Department for Transport

ADEPT LIVELABS2 Decarbonising Local Roads

A382

Plenary – Carbon Assessments

MILESTONE INFRASTRUCTURE
A part of MGroup Services

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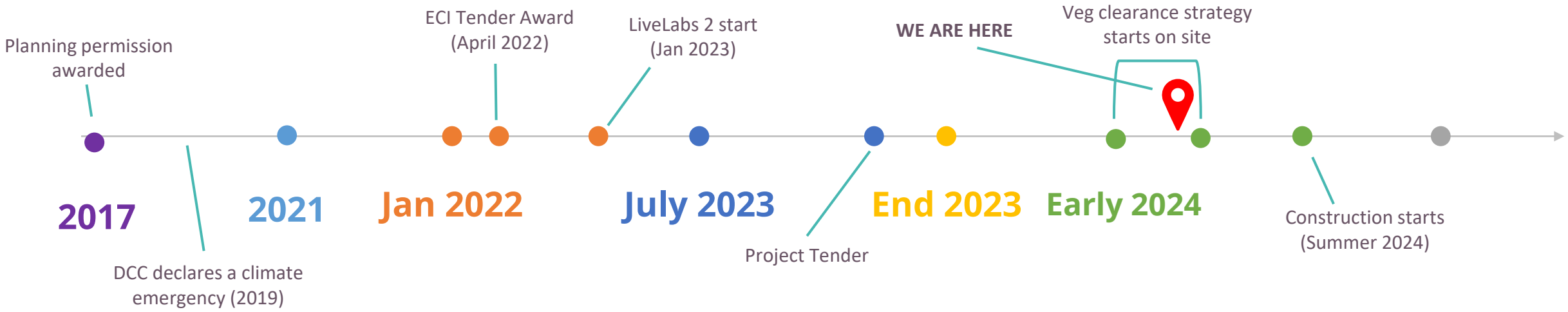
Project and Carbon Timeline



Initial Project Baseline	Tender	Pre-ECI	Detailed Design	Hybrid Carbon Tool	Devon Capture Tool
Planning stage Devon carbon tool **7776.98 tCO2e**	ECI Tender Milestone carbon assessment (in-house tool) using GA from planning **9280 tCO2e**	Milestone tool carbon assessment **10279 tCO2e**	Incorporating ECI changes	Incorporating scenarios for optioneering and innovations	Ongoing throughout construction

ECI = early contractor involvement

Carbon Lifecycle Modules & Scopes

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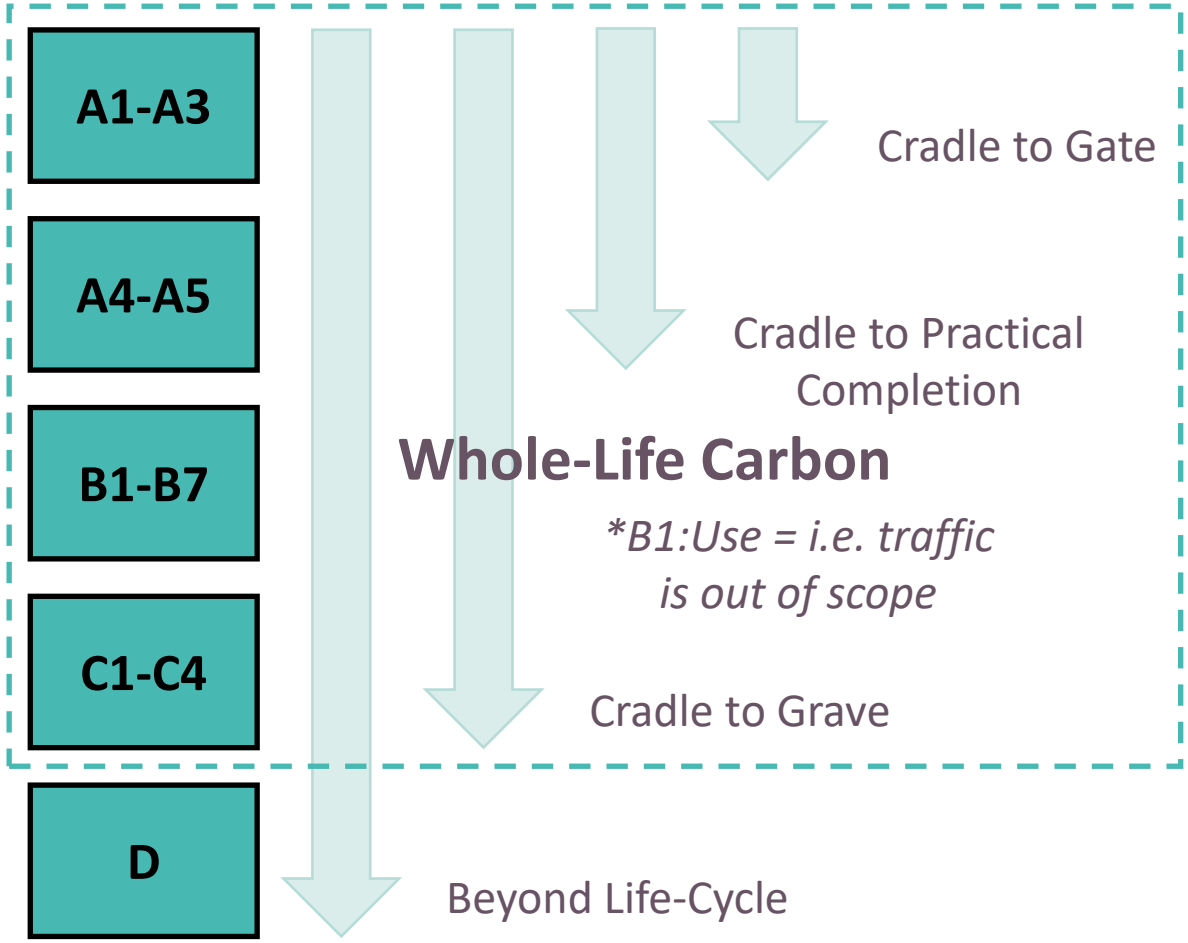
Scope 1 — Direct emissions from owned or controlled sources

Scope 2 — Indirect emissions from the generation of purchased electricity, fuels etc.

Our focus is NOT on ‘Scopes’

Scope 3 — All other indirect emissions that occur up and down the value chain



MILESTONE INFRASTRUCTURE

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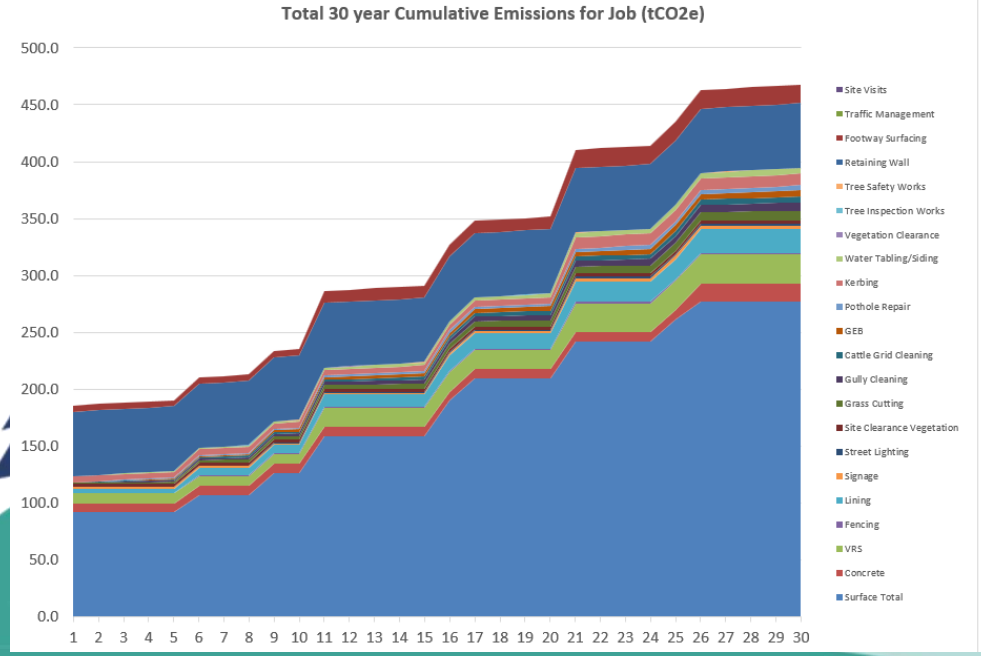
Devon Tools: Prior Work

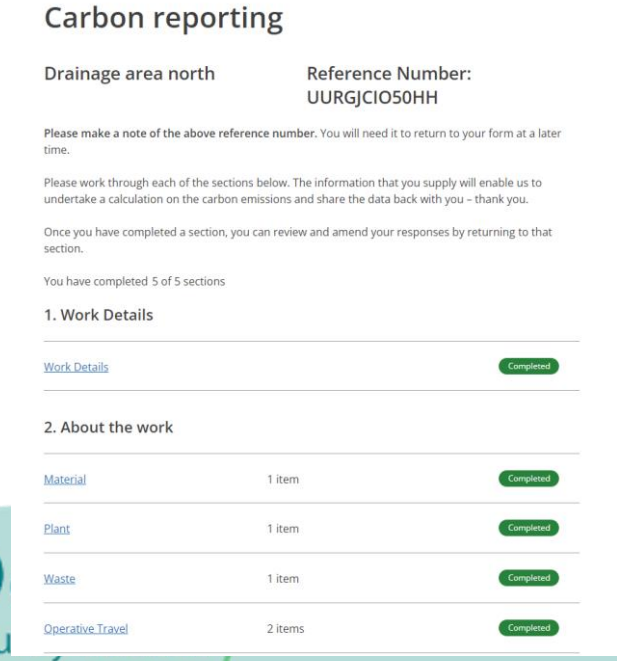
Designer Tool

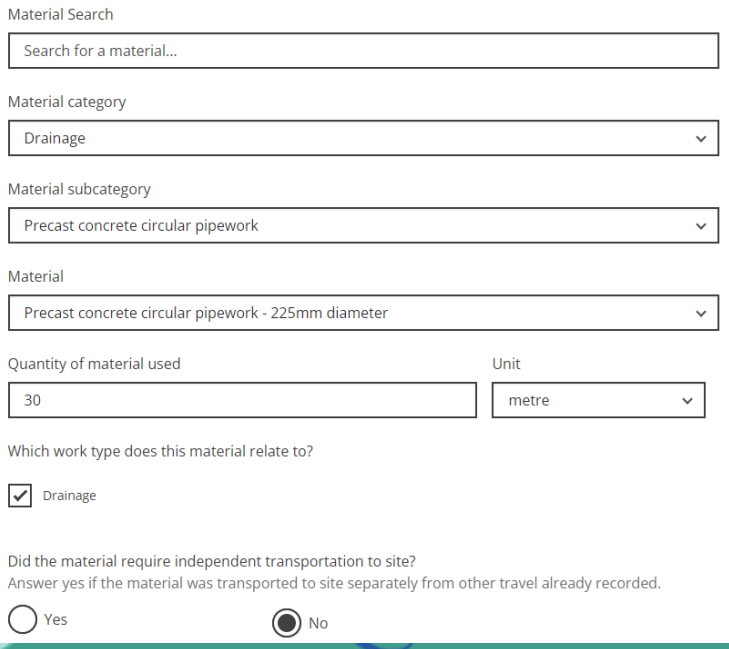
- Simple decision-making assessment tool,
- Focusses on standard repeated maintenance activities i.e. **‘activity based’** (FHRG CCAS), example jobs which can be multiplied and scaled up
- Includes lifecycle emissions based on expected lifespan and cyclical maintenance
- Scope and coverage: Materials, Plant, People, Waste (both process and transport)

Site Capture Tool

- Evolved from Designer Tool into a standalone Capture Tool
- Used to verify emissions from actual job
- Web entry into SQL database with embedded algorithms to establish emissions ‘live’
- Scope and coverage same as designer tool
- Aspiration to feedback into of the Designer Tool
- Plan to use to verify emissions from the project







Milestone Tool: C-Est

- Carbon Estimation tool for Design and ECI (Early Contractor Involvement)
- Designed for capital projects i.e. **‘inventory based’** (FHRG CCAS)
- Spreadsheet based (same format as BoQ, evolved from costing model) – used alongside estimating software
- Incorporates resources from ‘Candy’ estimating software (usually used for pricing) to form a ‘library’ or ‘shopping list’ of carbon emitting materials / activities which are needed for the BoQ items / outputs
- Breakdowns by bill category (see right) and detailed items
- Scope and Coverage:
  - People
  - Equipment and fuel
  - Materials
  - Subcontracting (same as above)

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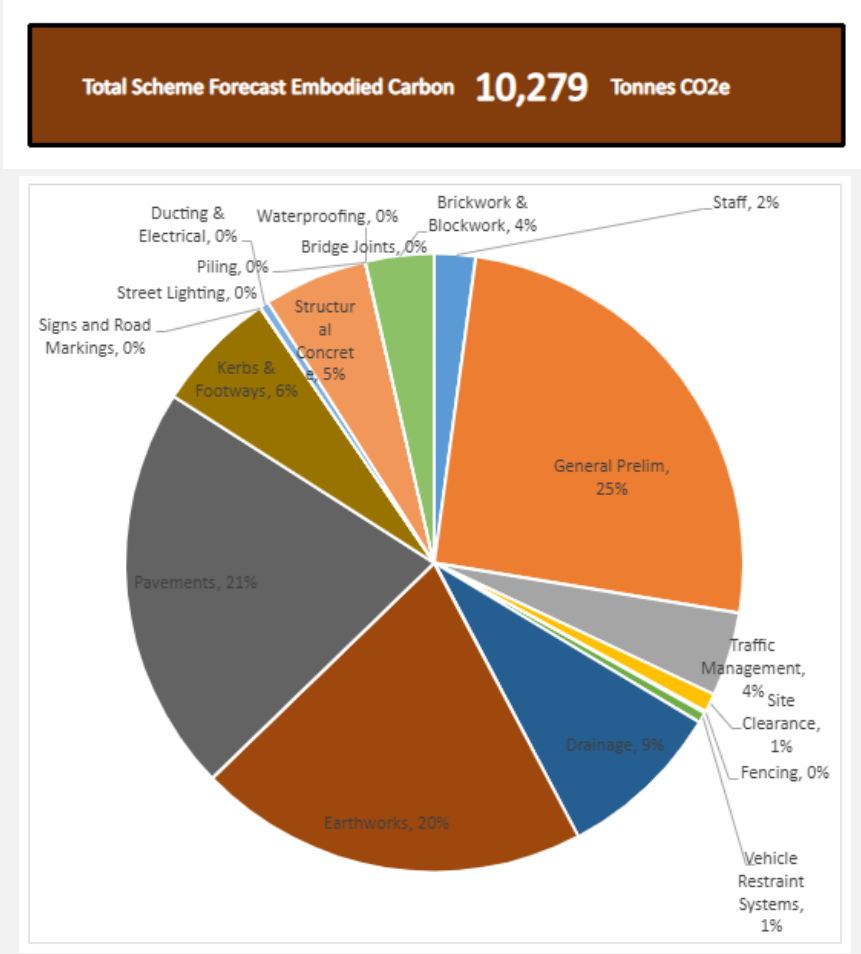

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C-Est Carbon Tool Principles

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‘Build Ups’ tab (BoQ items / outputs)

‘Resource’ tab (Materials, Plant, Labour etc from ‘Candy’)

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Resource Sheet

- Based on specific BoQ resources from Candy
- Currently approx. 400 quantified (normalized) items
- Carbon broken down into Production (upstream material, plant use etc.) and Transport/haulage
- Reference sources generic e.g. Gov GHG factors, ICE etc.
- HOWEVER…
  - Becoming apparent when looking at detail not everything is currently included
  - Emission factors and costs need revising
  - Needs to be able to handle scenarios
  - Needs to expand to Modules B to D

Level	Type	Resource Code	Description	Unit	£ Base Rate	Carbon kg/unit Not Live	Total Resource Carbon		Updated By	Last Update	Calculated Carbon kg/un²	Production	Travel / Haulage to Site	Notes & Comments	Haulage Comments	Unit Mass kg/main unit
1		0	MATERIALS				0							Heading Only		
2		00	GENERAL MATERIALS				0							Heading Only		
3		00A	Aggregates and Fills				0							Heading Only		
4		00A1	Concrete Aggregates				0							Heading Only		
	M	00A100	Limestone Dust	T	16.75	11.581	3,692		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
4		00A2	Drainage Aggregates				0							Heading Only		
	M	00A210	Pipe bedding 10mm Cl 503.3 (i)	T	17.95	11.581	95,101		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A213	Pipe bedding 20mm Cl 503.3 (i)	T	18.5	11.581	17,233		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A220	Sand Bedding : Cl 503.3 (ii)	T	18.5	11.581	214		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A251	Type B Filter Media Cl 505	T	17.95	11.581	0		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A260	Imported Drain Backfill	T	12	11.581	0		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A280	Filter Media NFD Type 8 1/20 Gc80-20	T	20	11.581	0		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
4		00A3	Sub Bases				0							Heading Only		
	M	00A310	Type 1 Sub base Cl.803	T	21	11.581	579,000		JH	15/04/21	11.581	4.380	7.201	~~ICE V3: Aggregate > General UK mixture~~ JH - changed to virgin land won as crushed rock	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
4		00A4	Highways Spec Fill (Series 600)				0							Heading Only		
5		00A41	Type 1 - General Granular Fill				0							Heading Only		
	M	00A410	1A : Well Graded Granular	T	17.95	11.581	16,714		JH	15/04/21	11.581	4.380	7.201	~~ICE V3: Aggregate > General UK mixture~~ JH - changed to virgin land won as lower carbon and normally of crushed rock origin	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
5		00A45	Type 5 - Topsoil Fill				0							Heading Only		
	M	00A451	5B : Imported Topsoil	T	19	28.320	66,610		JH	15/04/21	28.320	24.000	4.320	HE Imported Soils - Topsoil	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
5		00A46	Type 6 - Selected Granular Fill				0							Heading Only		
	M	00A465	6F1 : Fine Graded Capping Material	T	17.5	10.416	0		JH	15/04/21	10.416	6.095	4.320	ICE V3: Aggregate > recycled imported resources, no heat treatment	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
	M	00A466	6F2 : Coarse Graded Capping Material	T	9.75	10.416	0		JH	15/04/21	10.416	6.095	4.320	ICE V3: Aggregate > recycled imported resources, no heat treatment	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
	M	00A467	6F3 :	T	15	67.643	0		JH	15/04/21	67.643	63.323	4.320	ICE V3: Aggregate > Aggregates and sand, from secondary resources, bulk, loose	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
	M	00A468	6F4 : (Fine Grading)	T	16	10.416	136,874		JH	15/04/21	10.416	6.095	4.320	ICE V3: Aggregate > recycled imported resources, no heat treatment	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
	M	00A469	6F5 : (Coarse Grading)	T	16	10.416	128,897		JH	15/04/21	10.416	6.095	4.320	ICE V3: Aggregate > recycled imported resources, no heat treatment	Assume 20t delivery, travelling 30miles (60m trip) at 10mpg	
	M	00A470	6G : Gabion Stone	T	45	11.581	58,280		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A477	6N : Fill to Structures Granular - Well	T	17.9	11.581	0		JH	15/04/21	11.581	4.380	7.201	ICE V3: Aggregate > Virgin mixture of land won resources	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
4		00A5	Sand				0							Heading Only		
	M	00A510	Building sand - bulk	T	17.5	11.585	4,785		JH	15/04/21	11.585	4.384	7.201	ICE V3: Aggregate > Virgin mixture of land won and marine	Assume 20t delivery, travelling 50miles (100m trip) at 10mpg	
	M	00A521	Grout (kiln dried) sand - 25kg bag	no	2.5	2.975	0		JH	15/04/21	2.975	2.975		ICE V3: Aggregate > Virgin mixture of land won and marine		

Build Ups Sheet

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- Each bill item can comprise multiple rows corresponding to resources within that bill item
- Currently baseline model 726 bill items and ~15,000 rows that *could* be used
- Baseline model uses 84 bill items
- Enables a LOT of granularity regarding bill item, resource, specific detail etc.
- BUT makes it hard to manage when looking at options and scenarios

Each item comprises multiple bill items, that each have a QUANTITY and associated cost and carbon value

Rows can be scoped in or out of a scenario

Item	Bill description	Unit	Bill Quantity	Resource Type	Bill Element	Resource Code	Resource Production	Resource Net use / Unit	Resource Description	Resource Cost Per Unit	Resource Carbon Per Unit	Resource Unit	Cost Per Unit Use	Carbon Per Unit Usage	Cost Rate	Cost Value	Item no	Cost Resource Total Use	Carbon Resource Total Use	Carbon Rate kg/unit	Carbon Total kg	Included Scenario 02	Included Scenario 12	Included Scenario 27	Included Scenario 82	Included Scenario 47	Included Scenario 57	Included Scenario 62	Included Scenario 72
				Subcontract - Other	Pavements	S9999	0.952m3/N/U	1.05	Not Used	£0.00	0.00	N/U	0	0			0700/004	£ -	0.00											
																	0700/004													
0700/005	Cement bound granular mixture A sub-base in carriageway, hardshoulder and hardstrip 50m3 to 150m3	m3		Labour	Pavements	LA0120	6.522m3/hr	0.153	AGENCY Groundworker Operative	£23.44	0.77	hr	3.586	0.117	£ 92.88	£ -	0700/005	£ -	0.00	195.49	-									
				Labour	Pavements	LA0130	6.522m3/hr	0.153	AGENCY Groundworker Ganger	£25.20	0.77	hr	3.856	0.117			0700/005	£ -	0.00											
				Equipment & Fuel	Pavements	O01C1	6.522m3/hr	0.153	OP Tracked Excavator 12t/0.40m3 NO FUEL	£33.75	0.00	hr	5.164	0			0700/005	£ -	0.00											
				Equipment & Fuel	Pavements	P0030L	0.542m3/ltr	1.846	Gas Oil (litre)	£0.60	3.39	ltr	1.108	6.258			0700/005	£ -	0.00											
				Equipment & Fuel	Pavements	P06230	293m3/wk	0.003	4.2t Tandem Roller BW135AD-5 NO FUEL	£137.40	0.00	wk	0.412	0			0700/005	£ -	0.00											
				Materials	Pavements	00C410	0.952m3/m3	1.05	CBGM A Cement Bound Granular Material	£75.00	180.00	m3	78.75	189.001			0700/005	£ -	0.00											
				Subcontract - Other	Pavements	S9999	0.952m3/N/U	1.05	Not Used	£0.00	0.00	N/U	0	0			0700/005	£ -	0.00											
																	0700/005													
0700/006	Cement bound granular mixture A sub-base in carriageway, hardshoulder and hardstrip exceeding 150m3	m3		Labour	Pavements	LA0120	7.826m3/hr	0.128	AGENCY Groundworker Operative	£23.44	0.77	hr	3	0.098	£ 90.56	£ -	0700/006	£ -	0.00	196.04	-									
				Labour	Pavements	LA0130	7.826m3/hr	0.128	AGENCY Groundworker Ganger	£25.20	0.77	hr	3.226	0.098			0700/006	£ -	0.00											
				Equipment & Fuel	Pavements	O01C4	7.826m3/hr	0.128	OP Tracked Excavator 20t/1.2m3 NO FUEL	£30.94	0.00	hr	3.96	0			0700/006	£ -	0.00											
				Equipment & Fuel	Pavements	P0030L	0.496m3/ltr	2.018	Gas Oil (litre)	£0.60	3.39	ltr	1.211	6.842			0700/006	£ -	0.00											
				Equipment & Fuel	Pavements	P06240	352m3/wk	0.003	6.9t Tandem Roller BW141AD-5 NO FUEL	£137.40	0.00	wk	0.412	0			0700/006	£ -	0.00											
				Materials	Pavements	00C410	0.952m3/m3	1.05	CBGM A Cement Bound Granular Material	£75.00	180.00	m3	78.75	189.001			0700/006	£ -	0.00											
				Subcontract - Other	Pavements	S9999	0.952m3/N/U	1.05	Not Used	£0.00	0.00	N/U	0	0			0700/006	£ -	0.00											
																	0700/006													
	Base (Road Base)																0700/006													
																	0700/006													
0700/007	AC32 Dense Base Des 40/60 - Machine Lay	m3	8522.2	Subcontract - Surfacing	Pavements	S07010.M001	0.420	2.380	AC32 Dense Base 40/60 cl 929	£55.00	39.81	T	130.9	94.748	£ 164.89	£ 1,405,225.56	0700/007	£ 1,115,556	807461.41	105.4	898,496	Yes	Yes	Yes	Yes	Yes			Yes
				Subcontract - Surfacing	Pavements	S07010.P002	126.050	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	33.994	10.684			0700/007	£ 289,704	91051.18			Yes	Yes	Yes	Yes	Yes			Yes
0700/007a	AC32 Dense Base Des 40/60 - Machine Lay	m3	7556.3791	Subcontract - Surfacing	Pavements	S07010.M001	0.420	2.380	AC32 Dense Base 40/60 cl 929	£55.00	39.81	T	130.9	94.748	£ 164.89	£ 1,245,971.35	0700/007a	£ 989,130	715951.80	105.4	796,669						Yes		
				Subcontract - Surfacing	Pavements	S07010.P002	126.050	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	33.994	10.684			0700/007a	£ 256,872	80732.35									Yes		
0700/007b	AC32 Dense Base Des 40/60 - Machine Lay	m3	6391.65	Subcontract - Surfacing	Pavements	S07010.M001	0.420	2.380	AC32 Dense Base 40/60 cl 929	£55.00	39.81	T	130.9	94.748	£ 164.89	£ 1,053,919.17	0700/007b	£ 836,667	605596.05	105.4	673,872							Yes	
				Subcontract - Surfacing	Pavements	S07010.P002	126.050	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	33.994	10.684			0700/007b	£ 217,278	68288.39										Yes	
0700/007c	AC32 Dense Base Des 40/60 - Machine Lay	m3	2130.55	Subcontract - Surfacing	Pavements	S07010.M001a	0.420	2.380	GI Pave	£57.75	35.83	T	137.445	85.273	£ 171.44	£ 365,261.49	0700/007c	£ 292,833	181678.39	96.0	204,448							Yes	
				Subcontract - Surfacing	Pavements	S07010.P002	126.050	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	33.994	10.684			0700/007c	£ 72,426	22762.80										Yes	
0700/008	AC32 Dense Base Des 40/60 - Hand Lay	m3		Subcontract - Surfacing	Pavements	S07010.M001	0.420	2.380	AC32 Dense Base 40/60 cl 929	£55.00	39.81	T	130.9	94.748	£ 193.89	£ -	0700/008	£ -	0.00	120.55	-									
				Subcontract - Surfacing	Pavements	S07010.P001	31.513	0.03	Hand Lay Gang	£1,985.00	812.98	Shift	62.991	25.799			0700/008	£ -	0.00											
																	0700/008													
	Binder Course																0700/008													
																	0700/008													
0700/009	AC20 Dense Binder Des 40/60 - Machine Lay	m3	2886.57	Subcontract - Surfacing	Pavements	S07010.M101	0.420	2.380	AC20 Dense Binder 40/60 cl 929	£57.00	40.82	T	135.66	97.152	£ 183.67	£ 530,176.31	0700/009	£ 391,592	280436.05	112.2	323,758	Yes	Yes	Yes	Yes	Yes			Yes
				Subcontract - Surfacing	Pavements	S07010.P002	90.000	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	47.611	14.963			0700/009	£ 137,432	43191.75			Yes	Yes	Yes	Yes	Yes			Yes
				Subcontract - Surfacing	Pavements	S07010.M981	1.000	1	Bond Coat	£0.40	0.04	m2	0.4	0.044			0700/009	£ 1,155	127.01			Yes	Yes	Yes	Yes	Yes			Yes
0700/009a	AC20 Dense Binder Des 40/60 - Machine Lay	m3	2559.435	Subcontract - Surfacing	Pavements	S07010.M101	0.420	2.380	AC20 Dense Binder 40/60 cl 929	£57.00	40.82	T	135.66	97.152	£ 183.67	£ 470,091.43	0700/009a	£ 347,213	248654.23	112.2	287,066						Yes		
				Subcontract - Surfacing	Pavements	S07010.P002	90.000	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	47.611	14.963			0700/009a	£ 121,857	38296.83									Yes		
				Subcontract - Surfacing	Pavements	S07010.M981	1.000	1	Bond Coat	£0.40	0.04	m2	0.4	0.044			0700/009a	£ 1,024	112.62									Yes		
0700/009b		m3	2164.9275	Subcontract - Surfacing	Pavements	S07010.M101	0.420	2.380	AC20 Dense Binder 40/60 cl 929	£57.00	40.82	T	135.66	97.152	£ 183.67	£ 397,632.25	0700/009b	£ 293,694	210527.04	112.16	242,818.27							Yes	
				Subcontract - Surfacing	Pavements	S07010.P002	90.000	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	47.611	14.963			0700/009b	£ 103,074	32393.81										Yes	
				Subcontract - Surfacing	Pavements	S07010.M981	1.000	1	Bond Coat	£0.40	0.04	m2	0.4	0.044			0700/009b	£ 866	95.26										Yes	
0700/009c		m3	721.6425	Subcontract - Surfacing	Pavements	S07010.M101a	0.420	2.380	GI Pave	£59.85	36.74	T	142.443	87.436	£ 190.45	£ 137,436.81	0700/009c	£ 102,793	63097.53	102.44	73,925.06							Yes	
				Subcontract - Surfacing	Pavements	S07010.P002	90.000	0.01	Machine Lay Base / Binder	£4,285.00	1346.71	Shift	47.611	14.963			0700/009c	£ 34,358	10797.94										Yes	

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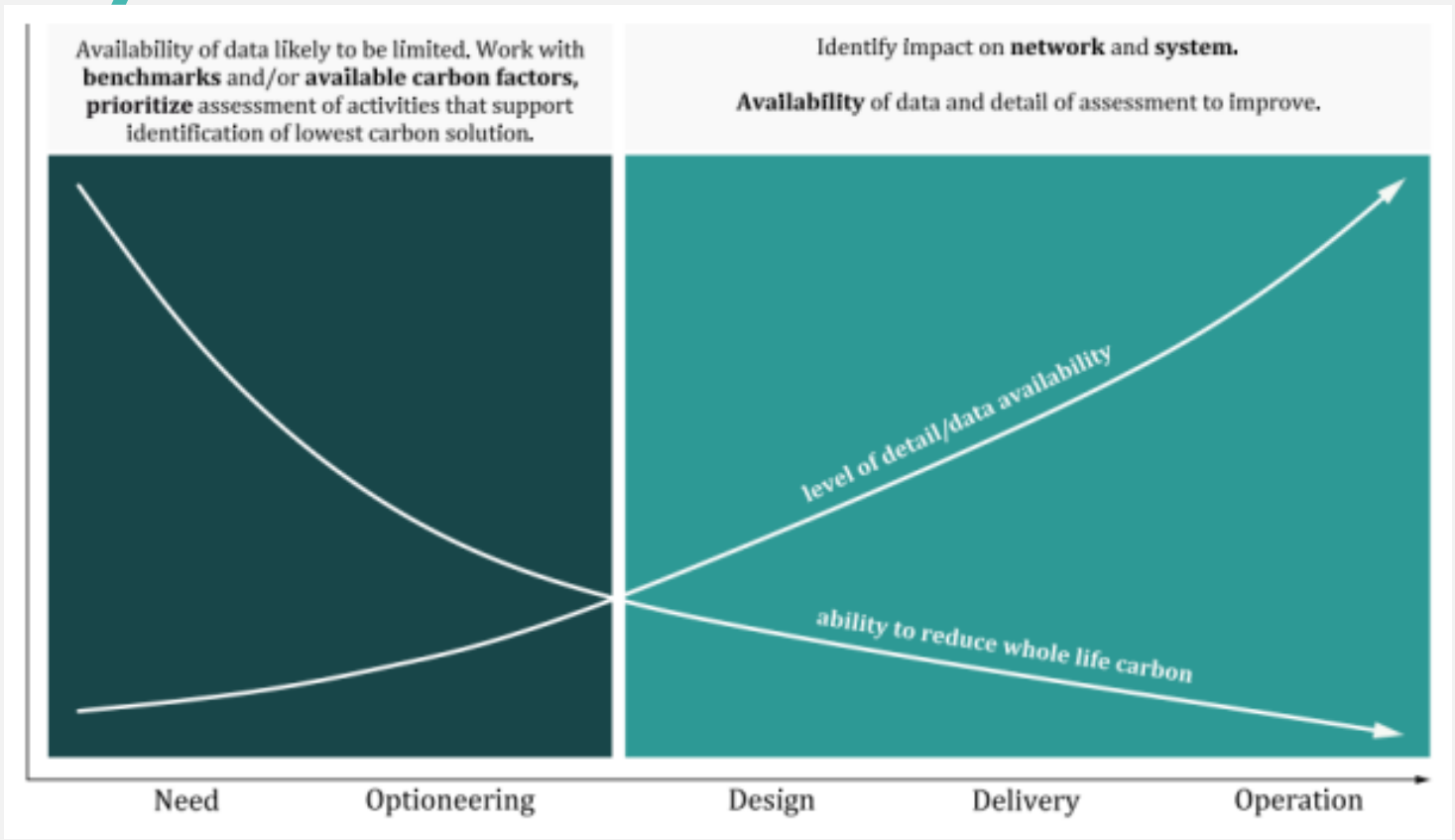
Hot Spots & Identifying Measures

Each column is the output of a scenario…

Row Labels	Sum of tCO2e Scenario 0	Sum of tCO2e Scenario 5	Sum of tCO2e Scenario 6	Sum of tCO2e Scenario 7
Staff	**216**	**216**	**216**	**216**
Labour	**216**	**216**	**216**	**216**
Construction Staff Person Days	205	205	205	205
Demobilisation Staff Person Days	4	4	4	4
Mobilisation Staff Person Days	7	7	7	7
General Prelim	**2560**	**2560**	**2560**	**671**
Equipment & Fuel	**2498**	**2498**	**2498**	**609**
Additional Fuel Allowance for non listed plant & equipment (Gas Oil)	229	229	229	21
Demobilisation	6	6	6	4
Hilux	116	116	116	116
Mobilisation and Set Up	6	6	6	3
Road Sweeper, incl driver and waste provision (Diesel)	143	143	143	143
Small Van	72	72	72	72
Telehandler, excl driver	86	86	86	8
Tower Lights(VB9)	85	85	85	8
Weekly Running	1722	1722	1722	230
Weekly Running 24 x 7	33	33	33	3
Labour	**10**	**10**	**10**	**10**
Demobilisation	0	0	0	0
General Yard Assistant	9	9	9	9
Mobilisation and Set Up	0	0	0	0
Materials	**52**	**52**	**52**	**52**
Demobilisation	0	0	0	0
Mobilisation and Set Up	11	11	11	11
Road Sweeper, incl driver and waste provision (Diesel)	42	42	42	42
Brickwork & Blockwork	**360**	**360**	**360**	**330**
Equipment & Fuel	**50**	**50**	**50**	**20**
Class B engineering brick; One and a half brick thick	15	15	15	6
Random stone; Exceeding 300 but not exceeding 400mm thick	36	36	36	15
Labour	**6**	**6**	**6**	**6**
Class B engineering brick; One and a half brick thick	2	2	2	2
Random stone; Exceeding 300 but not exceeding 400mm thick	5	5	5	5
Materials	**303**	**303**	**303**	**303**
Class B engineering brick; One and a half brick thick	86	86	86	86
Random stone; Exceeding 300 but not exceeding 400mm thick	217	217	217	217
Drainage	**874**	**874**	**874**	**515**
Equipment & Fuel	**431**	**431**	**431**	**72**
225mm internal diameter drain Twin Wall Plastic Pipe, Granular Surround, As Dug Backfill, average depth to invert	357	357	357	58
Connection of 150 mm internal diameter pipe to existing 150 mm internal diameter drain or piped culvert depth to	17	17	17	3
Connection of 150 mm internal diameter pipe to existing 300 mm internal diameter drain or piped culvert depth to	9	9	9	2
Fin drain, Type 6 as HCD F18, depth not exceeding 1.5m	28	28	28	5
Precast concrete trapped gully as HCD F13 with D400 cover and frame	20	20	20	4
Labour	**18**	**18**	**18**	**18**
225mm internal diameter drain Twin Wall Plastic Pipe, Granular Surround, As Dug Backfill, average depth to invert	15	15	15	15
Connection of 150 mm internal diameter pipe to existing 150 mm internal diameter drain or piped culvert depth to	1	1	1	1

- Carbon Model (left) used to Identify Hot Spots
- Cross reference with emerging list (top) of innovation options
- Use this to prioritise options with greatest potential for impact
- Will need to consider upfront and lifecycle emissions

Data, Analysis, Decisions



Do as well as we can in time for decision boards….

Modelling Options: Scoping

Decision board deadlines focusses attention

ID	Sub-ID	Heading	Item	Decision Board	Company Engagement	LL2 Team Member to Chase	Company Contact Name	Company Contact Email
DC01		Design Changes	Remove footbridge at Forches Cross	N/A	N/A	N/A	N/A	N/A
DC02			Reduction of carriageway width	N/A	N/A	N/A	N/A	N/A
DC03			Removal of kerb lines	N/A	N/A	N/A	N/A	N/A
DC04			Alternative verge construction detail	N/A	N/A	N/A	N/A	N/A
DC05			Minimise VRS and replace with alternatives	N/A	N/A	N/A	N/A	N/A
DC06			Change from traditional drainage to SuDS	N/A	N/A	N/A	N/A	N/A
DC07			Change in approach to streetlighting	Jun-24	N/A	N/A	N/A	N/A
DC08			Bat hop-over	N/A	N/A	N/A	N/A	N/A
IN01	IN01.1	Installations	Use of aluminium poles for streetlighting *use as baseline*	N/A	N/A	N/A	N/A	N/A
	IN01.2		Use of timber poles for streetlighting (Sourced from site)	TBC	Tender results returned on 15/01/24	BL		
	IN01.3		Use of 8 m timber poles for streetlighting (Urbis Schreder)	04/02/2024	Waiting on them for a quote and modular LCA data	NT/AW	Andy Etherton/ Anish Samani	aetherton@urbis-schreder.com
IN02			Composite poles for streetlighting (Mallatite FRP)	Jun-24	No response yet (email sent 03/01/24)	AW	TBC	groupsales@mallatite.co.uk
IN03			Steel streetlighting poles with solar wrap panels (Solar Vision)	Jun-24				
IN04			Street lighting with power generation (Snapfast)	Jun-24				
IN05	IN05.1		Drainage sensors for 'as required' maintenance (Kaarbon Tech)	Jan-25				
	IN05.2		Drainage sensors for 'as required' maintenance (Map16)	Jan-25				
IN06			Ground Screw *yet to engage*	Jun-24				
IN07			Bollards and sockets (NAL)	Jun-24				
IN08			Biopolymer bollards (TMP)	Jun-24				
IN09	IN09.1		Acoustic barriers (Gravitas - Flex MSE)	Jun-24	Had call on 06/12/23; BL to send them info on A382 and their technical manager (Alex) to arrange a site visit with us	BL		
	IN09.2		Acoustic barriers (Kokosystems - Kokowall Noise Barrier)	Jun-24	2 quotes from both UK distibutors (May/Jun'23) - Livingreen Design & Tendercare	AW	Dorian Hope/ Andrew Halksworth	dorian.hope@livingreendesign.com & andrew@tendercare.co.uk
	IN09.3		Acoustic barriers (Gramm - ECOSoundBlok)	Jun-24	Ongoing comms with Gramm but lack of engagement from them to date - latest info emailed from FC to BL/NT/AD 15.01.24. Await their response to our queries and costs. BL to make contact.	NT	Mark Whittle - Project Director	mark@grammbarriers.com
	IN09.4		Acoustic barriers (Jacksons - *use as baseline*)	Jun-24	Quote for Standard Reflective Commercial Barrier		Justin Khadaroo	justin.khadaroo@jacksons-fencing.co.uk
	IN09.5		Acoustic barriers (Littlewood Fencing - solar-powered noise barrier)	Jun-24	Inital engagement at Highways UK23 & follow up Teams call			
	IN09.6		Acoustic barriers (HATKO - recycled rubber noise barrier)	Jun-24	They have sent us many emails asking for a lot of information	FC/BL	Arda Kasaci	arda.kasaci@hatkosoundbarrier.com

- Long list of ~100 measures in 7 categories
  - Design Changes
  - Installations
  - Materials
  - Construction Phase
  - Biodiversity
  - Operational
  - Offsetting
- Initial efforts to contact suppliers and engage in dialogue….
- …this is time consuming and lots of dead ends!
- We need to establish sufficient information in lead up to decision board meetings

Modelling Options: Refining

ID	Sub-ID	Heading	Item	Engagement Status	Decision Board	Scenario No.	Quantity	Unit	Conversion Factor (CF)	CF Unit	Notes	Carbon Data Source Category
DC01		Design Changes	Remove footbridge at Forches Cross	7. Complete	N/A	1	1	item	-208.44	tCO2e/bridge	Carbon cost of installing the bridge, as calculated separately in C-Est	4. DCC/UoE estimates
DC02			Reduction of carriageway width	7. Complete	N/A	2	2050	m	-0.121	tCO2e/m of road now 8.3 m	Aidan's separate calculation based on paving emissions in C-Est (quantity value subject to change)	4. DCC/UoE estimates
DC03			Removal of kerb lines	7. Complete	N/A	3	1264.2	m	-0.02972	tCO2e/m removed	CF taken from C-Est tool (quantity value may be subject to change)	4. DCC/UoE estimates
DC04			Alternative verge construction detail	3. In progress	N/A							Please select...
DC05			Minimise VRS and replace with alternatives	3. In progress	N/A							Please select...
DC06			Change from traditional drainage to SuDS	3. In progress	N/A							Please select...
DC07			Change in approach to streetlighting	3. In progress	Jun-24	31	TBC	item	-0.247	tCO2e/pole removed	Based on emissions per pole from DCC carbon tool	4. DCC/UoE estimates
DC08			Bat hop-over	7. Complete	N/A	32	1	item	-17.735	tCO2e/culvert replaced	Aidan's separate calculation based on estimating concrete and operative emissions for a 2m diameter, 20m long culvert	4. DCC/UoE estimates
IN01	IN01.1		Use of aluminium poles for str			11	38	item	397.6	kgCO2e/ pole	This value is the total emissions per job on the DCC calculator, but can be broken down further by looking specifically at materials emissions for	4. DCC/UoE estimates
	IN01.2		Use of timber poles for street			12	21	item	TBC	kgCO2e/ pole	Requires sawmill input on time re	
	IN01.3		Use of 8 m timber poles for str		2024	13	32	item	183.3	kgCO2e/ pole	This value includes modules A1-C4, down by module and c	
	IN01.4		Use of 10 m timber poles for st		2024	14	6	item	228.8	kgCO2e/ pole	This value includes modules A1-C4, down by module and c	

Status
- Please select...
- 1. Not started
- 2. Waiting from supplier
- 3. In progress
- 4. Dropped: No engagement
- 5. Dropped: No data available
- 6. Dropped: Other (see notes)
- 7. Complete

Carbon Data Source Category
- Please select...
- 1. Environmental Product Declaration (EPD)
- 2. Other LCA (unaccredited)
- 3. Supplier calculations (other)
- 4. DCC/UoE estimates
- 5. Not possible to estimate

Further Columns....

Scenario No. to Clone (0 Unless Otherwise Stated)	Build Ups Item Codes Affected (Column A)	Bill Quantity Numbers Affected	Resource affected A1-3 kgCO2e/item	Resource affected A4-5 kgCO2e/item	Resource affected Modules D kgCO2e/item	Cost Implications

Emerging Innovative Design

Design Choice	Business-As-Usual Approach	Our New Approach	Carbon Saving (t CO2e)
Carriageway width	10 metres wide	8.3 metres wide	~ 249
Kerbing	Kerbs both sides	Removed where drainage and shared-use path allow	~ 38
Forches Cross	Shared use bridge	Bridge removed and replaced with parallel crossing	~ 208
Earthworks	Substantial earthworks/embankments throughout	Vertical alignment amended to reduce earthworks	TBC
Traffic management	Keep traffic running along route throughout	Discussions with contractor on options for closures and study of the effects	TBC
Bat protection	2 metre bat culvert	Removed and replaced with bat hop-over	~ 18

Challenges and Next Steps

- **Getting the baseline right**
  - Last time issue was ensuring it covers everything (especially some of the detailed innovation areas)
  - This is still an issue and the baseline keeps moving as more detail emerges
- **How to model scenarios** (cloned scenarios or individual calculations)
  - Last time question was full BoQ based scenarios or individual 'adjustment' calculations only for each measure
  - Decision to use BoQ detail
  - Next challenge will be integrating different modules (currently focused on A, need B and D)
- **Data sources and integrity of carbon calculations**
  - Last time initial model based on generic GHG sources with aim to prioritise EPD and other better sources….
  - Suppliers sometimes provide us with 'calculated saving' but don't provide underpinning calculations or assumptions/black box/low credibility.
  - In practice, data quality is quite 'sketchy' – decision to track data quality of each measure
- **Cumulative impact of measures**
  - e.g. reducing carriageway with AND switching fuel to biofuel is less overall saving than both those measures individually (so need modelling together at some point…)
- **Dealing with Innovation Options**
  - Emerging that many potential options tied up with Module D or avoided emissions and we need to decide what is allowed within the project
  - Initial findings are that abatement costs can be really high i.e. > £1,000/tCO2e (note: current value of traded carbon is £70/tCO2e)

Department for Transport

ADEPT LIVELABS2 Decarbonising Local Roads

A382

Thanks

MILESTONE INFRASTRUCTURE
A part of Milestone Services

Devon County Council

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