

Client: Department of Infrastructure  
 Project Name: Isle of Man - Sea defence options  
 Design Element: DOCA3 - Beach Recharge

Design Stage: Concept Date: 08/12/2014  
 Author: Skanberg-Tipp  
 Check: G. Kenn 16/12/2014  
 Review: G. Kenn 16/12/2014

TABLE 3-1: DESIGNER'S HAZARD INVENTORY (Revision 0.1, 13 December 2013)

Nr	Activity	Hazard	Task workers	Receptor			Eliminate by design?	Mitigation measures	Residual risk	Impracticable solutions
				Other workers	Public	Environment				
<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	<b>Option 1</b> - Excavate (low tide) and truck (Plant delivery from land).	Restricted access to Douglas beach through narrow winding roads. This dredge method would be relatively slow so extended delays and disruption to normal traffic flow would be extended.	Y	Y	Y	Y	N	Early Contractor involvement to consider best access routes for plant and deliveries. Development of a Traffic Management Plan. Consider design options that minimise large plant access. 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.	Due to the large volumes involved, may be impracticable.
2	<b>Option 2</b> - Small Dredge (CS / Pontoon) and pipeline to nourishment zone. (Plant delivery from land).	Restricted through narrow, winding roads. This dredge method would be medium-fast, however delays and disruption to normal traffic flow would be extended. A slurry pipeline is required which may run parallel to the roadway.	Y	Y	Y	Y	N	Early Contractor involvement to consider best access routes for plant and deliveries. Development of a traffic management plan. Consider design options that minimise large plant access. 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.	None.
3	<b>Delivery Option 3</b> - Cutter Suction Dredge (CSD). (Delivery from sea).	Collision with subsea hazards leading to oil spills and related damage. 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, identify potential drop-off site at an early stage. Up to date bathymetric charts to be supplied and oceanographic conditions (currents, tidal range etc) supplied.	Vessel Traffic Management Plan to be developed. Risk to be identified in Pre Construction Information Pack.	None.
4	<b>Delivery Option 4</b> - Trailing Suction Hopper Dredge (TSHD). (Delivery from sea).	Collision with subsea hazards leading to oil spills and related damage. 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, identify potential drop-off site at an early stage. Up to date bathymetric charts to be supplied and oceanographic conditions (currents, tidal range etc) supplied.	Vessel Traffic management plan to be developed. Risk to be identified in Pre Construction Information Pack.	None.
<b>1.1.2 Movement of plant around site</b>										
5	Movement of dredge vessels around Douglas Bay.	Collision with subsea hazards leading to oil spills and related damage. Damage from adverse weather conditions. Disruption to normal vessel traffic.	Y	Y	Y	N	N	Any dredge activities will be prolonged, depending on the capacity of the dredge. Early Contractor involvement to consider appropriateness for vessels harbouring within Douglas Harbour, and identify sheltered areas in the case of storms. Up to date bathymetric charts to be supplied and oceanographic conditions (currents, tidal range etc.) supplied. Investigate whether a license from MMO will be necessary.	Vessel Traffic Management Plan to be developed. Risk to be identified in Pre Construction Information Pack.	None.

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6	Movement of shore-based site traffic on public rights of way.	a) Public vehicles struck by plant on adjacent roadways/barriers, b) Public struck by plant on the beach, sinkage/inundation of plant c) Plant inundated.	Y	Y	Y	Y	Y	a) All works conducted from seaward side of barriers using beach-based plant. b) Consider constructing works during periods when beach area is less busy e.g. avoid summer months. Site Management plan will need to consider demarcation of beach area and fencing etc to prevent public access c) Tidal and weather plan for both methods would be required so work plant is not caught by the tide or adverse weather conditions. - Investigate whether a license from MMO will be necessary.	Tidal and weather works plan to be developed. Site Management Plan to be developed. Risk to be identified in Pre Construction Information Pack	None.
7	General movement around site.	Slips, trips and falls.	Y	Y	N	N	N	All work areas to be kept clean and tidy. Designated pedestrian routes to be demarcated.	Slips, trips and falls.	None.
8	Mud on road.	Hazard to other road users.	Y	Y	Y	Y	N	Monitoring by DoI or Contractor required. Contract requirements may include wheel wash; road sweeper (if adjacent land or activities disturbes soil).	Mud accumulates between road sweeping operations.	None.
<b>1.7 Dredging</b>										
9	Dredge plumes.	Disturbing clays, mud, anoxic zones, ships (oils etc), damage to flora and fauna, increased turbidity, excessive sedimentation smothering flora and fauna.	Y	Y	Y	N	N	Geotech survey to be undertaken prior to works, soundings and sonar to be used during dredging works. Apply for MMO license for dredging and placement of material. Works to be completed by competent contractor.	Site survey work by experienced personnel. Risk to be identified in Pre Construction Information Pack.	None.
10	Dredging.	cutting into services, damage to pipelines, services and the dredger.	Y	Y	Y	N	N	It is not known if services are present in the bay. Full services search to be completed prior to detailed design. CAT scan before excavation.	Site survey work by experienced personnel. Risk to be identified in Pre Construction Information Pack.	None.
11	Down time.	Down time due to stormy conditions, unable to dredge material, large losses of material, increased costs.					N	Consider dredging during quieter summer months, careful planning around weather and tide, apply for flood warning services, contingency built into programme.	Risk to be identified in pre-construction information pack.	None.
11	Unexploded Ordnance.	Striking unexploded ordnance.	Y	Y	Y	N	N	Conduct desk-based study for identification of unexploded objects, followed by detailed vessel mounted assessment of all dredged areas.	Site survey work by experienced personnel (E.g. Fellows). Risk to be identified in Pre Construction Information Pack.	None.
<b>1.7 Deposition</b>										
13	Deposition onto services.	Outfalls become buried during pumping.	Y	Y	Y	N	N	Existing drainage outfalls may require extension in order to prevent them becoming blocked.	Review to be undertaken after services search. Risk to be identified in pre-construction information pack.	None.
14	Public interaction with deposition sites.	Public being struck, submerged or injured.	N	N	Y	N	N	Create onshore working areas, cordoned off from the public. Visible demarcation of pumping site preventing public access. Consultation with locals.	Risk to be identified in pre-construction information pack.	None.

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15	Noise and light pollution during pumping.	Nuisance to local residents and visitors.	Y	Y	Y	N	N	The site is reasonably remote, so is not a large risk. Public consultation will be key and consider pumping during quieter winter months. Designated pumping windows. All noise and vibration to be monitored and controlled around construction site.	Noise, light pollution. Risk to be identified in pre-construction information pack.	None.
16	Disposal of unusable material.	Damage to marine environment, increased turbidity.	N	N	N	Y	N	Arrangements for disposal to be confirmed by contractor. Consider obtaining permission to use existing or new licensed seabed disposal area.	Risk to be identified in pre-construction information pack.	None.
<b>1.2 Adjacent land users</b>										
17	Location of site compound.	Limited space due to site proximity to urban area. Could cause impact on local residents and business owners.	Y	Y	Y	N	N	Careful consideration of site compound positioning. Early contractor involvement would be beneficial.	Contractor to advise on most suitable location and the associated risks.	Remote compound.
18	Shared use of walkways, beach access ramps and promenade access routes.	Injury to public.	Y	Y	Y	N	N	Physical separation of pedestrians and site traffic. Designated safe corridors for public to access the promenade area and clear signage of the work site is required. It would be beneficial to completely close the promenade area fronting Douglas beach during construction, however this may be impracticable due to requirements of public and home owners. May require phased working.	Unauthorised access.	None.
19	Public access to areas surrounding work area.	Injury to public.	Y	Y	Y	N	N	Fencing to site compound and work areas.	Trespassers.	None.
<b>1.3 Working at height</b>										
20	Falling hazard working around existing sea wall.	Falls, falling tools.	Y	Y	N	N	N	Contractor to setup temporary barriers and employ banksmen in areas at risk of working at height.	Contractor to advise on best method for this element of the work. Risk to be identified in Pre Construction Information Pack.	None.
<b>1.4 Working near water (Coastal location)</b>										
21	Flooding of works during construction.	Water damage risk to site and workers.	Y	Y	N	N	N	Contractor to register for Environment Agency flood warning and any other local flood warning services. Remove plant and materials from at risk area, if a flood warning is given.	Risk to be identified in Pre Construction Information Pack.	None.
22	Wave damage during construction.	Water damage risk to site and workers.	Y	Y	N	N	N	Work on the foreshore to be within prescheduled windows around low tide. Contractor to register for Environment Agency flood warning services, and response measures to developed for securing site works and equipment during risk of wave attack.	Risk to be identified in Pre Construction Information Pack.	None.
23	General works and operations near the sea.	Accidental water entry.	Y	Y	N	N	N	Contractor to provide life saving equipment Toolbox talks and training to be completed.	Risk to be identified in Pre Construction Information Pack.	None.
<b>1.5 Groundwork</b>										
24	Soft ground.	Sinking plant.	Y	Y	N	N	N	Site investigation to be undertaken prior to detailed design.	Risk to be identified in Pre Construction Information Pack.	None.
<b>1.6 Existing services</b>										

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25	Excavation (e.g. If installing a slurry pipeline).	Striking unknown services.	Y	Y	Y	Y	N	It is not known if the barriers host conduits for services. Full services search to be completed prior to detailed design. CAT scan before excavation; hand excavation for first 0.5m.	Risk to be identified in Pre Construction Information Pack.	None.
<b>1.8 Confined Spaces</b>										
26	N/A									
<b>2. CONSTRUCTION PHASE - HEALTH HAZARDS</b>										
<b>2.2 Manual handling</b>										
27	Manual handling of materials.	Injury to personnel.	Y	Y	N	N	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.	None.	None.
<b>2.3 Environmental and weather conditions</b>										
28	Working on site during dark, cold, wet and rainy conditions.	Personel 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	N	N	If possible works to be scheduled outside peak winter months, appropriate lighting to be installed if working during evening conditions, all personnel to wear appropriate PPE, including wet weather clothing.	None.	None.
<b>2.4 Noise and vibration</b>										
29	Will vary depending on the dredge method used.	Will vary depending on the dredge method used.	Y	Y	Y	N	N	Full H&S assessment to be undertaken following selection of dredge method.	Risk to be identified in Pre Construction Information Pack.	None.
<b>2.5 Materials</b>										
30	Biological hazards due to water (eg. Leptospirosis).	Illness to personnel.	Y	N	N	N	N	Staff awareness, avoid contact, good hygiene practice.	None.	None.
31	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.	None.	None.
32	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 bunded and containers located on drip trays; spill kit available.	Damage to fauna or groundwater.	None.
33	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.	None.
34	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.
<b>3. Decommissioning</b>										
<b>3.1 Dredging to remove beach</b>										
35	Likely to be undertaken by a CSD. Therefore all hazards above e.g. delivery of plant and carrying out dredging operations apply.	N/A	Y	Y	Y	Y	N	Full risk assessments to be undertaken before decommissioning works.	None.	None.
<b>4. Public Safety</b>										
36	Walking on uneven ground (beach cliffing).	Slips, trips and falls.	N	N	Y	N	N	Ground reinstated to a level surface following construction. No servere changes in level. Check for beach 'cliffing' post construction	Construction team to ensure all surface are reinstated appropriately.	None.

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37	Design not meeting thresholds for tolerable wave overtopping.	Public struck by overtopped water.	N	Y	Y	N	N	Design does not meet tolerable threshold for regular (1 in 1-year event). Hence, DoI will have to implement a storm action plan to close parts of the frontage during these storm events.	Storm action plan to be developed.	None.