MOTT MACDONALD

Old Colwyn Coastal Defence and Active Travel Scheme

Design for Resource Efficiency Record

August 2020

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
P01	August 2020	N. Spofforth B. Skinner	N. Spofforth	C. Williams	First issue

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Contents

1 Design for Resource Efficiency

1.1.1 To encourage reduced embodied carbon and material use a Design for Resource Efficiency Workshop (D4RE) was completed on March 4th. The D4RE workshop involves numerous members of the design team meeting to discuss possible actions to reduce materials usage and associated carbon. The workshop involved the following people:

- Project Manager;
- Coastal Team Lead;
- Landscape Architect Team Lead;
- Consultant Civil Engineer;
- Client Civil Engineers;
- Waste Management Specialist and workshop facilitator;
- Environmental Co-ordinator; and
- CEEQUAL Assessor and workshop facilitator.

1.1.2 Through the workshop all the ideas were grouped by ease of implementation and potential impact to allow prioritisation of the biggest impacts. These ideas were recorded within the opportunities matrix (Table 1.1) which has been treated as a live document and updated throughout the design process.

1.1.3 A number of the ideas recorded were quantifiable in terms of material and carbon savings which have also been recorded in the opportunities matrix and the Environmental Statement.

1.1.4 Where these ideas have not been fully implemented at this stage but have been recorded for implementation at later stages of the project they have been detailed in the Carbon Management Plan (Old Colwyn Coastal Defence and Active Travel Scheme Volume 2 Technical Appendices, Technical Appendix 9.1) and the first iteration of the Scheme Environmental Management Plan (EMP) (Technical Appendix 15.3).

Table 1.1 D4RE Workshop Opportunities Matrix

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
1	Coastal	Reducing the number of headland structures to one from three in Area 1, to incorporate steps and disabled access.	A - high impact, easy to implement	Fully implemented	*One headland may be more acceptable to future investors also given active travel funding.* *Design includes a single headland only.*	None.	Coastal team	Final tender design submission	N/A	3,359
2	Promenade	Targeted remediation of voids rather than the whole extent of the highway.	A - high impact, easy to implement	Implementation on-going	*GPR survey completed.*	GI to verify GPR survey to provide confidence.	Geotech team	Following GI	TBC post GI	TBC post GI
3	Coastal	Make the most of natural features for enhancement - pools, groynes etc to reduce import of materials, use excavated materials where feasible.	A - high impact, easy to implement	Determined to be unsuitable	*Opportunity for marine enhancement (biodiversity net gain) to be built into design - also proof of no net loss needed for CEEQUAL.* *Materials re-use not possible for construction of marine features given specification and durability requirements.*	None.	Env co-ordinator, ecologist, coastal team	Final tender design submission	N/A	N/A
4	Coastal	Potential for import of rock revetment by barge to avoid road transport.	A - high impact, easy to implement	Implementation on-going	*Final selection will also depend on timing of works and availability at quarries (all local quarries currently at capacity). Use of boat from Scotland or Norway likely to be more efficient. Emissions as follows - by boat approx. 0.92 tCO2e per km versus by road approx. 55.36 tCO2e per km.*	Carbon analysis of locally imported rock vs barged rock from Scotland or Norway (taking into account potential distance from quarries to ports). To be completed by contractor once further information is known.	Contractor	Prior to construction	N/A	919-1,749
5	Coastal	Re-use existing rock armour within Old Colwyn area within scheme (behind revetment or elsewhere).	A - high impact, easy to implement	Implementation on-going	*Location of re-use will depend on final design.*	Audit of volume materials available for re-use.	Stephen Burrows	Pre Tender cost estimate	~27,497m^3	7,046

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
6	Promenade	Use recycled steel for rebar.	A - high impact, easy to implement	Fully implemented		To be included in specification min 85% recycled.	PM	Final spec production	N/A	N/A
7	Coastal	Re-use beach material from toe of revetment (where feasible) within fill at back of revetment.	A - high impact, easy to implement	Determined to be unsuitable	*At Splashpoint contractor encountered very shallow clay which is unsuitable as a fill material. Therefore will depend on thickness of beach material available.*	Scoping response from NRW requested sediment to remain in sediment budget for sea front.	N/A	N/A	N/A	N/A
8	Coastal	Build in climate resilience into new structure design (optimise) to allow adaptation in future and prevent additional resource usage.	A - high impact, easy to implement	Fully implemented	*Balance between additional upfront use of materials and reducing future demand for materials needs to be found.*	Likely future levels to be considered to ensure design is future proof.	Coastal team	Final tender design	N/A	N/A
9	Coastal	Design in resilience to account for beach fluctuations in future in terms of toe levels/step landings.	A - high impact, easy to implement	Fully implemented	*Balance between additional upfront use of materials and reducing future demand for materials needs to be found.*	Likely future levels to be considered to ensure design is future proof.	Coastal team	Final tender design submission	N/A	N/A
10	All	Recycled cement replacement.	A - high impact, easy to implement	Fully implemented		36-65% ground granulated blast furnace slag. To be included in specification.	PM	Final spec production	N/A	238
11	Promenade	Soft landscaping and improvement of biodiversity with re-wilding/wild flower planting - reduction in future maintenance requirements.	A - high impact, easy to implement	To be implemented	*Advice needed on balance of planting to survive extremes of weather, provide suitable embankment stabilisation, biodiversity potential and not adversely impact the railway (leaves, excess growth, onerous maintenance requirements etc)*	To be implemented pending consultation with Network Rail.	Env co-ordinator, ecologist, coastal team	Final tender design submission	N/A	N/A

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
12	All	During quarry/armourstone extraction, use byproduct as underlayers/fill/aggregate/roadstone.	A - high impact, easy to implement	Requires further investigation	*Will depend on quarry selected.*	Obtain information on likely by-products to determine appropriate uses.	Contractor	Prior to construction	TBC	TBC
14	Coastal	Selection of rock vs pre-cast armour materials for optimal cost and performance	A - high impact, easy to implement	Fully implemented	*Precast rock armour analysis undertaken.*	Rock preferential to man made pre-cast rock armour.	PM	Final tender design submission	N/A	9,355
15	Coastal	Optimise vertical crest level	A - high impact, easy to implement	Fully implemented	*Defence levels optimised via coastal calculations to reduce material requirements.*	N/A - complete	Coastal team	Final tender design submission	N/A	N/A
16	Promenade	Use pre-cast concrete elements on promenade to ensure quality, reduce waste and minimise site operations	A - high impact, easy to implement	Implementation on-going	Design to incorporate pre-cast elements where possible.	None.	Coastal team	Final tender design submission	N/A	1,506
17	Coastal/Promenade	Reduce number of fishing platforms down to one main platform at the Splashpoint end of the Scheme	A - high impact, easy to implement	Fully implemented	*One fishing platform suitably located may be more acceptable to future investors given active travel funding.* *Detailed design contains only a single fishing platform.*	None	Coastal team	Final tender design submission	N/A	53
18	Coastal	Ensure revetments slopes are as steep as feasible to minimise volume of material required	A - high impact, easy to implement	Fully implemented	*Exercise completed.*	To be included on design drawings.	Coastal team	Final tender design submission	13,021 tonnes	1,167
19	Promenade	Incorporate electric vehicle charging points	A - high impact, easy to implement	Fully implemented	*Incorporated.*	Locations to be included on design drawings.	Landscape and highways teams	Final tender design submission	N/A	N/A
20	All	Source slate waste as fill to use for raising levels	A - high impact, easy to implement	To be implemented	*Assuming properties suitable.*	To be allowed for in spec and implemented by contractor.	PM	Final spec production	9,862 m^3	98

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
21	Coastal	Use of enhanced rock in revetment and passive enhancement through appropriate placing to reduce requirement for alternatives	A - high impact, easy to implement	Fully implemented	*Potential for large ecological gain. Enhanced rocks to be provided using revetment material, no additional materials needed. Use of revetment stone which would be imported anyway. Two sections 80m long, 3.6m wide 25-30% to be enhanced rock.*	None.	Env co-ordinator, ecologist, coastal team	Final tender design submission	N/A	N/A
22	Promenade	In Area 1 raise the level of the prom only not the road also	A - high impact, easy to implement	Fully implemented	*Implemented up-front/*	N/A - complete	Landscape and highways teams	Final tender design submission	~5800m^3	1,113
23	Coastal	Recycled materials for geotextile (investigate)	A - high impact, easy to implement	Determined to be unsuitable	*Investidated and not possible.*	None.	Coastal team	Final tender design submission	N/A	N/A
24	Coastal	Re-using existing wave return wall within scheme design	B - high impact, difficult to implement	Fully implemented	*Remaining in situ reducing the off site waste and concrete import.*	None.	PM	Final tender design submission	~330m^3	100
25	All	Specify contractor must use electric/hydrogen plant to drive industry change	B - high impact, difficult to implement	Determined to be unsuitable	*Would place prohibitive restrictions on project.*	None			N/A	N/A
26	Coastal	Off-shore seaweed farm	B - high impact, difficult to implement	Determined to be unsuitable	*Conditions unsuitable off-shore*	None	Marine ecologist	Final tender design submission	N/A	N/A
27	Coastal	Combine watercourse outfall with fishing platform	B - high impact, difficult to implement	Determined to be unsuitable	*Design constraints - unsuitable. Would require significantly more revetment stone to walk out along revetment.*	None	Coastal team	Final tender design submission	N/A	N/A
28	All	Reuse of fill from other sites for prom raising/behind revetment.	B - high impact, difficult to implement	Implementation on-going	*Will depend on timing and availability.*	Monitoring of other sites in area (CCBC knowledge) to identify potential donor sites. Contractor to explore depending on availability.	PM	Final spec production	N/A	359

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
29	Promenade	Surface water - potential to design in rills for managing in Area 1	B - high impact, difficult to implement	Determined to be unsuitable	*Deemed not possible for the design.*				N/A	N/A
30	Promenade	Auto cycle hire scheme for reducing private vehicle usage	B - high impact, difficult to implement	Requires further investigation	*Potentially located at picnic area. Possible issues with coastal environment and maintenance. Private supplier?*	Client to decide.	Client	Final detailed design	N/A	N/A
31	Coastal	If clay excavated at toe of revetment investigate potential for it to be sold as a construction material/re-used on other sites nearby depending on timing and availability.	B - high impact, difficult to implement	Requires further investigation		GI to determine presence/absence of beach material and clay.	PM	Post GI	TBC Post GI	TBC Post GI
32	Coastal	Use of novel (recycled) materials beneath revetment (wrapped in geotextile).	B - high impact, difficult to implement	Determined to be unsuitable	*Unsuitable for design.*	None.	Coastal team	Final tender design submission	N/A	N/A
33	Promenade	Re-use of existing materials e.g. lighting, parking meters, ramp, benches.	C - low impact, easy to implement	Implementation on-going	*May be constrained by the specifications for material longevity.*	Existing materials suitable for re-use elsewhere detailed on site clearance drawings.	PM	Final tender design submission	N/A	N/A
34	Promenade	Recycle existing blacktop for use within the scheme (cold recycling if coal tar present).	C - low impact, easy to implement	Fully implemented	*Existing blacktop to be removed - planed to 100m deep - 2,672m2; broken out to 240mm deep – 986 m2; total 504 m3.*	None.	PM	Final spec production	504m^3	14
35	Promenade	Handrails - predominant use of bolted and clamped rails for ease of replacement in future.	C - low impact, easy to implement	Fully implemented	*Implemented.*	None.	PM	Final spec production	N/A	N/A
36	Promenade	Investigate what materials/street furniture available at CCBC stockpiles and build into design where appropriate.	C - low impact, easy to implement	Determined to be unsuitable	*Specification of available materials deemed unsuitable.*	None.			N/A	N/A
37	Promenade	Solar panels on shelters - links to windfarm, power generation display, promote green energy.	C - low impact, easy to implement	Determined to be unsuitable	*Not included however solar powered parking meters and LED lighting is to be used.*	None.	PM	Final tender design submission	N/A	N/A

Ref.	Element	Detail of opportunity	Score	Status	Notes / Comments / Update	Next action?	Who	When	Estimated Benefits (Detailed where Quantifiable)	
									Material reduction	Carbon reduction (tCO_2e)
38	Promenade	PV in roads - colas trial.	D - low impact, difficult to implement	Determined to be unsuitable	*High cost, north facing (unsuitable location), extreme conditions and no viable test site elsewhere.*	N/A			N/A	N/A