



An Roinn Iompair
Turasoireachta agus Spóirt
Department of Transport,
Tourism and Sport



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ROADS Services Training Group

LOCAL AUTHORITY ROADS CONFERENCE and EXHIBITION - 2022

Radisson Blu Hotel & Spa, Sligo May 2022



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LOCAL AUTHORITY ROADS CONFERENCE and EXHIBITION – 2022

Presentation Title

Design and Lifecycle of Road Pavements and The Circular Economy”

Presenter's Name; Edward Winterlich

Presenter's Job Title; TII Network Manager–Pavement and Maintenance

Presenter's Organisation; Transport Infrastructure Ireland



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**Approximately
100 billion tonnes
of raw material
are removed from
the planet in just
a single year.**

**Roughly half is
used in the
world's built
environment.**

**Construction
Creates an
estimated third of
the world's
overall waste,**

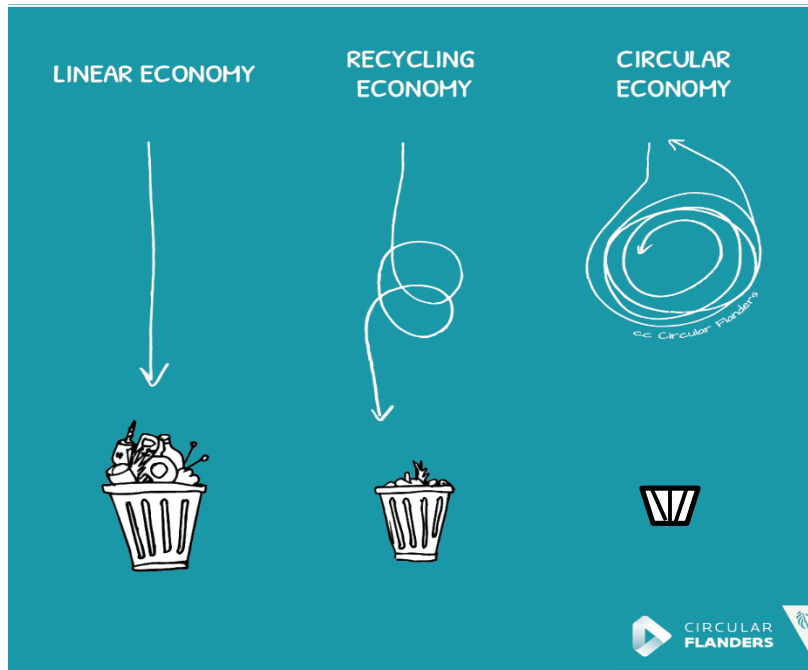
**Construction
creates at least
40% of
the world's
carbon dioxide
emissions**

Waste Action Plan for a Circular Economy. 2020



“A Circular Economy is one that is restorative and regenerative by design”

- Ellen MacArthur Foundation



The Three Principles:

- ❑ Regenerating natural systems
- ❑ Keeping products and materials in use
- ❑ Designing out waste and pollution

Responsible Materials Management



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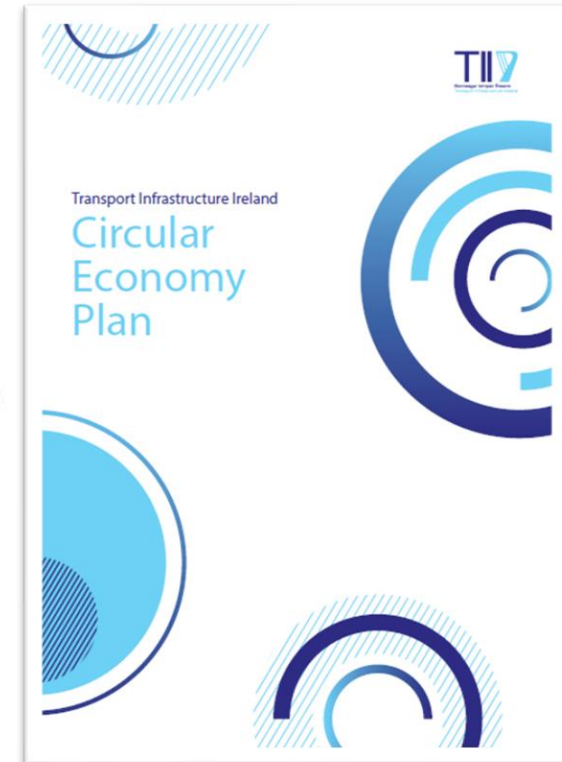
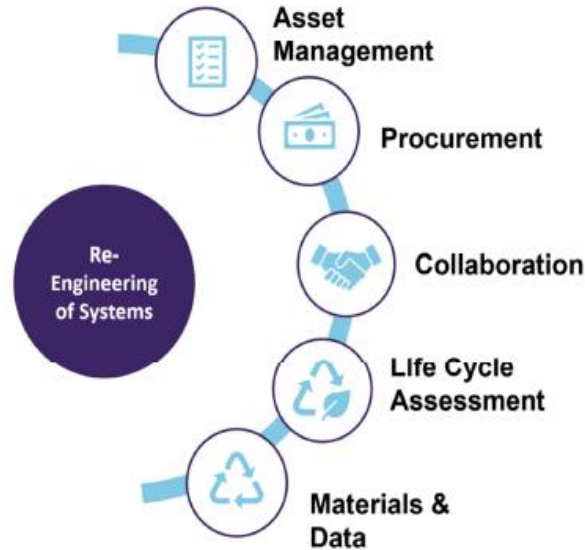


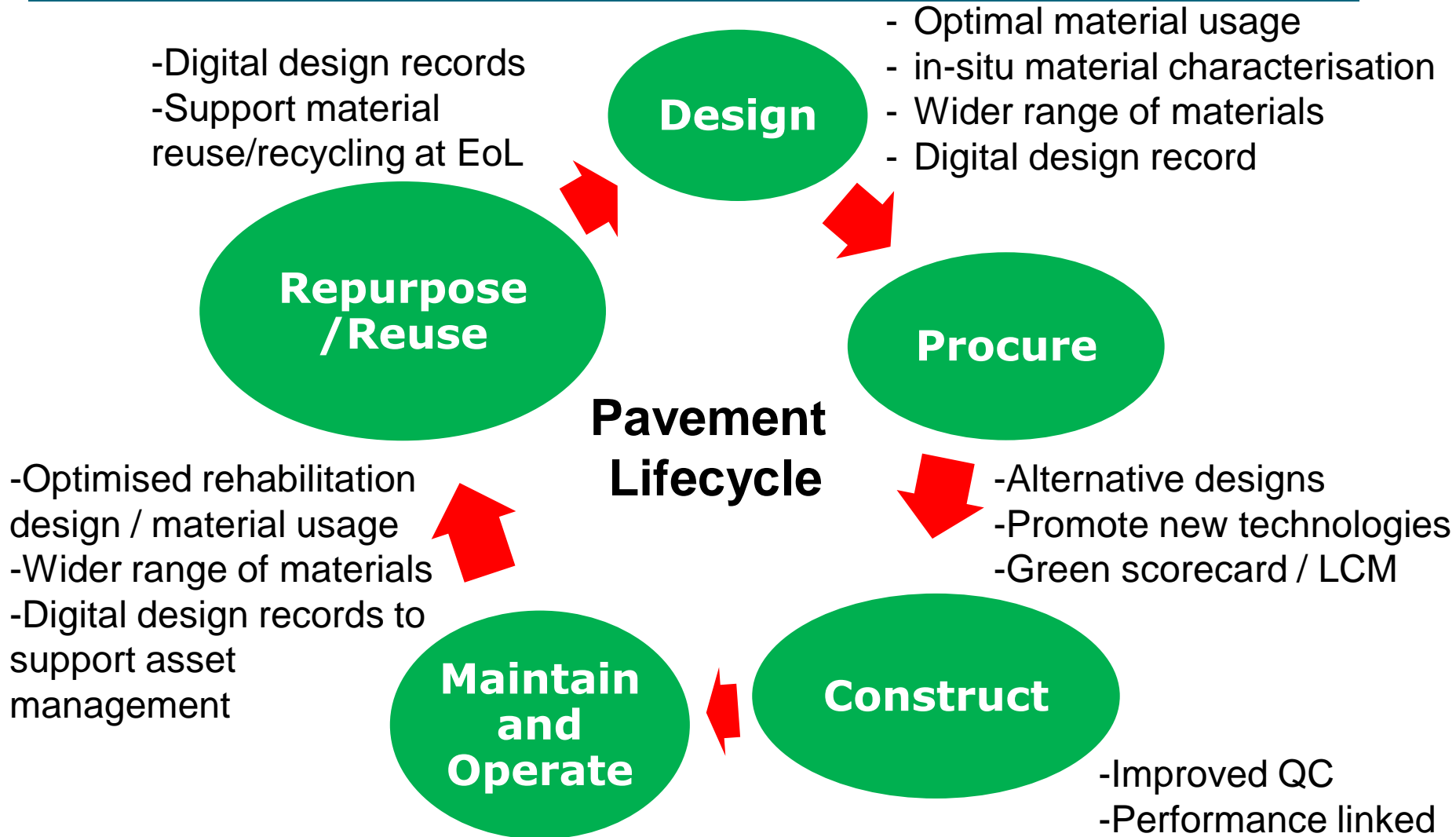
TII Circular Economy Action Across all Assets

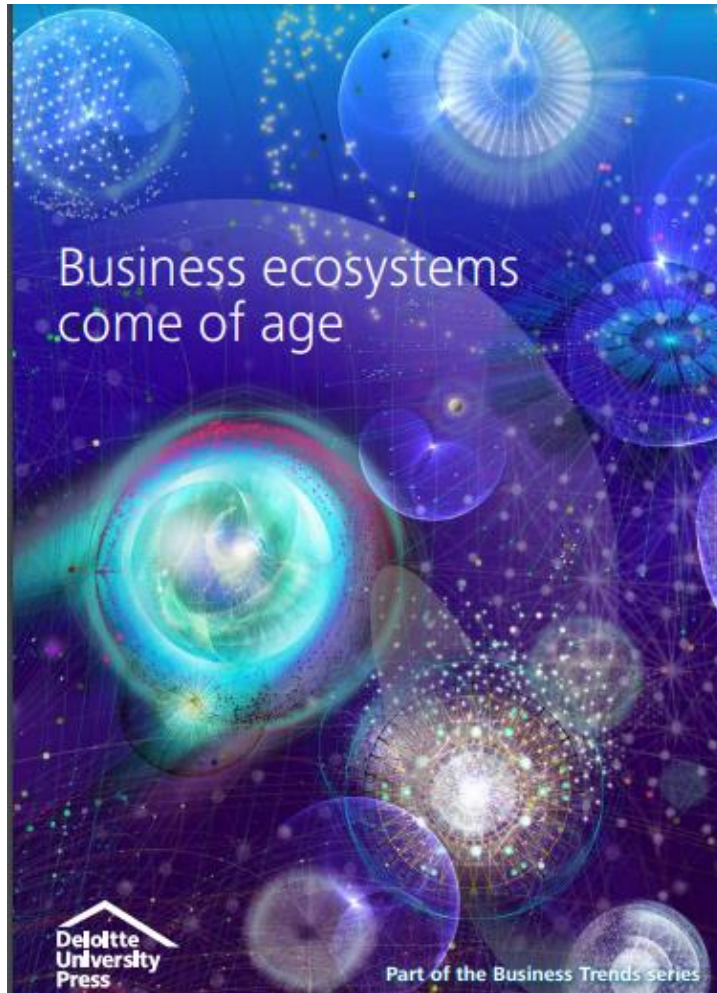
An economy which is restoration and regenerative by design and which aims to keep assets components and materials at their highest utility and value at all times.

Sweating of Assets

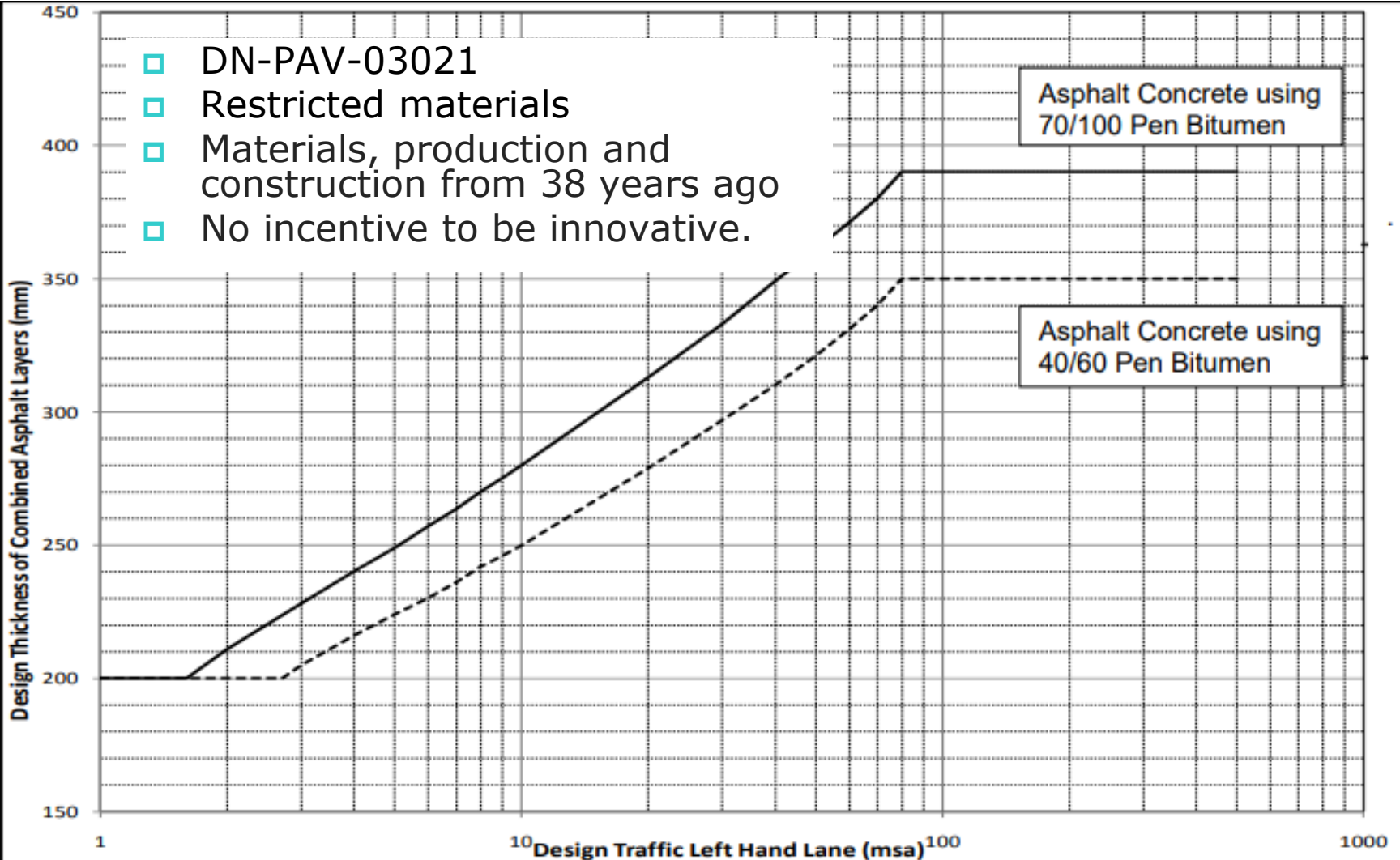
Taking a life cycle approach to all assets







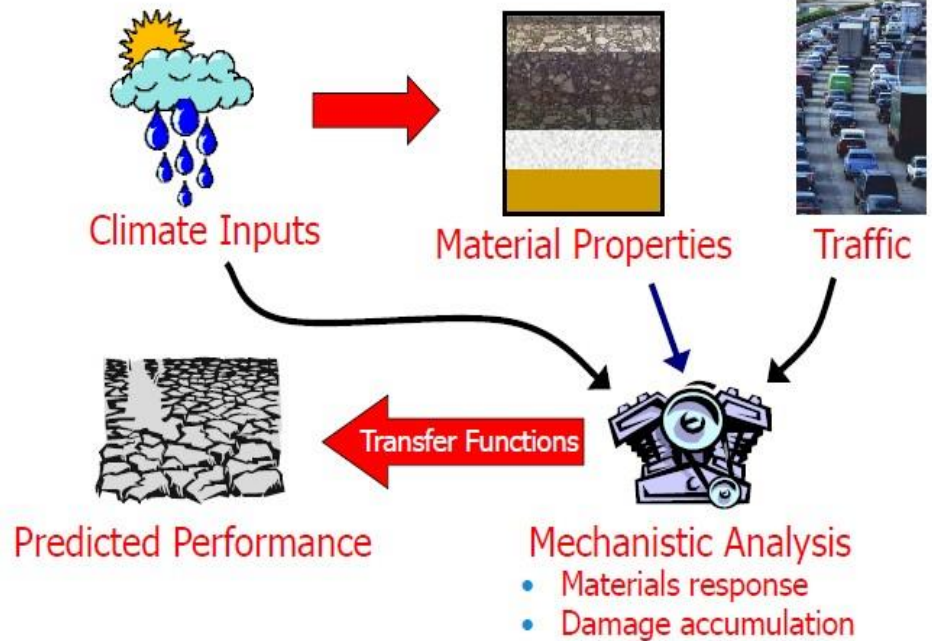
“Used effectively, design and designers truly do have the power to transform nearly everything: concepts, brands, categories, markets, technologies, materials, logistics systems, experiences, industries, even governments”





The IAPDM

- ❑ Mechanistic-Empirical Pavement Design
- ❑ Material performance characteristics
- ❑ Irish environmental and loading conditions
- ❑ Long term performance e.g. cracking, deformation
- ❑ Design models within a web-based user interface



Project Dashboard

- New Project / Design
- Aggregate Register
- Materials Database
- Help
- Feedback

Dashboard & Search

PROJECTS
3

Projects Created by You

DESIGNS
18

Designs Created by You

Your Projects 1 active projects

Projects	Name	Code	Designs	Status	
	N5 Turlough to Westport Road Project	001	2	Active	Edit
	test	01	3	Closed	View
	IAPDM Layer Stiffness Sensitivity Analysis	0001	13	Closed	View



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Model calibration through field and Lab investigations.

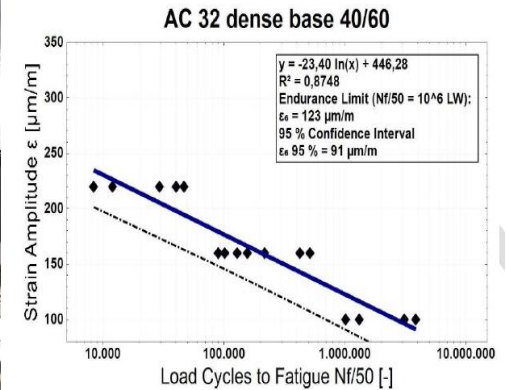
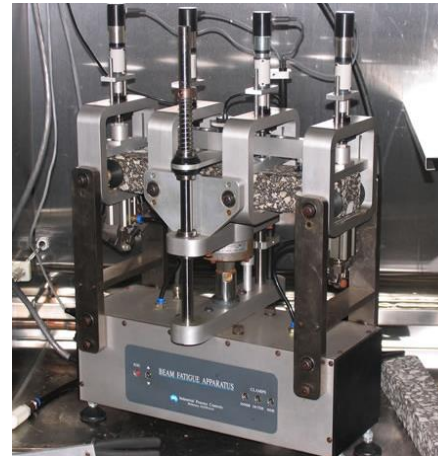
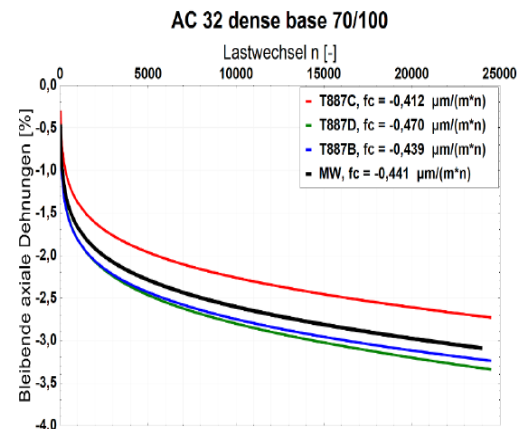


Figure 11: Fatigue results of AC 32 dense base 40/60





- ❑ Consultations to date:
 - Department of Transport,
 - Contractors / Producers,
 - Local Authorities NRDO's,

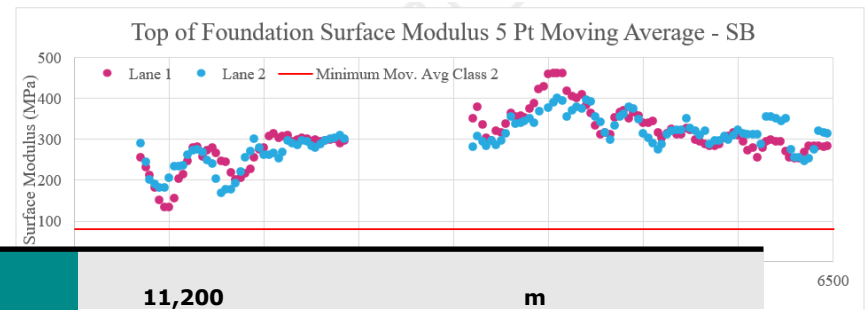
- ❑ Responses:
 - Software easy to use
 - Ability to verify / adjust FWD report recommendations
 - Some concerns with extent re quality control requirements
 - Interested in the ability to consider new materials
 - Already investing in additional laboratory equipment

- ❑ TII / Arup - N5 Westport to Turlough, N4 Colooney to Castlebaldwin



IAPDM Tool Case Study

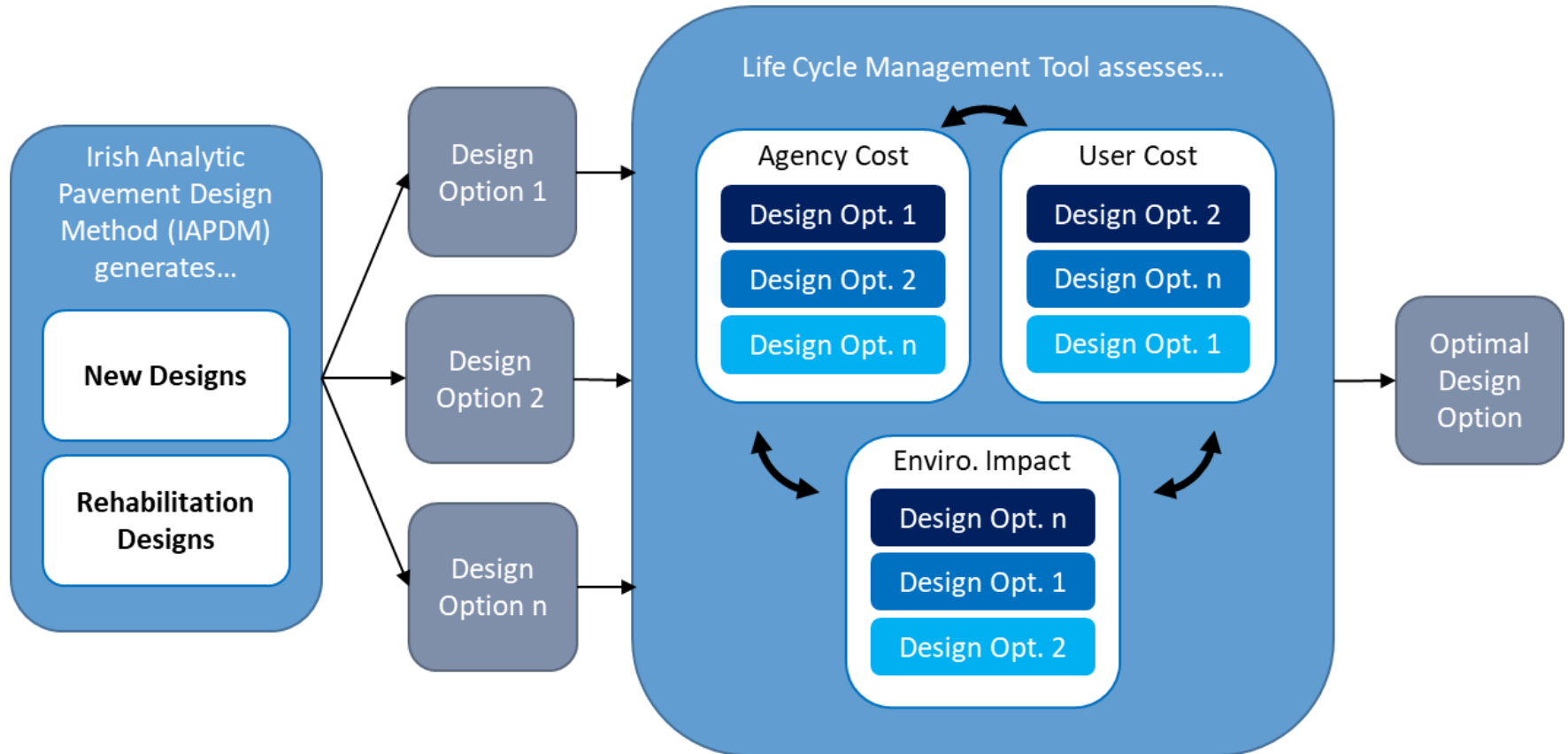
- Ability to reduce material usage



Length	11,200	m
Width	14	m
Area	156,800	m ²
Thickness saved	0.03	m
Volume saved	4,704	m ³
Mass saved	11,290	t
TII Rate AC32 40/60 (2019)	€ 178	per m ³
Value of material saved	€ 834,960	
Embodied Carbon saved	600,607	kgCO ₂



Life Cycle Management





Environmental Product Declaration

Product Level Analysis

Building Assessment Information				Supplementary Information	
A1-A3 Product Stage			A4-A5 Construction Process		
A1	A2	A3	A4 A5		
Raw material supply and production of building products	Transport	Manufacturing	Transport Construction-Process		
B1-B7 Use Stage			C1-C4 End of Life		
B1 B2 B3 B4 B5			C1 C2 C3 C4		
Use	Maintenance	Repair	Replacement	Refurbishment	Benefits and Loads beyond the System Boundary Reuse-Recovery-Recycling-Potential
B6 Operational Energy Use			Deconstruction/Demolition	Transport	
B7 Operational Water Use			Waste Processing	Disposal	

Amount of energy used within the product lifecycle stages

- (1) manufacture
- (2) construct
- (3) Operational
- (4) Decommission
- (5) Reuse at end of life



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TII Circular Economy – Action Plan for Pavements

CORE Characteristics

- ▣ REUSE / REGENERATE / RECYCLE RESOURCES
- ▣ MAXIMISE LIFESPAN
- ▣ MINIMISE WASTE

ENABLING Characteristics

- ▣ RE-ENGINEER PROCESSES –
 - **PAVEMENT STANDARDS AND SPECIFICATIONS, IAPDM, PAVEMENT AND FOUNDATION DESIGN DN-PAV-03021**
- ▣ SUPPLY CHAIN COLLABORATION –
 - **CEN, NSAI, EPA, IGBC, EPD WORKING GROUP, TII TECHNICAL GROUP,**
- ▣ DESIGN FOR LIFECYCLE –
 - **LCM AND EPD'S**
- ▣ DATA SOURCING & MANAGEMENT –
 - **NETWORK WIDE SURVEYS AND ANALYSIS, CEDR. CEN. RESEARCH PROJECTS**
- ▣ INDEPTH & CONTINUAL KNOWLEDGE MANAGEMENT –
 - **DESIGN AND LIFECYCLE OF PAVEMENTS, RESEARCH PROJECTS**



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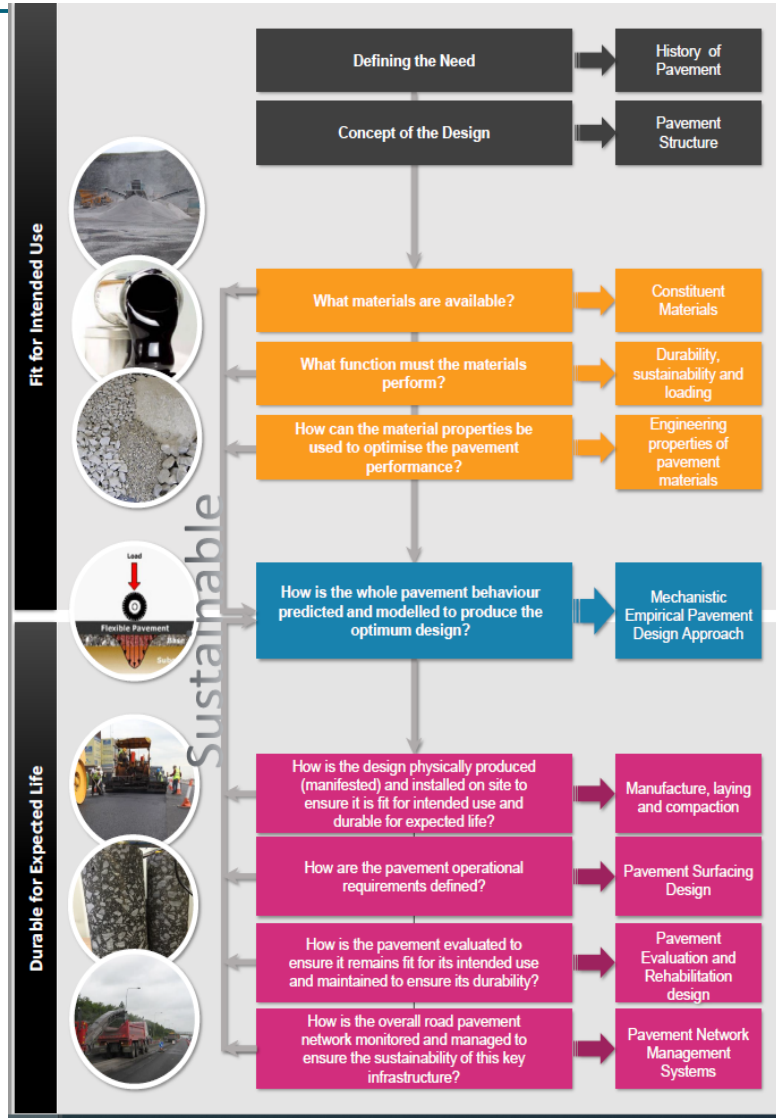


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"Fit for its Intended Use"

"Durable for its Expected Life"



IAPDM



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In Summary

- ❑ TII IAPDM, LCM Tools and Circular Economy Action Plan,
 - Brings pavement design into the 21st Century
 - Unlocks the potential of pavement materials
 - Reduces Carbon
 - Reduces Material Use
 - Increases predictability of life performance
 - Boosts repurposing capability



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edward.winterlich@tii.ie