Transport Infrastructure Ireland Carbon Assessment Tool for Road and Light Rail Projects

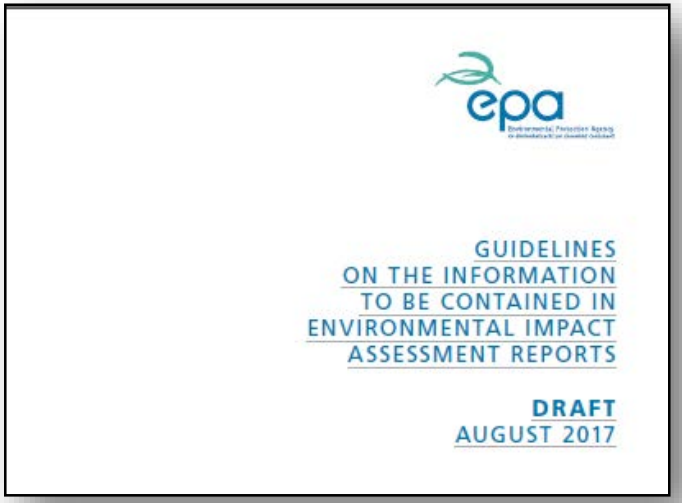
September 2018

The need for a tool

– EPA requires compliance with the EIA Directive for all EIA Reports submitted to the EPA or other consent authorities on or after the 16th May 2017

– No other Ireland Specific Tools available.

– This tool:
  - assesses carbon in infrastructure using Ireland-specific emission factors and data
  - reflects the project planning phases for road and light rail projects in Ireland
  - can be applied consistently across projects
  - *will provide a key part of achieving the wider agenda for Ireland to decarbonise its transport sector by acting as a decision-making tool that drives lower carbon infrastructure*



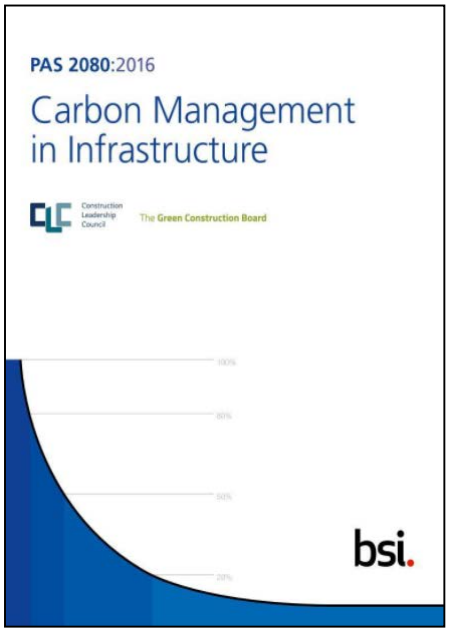
Aligning with best practice

– The method for calculating a carbon footprint is not outlined in the EIA Directive

– The tool adheres to best practice guidelines in relation to carbon footprinting in infrastructure:

– Publically Available Statement (PAS) 2080:

- specifies requirements & guidance for the management of carbon in infrastructure for provision of new infrastructure assets and the refurbishment of existing infrastructure
- provides good practice for lifecycle carbon quantification in infrastructure projects
- breaks down the project lifecycle into three stages:
  - 1) Before use,
  - 2) Use, and
  - 3) End of life.



The Purpose of the Tool

"To calculate the carbon footprint for road and light rail projects in Ireland and facilitate the integration of environmental issues into transport infrastructure planning, construction, and operation."

– It fulfils the following criteria:
  - Calculation of carbon emissions for light rail and road projects
  - Enables carbon data to be presented for the different lifecycle stages, and in alignment with PAS 2080
  - Aligns with TII infrastructure project management phases
  - Models multiple scheme designs and a business as usual baseline
  - Designed so that new emerging carbon emission factors data (from EPDs etc.) can be added
  - Captures carbon mitigation measures

The Purpose of the Tool: When should the tool be used?

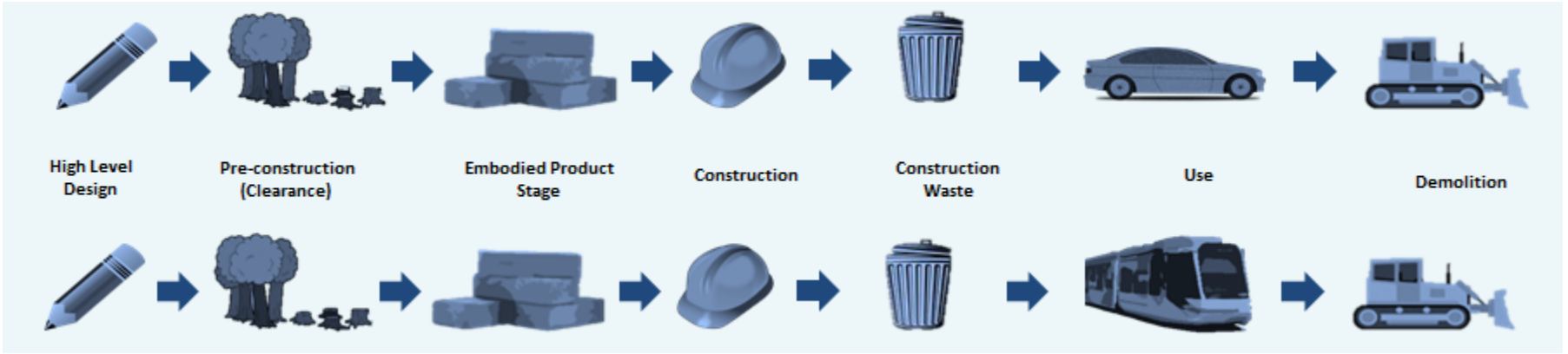
		Level of Completion Required for each Project Phase									
			Phase within the tool								
TII Project Phase – Road Projects	**TII Project Phase – Light Rail Projects**	Project Details	Scoping	Baseline	High Level Design	Before Use - Pre-construction	Before Use - Embodied	Before Use - Construction	Before Use - Waste	Use Stage	End of Life
Phase 0: Programme Overview & Requirement Definition	*Phase 0: Scope & Application*										
Phase 1: Scheme Concept & Feasibility	*Phase 1: Scheme Concept & Option Selection*										
Phase 2: Option Selection											
Phase 3: Design & Environmental Evaluation	*Phase 2: Preliminary Design*										
Phase 4: Statutory Processes	*Phase 3: Statutory Processes*										
Phase 5: Enabling & Procurement	*Phase 4: Detailed Design & Tender Process*										
Phase 6: Construction & Implementation	*Phase 5: Construction & Implementation*										
Phase 7: Closeout & Review	*Phase 6: Closeout & Review*										

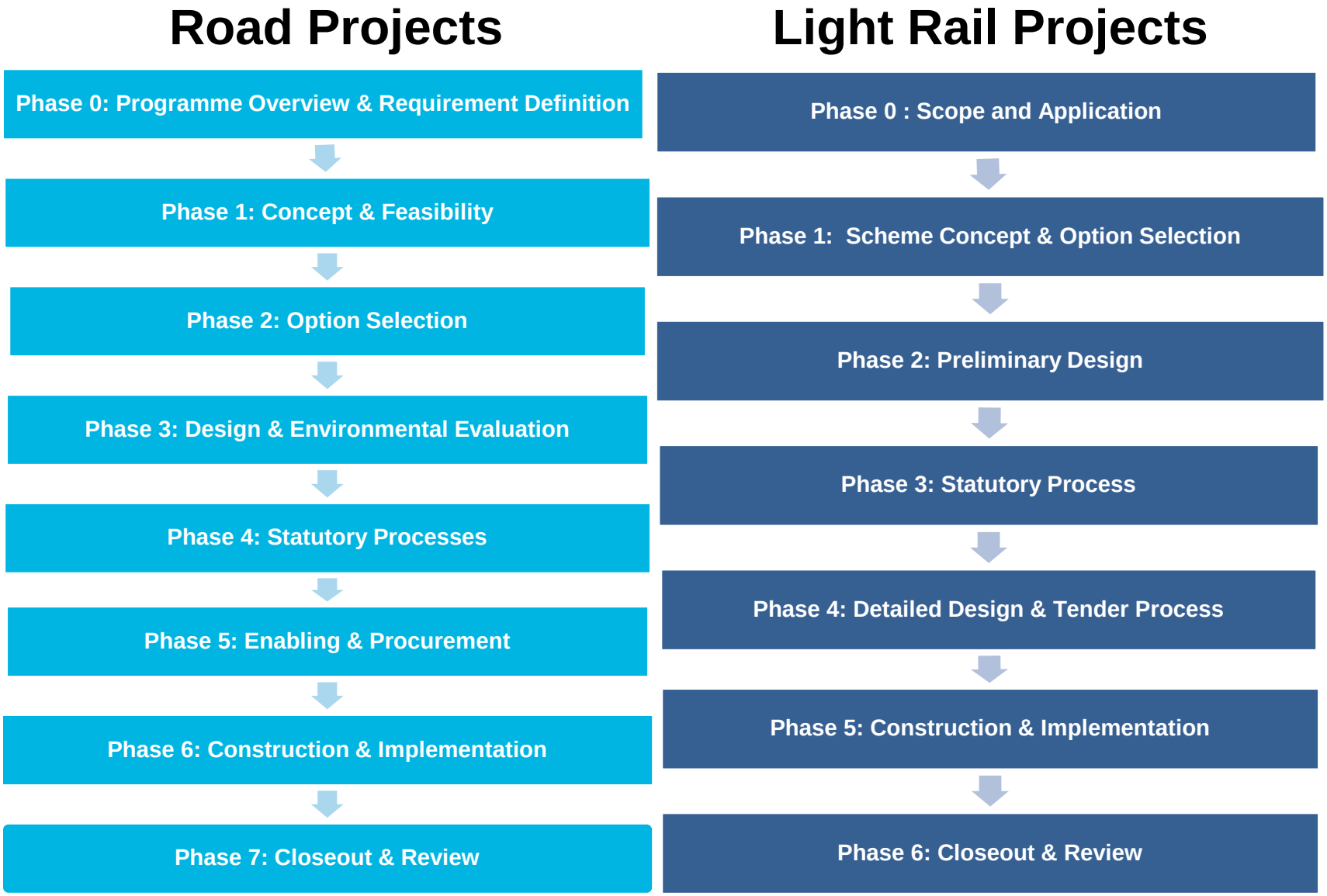
The Purpose of the Tool: Who should use the tool?

- To be completed by personnel involved in design for each project phase, this may be:
  - TII staff members
  - Consultants
  - Designers
  - Other contractors
- A separate version of the tool should be completed at each phase
- Tool undertakes the technical calculations automatically
- A degree of understanding of carbon footprinting processes will be advantageous to evaluate the outputs
- Expert knowledge is not expected as detailed guidance is available

The Tool Layout

- Excel Format
- Guidance & Introductory pages
- Project Detail Entry
- Project Data Entry
- Enter multiple design options for comparison




Road Projects
Phase 0: Programme Overview & Requirement Definition
Phase 1: Concept & Feasibility
Phase 2: Option Selection
Phase 3: Design & Environmental Evaluation
Phase 4: Statutory Processes
Phase 5: Enabling & Procurement
Phase 6: Construction & Implementation
Phase 7: Closeout & Review
Light Rail Projects
Phase 0 : Scope and Application
Phase 1: Scheme Concept & Option Selection
Phase 2: Preliminary Design
Phase 3: Statutory Process
Phase 4: Detailed Design & Tender Process
Phase 5: Construction & Implementation
Phase 6: Closeout & Review

Sample Data Input Pages

Complete the scoping table according to which elements are to be included and excluded in the carbon assessment. Where activities are scoped out, an explanation as to why must be included.

Key
Cells have been colourcoded according to the data entry type:

- Title row
- Select option from a drop down list
- Input a numerical value
- Input text
- Calculation/auto population cell (do not edit)

Lifecycle stage	Activity	Primary emission sources	Scoping outcome (and rationale)
Pre-construction stage	High level information on scheme design	Length of infrastructure, number of bridges, tunnels, interchanges, stations	Must be included
Product stage	Raw material extraction and manufacturing of products required for proposed Scheme	Embodied GHG emissions of materials	
		Material transport	
	Raw material lifetime to inform maintenance cycle	GHG emissions associating with replacing this material during the project lifetime	
Construction process stage	Clearance activities	Emissions from plant use during land clearance	
	Excavation activities	GHG emissions from excavation activities	
	On-site construction activity	GHG emissions from vehicle / plant use during construction	
	On-site water use	GHG emissions from water use on site during construction	
	Waste arising from construction	GHG emissions from waste arising during construction and the transport of waste	

Road Start Page

Return to Homepage

Select Phase

Select which Phase of the road project you are currently working on:

Input or copy data from previously completed versions of the tool for this project here
The data to be used to populate this table should be taken (copied and pasted) from the summary table at the top of the 'Detailed Outputs Page' of the previously populated version of the tool. If this is the first time that the tool is being used for this particular project, this table should be left blank.

	Before Use			Use	Decomissioning	Total (kgCO2e)
	Embodied Carbon	Construction Activitites	Construction Waste	Road Use	End of Life	
Option 1						
Option 2						
Option 3						
Option 4						
Option 5						
Baseline						

START HERE: Baseline Data Entry

Road Projects - Baseline

Baseline

Return to Road Start Page | Previous Page

Guidance Notes

Open Guidance Notes ▼

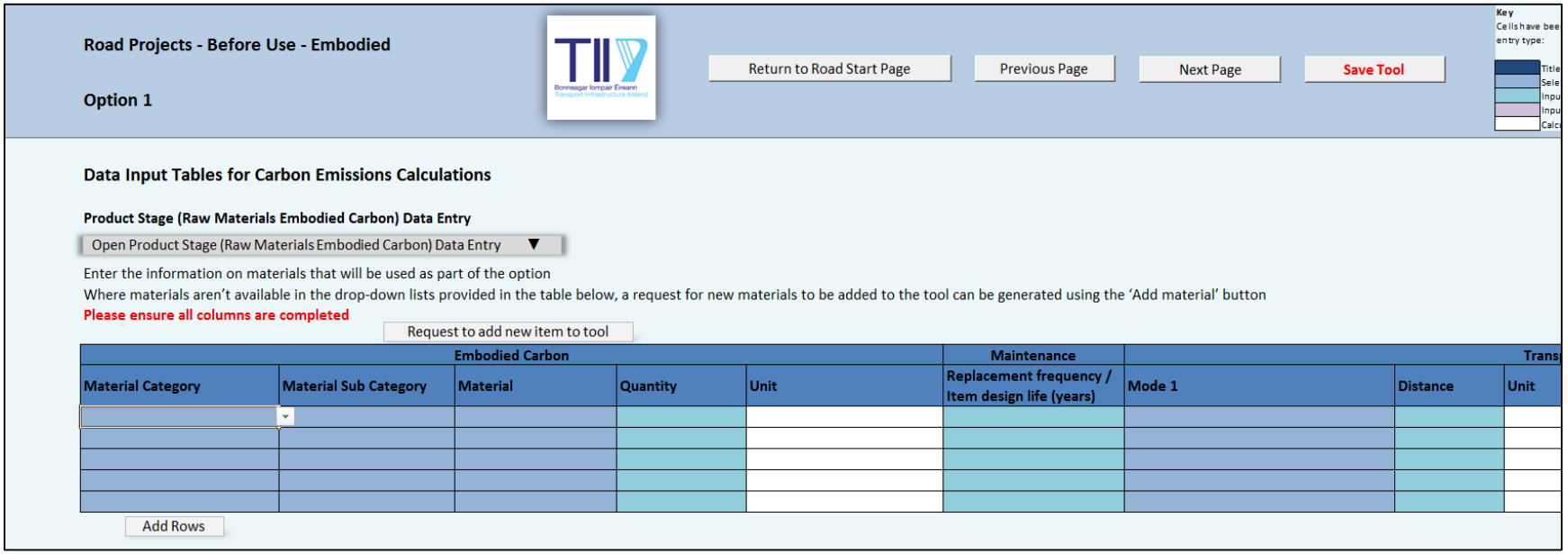
The project baseline represents the existing conditions. This includes existing land use and traffic flow (If applicable), as well as high level details of the proposed scheme.

Baseline

Open Baseline Data Entry ▼

What type of scheme is this?			
If completely new, will the scheme be constructed on untouched land, land used for another purpose, or a combination of both?			
If untouched land, what form of land clearance will be required?			m2
			m2
			m2
			m2
			m2
If it is to be constructed on land currently used for another use, what form of land clearance will be			m2
			m2
			m2

Sample Data Input Pages



Road Projects - Before Use - Embodied

Option 1

Return to Road Start Page | Previous Page | Next Page | Save Tool

Key
Cells have bee
entry type:
Title
Sele
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Data Input Tables for Carbon Emissions Calculations

Product Stage (Raw Materials Embodied Carbon) Data Entry

Open Product Stage (Raw Materials Embodied Carbon) Data Entry ▼

Enter the information on materials that will be used as part of the option

Where materials aren't available in the drop-down lists provided in the table below, a request for new materials to be added to the tool can be generated using the 'Add material' button

Please ensure all columns are completed

Request to add new item to tool

Embodied Carbon					Maintenance			Trans
Material Category	Material Sub Category	Material	Quantity	Unit	Replacement frequency / Item design life (years)	Mode 1	Distance	Unit

Add Rows

Carbon Savings Identified but not Implemented

Enter the options and solutions (and their estimated carbon savings where possible) that were considered but not implemented at this stage, related to clearance and demolition.

Description of options and how they will lead to carbon savings (when compared to more conventially used approaches)	Rationale for why the option has not been taken forward for implementation

Add Rows

Carbon Savings Identified and Implemented

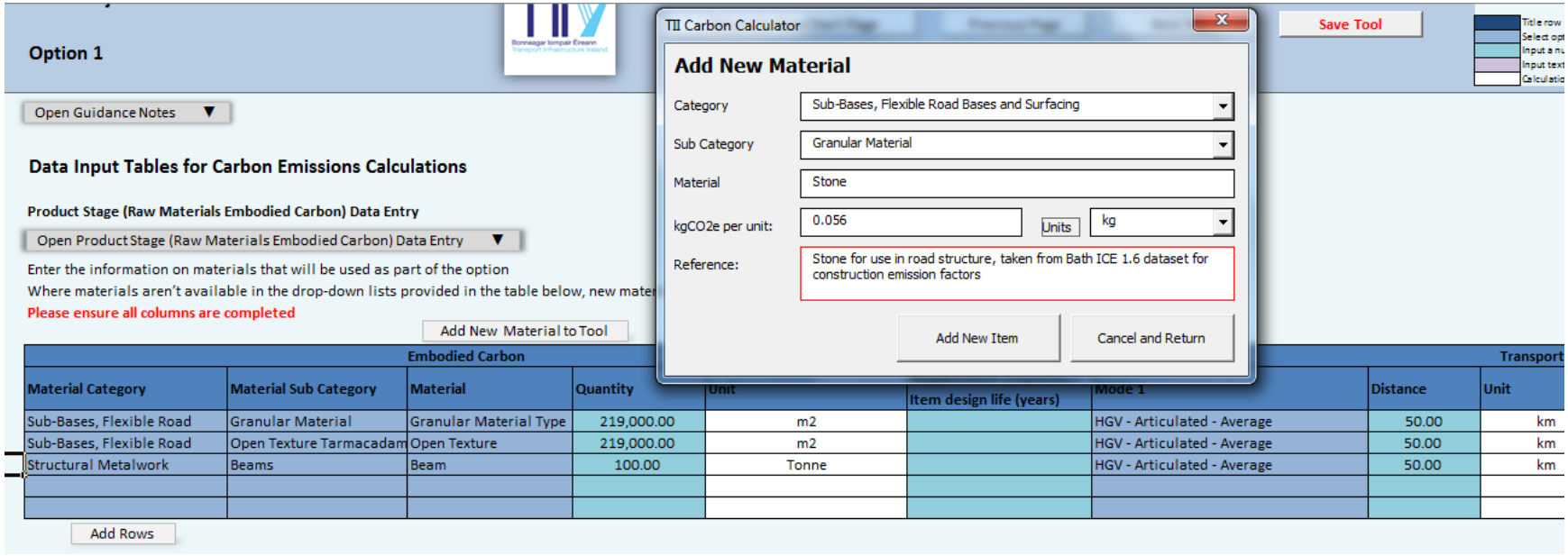
Enter the options and solutions (and their estimated carbon savings where possible) that were implemented at this stage, related to clearance and demolition.

Description of options and how they will lead to carbon savings (when compared to more conventially used approaches)	Rationale for Implementation

Add Rows

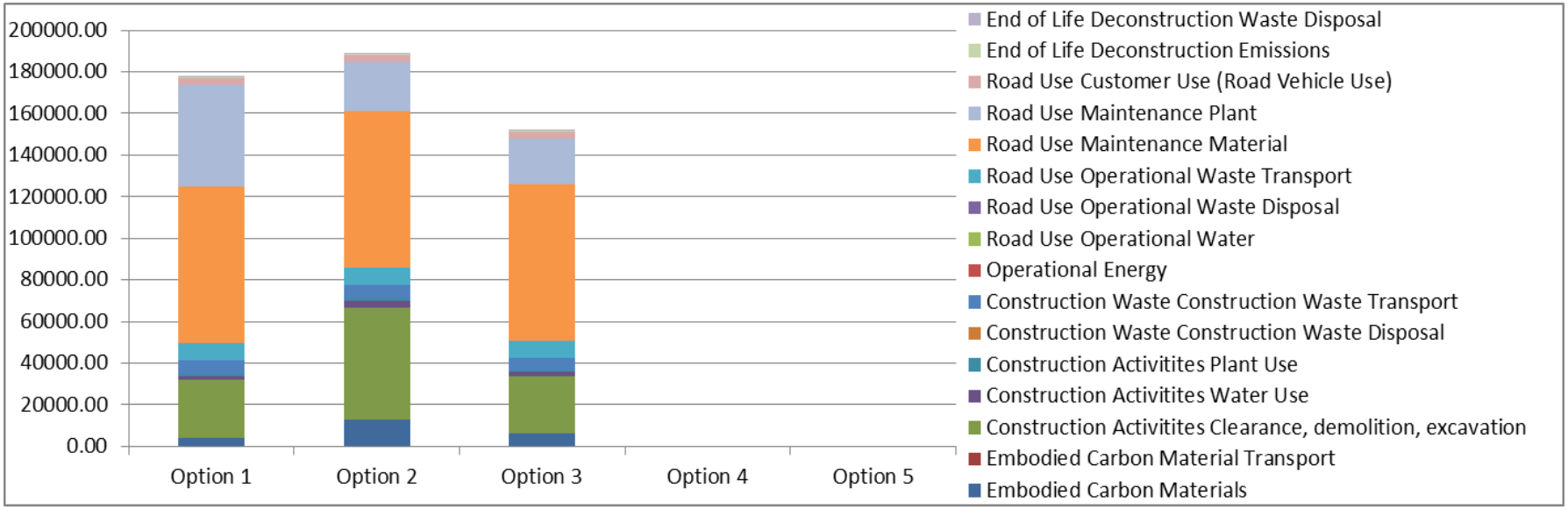
Adding new materials, components and emissions factors

- Materials selected from the drop-down lists
- Emission factors applied from embedded emission factors database
- Bespoke factors (e.g. carbon data from an EPD) can be added to the tool, through the ‘Add New Material’ button, which generates an email request to TII to add the material and emission factor
- Users must take care to ensure the information is clearly source referenced



Sample Outputs

	Before Use			Use	Decomissioning	Total Difference
	Embodied Carbon	Construction Activitites	Construction Waste	Road Use	End of Life	
Option 1	42236.00	122444.00	9000.00	115137.55	8000.00	296817.55
Option 2	52236.00	127444.00	4000.00	125137.55	10000.00	318817.55
Option 3	20000.00	111114.00	7000.00	115137.55	5000.00	258251.55
Option 4	0.00	0.00	0.00	0.00	0.00	0.00
Option 5	0.00	0.00	0.00	0.00	0.00	0.00



Future

- Periodic reviews to incorporate updates to emission factors.
- Outputs collated to develop benchmarks for different schemes.
- Carbon-saving options built into the tool.
- Outputs used to help set carbon emission targets for different project types and for different project phases.
- Structure adapted and used to develop tools for other types of infrastructure and non-infrastructure projects.
- Use of the tool could become a contractual requirement for TII's contractors.
- Embedment of the tool's use in all design activities for road and light rail projects, and use the tool's outputs in formal design option appraisal processes.
- Link with other TII tools and systems.

Thank You

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