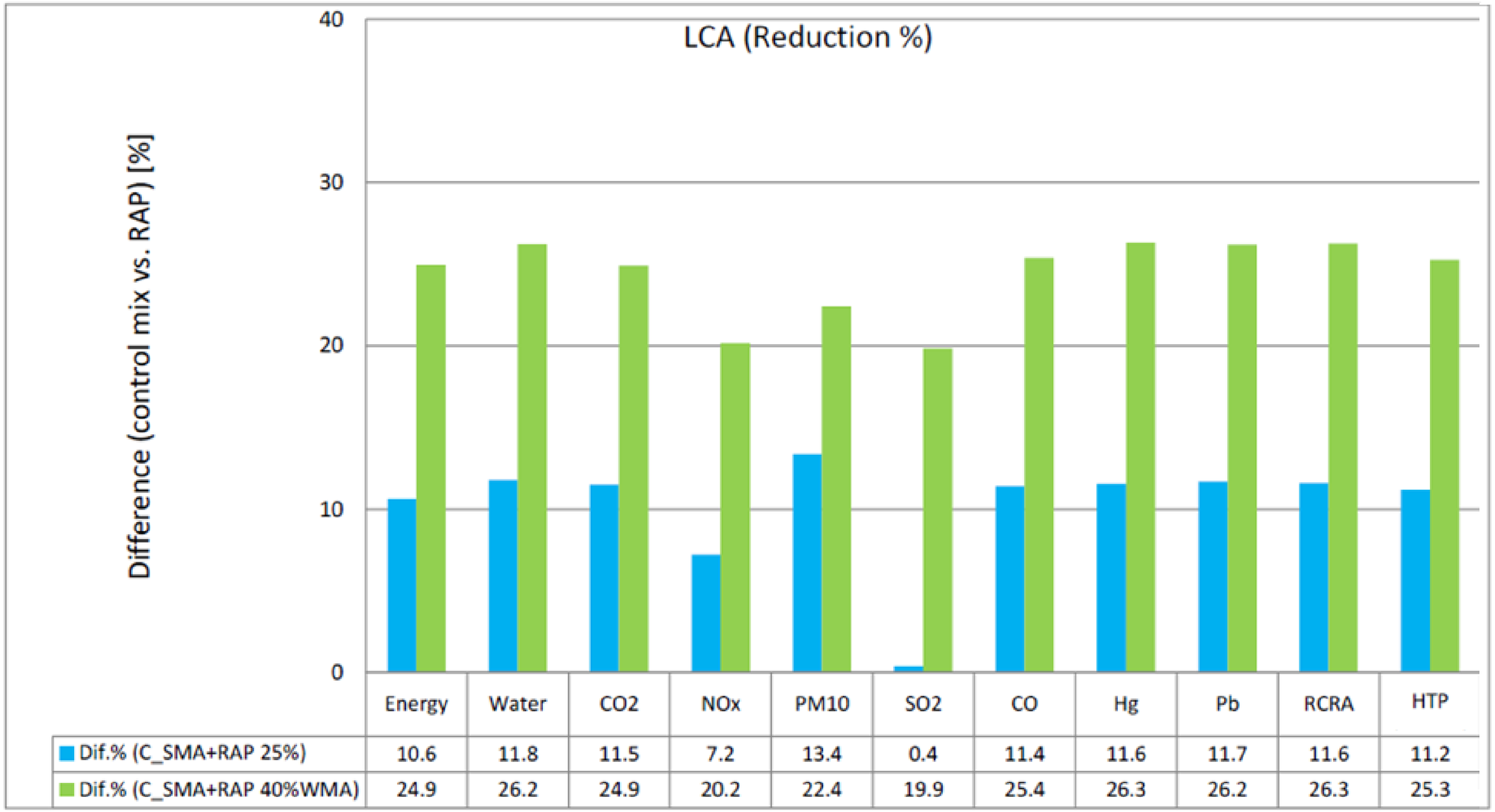
Life Cycle Assessment



	Energy	Water	CO2	NOx	PM10	SO2	CO	Hg	Pb	RCRA	HTP
Dif.% (C_RAP 25%)	18.6	20.8	20.1	12.5	22.7	0.6	20.1	20.5	20.7	20.5	19.7
Dif.% (C_RAP 40%WMA)	42.1	46.3	43.3	32.0	38.1	20.2	44.8	46.6	46.3	46.5	44.6

Case Study – R 147 Kilmainham Trial

Life Cycle Assessment



	Energy	Water	CO2	NOx	PM10	SO2	CO	Hg	Pb	RCRA	HTP
Dif.% (C_SMA+RAP 25%)	10.6	11.8	11.5	7.2	13.4	0.4	11.4	11.6	11.7	11.6	11.2
Dif.% (C_SMA+RAP 40%WMA)	24.9	26.2	24.9	20.2	22.4	19.9	25.4	26.3	26.2	26.3	25.3

Next Steps

The long-term durability of asphalt pavements is a key aspect to sustainability, as longer lifetime means less maintenance, less use of materials, less energy, and certainly, less impacts on the environment.

An asphalt pavement is 100% recyclable, requiring that future recyclability must be ensured when new materials or wastes are added into bitumen.

The asphalt industry is committed to reducing its carbon footprint and different levers are already available to help reduce emissions now.

To maximize the benefits, industry, national government and local authorities need to work together to share successes and promote new innovative methods of road design and construction.

Next Steps

Increase the use of WMAs

Adoption of energy efficiency initiatives, such as the use of warm mix asphalt (WMA) technologies to reduce mix production temperatures.

Increase the use of RAP

Increase use of reclaimed asphalt pavement (RAP) to reduce the impacts of raw material manufacturing.

Bitumen innovation

Use of biobased materials that remove carbon dioxide from the atmosphere during the life of the feedstock material, then sequester biogenic carbon into the pavement.

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Thank you

Sustainable Pavement Design and Construction – A Case Study

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Update on the new Road Safety Audit standard

Martin Deegan, CEng, TRAFFICO

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Title:

Update to The Road Safety Audit Standard

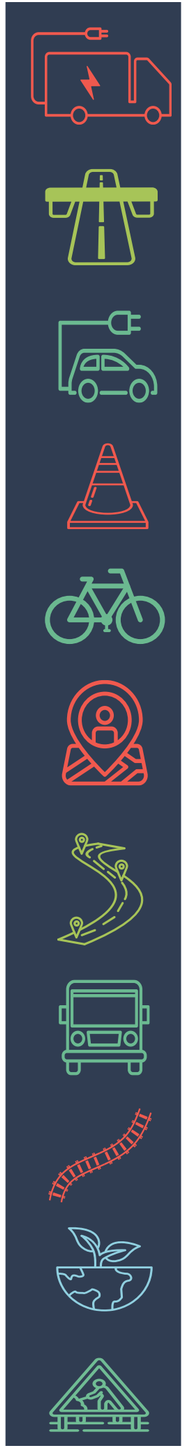
Speaker:

Martin Deegan
traffico

Update to the Road Safety Audit Standard

Topics Coverage

- Which Standards Are Being Updated
- Why Do We Need an Update?
- Overview of Changes to the Road Safety Audit Standards
- Remedies Being Sought for Specific Problem Areas
- The New Road Safety Audit Approval System
- Road Safety Auditor Training



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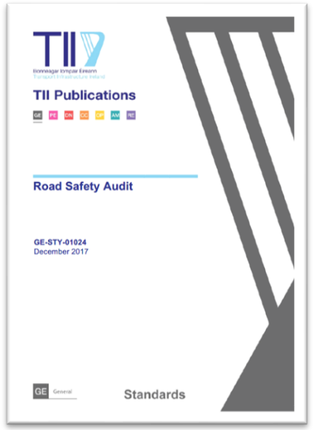
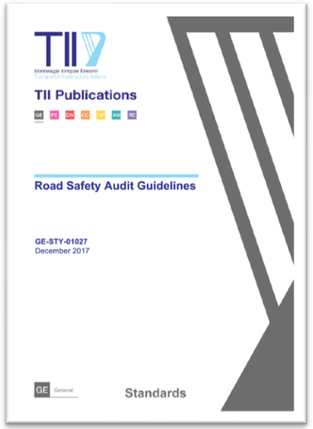
Which Standards Are Being Updated



Standard Name: **GE-STY-01024 Road Safety Audit**

Published: **December 2017**

This Standard sets out the **requirements** for Road Safety Audits on the National Road Network.



Standard Name: **GE-STY-01027 Road Safety Audit Guidelines**

Published: **December 2017**

This Guideline sets out the **process** for undertaking Road Safety Audits on the National Road Network.

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Why Do We Need an Update?

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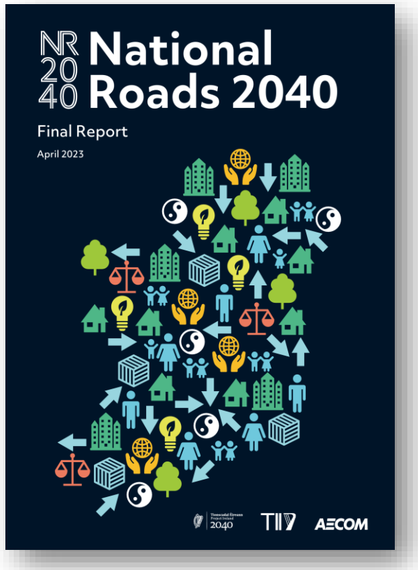
Compliance European Regulations & Irish Law

- **Europe: RISM Directive 2019 / 1936** – (Road Safety Infrastructure Management management) Safe Systems approach to minimising fatalities.
- **Europe: Ten T Directive 2024/1679** – improvement of quality of services, social conditions for transport workers and accessibility for all users.
- **Ireland: S.I. No. 612/2021** - European Communities (Road Infrastructure Safety Management) Regulations 2021. Now specifically applies to all road users, including vulnerable road users.

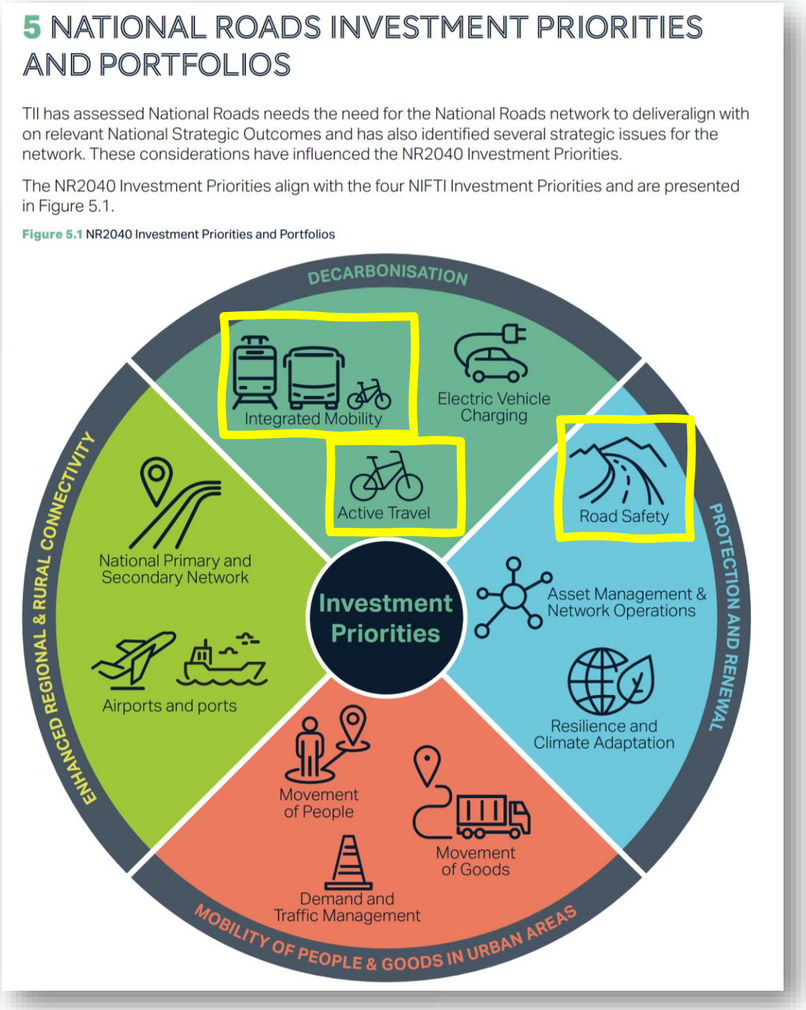
Why Do We Need an Update?

Meet Objectives Set Out in National Roads 2040 (April 2023)



The Road Safety Audit Standards will be updated to reflect Government prioritisation of:

- Road Safety
- Integrated mobility
- Active Travel

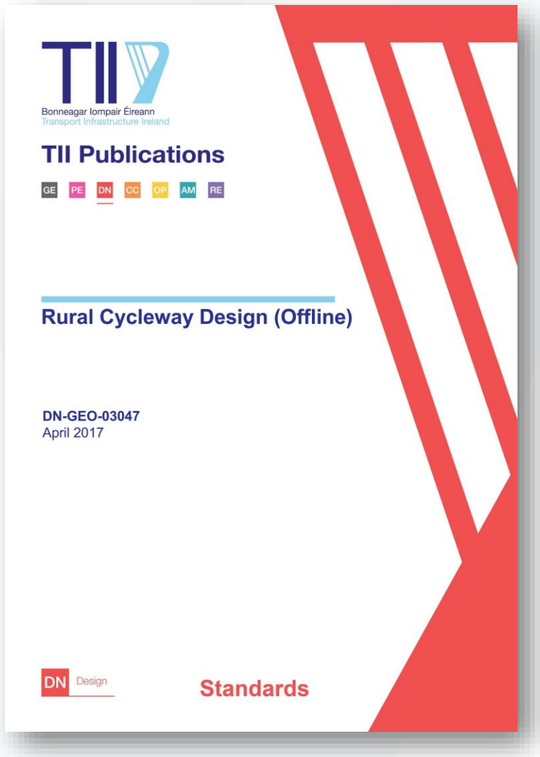


Why Do We Need an Update?

Making Provision for TII's Responsibility to Deliver Greenways

The current Road Safety Audit Standards do not provide practitioners with sufficient direction relating to:

- Greenways
- Or the Rural Cycle Network

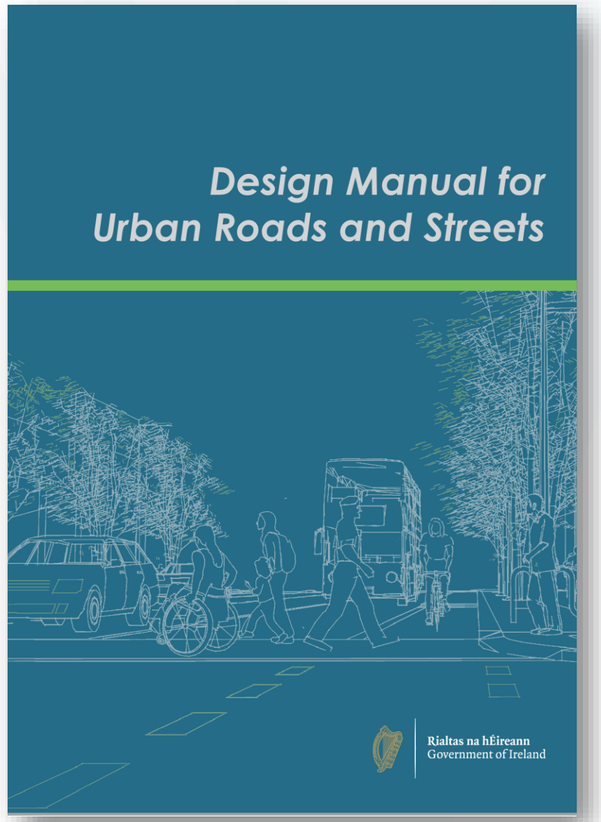


Why Do We Need an Update?

Urban Renewal or DMURS Schemes – Protecting the National Road Network

To ensure impacts on National Road Network are minimised, the revised Road Safety Audit Standards will offer guidance on how to successfully accommodate:

- Urban renewal schemes.
- DMURS Schemes.
- The DoT **NGS Circular 3 of 2022** which sets out the essential common requirement for RSA's & QA's on public roads in Ireland.

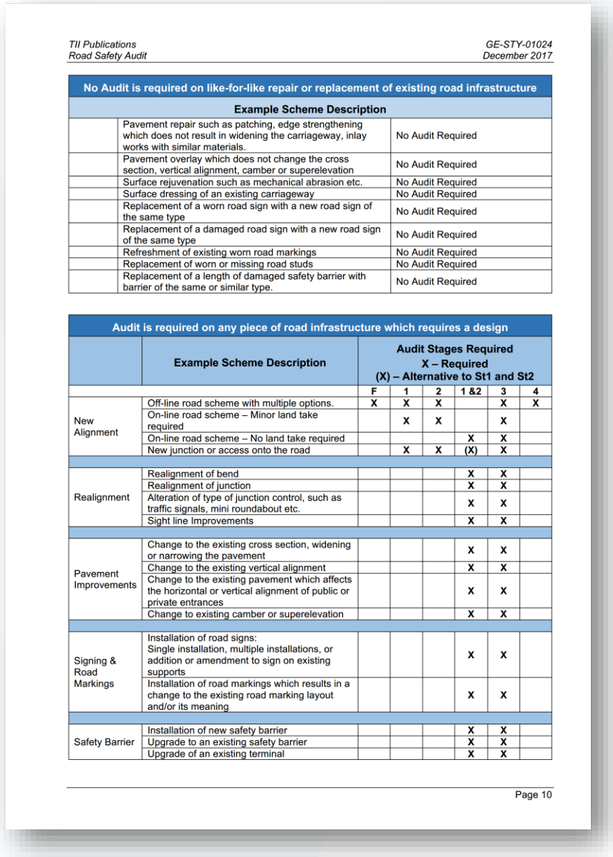


Road Safety Audit (GE-STY-01024)

Changes to Appendix A: Scheme Type & Audit Stage

A considerable amount of the standard changes are likely to focus on Appendix A. This will include:

- Compliance with Appendix A will become a mandatory requirement for schemes which effect National Roads.
- A reduction in schemes suitable for **Stage 1&2** Audits.
- More schemes types being considered for **Stage F** Audits
- Clarification on RSA Stages required for Active Travel Schemes.



TII Publications *GE-STY-01024*
Road Safety Audit *December 2017*

No Audit is required on like-for-like repair or replacement of existing road infrastructure		
Example Scheme Description		
	Pavement repair such as patching, edge strengthening which does not result in widening the carriageway, inlay works with similar materials.	No Audit Required
	Pavement overlay which does not change the cross section, vertical alignment, camber or superelevation	No Audit Required
	Surface rejuvenation such as mechanical abrasion etc.	No Audit Required
	Surface dressing of an existing carriageway	No Audit Required
	Replacement of a worn road sign with a new road sign of the same type	No Audit Required
	Replacement of a damaged road sign with a new road sign of the same type	No Audit Required
	Refreshment of existing worn road markings	No Audit Required
	Replacement of worn or missing road studs	No Audit Required
	Replacement of a length of damaged safety barrier with barrier of the same or similar type.	No Audit Required

Audit is required on any piece of road infrastructure which requires a design								
	Example Scheme Description	**Audit Stages Required X – Required (X) – Alternative to St1 and St2**						
		F	**1**	**2**	**1 &2**	**3**	**4**	
New Alignment	Off-line road scheme with multiple options.	X	X	X		X	X	
	On-line road scheme – Minor land take required		X	X		X		
	On-line road scheme – No land take required				X	X		
	New junction or access onto the road		X	X	(X)	X		
Realignment	Realignment of bend				X	X		
	Realignment of junction				X	X		
	Alteration of type of junction control, such as traffic signals, mini roundabout etc.				X	X		
	Sight line Improvements				X	X		
Pavement Improvements	Change to the existing cross section, widening or narrowing the pavement				X	X		
	Change to the existing vertical alignment				X	X		
	Change to the existing pavement which affects the horizontal or vertical alignment of public or private entrances				X	X		
	Change to existing camber or superelevation				X	X		
Signing & Road Markings	Installation of road signs: Single installation, multiple installations, or addition or amendment to sign on existing supports				X	X		
	Installation of road markings which results in a change to the existing road marking layout and/or its meaning				X	X		
Safety Barrier	Installation of new safety barrier				X	X		
	Upgrade to an existing safety barrier				X	X		
	Upgrade of an existing terminal				X	X		

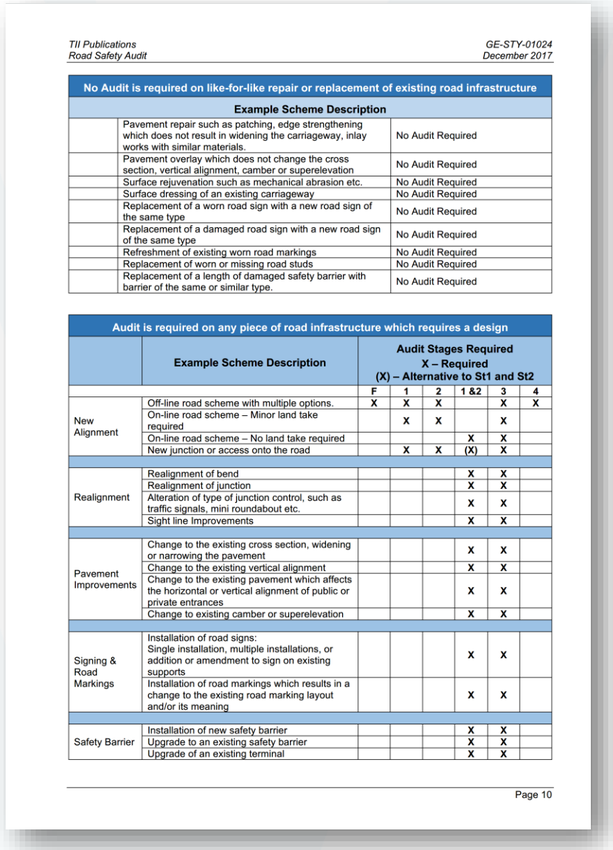
Page 10

Road Safety Audit (GE-STY-01024)

Changes to Appendix A: Scheme Type & Audit Stage

A considerable amount of the standard changes will focus on Appendix A. This will include:

- **Road Safety Impact Assessment** will now become part of the Stage F suite of Audits.
- Clarification on RSA Stages required for **Private Developments Schemes**.
- Greater clarity provided on how other **State Agency Schemes** which impact upon National Roads should be audited.



TII Publications *GE-STY-01024*
Road Safety Audit *December 2017*

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New Alignment	Off-line road scheme with multiple options.	X	X	X		X	X	
	On-line road scheme – Minor land take required		X	X		X		
	On-line road scheme – No land take required				X	X		
	New junction or access onto the road		X	X	(X)	X		
Realignment	Realignment of bend				X	X		
	Realignment of junction				X	X		
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Signing & Road Markings	Installation of road signs: Single installation, multiple installations, or addition or amendment to sign on existing supports				X	X		
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	Upgrade of an existing terminal				X	X		

Page 10

Road Safety Audit Standards

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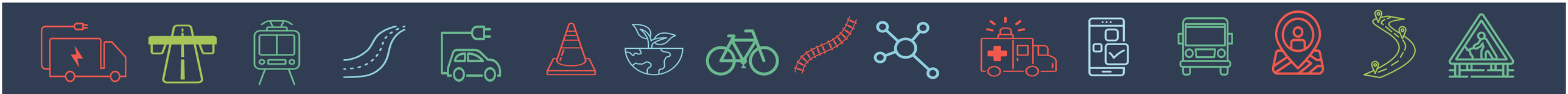
General Issues Being Addressed in the Revised RSA Standard

- Clarifications on the Road Safety Audit Process i.e. terminology, the role of the Client, Designer and Audit Team, Exception Reports etc.
- The essential need for the Road Safety Audit Feedback form to be completed by the Designer, Audit Team Leader and Client.
- Effectively managing impacts of private development and other State Agency schemes on the TII National Road Network.



The Road Safety Audit Approval System (RSAAS)

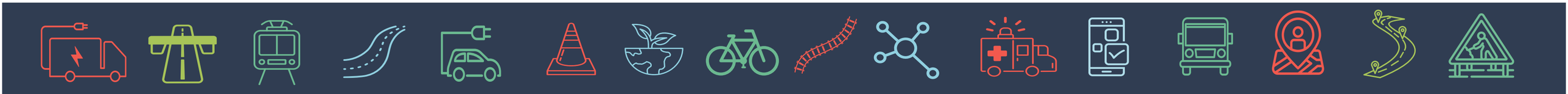
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Functions of the RSAAS

The (RSAAS) manages 2 primary functions:

1. Validation of Safety Auditors to undertake Audits on the National Network.

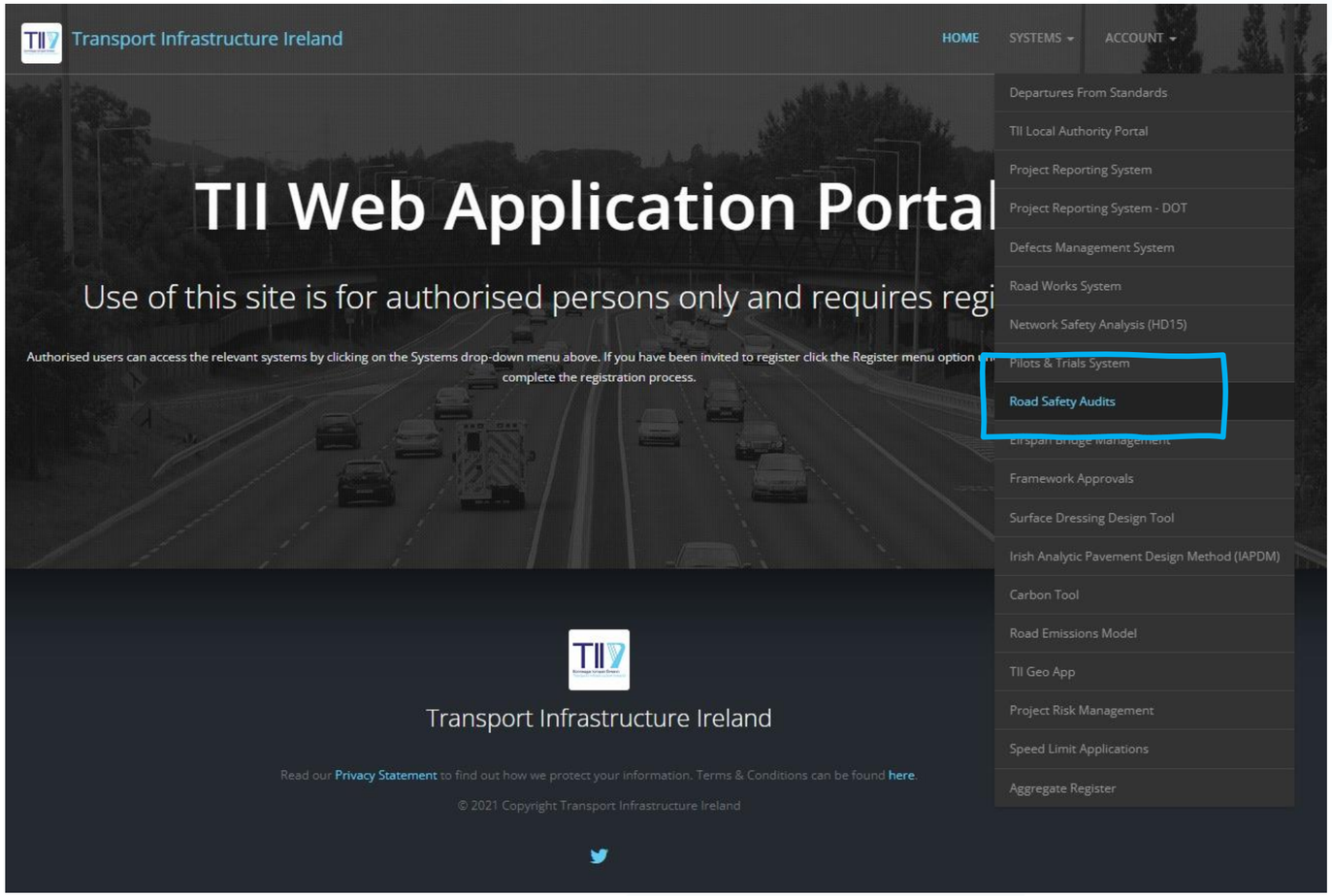
2. Approval of Audit Teams for proposed audits on National Roads.



The Road Safety Audit Approval System (RSAAS)

How to Register using the RSAAS

- Go to TII Web Application Portal: https://web.tii.ie/index.html
- Select '**Road Safety Audits**' from the drop-down menu.



The Road Safety Audit Approval System (RSAAS)

How to Register using the RSAAS

- Select ‘Request Access’ to commence the registration process.

The Road Safety Audit Approval System (RSAAS)

Closing Points on the RSAAS

- The Client (scheme creator), Designer, Audit Team Leader & Audit Team Member must be separate individuals i.e. cannot complete dual roles in the RSAAS.

- The Client, Designer, Audit Team Leader & Audit Team Member have to complete the registration process for the RSAAS to be available for selection.

- The Audit Team Leader and Audit Team Member also have to be approved by TII for the completion of road safety audits on National Roads. This process is completed by the auditors and TII Road Safety on the RSAAS.

Road Safety Auditor Training Opportunities

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Road Safety Audit Team Member Training

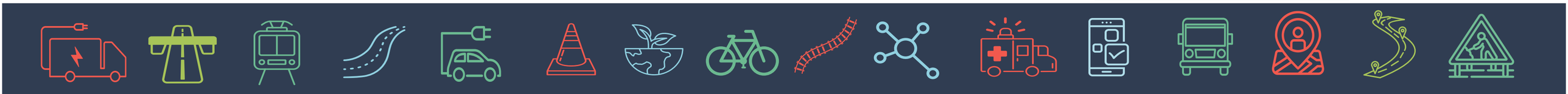
Contact Traffico for the Practical Road Safety Auditing Course:

- Email: hello@traffico.ie
- Web: https://traffico.ie/Traffico-training-mainpage.html

Road Safety Audit Team Leader Training

Contact ITS Sligo for the Certificate in Road Safety Audit & Engineering:

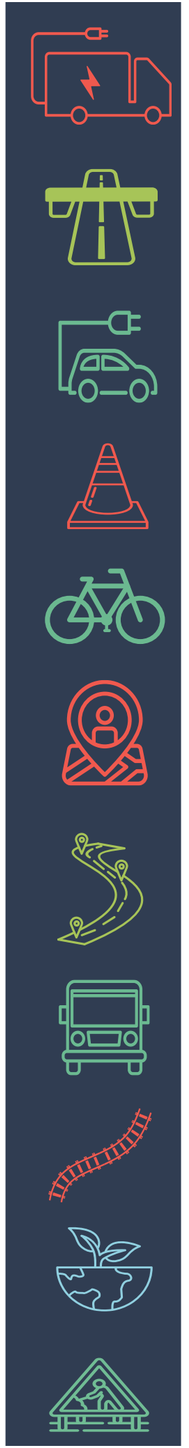
- Email: admissions.sligo@atu.ie
- Web: https://www.itsligo.ie/courses/certificate-in-road-safety-audit-and-engineering/



Update to the Road Safety Audit Standards

What Did We Cover?

- Which Standards Are Being Updated
- Why Do We Need an Update?
- Overview of Changes to the Road Safety Audit Standards
- Remedies Being Sought for Specific Problem Areas
- The New Road Safety Audit Approval System
- Road Safety Auditor Training



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Transport Infrastructure Ireland

Thank you for listening!

Martin Deegan

traffico
ROAD SAFETY ENGINEERING

e: hello@traffico.ie
w: www.traffico.ie

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Transport Infrastructure Ireland

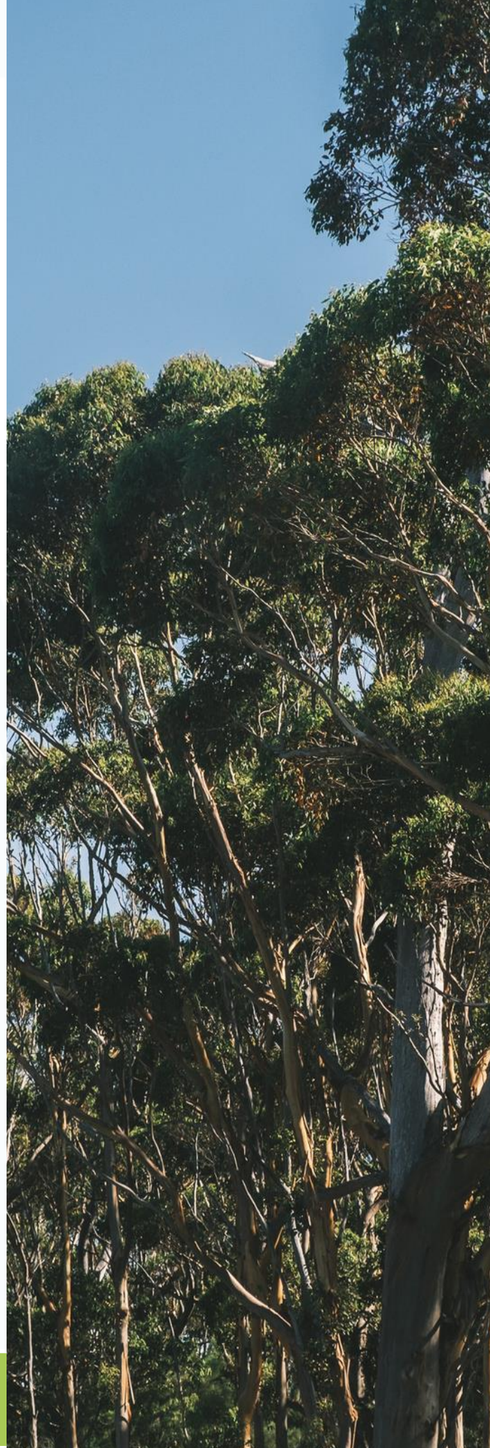
An introduction to Ireland's Supply Chain Sustainability School

Pamela Sheridan, Operations Manager, Supply Chain Sustainability School

SUPPLY CHAIN SUSTAINABILITY SCHOOL

Fostering Sustainability in the Construction Industry: Insights from the Supply Chain Sustainability School

Pamela Sheridan



Overview

- Introduction to the School
- Key Initiatives and Partnerships
- Membership and Community Engagement
- Education and Resources

Introduction to the School

The Supply Chain Sustainability School was established to address a critical need for sustainability education within the construction industry.

Our goal is to share knowledge that spans across various sustainability topics, directly impacting how we approach construction projects today.

An industry where everyone will have the skills and knowledge to deliver a sustainable future.

Values

Our approach is founded on four shared values:

01

Collaborative

We share knowledge and resources.

02

Impactful

We deliver measurable benefits.

03

Inspirational

We inspire and enable our industry to drive positive change.

04

Inclusive

We exemplify respect for the planet, our colleagues and wider society.

The Structure of the School

Led by Partners who guide strategic decisions.

Partners actively shape the School's daily operations and development.

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Transport Infrastructure Ireland

Current Partners

ARUP

CAIRN

CONSTRUCTION INDUSTRY FEDERATION

ESB Energy for generations

Gas Networks Ireland

Glenveagh

Iarnród Éireann Irish Rail

IPUT REAL ESTATE DUBLIN

PAUL John Paul Construction

Kingspan

kirby engineering & construction

MURPHY WORLD-CLASS INFRASTRUCTURE

PARK DEVELOPMENTS

roadstone A CRH COMPANY

SAINT-GOBAIN

BUILDERS SISK CONTRACTORS

Skanstec POWERING THE FUTURE

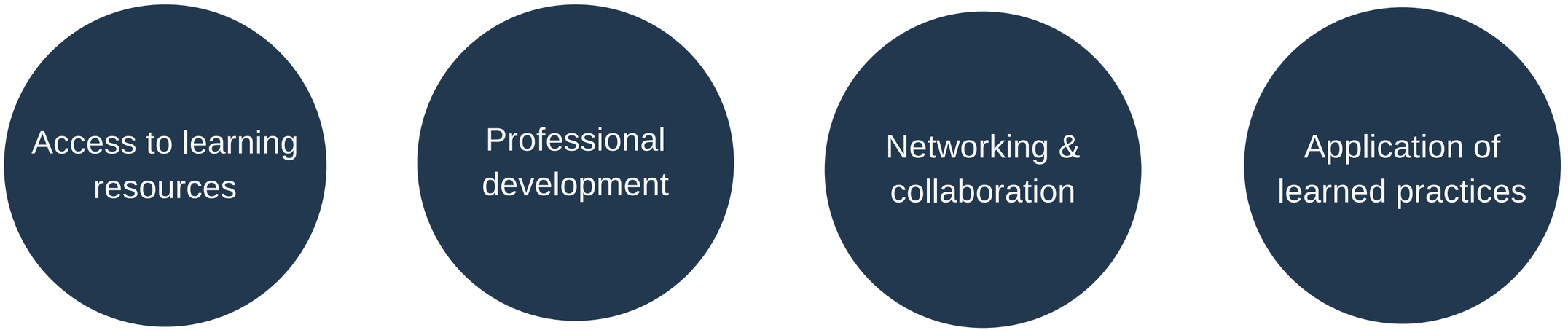
TII Bonneagar Iompair Éireann Transport Infrastructure Ireland

Uisce Éireann Irish Water

TII Bonneagar Iompair Éireann Transport Infrastructure Ireland

Membership

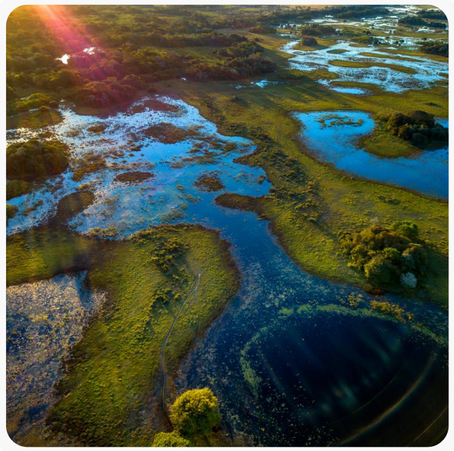
Membership in the Supply Chain Sustainability School provides free access to a wide range of learning resources designed to enhance understanding and implementation of sustainability practices in the built environment.



How to Join and Benefit from the School

The journey from signing up to leveraging the full suite of benefits the Supply Chain Sustainability School offers is designed to be straightforward and impactful, focusing on practical tools and resources that support continuous sustainability growth.

Sustainability Learning Overview



Introduction to Biodiversity

Sustainability Strategy

Introduction to Climate Change and Carbon

Community Engagement

Case study: Sisk

Leading Sustainability Through Collaboration

Sisk’s Sustainability Ambition:

- Lead industry in sustainable operation management.
- Partnerships with supply chains; sharing sustainability goals.
- Focus on lifecycle sustainability from project inception to completion.

Sisk’s Role in Supply Chain Sustainability School:

- Integral in establishing the School for industry-wide upskilling.
- Promotes webinars, workshops, and engagement for workforce development.
- Advocates for the industry’s transition to a sustainable, carbon-free future.

Next Steps: Engage with our sustainability initiative

Individuals & Organizations:

Register and complete a confidential self-assessment to identify learning areas for targeted sustainability education.

Prospective Partners

Submit an inquiry to discuss and potentially collaborate on sustainability initiatives.

Engage

Access specialized resources and opportunities for education, professional development, and collaboration for wider environmental and social impact.

THANK YOU

SUPPLY CHAIN SUSTAINABILITY SCHOOL

01 5240891

info@supplychainschool.ie

www.supplychainschool.ie

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Speed Limit Review (2023) and implementation

John McCarthy, Senior Advisor, Roads, Department of Transport

Speed Limits Ireland 2024

John McCarthy (DoT)

4 October 2024

Background

Road Network

National Roads

(Motorways, National Primary, National Secondary)

Strategic, Longer journeys, Substantially designed with safety systems but some Legacy, Higher Speeds

Regional Roads

Medium journeys, Some designed with safety systems but mostly Legacy, Medium Speeds

Local Roads

(Local Primary, Local Secondary, Local Tertiary)

Shorter journeys, Substantially legacy with little designed, Lower Speeds

Active Travel Users

Pedestrians and Cyclists

Framework – Legislation & Guidelines

VISION ZERO

Road Traffic Act 1961, Road Traffic Act 2004, Road Traffic and Roads Act 2023 - Speed Limit Guidelines & Directions

Speed limit guidelines

10D. (1) The Minister may issue guidelines relating to the making of special speed limit bye-laws, road works speed limit orders and variable speed limit schemes and may amend or cancel any such guidelines.

(2) Where guidelines under subsection (1) are, for the time being in force, a county council, city council or the National Roads Authority, as the case may be, shall ensure when they are making any special speed limit bye-laws, road works speed limit orders or variable speed limit schemes that such bye-laws, order or schemes are in accordance with such guidelines.

(3) Any guidelines issued by the Minister under section 9(9) that are in force on the day on which this subsection comes into force shall be deemed to have been made under this section.

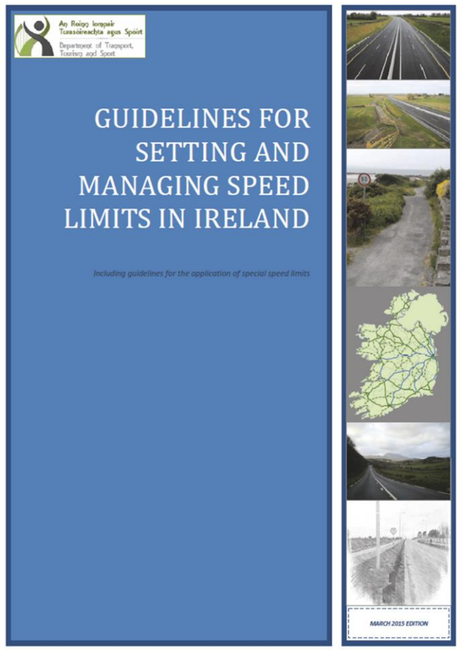
Ministerial policy directions in relation to certain speed limits

10E. (1) The Minister may, from time to time, give policy directions in writing to a county council, city council or the National Roads Authority with regard to any of its functions that relate to the application and operation of special speed limits, road works speed limits, or variable speed limits and a county council, city council and the National Roads Authority shall comply with any such direction.

(2) Notice of any direction given under subsection (1) and details of it shall be—

(a) laid before each House of the Oireachtas, as soon as may be, after it has been given, and

(b) published in *Iris Oifigiúil* and on a website operated by or on behalf of the Department of Transport not later than 21 days of it being given.".



Previous and Current System of Speed Limits

- Default Speed Limits
- Special Speed Limits (Locally Set, Reserved Function)
    - Periodic Speed Limits
- Roadworks Speed Limits (Locally Set, Executive Function)
- Variable Speed Limits (Updated 2023) National Managed Roads only

- Metrication in 2005
- Regional and Local Roads reduced in 2005
  Most rural roads have had default speed limit reduced to 80km/h from 100km/h in 2005. (90,000km approx.)

- Reduction in some Defaults 2024

Pre 2005				48.2 30 (D – U)	64.4 40		80.5 50		96.6 60 (D – R)		112.3 70 (D – M)
Current	**20** 12.4	**30** 18.6	**40**	**50** 31.0 (D - U)	**60** 37.28		**80** 49.7 (D – R, RL)		**100** 62.13 (D - N)		**120** 74.6 (D - M)
Proposed	**20**	**30** (D - U)	**50**	**50**	**60** (D RL)	**70** (VSL)	**80** (D – R, NS)	**90** (VSL)	**100** (D – NP)	**110** (VSL)	**120** (D – M)

- Permitted Speed Limits in BOLD
- mp/h in RED
- km/h in BLACK

Policy Background

Programme for Government

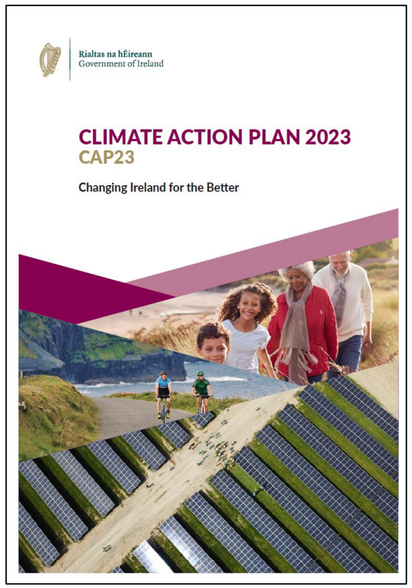
- Review and reduce speed limits where appropriate to address both road safety issues and carbon emissions and we will ensure greater compliance. (Page 12)

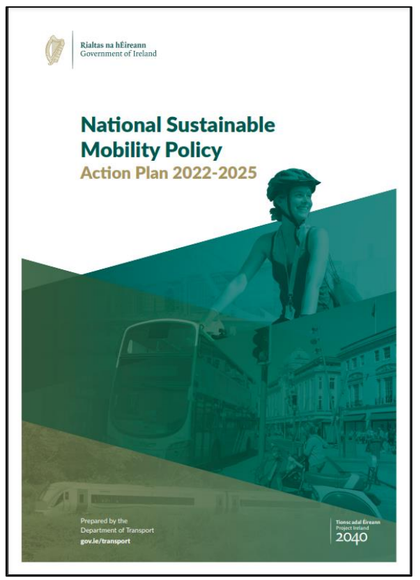
Ireland Strategies

- Road Safety Strategy
- Climate Action Plan
- Sustainable Mobility

International

- Vision Zero
- RISM Directive
- **TEN-T Directive**
- **ISA**
- UN





Background: Government Policy – Road Safety Strategy

- Road Safety Strategy - Safe System Intervention Pillar: Safe Speeds

6.	Establish a working group to examine and review the framework for the setting of speed limits. As part of this review there will be a specific consideration of the introduction of a 30kph default speed limit in urban areas.	Department of Transport, Road Safety Authority	DoT Principal, Director - Road Safety, Research & Driver Education	Q4 2022	AGS, TII, CCMA / LA's, NTA
7.	Establish a task force to share data and information on speeding, make recommendations and urgently implement any further measures identified to reverse the trend of non-compliance.	Road Safety Authority	Director - Road Safety, Research & Driver Education	Q4 2022	DoT, AGS, TII, CCMA / LA's

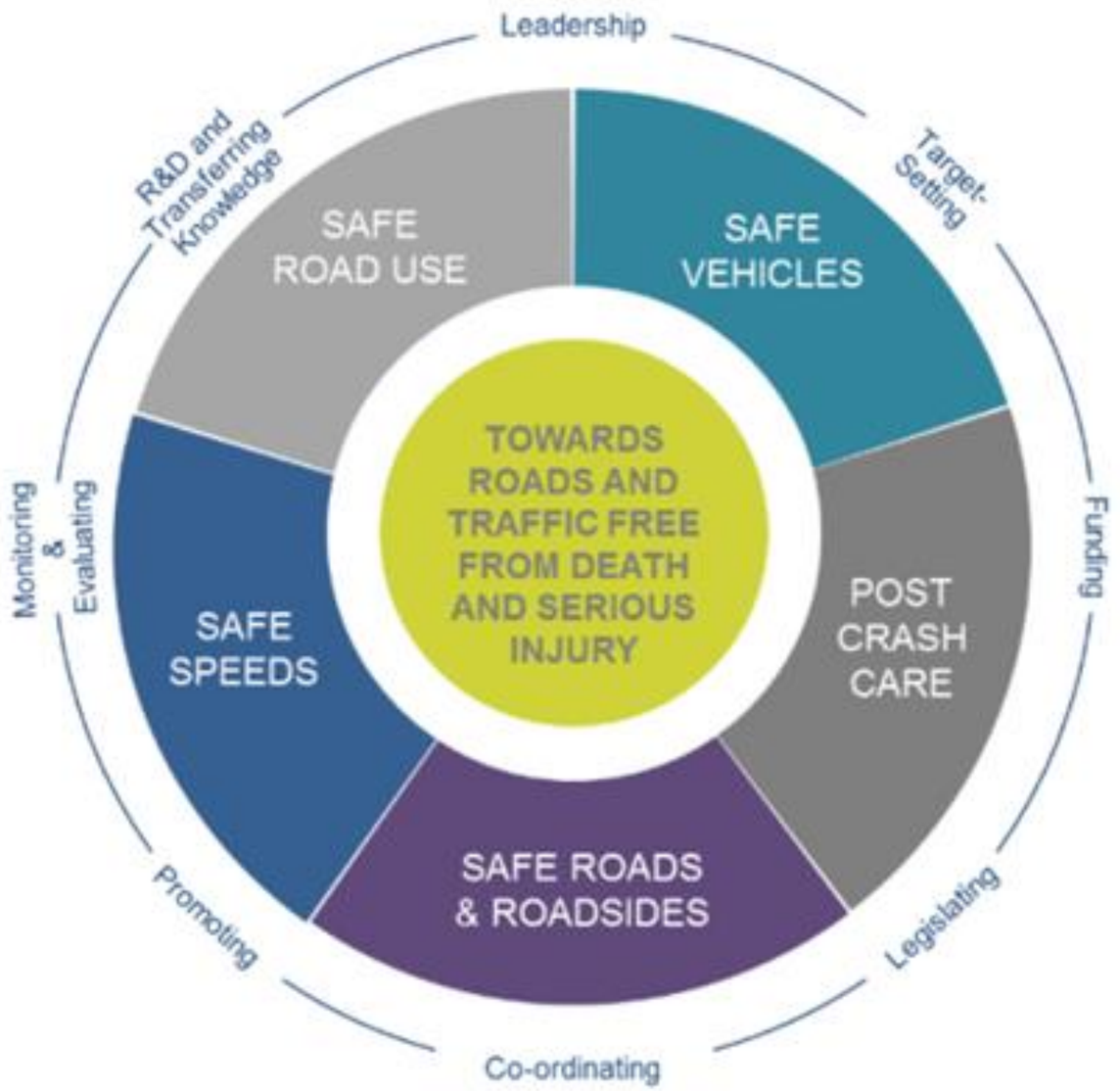
- Other RSS Relevant Actions

8.	Expand speed management measures on National, Regional and Local roads using Periodic Speed Limits at schools, Vehicle Activated Signs and Average Speed Cameras in collaboration with An Garda Síochána at appropriate high-risk locations.	Department of Transport, Transport Infrastructure Ireland, National Transport Authority	DoT Principal, CEO TII, CEO NTA	Q4 2024	CCMA / LA's, AGS, RSA
53.	Examine the implications of the installation of median barriers on roads with speed limits of 80kmh or more and make recommendations. (SPI 1)	Department of Transport, Transport Infrastructure Ireland	DoT Principal, CEO TII	Q4 2024	CCMA / LA's

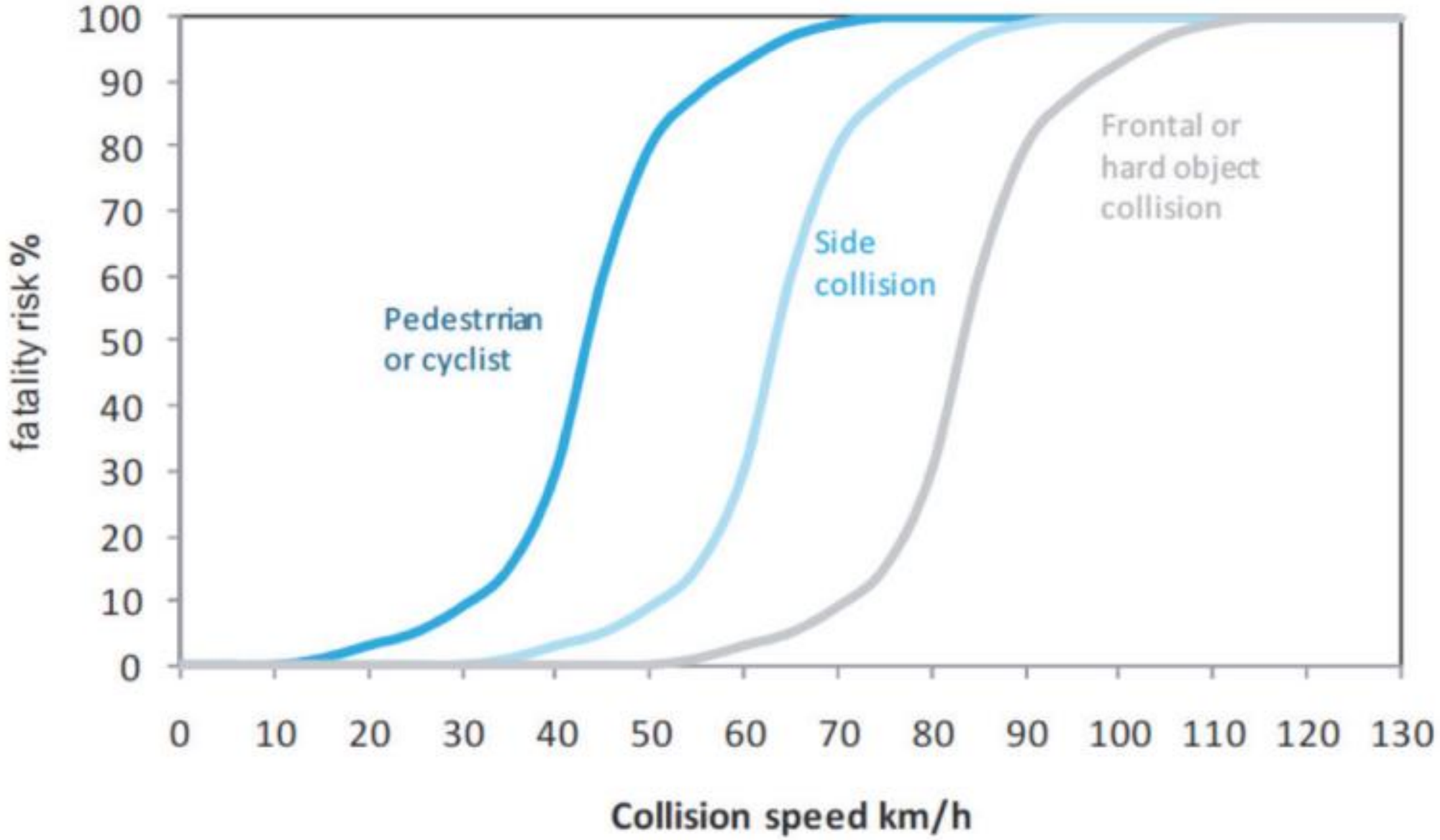
Background: Safe Systems

Coordination

Embedded into legislation
Embedded into other policy areas
Embedded into standards



Background: Collision Risk

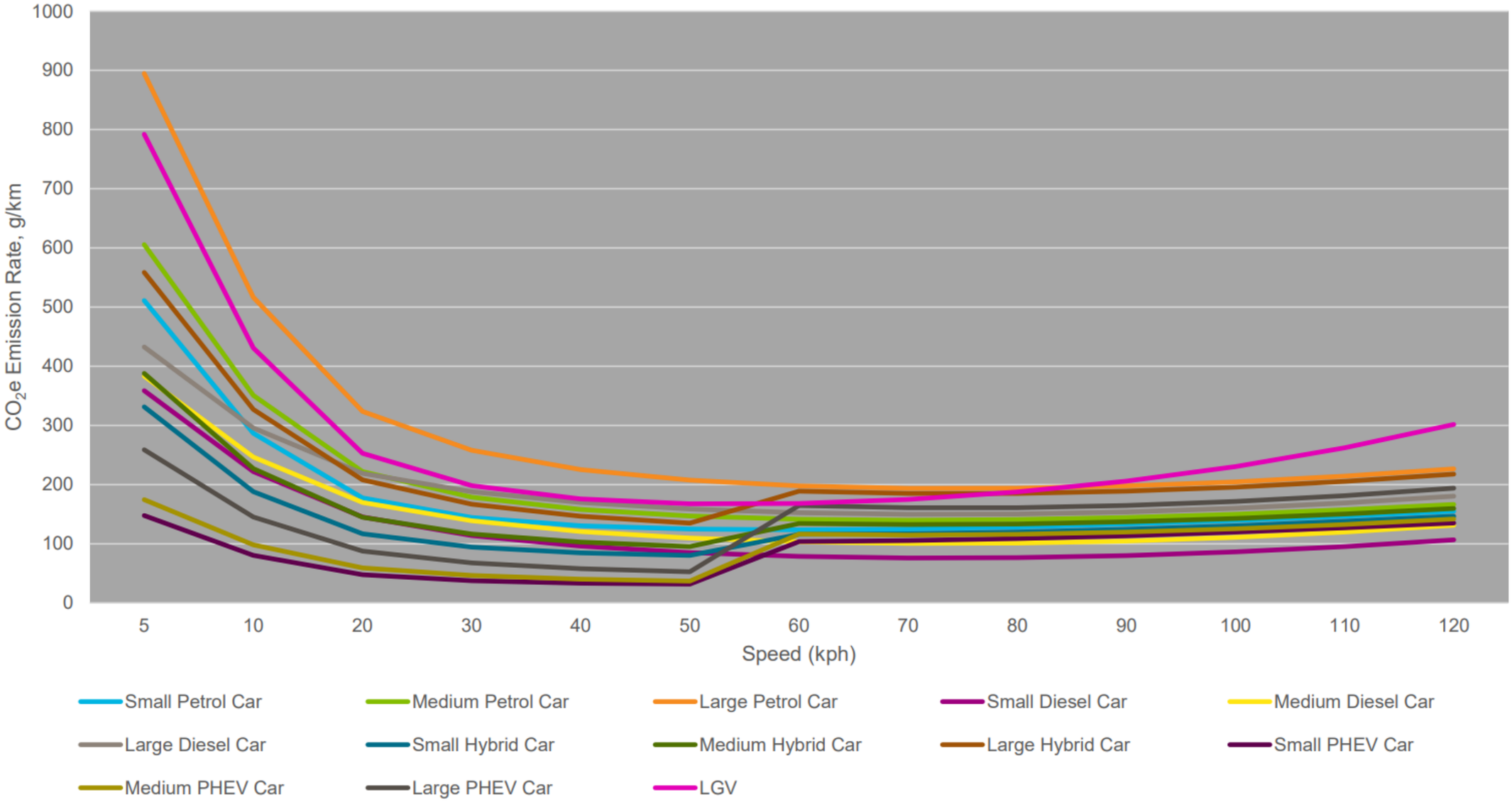


Background: Collision Risk

- Collision Risk
- Interaction (Conflict) with other users
- Active Travel Users
- Junctions / Intersections
- Dividing Roads

Potential conflicts and requirements associated with	Safe speed (km/h)
Possible conflicts with vulnerable road users in home zones (no foot paths and pedestrians using the carriageway)	15
Possible conflicts with vulnerable road users on roads and at intersections, including situations with bike lanes or advisory bike lanes	30
No conflicts with vulnerable road users, except with helmet-protected riders of motorised two-wheelers (mopeds on the carriageway). Possible right-angle conflicts between motorised vehicles, possible frontal conflicts between motorised vehicles. Stopping sight distance ≥ 47 m	50
No conflicts with vulnerable road users No right-angle conflicts between motorised vehicles, possible frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 2.5 m, (semi)hard shoulder Stopping sight distance ≥ 64 m	60
No conflicts with vulnerable road users No right-angle conflicts between motorised vehicles, possible frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 4.5 m, (semi)hard shoulder Stopping sight distance ≥ 82 m	70
No conflicts with vulnerable road users No right-angle or frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 6 m, (semi)hard shoulder Stopping sight distance ≥ 105 m	80
No conflicts with vulnerable road users No right-angle or frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 10 m, hard shoulder Stopping sight distance ≥ 170 m	100
No conflicts with vulnerable road users No right-angle or frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 13 m, hard shoulder Stopping sight distance ≥ 260 m	120
No conflicts with vulnerable road users No right-angle or frontal conflicts between motorised vehicles Obstacles shielded or obstacle-free zone ≥ 14.5 m, hard shoulder Stopping sight distance ≥ 315 m	130

Background: Relationship between Speed and Emissions



Key Points

- Safe Systems (Vision Zero)
  - TEN-T, RISM Directives (National Roads)
    - Divided roads will be required for roads greater than 80km/h
    - Undivided roads will be required to have a max speed limit of 80km/h
  - Lower Speeds (Pedestrians / Cyclists / Vehicles)

- Self-explaining / Regulating Roads & Streets
  - Works
  - Standards & Guidelines

- Compliance / Public Acceptance
  - **ISA / Camera Enforcement**
  - **COMS**

Key Tasks

VISION ZERO

Inventory of Speed Limits

- In consultation with DoT Support Office
- Current status of implementation of speed limits by road type – assess by region with a view to improve consistency
- Lack of data

Existing System of Speed Limits

- Existing System of Speed Limits
- LA Workshop
- Experience from Practitioners
  - Local Authorities
  - An Garda Síochana

Consultation with LA elected members

- To understand their views re current system of setting speed limits and help recommendations for enhancement
- Identify barriers and facilitators to ensure smoother operation of system

Work programme

International Practice Report

- Identify best practice
- Literature Review
- Case Studies
  - Sweden
  - France
- Arup / TRL

Modelling Report

- Currently underway by TII and NTA
- Working with NTA and TII transport simulation models to inform approach and recommendations to speed limits having regard to:
  - Safety
  - Climate impact
  - Economy

Consultation with Stakeholders

- Engagement with key Stakeholders such as: -
  - IRHA / FTI
  - AILG
  - Love30 / Rod King
  - Cyclists.ie
  - TUD / TCD

Recommendations

VISION ZERO

Principal

- Rural roads
- Urban roads

Specific

Examples include recommendations for speed limits in:

- Quiet Lanes
- Rural Cycleways/Greenways
- Cycle Streets (urban)
- School Limits
- Roadworks Speed Limit Zones
- Shared Space (zone)
- Pedestrian (zone)

Supporting

Examples include recommendations for:

- Design standards
- Data
- Guidelines (Priority);
  - Re-allocating Road Space
  - Settlement boundaries
  - Speed assessment framework
- Appeals process
- Enforcement
- Legislation
- Education/Training
- Communications

2023 Review
- Principal Recommendations

VISION ZERO

Urban

Default speed limit of 30kmh for built up and urban areas

- 30kmh limit should apply, for all city or town centres, residential roads and locations where there is a significant presence of vulnerable/active road users.

Exceptions may be permitted for the following: -

- Pedestrian zones and shared space/zones whereby a speed limit of 20km/h would apply.
- National, Regional, arterial roads and key public transport routes where limits up to 50km/h.
- Transition zones on National, Regional, arterial roads and key public transport routes where limits up to 60km/h.
- Urban arterial roads with a high design speed such as motorways, certain dual carriageways and roads with limited access where higher limits.

2023 Review
- Principal Recommendations

VISION ZERO

Rural

- Default speed limits

  Remain the same on the road network, except

  80km/h for National Secondary Roads (Exceptions permitted) (Currently 100km/h)

  60km/h for Local Roads (Currently 80km/h)

- New roads

  Sections of road network with a design speed / speed limit greater than 80km/h to be divided

- Existing roads

  Sections of National Road where it is intended to retain a limit > 80km/h to be divided by 2050 (criteria and plan by 2025)

  Sections of Regional and Local Road where it is intended to retain a limit > 80km/h to be divided (criteria and approach by 2025)

2023 Review
- Specific Recommendations

VISION ZERO

- Cycle Street (Urban)
- **School Speed Zones**
- Urban Shared Space (Zones)
- Pedestrian Zones
- Slow Zones
- Quiet Lanes
- Rural Cycleway / Greenway
- Variable Speed Limit Zones
- Roadworks Speed Limit Zones
- Gateways and Transition Zones
- Restricted Roads
- Traffic Calming

2023 Review
- Supporting Recommendations

- Legislation
- Standards / Guidelines
- Data and Inventory Management
- Speed Limit Guidelines
- Appeals Process
- Urban Area Definition
- Speed Assessment Framework
- Quality Control – Audits and Compliance Certificates
- Traffic Signs
- Classification
- Education / Training
- Public Engagement / Communications
- Reserved Function (Flow Chart)
- Speed Limits Enforcement

Speed Limits Implementation 2024

Speed Limits Implementation

September 2023

- Main Report and 3 no Supporting Reports published
- Peer Reviewed (Sweden and TCD)

Implementation

- Form implementation group with a plan to be developed to include a programme of work for 2023 and beyond. This included in the first instance a GANTT chart.
- 3 phases: -
    - Rural Local Roads - 80km/h
    - Urban & National Secondary Roads – 30km/h and 80km/h
    - Schools and other remaining
- Currently Phase 1 – Guidelines developed, primary legislation developed
    - Implementation of phase 1 progressing
    - Procurement of Signs - Local Authorities amending Bye-Laws

Full Implementation Plan

Speed Limit Implementation

Speed Limits Implementation Group

The key role for the Implementation group is …

The group is responsible for overall implementation and co-ordination of the actions from the review as well as the development of performance indicators. Priorities for the group would be: -

- Co-ordination and oversight of Legislation and Guidelines re Priority Actions,
- Development of Implementation plan,
- Develop performance indicators,
- Monitor and report on progress.

The group is chaired at CEO level and would compose of members drawn from LAs, TII, RSA, NTA, AGS and the DoT and the DoT at PO level or equivalent.

This group reports to the Road Safety Transformation Partnership Board (RSTPB).

Timelines - GANTT

VISION ZERO

		Owner	2024												2025							
			J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A
Legislation & Guidelines	Primary Legislation	DoT																				
	Speed Limit Guidelines	GWG																				
	Update Traffic Signs Manual and Regulations	DoT/TII																				
	Map and Schedule Urban Speed Limit Zones																					
	Develop Speed Limit Analytical Assessment Framework																					
	Issue Circular	DoT																				
	Monitor / Co-ordinate Implementation	DoT/LA																				
Implementation (Phase 1a - Rural Local Roads)																						
Consultation and Approval (Phase 1a)	Prepare Draft & Pre Consultation with Stakeholders	LA																				
	Initial Notification to Council	LA																				
	Notify Garda Commissioner	LA/AGS																				
	Public consultation- 30 Days	LA																				
	Revision A preparation for MD consideration (may be multiple)	LA																				
	Final draft for full Council approval	LA																				
	Commencement Day	LA																				
Signs Procurement (Phase 1a)	Quantify requirement	LA																				
	Advise sign suppliers	TII																				
	Phase 1 Order	TII/LA																				
	Erect Signage	LA																				
Implementation (Phase 1b - National Secondary and Urban Roads)																						
Consultation and Approval (Phase 1b)	Prepare Draft & Pre Consultation with Stakeholders	LA																				
	Notify Garda Commissioner	LA/AGS																				
	Public consultation- 30 Days	LA																				
	Revision A preparation for MD consideration (may be multiple)	LA																				
	Revision B preparation for TII approval	LA																				
	TII Approval for National Roads	LA/TII																				
	Final draft for full Council approval	LA																				
	Commencement Day	LA																				
Signs Procurement (Phase 1b)	Quantify requirement	LA																				
	Advise sign suppliers	TII																				
	Phase 1 Order	TII/LA																				
	Erect Signage	LA																				
Training and Communication	Develop Strategy	All/RSA/LA																				
	Training for Staff and Elected Members	All/LA																				
	Community Engagement	LA																				
	Implement Communications (Public)	RSA																				

Phase 1	Default Limits implementation (minimum period)
Phase 1	Default Limits implementation (extended period)

Priorities (DoT) – Phase 1

Legislation

- Amendments to Road Traffic Act 1961 and Road Traffic Act 2004
- Legal queries with AG
- Further amendments (possible Regs and postpone)
- Commencement (Regs)

COMS (Public, EMs)

- Plan to develop with multi-strand and multi-agency approach (rural roads first)
- Packs & material
- Website (update)

Signs

- Regs (RSL) & TSM
- Co-ordination of procurement (TII & Cork CoCo)

Appeals Process

- Update Governance and Procedures

Funding

- Signs, LAs, LGMA, COMS, Guidelines, Training, etc.

Guidelines

2 phases of work proposed: -

- New Default Speed Limits
  - Default National Secondary Roads (80km/h)
  - Default Local Roads (60km/h)
  - Default Urban Roads (30km/h)
  - 20km/h (incorporate existing separate guidelines)

Other matters

- Urban Definition
- Data / Monitoring
- Specific Recommendations
  - Mapping
  - Schools
  - Roadworks Speed Limits
- Process & Training

Rural Roads – Single Carriageway Roads

VISION ZERO

Initial Considerations

- From the outset, the Default speed limits outlined below shall be implemented by Local Authorities, unless altered through locally adopted Special Speed Limits.
- Where it is considered that the Default speed limit is not appropriate, such limits may be altered through Special Speed Limits in accordance with the Stage 1 and Stage 2 assessments.
- Any amendments to the Default shall follow a Stage 1 and Stage 2 assessment. A Stage 2 Assessment is not required where a speed limit is proposed to be lowered.
- For Local roads, separate criteria shall apply when altering the speed limit from 60km/h to 80km/h.

Single Carriageway Roads			
Default Speed Limits			
			
National Primary	National Secondary	Regional	Local
Applies to Single Carriageways in Rural areas			

Rural Roads – Single Carriageway Roads

VISION ZERO

Process for Assessing Single Carriageway Roads

- Stage 1
  - Paved width less than or equal to 7m – 80km/h applies
  - Paved width greater than 7m – stage 2
  - Is the road on a designated route for non-motorised users?
- Stage 2
  - Assess Geometrics
  - Other Factors

Local Rural Roads

VISION ZERO

Process for Assessing Local Rural Single Carriageway Roads

- Stage 1
  - Paved width less than 5m – 60km/h applies
  - Paved width between 5m and 5.5m – 60km/h unless other criteria applies
  - Paved width greater than 5.5 – stage 2
  - Is the road on a designated route for non-motorised users?
- Stage 2
  - Assess Geometrics
  - Other Factors

Urban Roads

Determination of Speed Limits in Urban Areas

A key factor for setting appropriate speed limits in built up or urban areas is that the roads or streets should be 'self-regulating' or 'self-explaining'.

The following Default speed limits (as set by the Road Traffic Act) represent the starting point to define an Urban Speed Limit Zone (USLZ).

"Built-up areas" are defined by the Local Government Act 2001 and apply to cities and former town councils that are scheduled and have a Default speed limit of 30km/h.

For urban areas outside the built-up areas, it should be noted that the Default speed limits are 60km/h (local roads), 80km/h (regional and national secondary roads) and 100km/h (national primary roads).

Urban Roads
Default Limit

Applies to roads in Urban areas
SSL Options


Urban Roads

Determination of Speed Limits in Urban Areas

Step 1:

Define an **Urban Speed Limit Zone (USLZ)**. This can be done through the following:

- Existing urban speed limits within the 60km/h speed boundary (consistent with the principles of DMURS). These urban areas are defined by the locations of existing posted 60km/h (or 50km/h if a 60km/h sign is not present) signs at the boundary with the rural areas.
- CSO Settlement Boundaries.
- Other areas may also be identified in accordance with Section 7.3.6 on Villages and Towns.

Notwithstanding the above, an Urban Speed Limit Zone should reflect existing Built-up and urban areas and should not account for potential or planned areas.

Urban Roads

Step 2:

Apply the following criteria to the road network within the Urban Speed Limit Zone (USLZ):

- **20km/h** speed limits for **pedestrian zones and shared space/zones**;
- **30km/h** speed limits for roads in defined **urban cores or centres, residential roads, housing estates** and locations where there is a significant interaction with **vulnerable road users**;
- A **40km/h** Special Speed Limit may be applied on roads **outside a defined urban core or centre**, where a **30km/h or 50km/h has been deemed to be unsuitable**;
- **50km/h** speed limits for **national, regional, arterial roads and key public transport routes** outside a defined urban core or centre;
- **60km/h** for **transition zones on national, regional, arterial roads and key public transport routes**; and
- **Urban arterial roads with a higher design speed and/or limited access** such as motorways, certain dual carriageways and other roads may have higher speed limits.

All remaining roads shall be 30km/h reflecting a default speed limit of 30km/h for Urban Speed Limit Zones.

Urban Roads – Future Workstreams

- Schools
- Cycle Streets
- Urban Shared Spaces (Zones)
- Pedestrian Zones
- Slow Zones
- Urban Area Definition
- Restricted Roads (High Speed)

School Speed Zones (and Periodic Speed Limits)

Speed limits and signage at schools to be reviewed and updated to support school speed zone limits of 30km/h and 50km/h respectively on urban and rural sections of road

Cycle Streets

Where cycle streets are provided, a speed limit of 30km/h should apply

COMS

Public Awareness Campaign

- Communications Subgroup
- Media relations
- Paid Advertising
- Communications Collateral and Guidance

Phase 1

- COMS with LAs
- Role of An Garda Siochana
- Roles for Ministers, Councillors, Etc.
- Involvement of community groups
- Understanding of Signs (Rural Speed Limit Sign)
- Website – www.speedlimits.ie

Phase 2 & 3 (Later)

- Urban Campaign (Phase 2)
- Schools (Phase 3)

Data / Monitoring / Mapping

Data / Monitoring

- Before / After for each phase
  - Speed (TII (Arup) / LAs / LGMA)
  - Collisions (AGS / RSA / TII)
  - Behaviour and Attitudes (RSA)
- Using existing data and specifically gathered data
- Produce report on benefits and impact
- Performance Indicators

Mapping

- Standardised across country
- Full use of mapping for Byelaws
- Support enforcement
- Support ISA (in vehicle)

Priorities (Local Authorities)

VISION ZERO

Priority (for DoT) Phase 1

- DoT Circulars (3 no) issued
- Bye Laws Progress
- Signage Procurement
- Installation
- COMS (Public, EMs)

Sign Procurement

VISION ZERO

Timeline –

- Cork County Council appointed as Central Procurement Agency for LA Sector.
- 35,000 poles & 62,000 signs.
- Tender issued / returned July.
- Post tender quality inspections at each of the 4 no. supplier locations
- Orders and Approvals Signed - September
- Preferred Supplier with 3 Substitutes under the existing Supply Gov Framework
- All 4 Suppliers awarded a segment to speed up delivery timeline
- First Delivery - Monday 23rd September

Note: -

Sign Procurement and installation funded by DoT

Comhairle Contae Chorcaí
Cork County Council

Speed Limits Ireland 2024

Thank You

4 October 2024

John.mccarthy@transport.gov.ie

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Strategic Asset Management Plan (SAMP) for National Roads.

Dr Kieran Feighan, PMS Ltd
Gerard O'Dea, TII

Contents

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

01 | Introduction

TII Asset Management Structure – Line of Sight

Goals

Existing Infrastructure
Operate, maintain and extend the life of national roads and light railway infrastructure to ensure the safety and efficiency of our transport networks, ensure appropriate management of environmental resources and contribute to the transition to a low-carbon and climateresilient society.

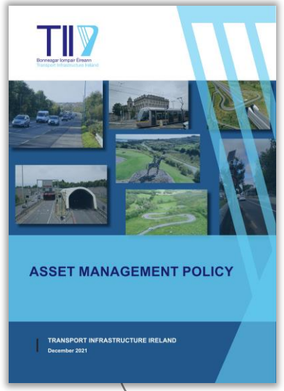
"Assets will be managed in a sustainable manner through the development, implementation, and maintenance of an asset management approach that is risk-based and data-driven, enabling us to make informed decisions throughout the life of our assets"

Asset Management Policy, Strategy, Framework, SAMP published to
www.tii.ie/assetmanagement

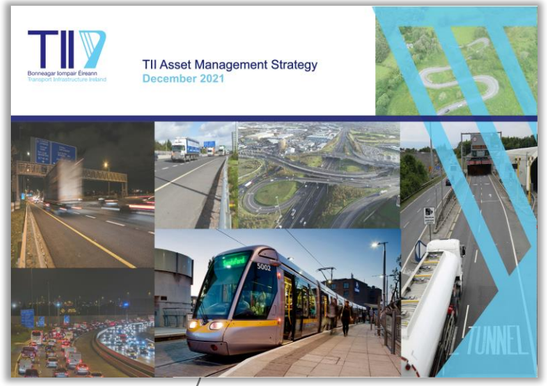
TII's Journey in Asset Management

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

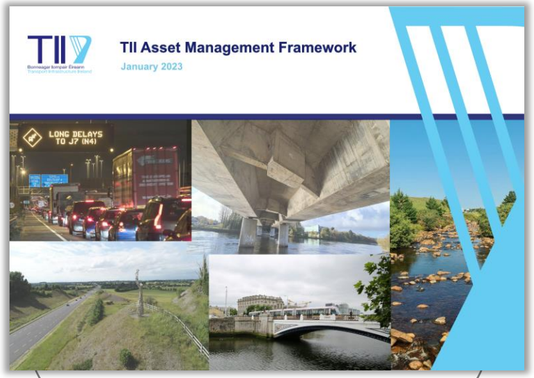
AM Policy



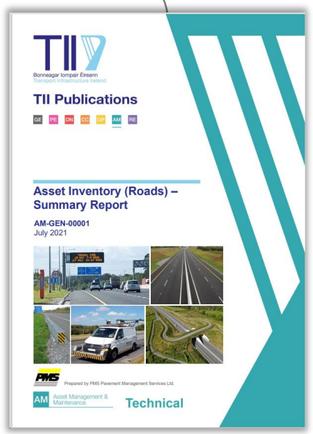
AM Strategy



AM Framework



July 2021

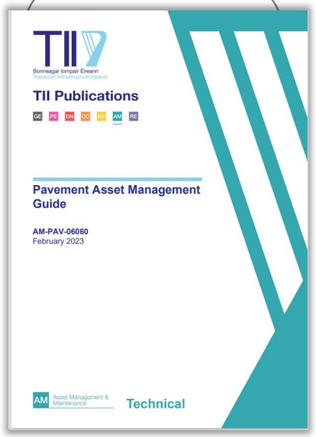


Asset Inventory & Valuation (Roads)

Dec 2021

Jan 2023

Feb 2023



Pavement Asset Management Guide

TII's Journey in Asset Management

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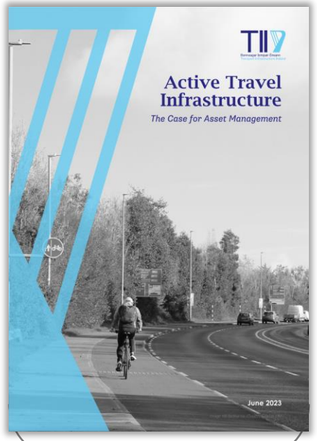
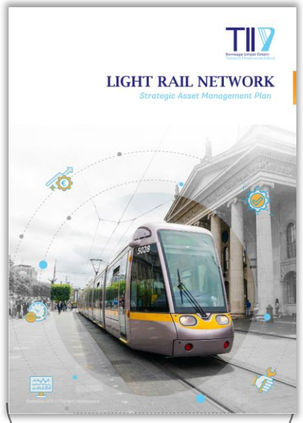
Active Travel Asset Management Case



June 2023

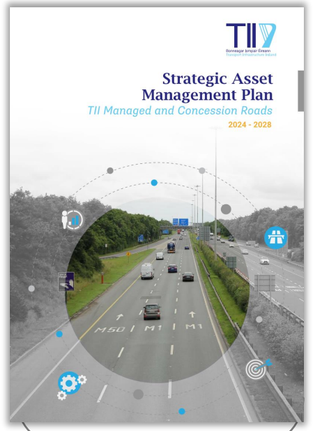
Light Rail SAMP



July 2023

Pavement Renewals Business Case 2023-2027

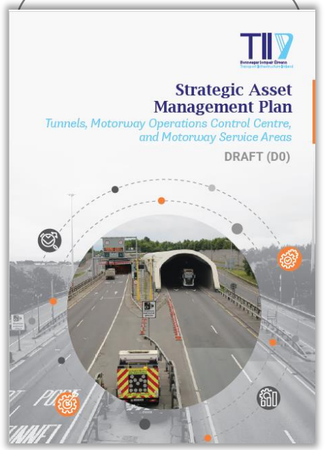
TII Managed and Concession Roads SAMP



Dec 2023

2024

In Progress



Tunnels, MOCC, and MSA SAMP

TII Asset Management Objectives

Safety

To ensure transport networks that are secure and safe for all

Reliability

To ensure consistent and predictable journeys for the movement of people and goods across all modes

Condition

To maintain, preserve, and extend the useful life of our transport assets

Maximising Value

To plan, build, operate, and maintain the transport system, through collaboration and appropriately targeted investment choices

Customer

To balance the diverse needs of our customers, achieving the best possible outcomes in terms of system quality and effectiveness

Environment

To provide efficient and effective transport systems with positive environmental benefits

Sustainability

To promote the sustainability of our transport systems while applying the principles of the circular economy

Climate Adaptation

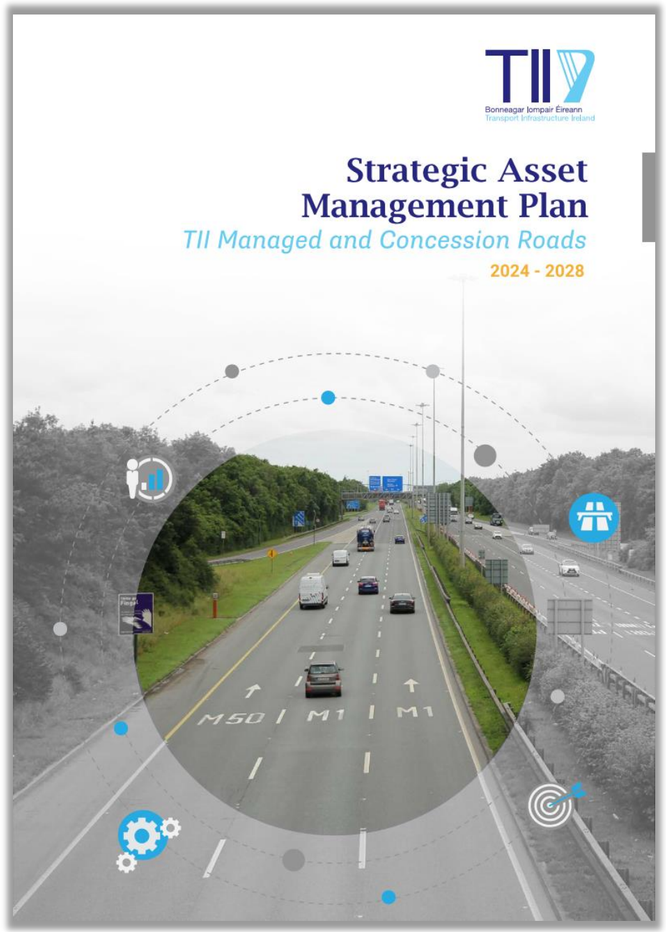
Resilience

To proactively assess, plan, and invest in strategies that ensure the resilience of our network

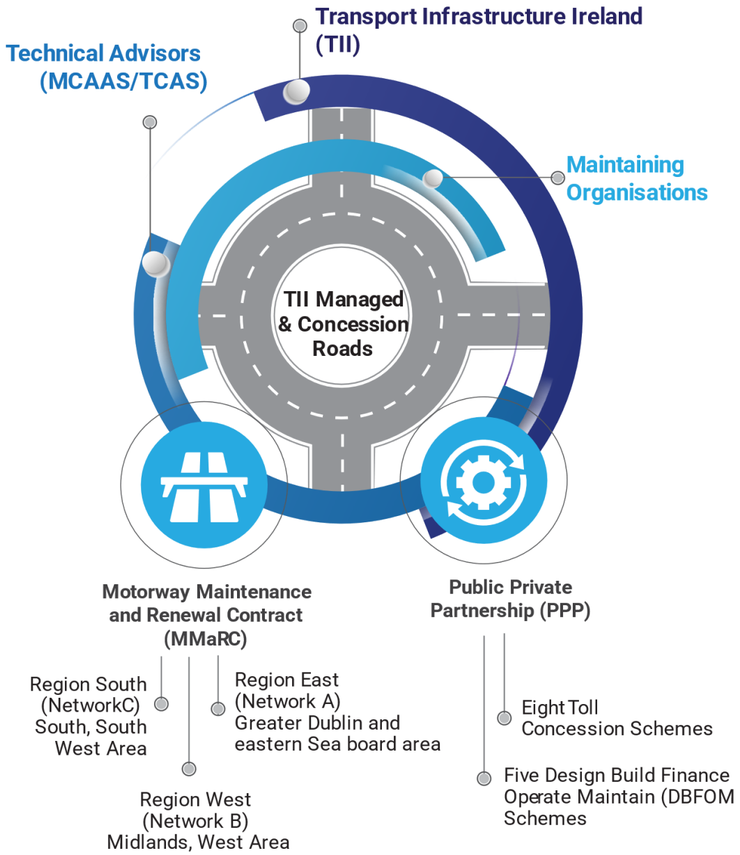
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

02 Strategic Asset Management Plan (SAMP) - Managed and Concession Network

Strategic Asset Management Plan – 2024 - 2028
TII Managed and Concession Network



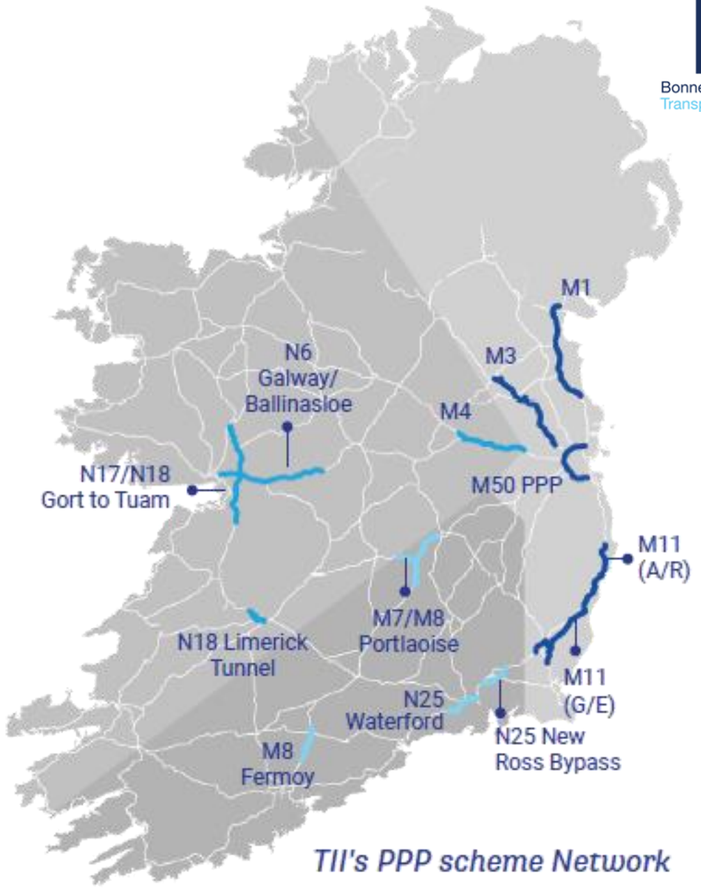
CONTENT



Governance and Management Structure

TII's MMaRC Network

3 MMaRC Networks Contracts - 887 km
(incl. Tasked Maintenance Areas (TMAs))



TII's PPP scheme Network

13 PPP Contracts - 461 km

Gross Replacement Cost – excess of € 20 billion

Snapshot of TII Managed and Concession Network

1. Land & Earthworks

Total Area Land of c. **9,000 ha** with Embankments (Fill vol **64 million m³** and Cut vol **84 million m³**)

2. Pavements

Almost **1,350** Centerline-km with **237** Interchanges and Paved Area of more than **30 million m²**

3. Structures

1,282 Road Bridges, **54** Foot Bridges, **71** Retaining Walls, and **1,500** Culverts, with Total Deck Area over **870,000 m²**

4. Drainage Systems

Over **1,950 km** Linear Drainage Systems with more than **69,000** Drainage Point Items, and **520** Attenuation Areas

5. Fencing & Noise Barriers

More than **2,500 km** Boundary Fencing / Noise Barrier, and c. **2,500 km** Safety Barrier

6. Pedestrian & Cycle Facilities

156km of Pedestrian/Cycle Facilities, and over **700km** of Kerbing

7. Road Lighting, Traffic Signs & Markings

15,000 Road Lighting Columns, **28,300** Traffic Signs, and more than **8,300 km** of Road Markings

8. Intelligence Transport Systems (ITS)

More than **1,225** Traffic Signals, **272** VMS, **1539** ERTs and over **2,750** Other ITS assets

9. Toll Plazas

16 Toll Plazas with Canopy Area **8,500 m²** and **128** Traffic Lanes

10. Depots & Buildings

26 Depots with Land Area **23 ha** and Buildings with Total Floor Area more than **25,500 m²**

11. Winter Service Facilities

106 Winter Service Fleet, **363** Other Vehicles/Plants, and over **110,000 Tonnes** Salt Storage and **270,000 litres** Fuel Storage Facilities

12. Staffing

454 Full-time and **179** Part-time Personnel

AM Objectives and KPI Themes

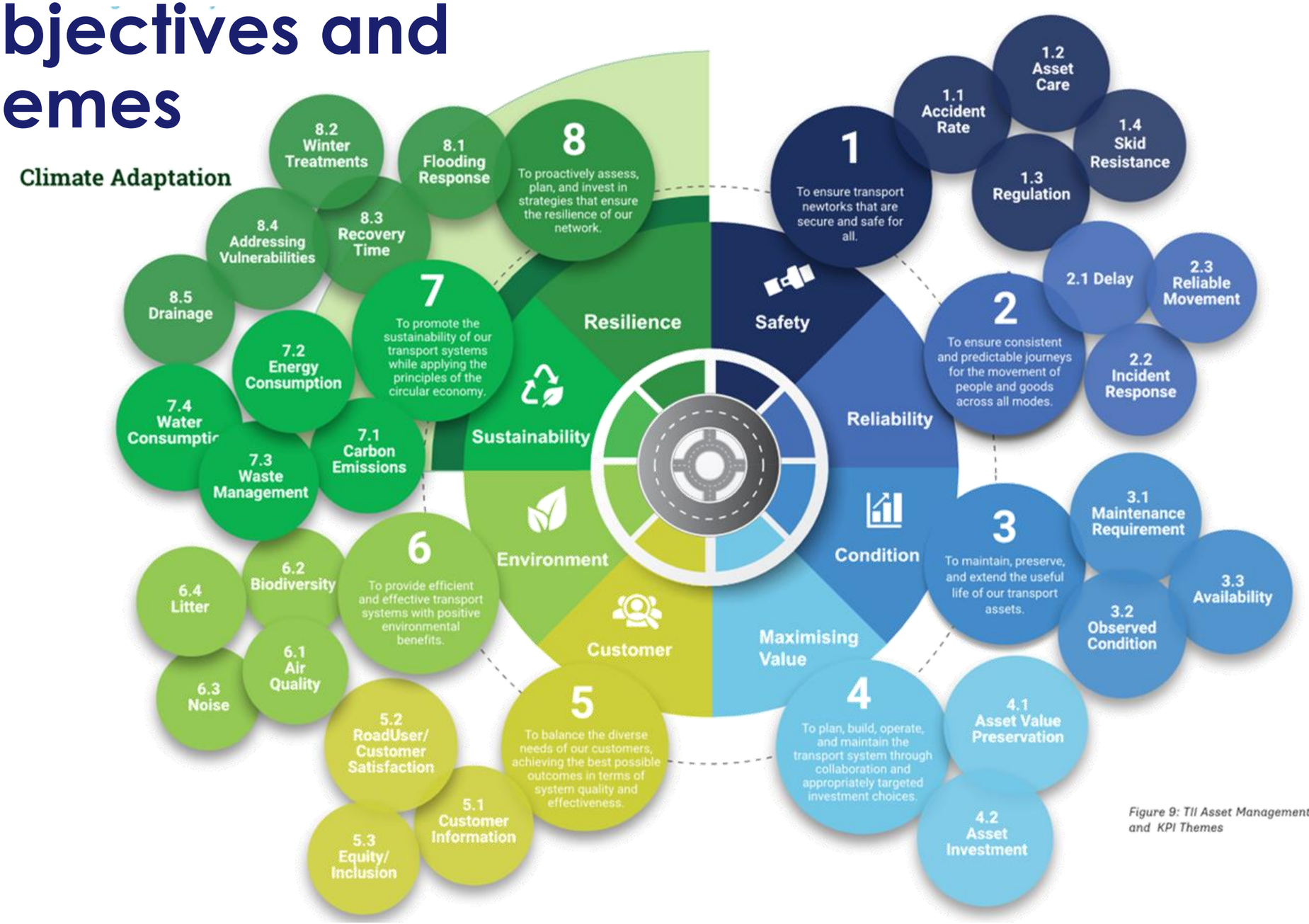


Figure 9: TII Asset Management Objectives and KPI Themes

Safety

To ensure transport networks that are secure and safe for all.

Themes	Basis for Indicators	Potential Metric	Implementation
Accident Rate	Collision/fatality/injury statistics	Contractor lost time accident frequency rate	Present
Asset Care	Procedural compliance for identification, rectification of hazards	Percentage of safety inspections and patrols carried out	Present
		Average defect repair time - Cat 1 / Cat 2 / Overall	Present
Regulation	Compliance with regulations/ standards for safety critical assets - e.g. condition of statutory signs	Sign retroreflectivity	Future
Skid Resistance	Annual skid resistance monitoring programme	Percentage of traffic on roads with SC value within 5 points of IL	Present

Reliability

To ensure consistent and predictable journeys for the movement of people and goods across all modes.

Themes	Basis for Indicators	Potential Metric	Implementation
Delay	Minimise delay caused by lane closures	Static lane closures exceeding permitted contract times	Present
		Average additional delay due to roadworks, compared to a benchmark journey time before roadworks were in place.	Future
	Overall measure of travel time	Difference between the observed travel time and the speed limit travel time	Future
Incident Response	Efficiency of incident response	Incident response times	Present
		Percentage of incidents responded to within target time for each category of response	Present
Reliable Movement	Importance of reliability to freight movement	Freight travel time reliability	Future
	Network availability/non availability	Percentage of time that network is available for uncongested use	Future

Condition

To maintain, preserve, and extend the useful life of out transport assets.

Themes	Basis for Indicators	Potential Metric	Implementation
Maintenance Requirement	Condition mapped against acceptable level	Asset condition (Percentage in desired condition/ acceptable condition)	Present
Observed Condition	Asset condition	Pavement surface health	Present
		Pavement surface safety (skid resistance)	Present
		Pavement structural health	Present
		Bridge condition rating	Present
		VRS - condition rating and defect reporting	Future
		Lighting - condition rating and defect reporting	Future
Availability	Asset performing as expected	Street lighting operational	Present
	Measure of availability	Percentage of time that roadside technology assets are available and functioning.	Present

Maximising Value

To plan, build, operate, and maintain the transport system, through collaboration and appropriately targeted investment choices.

Themes	Basis for Indicators	Potential Metric	Implementation
Asset Value Preservation	Investment vs. depreciation cost	Change in asset € value	Future
Asset Investment	Level of funding compared with funding needs	Asset Sustainability Index (% needs funded), ASI (Maintenance), ASI (Renewals) etc.	Present

Customer

To Balance the diverse needs of our customers, achieving the best possible outcomes in terms of system quality and effectiveness.

Themes	Basis for Indicators	Potential Metric	Implementation
Customer Information	Accuracy and timeliness of information	Use of and accuracy of ITS signage messaging	Present
Road User / Customer Satisfaction	Customer experience of network	Perceived quality of the maintenance of roads based on annual survey of road users	Future
		Percentage of drivers who are satisfied with their journey on the MMARC/PPP road network	Future
		Percentage nighttime works to minimise disruption to users on high occupancy routes	Future
Equity/ Inclusion	Awareness of customer needs	Percentage of customer facing staff that have completed disability awareness training	Present

Environment

To provide efficient and effective transport systems with positive environmental benefits.

Themes	Basis for Indicators	Potential Metric	Implementation
Air Quality	Proportion of network in exceedance of air quality targets	Percent length of managed motorway network in exceedance of the legal nitrogen dioxide (NO_2) limits	Future
Biodiversity	Management of invasive plant species	No. or area of invasive alien plant species treatments required	Future
	Biodiversity enhancement	Reduction/modification to grass cutting regime	Present
		Implement biodiversity accounting metric	Future
Noise	Noise Measurement	The number of households within mitigated Noise Important Areas where noise complies with noise requirements through funded projects	Future
		Inspection and maintenance of environmental noise barriers	Present
Litter	Clean roadsides	Compliance with litter collection activities	Present

Sustainability

To promote the sustainability of our transport systems while applying the principles of the circular economy.

Themes	Basis for Indicators	Potential Metric	Implementation
Carbon Emissions	Need to reduce carbon emissions from baseline	Scope 1 CO_2 emissions from MMARC/PPP activities	Present
		Scope 2 CO_2 emissions from MMARC/PPP activities	Present
		CO_2 emissions associated with the maintenance fleet	Future
Energy Consumption	Increase direct renewable energy output	kWh of energy generated through own renewable sources	Present/Future
	Need to reduce energy consumption	Reduction in total energy consumed in MMARC/PPP activities	Present
		kWh of energy used for public lighting	Present
Waste Management	Circular economy	Percentage of waste materials re-used or recycled	Present
Water Consumption	Water reduction	Percentage of water used collected from rainwater	Present

Resilience

To proactively assess, plan, and invest in strategies that ensure the resilience of our network.

Themes	Basis for Indicators	Potential Metric	Implementation
Flooding Response	Flood risk management	Number of reported flooding incidents	Present
		Lane closure duration on the managed motorway network due to flooding	Future
Winter Treatments	Winter network resilience	Percentage of winter service treatments carried out in compliance with the required timescale	Present
Recovery Time	Mitigating climate change	Time to restore minimum required performance level after disruption	Future
Addressing Vulnerabilities	Addressing resilience	Percentage of investments addressing identified vulnerabilities (may need Vulnerability Index)	Future
Drainage	Mitigating climate change	Percentage length of carriageway that is not susceptible to carriageway surface water problems	Present

Carbon Reduction, Climate Adaptation and Asset Management

AM Objective	Potential Metrics (Present)	Potential Metrics (Future)
Sustainability	• Scope 1 CO2 emissions rel. to baseline • Scope 2 CO2 emissions rel. to baseline • Maintenance fleet converted to EV (%) • Reduction in total energy consumed • Proportion of lighting that is LED • Percentage of water from collected rainfall • CO2 emissions associated with the maintenance fleet	• kWh of energy generated through own renewable sources
Resilience	• Number of reported flooding incidents • Percentage of winter service treatments in compliance with required timescale • Percent carriageway length not susceptible to carriageway surface water problems	• Lane Closure duration due to flooding • Time to restore minimum required performance level after disruption • Percent of investment addressing identified vulnerabilities

- Sustainability objective: Key Performance Indicators relating to **Carbon Emissions, Energy Consumption, Waste Management and Water Consumption** on the managed motorway network are introduced
- Resilience objective, KPIs relating to **Flooding Response, Drainage, Winter Maintenance, Addressing Vulnerabilities and Recovery Time** have been developed

Summary of Improvement Actions

Areas	Actions	Climate	Sustainability	Risk
 Pavement	Review and update trigger levels and KPIs, integrating whole-of-life analysis with a focus on embedded carbon.	✓		
	Consider expanding annual condition inspections to assess additional lane characteristics.			✓
	Monitor the composition of bituminous binders to ensure future achievement of surface lifespans.			✓
	Evaluate the feasibility of replacing bituminous binder with bio binders for carbon reduction, considering longevity effects.	✓		✓
	Innovatively use rejuvenators on the MMaRC and PPP networks to extend effective surface life.		✓	
	Consider increased use of high PSV recycled aggregate in surface layers for sustainability and circular economy benefits.		✓	
	Continue to develop innovative tests for aggregate skid resistance to expand sources of high skid resistance aggregates.		✓	
 Structures	Develop a costed asset renewal programme for bridge components to secure funding for life cycle interventions.			✓
	Implement periodic repainting of steel bridge elements to prevent corrosion and maintain structural integrity.			✓
	Prepare for bridges' handover from PPP to direct TII management. Develop policies and allocate resources for maintenance transfer, including assessment timing and funding.			✓
	Establish a separate management structure for large-span cable-stayed structures from inspection through post-handover maintenance.			✓
	Implement dTIMS bridge management software for prioritised repair and rehabilitation, enabling long-term forecasting under varied funding scenarios.			
	Conclude research on probabilistic-based bridge performance modelling, using the EIRSPAN database for lifecycle cost analysis of road network structures.			

Areas	Actions	Climate	Sustainability	Risk
 Geotech Assets	Implement Asset Management concepts for geotechnical assets, including slopes, embankments, walls, and unstable subgrades, to effectively measure and manage life-cycle risk, performance, and investment.		✓	✓
 Intelligent Transport Systems (ITS) Assets	Evaluate emerging tolling technologies within the evolving landscape of telematics and Intelligent Transportation Systems (ITS)..		✓	✓
	Periodically review the necessity of maintaining a network of roadside telephones in a mobile phone-saturated environment.			
	Regularly review asset lifespans, adopting maintenance approach reflecting technological advancements and power sources.			✓
	Continuously reassess Variable Messaging Systems (VMS), especially regarding ongoing developments in Connected Autonomous Vehicles (CAV) technology.			
	Continue developing and utilising degradation models in the Asset & Fault Management System (AFMS) to guide timely and cost-effective interventions for TII's ITS equipment.			✓
 Drainage and Hidden Assets	Map and classify current drainage assets, including gullies, channels, chambers, drains, and pipes, for climate adaptation purposes.	✓	✓	✓
	Perform vulnerability mapping and establish a programme to address high-risk areas identified in the assessment.	✓	✓	✓
	Evaluate existing culvert capacity considering future rainfall predictions.	✓	✓	✓
	Assess the risk of Bridge Scour under present and anticipated climatic conditions.	✓		✓
	Formulate a Bridge Scour Mitigation Programme as needed, which may include retrofitting measures for existing bridges.	✓		✓
	Develop comprehensive ducting mapping, including location and capacity details over time, to support effective asset management.	✓		✓

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Areas	Actions	Climate	Sustainability	Risk
 **Road Signing and Delineation**	Assess biodiversity measures' impact on drivers' sight-lines, addressing inappropriate planting obscuring visibility.	✓	✓	
	Evaluate sign cleaning cycle (frequency and effectiveness) to optimise lifespan and visibility day and night.			✓
	Review how retroreflectivity surveys can strategically target road marking replacement in addition to cyclical approaches.			✓
	Evaluate and adjust winter maintenance activities in anticipation of a reduced number of frost days due to projected warming.	✓	✓	✓
	Assess increased rainfall impact on surface water layer thickness. Review road marking material specifications and consider alternatives for varying water thicknesses due to intensified rainfall.			
	Prioritise consistent and detectable lane markings and delineators to ensure reliable CAV navigation.	✓	✓	✓
 **Landscaping**	Support long-term landscape management through consistent implementation of short-term maintenance and operational procedures.	✓		
	Facilitate successful landscape management through robust contact requirements and reviews	✓		
	Ensure planning and design guidance creates resilient, functional, and self-sustainable landscapes.		✓	
	Map the landscape to establish baseline data, enabling ongoing reporting to monitor landscape as resources change.		✓	
	Investigate the value of existing or planned TII landscapes concerning carbon storage and sequestration.		✓	
	Develop action plans for extreme weather events in landscape management, including winter storms and summer droughts.	✓	✓	✓
 **Lighting**	Continue with the 'Switch-Off Programme' and monitoring of both treated and control sites.	✓	✓	
	Investigate and monitor speed impacts, maintaining the policy of installing new road markings and studs when removing or switching off lighting.			✓
	Proceed with phased removal of redundant lighting poles at MMaRC and PPP junctions, prioritizing locations without safety barrier protection for lighting poles.	✓		

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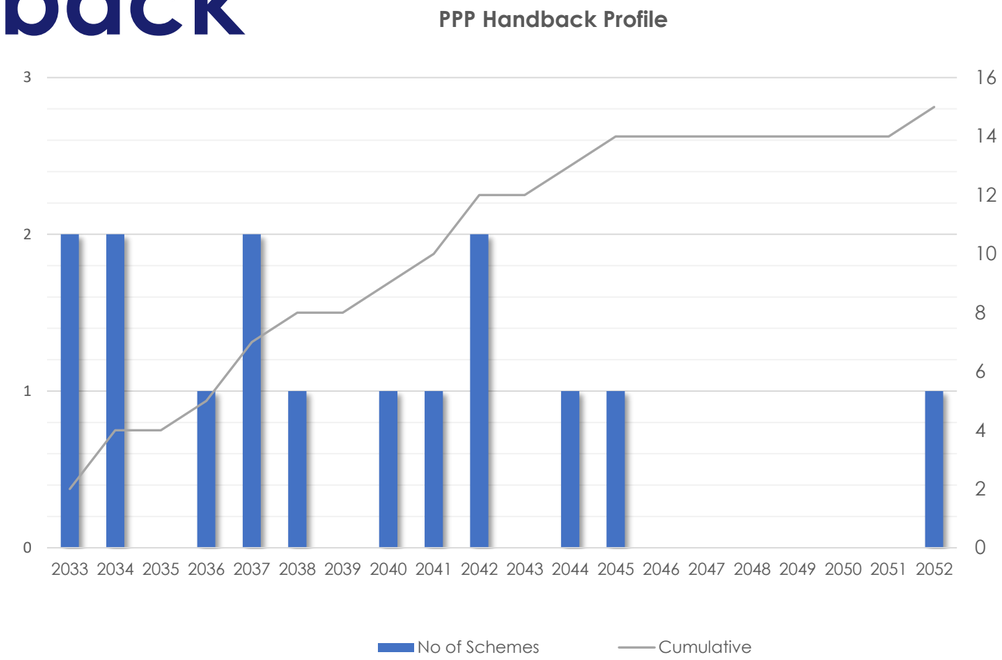
Areas	Actions	Climate	Sustainability	Risk
Biodiversity	Develop a biodiversity accounting metric for new projects and track progress on project-specific biodiversity enhancements.		✓	
	Establish the biodiversity baseline of the entire TII Network using the biodiversity accounting metric.		✓	
	Implementation of targeted research, mitigation, and, where applicable compensation.		✓	
	Identification and mitigation, where feasible, of priority species collision hotspots on the existing road network.		✓	
	Eradicate, control and prevent the spread of Invasive Alien Species on new projects and the existing network.		✓	
Asset Management Information & Systems	Integrate asset age and condition information from TII systems like dTIMS and EIRSPAN/dTIMS with selected outputs from MMaRC and PPP databases, and maintenance contractors.		✓	
	Establish automated processes with FME technology for seamless integration across systems, enhancing data analysis capabilities.			✓
	Expand MapRoad system use to MMaRC contracts for easy recording and geo-referencing of detailed project information. Encourage PPP operators to adopt same approach.			✓
	Capture geo-referenced and detailed records of maintenance and renewal activities for various asset types on a routine basis.		✓	
	Develop a standardised coding system for all assets, potentially aligning with TII Specifications for Road Works Series, for detailed expenditure breakdown by asset type.			
	Prioritise data types to be collected and consider establishing different "tiers" for assets based on their importance and impact.			✓
Lifecycle Planning	Develop a holistic cost-benefit analysis approach, considering factors beyond the asset's lifespan, such as safety, traffic delays, and embodied carbon.			
	Incorporate costs related to embodied and emitted carbon directly resulting from road construction or maintenance, including road user effects from these activities.	✓		✓
	Endeavour to minimise all relevant and quantifiable costs over the asset life cycle while maintaining the required performance.	✓		✓

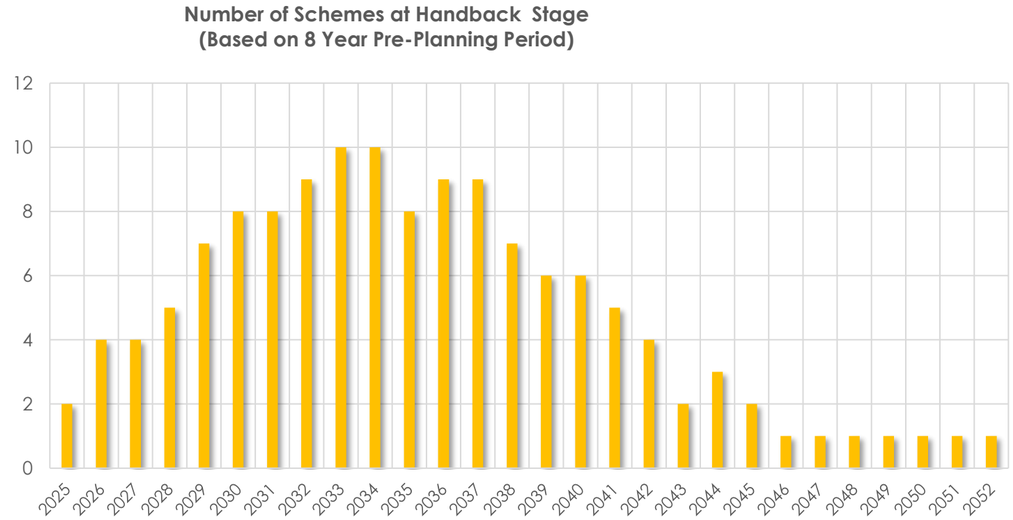
Areas	Actions	Climate	Sustainability	Risk
 **Reporting**	Assess additional data collection needs to support enhanced programs for signs, road markings, VRS, and other assets on MMARC and PPP sections.			✓
	Enhance data collection, reporting, and analysis to align with existing and proposed KPIs for the eight Asset Management objectives.	✓	✓	✓
	Prioritise Climate Adaptation objectives, focusing on Sustainability and Resilience KPIs.	✓	✓	
	Establish a systematic approach for monitoring and reporting progress in carbon reduction, responding to the growing requirement in these areas.	✓		
	Implement projects identified in TII's Climate Action Roadmap to reduce scope 2 emissions by 2030 on managed motorway sections.	✓	✓	
	Continuously measure, monitor, and improve performance related to scope 1, 2, and 3 emissions on the managed motorway network.	✓	✓	
	Analyse multi-year KPI data to set meaningful targets aligned with TII's established goals, particularly in areas such as Climate Adaptation and Response.			✓
	For newly proposed KPIs, assess trends and compare with international benchmarks before establishing realistic targets.			✓

Preparation for PPP Handback

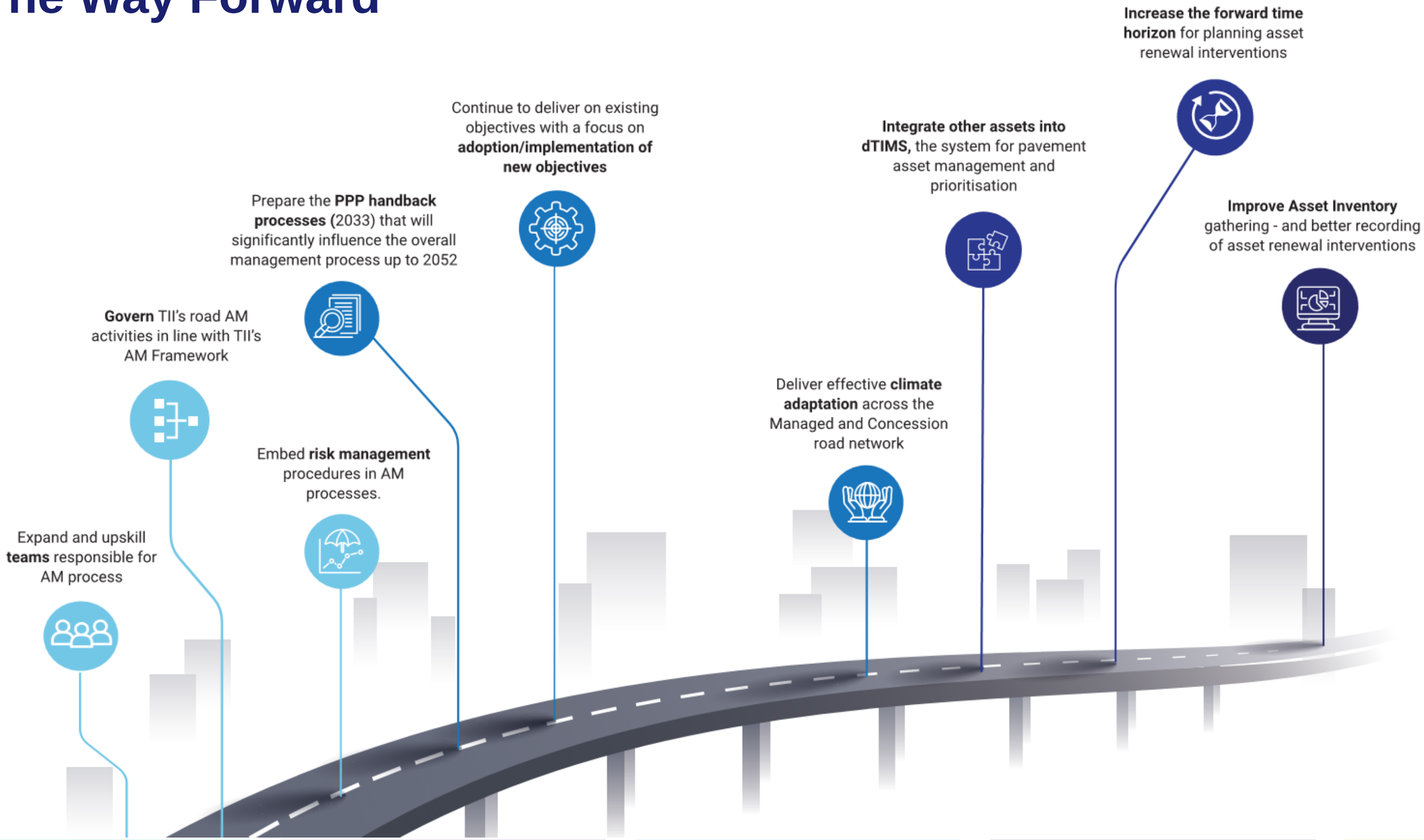
First Scheme Handback – 2033
Pre-planning period of 7 to 8 years

Document	Author
Preparing for PPP Contract Expiry – An overview of practical experiences and lessons learned so far."	EPEC -The European PPP Expertise Centre 2021
"Preparing for PFI Contract Expiry"	Infrastructure and Projects Authority (IPA) UK- 2022
"Managing the Risks of PFI Contract Expiry"	Infrastructure and Projects Authority (IPA) UK- 2021
"Case Studies of Handback Experience with Public-Private Partnerships"	United States Department of Transport-2017
Managing PFI assets and services as contracts end	National Audit Office (NAO) UK -2020





The Way Forward



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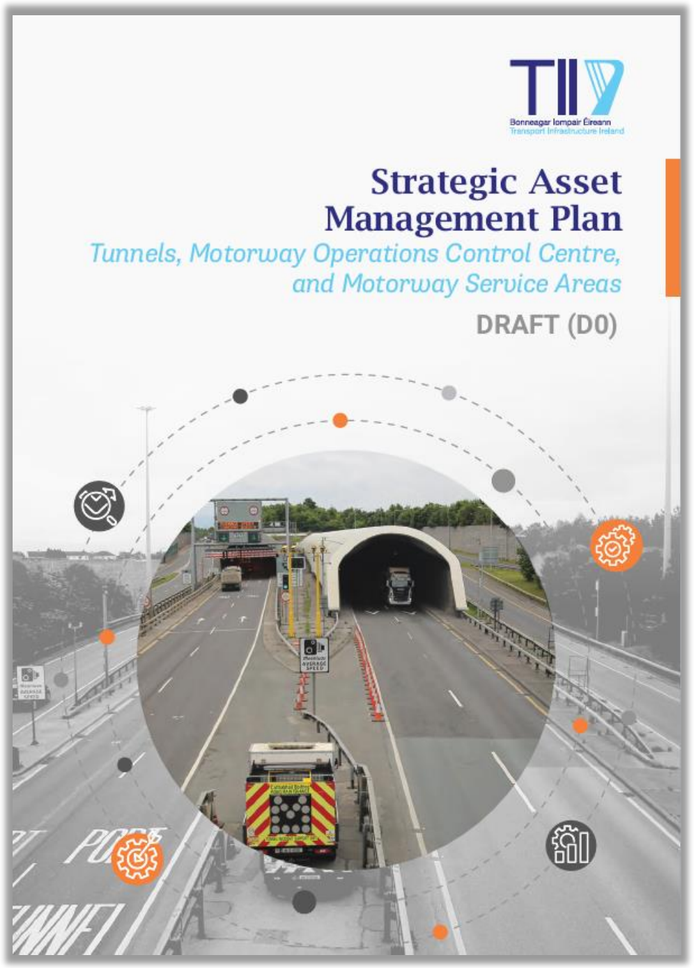
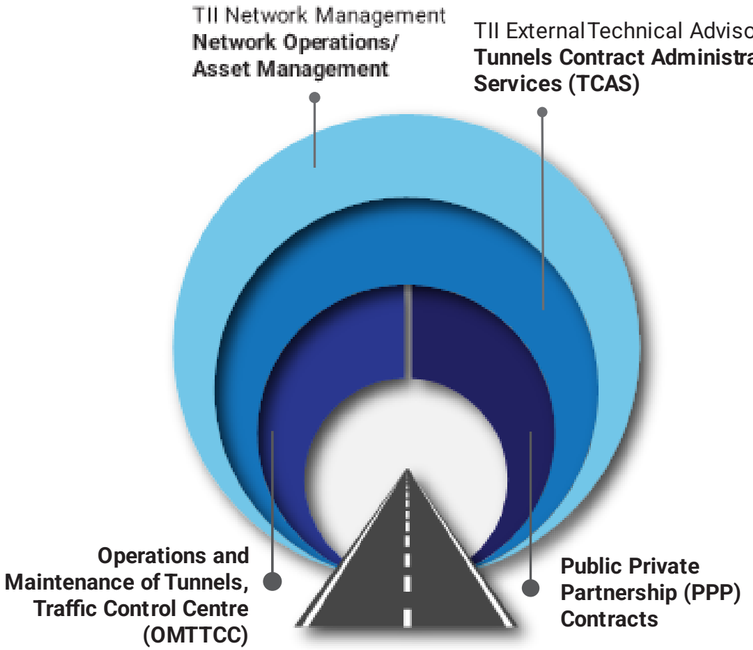
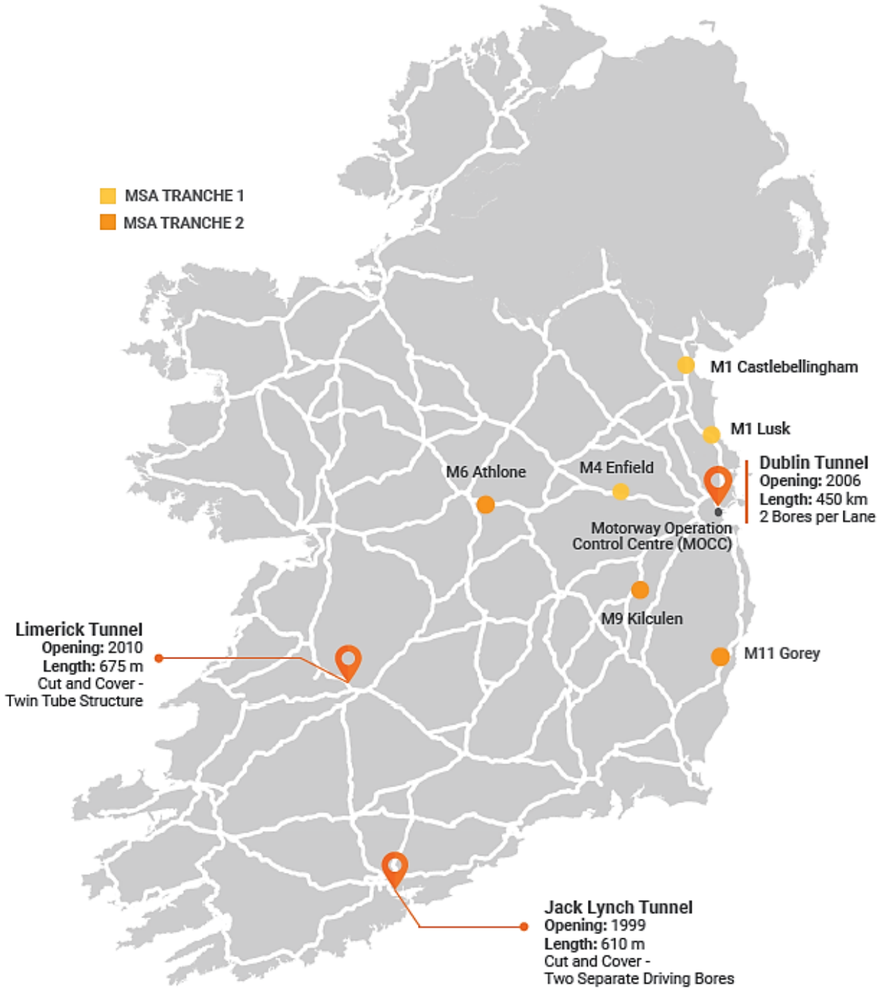
03 | Next Steps in Asset Management

Tunnels MSA MOCC SAMP



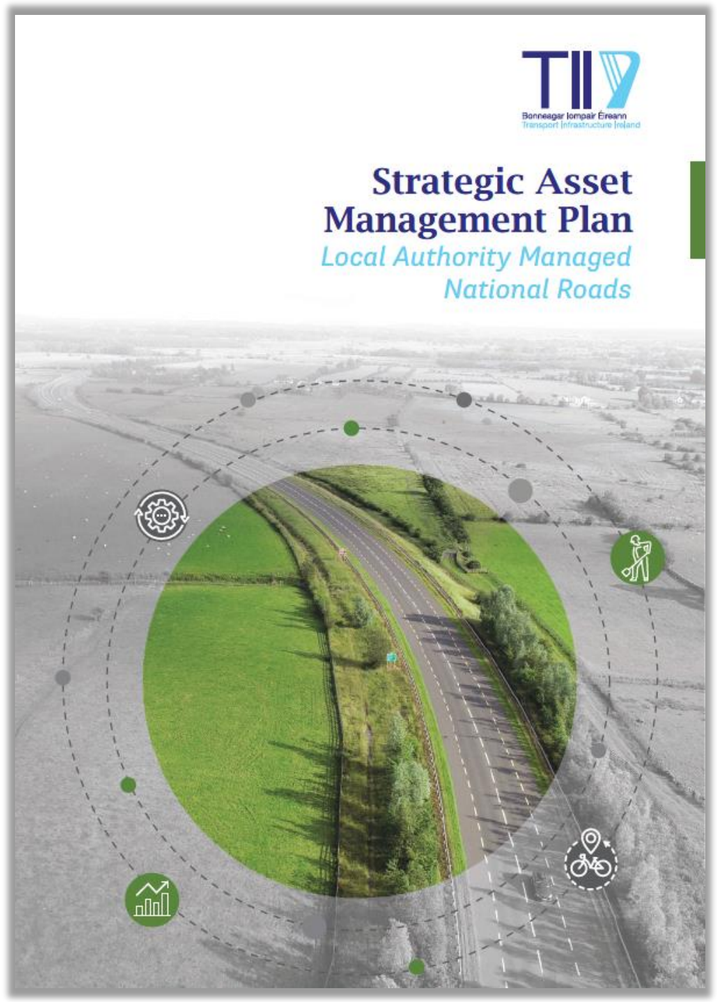


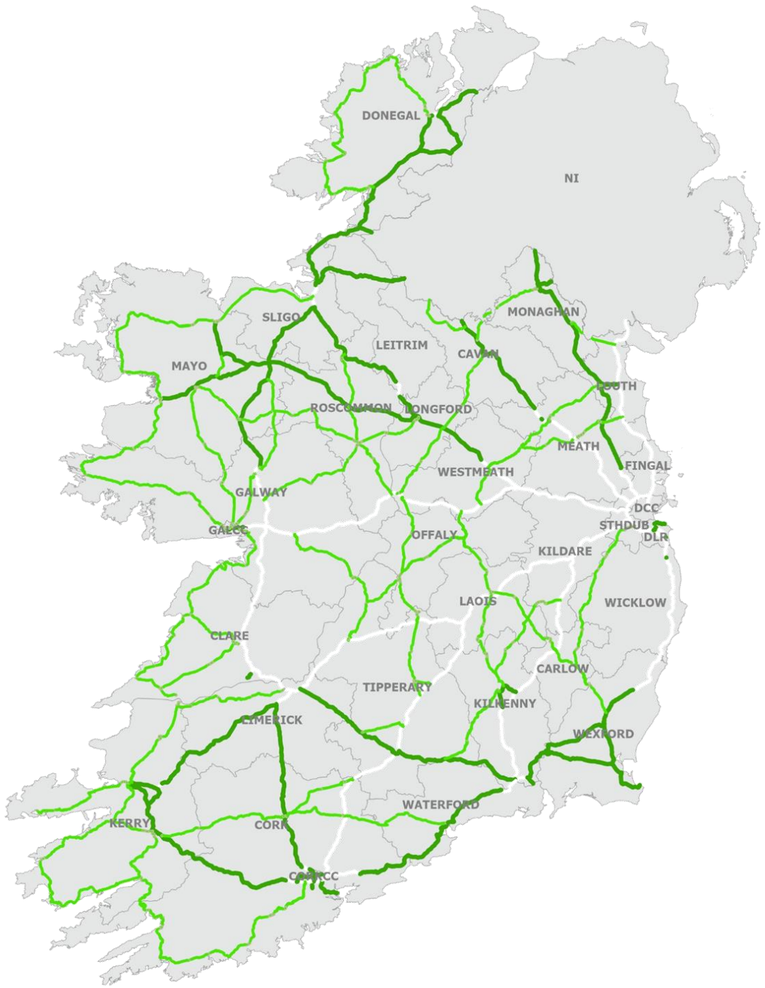
Governance and Management Structure for Tunnels and MSAs.



Motorway Operation Control Centre (MOCC), Motorway Service Areas (MSAs), and Tunnels.

Local Authority SAMP





LA-Managed National Roads: 3968 km (c. 75% of network)

Part 1 (Overview)

Governance structure, management and operations, and funding arrangements for the LA-managed national roads.

Part 2 (Assets and Resources)

Scale and Diversity of Assets being Managed.

Part 3 (AM Performance)

Alignment of LA operations and output with the eight AM objectives set by TII.

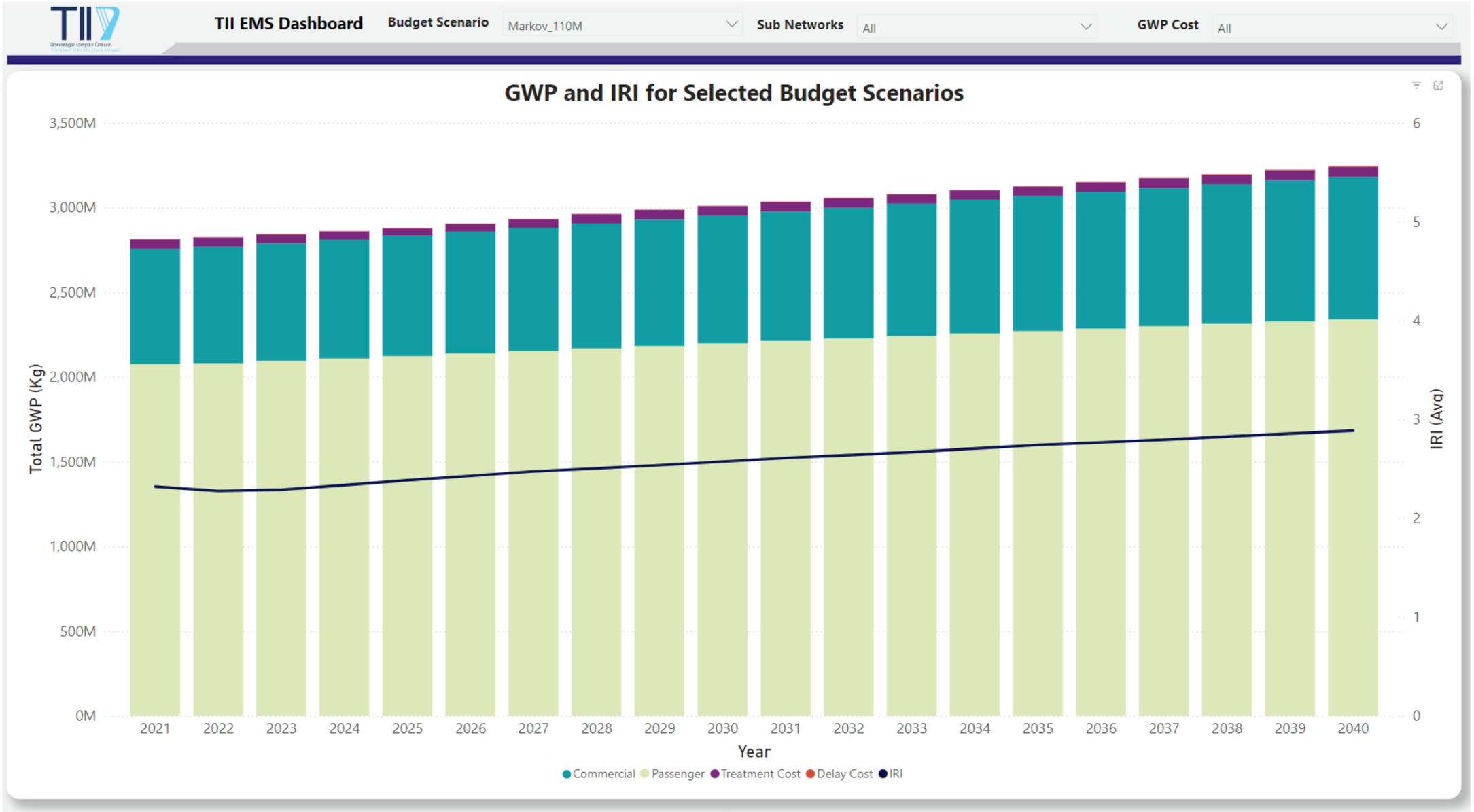
Part 4 (Continuing Improvement):

Forward-looking, medium to long-term view of issues that need to be examined and addressed on the LA-Managed National Road Network (Lifecycle Planning, Optimisation, Investment Needs, Programme Development, Reporting).

Part 5 (The Way Forward):

Future directions for asset management, including resources, improving governance, and integrating new asset management objectives.

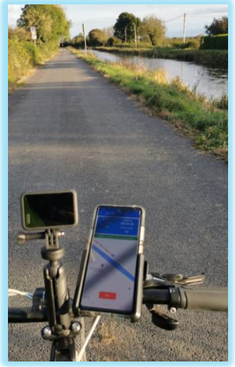
Carbon Assessment – Pavements – dTIMS EMS

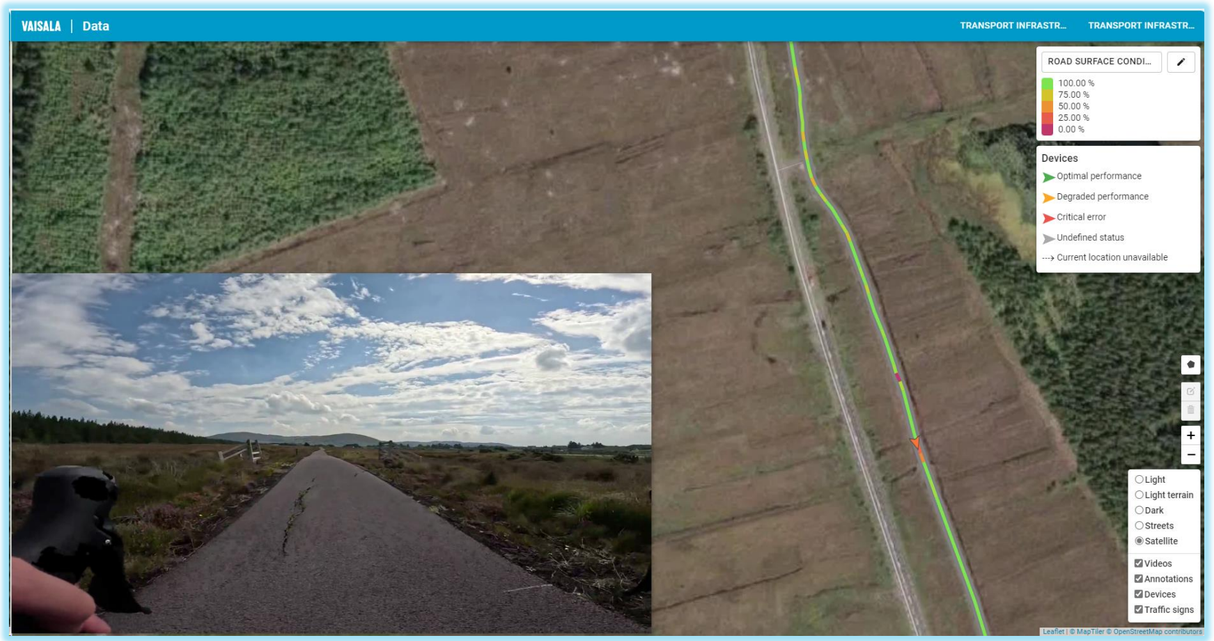


Carbon Assessment – Pavements – Maproad

Active Travel Asset Management – R&D / Innovations

- **Current**
  - ESRI AGOL Field Maps Collector App
  - GoPro Georeferenced Video– UbiPIX
  - Vaisala Road AI App
  - MapRoad – Inventory and Data Capture
- **Future**
  - University of Galway ATI Machine Learning - Research
  - VivaCity AI Sensor
  - Trial Xenobike – LiDAR.





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Thank you for your attention

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Collaboration between ESB and Road Authorities

Cormac Collins, Delivery Manager, ESB Networks

TII National Roads and Greenway Conference 4th October 2024

Cormac Collins, Networks Projects Delivery Manager

Agenda

- Introduction
- ESB Networks
- Grid Change Drivers
- Constructing Grid Infrastructure
- Collaboration

ESB Networks – Facts and Figures 2024

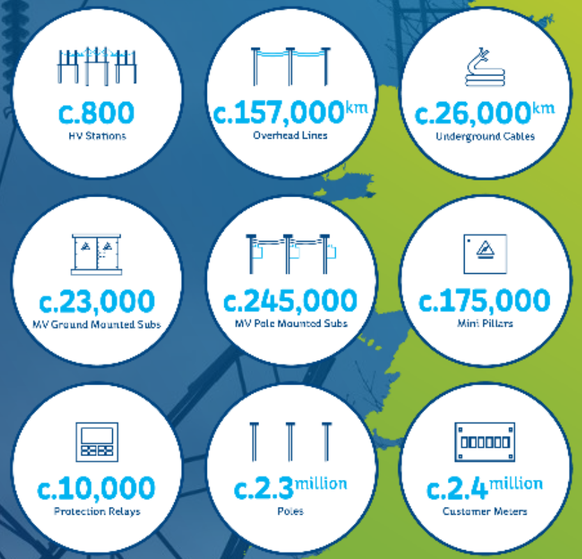
3,900
Employees Nationwide

>1,100
Irish Suppliers

€1.2bn
Contribution to Irish Economy

€1bn
Annual Investment

€4bn
in Contractor Frameworks



Policy and Regulatory Context

Ireland – Five Year Price Review

EU - Security of Supply

Ireland – Net Zero Legal Binding

Paris Agreement 2016

CRU PR5 2020

Fit for 55 2021

National Energy Security Framework 2022

RepowerEU 2022

Climate Action Plan 2023/4

196 Parties - Limit Global Warming to 1.5 degrees

EU – Emissions down 55%

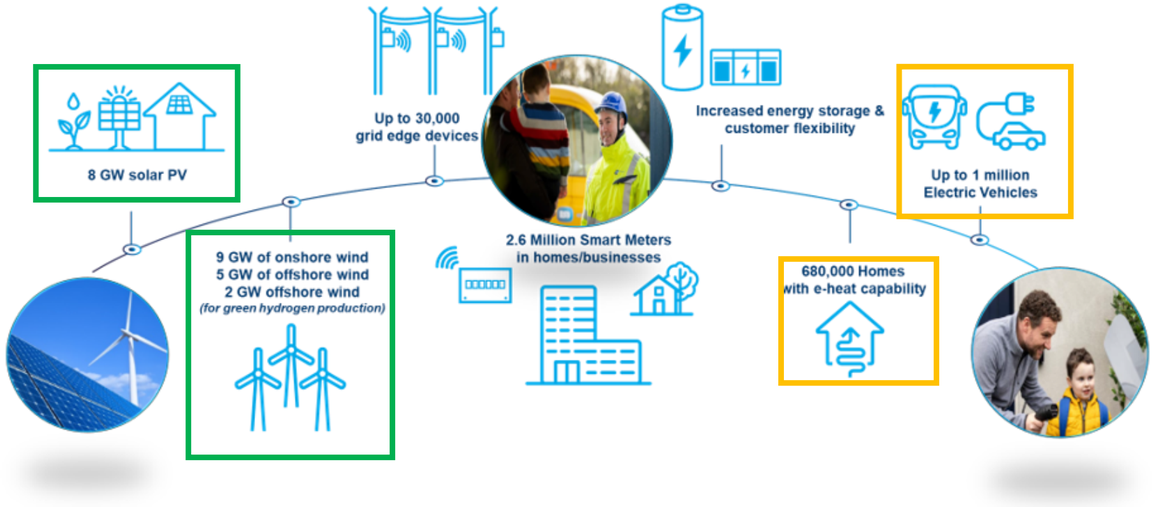
EU – Acceleration of less Fossil Fuels

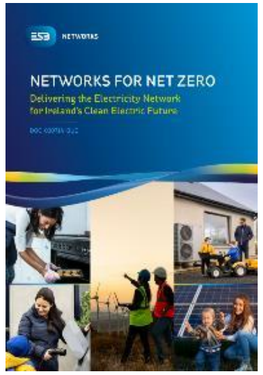
<u>EPA Report</u>

29% emissions reduction at present pace (v 42% EU Target v 51% Ireland Target)

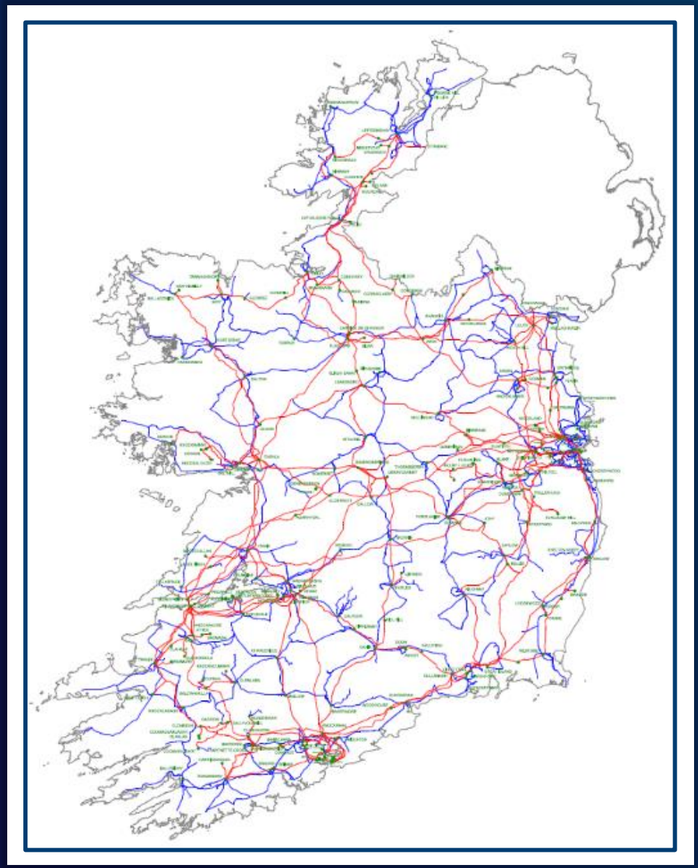
EU Penalties of up to €8bn if missed

Electrical Energy Landscape





city System and End User



Driver	Indicator	MVA Demand (approx by 2030)
Housing	44,000 housing units per year	~ 792 - 1,452 MVA
Electrification of homes	Retrofitting 280,000 units	~ 280 - 840 MVA
Economy & Industrial Heat	Last 12 months	~ 100 MVA per year
Electrification of Public Transport	Bus Depots, DART+, Metrolink	~ 270 MVA
AFIR (Alternative Fuel Infrastructure Regulation)	Public Re-charging Infrastructure - 945,000 EVs Ports & Airports	~ 1,000 MVA Under Evaluation

Legend:

- Transmission System (all voltage levels)
- High Voltage Distribution System (110 kV in Dublin and 38 kV nationally)
- Interface stations between transmission and distribution system

Grid Construction

Killonan 220kV GIS

Kilnap 110kV GIS

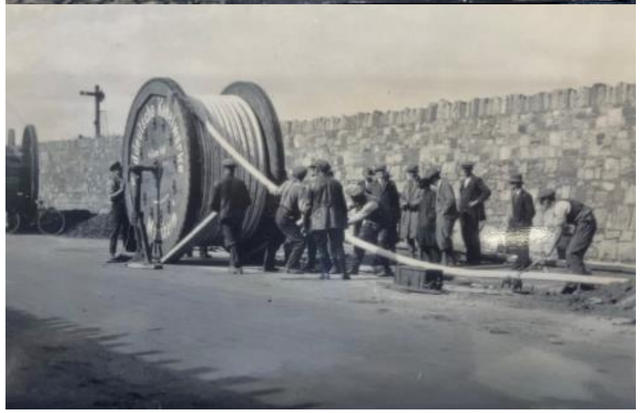
Finglas-Dardistown 110kV Cable

Woodford 38kV Uprate

Laois-Kilkenny OHL Reinforcement

Ballyvouskil StatCom

1950s



Modern Installation

Signage on Approach

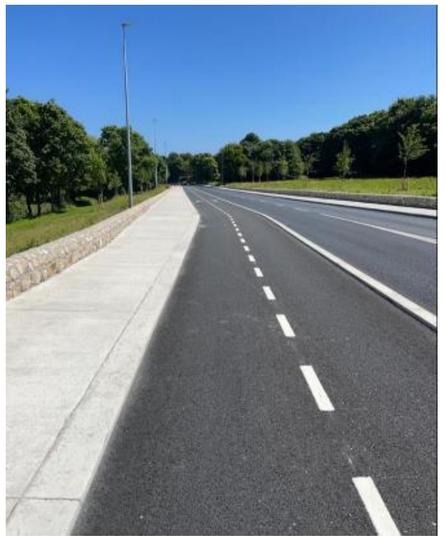
TM in place, road opened up

Install Underway

Temporary Reinstatement

Collaboration

Templeogue Village Upgrade (during and after)

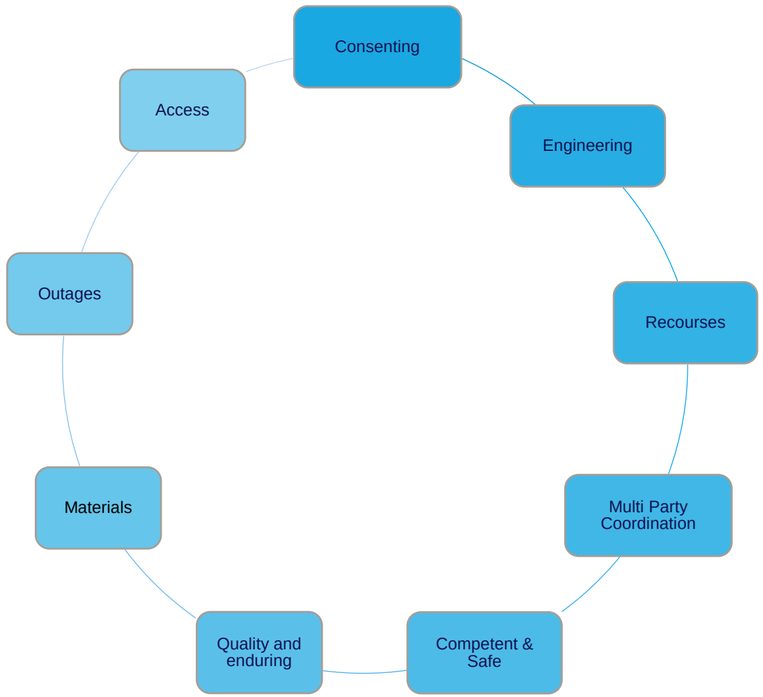


Dodder Greenway Phase 4 (during and after)

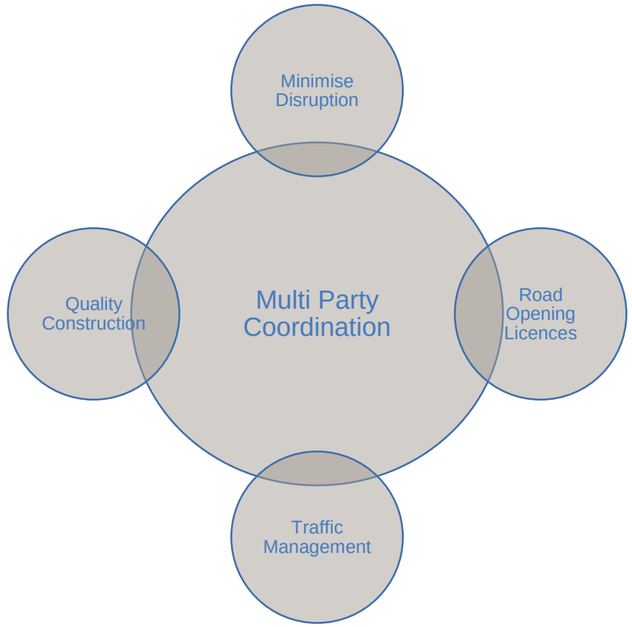
Sub Station

Substations

Project Enablers - Complexities



- HV Interphase Forum
- Dublin Infrastructure Forum



Thank You

Questions: Session 5 Panel

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Session 5: Protection & Renewal *Chair: Stephen Smyth, Senior Manager, Pavement Asset Management Programmes, TII*	
Sustainable Pavement Design and Construction: A case study	*Dimitris Michailidis, CEng, Kilsaran*
Update on the new Road Safety Audit standard	*Martin Deegan, CEng, TRAFFICO*
An introduction to Ireland's Supply Chain Sustainability School	*Pamela Sheridan, Operations Manager, Supply Chain Sustainability School*
Speed Limit Review (2023) and implementation	*John McCarthy, Senior Advisor, Roads, Department of Transport*
Strategic Asset Management Plan (SAMP) for National Roads.	*Dr Kieran Feighan, PMS Ltd and Gerard O'Dea, TII*
Collaboration between ESB and Road Authorities	*Cormac Collins, Delivery Manager, ESB Networks*

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End of Session 5

Tea & Coffee Break

Session 6 commences at 11.10am