Bonneagar Iompair Éireann
Transport Infrastructure Ireland

NATIONAL ROADS AND GREENWAYS CONFERENCE 2025

Thursday 9th and Friday 10th October 2025

Programme: Session 5

Session 5: Decarbonisation *Chair: Dr. Vincent O'Malley, Head of Environmental Policy & Compliance, TII*		
9.00am	**Climate Action Plan 2026 – DoT Update**	*John Martin, Head of Climate Engagement and Governance, Department of Transport*
9.20am	**M28 Carbon Reporting with the NEC Climate Change Clause – Client and Contractor Views**	*Cathal Touhy Cork Co.Co, Natalie Bird BAM, Dave Stewart Jacobs*
9.45am	**Low Carbon Road N52 Ardee Pavement Scheme**	*Ciaran Collier, National Technical Manager, Roadstone*
10.00am	**Environmental Product Declaration Data Analysis & TII Market Surveillance**	*Kevin Crawley TII and Olivier Mainardis Arup*
10.20am	**Biodiversity Standard and Net Gain Metric**	*Tom Butterworth – Arup Consulting Engineers, / Richard Arnold SLR Consulting*
10.40am	**Q&A**	
10.45am	**Tea & Coffee**	

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Climate Action Plan 2026 – DOT Update

John Martin, Head of Climate Engagement & Governance, Department of Transport

An Roinn Iompair
Department of Transport

Climate Action Plan for Transport
Department of Transport Update

Dr. John Martin | Climate Engagement & Governance

TII National Roads and Greenways Conference 2025 | 10 October 2025

An Roinn Iompair
Department of Transport

ONE - Background to Climate Action Plan process

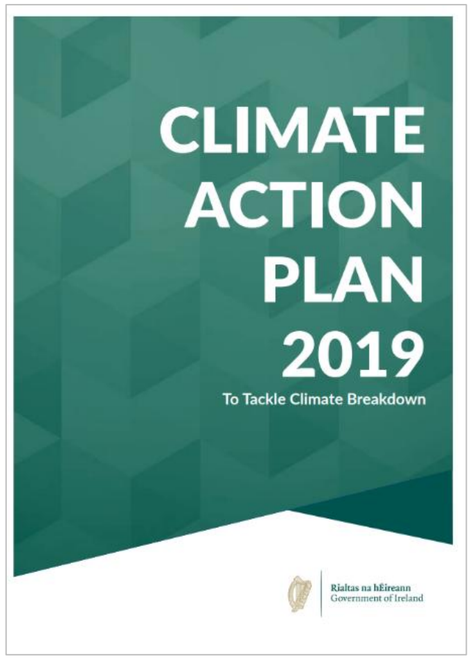
TWO – Where do we stand currently…

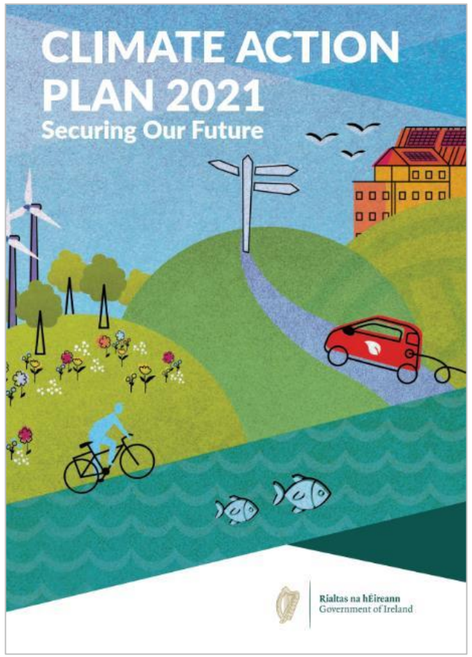
THREE – What does the decarbonisation of transport look like?

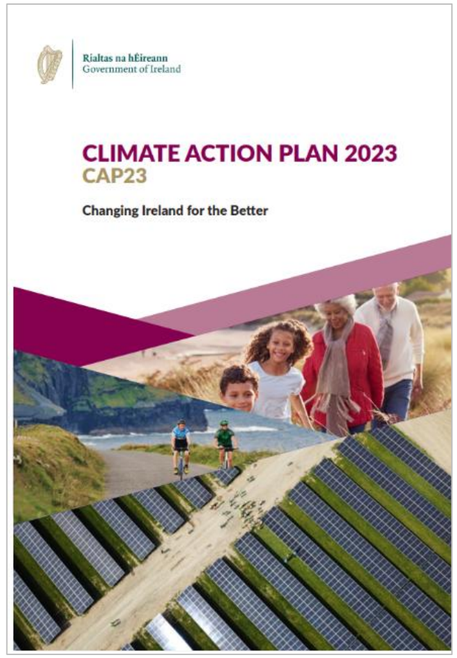
FOUR – Do we need a new Policy Pathway?

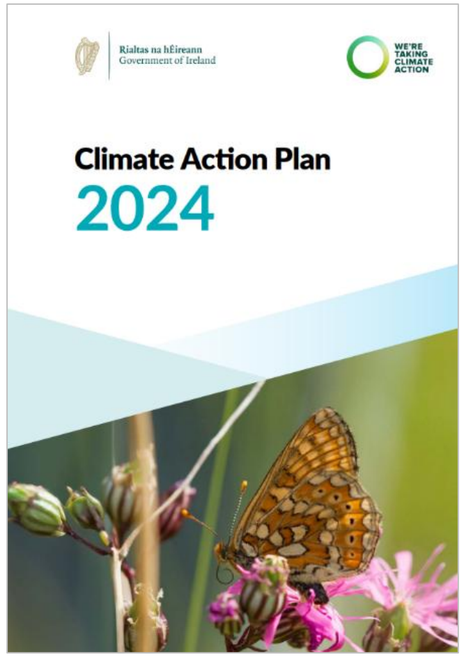
FIVE – To sum up…

(1) Background – Climate Action Plans









2015 Act

2021 Act

Statutory Carbon Budgets & Sectoral Emissions Ceilings

Strategic Environmental Assessment

Basis for LA 5-Year CAPs

(1) Background – Climate Action Plans

The ***Climate Action & Low Carbon Development Act 2021*** requires, under Section 4

(1) The Minister shall prepare an **annual update** to the *"Climate Action Plan 2019"*…

(2) The Minister shall, when preparing a climate action plan

- (a) ensure that the plan **is consistent with the carbon budget programme**,
- (b) set out a **roadmap of actions**
- (c) **consult** with other Ministers and the public and such persons as he or she considers appropriate.

(3) The roadmap of actions shall—

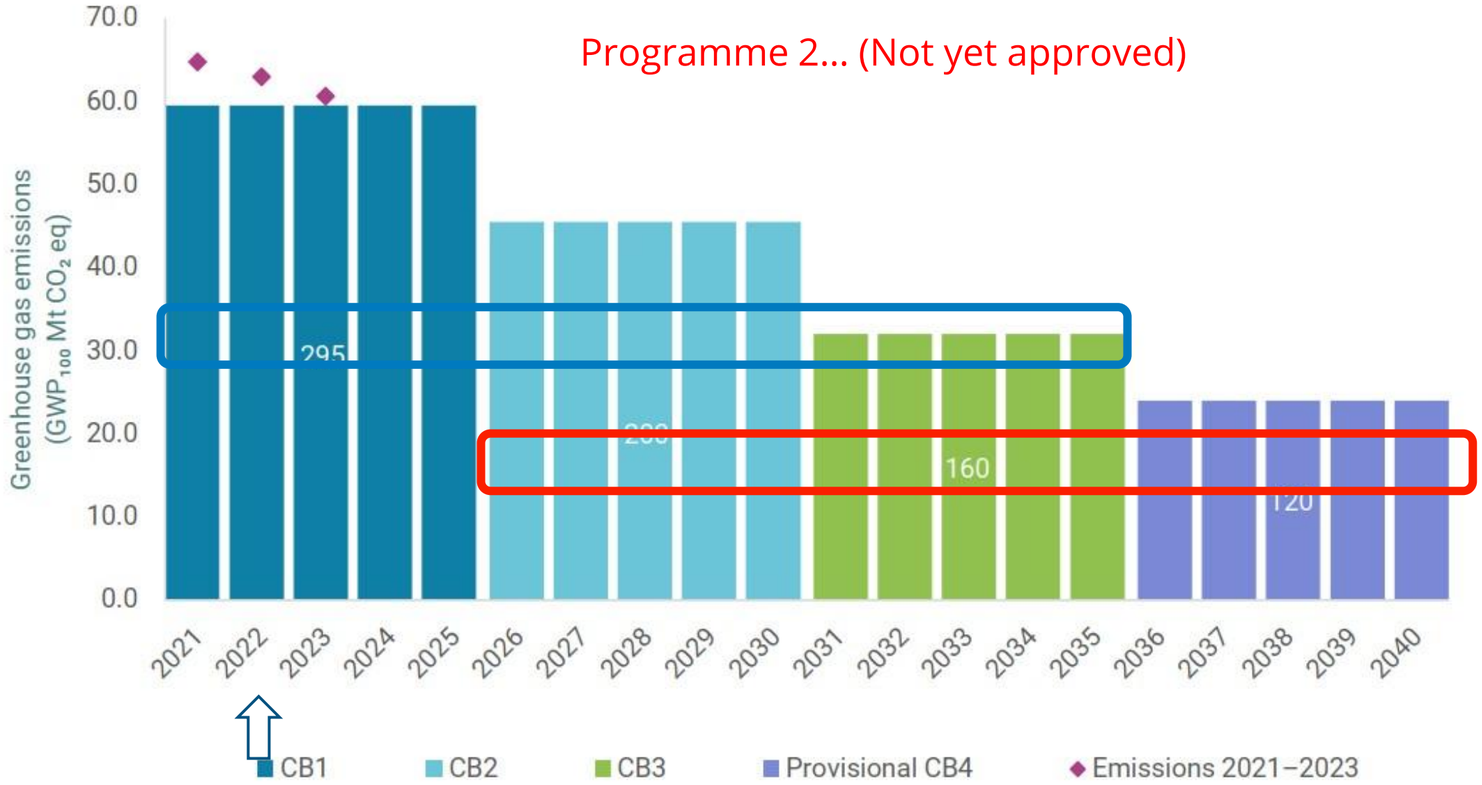
- (a) specify **measures** that, in the Minister's opinion, will be required for the **first budget period in a carbon budget programme**,
- (b) set out an **overview of the policies and, to the extent feasible, measures** required for the **second budget period in a carbon budget programme**,
- (c) outline **potential policies** that, in the Minister's opinion, may be required for the **third budget period in a carbon budget programme**.

(4) The Minister shall, in **each year submit a draft of the climate action plan** to the Government for approval

(1) Background – Carbon Budget Proposals for CB3 / CB4

Programme 1

Programme 2… (Not yet approved)



An Roinn Iompair
Department of Transport

ONE - Background to Climate Action Plan process

TWO – Where do we stand currently…

THREE – What does the decarbonisation of transport look like?

FOUR – Do we need a new Policy Pathway?

FIVE – To sum up…

(2) Context – National emissions targets

Ireland's legal climate **targets** flow from two sources:

The EU - "Fit for 55"

- 55% reduction by 2030, against 1990 levels
- Effort Sharing Regulation (non-ETS Sectors) – 42% reduction by 2030, against 2005 levels

National Legislation – Climate Action & Low Carbon Development Acts 2015-2021

- 51% percent reduction by 2030, against 2018 levels (Section 6A of 2021 Act)
- 5-year National Carbon Budgets (Section 6B)
- Divided across 'High Impact' sectors (incl. transport) as 'Sectoral Emission Ceilings' (Section 6C)

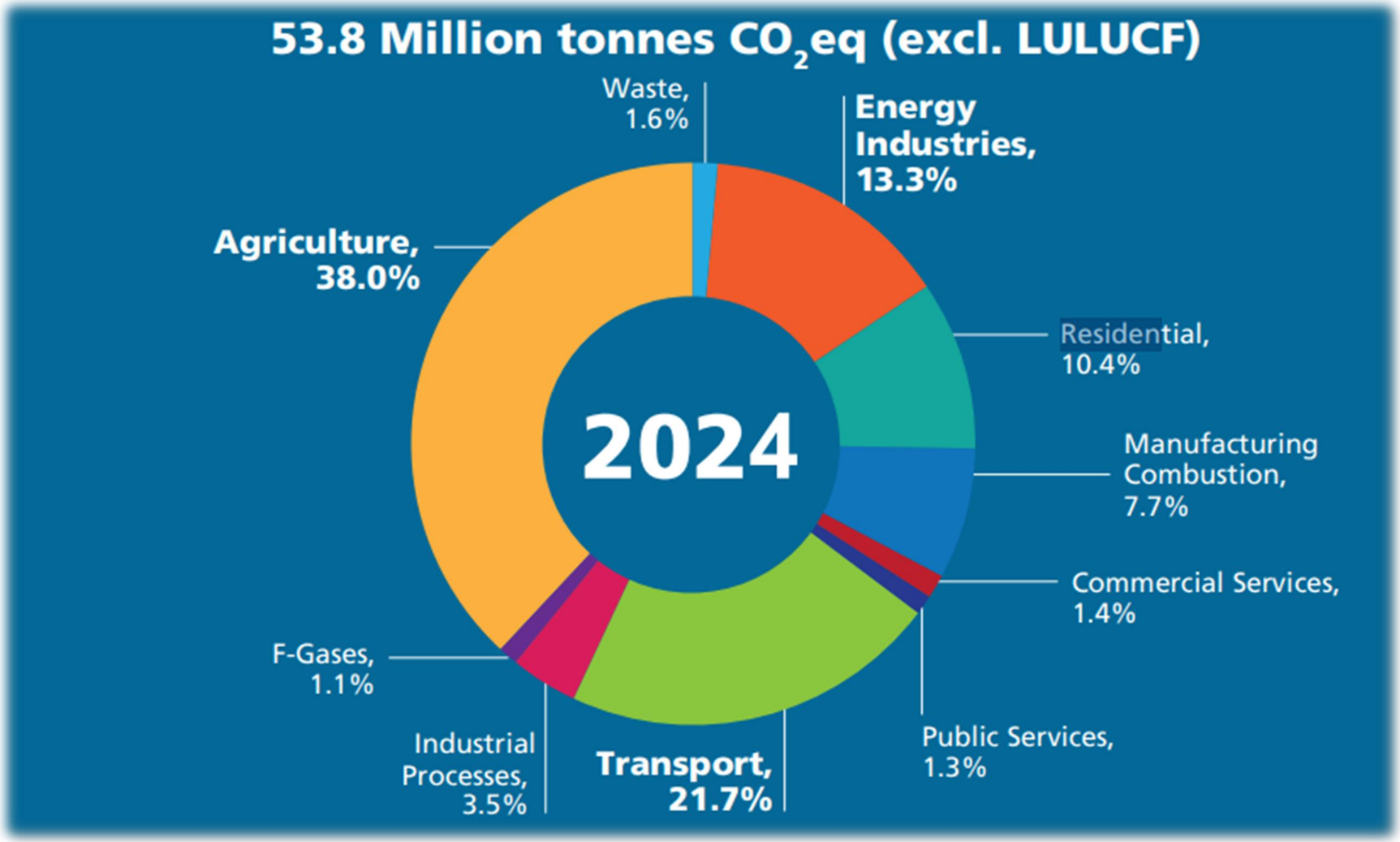
(2) Context – National emissions targets for transport

- Rather than focusing on a %'age reduction (vs 2018), legal targets are now defined as absolute cumulative emissions maxima (ceilings) over 5-year periods, as shown:

Period	Date	Transport Sectoral Ceiling (MtCO2eq.)
CB1	2021-2025	54
CB2	2026-2030	37
CB3	*2031-2035*	*30**

**Estimate based on proposed CB3 carbon budget and previous share allocated to transport sector for CB1 and CB2.*

(2) Context – EPA GHG Inventory (4 July 2025)



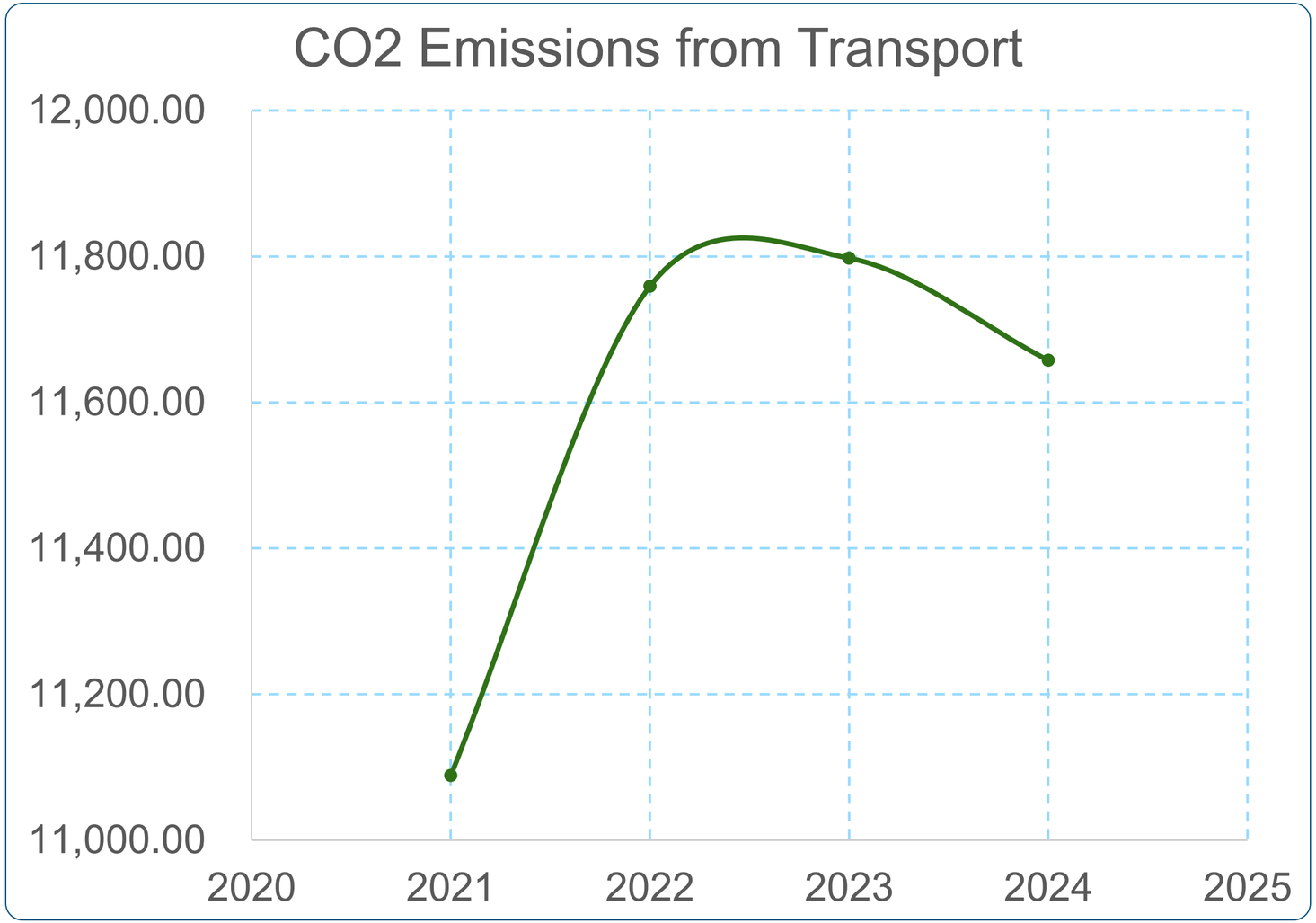
(2) Context – EPA GHG Inventory (4 July 2025)

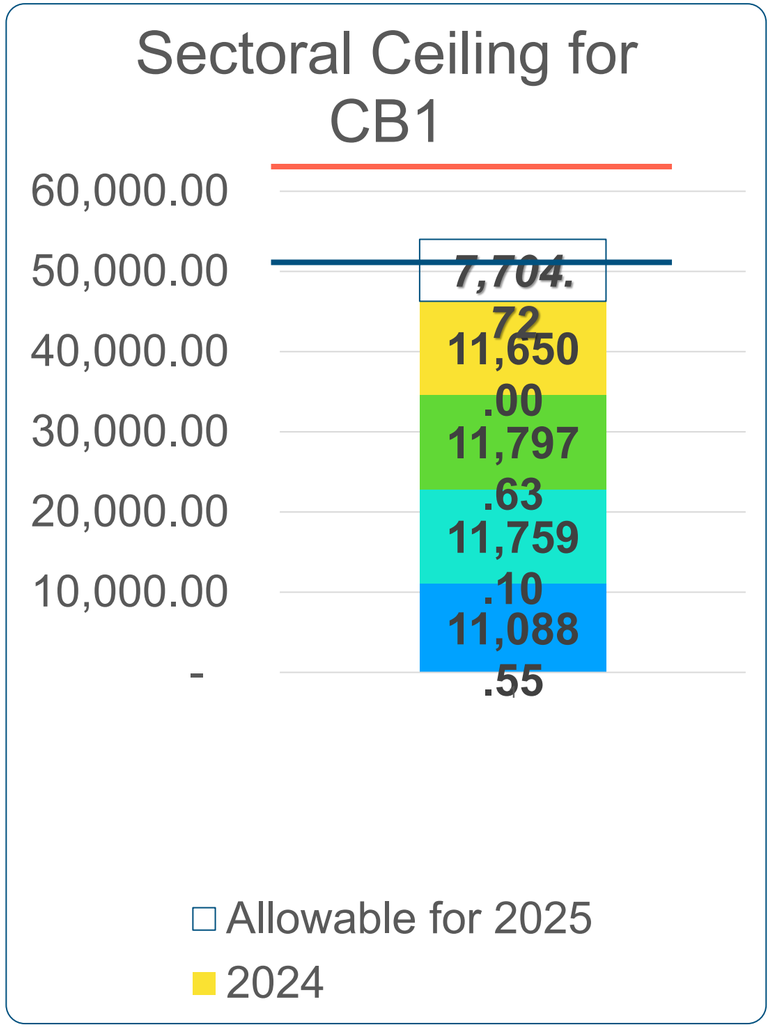
- Total national emissions in **2024**: **53.75MtCO2eq.** (excl. LULUCF)
- This is **2% down** from 2023, and the lowest level in the 35-year time series.

- The transport sector made up **21.7%** sectoral share of national emissions at **11.65MtCO2eq.**
- This was **1.2% lower than 2023** – the first year-on-year drop since before covid.

- Transport has used 85.7% of its sectoral ceiling in the first 4 years of the 5-year Carbon Budget Period 1 (2021-2025).

(2) Context – EPA GHG Inventory (4 July 2025)





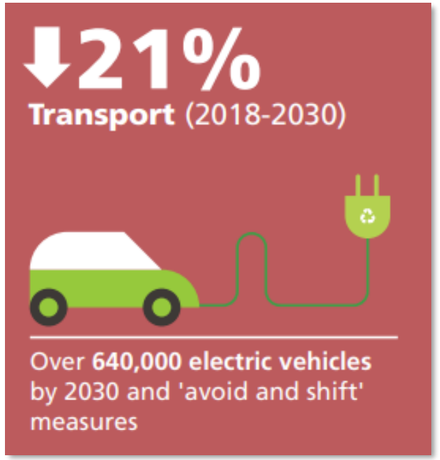
(2) Context – EPA GHG Projections (28 May 2025)

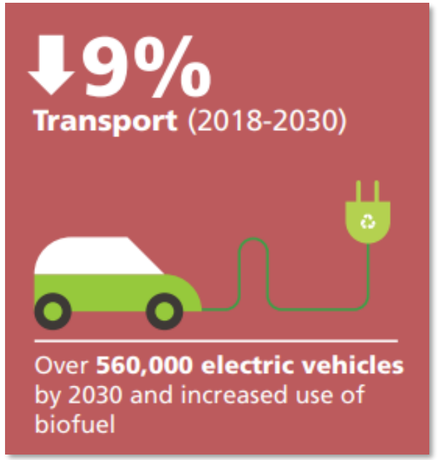
The EPA Projections based on two scenarios:

WEM (With Existing Measures) and **WAM** (With Additional Measures).

- Under the 'With Additional Measures' (WAM) scenario, the transport sector would only reach a **21% reduction by 2030** (considerably short of the 50% transport sectoral target).
- Under the 'With Existing Measures' WEM scenario, this figure drops to **9%**.

- The corresponding whole-of-economy figures = 23% reduction for WAM (well short of the 51% whole-of-economy target) & 9% reduction for WEM.





An Roinn Iompair
Department of Transport

ONE - Background to Climate Action Plan process

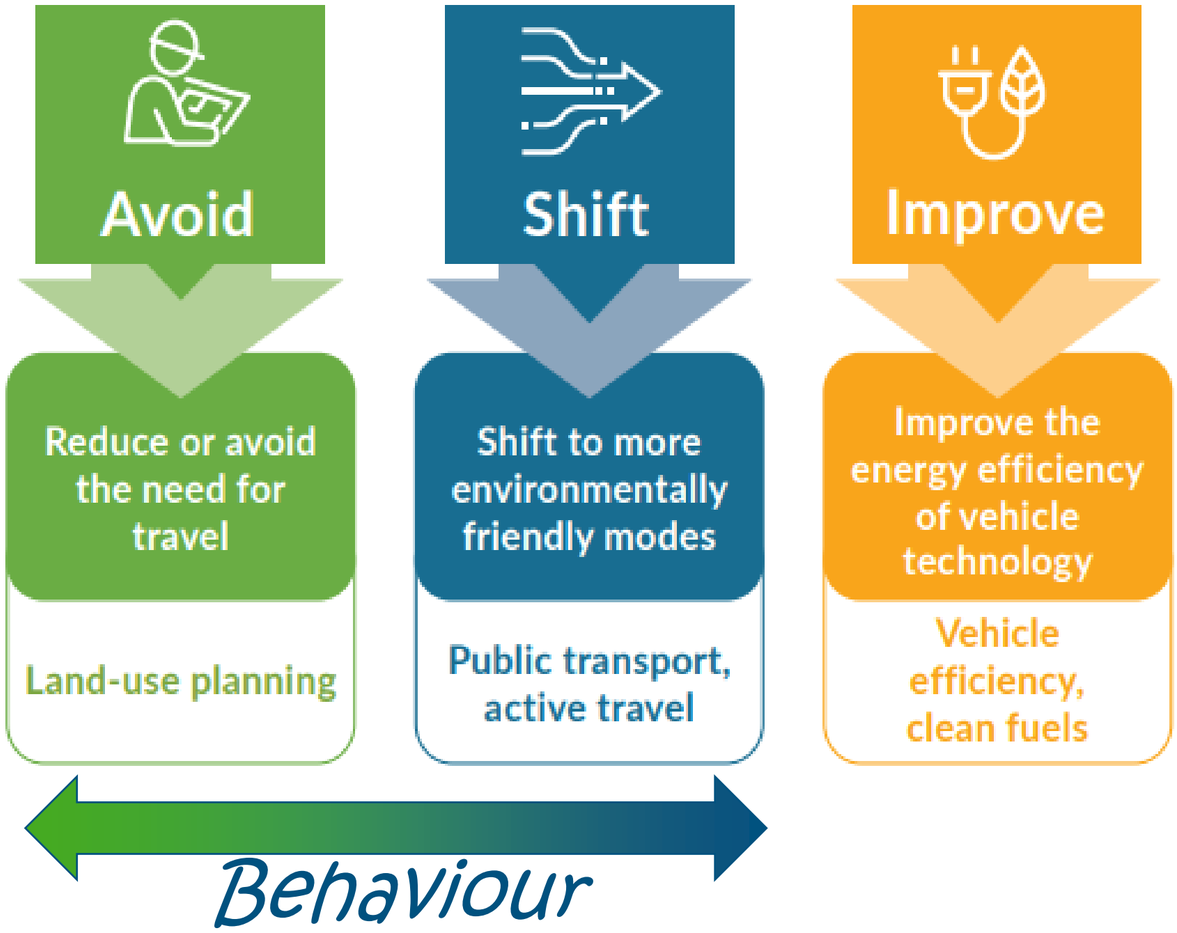
TWO – Where do we stand currently…

THREE – What does the decarbonisation of transport look like?

FOUR – Do we need a new Policy Pathway?

FIVE – To sum up…

(3) Transport Decarbonisation Policies – Since CAP23



Develop services, communities, and infrastructure in such a way that **AVOIDS** the need to travel as much as we do today

Improve the relative attractiveness of sustainable travel modes (Public Transport, Cycling and Walking), to **SHIFT** away from car use; private car modal share from over to 70% (today) to just over 50% in 2030; and

Compliment these by increasing the proportion of EV's in our car fleet to 30% by 2030, which will **IMPROVE** the efficiency of the national car fleet; electrification of the freight and public transport sector will also be key.

(3) Transport Decarbonisation Policies

Enhanced Governance & Accelerating Implementation

Communications Strategy

Haulage and Logistics

Transport Adaptation for Enhanced Climate Resilience

AVOID

Enhanced Spatial and Land-use Planning

Demand Management Strategy

Roadspace Reallocation

Strategic Transport Planning

SHIFT

Active Travel Infrastructure Programme

Major Public Transport Infrastructure Programme

Public Transport Services and Escort to Education Journeys

Smart, Shared and Integrated Mobility

IMPROVE

Decarbonising Public Transport & School Transport Services

EV Charging Infrastructure Strategy / ZEVI WP

Renewable Fuels for Transport

(3) CAP Policies – ‘AVOID’ Actions’

AVOID

- Delivery of National Demand Management Strategy

Metrices (by 2030)

Reduce total vehicle kilometres driven by 20%

50% reduction in fuel usage

(3) CAP Policies – ‘SHIFT’ Actions

© Transport Infrastructure Ireland / Aecom, 2023

Metrices (by 2030)

50% increase in daily active travel Journeys

Increase Active Travel Modal share from 20% to 28%

(3) CAP Policies – 'SHIFT' Actions

SHIFT – Active Travel

- Roll-out of **walking/cycling infrastructure** in line with National Cycle Network and CycleConnects plans
- Policy Statement on **Mobility Hubs**
- Implementation of **Safe Routes to School Programme**
- Expanded **Regional Bike sharing schemes** in Limerick, Cork, Waterford and Galway, including enhanced e-bike provision

Metrices (by 2030)

50% increase in daily active travel Journeys

Increase Active Travel Modal share from 20% to 28%

(3) CAP Policies – ‘SHIFT’ Actions

© John Martin, 2023

Metrices (by 2030)

130% increase in daily Public Transport Journeys

Increase Public Transport Modal share from 8% to 19%

(3) CAP Policies – 'SHIFT' Actions

SHIFT – Public Transport

- **DART+** and **BusConnects** Programmes
- Investment in **passenger and freight rail**, (per All-Island Strategic Rail Review)
- **NTA Connecting Ireland** and new town services, via demand responsive transport pilot initiatives, and conventional & non-conventional modes of public transport services

Metrices (by 2030)

130% increase in daily Public Transport Journeys

Increase Public Transport Modal share from 8% to 19%

(3) CAP Policies – ‘IMPROVE’ Actions

Metrices (by 2030)

Battery EV share of total passenger car fleet = 30%

EV share of new registrations = 100%

EV share of total LGV fleet = 20%

95,000 commercial EVs

ZE share of new heavy duty vehicle registrations = 30%

3,500 HGVs

1,500 EV buses in PSO bus fleet

Expansion of electrified rail services

Biofuels Blend Rate - E10:B20

(3) CAP Policies – 'IMPROVE' Actions

IMPROVE

- Implementation of EU 'AFIR' Targets re: EV charging and Hydrogen Re-fuelling Infrastructure…
- Roll out of key elements of EV Infrastructure Strategy
- Advance PSO electric bus fleet procurement, incl. depot charging upgrades / improve sustainability of School Transport Scheme
- Implement the measures in the Renewable Transport Fuel Policy Statement 2025-2027

Metrices (by 2030)

Battery EV share of total passenger car fleet = 30%

EV share of new registrations = 100%

EV share of total LGV fleet = 20%

95,000 commercial EVs

ZE share of new heavy duty vehicle registrations = 30%

3,500 HGVs

1,500 EV buses in PSO bus fleet

Expansion of electrified rail services

Biofuels Blend Rate - E10:B20

(3) CAP Policies – Cross-cutting Actions

An Roinn Iompair
Department of Transport

ONE - Background to Climate Action Plan process

TWO – Where do we stand currently…

THREE – What does the decarbonisation of transport look like?

FOUR – Do we need a new Policy Pathway?

FIVE – To sum up…

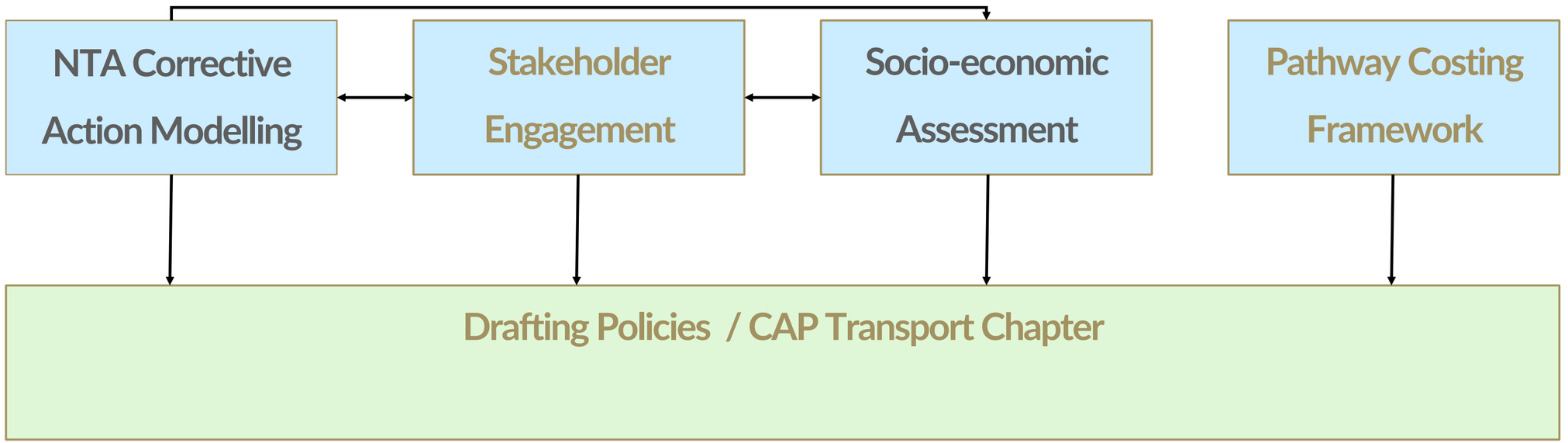
(4) Objectives of C.A.M.P. Project:

- To identify a policy pathway to correct trajectory of carbon emissions from transport sector;

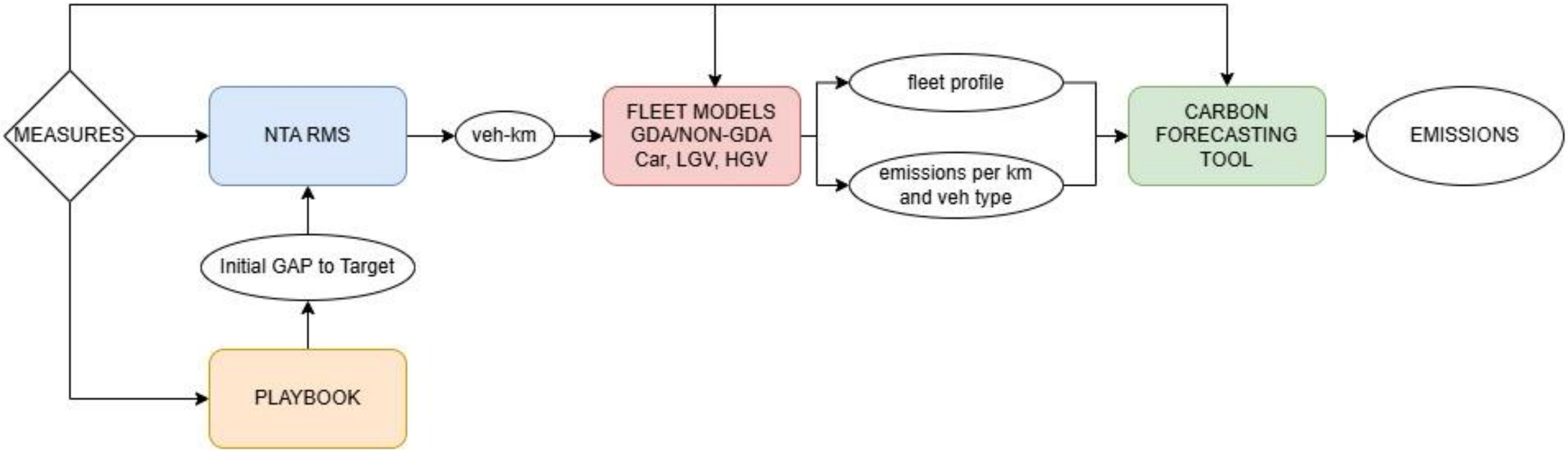
- To look for any additional measures to deliver currently unallocated savings for carbon budget period 2, above and beyond those required to keep the transport sector within its sectoral emissions ceilings;

- To identify decarbonisation interventions / policy pathways that deliver sustained & accelerated emissions abatement *beyond 2030* into Carbon Budget 3, in line with national and European targets.

(4) Structure / Workstreams



(4) Modelling Methodology



(4) NTA Modelling - Testing four scenarios

2030/2035 Baseline Reference Case (BRC)

- Business as Usual Scenario – With assumptions around future population & demographic growth; network developments (e.g. roads); public transport routes / services…

DS1 - Quick-Win Scenario

- Emissions impact of relatively easily implemented interventions that are readily affordable and politically palatable

DS2 - High Ambition Scenario

- Emissions impact of extensive decarbonisation interventions

DS3 - Full Compliance Scenario

- Level of intervention required to fully achieve our sectoral emission ceilings by 2030 / 2035 (all possible interventions)

(4) Stakeholder Engagement / Management

Important - in order to:

- Raise awareness of the Corrective Action Modelling Project.
- Dialogue on decarbonisation of the transport sector with stakeholders.
- Understand what other modelling tools and analysis are available, and how they interact with each other.
- Stakeholder input to specific measures to test as part of policy pathways.

- Present results of various measures to stakeholders.
- Gain an understanding of potential challenges & barriers in implementing policy pathways.
- Ensure understanding amongst stakeholders of the final proposals for policy pathways.
- Discuss implementation routes for policy pathways.

(4) Supporting work - Economics

Socio-economic Assessment :

- Avoid and/or adequately mitigate proposals that may have detrimental impacts;
- Provide a clear evidence base to demonstrate fairness of the proposed policy pathways;
- Engage with concerns at a political level about the fairness of the proposed policies.

Costing Framework :

- A framework approach for costing a future prioritised list of measures

An Roinn Iompair
Department of Transport

ONE - Background to Climate Action Plan process

TWO – Where do we stand currently…

THREE – What does the decarbonisation of transport look like?

FOUR – Do we need a new Policy Pathway?

FIVE – To sum up…

(5) Conclusions

IE has a **clear governance model** set out in statute, to reduce carbon emissions, incl. transport.

The transport sector is currently **not on track** to meet its 2030 targets.

We have clear policies to reduce emissions, but they are **not having an effect quick enough**.

There are **roles across all sectors of society**, including significant behavioural change.

We need to **revisit our decarbonisation policy pathways**, to see if we can do more.

It remains to be seen whether this will be **set out in CAP26**…?

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

M28 Carbon Reporting with the NEC Climate Change Clause – Client & Contractor Views

Cathal Touhy, Cork County Council, Natalie Bird, BAM & Dave Stewart, Jacobs

Comhairle Contae Chorcaí
Cork County Council

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Cork
City Council
Comhairle Cathrach Chorcaí

Session 5: Decarbonisation

M28 Carbon Reporting with the NEC Climate Change Clause – Client and Contractor Views

Jacobs

bam

AtkinsRéalis

Topics.

1. Background to Client's Carbon Requirements.
Cathal Tuohy – Cork County Council

2. The Contractor's View & what X29 means in Practice.
Natalie Bird - Bam

3. The NEC Contract and the X29 Climate Change Clause.
David Stewart - Jacobs

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

M28 Cork to Ringaskiddy Project

M28
Cork to Ringaskiddy

M28 Delivery:

Scope

- 10.7km of Dual 2 lane motorway from N40 South Ring Road to Ringaskiddy, with 2.5km Online Upgrade and a 10.2km Offline Section.
- 1.5km Single C/W Section relief road for Ringaskiddy.

Project Delivery

- EIS/EIA commenced 2015.
- CPO published 2017.
- Oral Hearing Q4 2017
- Approved by ABP 2018.
- Cleared legal challenges 2021.
- Advanced Works commenced 2021 with 30 separate Advance Works Contracts.
- Ringaskiddy Urban Realm and Ringaskiddy Relief Road both commenced in Q3 2024, with 2025 and 2026 completion dates.
- Contract Award to BAM. April 25 with Motorway Works commencing May 2025.
- ……Motorway Completion Q2 2028.

Background to Client's Carbon Requirements

Cathal Tuohy

Cork County Council

Why the M28 Project?

- The M28 is doing our part in supporting the delivery of the current National Planning Framework (NPF), with Climate and Environmental Performance one of its Strategic 0utcomes. Being part of 51% reduction in greenhouse gas (GHG) emissions by 2030.
- With an experienced team delivering the M28, there was significant planning in the pre-tender phase, on how best to align our Scheme Delivery with the recent Climate Action Plans (CAPs).
- Careful consideration was given by Client, our Technical Advisor Jacobs, and TII, on how best to align our objectives with Green Public Procurement Strategy, by stipulating a carbon reduction goal during the construction stage through the Main Works Contract Requirements.
- Further options were looked at to achieve a carbon reduction on the scheme, that were being Piloted on other TII contracts in Ireland, i.e. such as mandating the of CO2 Performance Ladder.
- Ultimately, it was decided to use the NEC X29 Clause utilising a Performance Table which uses Key Performance Indicators (KPIs).
- To highlight these Project Climate Change Objectives to the tenderer's a "Sustainability" essay was one of five Technical Questions asked, where Quality was 70% of the overall tender.

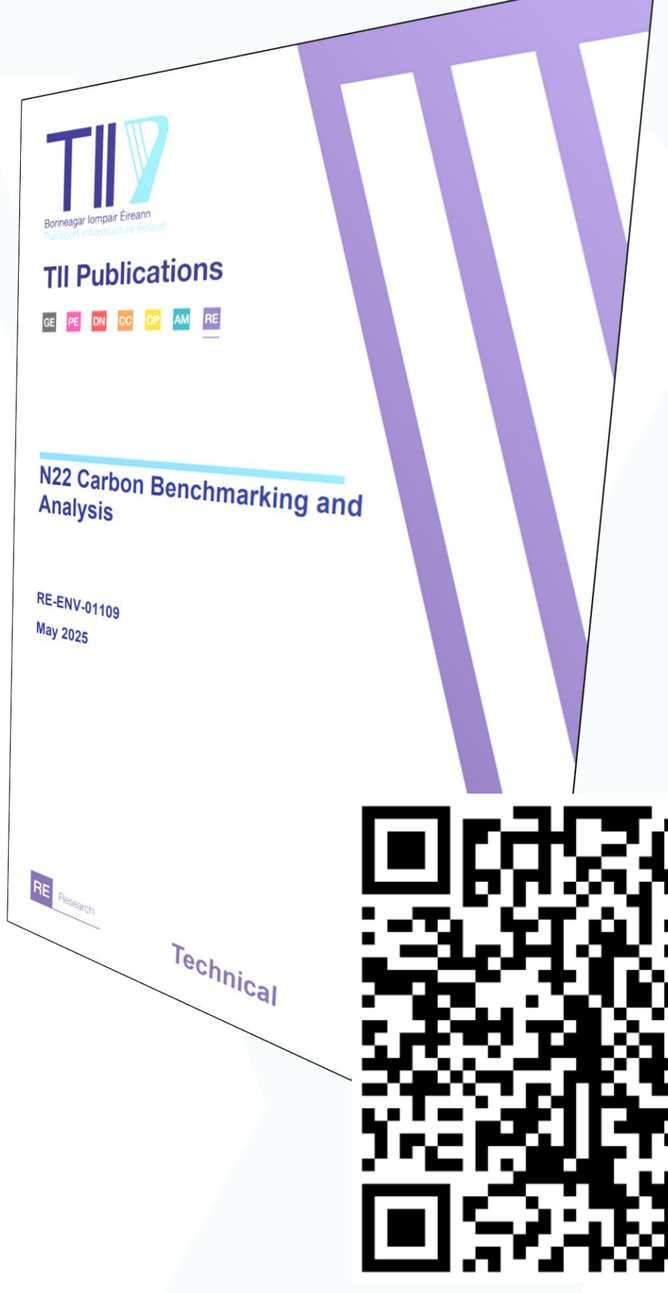
Why the M28 Project?

Previous works on the N22 Macroom to Baile Bhuirne Benchmarking Exercise.

- Over the last number of years, TII had been looking to establish a library of As-built Carbon Information for Road Projects in Ireland.
- They sought information to undertake carbon analysis to understand the breakdown of carbon across their project in terms of TII Standard Series, Materials and their Lifecycle Stages.
- In 2022, TII, their Consultants AECOM, and Cork County Council commenced work on the As-built record data that CCC had been collating for the N22BBM.
- During 2023 and 2024, CCC worked with AECOM and TII, utilising TII's Carbon Tool to provide the data required to undertake the required Analysis.
- The Purpose of Scope of the Analysis was to:
    - Develop a Series of Carbon Benchmarks that quantified carbon emissions for a range of as built road structures.
    - Establish the overall N22BBM Carbon Footprint to have a carbon figure per lane per km of road constructed.
    - A detailed "Structure by Structure" Carbon Analysis on materials, material transport, plant use, worker travel and operational data.

CARBON TOOL
Transport Infrastructure Ireland

AECOM



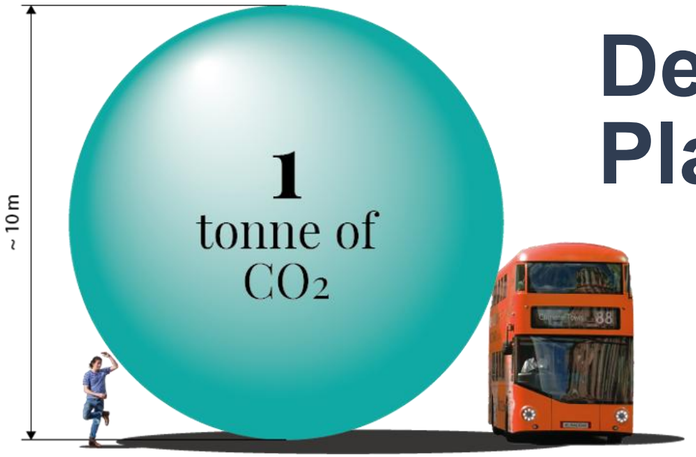
TII' Head of Environmental Policy & Compliance Dr Vincent O'Malley

"Your great work has significantly helped us get a greater understanding of carbon emission during the construction phase of a project.."

TIIs' former Chief Executive Peter Walsh RTE News Press Release 6th Nov 2023

"The project was innovative in many ways including the use of a carbon tool to record its footprint which will be of significant benefit in the planning of future projects."

Development of Online Platform for Recording As-Built Carbon Data

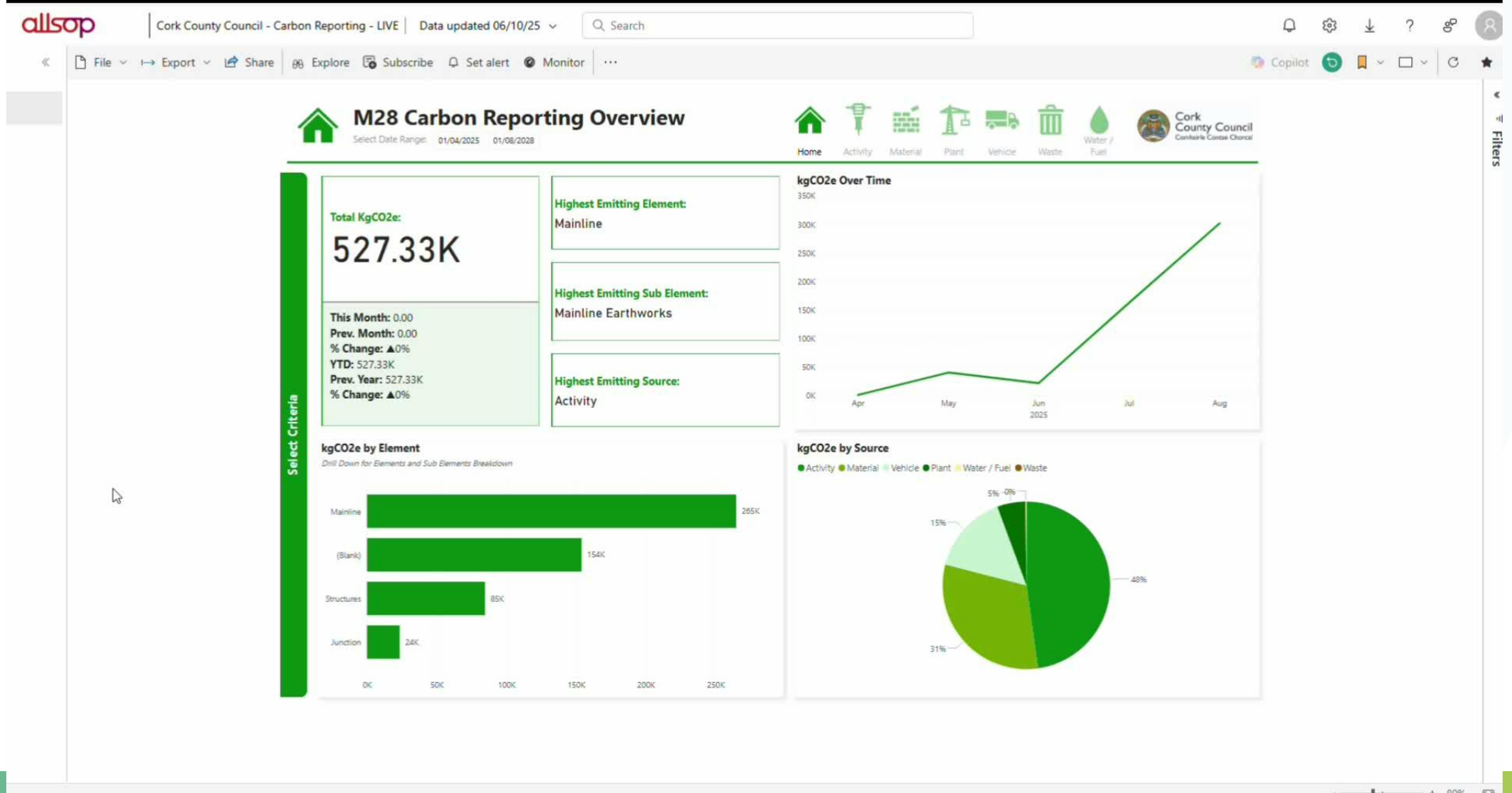


Development of Client Provided Online Platform

The CCC Online Portal was developed based on the TII Carbon Tool and adheres to PAS2080: 2023 Carbon Management in Buildings & Infrastructure.

Category	Project Component	Data Requirement
Embodied carbon (tCO_2e)	Construction Materials (A1-A3)	The embodied carbon associated with the construction material quantities.
	Transport of materials (A4)	The carbon associated with the transport of construction materials to the site by vehicle ty… i.e. HGV, LGV etc.
Embodied Carbon -Construction Activities	Plant Use (A5)	The carbon associated with the litres of fuel used by plant and equipment during the construction phase. i.e Total fuel use per piece of equipment per function
	Employee Commuting (A5)	The carbon associated with the transport of site operatives to and from the construction site for different transport types. i.e Total distance travelled and by transport mode, by workers during construction (km).
	Clearance & Demolition (A5) Activities	The carbon emissions associated with the clearance and demolition activities before construction of the road scheme. i.e Hectares of land cleared per land type.
	Land Use Change (A5)	The carbon emissions associated with the land use change associated with the construction of the road scheme, i.e. the loss of forest, peatland etc. i.e Hectares of land changed per land type.
	Excavation (A5)	The carbon released during the excavation process i.e Volumes of Materials in Earthworks

CCC Online Carbon Reporting Platform

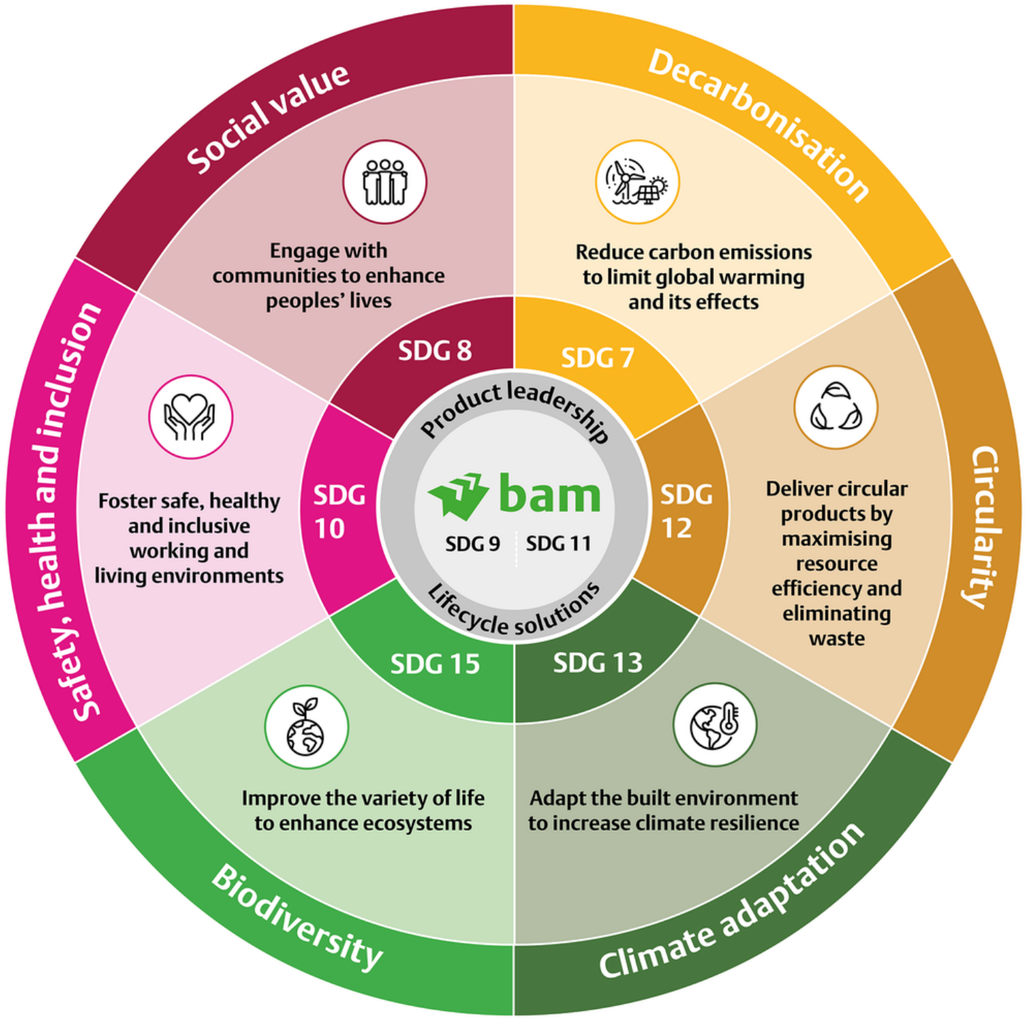


The Contractor’s View & what X29 means in Practice.

Natalie Bird

BAM

BAM Sustainability Strategy



Reduce carbon emissions to limit global warming and its effects

Scope 1 and 2 CO2 intensity:

- Fuel and electricity
- Reduce by 50% by 2023 and 80% by 2026 (compared to 2015)

Scope 3 CO2 intensity:

- Purchased goods and services, emissions from sold goods (mostly)
- Reduce by 50% by 2030 (compared to 2019)

Maintain CDP Climate A List position

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

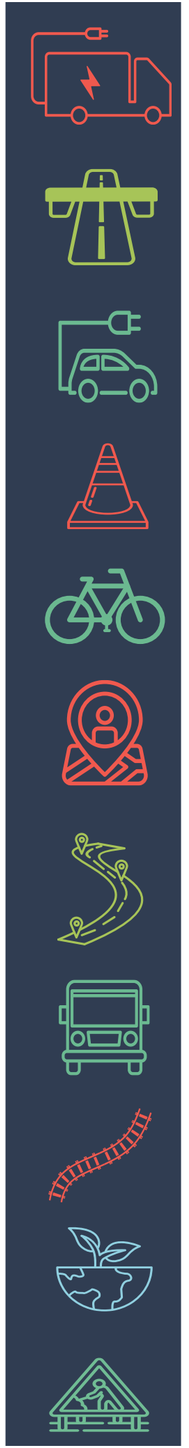
Measuring progress

Baseline carbon estimate
Based on outline design quantities

Reduction target
Agreed with the client based on achievable reduction interventions

Forecast estimates
Developed quarterly, capturing carbon reduction interventions planned and implemented

Actual carbon
Reported monthly to CCC based on materials, fuel and energy used and estimated from transport distances and mode



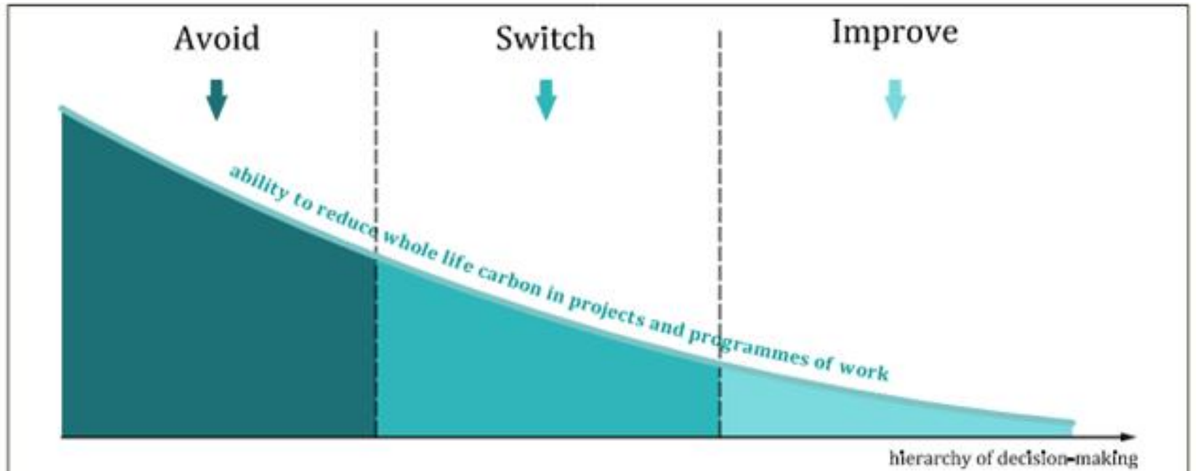
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

How we are reducing emissions on M28

Avoid:
- Value engineering to reduce culvert lengths and structures
- Reducing haulage distances
- Use of site won materials

Switch:
- Using HVO instead of diesel for all BAM earthworks and employee travel,
- Energy grid connection in lieu of diesel generators
- Use of cement replacements

Improve:
- Anti-idling technology
- Energy management systems all compounds
- Construction traffic management plans to reduce congestion and delivery distances



***NOTE** This figure represents a simplified and streamlined version of the carbon reduction hierarchy presented in PAS 2080:2016 and the* Infrastructure carbon review *[1]. It has been updated to clarify its applicability and relevance to a wider range of projects and programmes within the built environment (i.e. to clarify that the carbon reduction hierarchy is not solely about new builds).*

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

More novel opportunities to decarbonise road building

Concrete

- Use of or trial of more net zero aligned cement replacements such as calcine clays, limestone fines
- Use of cement free concrete technologies (AACMs and Geopolymers)

Earthworks

- Use of continuous compaction control to optimise passes & associated fuel use
- Use of electric plant
- Trial the use of hydrogen plant

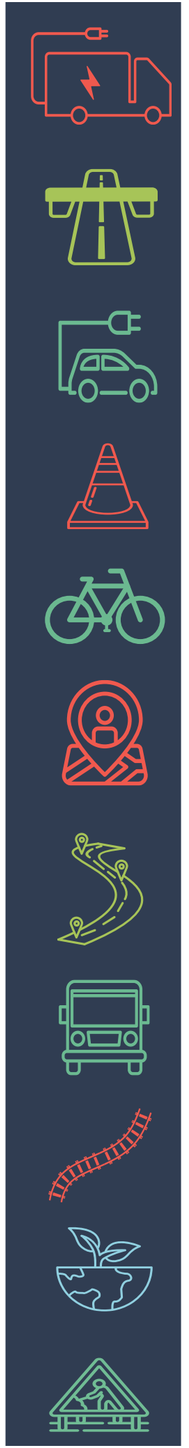
Asphalt

- Use of bio-based bitumen alternatives
- Use of rejuvenator technologies to use higher recycled contents
- Use of cold and half warm asphalt mixes
- Trial the use of carbon sequestrating aggregates

Limited experience and confidence in novel approaches across client, designer, contractor and supplier

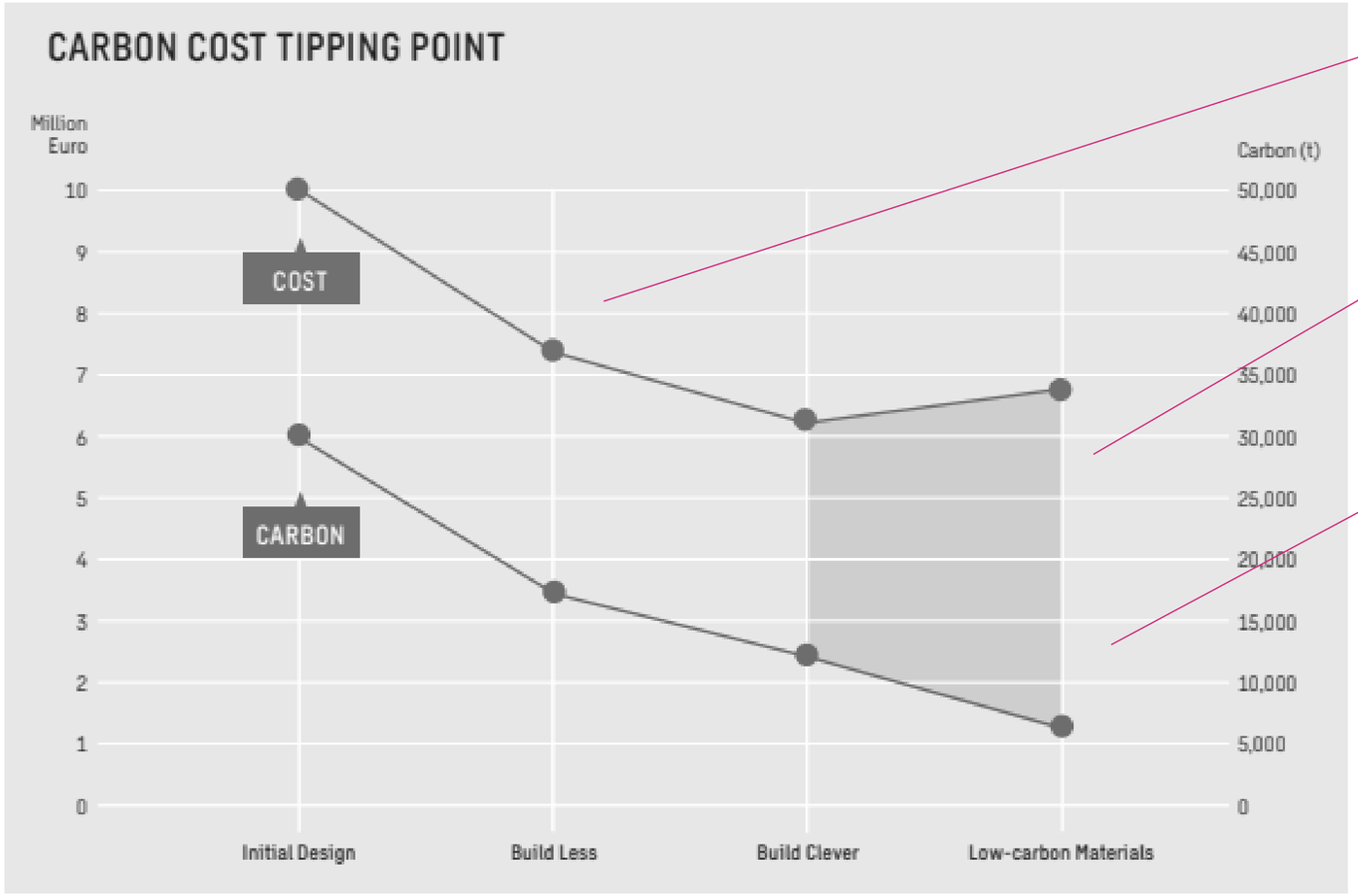
Means

more expensive and challenging to implement than current BAU



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

If it’s in the contract it gets done



Values are for illustrative purposes.

Source: Sweco report: Carbon Cost in Infrastructure

Reductions in carbon through value engineering can save costs for client and contractor when incentivised correctly

Easy to implement “low hanging fruit” can be required upfront to mitigate costs

X29 clause helps to align expectations between the client and the contractor where

- Novel lower carbon materials might be more expensive to purchase
- Time cost of designing non-standard approaches
- Mitigating and distributing risk

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

The NEC Contract and the X29 Climate Change Clause

David Stewart

JACOBS

How do we Tie this Together?

- We have a Client who has well defined aspirations. We have a supply chain who want to meet those aspirations. But we also have a commercial reality.

- At the M28, we are using the NEC form of contract. Every NEC contract is assembled from a menu of components which come together to provide a bespoke contract.

- One of the Secondary Options available to us is X29 – Climate Change.

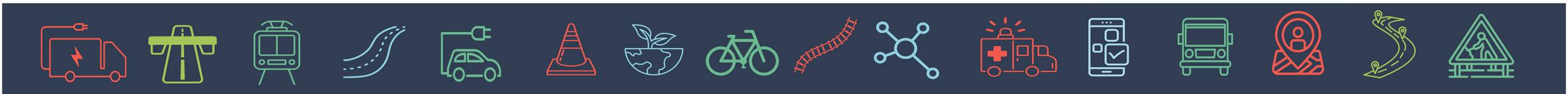
- Introducing X29 creates a framework within the contract which should allow us to achieve the outcomes we **all** aspire to.

The Main Features of X29

- Including Option X29 adds the following features to the standard contract:
  - It allows clients to state their **climate change requirements** in the scope.
  - It requires contractors to provide a **climate change plan**
  - It requires contractors to collaborate with stated **climate change partners**
  - It introduces a **performance table** which enables clients to set financial incentives to encourage contractors to achieve the required performance targets.

- At the M28, our performance table has two main incentivised objectives.
  1. Collect good quality data which allows us to measure carbon.
  2. Set a target for and then achieve an overall reduction in carbon.

- This means that carbon is now a metric which impacts payment. In effect, **carbon becomes a currency** in the contract.



Why Incentivisation, not Enforcement?

- If the climate change requirements are in the scope, why do we need to incentivise the contractor to comply with them?

- The challenge is: If the contractor simply ignores these requirements but builds the project well, how are they held to account? The practical answer is: with difficulty.

- In NEC, incentivisation is often used when we are seeking a particular behaviour from the supplier.

- In X29 at the M28 we assign a price to carbon. The more carbon is reduced, then the more the contractor gets paid.

Factors to Consider when Incentivising

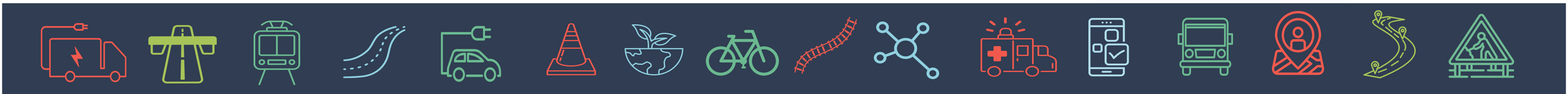
1. Once you are in contract, its business. Requirements need to be objective and unambiguous.

2. If you choose to link an incentive to a specified reduction in carbon, then you need ensure that you have a robust method for counting carbon. There must be enough granularity to ensure that even small savings can be banked.

3. If your targets are too easy, you give the money away,=. If they're too aspirational and the incentive is lost. What's realistic?

4. It costs money to collect the data. What do you actually **need** to measure?

5. Contractors are already incentivised to keep cost down. You don't need to incentivise an overall reduction in materials or consumables. You want the incentive to pay for **investment** in the reduction of carbon.



Options to Consider

Mandate Obvious Good Practice in the Scope

- If you know it’s a good idea, then you don’t need to incentivise it.

Incentivise Ideas Rather than “Stuff”

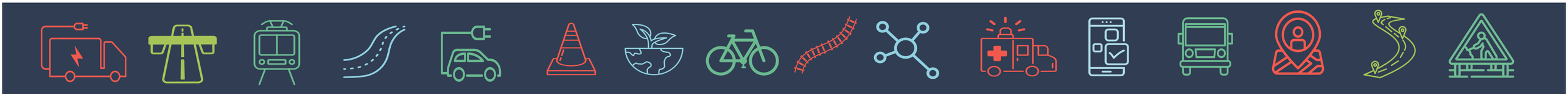
- Hold the wider budget and choose to implement things which add value.

Consider Incentivising Part of the Project, not the Whole

- Don’t count every tonne of carbon in detail, count the tonnes which matter.

Incentivise the Wider Supply Chain and use Partnering

- Encourage parties to multiple contracts to work together with aligned objectives.



Final Observations

- Every project becomes a construction task at some point. That means it will be underpinned by a contract and a series of financial transactions.
- How you intend to manage your climate change priorities should be factored into your procurement decisions.
- The supply chain wants to help. We can be creative and establish an environment in our contracts which allows them to add value.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Low Carbon Road N52 Ardee Pavement Scheme

Ciaran Collier, National Technical Manager, Roadstone

Low Carbon Road N52 Ardee Pavement Scheme

Ciaran Collier
National Asphalt Technical Manager
Roadstone Ltd.

Objective: What are we trying to achieve

- Provide a Low Carbon Road
- Improved performance
- CO_2 Reduction
- Collaboration in the evolution of specifications

Only possible through Collaboration

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

roadstone
A CRH COMPANY

comhairle chontae na mí
meath county council

iCSC
Innovation Centre for Sustainable Construction

We think…

Recycle

But, it's also…

Reduce

Reuse

Repurpose

Rethink

Article 27 Registration – Reclaimed Asphalt

Only material destined for use as a raw material in a Reclaimed Asphalt Pavement plant for the manufacture of bituminous mixtures, is a by-product and not a waste.

By-product Registration

Registration Reference	N-BP-0027
Registration Date	21 March 2024
Registrant	Roadstone Limited
Registrant Contact Details	Aiden McDonagh, 0866049395, amcdonagh@roadstone.ie
Materials	
Criteria	BP-N001/2023 https://www.epa.ie/publications/licensing--permitting/waste/National-By-Product-Criteria-Ref.-No.-BP-N0012023.pdf
Notified Material	Road Planings / Bituminous Materials
Quantity of Material (M3)	10810.0
Source Location	
Name and Address	M8 Dunkettle Interchange to Watergrasshill
County	Cork
Eircode	
Eastings and Northings	https://irish.gridreferencefinder.com/index.php?x=176859.171&y=84622.864
Local Authority	Cork County Council
Use Location	
Use Plant	Roadstone - Carrigtwohill BP-N001/2023
Plant Address	Ballintubber, Carrigtwohill, Cork, T45 V103
Local Authority	Cork County Council

The producer has confirmed that they shall make all relevant documents and records related to this by-product registration, including, but not limited to Statements of Conformity, end user declaration(s), maps, and logs of material dispatched from the production process as by-product, available for inspection by the relevant competent authority(s) upon request.

Project Stages

Research Proposal

- Identify Knowledge Gap
- Literature Review
- Formulate Research Objectives
- Develop Experimental Design

Laboratory Investigations

- Material Characterization (RAP, Bitumen, Additives)
- Compatibility Studies
- Rejuvenator/Bio-Binder Optimisation
- Mix Design Optimisation

Small-Scale Plant Trials

- Mixture Design and Production
- Performance Evaluation
- Further Design Optimisation

Large-Scale Field Trials

- Material Production
- Site Selection & Preparation
- Pavement Construction and Laying
- Quality Control and Monitoring

Performance Monitoring, Data Analysis & Reporting

- Long-Term Performance Assessment
- Data Collection and Analysis
- Life Cycle Assessment
- Dissemination of Findings

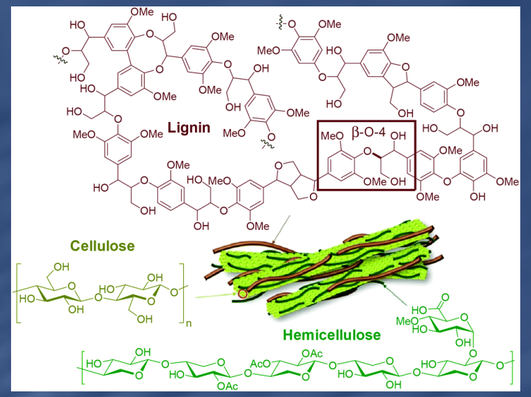
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Bio-Binders/Additives

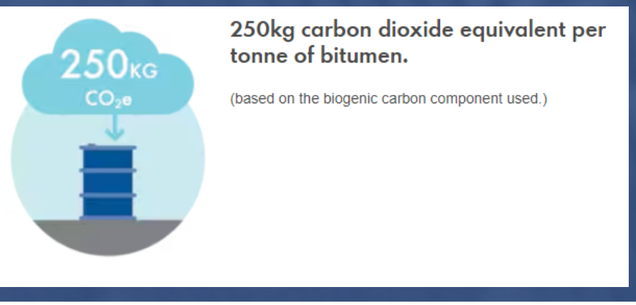
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

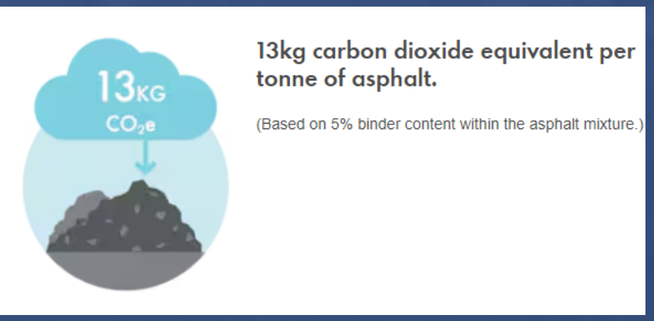
Our selection of Bio-Binders and Additives help to:

- Improve Sustainability and Net CO_2 emissions
- Enhance Aging Resistance
- Improve Mechanical Properties
- Improve Moisture Resistance



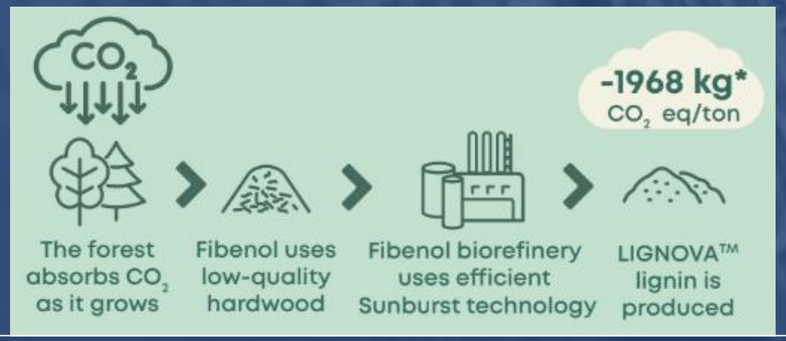
Shell Carbonsink Bio-binder





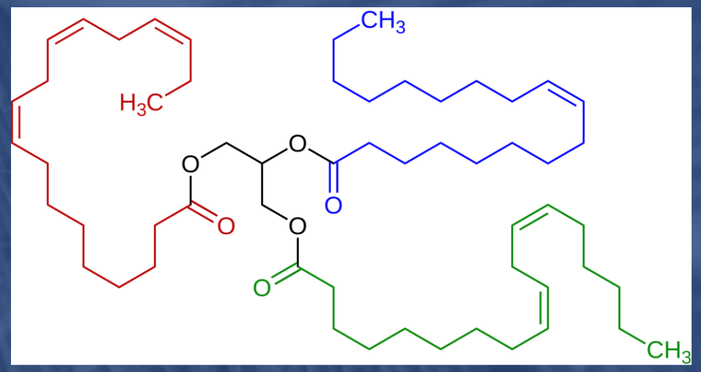
Lignin Bio-Binder

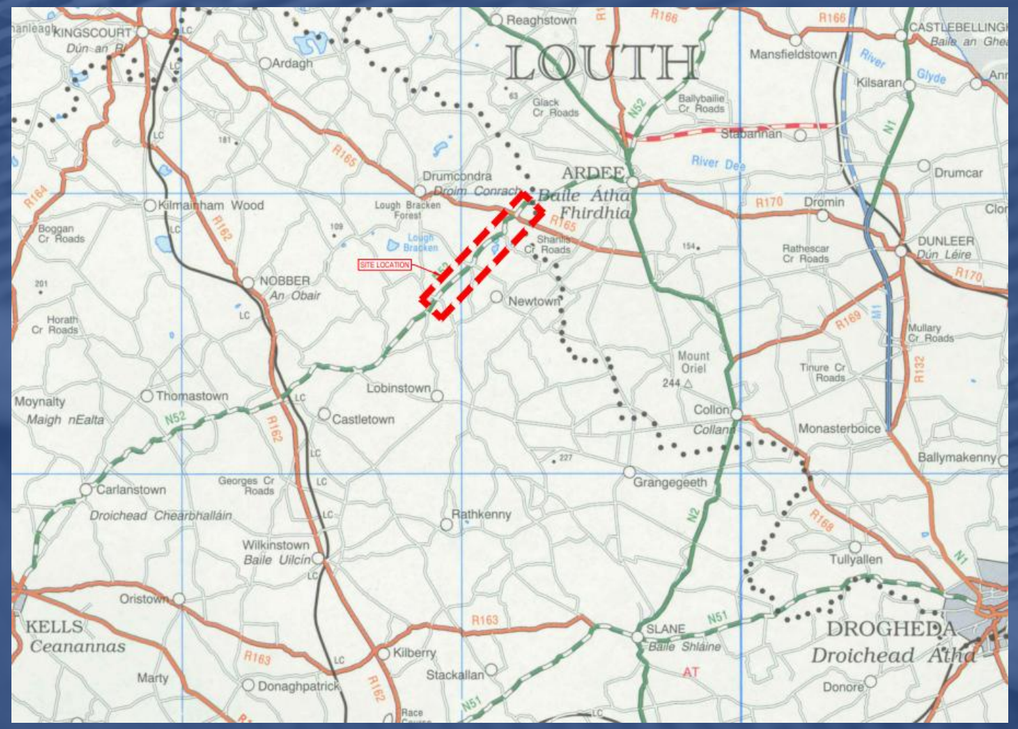
Lignin, a natural polymer from biomass, offers numerous advantages when added to asphalt. Its unique chemistry and renewable nature make it an attractive additive for sustainable asphalt.

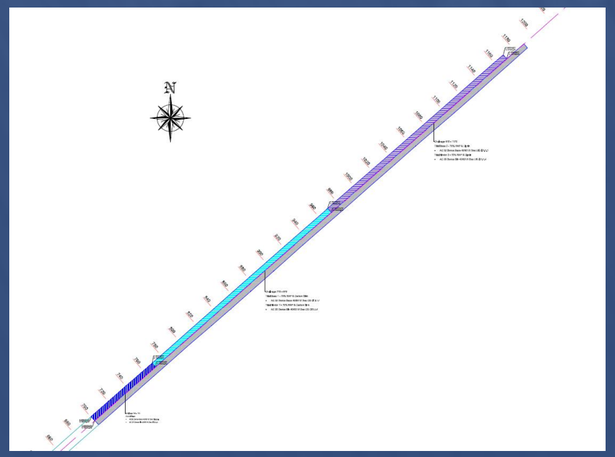


WMA & Rejuvenator

A blend of naturals oils, which provides a balanced mixture of saturated and unsaturated fatty acids for RA rejuvenation and WMA.







Material Used

- Virgin mix (70m)
- 70% RA + Carbonsink (200m)
- 70% RA + 10% Lignin + Novel Additive (200m)

All materials produced at 145˚C

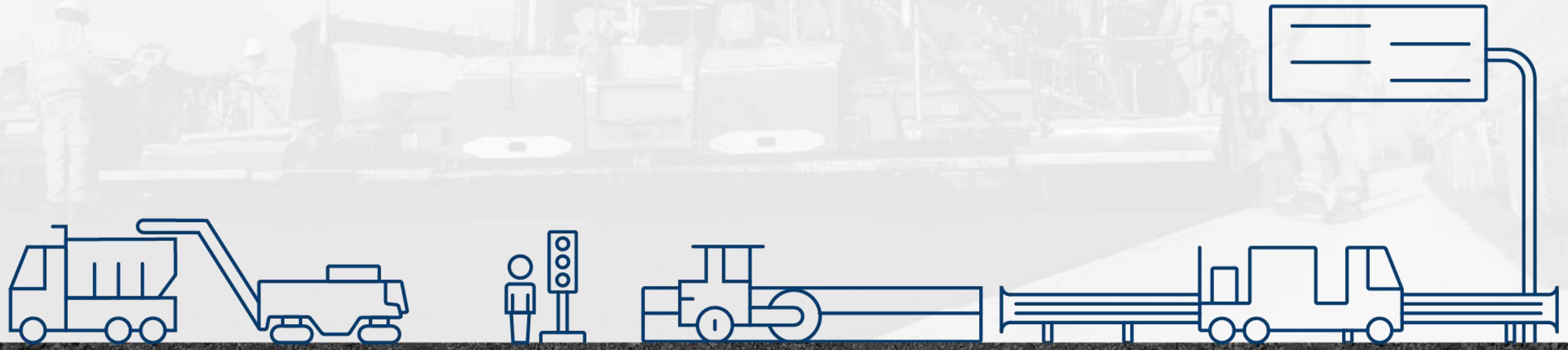
Research & Development - The Key to Maximum Impact

Optimised Ultra High RA Mix (70%)

10% Lignin Bio-Binder or Carbonsink

Innovative Rejuvenator

Alternative Fuels



Binder

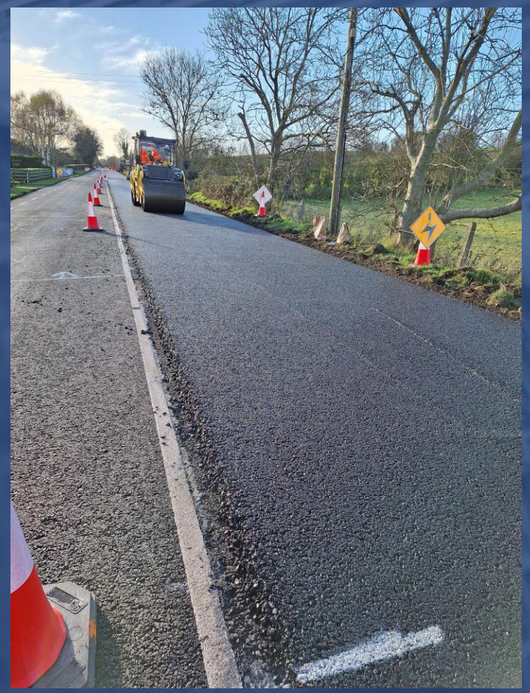
Base

Art of the Possible Scenarios

	Circularity	Mixing Temperature	Electricity	Quarry & Plant Fuel	Transport & Construction Fuel
Standard Design	100% Virgin Materials	Hot Mix	Grid	Diesel	Diesel
Enhanced Design	Maximise Reclaimed Asphalt	Warm Mix	Clean Electricity	Diesel	Diesel
Ultimate Design	Bio Binder & Maximise Reclaimed Asphalt	Warm Mix	Clean Electricity	Low Carbon Fuel	Low Carbon Fuel

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Bonneagar Iompair Éireann
Transport Infrastructure Ireland



Material Testing and Monitoring

A key consideration for this trial will be on material testing and monitoring. Testing included:

- Stiffness
- Fatigue
- Water Sensitivity
- Densities (Bulk, Max & Refusal)
- Wheel Tracking
- M.I.S.T.
- FWD

- Binder Testing
  - Penetration
  - Softening Point
  - Rheology

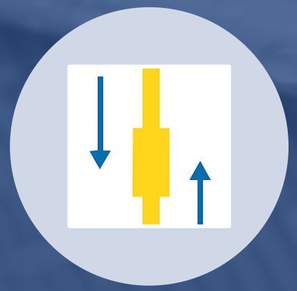
Material Performance – Core Results

	AC 20 - Lignin	AC 20 - Carbonsink	AC 20 Control	AC 32 - Lignin	AC 32 - Carbonsink	AC 32 Control
Stiffness (Mpa)	3302.4	2962.8	2111.7	3114.7	3017.4	3611.1
Wheel Tracking (PRD)	3.56	4.71	4.4	4.35	4.05	4.23
M.I.S.T (%)	114.9	96.93	92.34	111.8	84.04	77.4

	Fatigue Resistance (ε6)
Control - AC 20	143.9
Carbonsink - AC 20	115.8
Lignin - AC 20	171.8

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Key Performance Findings



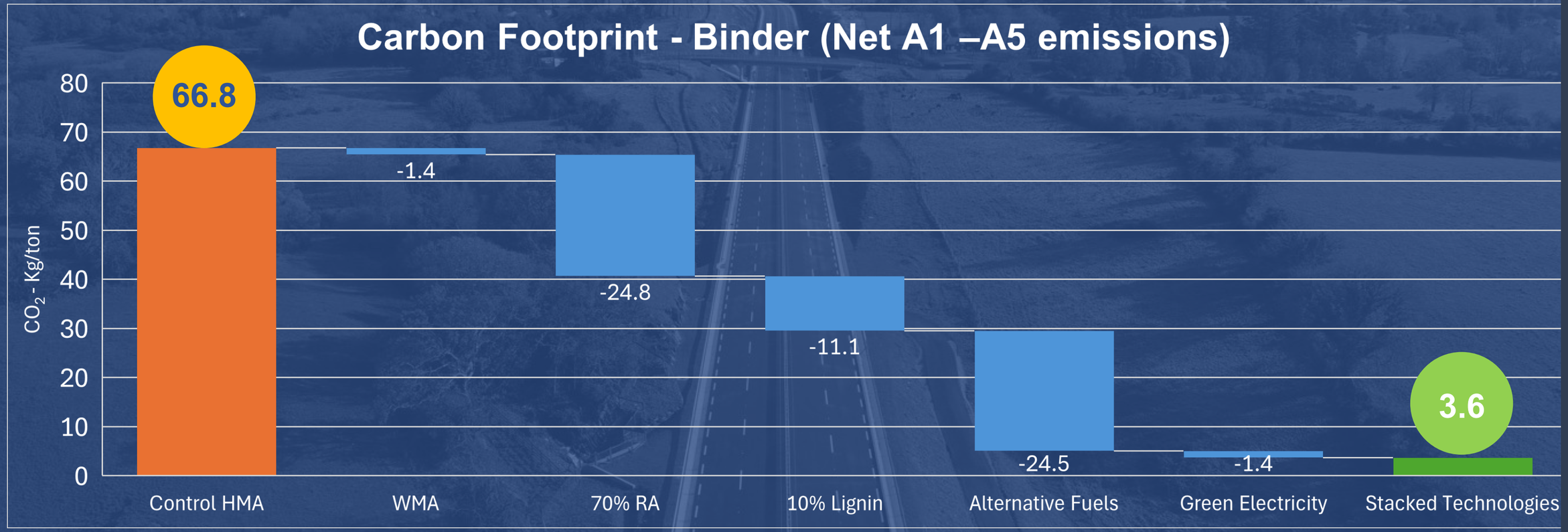
IMPROVED STIFFNESS

ENHANCED FATIGUE PERFORMANCE & RUTTING RESISTANCE

IMPROVED MOISTURE SENSITIVITY

CO_2 REDUCTION

Proven Results Delivering Real Impact



Proven Performance Metrics

90% CO_2 Reduction

Art of the Possible Scenarios

	Circularity	Mixing Temperature	Electricity	Quarry & Plant Fuel	Transport & Construction Fuel
Standard Design	100% Virgin Materials	Hot Mix	Grid	Diesel	Diesel
Enhanced Design	Maximise Reclaimed Asphalt	Warm Mix	Clean Electricity	Diesel	Diesel
Ultimate Design	Bio Binder & Maximise Reclaimed Asphalt	Warm Mix	Clean Electricity	Low Carbon Fuel	Low Carbon Fuel

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Challenges & Next Steps

Key Challenges Addressed

Developing industry-wide standards for bio-binders & rejuvenators

Stakeholder engagement on low-carbon road technologies

Next Steps

Long-term performance monitoring.

Exploring further optimization of bio-binders & rejuvenators.

Wider trials & further collaboration on specification updates

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Environmental Product Declaration Data Analysis & TII Market Surveillance

Kevin Crawley, TII

Olivier Mainardis, Arup

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Environmental Data for Bituminous Mixtures

Olivier Mainardis
Ireland Pavement Engineering Lead – Arup

Kevin Crawley
Senior Engineer – Pavement Engineering & Technology
Network Management | Transport Infrastructure Ireland

Decarbonisation of Pavement Assets

TII National Roads and Greenways Conference 2023 - Cork

Tackling Carbon in TII Pavement Assets

Stephen Smyth
Senior Manager - Pavement Asset Management Programme & Winter Services - TII

Olivier Mainardis
Ireland Pavement Engineering Lead - Arup

TII Statement of Strategy

Sustainability

Collaboration

Innovation

Collaborate for a holistic approach

Deliver end-to-end improvements

Transition to Net Zero

Transport Infrastructure Ireland

Sustainability Implementation Plan

Our Future

Decarbonisation of Pavement Assets

Creating Environmental Data

- Asphalt Producers
- EPD Programme Operators
- Constituents Producers
- TII
- LCA harmonisation facilitator
- CEN Technical Committee Members
- LCA Verifiers
- ARUP
- LCA Specialists

What the Irish Industry shared with TII

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

ARUP

Environmental performances of

588

specific products assessed…

…of which

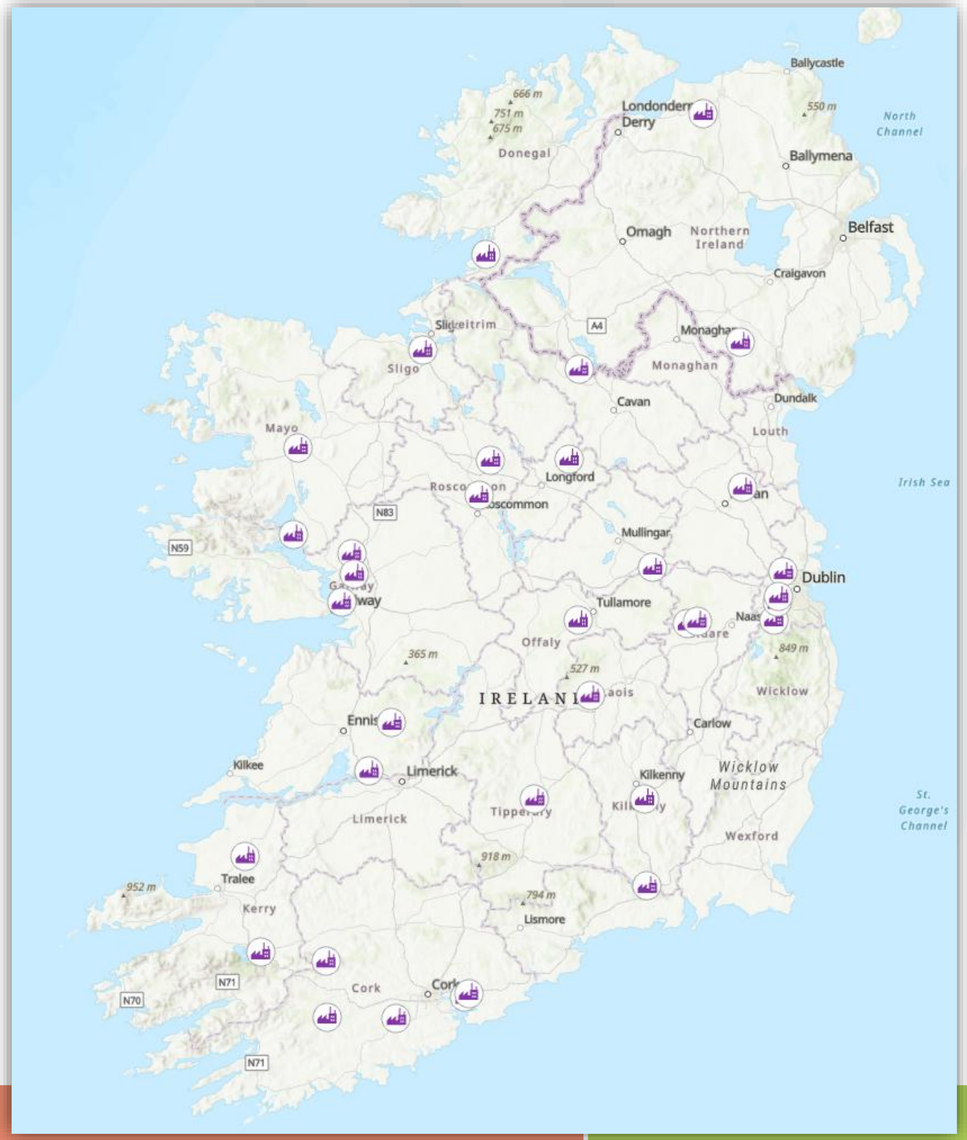
462

specific products are covered by TII Publications

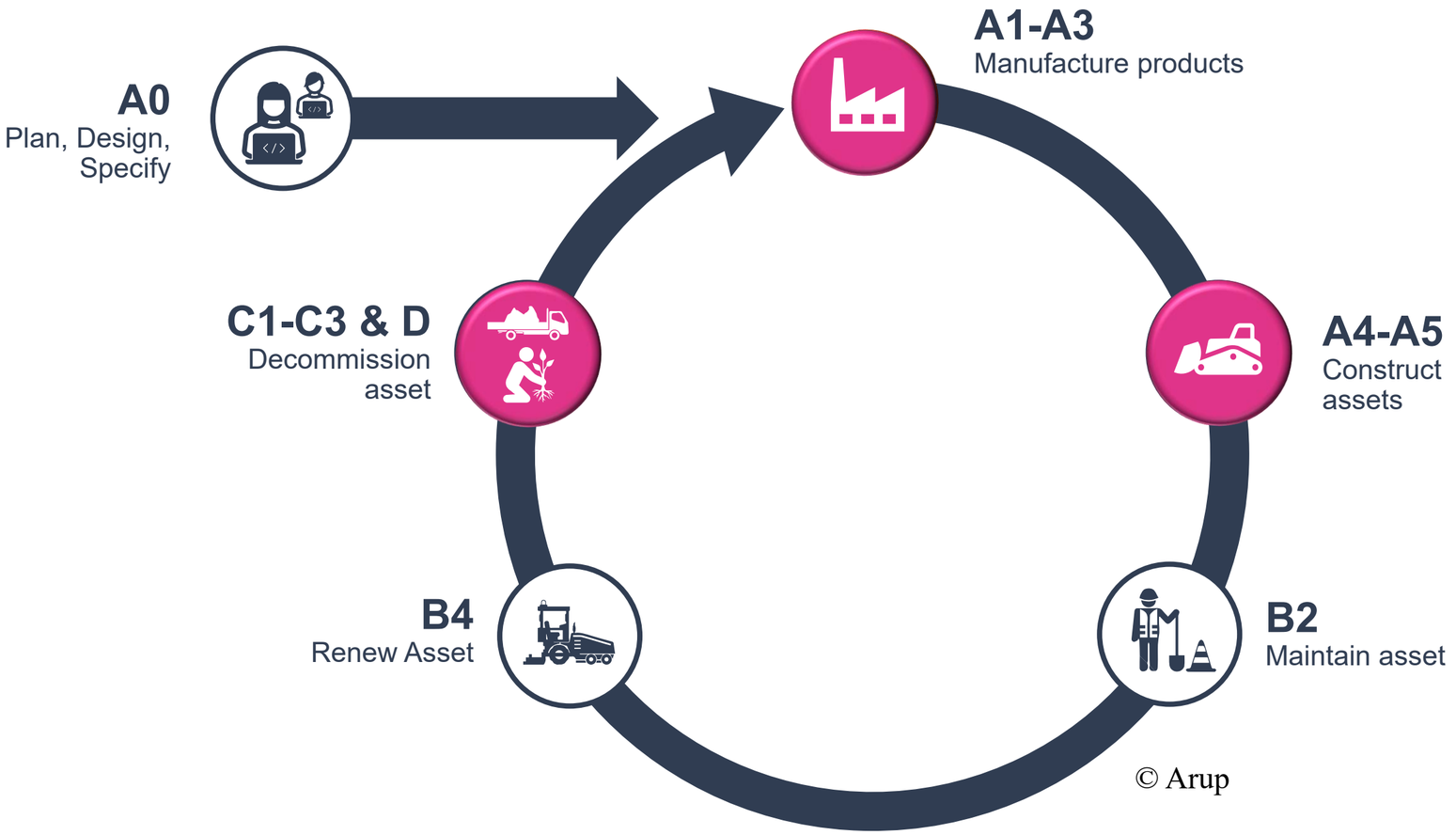
13 producers covering **35** asphalt plants

Cradle-to-grave GWP_{total} ranging from

45 to 240 $kgCO_2eq$ per tonne



So far, we looked at…



So far, we looked at…

TII Publications — *CC-SPW-00900*
Road Pavements – Bituminous Materials — *October 2023*

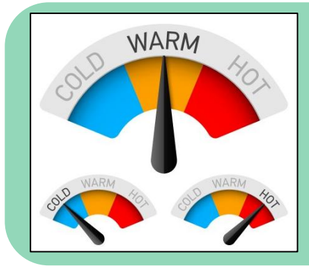
5. Stone Mastic Asphalt Products

Stone Mastic Asphalt mixtures shall comply with this Specification which is derived from IS EN 13108-5. Assessment and Verification of Constancy of Performance shall be carried out to System 2+ in accordance with IS EN 13108-5. The DoP, CE Marking, Type Testing and FPC information detailed under CC-SPW-00010 and Clause 1 of this Series shall be provided.

5.1 Mixture Designations

The mixture designations available are:

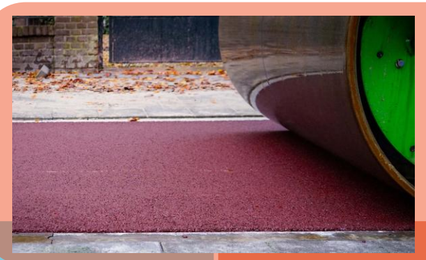
5.1.1	SMA	10	surf	PMB 65/105-60	des
5.1.2	SMA	10	surf	40/60	des
5.1.3	SMA	14	surf	PMB 65/105-60	des
5.1.4	SMA	14	surf	40/60	des
5.1.5	SMA	6	bin	40/60	des
5.1.6	SMA	6	bin	70/100	des
5.1.7	SMA	6	bin	PMB 65/105-60	des
5.1.8	SMA	10	bin	40/60	des
5.1.9	SMA	10	bin	70/100	des
5.1.10	SMA	10	bin	PMB 65/105-60	des
5.1.11	SMA	14	bin	40/60	des
5.1.12	SMA	14	bin	70/100	des
5.1.13	SMA	14	bin	PMB 65/105-60	des



Temperature of production

Reclaimed Asphalt content

Skid resistance properties (PSV*)



Pigment additive

maximum

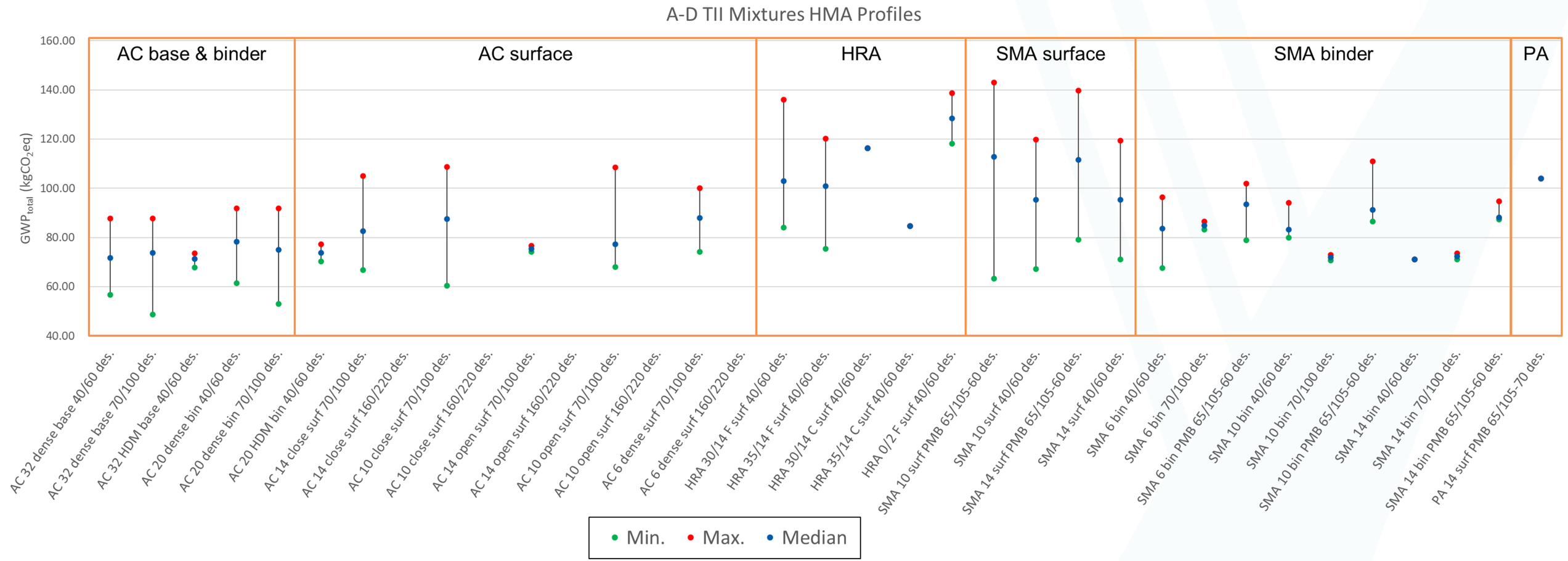
median

minimum

* PSV: Polished Stone Value

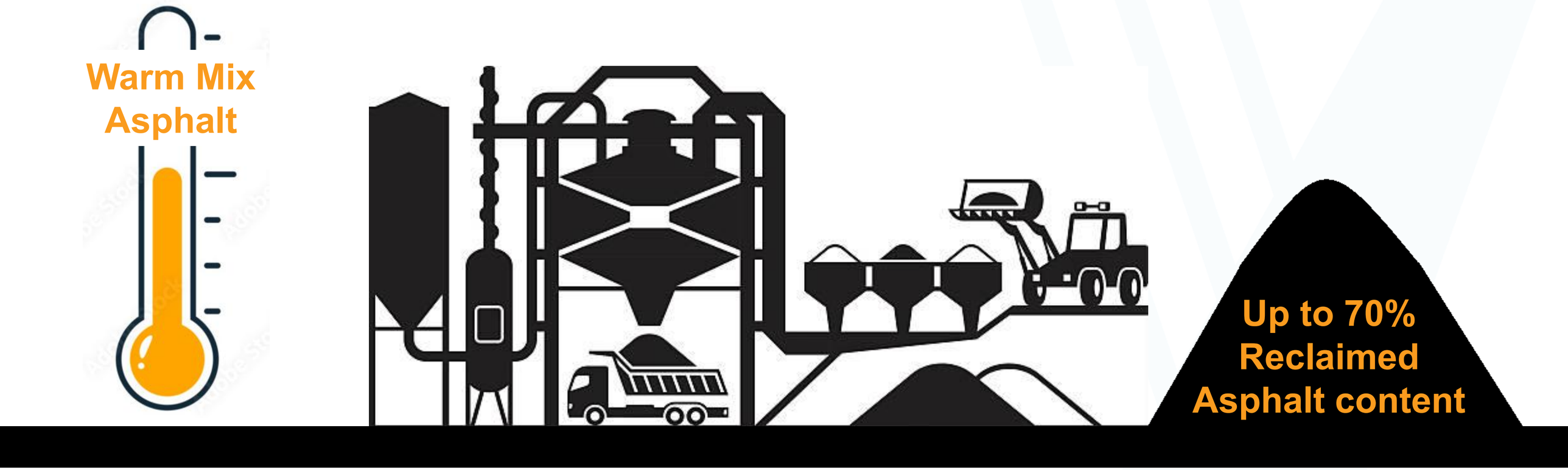
Carbon emissions of Hot Mix Asphalts

Focus on lifecycle modules A to D without B



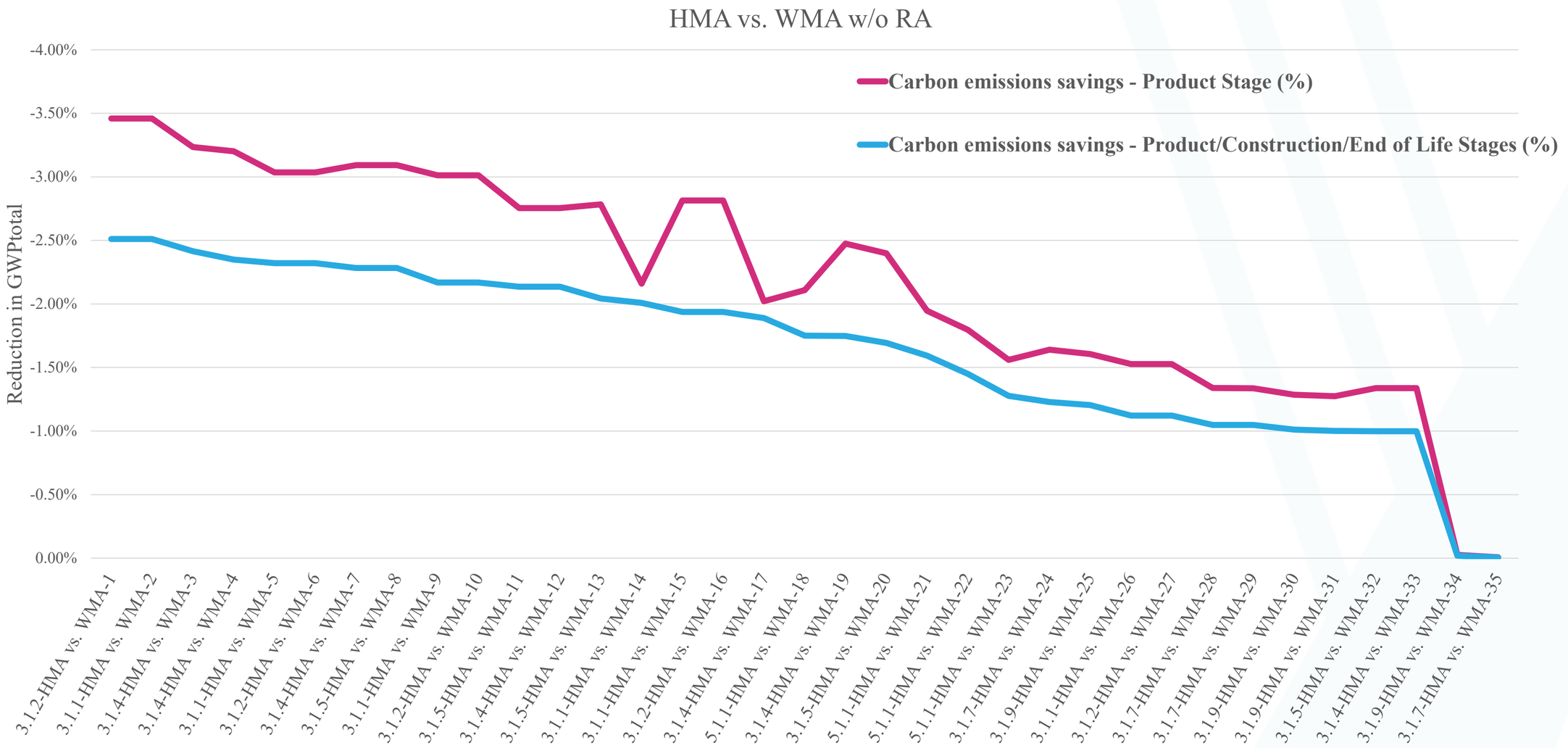
Use of Environmental Data

Demonstrating the benefits generated by changes in materials specifications (CC-SPW-00900):



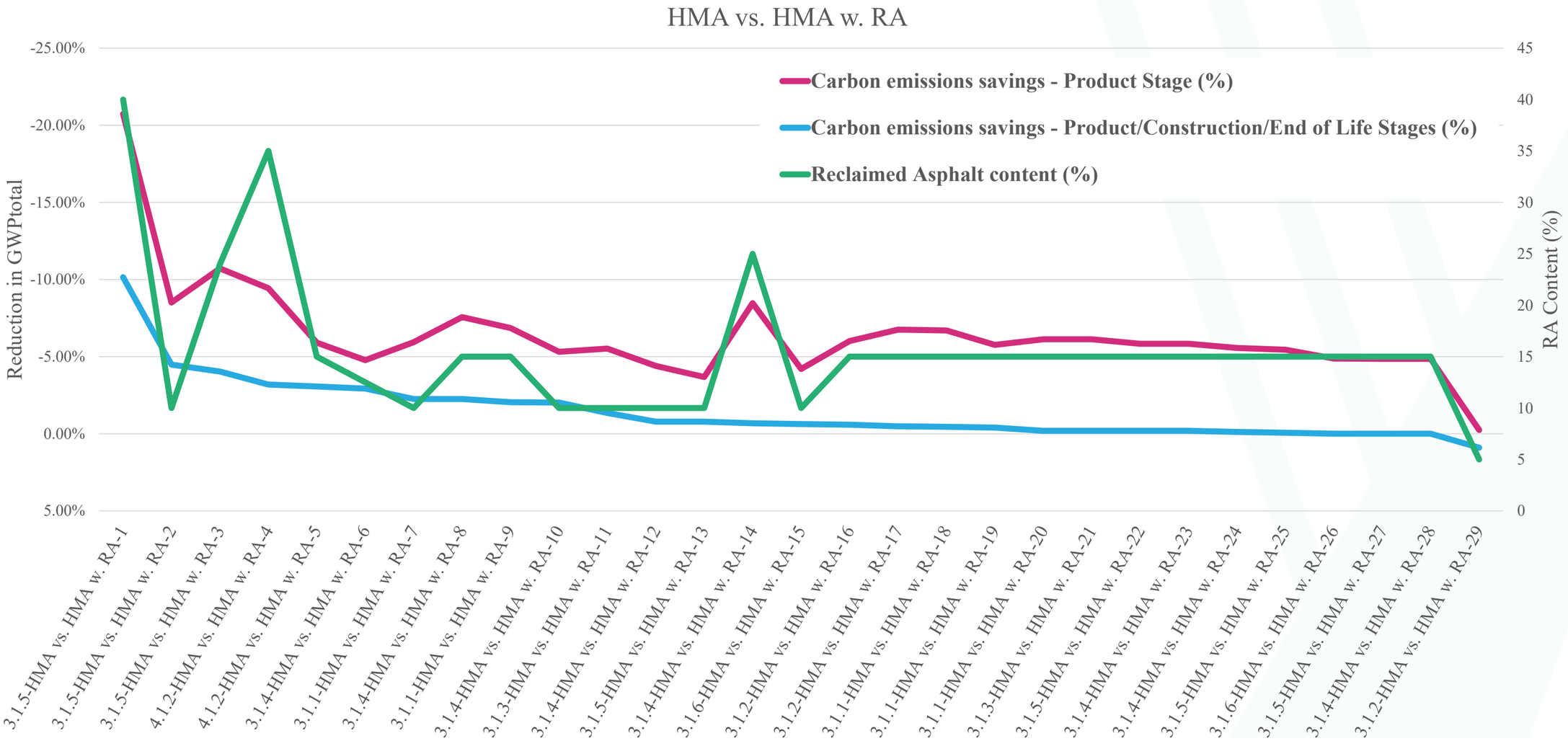
Benefits of Warm Mix Asphalts

Comparison between different variants of the same bituminous mixture produced at the same plant



Benefits of Hot Mix Asphalts with RA*

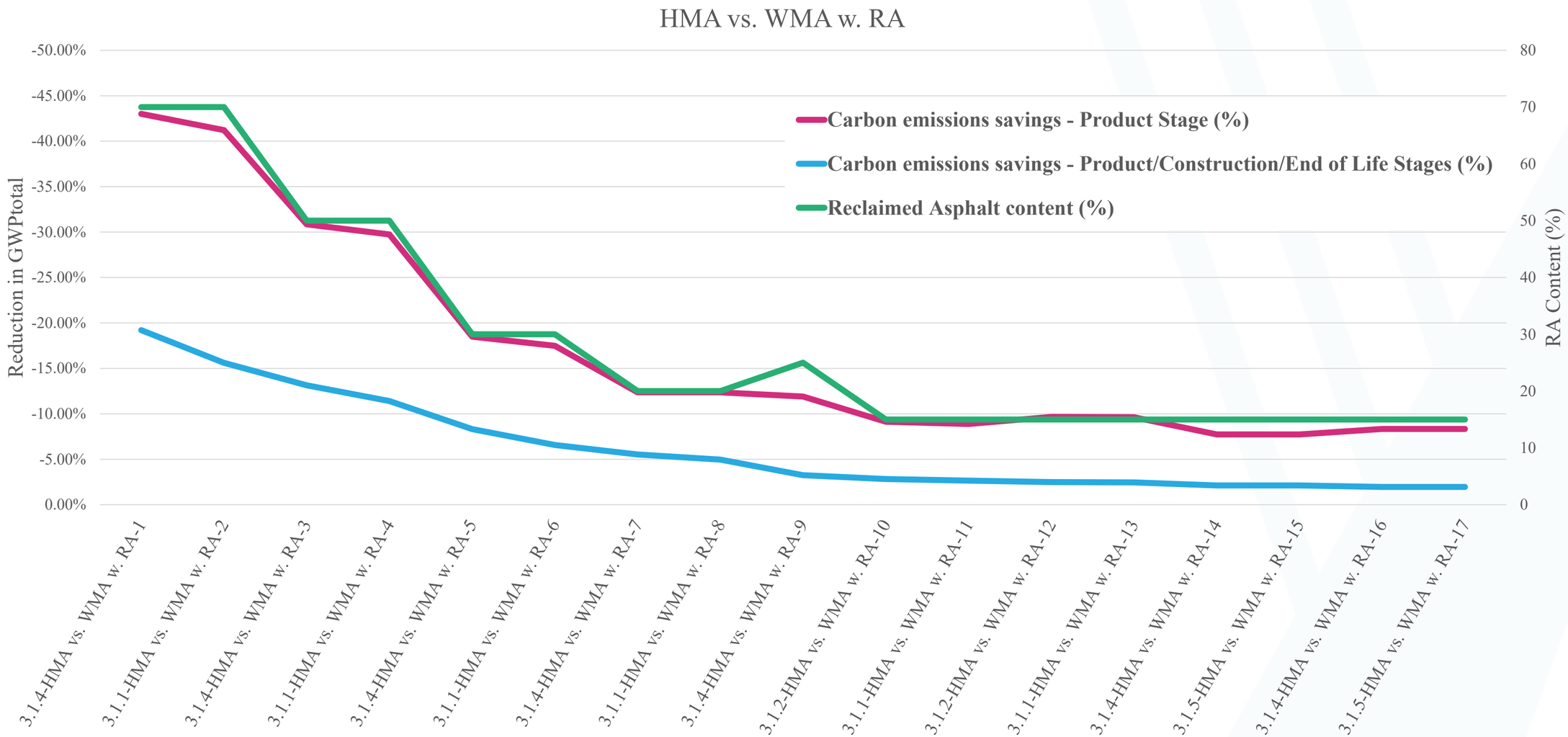
Comparison between different variants of the same bituminous mixture produced at the same plant



* RA: Reclaimed Asphalt

Benefits of Warm Mix Asphalts with RA*

Comparison between different variants of the same bituminous mixture produced at the same plant



* RA: Reclaimed Asphalt

Use of Environmental Data

Testing and identifying areas for improvement in TII Publication DN-PAV-03077

Optimal Pavement Asset Management by balancing investment, network condition, and carbon emissions savings

Industry able to quantify the benefits of their investments to offer more sustainable products and services

Reliable baseline for the Irish asphalt industry

More accurate reporting of carbon emissions of Pavement Renewal Schemes through MapRoad

Optimised Pavement Designs in the IAPDM*

* IAPDM: Irish Analytic Pavement Design Method

Thank you for your attention

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

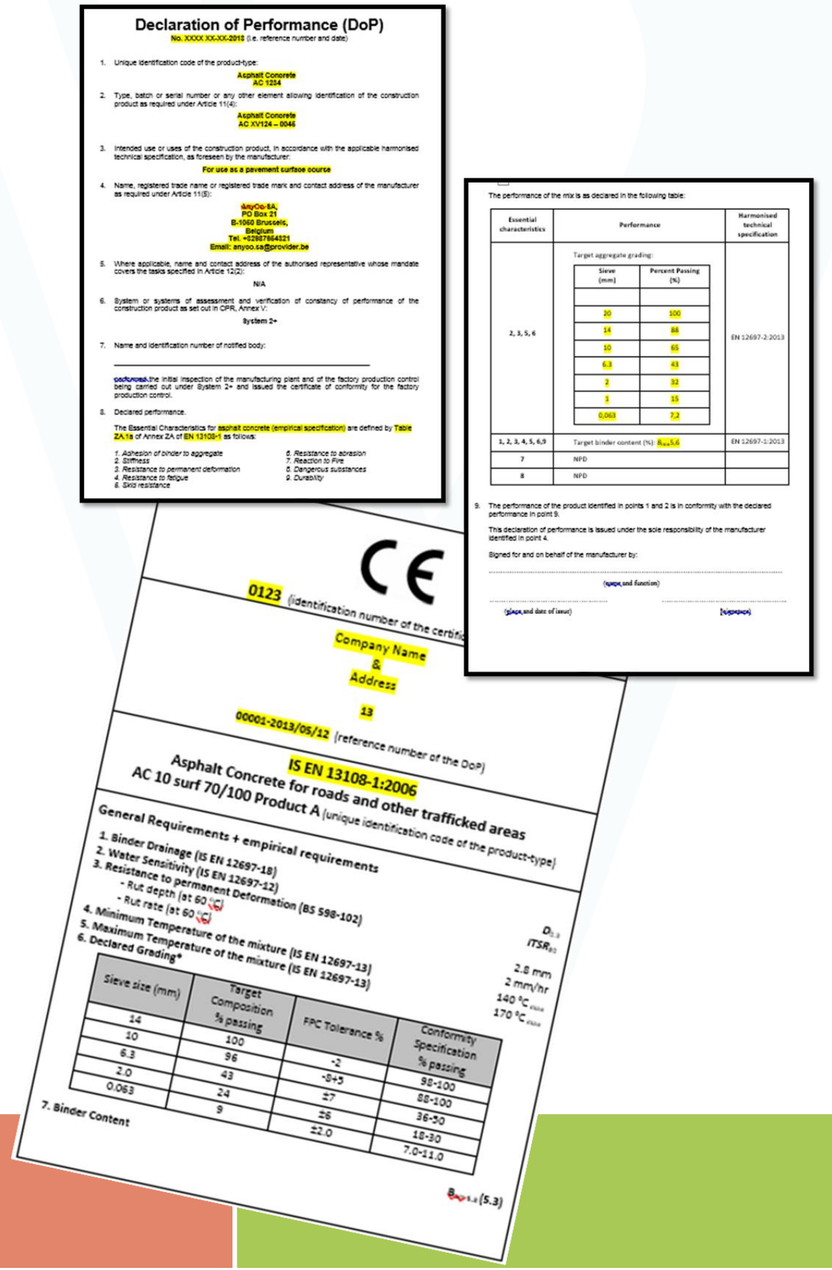
TII and Market Surveillance Activities as a Competent National Authority

Kevin Crawley
Senior Engineer – Pavement Engineering & Technology
Network Management | Transport Infrastructure Ireland

Construction Product Regulations – What does it do?

Relevant Regulations & Requirements

- Regulation (EU) No 305/2011 (“the CPR”) sets out rules for the marketing of construction products in the EU
- Introduces the concept of Market Surveillance.
- Member States are responsible for regulating for its own market surveillance activities.

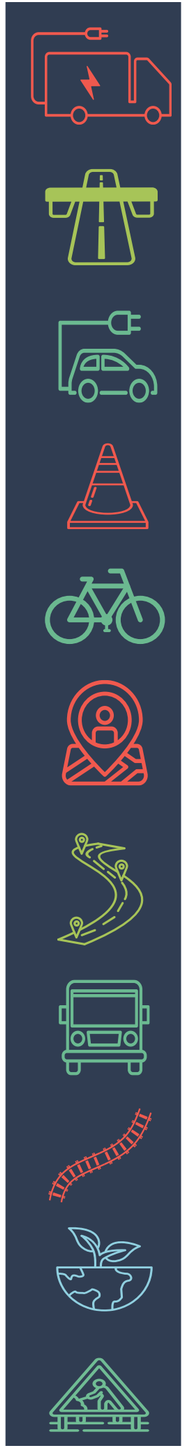


What is Market Surveillance?

- Market Surveillance is defined as activities carried out and measures taken by public authorities to ensure that products comply with the applicable union harmonisation legislation and do not endanger health, safety or any other aspect of public interest protection.

- Market Surveillance Activity should enable non-compliant products to be identified and kept or taken off the market.

- Market surveillance authorities shall perform appropriate checks on the characteristics of products on an adequate scale



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Market Surveillance – Who is involved?

Market Surveillance Activities

TII's role as a designated Competent National Authority

- TII have been specified as being the Competent National Authority for:
  - Aggregates (Product Area Code 23) and
  - Road Construction Products (Product Area Code 24)

- Art 11.8 of the CPR – Manufacturers shall, further to a **reasoned request** from a competent national authority, provide it with all the information and documentation….

- Proactively carry out market surveillance activities for road construction products
  - Aggregates for Surface Courses
  - Road Pavements – Bituminous Material
  - Road Pavements – Bitumen & Bitumen emulsion

- Take a Risk Assessment Approach

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Market Surveillance Process

TII Standard Operating Procedure

Five Stages

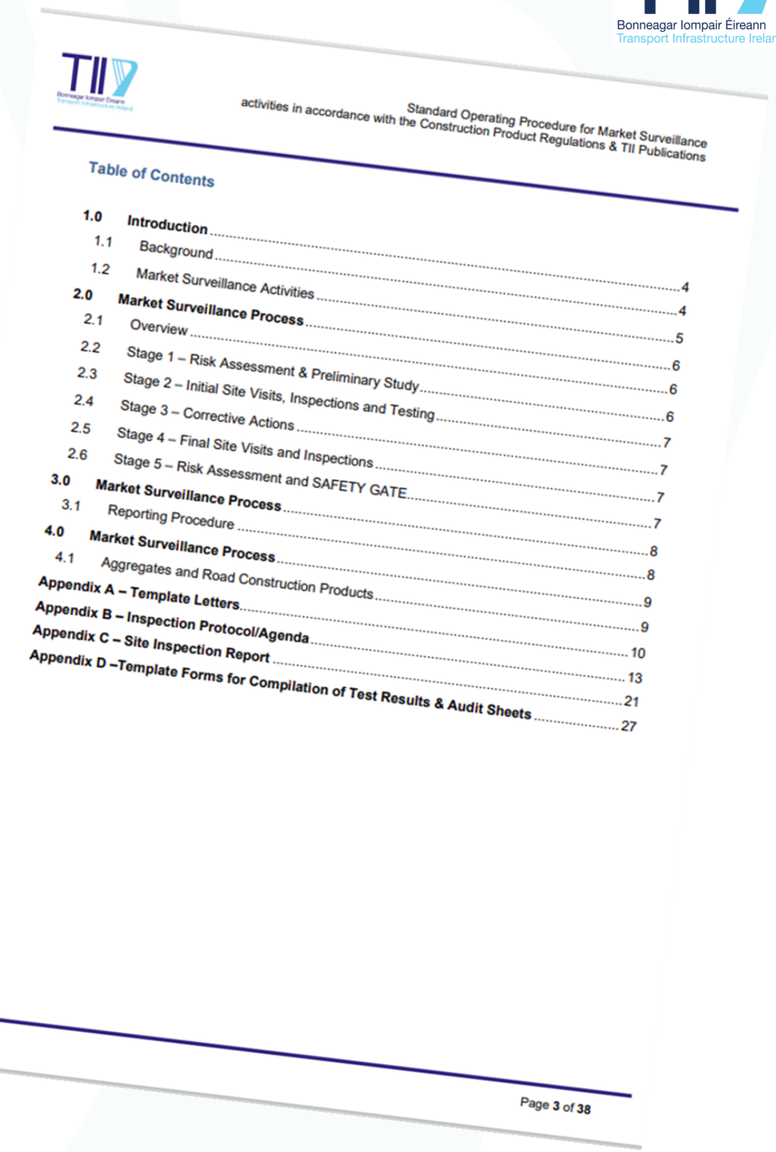
Stage 1 - Risk Assessment & Preliminary Study
by TII as Competent National Authority

Stage 2 - Initial Site Visits, Inspection & Testing
by TII as Competent National Authority

Stage 3 - Corrective Actions
by TII as Competent National Authority

Stage 4 - Final Site Visits
by TII as Competent National Authority

Stage 5 - Risk Assessment & SAFETY GATE
by relevant Local Authority as Market Surveillance Authority



Standard Operating Procedure for Market Surveillance activities in accordance with the Construction Product Regulations & TII Publications

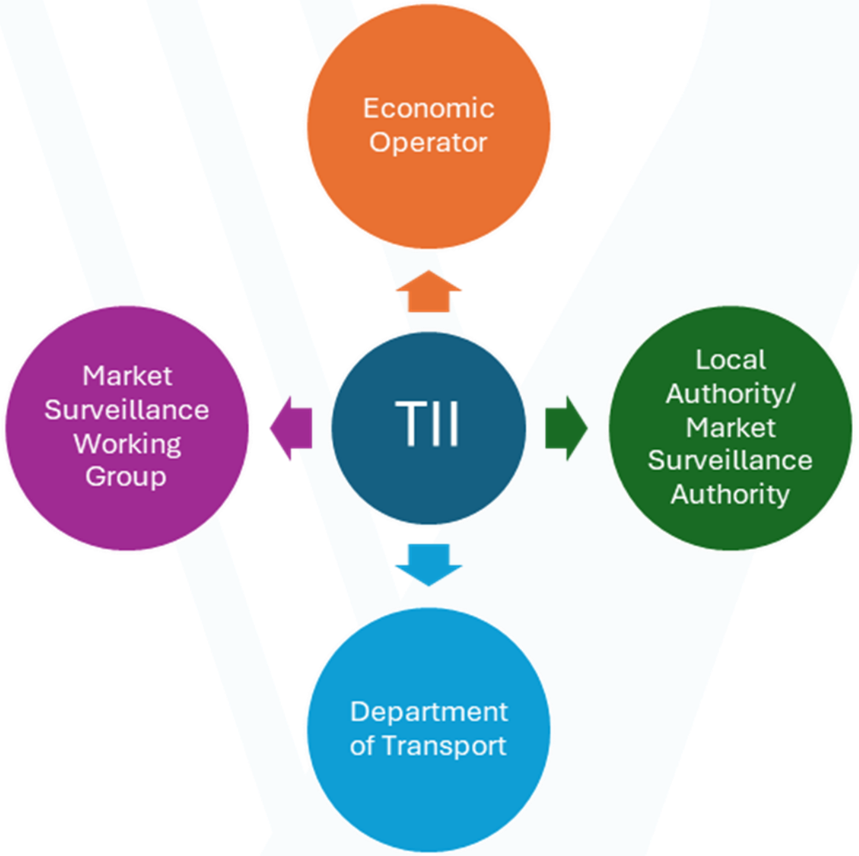
Table of Contents

1.0 Introduction 4
1.1 Background 4
1.2 Market Surveillance Activities 5
2.0 Market Surveillance Process 6
2.1 Overview 6
2.2 Stage 1 – Risk Assessment & Preliminary Study 6
2.3 Stage 2 – Initial Site Visits, Inspections and Testing 7
2.4 Stage 3 – Corrective Actions 7
2.5 Stage 4 – Final Site Visits and Inspections 7
2.6 Stage 5 – Risk Assessment and SAFETY GATE 8
3.0 Market Surveillance Process 8
3.1 Reporting Procedure 9
4.0 Market Surveillance Process 9
4.1 Aggregates and Road Construction Products 10
Appendix A – Template Letters 13
Appendix B – Inspection Protocol/Agenda 21
Appendix C – Site Inspection Report 27
Appendix D –Template Forms for Compilation of Test Results & Audit Sheets

Market Surveillance Process

TII will report on completed market evaluation activities through the following bodies:

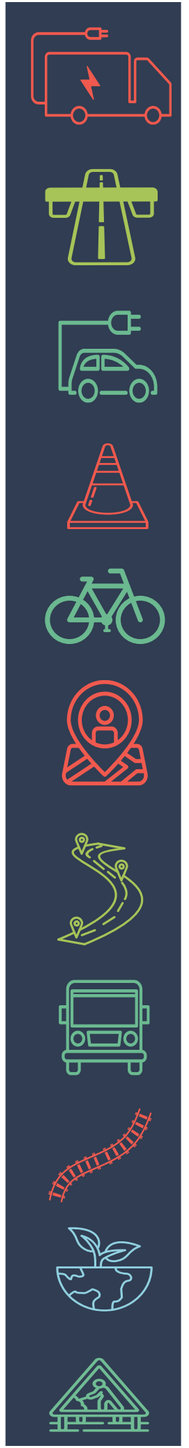
- Internal TII Network Management Reporting Procedures
- Relevant Economic Operator
- Relevant Local Authority as Market Surveillance Authority (Local Authority)
- Market Surveillance Working Group (Local Authorities, TII, DHP&LA, NBCO / NBC&MSO
- Department of Transport



Market Surveillance Activities

Progress to Date

- Inspection of manufacturers/distributers of bitumen & bitumen emulsion products in Ireland completed
- Risk assessment of producers of Asphalt & High PSV aggregates undertaken
- Subsequent request for inspections to be issued to relevant identified production facilities.
- Inspections to be carried out by Q2 2026.
- Further round of risk assessment analysis to be then carried out.



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Thank you

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Biodiversity Standard and Net Gain Metric

Tom Butterworth, Arup Consulting Engineers
Richard Arnold, SLR Consulting

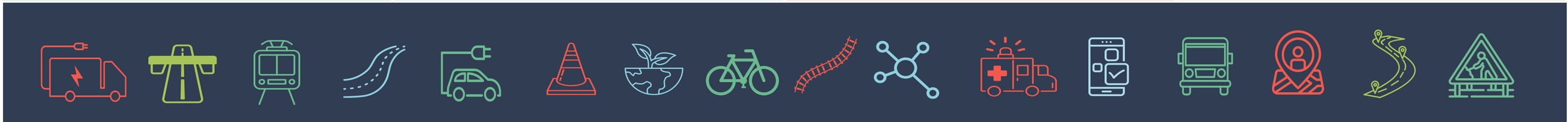
TII Biodiversity Metric Tool and Guidance

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Tom Butterworth, Director, Nature Lead, Arup

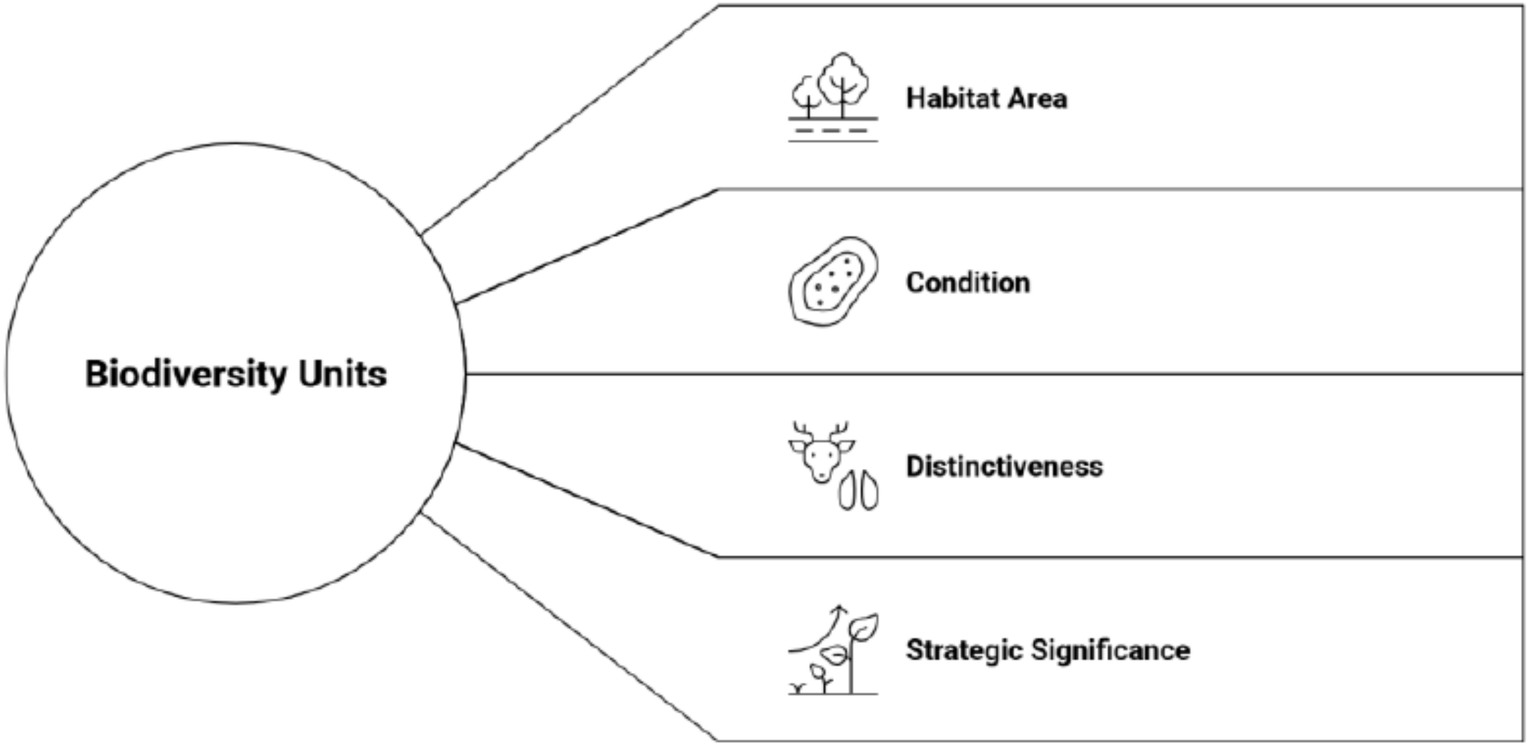
NATIONAL ROADS AND GREENWAYS CONFERENCE 2025

Thursday 9th and Friday 10th October 2025



What is the TII Biodiversity Metric?

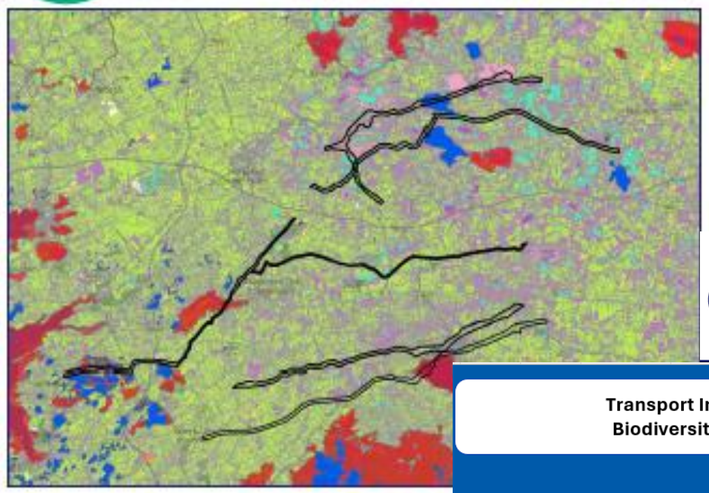
- Biodiversity metric measures change in biodiversity
- Using habitat area and quality as a proxy
- It is part of the ecology assessments required



What is the TII Biodiversity Metric?

- Used through each project stage
- To inform route selection, design, construction and operations
- Easy to use, rapid, consistent and clear

GIS Analysis



Excel Output

Transport Infrastructure Ireland
Biodiversity Accounting Metric

ARUP

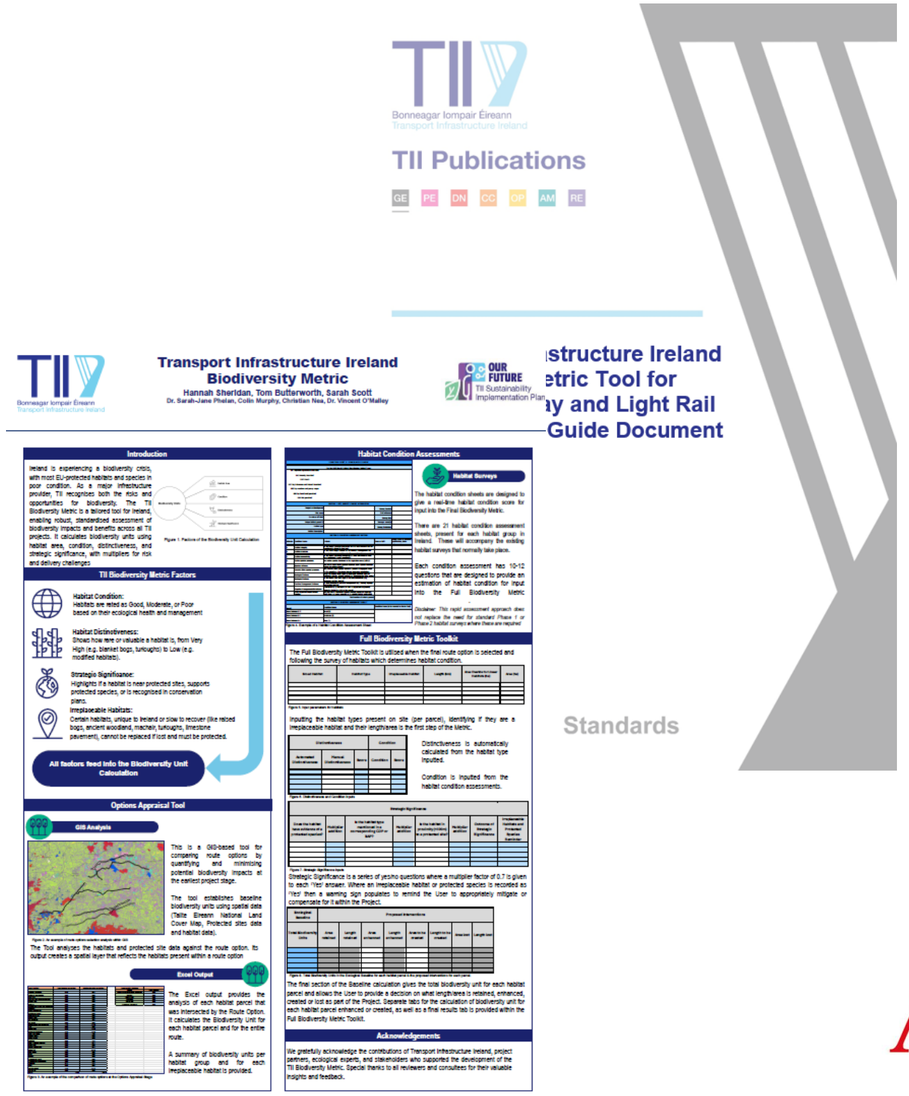
Project Details	
Project Name	
Project Type	
Applicant	
Application Type	
Ref No	
Completed By	
Options Appraisal completed by	
Options Apraisal completed on	
Options Appraisal Calculation (final)	
Comptent Authority Reviewer	
Date of Review	
Target % No net loss	
Irreplaceable Habitat present at baseline	No
Total site area (including irreplaceable habitat ha)	0.00
Total area retained	0.00
Total compensation area	0.00
Total enhancement area	0.00

ARUP

What is the TII Biodiversity Metric?

- Literature Review
- Options Appraisal Toolkit
- Biodiversity Metric
- Habitat Condition Assessment
- User Guide
- Technical Report

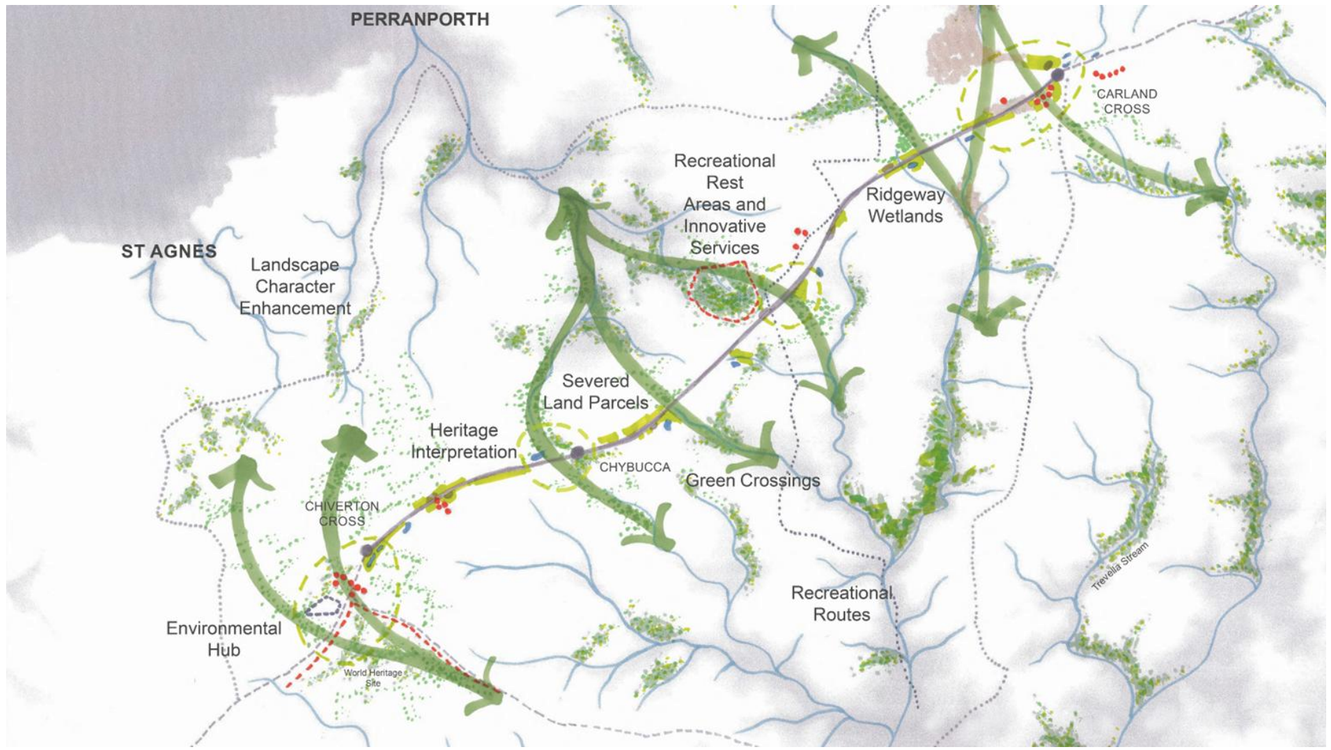
To be published this Autumn



What is the TII Biodiversity Metric?

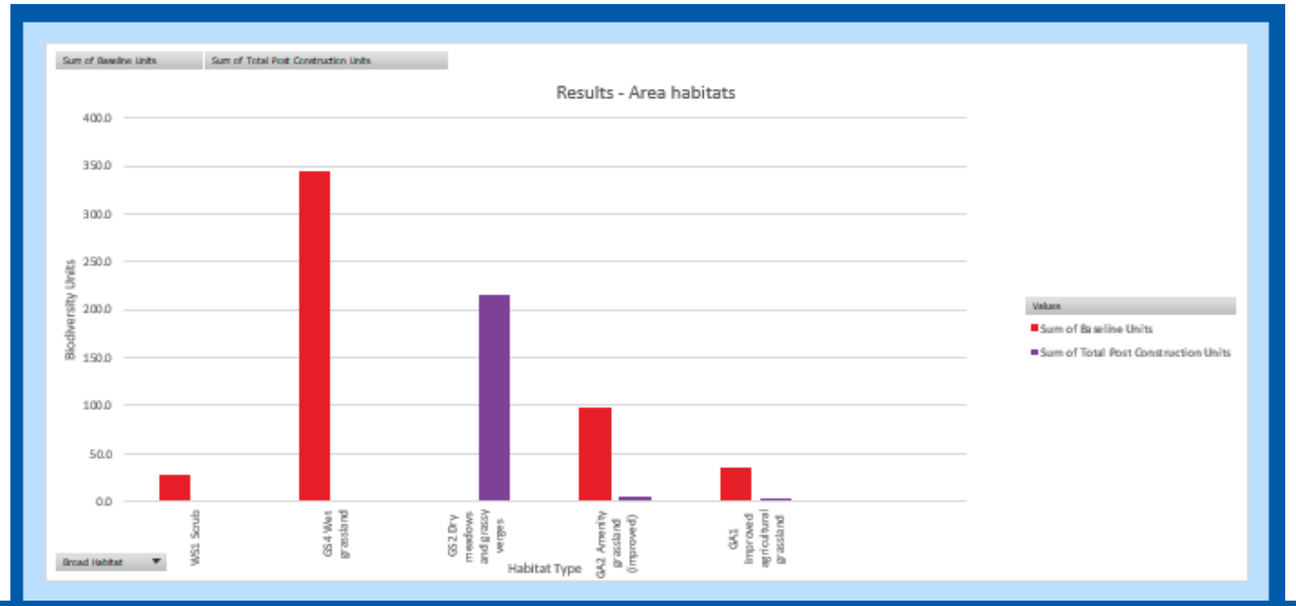
- Rapid option assessment
- Delivering multiple benefits
- Connecting people and nature

Keyn Glas Green Ribs, A30 – Cornwall



What is the TII Biodiversity Metric?

- Find out more….



Transport Infrastructure Ireland
Biodiversity Accounting Metric

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

ARUP

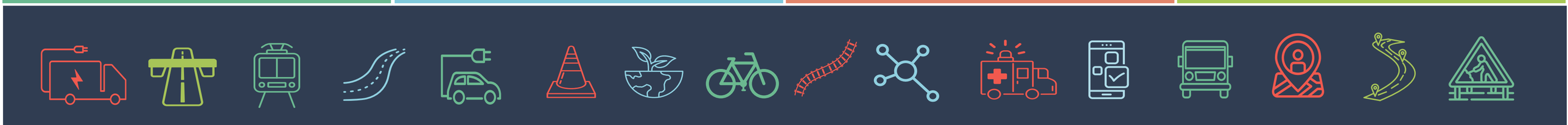
Biodiversity Impact Assessment Standard

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Richard Arnold, Technical Director at SLR Consulting Ltd.

NATIONAL ROADS AND GREENWAYS CONFERENCE 2025

Thursday 9th and Friday 10th October 2025



Biodiversity Impact Assessment Standard

Key Messages

1. Consultation draft published this/next month
2. Final draft in May 2026
3. Replaces the NRA Guidelines
4. AKA Ecological Impact Assessment
5. Based on existing laws and guidelines
6. Mandatory for new specified projects once published
7. Early consideration of constraints and risks

What is Biodiversity?

Biodiversity is ‘The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems’ (Article 2 of the Convention on Biological Diversity).

What is Biodiversity Impact Assessment?

Biodiversity Impact Assessment is the process of identifying, quantifying and evaluating the effects of a proposed development (or another type or project/activity) on biodiversity, including protected sites, habitats and species, with reference to environmental protection objectives, legislation and policy, and objectives and plans to restore biodiversity.

What will the Standard do?

1. Align BIA with TII project processes
2. Ensure biodiversity is considered at all project phases
3. Require use of the TII Biodiversity Metric
4. Consider all biodiversity, not just protected sites and species
5. Significant effects based on the objectives for biodiversity
6. Consider the restoration of biodiversity
7. Set reduced requirements for non-EIA projects
8. Ensure different specialists work together
9. Explain the key steps in BIA

What won’t the Standard do?

1. Assessments under the Habitats Directive
2. Provide detailed survey instructions
3. Provide designs for mitigation
4. Set fixed targets for Biodiversity Net Gain
5. Make for a good novel!

Questions: Session 5 Panel

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Session 5: Decarbonisation *Chair: Dr. Vincent O'Malley, Head of Environmental Policy & Compliance, TII*	
Climate Action Plan 2026 – DoT Update	*John Martin, Head of Climate Engagement and Governance, Department of Transport*
M28 Carbon Reporting with the NEC Climate Change Clause – Client and Contractor Views	*Cathal Touhy Cork Co.Co, Natalie Bird BAM, Dave Stewart Jacobs*
Low Carbon Road N52 Ardee Pavement Scheme	*Ciaran Collier, National Technical Manager, Roadstone*
Environmental Product Declaration Data Analysis & TII Market Surveillance	*Kevin Crawley TII and Olivier Mainardis Arup*
Biodiversity Standard and Net Gain Metric	*Tom Butterworth – Arup Consulting Engineers, / Richard Arnold SLR Consulting*

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

End of Session 5

Tea & Coffee Break

Session 6 commences at 11.15am

Programme: Session 6

Session 6: Protection and Renewal *Chair: Pat Maher, Director of Network Management, TII*		
11.15am	**Climate Adaptation Implementation Plan for National Roads in Ireland**	*Stephen Smyth - Senior Manager, TII*
11.30am	**Abnormal Load Management in Ireland – Findings from a TII Research Project**	*Caitríona De Paor, Research Driven Solutions*
11.50am	**Road Network - High Voltage interfaces, Celtic Interconnector Case Study.**	*Martin Bourke TII & Brendan Meagher Cork Co Co*
12.10pm	**Getting ready for use of BIM on transport projects - Overview**	*Jansi George Senior Engineering Inspector TII*
12.25pm	**Designing for Safe Systems: Revised Standard for Divided National Primary Roads**	*Danny Wicks, Arup*

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Climate Adaptation Implementation Plan for National Roads in Ireland

Stephen Smyth, Senior Manager, TII

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Transport Infrastructure Ireland

Climate Adaptation Implementation Plan

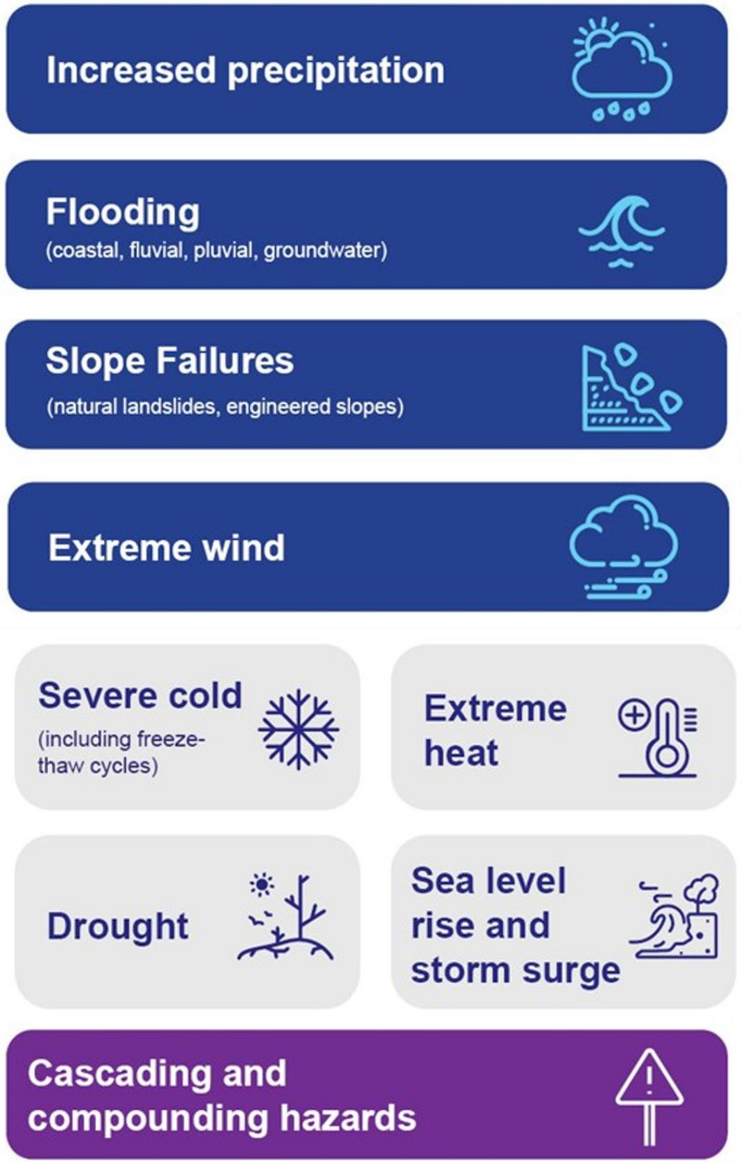
For National Roads

10th October 2025

Agenda

- Why do we need to think about climate adaptation?
- Climate adaptation planning in TII
- Value and diversity of the National Roads network
- Stakeholders
- Approach to Developing the Climate Adaptation Implementation Plan (CAIP)
- Examples of CAIP Adaptation Measures
- Flood Risk
- Monitoring, Evaluation and Learning (MEL)
- Next Steps

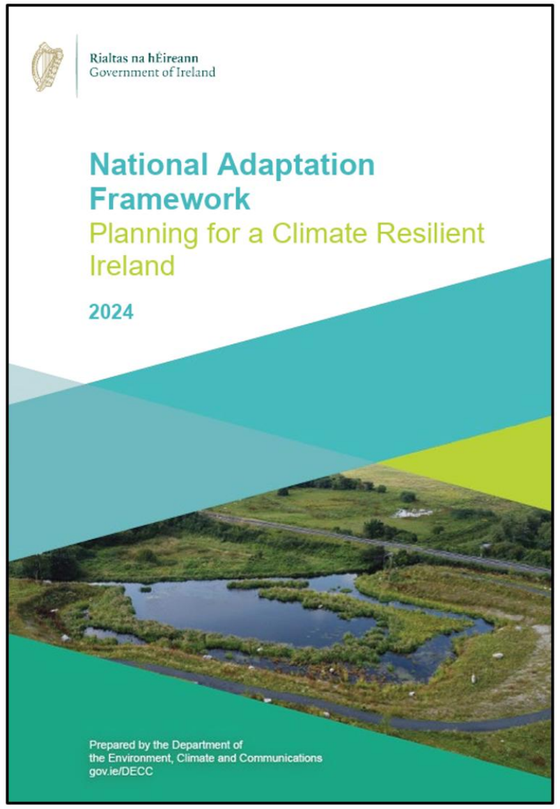
Why do we need to think about climate adaptation?

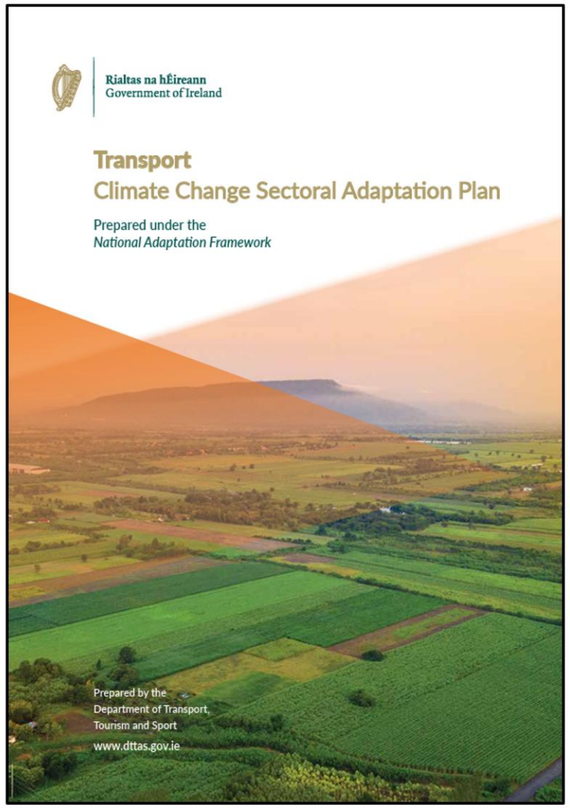


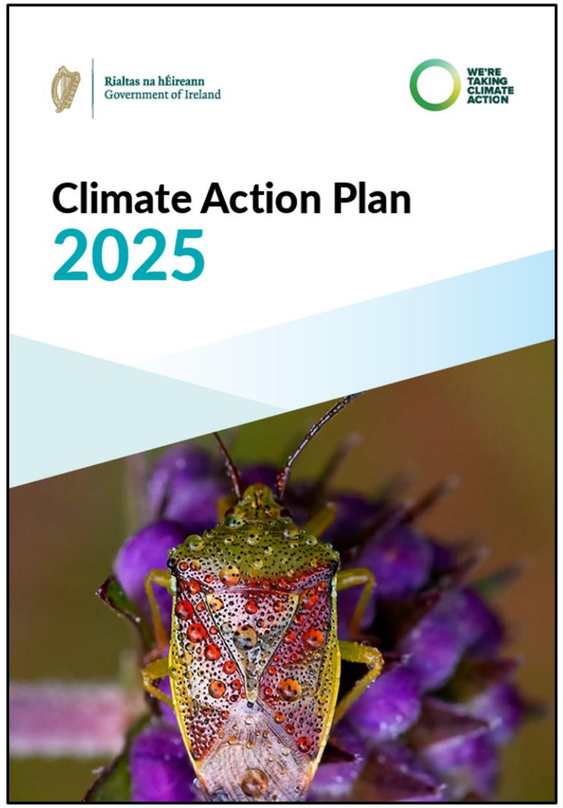
- Ireland's climate is changing (EPA State of the Environment Report 2024).
- This means Ireland will have more severe weather and flooding events, more intense rainfall and slope failures, and higher sea levels.
- Ireland's national road infrastructure, while robust, was not designed to perform in this new climate.
- Cannot completely eliminate the risk of damage to road infrastructure from future climate change events, or the consequences for communities.
- But we can reduce the risks.
- Adaptation can make infrastructure more resilient before, during and after extreme weather events.

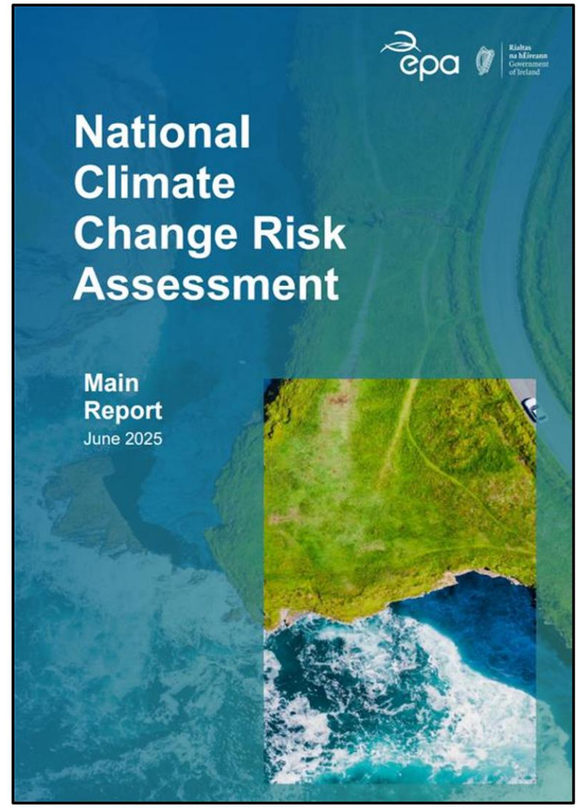
Why do we need to think about climate adaptation?

National policy context









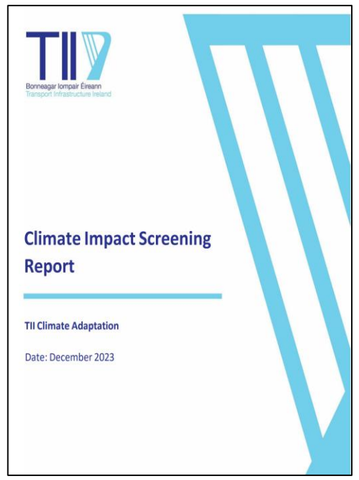
The National CCRA identifies 'Built Infrastructure' – which includes transport infrastructure – as facing among the most severe risks from climate change in the coming decades. TII recognise this threat and have commenced with a series of actions to reduce the vulnerability of the network.

Climate adaptation planning in TII

Climate adaptation in National Roads

2022 – 2024 → **2025** → **2026-2030**

Climate Adaptation Strategy



Climate Impact Screening Assessment – National Roads

Climate Adaptation Implementation Plan – National Roads

2026: Development of National Roads-specific climate change risk assessment (CCRA)

2028: update to CAIP based on CCRA and progress to date.

2030: development of next iteration of implementation plan.

The Climate Adaptation Implementation Plan (CAIP) for National Roads is first of its kind for infrastructure in Ireland – this represents an opportunity to create a positive precedent for application across TII, the transport sector, and built infrastructure more generally.

Value of the National Roads Network

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Key statistics of the NRN, 2024

3.5 million daily trips, and highest ever average daily traffic.

Connecting people and places and help develop communities.

80-90% of all kilometres travelled by goods vehicles within Ireland occur on the NRN.

Providing opportunities to access jobs, education, leisure, and services.

With an estimated value exceeding €31 billion, it is one of the Ireland's most valuable assets.

Permitting efficient movement of goods and services, and enabling economic activity.

Approximately **5,300 kilometres** in length, representing 5% of Ireland's overall road network.

First designated in 1977, with rapid expansion in years since.

3.5 million daily individual journeys, including 82,000 heavy-goods vehicles.

Important tourism and cultural asset, enabling further economic and social development.

Diversity of the National Roads Network

Nationally-critical economic artery

The M50 is Ireland's busiest road (more than 450,000 individual journeys everyday).

Radiates from Dublin City and serves the wider capital region.

Connects to Dublin Airport and Dublin Port, the island's critical international connections.

Part of European Union's TEN-T system, facilitating the movement of international trade.

Lifeline & Legacy Roads – *essential social function*

Predominantly the National Secondary road network.

Situated in isolated geographies, such as the western seaboard (i.e. N56 Donegal, and N71 Kerry).

Connects rural communities to essential goods and services, and to other communities.

Lifeline road network is defined by lack of viable alternative routes (or significant journey times/lengths).

Stakeholders in the National Roads Network

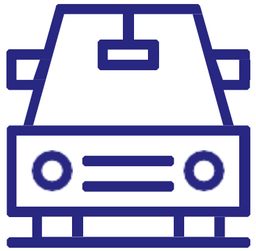
There are several key stakeholders in the National Roads network, each playing a key role in ensuring its functionality. Stakeholders include:

Motorway Maintenance and Renewals Contractors (MMaRCs)

Public-Private Partnerships (PPPs)

Government Departments & Agencies

Local Authorities



Network users

Collaboration with Local Authorities and other stakeholders/agencies (e.g. CARO, OPW, NPWS, EPA, ME) will be a critical factor in delivering the measures within the CAIP and enhancing the long-term resilience of the National Roads network.

For all stakeholders, it is critical to note that measures to enhance network resilience to climate change must exist alongside regular maintenance and operations, not replace them – both are essential to the long-term functionality of the National Roads network.

Approach to developing the CAIP

Implementation Plan 2026-2030

Enabling conditions: evidence and data, resources, policy, standards

Climate Adaptation Strategy

Climate change risk assessments

Identify locations at highest risk on the road network

Prioritise locations for targeted adaptation

Prioritise high-risk locations for adaptation and risk reduction measures

Identify adaptation pathways

Determine what measures will be needed and when

Design and cost adaptation measures

Undertake detailed design and costing of proposed measures

Implement the adaptation measures

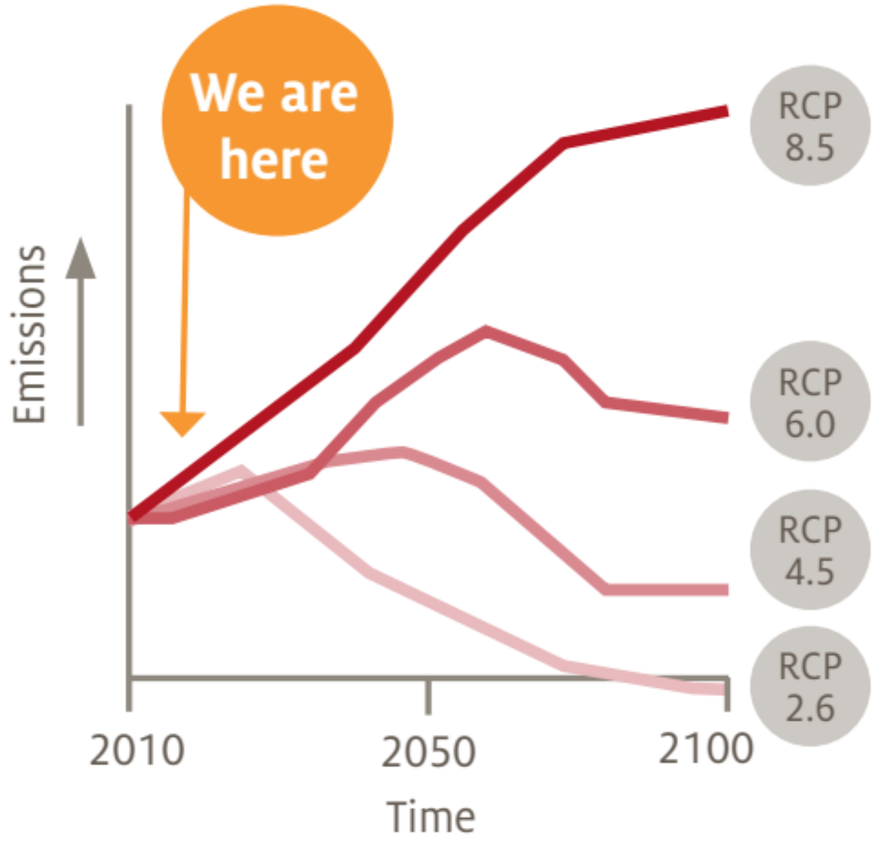
Construct or embed the proposed measures

Stakeholder engagement

Monitoring, evaluation and review

Approach to Developing the CAIP – RCP

Decision-making under uncertainty



If we follow the RCP 8.5 pathway, **more adaptation** will be needed.

If we follow the RCP 2.6 pathway, **less adaptation** is needed.

RCP 8.5 leads to much greater temperature increases, and this means greater impacts and greater costs. To adapt to these changes will also cost more. A balance must be struck between the cost of impacts and the cost of adaptation.

Approach to developing the CAIP

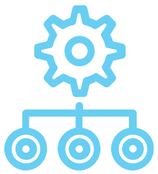
Climatic hazards explored within the CAIP

- Precipitation
- Flooding
- Slope failures
- Extreme wind
- Severe cold
- Extreme heat
- Drought
- Sea level rise and storm surge
- Cascading and compounding hazards

Approach to Developing the CAIP - Scope

Asset categories and measures

Universal application



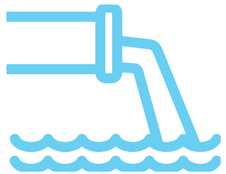
Overarching

4 measures

Aligned with asset categories

Bridges and Structures

4 measures



Drainage

3 measures

Geotechnical

3 measures

Motorway Operations

3 measures

Tunnels

2 measures

Pavements

1 measure

Examples of CAIP adaptation measures

Example: STR-1

STR-1 Asset management database expansion to include retaining walls	
Measure Type	**Overview**
	This measure will develop and refine modules for a retaining walls asset management database. It will also include engaging with stakeholders and reviewing existing asset data sources, conducting laser imaging detection and ranging (LiDAR) surveys of the network and populating the database.
Hazard(s)	**Anticipated outcomes**
	• Enables proactive inspection and maintenance of retaining walls. • Reduces likelihood of long-term damage and disruptive, unplanned maintenance.
	Engagement with stakeholders
	• Local authorities. • Road contractors e.g., MMaRCs and PPPs. • National agencies e.g., Tailte Éireann.
Timeline	**Links with ongoing work**
2026-2028	None identified.

Slope stabilisation and retaining wall remediation along N70 and N71.

Examples of CAIP adaptation measures

Example: OPS-1

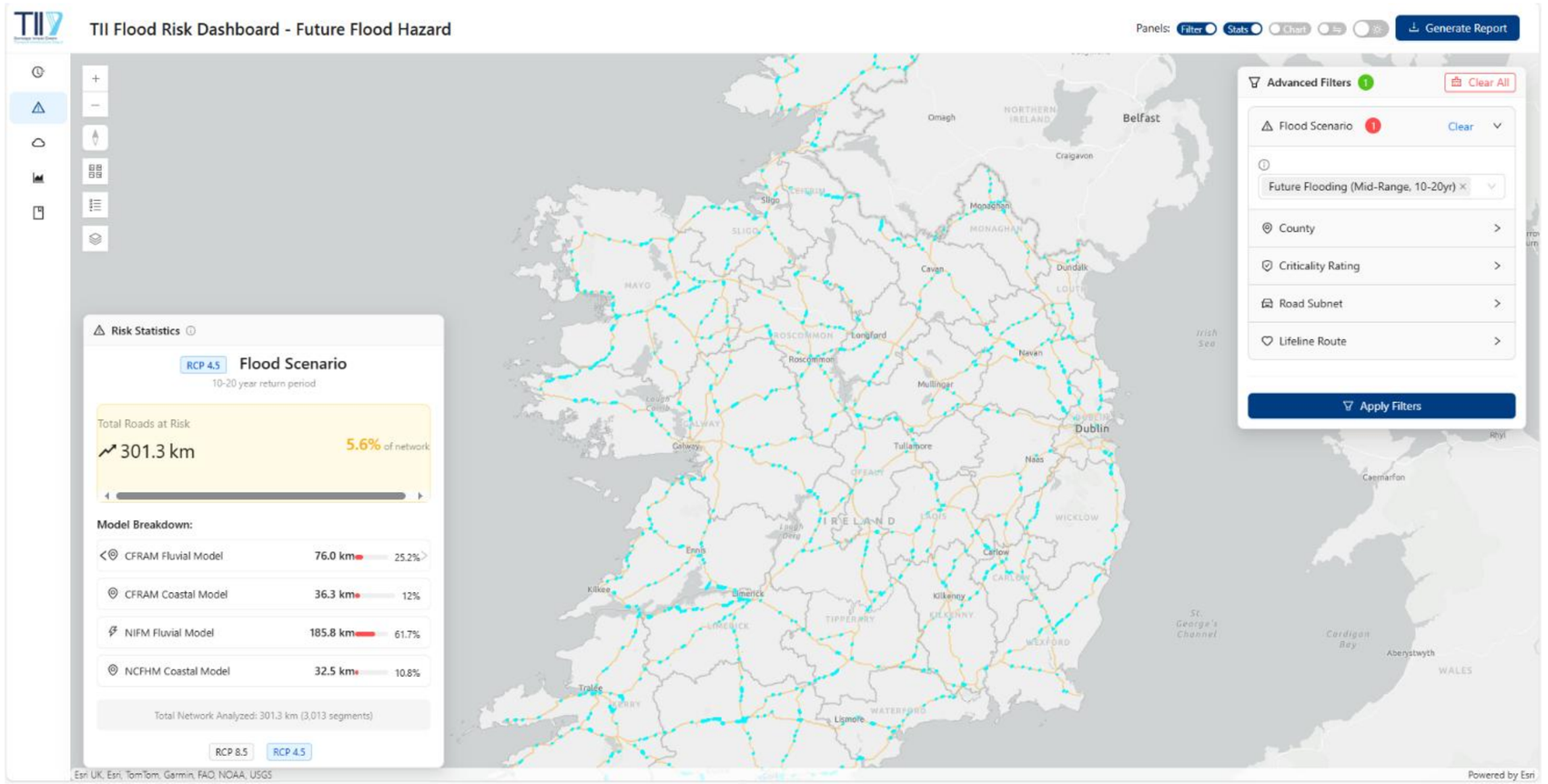
OPS-1 Implement MMaRC third generation contracts, including contractual enhancements for improving resilience to flood, wind, and cold spell events	
Measure Type	**Overview**
	This measure will undertake a review of existing contract documentation and operational arrangements that MMaRCs currently have in place to respond to flood, wind and cold spells events for evaluation and to identify recommendations for how resilience planning might be enhanced in the third generation contracts.
Hazard(s)	**Anticipated outcomes**
	• Improved Climate Resilience • Support Local Authorities in dealing with Extreme weather events • Improve recovery time from a climate related event
	Engagement with stakeholders
	• Road operators. • National agencies e.g., An Garda Síochána, Met Éireann, RSA.
Timeline	**2024 – 2026**

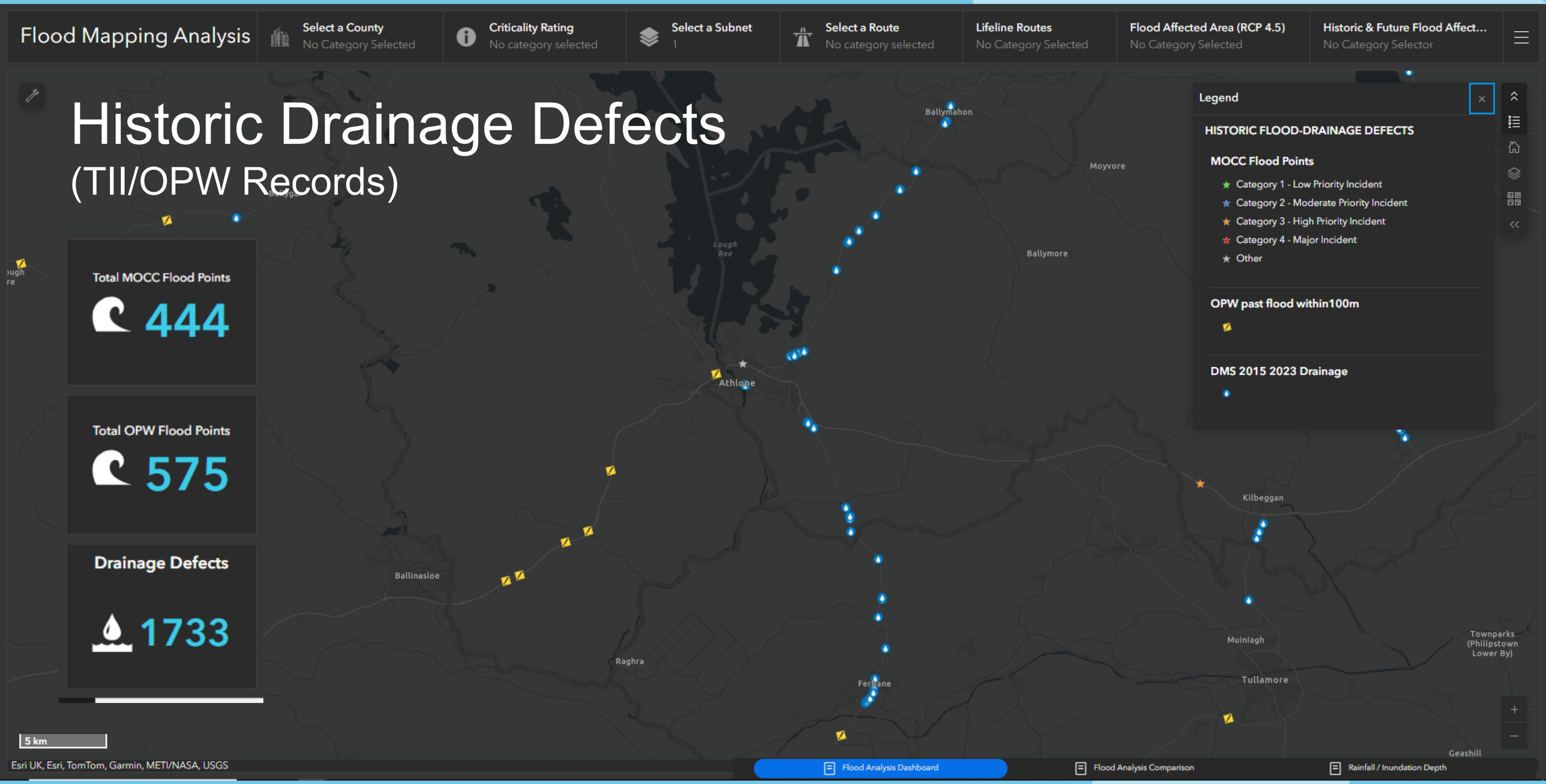
Flood Risk – Prioritising early-stage adaptation measures

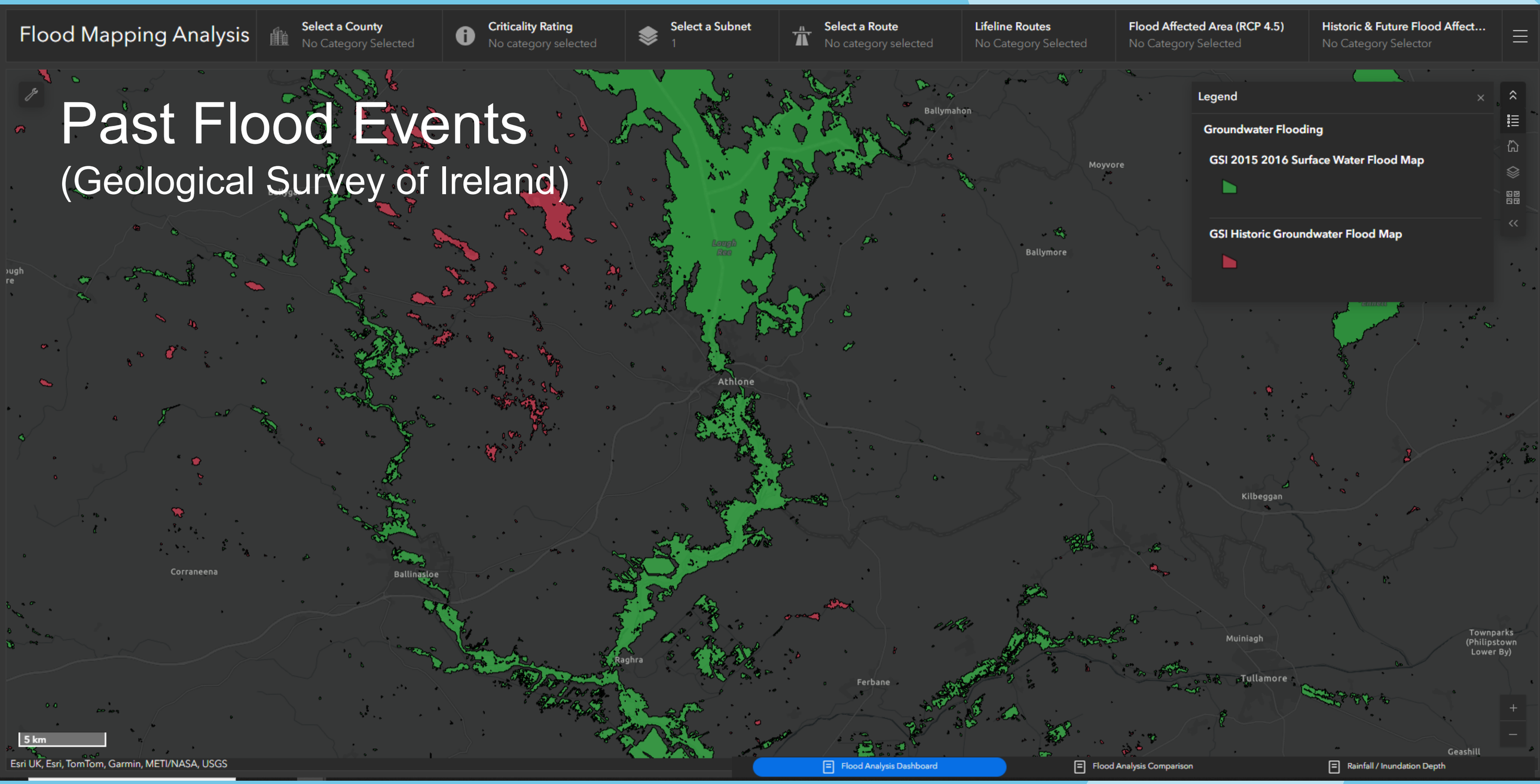
A focus on flood risk

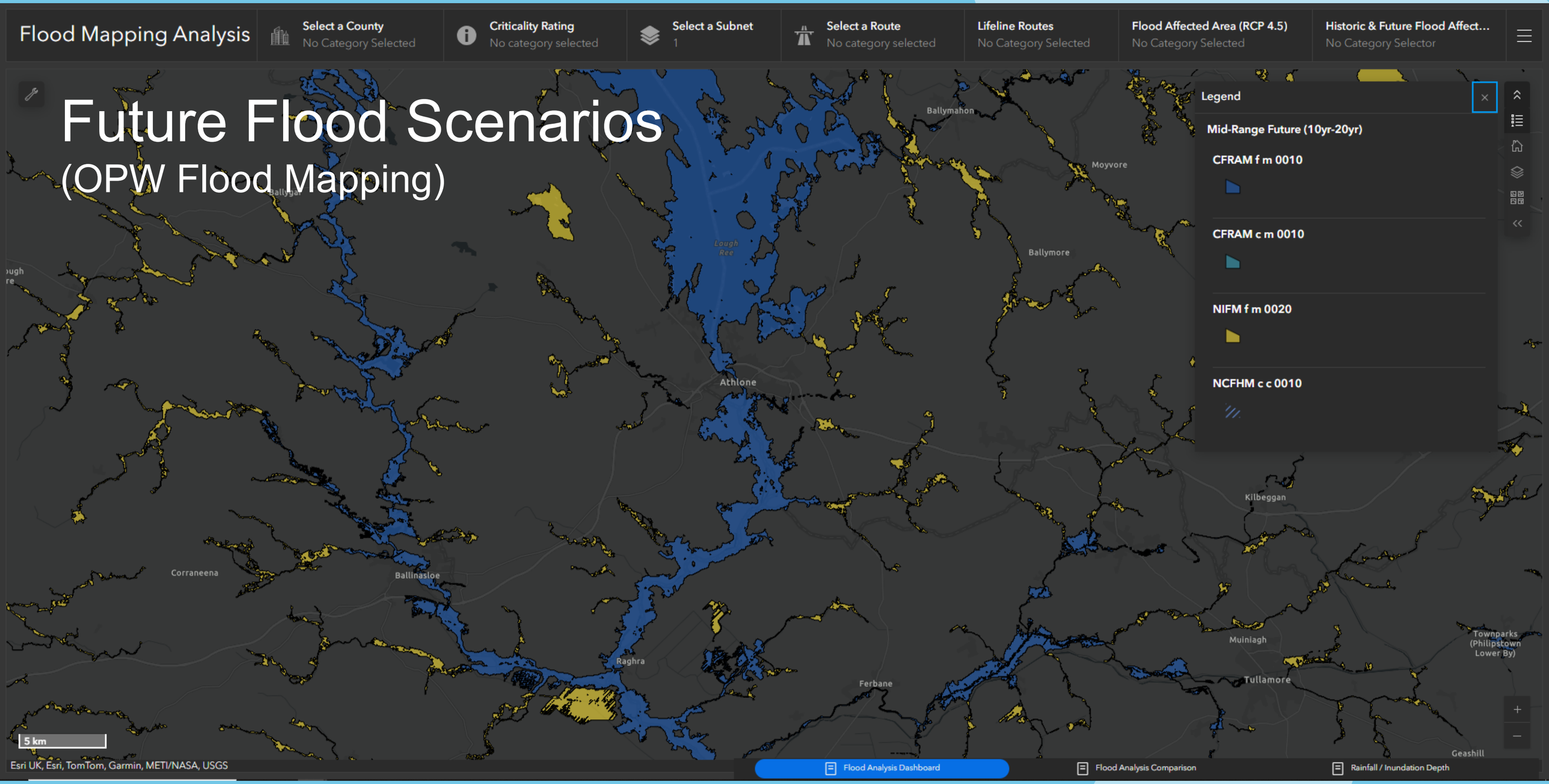
Based on historical data, TII has a strong evidence base to support early action for heavy precipitation and flood risk.

Records provided by MMaRC operators, Met Éireann and the OPW were combined with the *National Road Network Criticality Assessment* (TII, 2025) to identify sites for immediate action, enabling the development and implementation of physical measures.



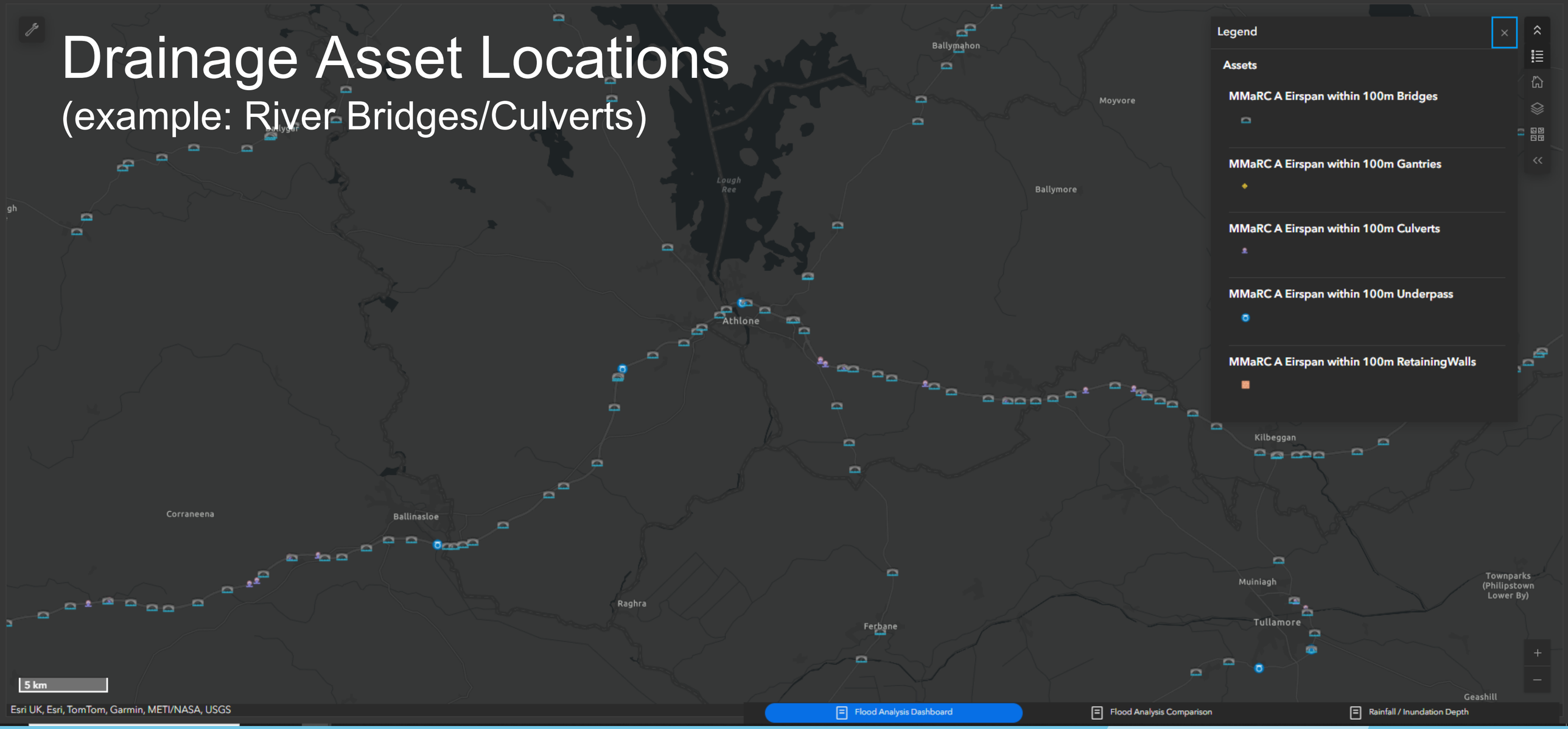

Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
No category selected
Select a Subnet
1
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
No Category Selected
Historic & Future Flood Affect...
No Category Selector
Historic Drainage Defects
(TII/OPW Records)
Total MOCC Flood Points
444
Total OPW Flood Points
575
Drainage Defects
1733
Legend
HISTORIC FLOOD-DRAINAGE DEFECTS
MOCC Flood Points
Category 1 - Low Priority Incident
Category 2 - Moderate Priority Incident
Category 3 - High Priority Incident
Category 4 - Major Incident
Other
OPW past flood within100m
DMS 2015 2023 Drainage
Ballymahon
Moyvore
Ballymore
Athlone
Kilbeggan
Ballinasloe
Raghra
Ferbane
Muiniagh
Tullamore
Townparks (Philipstown Lower By)
Geashill
5 km
Esri UK, Esri, TomTom, Garmin, METI/NASA, USGS
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth

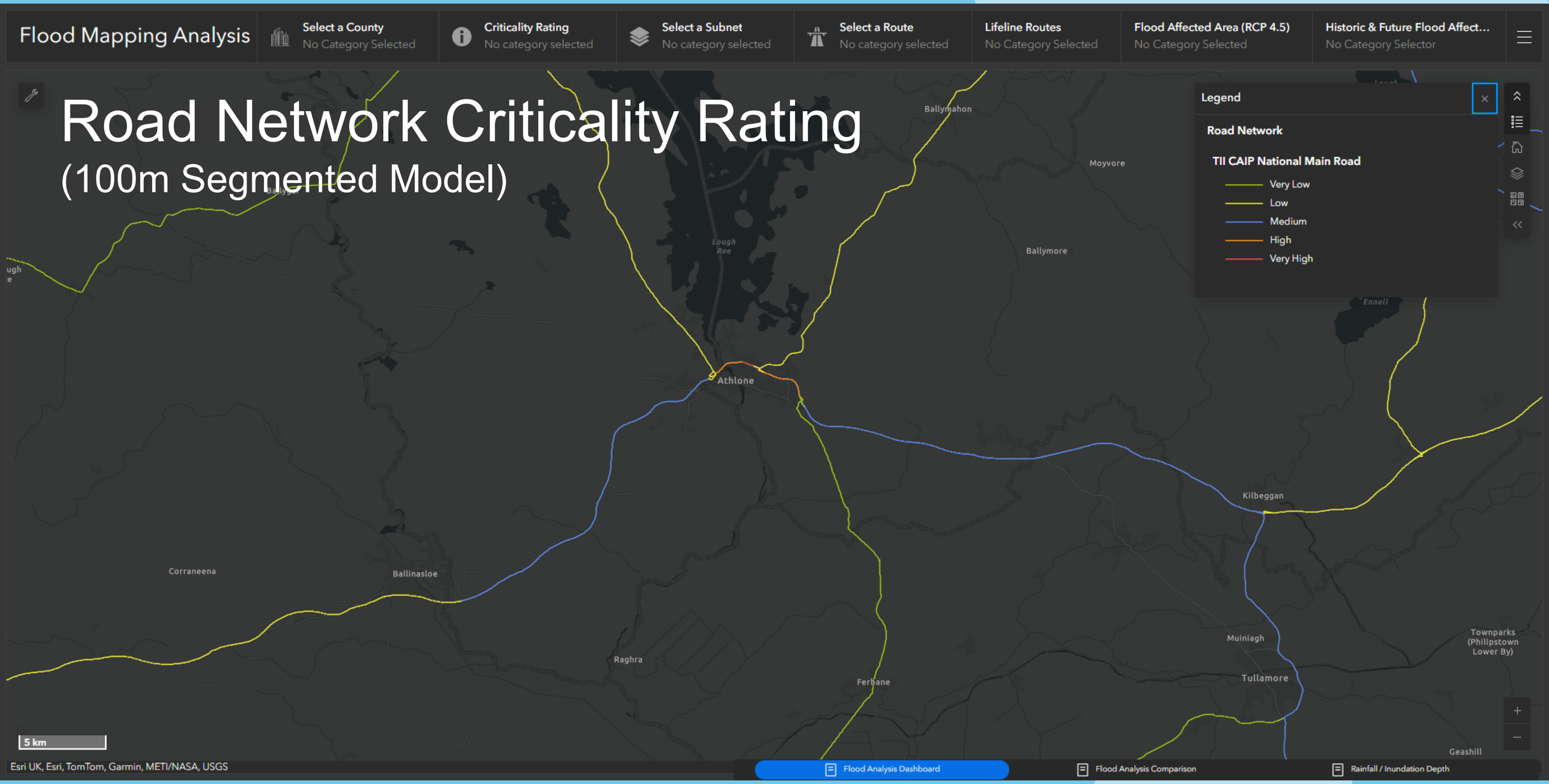

Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
No category selected
Select a Subnet
1
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
No Category Selected
Historic & Future Flood Affect...
No Category Selector
Past Flood Events
(Geological Survey of Ireland)
Legend
Groundwater Flooding
GSI 2015 2016 Surface Water Flood Map
GSI Historic Groundwater Flood Map
Ballymahon
Moyvore
Ballymore
Lough Ree
Athlone
Kilbeggan
Corraneena
Ballinasloe
Raghra
Ferbane
Muiniagh
Tullamore
Townparks (Philipstown Lower By)
Geashill
5 km
Esri UK, Esri, TomTom, Garmin, METI/NASA, USGS
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth

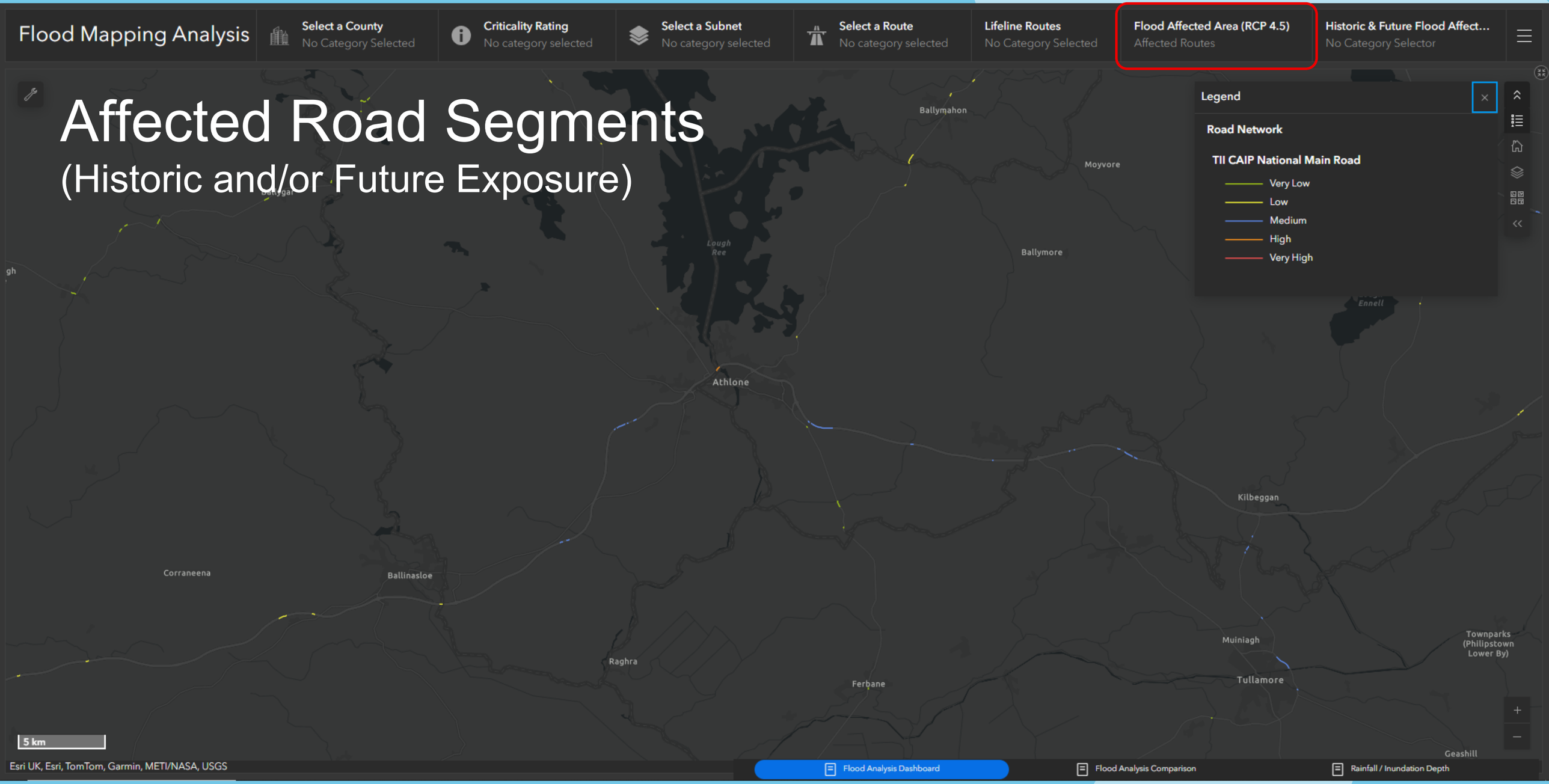

Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
No category selected
Select a Subnet
1
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
No Category Selected
Historic & Future Flood Affect...
No Category Selector
Future Flood Scenarios
(OPW Flood Mapping)
Legend
Mid-Range Future (10yr-20yr)
CFRAM f m 0010
CFRAM c m 0010
NIFM f m 0020
NCFHM c c 0010
Ballymahon
Moyvore
Ballymore
Lough Ree
Athlone
Kilbeggan
Corraneena
Ballinasloe
Raghra
Ferbane
Muiniagh
Tullamore
Townparks (Philipstown Lower By)
Geashill
5 km
Esri UK, Esri, TomTom, Garmin, METI/NASA, USGS
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth

Drainage Asset Locations

(example: River Bridges/Culverts)




Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
No category selected
Select a Subnet
No category selected
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
No Category Selected
Historic & Future Flood Affect...
No Category Selector
Road Network Criticality Rating
(100m Segmented Model)
Legend
Road Network
TII CAIP National Main Road
Very Low
Low
Medium
High
Very High
Ballymahon
Moyvore
Ballymore
Lough Ree
Athlone
Ennell
Kilbeggan
Corraneena
Ballinasloe
Raghra
Ferbane
Muiniagh
Tullamore
Townparks (Philipstown Lower By)
Geashill
5 km
Esri UK, Esri, TomTom, Garmin, METI/NASA, USGS
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth


Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
No category selected
Select a Subnet
No category selected
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
Affected Routes
Historic & Future Flood Affect...
No Category Selector
Affected Road Segments
(Historic and/or Future Exposure)
Legend
Road Network
TII CAIP National Main Road
Very Low
Low
Medium
High
Very High
Ballymahon
Moyvore
Ballymore
Lough Ree
Athlone
Ennell
Kilbeggan
Corraneena
Ballinasloe
Raghra
Ferbane
Muiniagh
Tullamore
Townparks (Philipstown Lower By)
Geashill
5 km
Esri UK, Esri, TomTom, Garmin, METI/NASA, USGS
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth


Flood Mapping Analysis
Select a County
No Category Selected
Criticality Rating
High, Medium, Very ...
Select a Subnet
No category selected
Select a Route
No category selected
Lifeline Routes
No Category Selected
Flood Affected Area (RCP 4.5)
Affected Routes
Historic & Future Flood Affect...
No Category Selector
Road Network
TII CAIP National Main Road
Very Low
Low
Medium
High
Very High
Mid-Range Future (10yr-20yr)
CFRAM f m 0010
(Fluvial)
CFRAM c m 0010
NIFM f m 0020
NCFHM c c 0010
Affected Segments (Very High Criticality)
OPW Historic Flood Point
Culvert
Flooding observed on the inbound diverge slip. N7 J6, Diverge slip flooded inbound: Mini-digger and crew needed to clear
M7
Flooding
Category 2 - Moderate Priority Incident
15/02/2020 16:33
M7
Flooding
Category 3 - High Priority Incident
01/03/2024 21:08
Legend
Assets
MMaRC A Eirspan within 100m Bridges
MMaRC A Eirspan within 100m Gantries
MMaRC A Eirspan within 100m Culverts
HISTORIC FLOOD-DRAINAGE DEFECTS
MOCC Flood Points
Category 1 - Low Priority Incident
Category 2 - Moderate Priority Incident
Category 3 - High Priority Incident
Category 4 - Major Incident
Other
OPW past flood within100m
DMS 2015 2023 Drainage
100 m
Maxar, Microsoft
Flood Analysis Dashboard
Flood Analysis Comparison
Rainfall / Inundation Depth

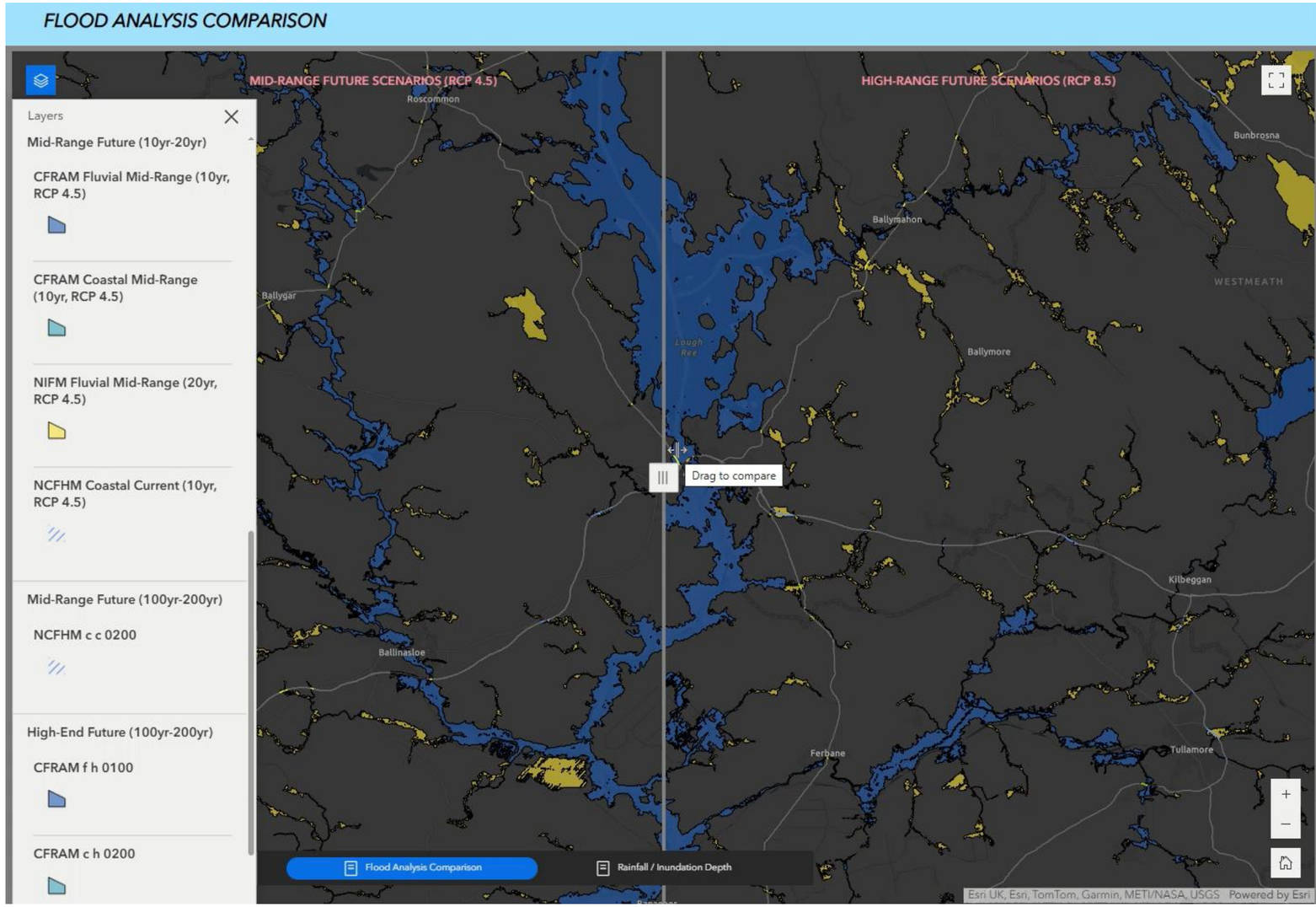
Flood Hazard Data

CFRAM and NIFM Methodologies
The methodology utilises flood-risk data from OPW, specifically CFRAM and NIFM, for thorough flood assessments.

CFRAM Flood Data Insights
CFRAM mapping provides insights into fluvial and coastal flood extents using various modelled scenarios for effective planning.

Focus on Mid-Range (RCP4.5) Scenarios
Initial phase analysis emphasises mid-range future scenarios with specific return periods for targeted vulnerability assessments.

Evolving Methodology
The methodology is designed to evolve, incorporating higher-end future scenarios for a comprehensive flood risk outlook.



Monitoring, evaluation and learning

To measure and enhance the progression of the CAIP, it will utilise a Monitoring, Evaluating and Learning (MEL) framework. The objectives of the MEL framework are to:

Development of KPIs for CAIP based on TII Climate Adaptation Strategy objectives.

Example KPI's

Key performance indicators		Indicator type	Implementation
Objective 1 | Observe fewer network disruptions during climate-related events			
1.1	Number of adverse weather events (e.g., flooding) compared to baseline years	Outcome	Future
1.2	Average duration of disruptions due to adverse weather events	Outcome	Future
1.3	Length of National Roads network with incident report systems that capture disruption (due to adverse weather events) data	Output	Present
1.4	Funding allocated to climate adaptation measures	Input	Present

Next Steps

Implementation of the CAIP will be overseen and coordinated by TII's Network Management Directorate. Next steps will include:

- Publication of the Climate Adaptation Implementation Plan for the National Road Network.
- Establish a reporting framework to ensure progress is recorded and communicated transparently to all stakeholders.
- Engage with the relevant stakeholders, overseeing the progression of implementing measures within specific asset groups.
- Establish and/or participate in external Climate Adaptation forums working collaboratively towards the delivery of a more resilient road network as we experience increased impacts due to climate change.
- Intention is to update to CAIP under mid-term review (2028).
- update will incorporate insights from detailed CCRA, and lessons learnt from implementation of measures up to then.

Progress on the Climate Adaptation Implementation Plan for National Roads will be reported at least annually, with more frequent updates aligned to key planning and decision cycles.

Potential means of reporting progress include the annual *National Road & Greenway Network Indicators* publication, or the *Annual Report and Financial Statements*.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Thank You

stephen.smyth@tii.ie
aisling.doyle@tii.ie
joe.joyce@tii.ie

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Abnormal Load Management in Ireland – Findings from a TII Research Project

Caitríona De Paor, Research Driven Solutions

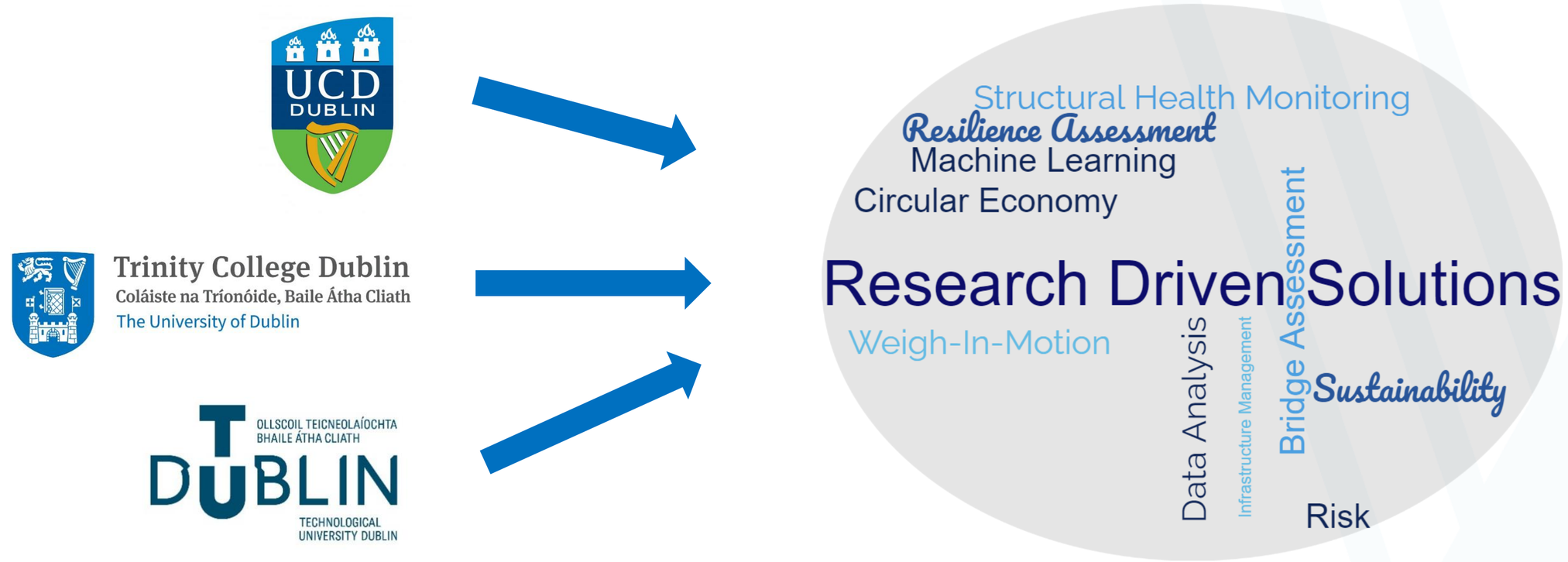
RESEARCH DRIVEN SOLUTIONS

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Abnormal Load Management in Ireland – Findings from a TII Research Project

Dr. Caitríona de Paor, *Lorcan Connolly, Dr. Alexandra Micu, Prof. Eugene OBrien*
Research Driven Solutions
Fergal Cahill, Chris Pires
Transport Infrastructure Ireland

Research Driven Solutions
University Research to Practice



Who Are We?

- We are an Irish SME **combining academic research learnings with industry experience**, helping infrastructure owners and managers to solve the engineering problems they face.
- We are made up of a **team of experts in infrastructure management** with extensive experience in answering infrastructure questions.

Abnormal Load Management in Ireland
Project Background and Motivation

RESEARCH DRIVEN SOLUTIONS

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

- Project funded under TII Research Call 2023
- Abnormal Loads can cause damage and deterioration to pavements and bridges on the Irish road network.
- Currently little or no engineering analysis performed when permits are being granted
- Currently no central repository of permits issued

Primary Objective: utilise knowledge of international best practice to develop an appropriate Policy, Strategy and Framework for the management of abnormal loads in Ireland.

Abnormal Load Management in Ireland
Project Background and Motivation

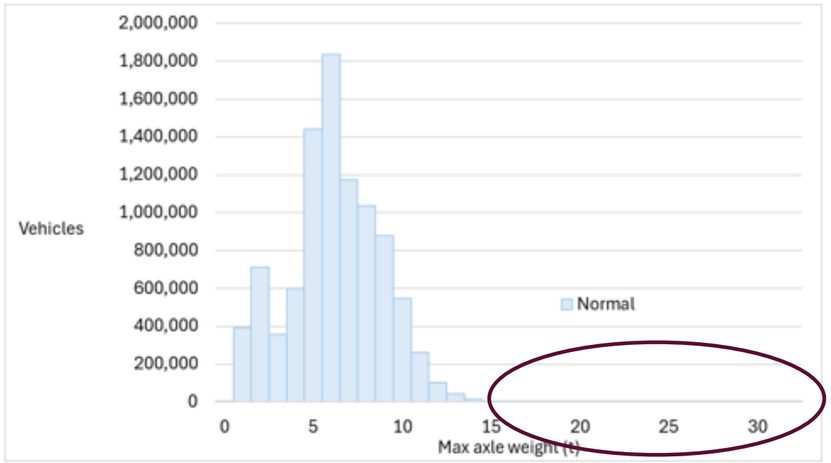
RESEARCH DRIVEN SOLUTIONS

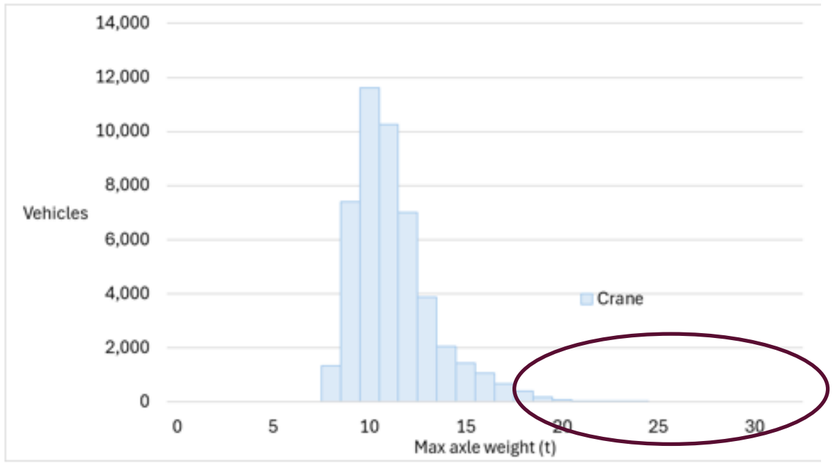
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

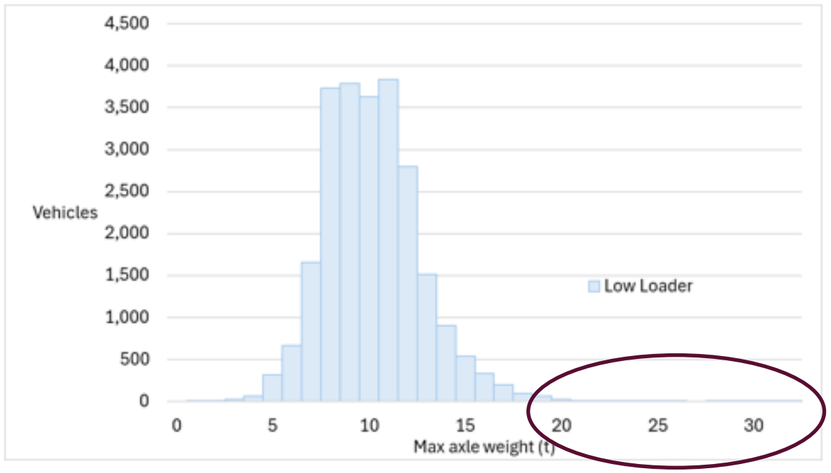
Current Loading on Irish Road Network:

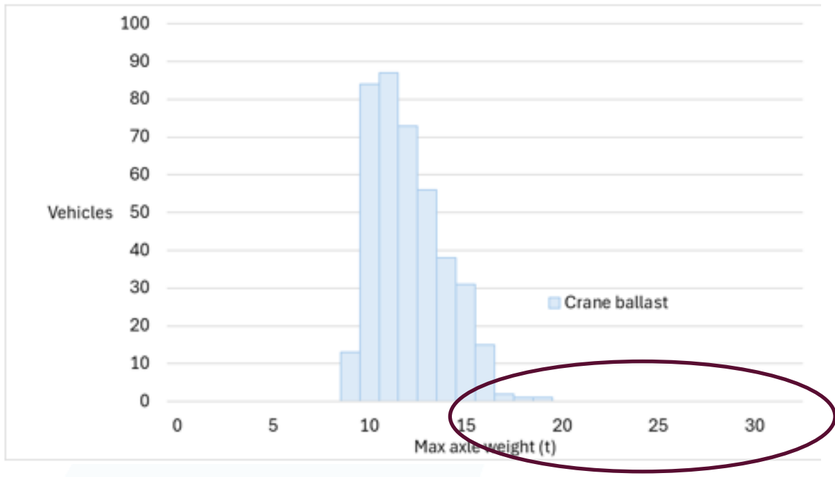
- Data from Weigh-in-Motion (WIM) sites taken from 2017 – 2023
- Data classified into 4 different vehicle categories depending on axle number and spacings:
  - Crane,
  - Crane ballast,
  - Low Loaders, and
  - Other 2 - 6 axle vehicles (Normal).
- Additional increased loads from energy network upgrades

Max Axle Weight (t)









Abnormal Load Management in Ireland
Project Background and Motivation

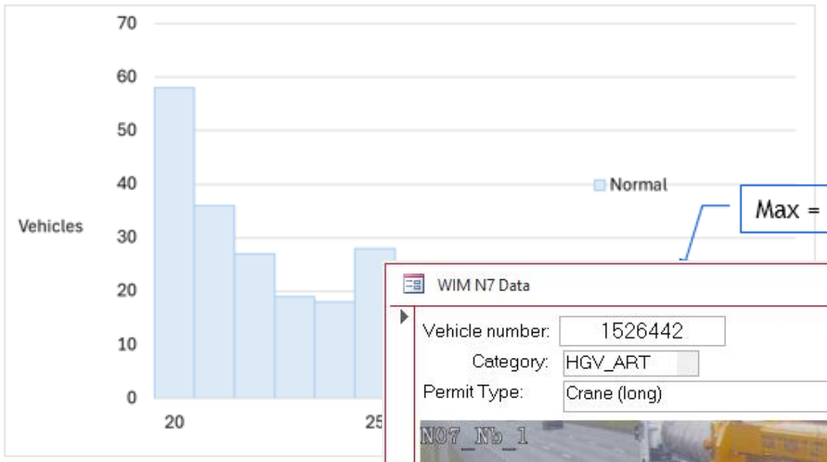
RESEARCH DRIVEN SOLUTIONS

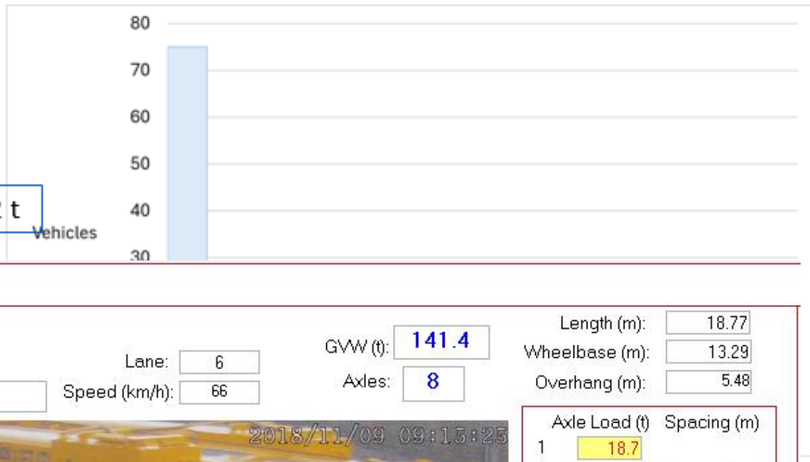
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

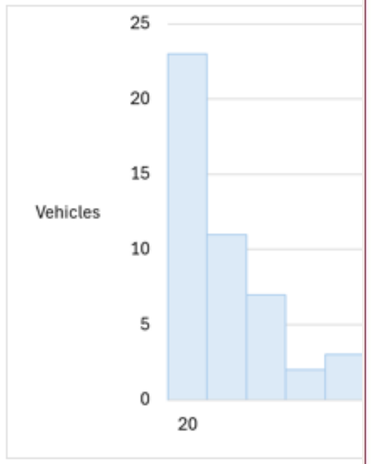
Current Loading on Irish Road Network:

- Data from Weigh-in-Motion (WIM) sites taken from 2017 – 2023
- Data classified into 4 different vehicle categories depending on axle number and spacings:
  - Crane,
  - Crane ballast,
  - Low Loaders, and
  - Other 2 - 6 axle vehicles (Normal).
- Additional increased loads from energy network upgrades

Max Axle Weight (t)







Abnormal Load Management in Ireland
Current Practice

RESEARCH DRIVEN SOLUTIONS

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Abnormal Load Management in Ireland

No Permit required	An Garda Síochána Permit	Local Authority Permit
Vehicle according to C&U Regulations	For Designated Routes only	Required for any non-Designated Route
Maximum of 46 tonnes	Weight limits according to C&U regulations	Weight limits greater than outlined in C&U Regulations
Maximum of 6 axles	Permits - up to 1 year	Varying permit length (single trip to 1year)
	Dimensions: < 27.4m length, < 4.65m high and < 4.3m wide	AGS also to be notified in advance when transporting abnormal load

Key Issues to be Addressed

Safety of Infrastructure	No centralised database	Multiple agencies involved	Inconsistent timelines	Multiple permits required

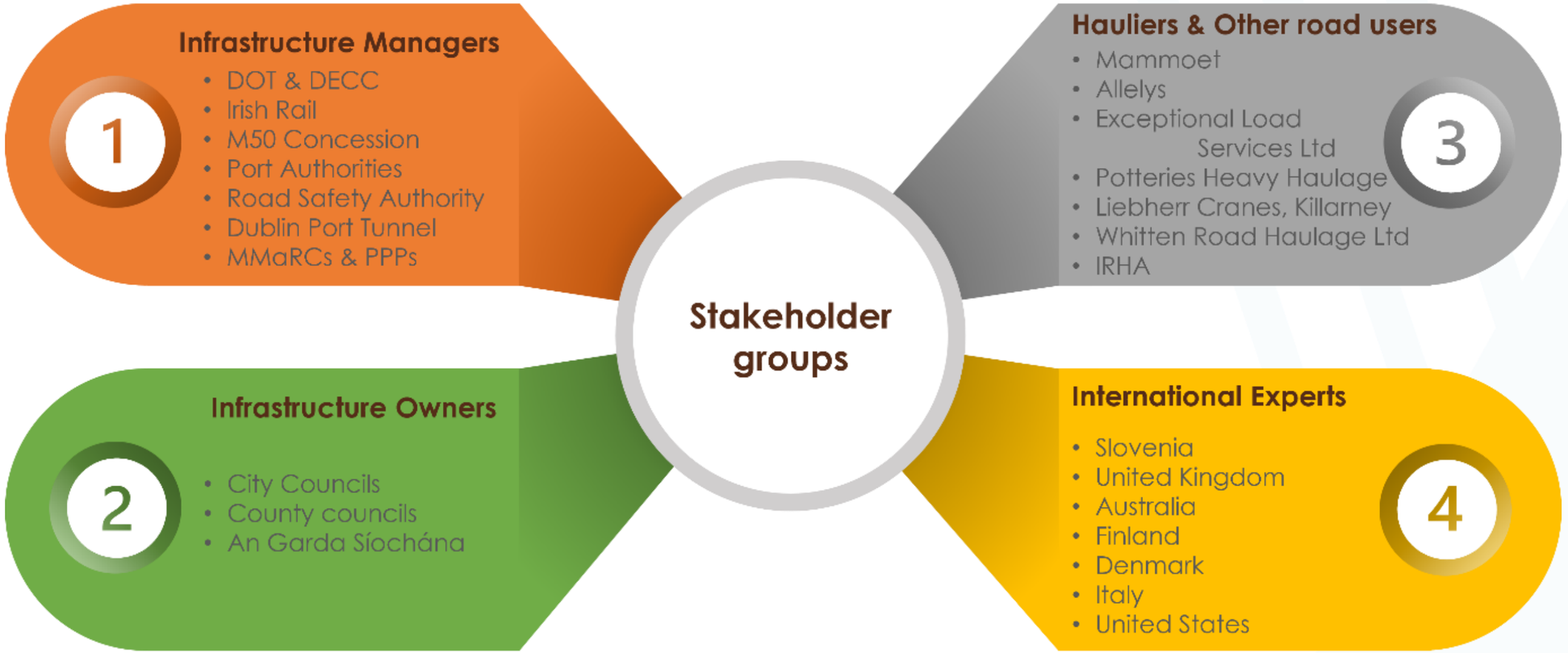
Abnormal Load Management in Ireland
Project Tasks

RESEARCH DRIVEN SOLUTIONS

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

- Literature review of international best practice in abnormal load management
- Stakeholder Engagement with key groups in Ireland and internationally
- User Needs Analysis
- Development of an Abnormal Load Management **POLICY** (business case)
- Development of an Abnormal Load Management **STRATEGY** (road map for implementation)
- Development of an Abnormal Load Management **FRAMEWORK** (toolkit)
- Conclusions and Recommendations

Abnormal Load Management in Ireland
Stakeholder Engagement



Abnormal Load Management in Ireland
Key Findings

- Current system not easy to use
  - No engineering analysis being performed
  - Need for a single national application system
- Risk to network infrastructure and users with current system
- New Legislation required
- Strategic Network connecting ports and cities would expedite applications
- Currently unknown levels of compliance / enforcement
- Currently no upper bound weight limit for vehicles to travel on network
- Requirements vary for each county
- Limited / no records of issued permits / routes

Abnormal Load Management in Ireland
Conclusions

1. ***Overhaul of abnormal load management system required to reduce risk to infrastructure, increase safety for everyone, and increase efficiency for operators, aligning with national economic growth strategies.***

2. ***Significant investment is required to reduce the current risk to infrastructure.***

Abnormal Load Management in Ireland
Recommendations (1)

- Abnormal Load Permit Application and Management System
  - **One single electronic application system managed by a centrally based team**. Team will consist of administrators plus bridge engineers to support local authority staff. Specialist consultancy services will also be required.
  - Prior to implementation of new system, **gather available capacity and condition data of bridges** on local, regional and national roads. Take steps to address gaps in available data.
  - Application system should have **mapping capabilities**, and be interconnected with other systems (Eirspan, MapRoads (RoadWorks and Bridges), MTCC Road Space Bookings etc.).
  - Develop a **Strategic Network** connecting ports and cities (similar to Heavy Loads Grid in UK) using the “designated roads” as a starting point. Bridge assessments required where capacities are unknown.
  - **Keep records** of all issued permits including vehicle and route details.
  - **Upper Bound Limit** for the network should be defined

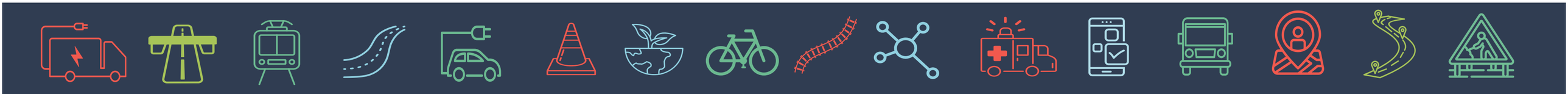
Since project commencement, DoT have set up a multi-agency working group set up to review permitting system, being led by Monaghan Co. Co.

Abnormal Load Management in Ireland
Recommendations (2)

- Abnormal Load and Exceptional Abnormal Load Permit Types
  - **Category 1 (Oversize vehicles):** 3 working days' notice for vehicles up to 30 m long x 3.5 m wide x 4.65 m high, and up to 46 tonnes (previously approved routes).
  - **Category 2:** Permit application for vehicles of any dimension, and up to 80 tonnes.
  - **Category 3:** Permit application for vehicles greater than 80 tonnes, and up to 150 tonnes, any dimension, not already covered by Categories 1 and 2.
  - **Category 4:** Permit application for all exceptional abnormal loads (EALs > 150 tonnes) where the application is reviewed and an initial response is issued within 15 working days confirming the status of the EAL application.

Abnormal Load Management in Ireland
Recommendations (3)

- Abnormal Load Management Team
  - **Central team** of one Senior Engineer (Grade 1), two bridge engineers (Grade 2) and 6 administrative staff (Grade 6)
  - **One engineer** in each local authority required to review permits in their area
- Legislation
  - **Definitions**: Legislation should define what abnormal loads are, the different categories of abnormal loads, and an Exceptional Abnormal Load (EAL).
  - **Upper Bound Limits** for gross vehicle weight (GVW) and axle weight should be defined.
  - Legislation to require all operators to apply for and stakeholders to review abnormal load permits using a single electronic system.
  - Legislation around **insurance / indemnity requirements** to be reviewed.
  - **Remove An Garda Síochána as approving authorities** for abnormal load permits.
  - **Escort Vehicles**: Legislation defining the use of Escort Vehicles is needed – currently not defined in legislation.

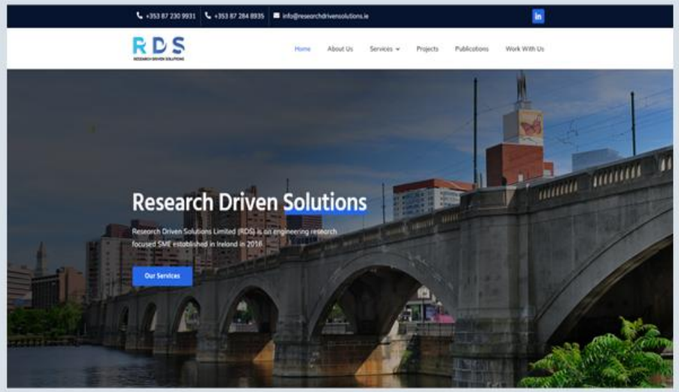


Abnormal Load Management in Ireland
Recommendations (4)

- Training / Education
  - Training/education is recommended for all parties including public involved to educate drivers and infrastructure managers around the legislation pertaining to abnormal loads.
- Enforcement
  - Role of An Garda Síochána should be restricted to enforcement only. Current level of enforcement of abnormal vehicles is unknown.
  - Data from WIM sites, Vehicle Monitoring and Tracking may be used to assist enforcement.

Thank you!

Research Driven Solutions (RDS)



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Road Network – High Voltage Interfaces, Celtic Interconnector Case Study

Martin Bourke TII and Brendan Meagher, Cork County Council

Road network - High Voltage interfaces

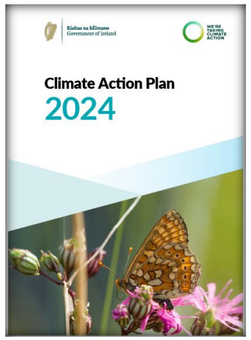
Martin Bourke
Regional Operations Manager
Transport Infrastructure Ireland

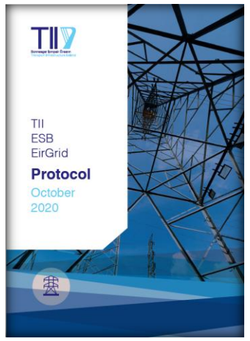
Background

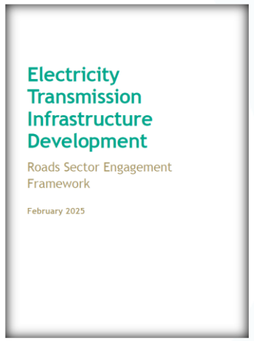
Section 12.4.1.1 of the Climate Action Plan 2024 (CAP24):

'*Accelerate Renewable Electricity Generation*' outlines the objective of reaching 80% of electricity demand from renewable sources by 2030 through a range of measures, including;

'All relevant public bodies will carry out their functions in a manner which supports the achievement of the renewable electricity targets, including, but not limited to, the use of road and rail infrastructure to provide a route for grid infrastructure where this is the optimal solution'.







Background

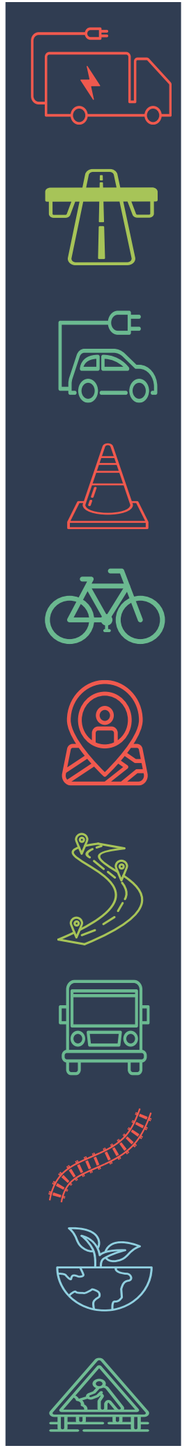
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Increased interactions/demand from:

- ***Renewables,***
- ***Industry***
- ***Transport,***
- ***Heating &***
- ***Data Centres-AI***

Coordination

- High Voltage Forum
- Co-operation agreement between Roads & Energy partners.
- ***Strategic interfaces: Joint Energy Transport (JET)***
- ***Local Authority Strategic Support Unit***
- ***Dedicated Site supervision teams***
- Accelerating Renewable Energy Taskforce (ARET)
- Accelerating Infrastructure Taskforce (DPER)
  - ***Optimise the efficient utilisation of roads and other lands for infrastructure corridors***



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Interactions

For road asset owners/managers;

Energy sector impacts across 2 disparate streams

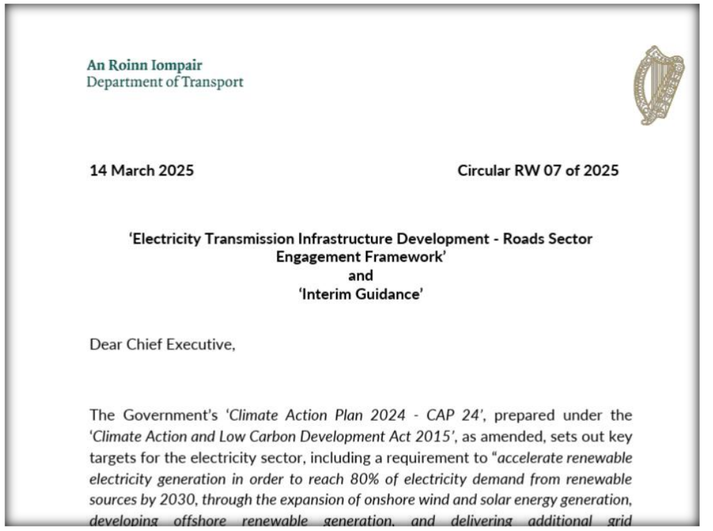
1. Cable Routing
2. Exceptional Abnormal Loads (EAL)

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Interactions

1. Cable Routing *(Existing & Planned Roads)*

- Engagement framework Transmission (110KV+)
  - effective collaboration with respective statutory bodies ***through the full project life cycle***
  - appropriate design & construction standards
- Enduring Standards; ***WIP***
- LA Interim Guidance
- Clarifications on 10KV & 20KV lines
- ***LA Strategic Support Unit***
- ***Dedicated Site supervision teams on projects of scale***



An Roinn Iompair
Department of Transport

14 March 2025 Circular RW 07 of 2025

'Electricity Transmission Infrastructure Development - Roads Sector Engagement Framework'
and
'Interim Guidance'

Dear Chief Executive,

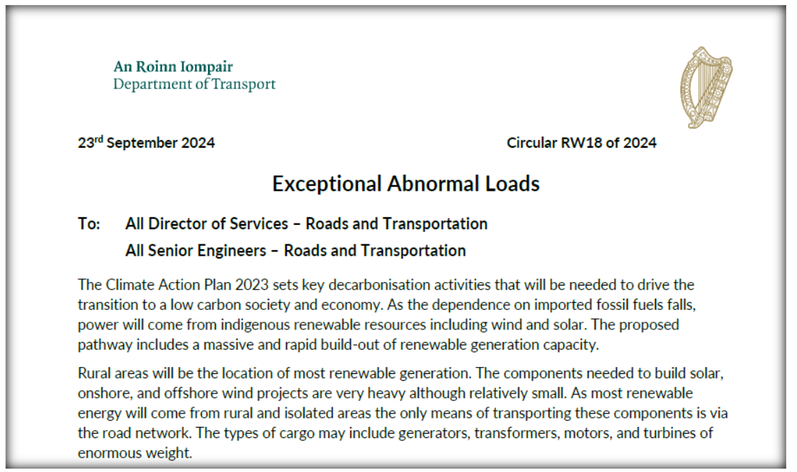
The Government's *'Climate Action Plan 2024 - CAP 24'*, prepared under the *'Climate Action and Low Carbon Development Act 2015'*, as amended, sets out key targets for the electricity sector, including a requirement to "*accelerate renewable electricity generation in order to reach 80% of electricity demand from renewable sources by 2030, through the expansion of onshore wind and solar energy generation, developing offshore renewable generation, and delivering additional grid*

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Interactions

2. EALs *(Existing & Planned Roads)*

- Gross Loads approaching 600t, 400t++ have moved
- RW 18 Process
- Move to a Proactive approach to “load-rate” the network
- Will allow origin destination movements
- ***Mycoco*** system for Abnormal load permitting, 46t+



An Roinn Iompair
Department of Transport

23rd September 2024 Circular RW18 of 2024

Exceptional Abnormal Loads

To: All Director of Services – Roads and Transportation
All Senior Engineers – Roads and Transportation

The Climate Action Plan 2023 sets key decarbonisation activities that will be needed to drive the transition to a low carbon society and economy. As the dependence on imported fossil fuels falls, power will come from indigenous renewable resources including wind and solar. The proposed pathway includes a massive and rapid build-out of renewable generation capacity.

Rural areas will be the location of most renewable generation. The components needed to build solar, onshore, and offshore wind projects are very heavy although relatively small. As most renewable energy will come from rural and isolated areas the only means of transporting these components is via the road network. The types of cargo may include generators, transformers, motors, and turbines of enormous weight.

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Summary

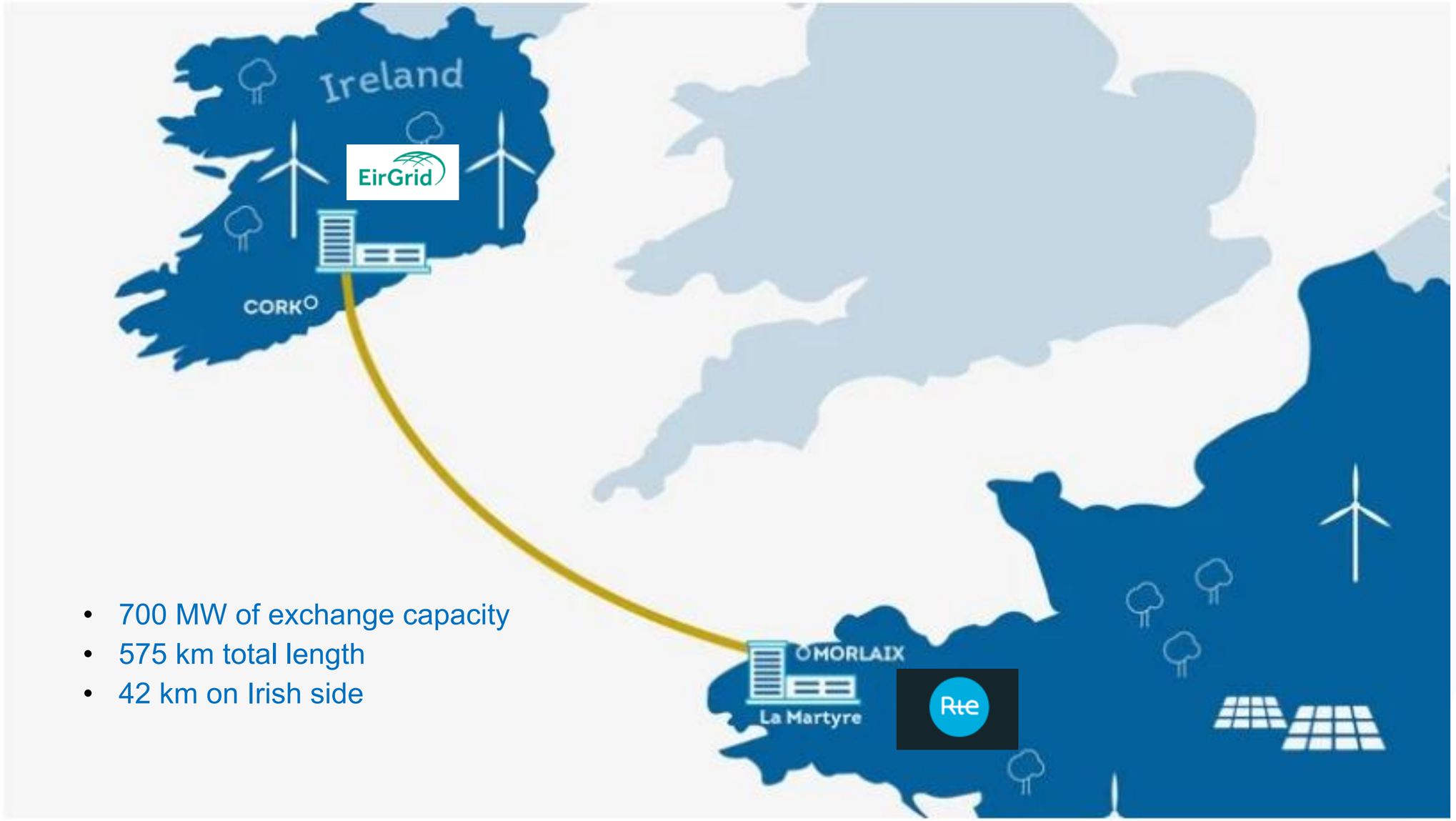
- Plan led approach (Look at ***ALL*** schemes/utilities)
- Mitigate all impacts over ***FULL*** project lifecycle
- Residual Costs & Liabilities
- EARLY ENGAGEMENT, ENGAGEMENT, ENGAGEMENT, ENGAGEMENT, ENGAGEMENT

Thank You

Road network - High Voltage interfaces

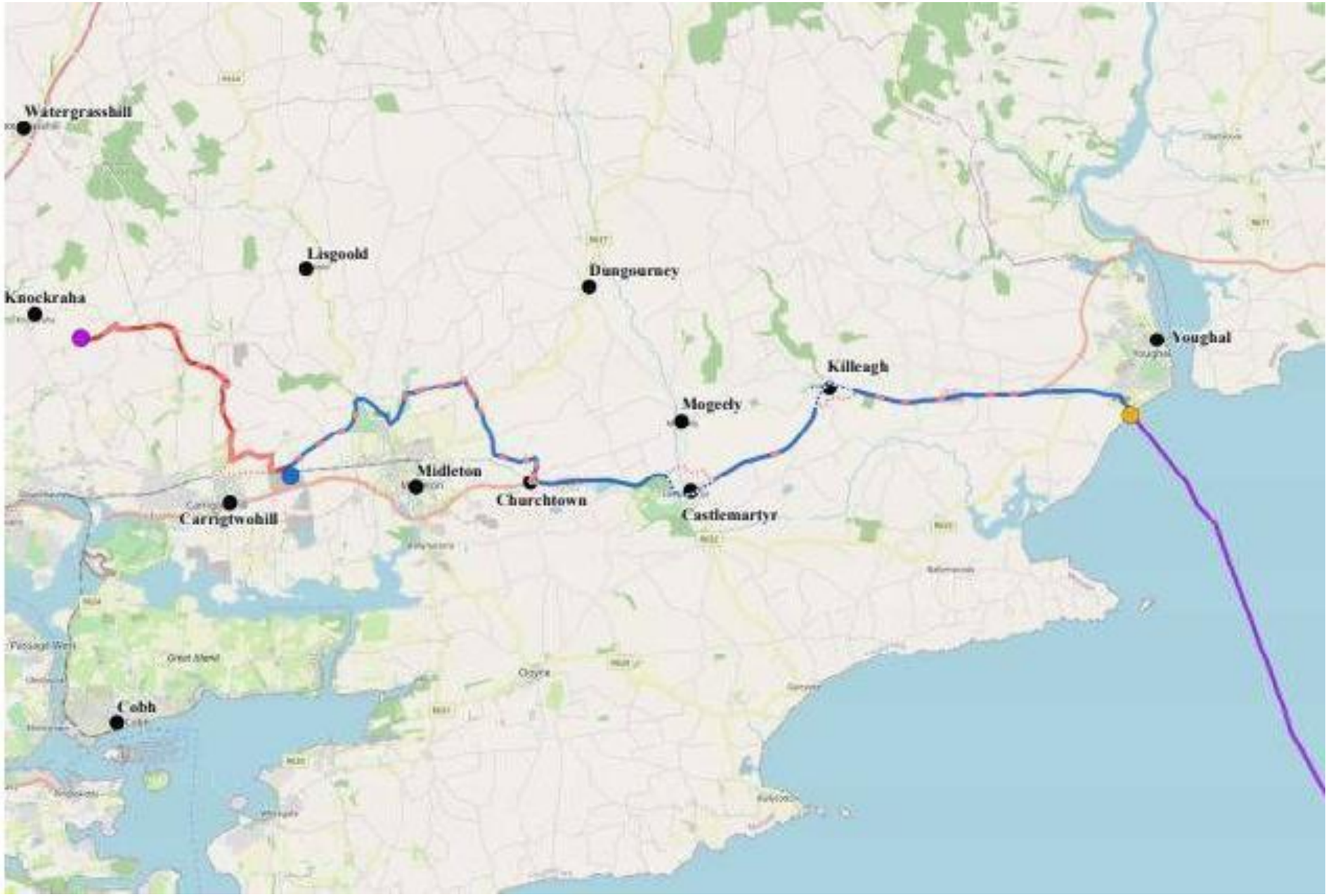
Brendan Meagher,
Cork County Council

Case Study - The Celtic Interconnector



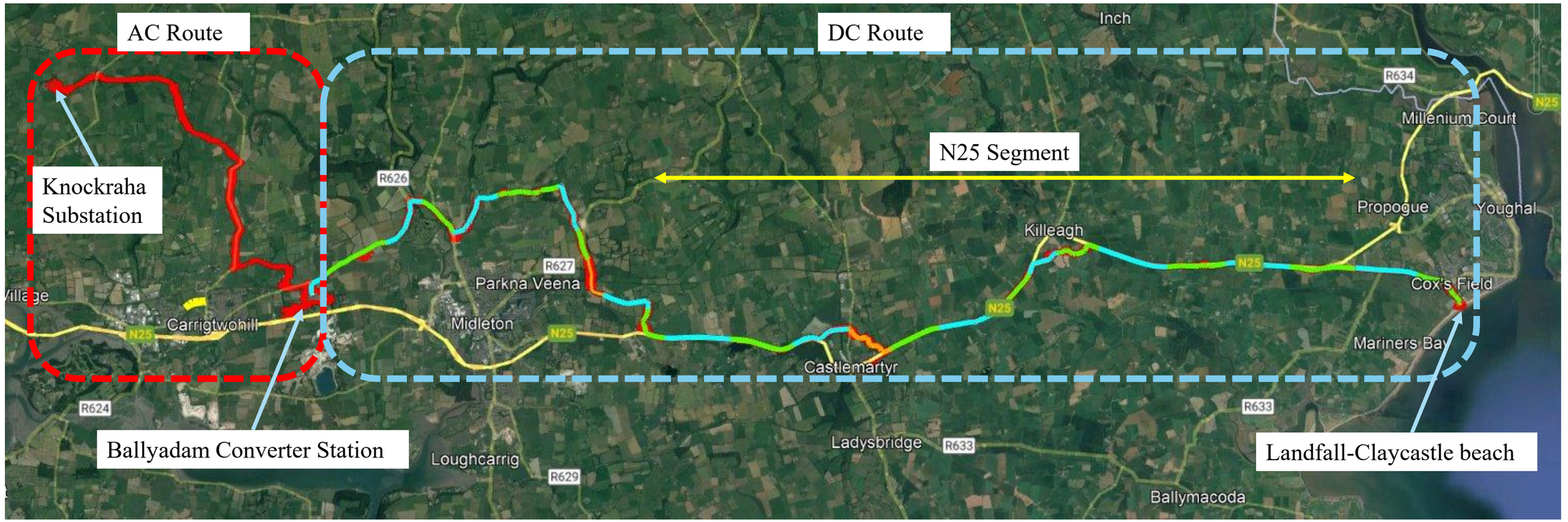
- 700 MW of exchange capacity
- 575 km total length
- 42 km on Irish side

Celtic Interconnector Irish Route



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector Irish Route



- **Statistics :**
  - Overall Length = 42km.
  - Length on N25 = 13km.
  - Length on regional & local roads & private lands = 29km.
  - Jointing bays = 60 no.
  - Jointing bays in the N25 section of the route = 10 no.
  - The 400KV AC route – red
  - The 320KV DC route – blue/green

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Potential Impacts

- Early Engagement – Steering group
- Cable Routing
- Construction Sequencing
- Joint Bay Design & Locations
- Pavement Condition
- Exceptional Abnormal Loads (EAL)

Comhairle Contae Chorcaí
Cork County Council

Oifig na mBóithre Náisiúnta Chorcaí
Cork National Roads Office

An Coimisiún Pleanála

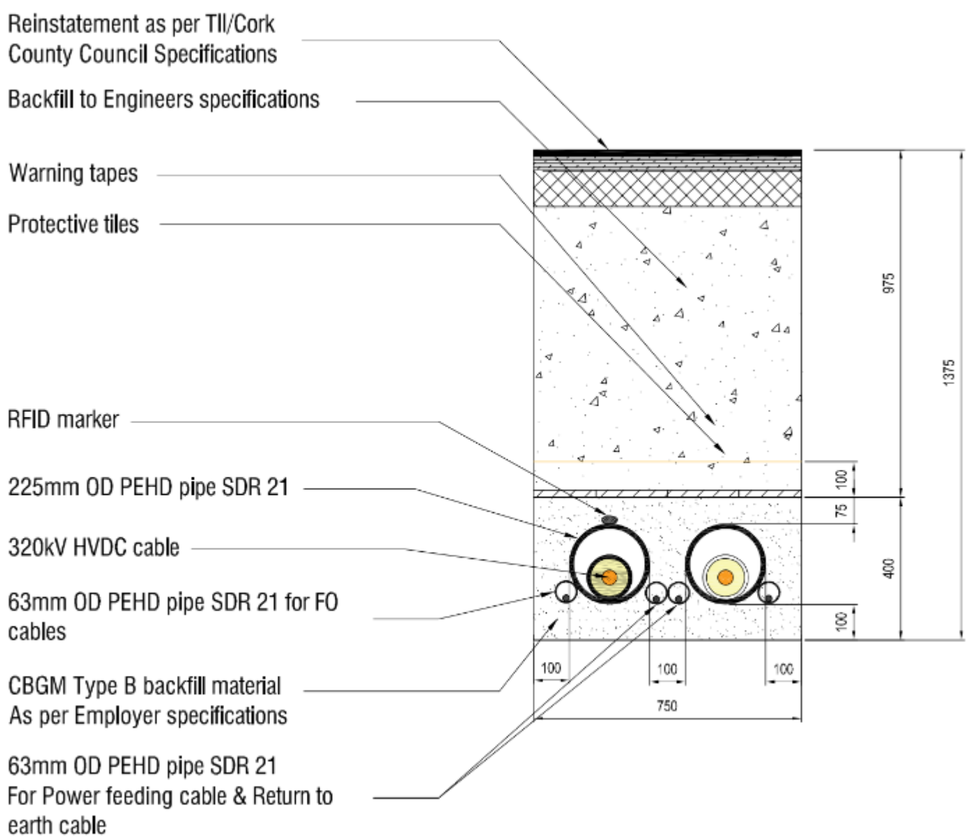
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

RMO
An Oifig um Bainistiú Bóithre
Road Management Office

MARA
An tÚdarás Rialála Limistéir Mhuirí
Maritime Area Regulatory Authority

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

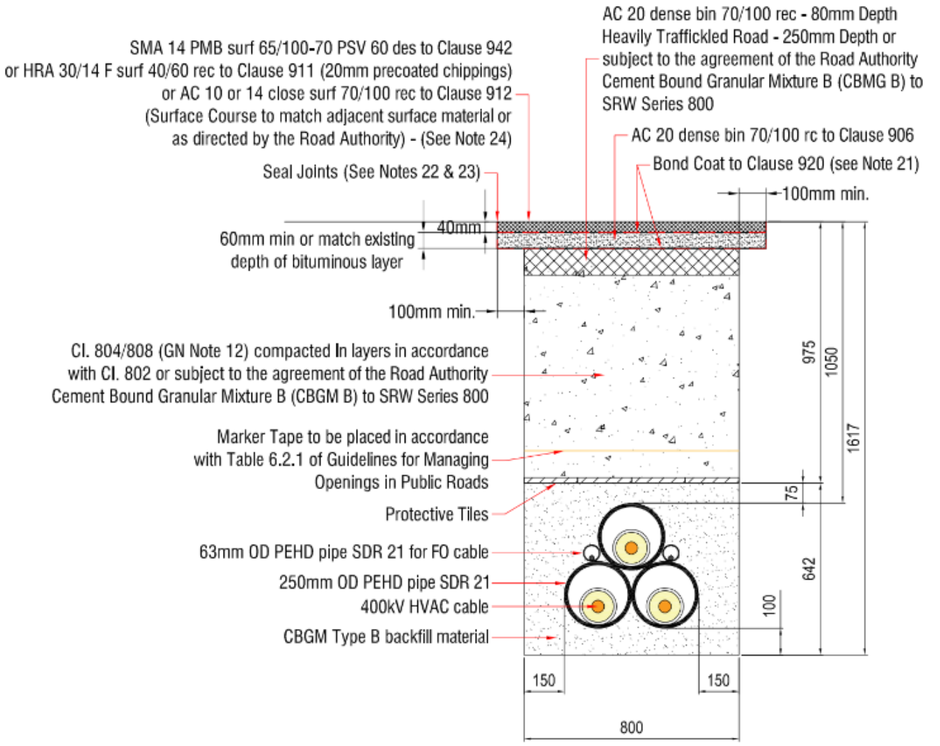
Celtic Interconnector – Design Coordination – Routing/Ducting – National roads.



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

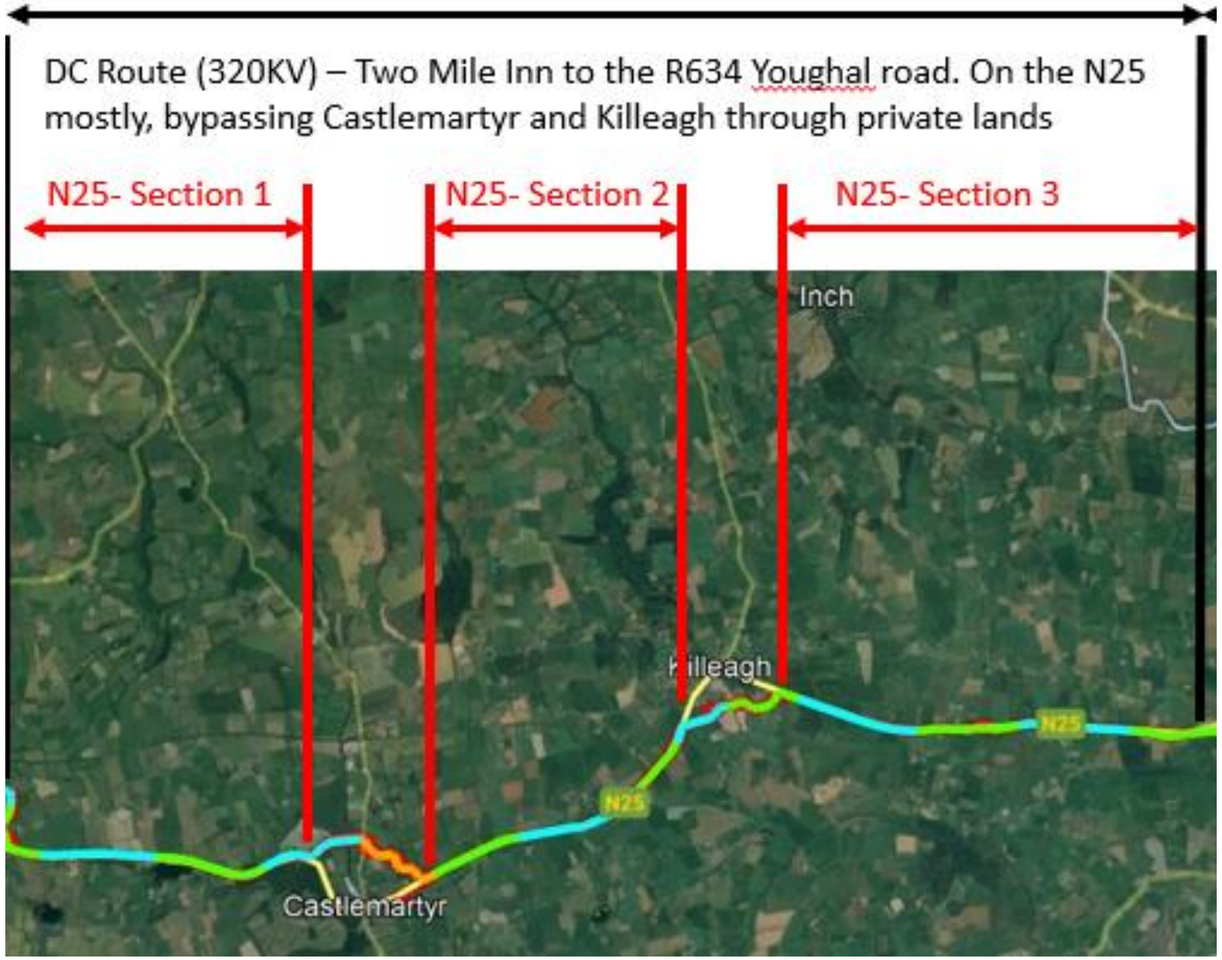
Celtic Interconnector – Design Coordination – Routing/Ducting – Regional & Local Roads

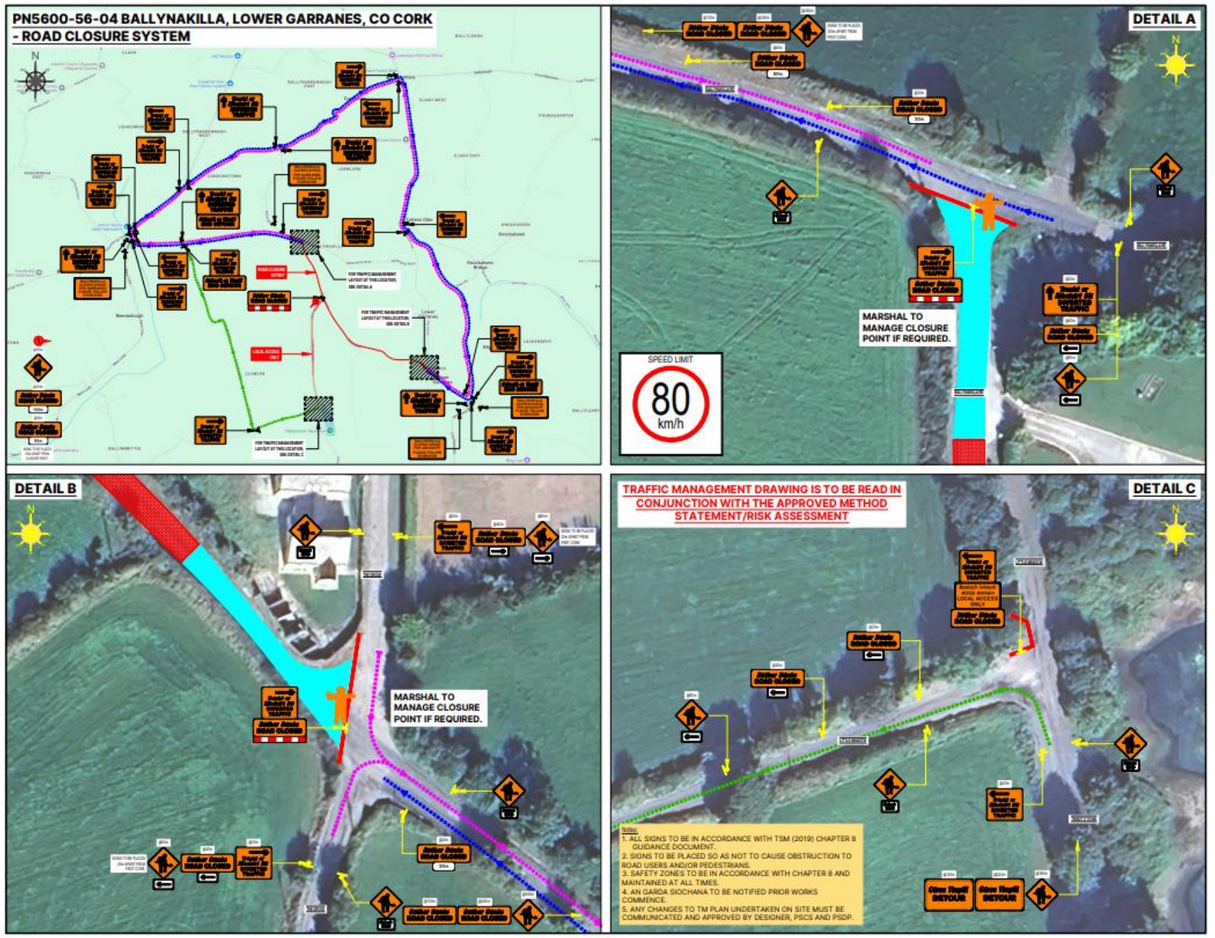
TRENCH DESIGN IN PUBLIC ROADWAY (TREFOIL FORMATION)



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Construction Sequencing

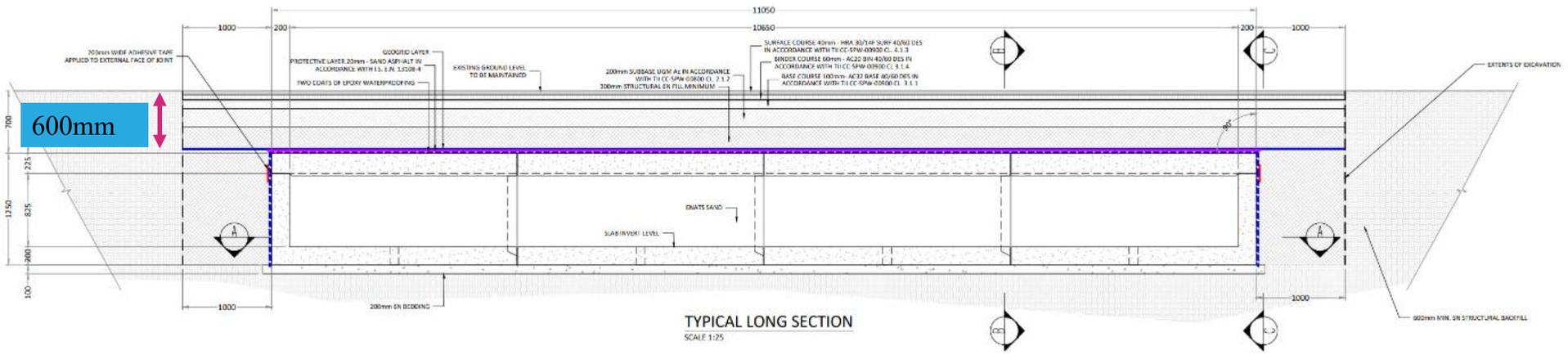


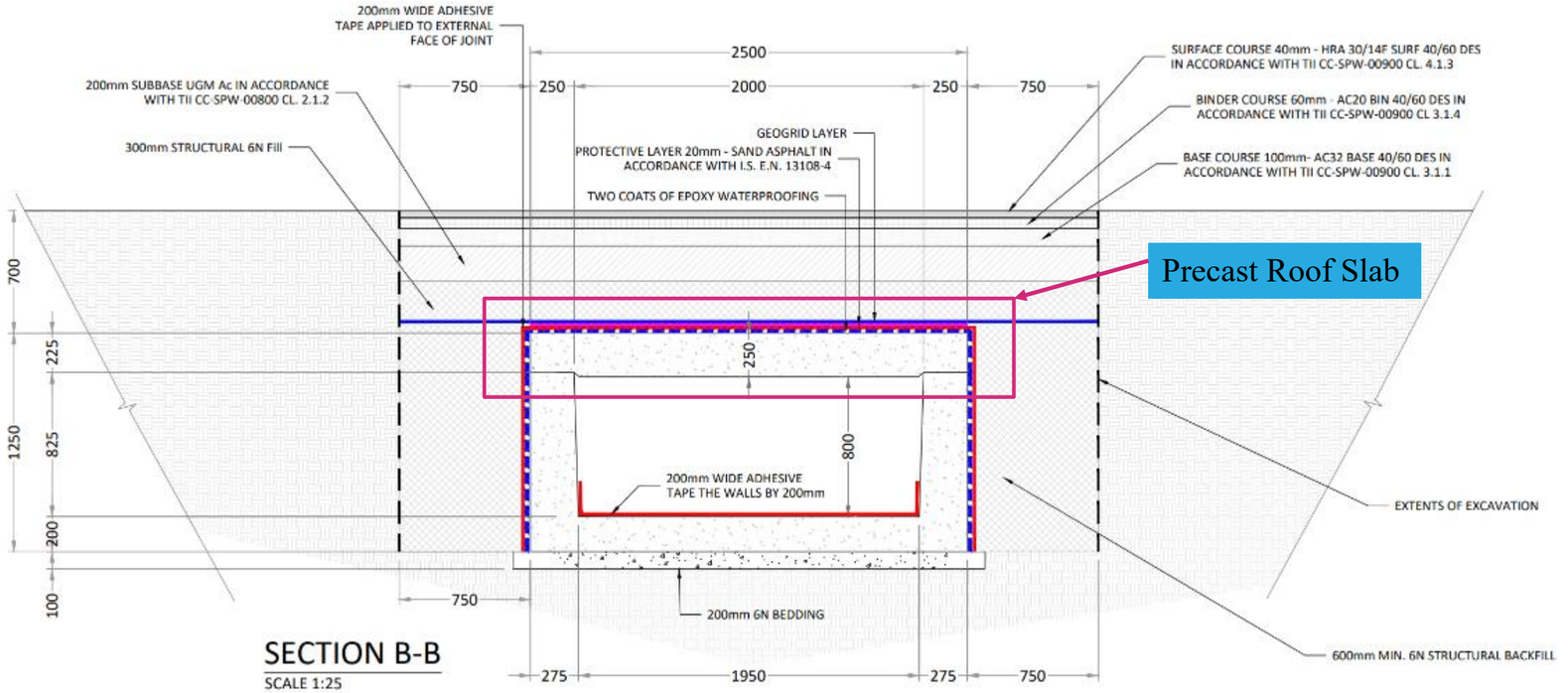


Celtic Interconnector – Design Coordination – Jointing Bays

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Design Coordination – Jointing Bays





Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Design Coordination – Jointing Bays

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Design Coordination – Jointing Bays

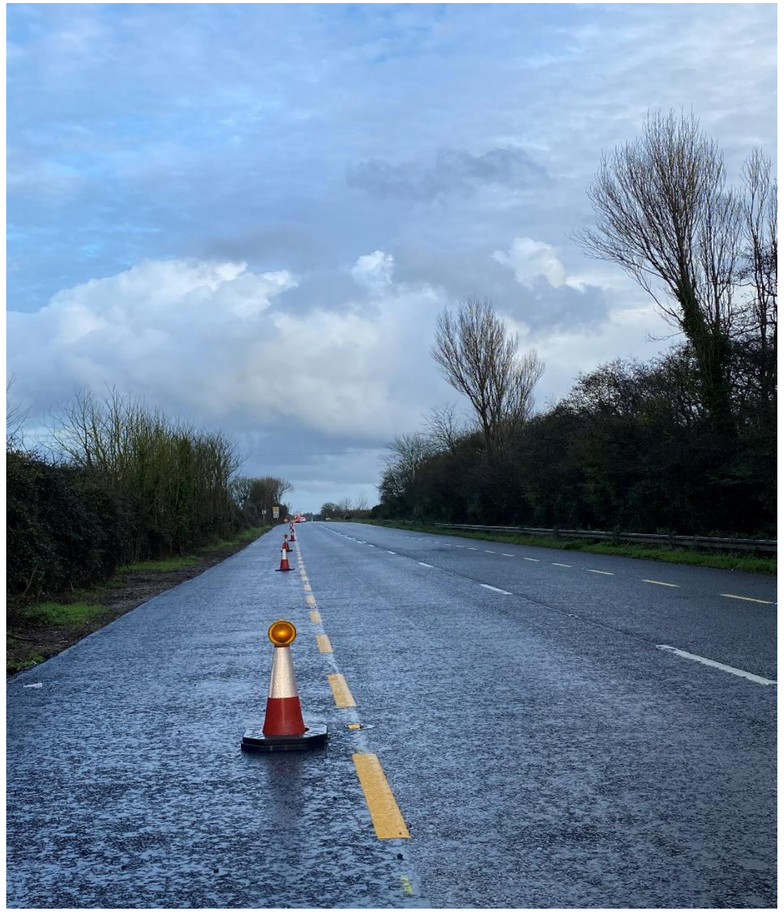
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

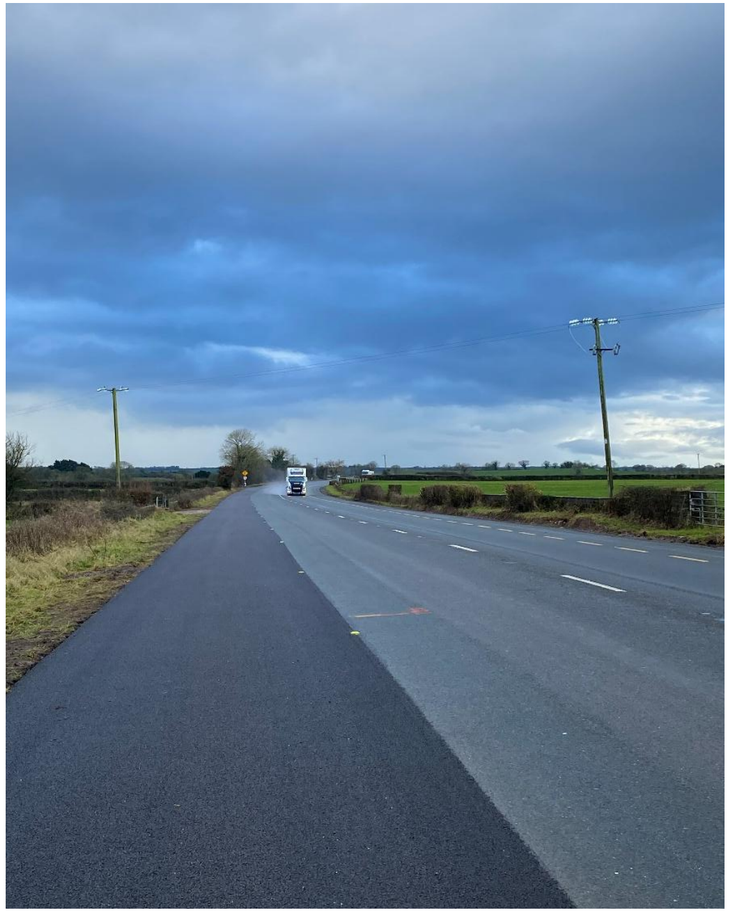
Celtic Interconnector – Design Coordination – Jointing Bays

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Road Reinstatements:

Celtic Interconnector – Ducting & Road Reinstatement Local Roads

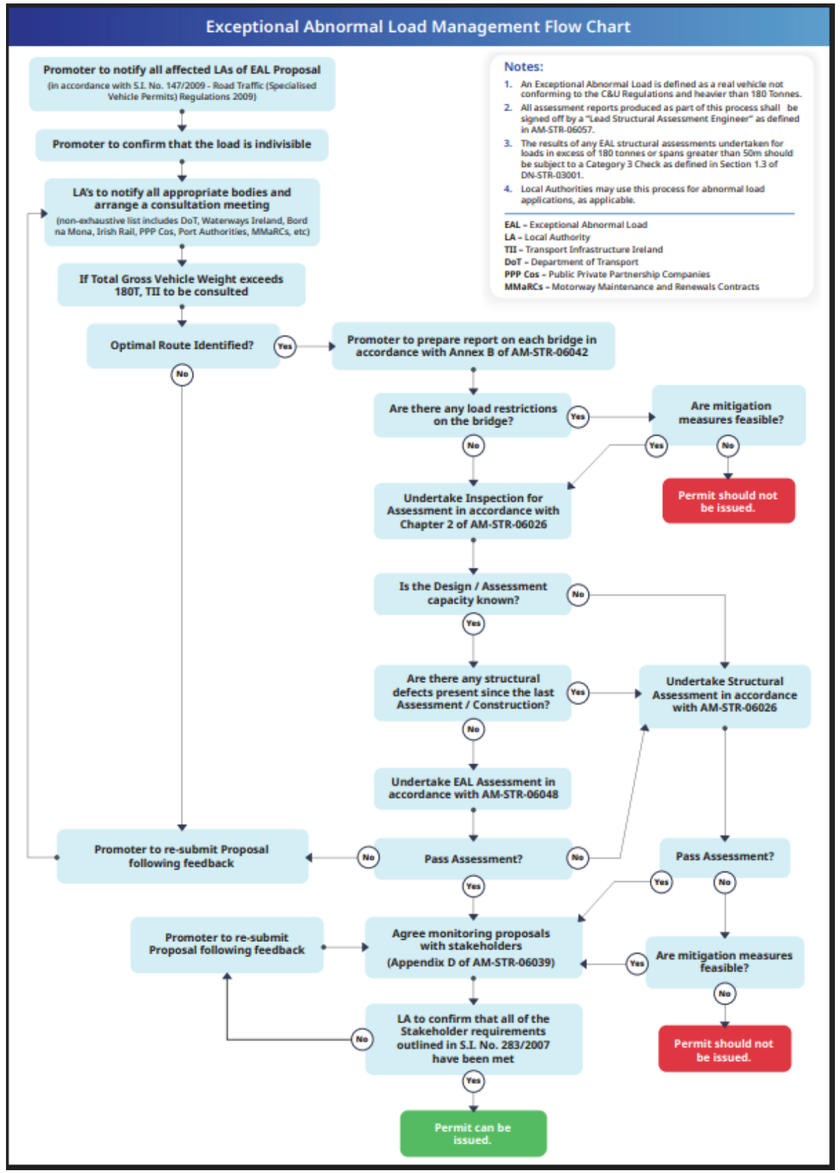




Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Exceptional Abnormal Loads – RW 18 Process

Celtic Interconnector – Exceptional Abnormal Loads – RW 18 Process



Weights

Vehicle 1:	**4 Axles Truck Unit 8x6 (cf. MB Arocs SLT 4163) (02-LS-6032)**	**39 000 kg**	*Weight empty*
Vehicle 2:	**12 row**	**39 600 kg**	*Weight empty*
Vehicle 3:	**12 row**	**39 600 kg**	*Weight empty*
Cargo:	**Girder frame - 12.5m beams - 227,000kg**	**299 000 kg**	
		417 200 kg	*Total weight*

Total dimensions

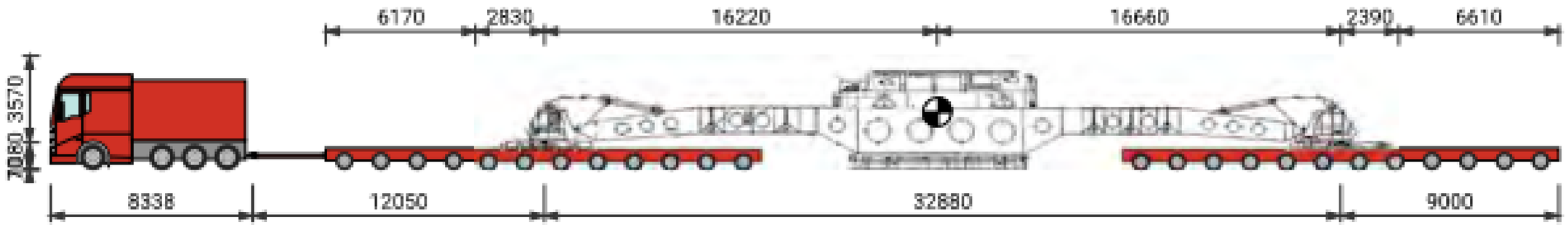
Length: **62 278 mm** x Width: **4 790 mm** x Height: **4 720 mm**

Axle load calculation check report

Checked by: **Aylward Heavy Haulage, Marc Aylward**

Checked with: **HeavyGoods.net**

Date: **January 21 2025**

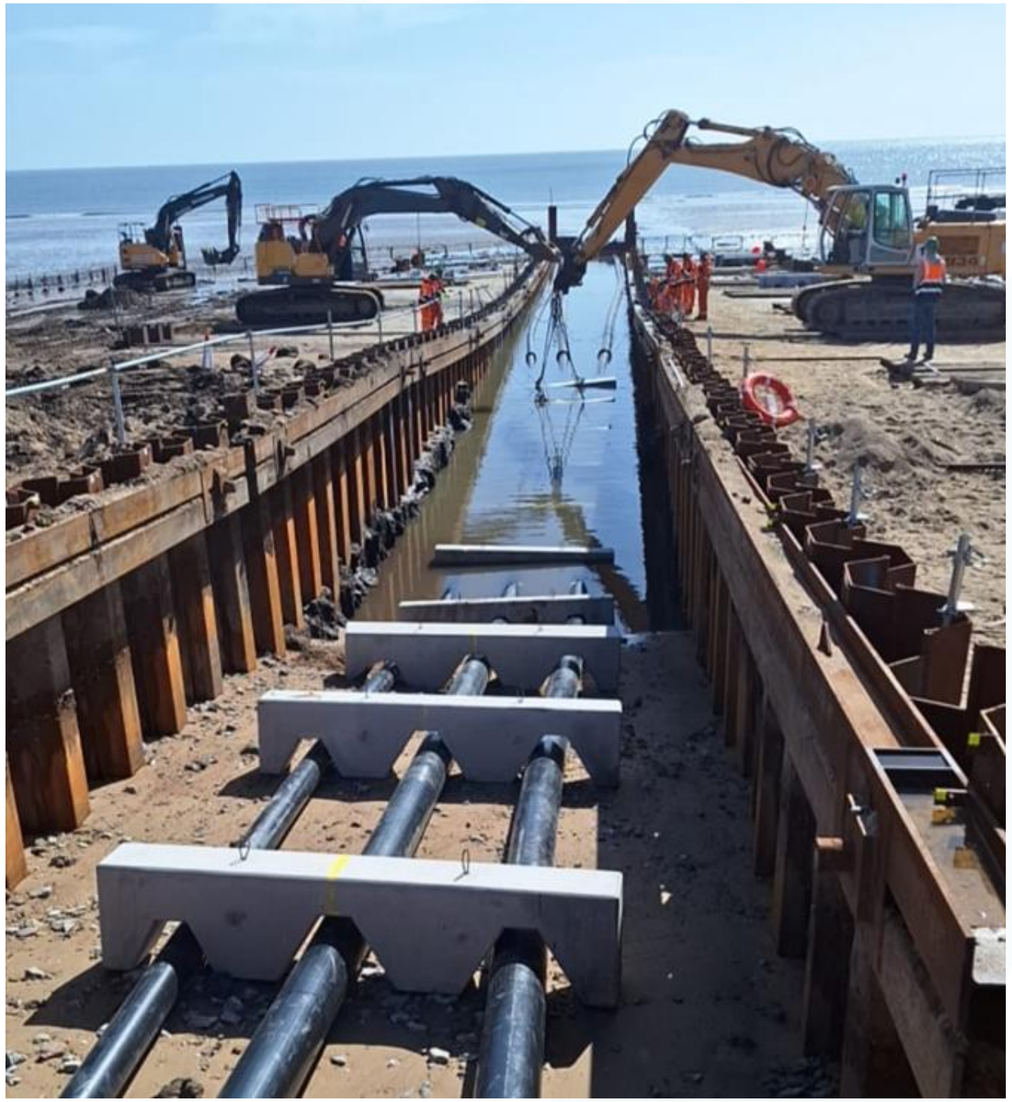


Celtic Interconnector – Exceptional Abnormal Loads

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Celtic Interconnector – Landfall – Beach Works



Celtic Interconnector – Ongoing Works

- Marine cable installation commenced from 15 km offshore of Youghal. 85 km will be laid in this visit.
- Reinstatement of the HVDC regional and local roads, pavement contract no. 2 awarded by Cork County Council. Commencing October 13th.
- Ballyadam transformer move for the last two units (EAL) is scheduled for late October.
- Cable installation in Section 2 N25 ongoing.
- Cable installation on N25 Section 1, Section 2 & the HVDC route on the regional and local roads will be Spring 2026.

Celtic Interconnector – Lessons Learned

- Planning:
  - Detailed route design & ROL
  - Detailed design of jointing bays.
  - Road reinstatement.
  - O&M
  - Planning conditions.
- Consultation:
  - Interfaces with future schemes to be discussed and developed at the earliest possible opportunity.
  - Engagement with landowners, routing options, underpass.
- Coordination of the Works:
  - Mobilise a site supervision team at the earliest opportunity.
  - Steering group could be established.
  - Central clearing house/central support unit.

Thank you

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Getting ready for use of BIM on transport projects – Overview

Jansi George, Senior Engineering Inspector, TII

What is BIM/Information Management?

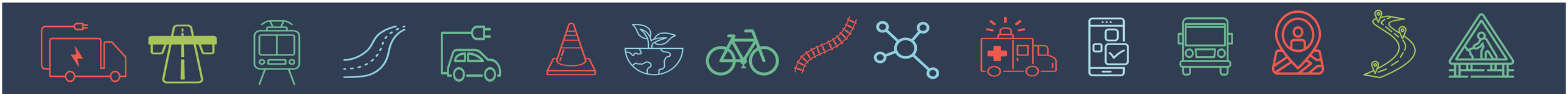
- New collaborative business process
- Information management and control tool
- Digital model

Benefits of BIM for Infrastructure

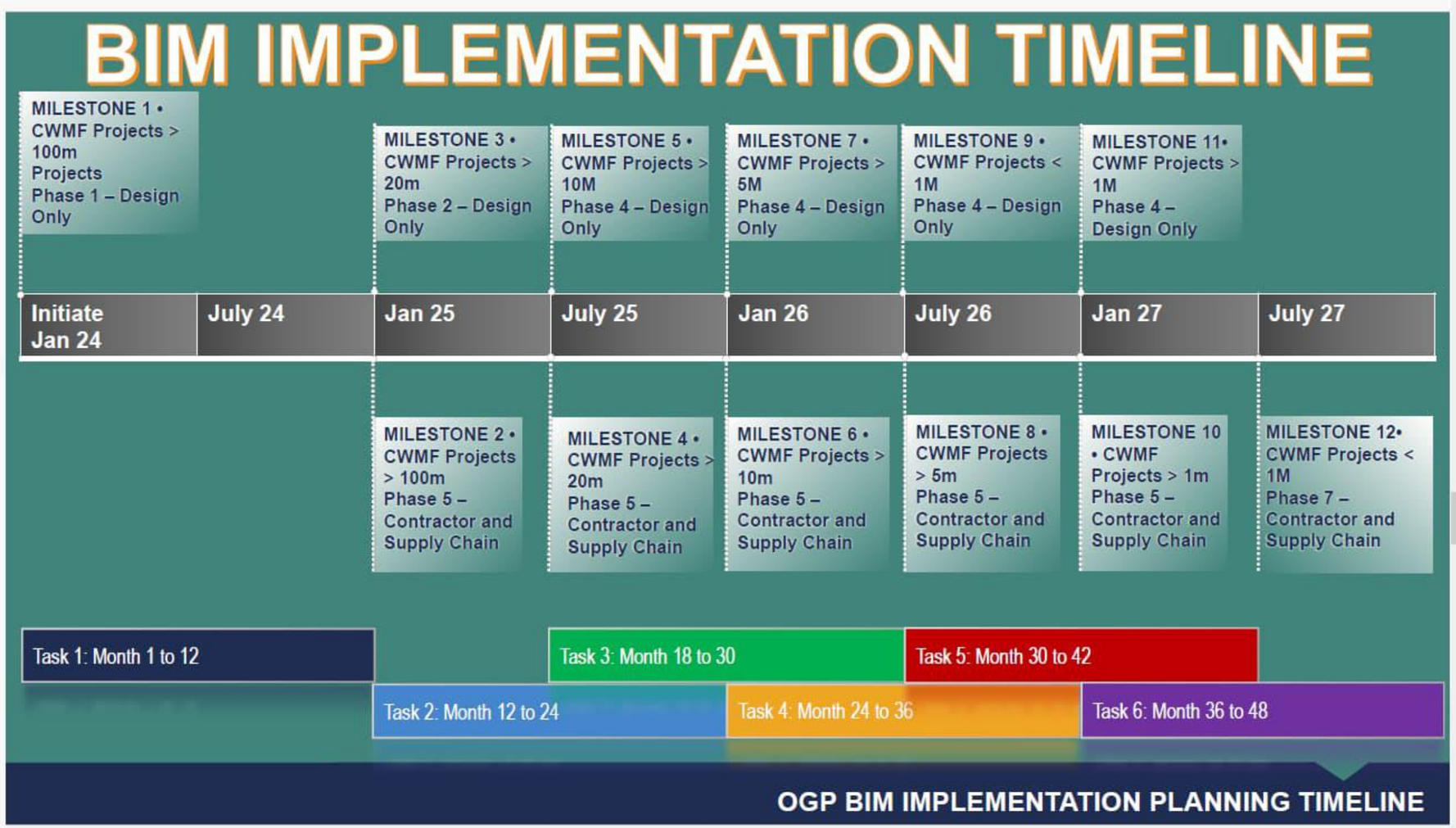
- **75%** of contractors reported improved collaboration (McGraw Hill Construction, UK)
- **72%** experienced better communication and coordination (NBS National BIM Report study, UK)
- **40%** Reduction in design errors in Road Design (Federal Highway Administration, US)
- **25%** reduction in public objections to road construction projects (Journal of Construction Engineering and Management)
- **32%** decrease in construction-related disputes (Autodesk)

Why TII BIM for Infrastructure policy/standards?

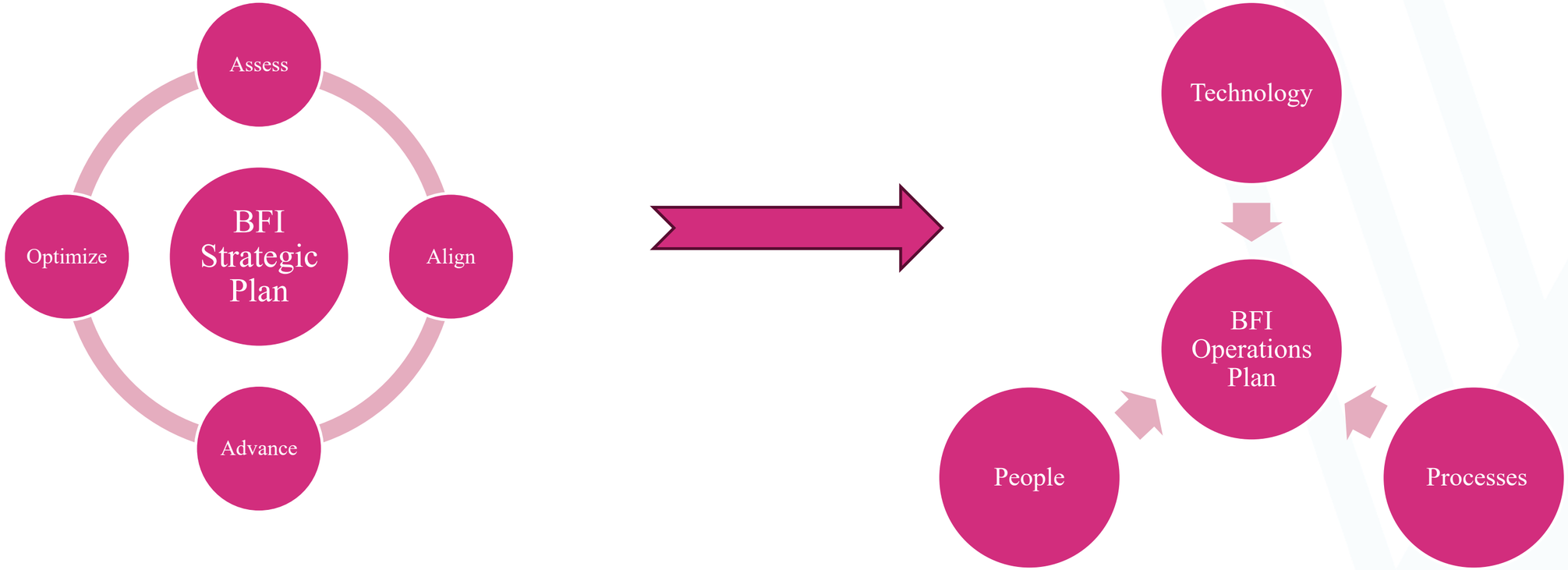
- Comply with OGP BIM Mandate
- To Provide guidance to Sponsoring Agencies and Supply Chain



OGP BIM Implementation Timeline

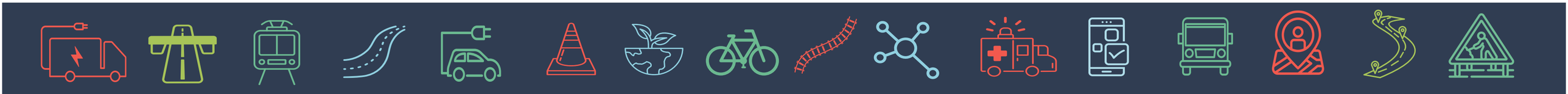


TII BIM For Infrastructure (BFI) Strategic Framework



TII BFI Implementation Plan

- Plan to achieve ISO 19650 and OGP mandate compliance
- Requirements are divided in 3 categories : People, Processes and Technology
- Guidance and templates will be provided – In progress



TII BFI Standards and Guidance documents in progress…

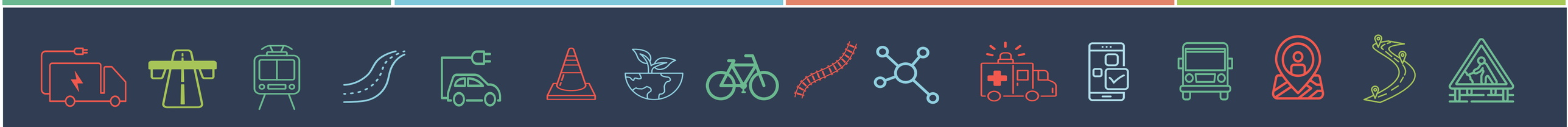
- Information Management – Policy and Road Map
- Information Management Implementation Guidelines
- CAD Standards
- Level of Information Need Detail
- Information Manager Requirements Guidance
- Exchange Information Requirements Template
- Capability and Capacity Assessment Template
- BIM Execution Plan (BEP) Template

Thank You

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Designing for Safe Systems: Revised Standard for Divided National Primary Roads

Danny Wicks, Arup



Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Revised Standard for Divided National Primary Roads

Danny Wicks, Arup

Divided Roads

Background

- Major update to TII Geometry Standards – May 2023
- Transport policy further evolved:
  - TEN-T – June 2024
  - Road Safety Strategy (RSS) 2021-2030
  - National Speed Limit Review – September 2023
- Review of cross sections in standard required to align with current Road Safety policy

Updates to TII Standards

To align with Road Safety policy on divided roads, the following needed to be considered:

1. What is a ‘Divided Road’?
   Physically segregated / non-physically segregated

2. Are there new cross section types to be included in standards?

Research developed in consultation with Technical Committee – TII Road Safety, TII Network Operations, NROs

Road Safety Strategy (RSS) 2021-2030

By 2030, reduce deaths

50%

Establishing working group to investigate speed limits on national road network

By 2030, reduce serious injuries

50%

Action 53 – examine implications of installation of median barriers on high-speed roads

By 2050, VISION ZERO

National Speed Limit Review (SLR)

National Secondary Roads

P2a – National secondary roads to be reduced to 80km/h

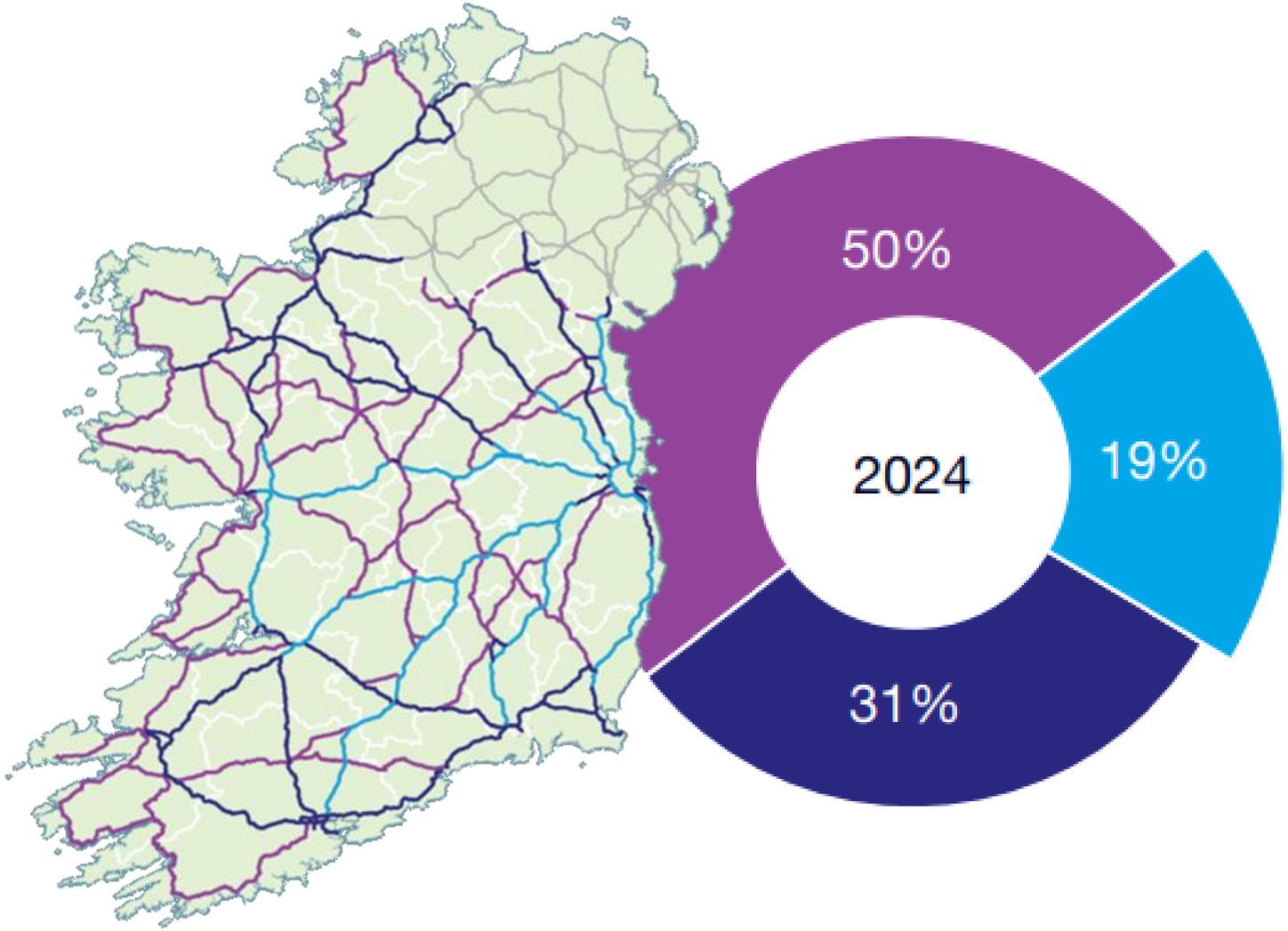
National Primary Roads

P2c – sections of current road network, where speed limit > 80km/h is to be maintained, the requirement to divide these shall be investigated.

P2d – new sections of road network to have a speed limit > 80km/h, not yet through planning process, shall be divided.

- *Offline and online improvements*

National Road Network by Classification



- Motorway, 995 km
- National Primary Roads, 1,648 km
- National Secondary Roads, 2,662 km

- Non-Motorway National Primary Network – 1,648 km
- 77% / 1,270 km of this network is undivided

Fatalities on All National Roads (2018-2024)

- **Head-on collisions (39%)** are main occurrence of fatalities
- Significant proportion of fatalities on **undivided road network (77%)**

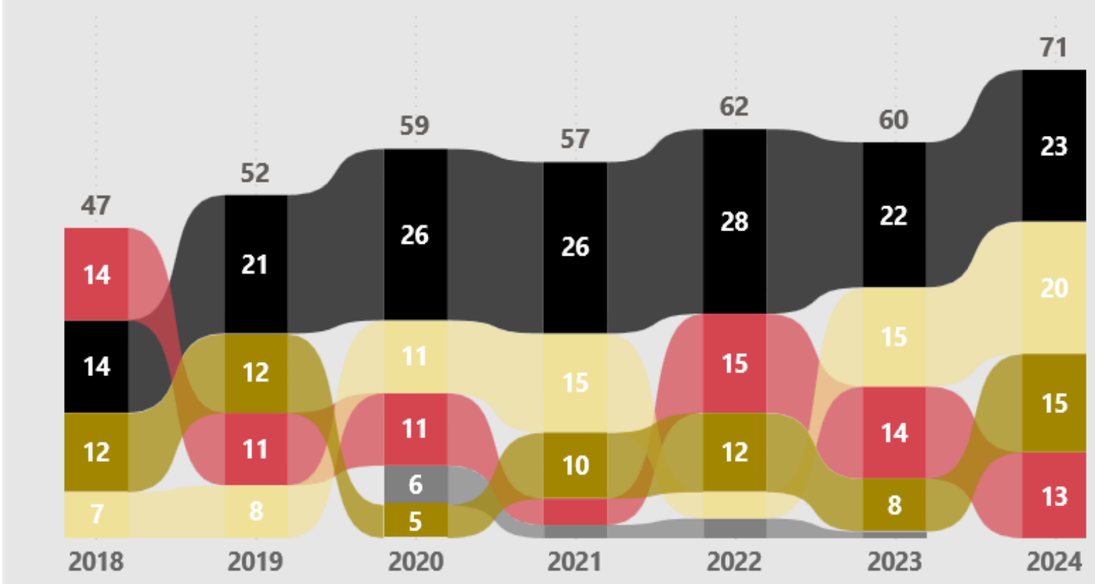
Head-on fatal injuries
160

Veh to Veh fatal injuries
74

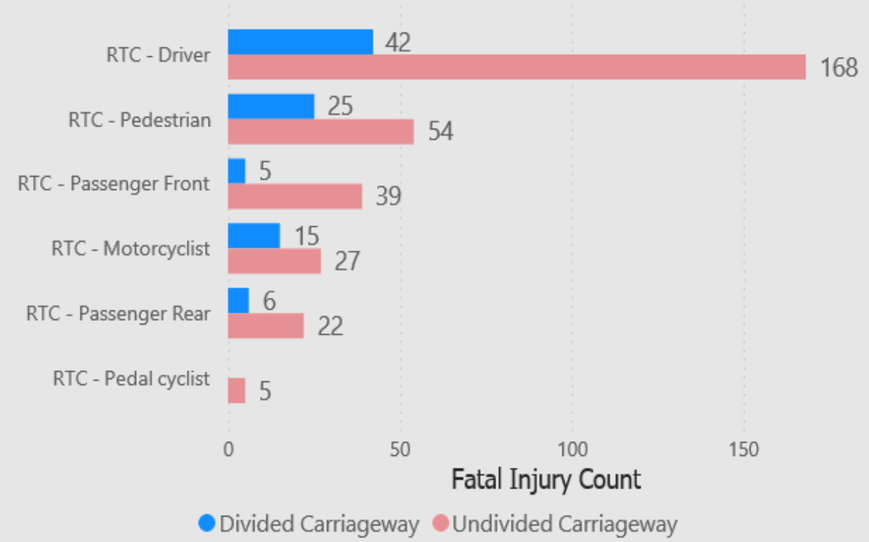
Single vehicle fatal injuries
80

NMUs fatal injuries
82

Other PCT fatal injuries
12



Discrepancies in totals are due to incomplete categorical information (by AGS) e.g. recording a fatal collision with a pedestrian as a head-on collision.



Collision Rates on National Roads

Rural Single Carriageway (3,478 KM)

2018 to 2020 Collision Rate = 6.797

Benchmark Rate

Rural Dual Carriageway / Divided Road (275 KM)

2018 to 2020 Collision Rate = 2.372

2.8 times safer than benchmark rate

Rural Motorway (947 KM)

1st

2018 to 2020 Collision Rate = 1.660

4 times safer than benchmark rate

Urban Motorway (M50 – 50 KM)

2018 to 2020 Collision Rate = 3.227

2.1 times safer than benchmark rate

92% of fatal collisions and **86%** of serious injury collisions occur on Single Carriageway national roads, which account for only **38%** total Vehicle Kilometres Travelled (VKT)

Current TII Standard Cross Sections

Divided Road

Motorway (2+2)
Type 1 Dual Carriageway (2+2) [21.6m]
Type 2 Divided Road (2+2) [16.5m]
Type 3 Divided Road (2+1) [13.0m]

Undivided Road

- **Type 1 Single Carriageway [12.3m]**
- **Type 2 Single Carriageway [8.0m]**
- Type 3 Single Carriageway [7.0m]

Research on ‘Divided’ Road Cross Sections

1) Wide Centreline Treatment (WCLT)
2) 2+1 with Painted Median
3) ‘Narrow’ 2+1

Reviews of international standards and case studies

Questionnaire, Engagement with CEDR member states

International route reviews

1) Wide Centreline Treatment (WCLT)

2) 2+1 with Painted Median

3) ‘Narrow’ 2+1

- **Divided Road**, generally single lane in each direction
- **15-30% overtaking** provision
  (Type 3 Divided Road / 2+1 – 40% overtaking)
- Approximately 9.0m wide in single lane sections
- Adopted extensively in Sweden for retrofitting to 9.0m wide single carriageways
- Emergency Refuge Areas (ERAs) provided at regular intervals
- Subject to Swedish Road Authority approval

3) ‘Narrow’ 2+1 – National Route 25 in Sweden

3) ‘Narrow’ 2+1

Junctions

- At-grade junctions maintained with breaks in barrier
  - Jug-handle junctions (safety issues)
  - Ghost Island junctions
  - Right-in Right-out junctions
- Speed limits may be reduced to 80 km/h at junctions

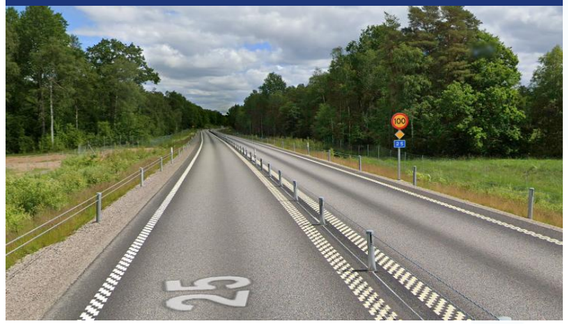
Direct accesses

In Sweden:

- Consolidation of accesses generally
- Some access maintained forestry, fields, private properties

Research Findings

‘Narrow 2+1’ achieves similar / equivalent level of safety to established divided road cross section

Wide Centreline (WCLT)	2+1 with Painted Median	Narrow 2+1	Type 3 Divided / 2+1
			
⬇~30%	⬇~35%	⬇50-65%	⬇50-90%

1. **What is a Divided Road?**
   Divided road should include a median barrier

2. **New Cross Sections:**
   ‘Narrow 2+1’ (i.e 1+1, 15 – 30% overtaking) to be included for online options only

Key Updates to TII Geometry Standards

1. Rebranding of Divided Roads

- ‘Singular’ cross section type with varying lane configurations
- e.g 2+2 (~90% overtaking) and 2+1 (~ 40% overtaking)

2. Inclusion of new Divided Road configuration

- 1+1 Divided (~15-30% overtaking) – constrained online sections, allowing re-use of existing
- Subject to TII approval (Departure)

3. Additional Guidance

- Overtaking provision / capacity, junction strategy
- Allow Designers to develop context sensitive solutions

Updates to Standards

2026

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Thank you

Revised Standard for Divided National Primary Roads

Danny Wicks, Arup

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Thank you for attending the 2025 National Roads and Greenways Conference