

Client: Aberdeenshire Council  
 Project Name: Stonehaven rock armour study  
 Design Element: Detached breakwater

Design Stage: Concept Date  
 Author: A. Dane 24/09/2014  
 Check: G. Kenn 25/09/2014  
 Review: D. Rodger 11/11/2014



TABLE 3-1: DESIGNER'S HAZARD INVENTORY (Revision 1.0, 04 March 2014)

Nr	Activity	Hazard	Task workers	Receptor Other workers	Public	Environ- ment	Eliminate by design?	Mitigation measures	Residual risk	Impracticable solutions
<b>1. CONSTRUCTION PHASE - SAFETY HAZARDS</b>										
<b>1.1 Access and egress</b>										
<b>1.1.1 Delivery of plant and access to site</b>										
1	Plant delivery access to site.	Restricted access to River Carron through narrow roads in Stonehaven. Delays and disruption to normal traffic flow.	Y	Y	Y		N	Early Contractor involvement to consider best access routes for plant and deliveries. Consult with locals to avoid plant delivery during busy periods.	Traffic management plan to be developed. Risk to be identified in Pre Construction Information Pack	
<b>1.1.2 Movement of plant around site</b>										
2	Movement of site traffic on public rights of way e.g. roads and paths.	Public struck by site traffic	Y	Y	Y		N	Traffic Management Plan. Contractors to consult with local resident groups. Corridors for plant movements set up.	Traffic management plan to be developed. Risk to be identified in Pre Construction Information Pack.	
3	Movement of plant around beach and foreshore area	The beach area is a popular area for the public, while the foreshore can be used for rock pooling. Any access by the public will increase the risk of being struck by plant.	Y	Y	Y	Y	N	Consider works outside peak holiday season. Site Management plan will need to consider demarcation of beach area and fencing etc to prevent public access.	Site Management Plan to be developed. Risk to be identified in Pre Construction Information Pack.	
4	General movement around site	Slips, trips and falls	Y	Y			N	All emergency access to be maintained at all times.	Slips, trips and falls.	
5	Mud on road	Hazard to other road users	Y	Y	Y	Y	N	Contract requirements to include wheel wash; road sweeper.	Mud accumulates between road sweeping operations.	None
<b>1.1.3 Delivery of rock armour</b>										
6	<b>Material Delivery Option 1 -</b> Delivery of rock by land	Restricted access to site through narrow, busy roads in and around Stonehaven. Delays and disruption to normal traffic flow.	Y	Y	Y		N	Early Contractor involvement to consider best access routes for plant and deliveries. Consult with locals to avoid material delivery during busy periods.	Traffic management plan to be developed. Risk to be identified in Pre Construction Information Pack	
7	<b>Material Delivery Option 2 -</b> Delivery of rock by sea	Collision with Stonehaven Harbour leading to oil spills and related damage. A number of rocky reefs located on/around the foreshore which could make vessel access difficult. Damage from adverse weather conditions. Disruption to normal vessel traffic	Y	Y	Y	Y	N	Early Contractor involvement to consider appropriateness for sea-based delivery and identify sites for unloading. Up to date bathymetric charts to be supplied and oceanographic conditions (currents, tidal range etc) supplied. To be conducted by competent contractor only.	Vessel Traffic management plan to be developed. Risk to be identified in Pre Construction Information Pack	
<b>1.2 Adjacent land users</b>										
8	Location of site compound	Limited space due to site proximity to coast and built up nature of Stonehaven. Could cause impact on local residents.	Y	Y	Y		N	Careful consideration of site compound positioning. Should avoid disturbance to local residents. Early contractor involvement would be beneficial.		Remote compound
9	Shared use of beach access routes	Injury to public	Y	Y	Y		N	Physical separation of pedestrians and site traffic on footpaths and approaches; designated safe corridors for public to access beach area, signage.	Shared use of accesses. Unauthorised access.	
10	Public access to areas surrounding work area	Injury to public	Y	Y	Y		N	Fencing to site compound and work areas.	Trespassers	
<b>1.3 Working at height</b>										
11	Levelling during rock placement	Site personnel climbing on rock to gain level data	Y	Y			N	Plant based level equipment to be used e.g. Grab levels. Personnel should not be required to climb on rock armour.	Ensure rules regarding no personnel access on rock armour are adhered to.	
<b>1.4 Working near water (Coastal location)</b>										

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12	Working in a tidal location during construction works	Drowning / inundation of works	Y	Y			N	Ensure careful planning of work activities around tidal cycle. Ensure daily weather monitoring and forecasting is undertaken to provide early warning of storm events. Ensure temporary works are in place to mitigate the risk of tidal inundation to working areas. Provide life jackets for all personnel working in close proximity to the sea. Training and tool box talks covering working in a tidal environment	Risk to be identified in Pre Construction Information Pack	
13	General works and operations near the sea	Accidental water entry	Y	Y			N	Contractor to provide life saving equipment Toolbox talks and training to be completed	Risk to be identified in Pre Construction Information Pack	

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14	Flooding of works during construction		Y	Y			N	Temporary tidal defences to be maintained during the course of construction works if required. Contractor to register for Environment Agency flood warning. Remove plant and materials from tidal area every shift.	Risk to be identified in Pre Construction Information Pack	
<b>1.5 Groundwork</b>										
16	Excavation through foreshore material	Ground instability	Y	Y	Y	Y	N	Contractor to ensure construction plant is sited a suitable distance from bank edge and track mats are used where appropriate. Maximum panel length of excavations to be no greater than 5m at any one time and rock armour is to be placed prior to the excavation of second 5m panel.	Risk to be identified in Pre Construction Information Pack	
17	Soft ground	Sinking plant	Y	Y			N	Contractor to undertake site investigation to be undertaken prior to construction. Track mats used where necessary.		
<b>1.6 Existing services</b>										
18	Excavation	Striking unknown services	Y	Y	Y			It is not known if any services run under the beaches at Stonehaven. Full services search to be completed prior to construction commencing. CAT scan before excavation; hand excavation for first 0.5m.	Risk to be identified in Pre Construction Information Pack	
<b>1.7 Unexploded ordnance</b>										
21	Excavation	Striking unexploded ordnance	Y	Y	Y		N	Conduct desk based study for identification of unexploded objects.	Site survey work by experienced personnel. Risk to be identified in Pre Construction Information Pack	
<b>1.8 Confined Spaces</b>										
	N/A									
<b>2. CONSTRUCTION PHASE - HEALTH HAZARDS</b>										
<b>2.1 Manual handling</b>										
22	Manual handling of materials	Injury to personnel	Y	Y			N	Where possible all elements specified should be suitable for lifting and positioning by mechanical means. Suitable access routes to construction areas to allow delivery directly to working area with lifting and handling equipment, competent personnel. Manual handling tool box talks and training.		
<b>2.2 Environmental and weather conditions</b>										
23	Working on site during dark, cold, wet and rainy conditions	Personnel not being visible during short or dark days (due to limited daylight) and being hit by plant, getting wet and cold, slipping or tripping in the wet and cold.	Y	Y			N	Appropriate lighting to be installed if working during evening conditions, all personnel to wear appropriate PPE, including wet weather clothing.		
<b>2.3 Noise and vibration</b>										

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24	Demolition of any relic structures	Hand arm vibration, crushing	Y	Y			N	Use mechanical methods for demolition wherever possible. If hand demolition is required then ensure adherence to guidance.		
<b>2.4 Materials</b>										
25	Biological hazards due to water (eg Leptospirosis)	Illness to personnel	Y				N	Staff awareness, avoid contact, good hygiene practice		
26	Dust due to construction plant and vehicles	Health and visual impact to personnel and public	Y	Y	Y	Y	N	Dust-management measures: tarpaulins on lorries, water sprays		
27	Fuel spillage	Fire hazard, damage to flora (limited), fauna (fish and marine/aquatic species) and coastal waters.	Y	Y	Y	Y	N	Fuel storage remote from waters, all fuel storage areas to be banded and containers located on drip trays; spill kit available	Damage to fauna or groundwater	
28	Hydraulic oil spillage	Fire hazard, damage to flora, fauna and watercourse	Y	Y	Y	Y	N	Regular maintenance of plant; biodegradable hydraulic oil in plant working near watercourses (optional); spill kit	Damage to fauna or groundwater	
29	Mud due to construction plant and vehicles	Dangerous road conditions	Y	Y	Y	Y	N	Contract requirements to include wheel wash; road sweeper	Mud accumulation between road cleaning leading to slippery conditions	None
30	Rock armour placement (Under layer)	Splintering during rock armour placement	Y	Y	Y	Y	N	Rock armour placement method statement to be developed. PPE to be worn at all times		
<b>3. DECOMMISSIONING</b>										
31	Decommissioning of structure	Hazards associated with decommissioning coastal defence during 100 year design life					Y	Materials all have a design life exceeding the 100 years so hazards have been mitigated by design.		
32	Working near water during defence inspection	Water entry	Y				Y	All inspections can be completed during periods of low tide. No requirement to access during high tides		
<b>4. PUBLIC SAFETY</b>										
33	Walking on uneven ground	Slips, trips and falls			Y		N	Ground reinstated to a level surface following construction. No severe changes in level	Construction team to ensure all surface are reinstated appropriately	
34	Normal shipping and navigation	Collision with breakwater structure, damage to boats, breakwater, loss of life/materials, spillage of materials, fire, explosions			Y		N	Contact MCA at the earliest developmental stage to achieve permission to build the breakwater offshore. MCA to advise interested parties of the proposed development, update nautical maps and make announcements of the potential obstruction to shipping. Working in accordance with MCA hold regular meetings with regular users, to work out best practice. Place (illuminated) navigation markers at the breakwater roundhead toes to show where the extents of defence will be.	All subject to MCA approval. Regular toolbox meetings and placement of navigation markers.	
34	Unauthorised climbing on rock armour (breakwater accessible at low tide)	Falls and trapping risk from rock armour			Y		N	Access from the beach side cannot be eliminated but could be discouraged through the use of signage.	Aberdeenshire Council should consider installing warning signage	