

Technical Note

264326

17 May 2021

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Project title Barmouth North Promenade OBC

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Subject Barmouth North Promenade –Assumptions Register for the Preferred Option

Technical Note: Risk and Assumptions Register – Preferred Option

No.	Input required	Needed for	Assumption taken	Risk Impact and <i>QUANTIFIED RISK ASSESSMENT ID</i>	Potential mitigation in next phase
1	Site access for trucks (delivery of materials)	Cost estimate	Access through existing slipway and temporary access built along seawall	Increase in cost due to alternative access required. <i>QRA ID3 and 10.</i>	Clarify conditions for planning permission
2	Areas available for stockpile of materials	Cost estimate	Core material can be stockpiled by access ramp and undeveloped land to rear of North Promenade.	Increase in cost due to unavailable space. <i>QRA ID3, 10 and 14.</i>	Clarify conditions for planning permission
3	Quarry availability	Supply of rock armour and underlayer	Rock armour can be viably sourced. Rates based on ECI input for Barmouth North Promenade 2021 – larger material (3-6t) was assumed to be supplied by barge, with underlayer transported by road.	No viable source of rock available. High cost of supply of materials. <i>QRA ID18.</i>	Confirm available quarries – rock armour sourced locally or from European ports.
4	Quarry availability	Supply of shingle to recharge beach profile	Shingle beach material can be viably sourced. Rates based on Cefn Graianog Quarry. Shingle beach material to be brought in precontract over a 12 month period and stockpile in the old railway yard, adjacent to North Promenade.	No viable source of shingle available. High cost of supply of materials. <i>QRA ID18.</i>	Cefn Graianog Quarry, near Caernarfon, can provide both shingle beach material.
5	Environmental constraints intertidal zone	Cost estimate	Rock for armour construction on intertidal zone at high tide to be used at low tide	Increase in cost due to required HRA and limitations due to breeding season. <i>QRA ID28</i>	Assess environmental impact of works. Contact NRW.
6	Confirmation of extents of rock armour and shingle profiles	Drawings and cost estimate	Rock armour extends 300m, whilst shingle profile extends 550m.	Changes in layout and dimension with increase of overall cost. <i>QRA ID16-22.</i>	Confirmation following shoreline modelling and further investigation of the coastal processes along the shorefront.
7	Refurbishment of sheet piles	Drawings and cost estimate	Sheet piles required for 700m length. Rates based on ECI input for Barmouth North Promenade 2021.	Changes in layout and dimension with a potential increase of overall cost. <i>QRA ID8, 9, 15.</i>	Confirmation following structural investigation and survey at detailed design
8	Condition and performance of primary wall	Drawings and cost estimate	There is no information available outlining the design and construction information of the primary wall. Due to concerns that works to the primary wall may undermine the structural stability or performance of the structure, works to raise or replace this structure have been avoided.	Condition or performance of primary wall is not sufficient to support the life-span of the project. Further works required to re-furbish the primary wall. Proposed works to the promenade/ revetment may pose a risk to the existing performance. <i>QRA ID8, 15, 16, 22 and 32.</i>	Structural investigation and surveys to confirm structural integrity, performance and construction details of the existing structure.
9	Anticipated wave loading on the primary, alternative primary and tertiary walls.	Drawings and cost estimate	There is no empirical method to calculate wave loads for this geometry. Therefore, for preliminary sizing of flood defences, it was assumed to be 75-125kN/m on primary wall, based on similar cases and constructability. A reduction of 30% was applied to the alternative primary wall and <10% on the tertiary wall. This excludes additional structural / sliding support from the revetment. Impact load for debris (250kg) does not apply at the same time as the wave loading.	IncreasedLarger return period storm or wave loading iswould likely to require larger structures, with more extensive foundations for the alternative primarysecondary and tertiary flood walls. Results in an increase in cost. <i>QRA ID16 and 22.</i>	Physical coastal modelling required at detailed design to define wave loading. Decision making required in relation to allowed damage to walls and return period for structural capacity design.
10	Standard of protection (SOP) of scheme	Economic case of preferred option	Scheme is assumed to provide a SOP; based on the tertiary wall containing overtopping between the highway and sea-wall.	Modifications required to design (e.g. increase in wall height and/or size) to maintain minimum SOP. <i>QRA ID16, 22 and 32.</i>	Physical coastal (see 9 above) and inundation modelling required at detailed design to develop and refine design proposals.
11	Design and layout of alternative primary and tertiary walls	Drawings and cost estimate	Reinforced concrete stem flood walls (alternative primary and tertiary) along 1.15km length of promenade, to a height of 1.1 and 1.2m respectively.	Modifications required to design (e.g. increase in wall height and/or size) to achieve desired SOP. <i>QRA ID8, 15, 16, 22 and 32.</i>	Physical coastal (see 9 above) and inundation modelling required at detailed design. Opportunities for innovative geometry (e.g. double row shifted storm walls) should be considered.

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12	Performance of rock toe to reduce overtopping	Standard of protection, drawings and cost estimate	The proposed rock revetment has the potential to reduce overtopping along the promenade.	Rock toe may have a limited effect on reducing overtopping rates. Modification to toe structure or size / height of alternative primary and tertiary walls to maintain an appropriate SOP may be required. Could result in increase in cost. <i>QRA ID 16.</i>	Physical coastal modelling required to test performance of proposals.
13	Wave conditions at the root/trunk of the rock toe	Rock size optimisation, planning	No optimisation or sizing undertaken. Rock size is the same as required at the furthest seaward extent of section.	Rock size required may increase, however these is also the opportunity to reduce costs. <i>QRA ID 16.</i>	Physical coastal modelling required to test performance of proposals.
14	Vehicle containment	Cost estimate	No vehicle containment is required by the alternative primary and tertiary flood walls.	Increased size of structure required. <i>QRA ID 9.</i>	Confirmation with planning permission
15	Ground conditions and condition of promenade	Stability of promenade and cost estimate	Promenade and revetment is situated on sand. Voiding beneath the structure (as identified in the OBC Existing Structures assessment).	Significantly more voiding beneath structure than anticipated. Performance of promenade is lower than anticipated. Further works required to refurbish promenade and resulting in additional costs. <i>QRA ID 8, 11 and 32.</i>	Intrusive ground investigation and surveys
16	Contamination	Rock toe design which requires some dredging for the bedding	No contamination	If soil is contaminated it may require waste treatment before disposal. It may also prohibit any dredging, therefore toe configuration may need to be changed. <i>QRA ID 31.</i>	Ground investigation - trial pits
17	Utility Diversions	Cost estimate	Minor utilities diversions assumed as part of contingency in cost of preferred option.	Additional utilities identified – increase in cost. <i>QRA ID 12 and 13.</i>	Ground investigation and surveys
18	Seasonal restrictions during construction period	Cost estimate	Construction period to be carry out throughout summer season	Increase in programme and cost if construction needs to be stopped during summer season and restarted in the next season. <i>QRA ID 10.</i>	Confirmation with planning permission
19	Third party objections	Specify location of the works	YGC to undertake further public engagement and consultation throughout design development.	Change of location and delay in programme. <i>QRA ID 1, 3, 4, 10 and 27.</i>	Confirmation with planning permission
20	Interfaces	Construction period	Location and construction period(s) determined with support by stakeholder consultation.	Interface with public during construction period. <i>QRA ID 1, 3, 4, 10, 14 and 27.</i>	On-going consultation and awareness raising of works on the shorefront.
21	Repairs to promenade and existing outfalls	Cost estimate	Cost estimate to repair voiding to the promenade based on YGC estimate (2019). It is assumed that repairs to the existing outfall and flap valve are required.	Extended voiding to the promenade is identified as a risk – which could increase the cost estimate. Provisional inclusion of refurbishment of outfall. <i>QRA ID 8, 9, 15 and 32.</i>	Undertaking surveys as identified above. Confirming requirements for refurbishment of existing beach surface water outfalls.
22	Shingle beach material	Cost estimate	Sediment size is 70mm	Material availability – smaller particle sizes would make the nourished beach less stable requiring more frequent beach nourishment campaigns whereas bigger particle sizes may not be acceptable from the amenity value point of view. <i>QRA ID 17, 18 and 19.</i>	ECI and early public engagement.

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DOCUMENT CHECKING (not mandatory for File Note)

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