

Designer's Risk Assessment



Title of Scheme	<i>Penmaenmawr Sea Defence Wall</i>			Document Ref	24088W-RAR-001	Revision	A01
Location	<i>Penmaenmawr, Conwy</i>			Date of Issue	17/10/2024		
ELR	CNH3	Mileage	<i>229m 1438ch</i>	O.S Grid Ref	SH 70520 76252	Structure No	<i>W2291320</i>

Normal Hazards:
 It is assumed that normal site-based risks will be identified and addressed by the competent contractor with experience of undertaking construction in a Railway environment. These hazards include, but are not restricted to, injury from falling, tripping, lifting materials, contact with substances hazardous to health, etc.

Ref	Residual risk	Activity / Element	Risk	Action at Design Stage	Risk Mitigation by Contractor	Initial	Date
01	Unforeseen ground conditions / groundwater conditions	All Stages	Insufficient bearing resistance leading to sheet piled wall instability and excessive sheet deflection. Refusal of sheet piles and anchors due to unforeseen ground conditions. Unforeseen groundwater table leading to saturated material and reduction in bearing resistance.	Design is based upon the available ground / groundwater information from ground investigation carried out on site. The design has utilised conservative parameters as an allowance for poorer ground conditions. Refusal of sheet piles has been mitigated through the specification of pre-auguring on site.	If unforeseen ground conditions are encountered on site, all works must halt immediately, and the Designer is to be contacted at the earliest opportunity. The Contractor must make an allowance for a geotechnical engineer on site to assess the ground conditions as works progress.	CW	October 2024

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02	Adverse weather	All Stages	Excessive rainfall resulting in saturated material and reduction in bearing resistance behind the existing sea wall. Increase in sea level resulting in toppling of existing sea wall.	The design has taken the worst-case groundwater readings from the ground investigation. The design considers remediation of existing failure, not further damage to the existing sea wall from sea level rise.	Contractor is to install the proposed remediation measures as per the design drawings. Contractor to ensure suitable temporary works design is in place for installation of proposed permanent works.	CW	2024
03	Corrosion of sheet piled wall	All Stages	Corrosion of sheet piled wall leading to damage of the sheets and failure of the sheet piled wall	An allowance for corrosion of the sheet piles has been considered within the design by considering a greater sheet pile section thickness. Corrosion is considered as we are in a marine environment.	Contractor to use the specified materials as per the design drawings. Contractor is to employ a competent person to inspect materials delivered to site to ensure they comply with the design specification. Ensure correct sheet piles that have been specified by the Designer are utilised on site and the target depth is reached.	CW	October 2024

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05	Sheet pile refusal	All Stages	Sheet pile refusal resulting in insufficient excavation	The design has considered top of bedrock levels in accordance with the available ground information. Designer has detailed pre-auguring as a requirement prior to sheet pile installation. If the Contractor is unable to achieve the required toe depth due to shallow bedrock, the Designer is to be contacted at the earliest opportunity. Likely measures are to be a borehole undertaken at the location of the shallow refusal to confirm bedrock and strength properties. Once strength of bedrock is determined, a reassessment of the sheet pile wall can be undertaken.	Contractor to ensure that the piling contractor has made provisions for installation of sheet piling with pre-auguring techniques. If the Contractor is unable to achieve the required toe depth due to shallow bedrock, the Designer is to be contracted at the earliest opportunity.	CW	October 2024

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06	Anchor refusal	All Stages	Refusal of anchors resulting in excessive deflections of sheet pile wall and instability	Appropriate anchor specification and root diameter specified based upon the anticipated materials on site.	Should shallow anchor refusal occur on site, works must halt immediately, and the Designer is to be contacted.	CW	October 2024
07	Adverse loading	All Stages	Adverse loading on top of the existing sea wall / proposed sheet pile wall	Design of sheet pile wall has considered additional loading from potential maintenance / inspection vehicles of 20 kN/m ² immediately behind the top of the existing wall. This load has been considered concurrently with a pedestrian surcharge of 5kN/m ² .	If adverse loading is anticipated above the wall, the Designer is to be contacted at the earliest opportunity and the design re-assessed for alternative loading conditions.	CW	October 2024
08	Fall from height	All Stages	Fall from top of existing sea wall	The permanent works design does not worsen the existing risk nor create an additional fall from height risk.	Contractor to ensure appropriate fall from height mitigation during temporary works element. TWD to either design out fall from height or ensure risk is appropriately flagged to the Contractor.	CW	October 2024

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09	Buried services	All Stages	Damage to known / unknown buried services	Design has been carried out with all available information on buried services provided by the Contractor.	Contractor to CAT and Genny scan the site prior to works commencing and clear / protect all potential services.	CW	October 2024
10	Loss of beach material	All Stages	Overdig resulting in instability of the sheet pile wall	Risk noted. Overdig has been accounted for by factoring in an allowance for reduced passive pressure in front of the sheet piled wall.	If greater excavation works are required than what is allowed for in the design, all works must halt immediately, and the Designer is to be contacted.	CW	October 2024
11	Wall deflections	All Stages	Excessive deflection of sheet pile wall	The design has limited deflections under SLS conditions to >25 mm.	The Contractor must monitor the sheet piled wall during construction and note observable deflections. If excessive deflections are observed, the Designer is to be contacted immediately.	CW	October 2024

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12	Existing sea wall instability	All Stages	Failure of existing sea wall resulting from the instability associated with the undermining from tidal action.	Risk noted. The design considers the active pressure of the sea wall and retained material in the stability checks. However, the design does not consider the structural integrity of the sea wall above top of sheet level. The design improves the stability of the existing sea wall and considers the mass of the sea wall which is resisted by the proposed sheet piles.	If the condition of the sea wall is to further deteriorate from conditions provided to the Designer, an updated conditions report should be undertaken and provided to the Designer. The Contractor is to outsource temporary works to an appropriately qualified design team. Temporary works to consider the stability of the existing sea wall with the addition of a piling rig surcharge.	CW	October 2024
13	Vibration	All Stages	Vibration for sheet pile installation resulting in destabilising existing sea wall	Risk noted. No design mitigation possible.	The Contractor is to visually monitor the existing sea wall for signs of movement / instability / damage and if observed, works must halt immediately.	CW	October 2024

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14	Insufficient Sheet Pile Capacity	All Stages	Bending of sheet piles from active surcharge	Risk has been mitigated through appropriate selection of sheet pile and sheet pile thickness to resist the anticipated loading.	The Contractor is to ensure all materials delivered to site meet the requirements provided by the Designer. If anticipated loading is to deviate from what this design considers, all works must halt immediately, and the Designer is to be contacted.	CW	October 2024
15	Insufficient Ground Anchor Capacity	All Stages	Pullout of anchors from active pressures	Risk has been mitigated through appropriate selection of anchors to resist pullout.	The Contractor is to ensure all materials delivered to site meet the requirements provided by the Designer. If anticipated loading is to deviate from what this design considers, all works must halt immediately, and the Designer is to be contacted.	CW	October 2024

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16	Insufficient Bond Strength	All Stages	Pullout of anchors from insufficient bond strength between the grout and native soil	The design has considered a suitable bond strength for the anticipated soil in accordance with COROA c637. To confirm a suitable bond strength is exhibited in the anticipated soil, 1No. sacrificial anchor test is to be carried out on each side prior to bringing temporary works to site.	Contractor is to carry out sacrificial testing as per specification on design drawings. If the sacrificial testing does not meet the specification requirements of the design, the Designer is to be contacted.	CW	October 2024
17	Sheet Pile Clash with Wall Foundations	All Stages	Clash from installing sheet piles into existing sea wall foundation	Assumed dimensions of sea wall foundation taken and sheet piled wall designed accordingly.	If foundation dimensions deviate from what is assumed, works must halt immediately, and the Designer is to be contacted.	CW	October 2024
18	Contractor not following construction sequence	All Stages	Incorrect sequence followed on site leading to excessive loading onto existing sea wall / anchor refusal / unforeseen clashes	Risk noted, envisaged construction sequence detailed.	Contractor to follow envisaged construction sequence provided by the Designer or construction sequence provided by Specialist Contractor.	CW	October 2024

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19	Ship Collision	All Stages	Failure of stopping a ship resulting in collision with sheet piled wall / sea wall	Risk noted. The design does not consider collision from any sea worthy vessels into the sheet pile wall.	No mitigation possible.	CW	October 2024
20	Damage to existing wall	All Stages	Damage to existing wall from construction of sheet pile wall	Risk noted. The design considers an offset from the existing sea wall to mitigate a potential clash with any foundations. The designer has not had visibility of the construction of the wall and the extents of any foundations. Offset to be confirmed at detailed design.	Contractor to incorporate appropriate exclusion zones and protection measures for the existing sea wall. If the sea wall is damaged from construction activities, the PWD and TWD must be contacted, and all works must halt immediately.	CW	October 2024