

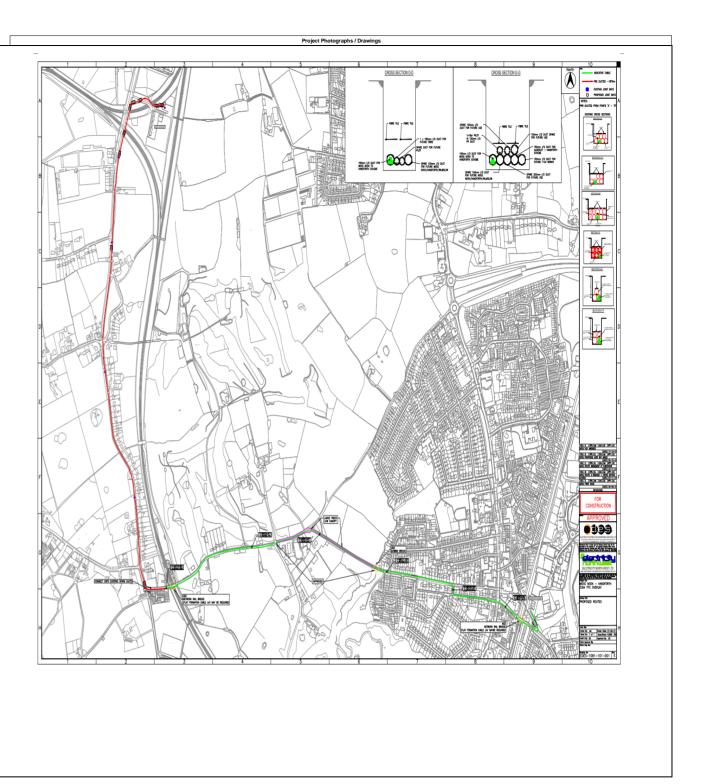
Alderley to Handforth Fluid Filled Cable Replacement 33kV Single Circuit 500mm2 XLPE. Route Length 6529m.

Project En	nbodied Carbon Breakdown and Totals t(Co2e):		Calculation Date:	18/09/2024
Total A1-5w	502.79	Note: Total A1-5w t(CO2e): Type 1&2 + Type 3&4 = Ans	Project Code:	550022053
A5a	8.13		Project Completed in Financial Year:	FY24
Total A1-5 t(CO2e)	510.92	Note: Total A1-5t(CO2e): Total A1-5w + A5a = Ans	Estimated Cost of Cable Works(£): (To Estimate A5a)	£1,161,867.00

Roadway	From		Existing Cable Ducts (m)	Unmade Ground Selected Excavated Material (m)	Footpath Imported Material (m)		Road Type 3&4 Imported Material (m)	Total
Adlington Road (385884:380722)	Pre Installed Ducts off Hough Lane	Brown Lane					1,280	1,280
Brown Lane (386733:381422)	Adlington Road	Cross Lane				210		210
Cross Lane (386614:381422)	Browns Lane	Dean Row Road				505		505
Handforth Road (386734:382046)		Handforth Road					230	230
Dean Road (386307:383254)	Dean Row Road	Dean Road					815	815
Station Road (386021:383254)		Station Road					600	600
Old Road (385964:383306)		Old Road					85	85
Grounds of Handforth sub (385933:383362)		Grounds of Handforth sub				80		80
	Old Road	Switch Gear / Joint Position				40		40
Pre Installed Ducting								0
Hough Lane - Type 1 Road Way (385883:380722)	Adlington Road	Heyes Lane	1,230					1,230
Heyes Lane - Type 3 Road Way (385651:379563)	Hough Lane	Alderley Substation	860					860
		Total	2,090			835	3,010	5,935
	Desktop Contigency	10%	209			84	301	594

Road & Cable Calculations Table																
	Cable Type & Excavation		Cable/Duct Number	Units values to input in conversion to tonnes cell	Conversion to tonnes		ECF (g(CO2e	kg)		Embodied C	arbon t(CO2	e)		Total EC t(CO2e)	Notes / Comments
				conversion to tonnes cell	tonnes	(t)	A1-3	A4	A5w	A1-3	A4	A5w	A1-5w		A1-5w	
		Asphalt, 8% (Bitumen) binder content (by mass) weight @ 2322kg / m3		input value in m3 (in 'conversion to tonnes' cell)	36.76	85.35672	0.086	0.005	0.006	7.34067792	0.4267836	0.49311	8.260567291	Suface / Binder / Course layer (Tarmac)	8.260567291	
		Ready mix concrete 32/40. 2350kg / m3		input value in m3 (in 'conversion to tonnes' cell)	66.17	155.4995	0.132	0.005	0.008	20.525934	0.7774975	1.27743	22.58085989	Base layer (Concrete)	22,58085989	
		Ready Mix Expanding Foam Concrete weight @ 4.5kg / m3		input value in m3 (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.011	Ó	0	0	0		22.58065969	
		Engineering MOT		input value in m3 (in 'conversion to tonnes' cell)	77	115.5	0.005	0.005	0.001	0.5775	0.5775	0.1714	1.326402			Depth of soil to be calculated (# 50% imported and 50% backfill
		Aggregate, 1500kg/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' cell)	0	0	0.005	0.005	0.001	0	0	0	O	Sub - base layer (Aggregate / MOT / DTP/ Sand)		
& 2	Voltage	Sand, 1600kg/m3		input value in m3 (in 'conversion to tonnes' cell)	73.5	117.6	0.005	0.005	0.001	0.588	0.588	0.17452	1.3505184			
Type 1 4	& High	Waste material content. 1m3 = 1.43 tonnes.		input value in m3 (in 'conversion to tonnes' cell)	294	420.42		0.005	0.001	0	2.1021	0.51249	2.61459198	Excavations & Backfill laver		
	Low	Soil assumed 5% cement content. 1m3 = 1.9 tonnes of clay soil.		input value in m3 (in 'conversion to tonnes' cell)	77	146.3		0.005	0.001	0	0.7315	0.17834	0.9098397			
		Cable Ducts PVC weight @ 200mm dia 4.44kg / m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172	0	0	0	0			
		Cable Ducts PVC weight @ 150mm dia 3.3kg / m	1	input value in meters (in 'conversion to tonnes' cell)	755	2.4915	3.23	0.005	0.172	8.047545	0.0124575	0.42956	8.489559524	Cable Ducts	8.489559524	
	Cable Ducts PVC weight @ 100mm dia 2.16kg / m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172	0	0	0	0				
		Single Core Cable 33kV 500mm2 : weight @ 6.35kg/m	3	input value in meters (in 'conversion to tonnes' cell)	919	17.50695	3.81	0.032	0.039	66.7014795	0.5602224	0.67577	67.93747017	Cables	67 93747017	Until manufacturers ECF values are available the ECF value for New Copper used for Power Cables
	Single Core Cable 6.6 / 11kV : weight @ 1.7kg/m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.81	0.032	0.039	0	0	0	0	out of			
														A1-5w t(CO2e)	113.469809	

Road & Cable Calculations Table																
Cable Type & Excavation C		Cable/Duct Number	Units values to input in conversion to tonnes cell	Conversion to tonnes	Quantity (t)	ECF k	ECF kg(CO2e/kg)			Embodied 0	Carbon t(CO2	le)		Notes / Comments		
				conversion to tonnes cen	tonnes	0	A1-3	A4	A5w	A1-3	A4	A5w	A1-5w		A1-5w	
		Asphalt, 8% (Bitumen) binder content (by mass) weight @ 2322kg / m3		input value in m3 (in 'conversion to tonnes' cell)	132	306.504	0.086	0.005	0.006	26.359344	1.53252	1.77067	29.66253761	Binder/ Suface Course layer (Tarmac)		
		Ready mix concrete 32/40. 2350kg / m3		input value in m3 (in 'conversion to tonnes' cell)	238.4	560.24	0.132	0.005	0.008	73.95168	2.8012	4.60237	81.3552516	Base laver (Concrete)	81 3552516	
		Ready Mix Expanding Foam Concrete weight @ 4.5kg / m3		input value in m3 (in 'conversion to tonnes' cell)	0	0	0.188	0.005	0.011	0	0	0	0	Base layer (Concrete)	81.3552516	
		Engineering MOT		input value in m3 (in 'conversion to tonnes' cell)	278	417	0.005	0.005	0.001	2.085	2.085	0.61883	4.788828		9.658044	Depth of soil to be calculated (# 50% imported and 50% backfill
		Aggregate, 1500kg/m3 Note: aggregate density will change per m3 based on type and mm to dust of material.	r	input value in m3 (in 'conversion to tonnes' cell)	0	0	0.005	0.005	0.001	Ō	0	0	0	Sub - base layer (Aggregate / MOT / DTP / Sand)		
8.4	/oltage	Sand, 1600kg/m3		input value in m3 (in 'conversion to tonnes' cell)	265	424	0.005	0.005	0.001	2.12	2.12	0.62922	4.869216			
Type 3	w & High	Waste material content. 1m3 = 1.43 tonnes.		input value in m3 (in 'conversion to tonnes' cell)	1059	1514.37		0.005	0.001	0	7.57185	1.84602	9.41786703	Excavations & Backfill layer	12.70274283	
	Ľ	Soil assumed 5% cement content. 1m3 = 1.9 tonnes of clay soil.		input value in m3 (in 'conversion to tonnes' cell)	278	528.2		0.005	0.001	0	2.641	0.64388	3.2848758			
		Cable Ducts PVC weight @ 200mm dia 4.44kg / m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172	0	0	0	0			
		Cable Ducts PVC weight @ 150mm dia 3.3kg / m	1	input value in meters (in 'conversion to tonnes' cell)	1000	3.3	3.23	0.005	0.172	10.659	0.0165	0.56895	11.2444497	Cable Ducts	11.2444497	
		Cable Ducts PVC weight @ 100mm dia 2.16kg / m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.23	0.005	0.172	0	0	0	0			
		Single Core Cable 33kV 500mm2 : weight @ 6.35kg/m	3	input value in meters (in 'conversion to tonnes' cell)	3310	63.0555	3.81	0.032	0.039	240.241455	2.017776	2.43394	244.6931733	Cables	244.6931733	Until manufacturers ECF values are available the ECF value for New Copper used for Power Cables
		Cable 6.6 / 11kV : weight @ 1.7kg/m	0	input value in meters (in 'conversion to tonnes' cell)	0	0	3.81	0.032	0.039	0	0	0	0			
														A1-5w t(CO2e)	389.316199]



Important note: All materials calculated in above sheet, includes only imported materials

		Caculation are based on Embodied Carbon Factors (ECF) to Extract & Manufactur kg(CO2e/kg) = Embodied Carbon t(CO2e). Sourced IstructE	e the material Calculated as: Tonnes x ECF								
Key:		Calculation based on kg of CO2e produced by Distance travelled in km, ECF based Carbon t(CO2e). Distances referenced from IStructE: Locally sourced within 50km 320km = 0.32kg(COe) / European sourced within 1500km = 0.16kg(CO2e): Source	= 0.005kg(CO2e) / Nationally Sourced with		ulating for Cal	ble & Duc	ts note:				
	A5w	Calculation based on the Waste Factor (WF) of Materials. So brick has a waste fact ECF x Distance Travelled x Distance travelled forwaste material taken to lanfill (A5w / Example, assumed waste of concrete is : 0.053 x (A1-3 x x A4 x C2 x C3-4) = /	C2) × C02 used for processing disposal (C	when	n adding in cal late the embod		ns in meters, the calcula on factor	tion must include ca	ble numb	ers for the table to	
		Typical assumed costat stage A1-5 of build is 50% so: 700kg(CO2e) per £100,000 = Ans t(CO2e): Soruced IstructE	so: 0.7 x (cost of build + 100,000)	Key:	Design	er to fill i	n all cells highlighted	in light grey		Reference note:	Calculations & Embodied Carbon
Note:		Please fill in all relavent cells highlighted in GREY - Profile Depths for Type 182: Tarmac top Iayer = 100mm Concrete layer = 180mm MOT = 210mm MOT = 210mm		high c	contributing ma	sterials. Be	e)' cells are using a traf slow this cell in an exam hat they indicate.				factors for materials used in the tableare sourced from the Brisa (ICE) & IstructE
		Sand layer = 200mm (+/-300mm) Material Waste = Estimate 80% of total Excavated material Profile Depths for Type 3&4: Tarmac top layer / 100mm Concrete layer = 50mm		Le	ow		Medium		High	Ref for material Emobdied Carbon Factors:	A BSRIA guide: Hammond.G etal., 'Embodied Carbon'., The inventory of Cabon and Energy., (ICE).
		MOT = 275mm Backfill = 275mm Sand layer = 200mm (+/- 300mm) Material Washe = Estimate 80% of total Excavated material		0	0 1	2.5	25	37.5	50	NOT FOR CALCULATING	Embodied Carbon - The Inventory of Carbon and Energy (ICE) (greenbuildingencyclopaedia.uk)
		material waste - Estimate ov /s or total EXCOVITED material								Embodied Carbon A1- 5& Cell colour	The Institution of Structural Engineers 'How to calculate embodied carbon'.
											A brief guide to calculating embodied carbon (istructe.org)