

Designer Embodied Carbon (EC) Calculation - Civil & Electrical	
Build Table Most Contributing Materials 1%+ - Embodied Carbon A1-5	
Project Name:	Higher Water - Legend Code Replacement
Project URL:	https://www.bentley.com/en-us/resources/codes-and-standards/legends-codes-replacement-project

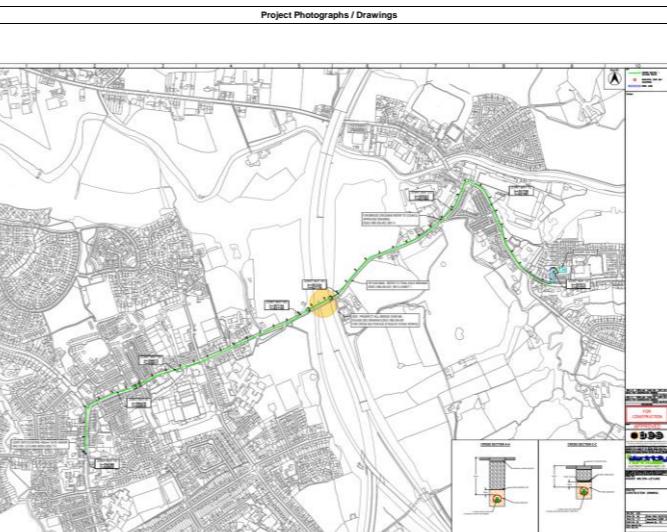
Project Scope		Emissions Category: Greenhouse Gas Protocol Category 2 (GHG)		Calculation Date: 19/09/2024	
Project Embedded Carbon Breakdown and Totals tCO2eq:					
Total A1-5w	184.73	Note: Total A1-5w (tCO2eq): Type 1&2 + Type 3 + Sub Ground / Footpath & soft verge = Ans		Project Code:	50019473
A5a	2.95			Project Completed in Financial Year:	FY24
Total A1-5 tCO2eq	187.68			Estimated Cost of Cable Works (£) (To Estimate A5a)	E421,911.00

Road & Cable Calculations Table																	
	Cable Type & Excavation	Cable/Duct Number	Units values to input in conversion to tonnes/tonne			Conversion to tonnes	Quantity (t)	ECF kg(CO2eq/kg)			Embedded Carbon (CO2eqs)			Total EC (tCO2eq)			Notes / Comments
			A1-3	A4	A5w			A1-3	A4	A5w	A1-3	A4	A5w	A1-5w	A1-5w		
Low & High Vc type	Asphalt, 8% (Bitumen) binder content (by mass) weight @ 2322kg / m³		Input value in m³ (in conversion to tonnes/tonne)	4.88	11.33136	0.086	0.005	0.005777	0.07446996	0.0596068	0.065461287	1.209615027	Binder Surface Course layer (Tarmac)		1.209615027		
	Ready mix concrete 3240, 2350kg / m³		Input value in m³ (in conversion to tonnes/tonne)	8.7	20.445	0.132	0.006	0.006215	2.98974	0.12225	0.167950575	2.366930275	Base layer (Concrete)		2.366930275		
	Ready Mix Expanding Foam Concrete weight @ 4.5kg / m³		Input value in m³ (in conversion to tonnes/tonne)	0	0	0.188	0.006	0.011183	0	0	0	0					
	Engineering MOT		Input value in m³ (in conversion to tonnes/tonne)	10.2	15.3	0.005	0.006	0.001484	0.0786	0.0786	0.0227052	0.1757052					
	Aggregate, 1500g/m³ Note: Aggregate density will change per m³ based on type and mm to dust of material.		Input value in m³ (in conversion to tonnes/tonne)	0	0	0.005	0.006	0.001484	0	0	0	0	Sub - base layer (Aggregate / MOT / DTP)		0.355039344		
	Sand, 1600kg/m³		Input value in m³ (in conversion to tonnes/tonne)	9.76	15.816	0.005	0.006	0.001484	0.07868	0.07868	0.023174414	0.178334144					
	Waste material content, 1m³ = 1.43 tonnes.		Input value in m³ (in conversion to tonnes/tonne)	54	77.22	0.005	0.001219	0	0.3861	0.09413118	0.480231198		Excavations & Backfill layer		0.6007554		
	Soil assumed 5% cement content, 1m³ = 1.9 tonnes of clay soil		Input value in m³ (in conversion to tonnes/tonne)	10.2	19.38	0.006	0.001219	0	0.9969	0.02392422	0.128592422						
	Cable Ducts PVC weight @ 200mm dia 4.4kg/m	0	Input value in metres (in conversion to tonnes/tonne)	0	0	3.23	0.005	0.172409	0	0	0	0					
	Cable Ducts PVC weight @ 150mm dia 3.3kg / m	1	Input value in metres (in conversion to tonnes/tonne)	169	0.5577	3.23	0.005	0.172409	1.801371	0.0207895	0.09162499	1.90311999	Cable Ducts		1.90311999		
	Cable Ducts PVC weight @ 100mm dia 2.16kg / m	0	Input value in metres (in conversion to tonnes/tonne)	0	0	3.23	0.005	0.172409	0	0	0	0					
	Cable 33kV (New) weight @ 5.2kg/m	3	Input value in metres (in conversion to tonnes/tonne)	169	2.6364	3.81	0.16	0.03988	10.0446964	0.421624	0.105139632	10.57164763				10.57164763	
	Cable 6.6 / 11kV (New) weight @ 1.7kg/m	0	Input value in metres (in conversion to tonnes/tonne)	0	0	3.81	0.032	0.0396	0	0	0	0					
														A1-5w tCO2eq	17.49329008		

		Road & Cable Calculations Table																	
		Cable Type & Excavation	Cable/Duct Number	Units value to input in conversion to tonnes cell	Conversion to tonnes	Quantity (t)	ECF kg(CO2/kg)			Embedded Carbon (tCO2e)						Total EC (tCO2e)	Notes / Comments		
							A1-3	A4	A5w	A1-3	A4	A5w	A1-5w						
Type A Low & High Voltage	Asphalt, 8% (Bitumen) binder content (by mass) weight @ 232kg/m ³	input value in m3 (in conversion to tonnes cell)	57.28	133.00416	0.096	0.005	0.003777	11.43837176	0.9865208	0.795360332	12.8717459					12.8717459			
		Ready mix concrete 3240, 2350kg / m3		input value in m3 (in conversion to tonnes cell)	103.1	242.285	0.132	0.005	0.002615	31.98162	1.939371275	1.939371275	35.18341628				35.18341628		
		Ready Mix Expanding Foam Concrete weight @ 4.5kg / m3		input value in m3 (in conversion to tonnes cell)	0	0	0.188	0.006	0.011183	0	0	0	0						
		Engineering MOT		input value in m3 (in conversion to tonnes cell)	120.3	180.45	0.005	0.005	0.001484	0.90225	0.90225	0.90225	0.90225						
		Aggregate, 1500kg/m ³ Note: aggregate density will change per m3 based on type and mm to mm of dust of material		input value in m3 (in conversion to tonnes cell)	0	0	0.005	0.005	0.001484	0	0	0	0				4.1779404	Depth of soil to be calculated @ 50% imported and 50% backfill	
		Sand, 1600kg/m ³		input value in m3 (in conversion to tonnes cell)	114.6	183.36	0.005	0.005	0.001484	0.9168	0.9168	0.9168	0.9168						
		Waste material content, 1m3 = 1.43 tonnes.		input value in m3 (in conversion to tonnes cell)	458.24	655.2832	0.005	0.005	0.001219	0	3.767416	3.767416	4.07309221						
		Soil assumed 5% cement content, 1m3 = 1.9 tonnes of clay soil		input value in m3 (in conversion to tonnes cell)	120.3	228.57	0.005	0.005	0.001219	0	1.14285	1.14285	1.4214783					5.496683051	
		Cable Ducts PVC weight @ 200mm dia 4.4kg/m	0	input value in metres (in conversion to tonnes cell)	0	0	3.23	0.005	0.072409	0	0	0	0						
		Cable Ducts PVC weight @ 150mm dia 3.3kg/m	1	input value in metres (in conversion to tonnes cell)	1432	4.7256	3.23	0.005	0.072409	15.203688	0.023698	0.8147597	16.16205197					16.16205197	
		Cable Ducts PVC weight @ 100mm dia 2.1kg/m	0	input value in metres (in conversion to tonnes cell)	0	0	3.23	0.006	0.072409	0	0	0	0						
		Cable 33kV (New) weight @ 5.2kg/m	3	input value in metres (in conversion to tonnes cell)	1432	22.3392	3.81	0.16	0.211364	35.747272	4.721702889	21.4523557						93.40832667	Unit manufacturers ECF values are available the ECF value for New Copper is used for Power Cables
		Cable 6.6 / 11kV (New) weight @ 1.7kg/m	0	input value in metres (in conversion to tonnes cell)	0	0	3.81	0.032	0.20458	0	0	0	0						
															A1-5w (tCO2e)	167.2402156			

Road & Cable Calculations Table															
	Cable Type & Excavation	Cable/Duct Number	Units values to input in conversion to tonnes	Conversion to tonnes	Quantity (t)	ECF kgCO2es/t				Embedded Carbon (tCO2e)				Total EC (tCO2e)	Notes / Comments
						A1%	A2%	A3%	A4%	A5%	A6%	A7%	A8%		
Low & High Voltage	Asphalt, 8% (bitumen) binder content (by mass) weight @ 232kg/m ³ / m ²		Input value in m ³ (in conversion to tonnes)	26.92	62.50824	0.085	0.005	0.005777	5.3757094	0.3125412	0.3611102	0.043603942	Binder Surface Course layer (Tarmac)	6.04935942	
	Ready mix concrete 2340, 2350kg / m ³		Input value in m ³ (in conversion to tonnes)	46.46	113.881	0.132	0.005	0.006215	15.033292	0.69845	0.936530315	18.53722942	Base layer (Concrete)	16.53722942	
	Ready Mix Expanding Foam Concrete weight @ 4.5kg / m ³		Input value in m ³ (in conversion to tonnes)	0	0	0.188	0.005	0.001183	0	0	0	0			
	Engineering MOT		Input value in m ³ (in conversion to tonnes)	56.53	84.795	0.085	0.005	0.001484	0.423805	0.42875	0.1288078	0.0361878			
	Aggregate, 1500kg/m ³ Note - density will change per m ³ based on sand & gravel content of material		Input value in m ³ (in conversion to tonnes)	0	0	0.005	0.005	0.001484	0	0	0	0	Sub - base layer (Aggregate / MOT / DTP)	1.9623285	Depth of soil to be calculated @ 50% imported and 50% backfill
	Sand, 1600kg/m ³		Input value in m ³ (in conversion to tonnes)	63.8	96.008	0.085	0.005	0.001484	0.4304	0.42874	0.1277472	0.03684272			
	Waste material content, t/m ³ = 1.43 tonnes		Input value in m ³ (in conversion to tonnes)	215.36	307.9648	0.005	0.005	0.001219	0	1.358624	0.374050991	1.912333991	Excavations & Backfill layer	2.583197224	
	Soil assumed 9% cement content, t/m ³ = 1.9 tonnes of clay soil		Input value in m ³ (in conversion to tonnes)	56.53	107.407	0.005	0.005	0.001219	0	0.537035	0.136921933	0.6767941133			
	Cable Ducts PVC weight @ 200mm dia 4.4kg/m	0	Input value in meters (in conversion to tonnes)	0	0	3.23	0.005	0.0172409	0	0	0	0			
	Cable Ducts PVC weight @ 150mm dia 3.8kg / m	1	Input value in meters (in conversion to tonnes)	673	2.2209	3.23	0.005	0.0172409	7.173307	0.0111045	0.392803148	7.567514648	Cable Ducts	7.567514648	
	Cable Ducts PVC weight @ 100mm dia 2.16kg / m	0	Input value in meters (in conversion to tonnes)	0	0	3.23	0.005	0.0172409	0	0	0	0			
	Cable 33kV (New) - weight @ 5.2kg/m	3	Input value in meters (in conversion to tonnes)	673	10.4988	3.81	0.16	0.21194	40.059405	1.679688	2.210986863	41.9886456			Unit manufacturers ECF values are available the ECF value for New Copper is used for Power Cables
	Cable 6.6 / 11kV (New) - weight @ 1.7kg/m	0	Input value in meters (in conversion to tonnes)	0	0	3.81	0.032	0.020458	0	0	0	0		43.89930436	

Important note	All materials calculated in above sheet, includes only imported materials	A1-Sir (ICD0)	75.0883403
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Project Photographs / Drawings