Accident Prevention Procedure

Hierarchy of Control: Elimination → Substitution → Engineering control → Administrative control → PPE → Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
TSHD - Dredging												
Dredging												
Encounter of boulders, other submerged objects	Motion	Impact of Objects / Collision	P, A	4	D		Insurvey to identify anomalies before the start of the dredging activities. Mark the location of the obstructions on the survey / Qinsy screen.	Administrative control	4	B		
Damage to infrastructure on the seabottom	Motion	Impact of Objects / Collision	E, A	3	B		Survey of submarine infrastructure prior to start work. Results to be included on survey computer onboard of dredgers. Updated charts / regular update of survey data onboard Re-calibration / system check of draghead, gyro and GPS prior to start work	Administrative control	1	B		
3rd party vessels passing too fast causing high stern waves	Motion	Impact of Objects / Collision	P, E, A	3	C		Posting of navigation sign for reduced manoeuvrability	Administrative control	3	B		JDN.PSI.28.36
Damage to the suction tube, draghead and/ or hull	Motion	Impact of Objects / Collision	E, A	3	C		Installation of safety chains to avoid loss of drag head	Engineering control	3	B		JDN.PSI.28.41
Damage to the suction tube, draghead and/ or hull	Motion	Impact of Objects / Collision	E, A	3	C		Always dredge with an upward bend at the cardan joint. Installation of a hinge piece between the draghead and suction pipe. Measureming and monitoring of tension by means of load cells on the suction tube.	Engineering control	3	B		
Damage to the suction tube, draghead and/ or hull	Motion	Impact of Objects / Collision	E, A	3	C		Install position location buoy in case of loss of draghead	Response & Recovery	3	B		
Damage due to adverse weather (swell, current, ...)	Motion	Impact of Objects / Collision	P, E, A	3	C		Restriction of work time by defining max Hs	Administrative control	3	B		
Damage due to adverse weather (swell, current, ...)	Motion	Impact of Objects / Collision	P, E, A	3	C		Breakup / stop dredging during adverse weather	Response & Recovery	3	B		
Dredging, including overflow, causing high turbidity levels	Biological	Incident involving fauna / flora	E	4	E		Dredging procedure and turbidity limits approved by client. Compliance with permits.	Administrative control	1	E		
Dredging, including overflow, causing high turbidity levels	Biological	Incident involving fauna / flora	E	4	E		Turbidity monitoring, modeling with sampling results.	Administrative control	1	E		
Instability of vessel due to loading. danger of sinking	Pressure	Other	P, E, A	5	B		No overloading. Computer system to monitor draught and pitch. Reduced loads in case of adverse weather. Experienced pipe operator and officers	Administrative control	5	A		
Hazardous gases	Chemical	Exposed to Dangerous Material or Condition	P, A, R	5	C		Investigation of soil reports and other records to determine the risk of release of hazardous gases during dredging activities. Areas with high risks to be indicated on survey computer. Doors, hatches, etc. to be closed during dredging. Gas monitoring at strategic locations Ventilation / aircon to be stopped. Limitation of personnel on deck. Training of personnel in recognition of observations (e.g. smell) and response Technical modifications to prevent intake of hazardous gases in airco system Required PPE (goggles, protective gloves, air line with full-face mask, ...) to be available onboard.	Administrative control	5	B		JDN.SP.08.22
Dredging Operations -TSHD	Motion	Being struck / hit by moving or flying object	P	3	C		'Do not stay in places handling the trailing heads and steel cables supporting equipment when dredging operation.	Administrative control	3	B		

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				S	L	R			S	L	R	
Dredging / vessel movements at borrow area or sailing: Collision with vessels	Motion	Impact of Objects / Collision	P, E, A, R	5	C		Compliance with Port Marine Notice. Continuous monitoring of 3rd party vessels. Radio communication by officer on watch. Always 2 officers on deck during dredging and sailing in critical areas. Agreed communication plan with Port Authorities. Additional communications officer / pilot onboard (if required). Kick-off meeting with vessel to explain scope, safety procedures and past experiences. Respecting COLREG. Sailing routes to dumping location are well considered and communicated.	Administrative control	5	B		
Sawing												
Sawing - incorrect position of draghead	Motion	Being struck / hit by moving or flying object	A	3	C		Only after explicit approval of area management who will consult Mr. JPJ De Nul. Compulsorary toolbox meeting and KOM with the involved crew.	Administrative control	3	B		
Sawing - incorrect position of draghead	Motion	Being struck / hit by moving or flying object	A	3	C		Use of 2 suction pipes, alternating between PS and BS pipe to avoid the need to start sawing.	Substitution	1	B		
Sawing - incorrect position of draghead	Motion	Being struck / hit by moving or flying object	A	3	C		Mention sawing zones and tracks on the survey screen.	Administrative control	3	B		
Sawing in ports/ areas with passage	Motion	Impact of Objects / Collision	P, E, A, R	5	C		Inform the port authorities and perform sawing our off the way of active traffic.	Administrative control	5	B		
Sawing alongside quaywalls	Motion	Impact of Objects / Collision	P, E, A, R	5	C		Engineer on stand-by in the ER. Experienced officers or someone guided by a first officer or Master. Continous monitoring of the activities in the vicinity (onshore and shore). Suspended crane operations. Visitors are not allowed on the bridge. Monitor the weather conditions.	Administrative control	5	B		
Sawing alongside quaywalls	Motion	Impact of Objects / Collision	P, E, A, R	5	C		Monitoring and adapting of DP system, survey and IMC system. Disabling of winches as soon as the suction tube is lifted.	Engineering control	5	B		
Sawing close to shallow areas	Motion	Grounding / Stranding	P, E, A, R	5	B		Define and respect the minimum UKC.	Administrative control	5	B		
Changing picthes	Motion	Being struck / hit by moving or flying object	A	3	C		Changing of pitches in gradual stages to avoid damage caused by vibrations of caviation.	Engineering control	3	B		
Ripper dredging												
Incorrect breaking pin	Pressure	Breakdown of Tool or Equipment	A	3	C		Correct dimensioning of the breaking pin. Start with small pins and increase the size if required. Monitoring damage and wear and tear.	Engineering control	3	B		
Damage on the foundation, water chamber and pins	Pressure	Breakdown of Tool or Equipment	A	3	C		Increase/ decrease sailing speed. Adapt the swell compensator pressure. Change size of pins if required.	Engineering control	3	B		
Milling drag head dredging												

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Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Buckling of suction pipe due to adverse weather (swell, current, ...)	Motion	Impact of Objects / Collision	P, E, A	3	C		Restriction of work time by defining max Hs	Administrative control	3	B		
TSHD - Maintenance and repairs												
Checking and cleaning drag head												
Preparation - poor communication	Motion	Being struck / hit by moving or flying object	P	4	C		Take radio with you all the time and check communication Dredge pipe needs to be completely on deck in its saddle. Wait approval of bridge before start of the activities and all LOTO should be in place.	Administrative control	3	B		
Preparation - poor communication	Gravity	Being struck / hit by dropped object	P	4	C		LMRA to identify loose objects in drag head. Visual inspection of objects in drag head. Select proper tools and method.	Administrative control	4	A		
Cleaning of drag head - preparation	Motion	Being struck / hit by moving or flying object	P	3	C		Select correct tools. Do not use directly your hands.	Administrative control	2	B		JDN.PSI.28.17
Cleaning of drag head - preparation	Psychological	Overexertion (> Stress or Strain)	P	2	D		Rotation of personnel doing the job. Proper posture. Use small step ladders if needed.	Administrative control	2	B		
Cleaning of drag head - preparation	Motion	Fall in the Water (> drowning)	P, R	5	B		Ensure guardrails are available on the drag head platform.	Engineering control	5	A		
Cleaning of drag head - preparation	Gravity	Fall, Trip or Slip - same level	P	2	D		Clean the platform of the drag head before the start of the operation.	Engineering control	1	B		
Cleaning of drag head - preparation	Motion	Being struck / hit by moving or flying object	P	3	C		The visor or water flap of the drag head can be positioned into a better position to gain more access. Nobody should be near the drag head when the visor is moved.	Administrative control	3	B		
Cleaning of drag head -general	Gravity	Being struck / hit by dropped object	P	3	C		Never stand under the drag head.	Administrative control	3	B		
Cleaning of drag head -general	Gravity	Fall, Trip or Slip - same level	P	2	D		Collect removed debris right next to the platform.	Administrative control	2	C		
Cleaning with grinder	Motion	Being struck / hit by moving or flying object	P, A	3	C		Be aware that items in the drag head can fly away due to the tension present.	Administrative control	3	B		
Cleaning with oxygen-acetylene cutting	Chemical	Exposed to Dangerous Material or Condition	P	3	C		Special attention is needed to avoid gasses building up inside small spaces in the drag head.	Administrative control	3	B		
Cleaning with oxygen-acetylene cutting	Motion	Impact of Objects / Collision	P, A	4	C		Cylinders should stay on a safe place away from the drag head. This to avoid debris falling down on top of the cylinders damaging the valves.	Administrative control	4	A		
Removing long cables	Motion	Impact of Objects / Collision	A	4	C		Deckhand informs bridge. Pipe operator will bring the drag head close to the vessel (but still in overboard position). Switch off the engine on the side where the cable is noticed. This to avoid the cable is getting stuck in the propeller. Deckhand informs bridge when cable is cut (with grinder, cutting torch or something else). Bridge team will put the drag head inside the chairs and the turned-off propeller can be activated again.	Elimination	1	B		
Remove obstructions from inside	Chemical	Exposed to Lack of Oxygen (> asphyxiation)	P, R	5	B		Gas monitoring before the start of the operation. Rescue equipment and evacuation equipment should be available.	Administrative control	3	B		
Cleaning of drag head -contaminated material	Chemical	Exposed to Dangerous Material or Condition	P	3	C		Adjust PPE depending on the contamination (rubber gloves, breathing apparatus, etc.) Clothes need to be washed or removed and showering is obligated.	Personal Protective Equipment	2	C		JDN.SP.08.03
Cleaning of drag head -rocks	Motion	Being struck / hit by moving or flying object	P, A	3	C		Only 1 person is working under the drag head supported with 1 supervisor. Rock removal from hopper side towards sea side and start at the corner of the drag head.	Administrative control	3	B		

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				S	L	R			S	L	R	
Cleaning of drag head -wood and metal beams	Motion	Being struck / hit by moving or flying object	P, A	3	C		Always be carefully dislodged from the drag head in order to prevent them from falling down suddenly	Administrative control	3	B		
Cleaning of drag head -UXO	Chemical	UXO encounter	P, A,E,R	5	C		Inform officer of the watch and master. Barricade access to drag head Do not remove the UXO Follow emergency response plan.	Administrative control	5	A		
Cleaning of drag head -fauna	Biological	Incident involving fauna / flora	P, R	2	B		Move away and keep visual contact and observe behaviour. Try to move the snake/ sea animal into the water.	Administrative control	2	A		
Inspection on top of dredge installation	Gravity	Fall from a Height	P, R	5	C		Attach safety harness to lifting eyes on the dredge installation or install a life line on top of the dredge pipes.	Personal Protective Equipment	2	C		JDN.SP.08.03
Working in the hopper												
General	Gravity	Fall from a Height	P,R	5	C		All harnesses shall be correctly inspected and used. Personnel shall be fully attached at all times.	Personal Protective Equipment	2	C		JDN.INSTR.2000 JDN.SP.08.03
Working in a filled hopper.	Motion	Fall in the Water (> drowning)	P,R	5	B		A life buoy with sufficient length of life line shall be thrown in the hopper in proximity where works will be done. The life line shall be attached on deck level. Life jacket shall be worn at all the time.	Personal Protective Equipment	5	A		JDN.INSTR.2000 JDN.SP.08.03
Winch wire replacement												
Installing new winch wire	Motion	Being struck / hit by moving or flying object	P, A	3	C		Winch wires will generally be delivered on a steel or wooden drum. The drum should be positioned in line with the winch. The drum will be put in place by using the deck crane. Before starting the job the drum has to be secured in place, so it cannot move during the unrolling of the wire. The drum can be secured in place by using chains, chain blocks... 1. A part of the new wire shall be rolled off the drum 2. The end shall be inserted through the wire opening of the drum 3. The wire locks shall be secured again on the new wire 4. The winch can be operated slowly to wind the wire on the winch 5. One person shall guide the wire on the winch by using a boat hook, metal bar or crow bar	Engineering control	2	B		JDN.PSI.28.18
Removing old winch wire	Gravity	Fall, Trip or Slip - same level	P	2	D		The completely removed winch wires shall be stored properly to prevent any tripping hazards	Elimination	1	A		JDN.PSI.28.18
Changing of gantry-wires												
Poor coordination - Poor communication between all parties	Motion	Being struck / hit by moving or flying object	P,R	4	C		- Take radio with you all the time and check communication -Dredge pipe needs to be completely on deck in its saddle. - Wait approval of bridge before start of the activities and all LOTO should be in place.	Administrative control	3	B		
Exchange of dredge pipelines												
Exchange of dredge pipelines	Gravity	Fall, Trip or Slip - same level	P	2	D		Be aware of the slippery pipe surfaces.	Administrative control	2	C		
Exchange of pump parts												
Preparation	Biological	Exposed to Dangerous Material or Condition	P	2	C		If possible flush pump before start of the activities.	Elimination	2	A		

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Poor coordination - Poor communication between all parties	Motion	Flooding / Capsizing	P,R	5	B		Provide sufficient light. Use of portable VHF including spare batteries (charged) Define radio channel for communication. Inform all crew before the start of the operation.. There should be one watchman in Pumproom with a UHF radio	Administrative control	3	A		
Mobilisation and preparation of tools	Gravity	Fall from a Height	P,R	5	C		Pump repair box or mercy box is crane-lifted nearest to the work area as possible.	Administrative control	5	A		
Working at height	Gravity	Fall from a Height	P,R	5	c		Personnel are not permitted to stand on housing, casing or pipes.	Administrative control	5	A		
Exchange of pump parts - general	Motion	Flooding / Capsizing	P,R	5	B		Use of emergency sliding piece. Device that slides just in front of the sea inlet.	Elimination	5	A		
Removing or installing of the inspection piece	Motion	Flooding / Capsizing	P,R	5	B		Drain the inspection piece. Test bilge pump.	Elimination	5	A		
Removing or installing of the inspection piece	Motion	Loss of structural integrity / stability	P,A	3	C		Designate a location to place the inspection piece once removed.	Administrative control	2	A		
Removing or installing of the inspection piece	Mechanical	Breakdown of Tool or Equipment	P,A	4	C		Over-compensate the lifting equipment. As it's possible the inspection piece may not come out easily.	Engineering control	4	A		
Removing or installing of the inspection piece	Gravity	Being struck / hit by dropped object	P	4	C		-First remove all bolts on the top half of the flanges, this on both sides of the inspection piece. The bolts on the bottom halves should remain in place. -Make sure chainblocks are tight. -Then the bolts on the bottom halves can be removed on both sides of the inspection piece. -When all bolts are removed it is good practice to lift the piece approximately 10 centimetres to verify if the piece will come out easily. -Before continuing the lift, the loose flange of the inspection piece should be tightened, to prevent it from sliding of.	Administrative control	4	A		JDN.INSTR.2006
Removing or installing of the inspection piece	Motion	Flooding / Capsizing	P,R	5	B		Is the inspection piece out ,place blindplate on Pipeline(Suctionline)	Elimination	5	A		
Removing or installing of the suction cover	Gravity	Being struck / hit by dropped object	P	4	C		-Use of Suction cover lifting bracket. -Attach bracket to designated lift point. -Remove all bolts from the suction cover apart from three on each side at working height. -Hook the lifting bracket in the lower side of the suction cover and then lift the hook of the lifting bracket against the lower side of the suction cover. -Fasten two bolts/nuts to secure the lifting bracket to the suction cover. -Change the lifting equipment on the lifting bracket from the designated lifting point 'BO' – to designated lifting point 'SC' (lifting point for bracket with Suction Cover) and take up the slack on the lifting equipment.	Administrative control	4	A		JDN.INSTR.2006
Removing or installing of the suction cover	Gravity	Fall from a Height	P,R	5	C		-Portable work platforms must be available in the immediate work area to safely access the top bolts. -A sling should be suspended from the deck head to allow a person to hook up a fall arrest harness, should they need to step onto the pipe to access the top bolts. This can also be done while the inspection piece is still in place. The top bolts of the suction cover are then easier to reach. When the inspection piece is removed afterwards, the lower bolts can be removed.	Engineering control	3	B		
Removing or installing of the suction cover	Motion	Being struck / hit by moving or flying object	P	4	C		Make sure the crane is positioned more towards the pump shaft than away from the pump. Like this it is prevented that the suction cover swings towards the persons removing the last bolts.	Engineering control	3	B		

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				S	L	R			S	L	R	
Removing or installing of the suction cover	Gravity	Being struck / hit by dropped object	P	4	C		When the cover is loose, carefully lift the suction cover out of the dredge pump and place in the cradle on the deck floor or transfer deck.	Administrative control	4	A		JDN.INSTR.2006
Removing or installing of the impeller	Gravity	Being struck / hit by dropped object	P	4	C		Position the lifting bracket inside the impeller and secure it by tightening a bolt. The impeller is now locked to the lifting bracket.	Administrative control	4	A		
Removing or installing of the impeller	Gravity	Being struck / hit by dropped object	P	4	C		Turning Machine can be clutched in. Make sure the three part ring has been removed. This is a ring between the impeller and the liner of the shaft preventing the impeller to move towards the gearbox. The impeller can now be turned in its opposite direction until it gets fixed on the bracket. Slowly lift the impeller from the pump housing. Place the impeller in its designated cradle.	Administrative control	4	A		
Repairing of pump parts	Electrical	Exposed to Electricity (> electric shock)	P	4	C		Check if no ponding water is in the work area. Welding in humid environment or wet conditions requires low voltage equimpent.	Engineering control	3	A		
Pump inspection and deblocking												
Poor coordination - Poor communication between all parties	Motion	Being struck / hit by moving or flying object	P	3	C		- Take radio with you all the time and check communication - Wait approval of bridge before start of the activities and all LOTO should be in place.	Administrative control	3	B		
Opening of inspection hatch	Motion	Being struck / hit by moving or flying object	P	3	D		Be aware of pichpoints when turning the inspection hatch open on his hinges.	Administrative control	3	B		
Opening of inspection hatch	Motion	Flooding / Capsizing	P,R	5	B		Drain the inspection piece. Test bilge pump. 'Block impeller with turning gear. Open drain valve on bottom inspection piece. Wait till water flow from drain valve is stopped. If water flow doesn't stop, don't open inspection piece. When water flow is stopped, open door from inspection piece.	Administrative control	5	A		
Inspection and deblocking of the pump	Chemical	Exposed to Lack of Oxygen (> asphyxiation)	P,R	5	B		Implement all control measures related to confined spaces. Provide sufficient light.	Administrative control	3	B		
Inspection and deblocking of the pump	Motion	Being struck / hit by moving or flying object	P	3	C		Spaces between the impeller blades should be inspected one by one. When a next space has to be inspected, all persons should first get out of the pipe/pump.	Administrative control	3	A		
Exchange draghead												
Poor coordination - Poor communication between all parties	Motion	Being struck / hit by moving or flying object	P	3	C		- Take radio with you all the time and check communication - Wait approval of bridge before start of the activities and all LOTO should be in place.	Administrative control	3	B		
Exchange drag head	Psychological	Overexertion (> Stress or Strain)	P	2	D		Use of deck crane to collect heavy tools or equipment from below deck.	Administrative control	1	B		JDN.INSTR.2006
Exchange drag head	Gravity	Fall from a Height	P,R	5	C		Avoid walking on top of the drag head.	Elimination	1	B		

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				S	L	R			S	L	R	
Exchange drag head	Gravity	Fall from a Height	P,R	5	C		-Ensure dredgepipe is properly seated in it's stowage position. - Prepare lifebuoy with line. Ensure that the lifebuoy is tied up properly (responsibility of the watchman on main deck). With min.30m of life line. Watchman must be standby on maindeck with the life line tied up on deck level. -From now onwards, the watchman on main deck with radio shall overview the work activities. He shall be in constant contact with the Person in charge (OOW) and the crew carrying out the work on top of dredge pipe/draghead. The watchman on main deck shall not carry out any other work. -Persons assigned to carry out the job must wear a safety harness. Persons should wear safety harness, when in man basket connected to crane hook. -Install wire where safety harness can be attached. -Persons assigned to carry out the job shall enter the area of work via the steps provided at the different gantries or via the man basket. - All persons carrying out the work must be back on the main deck before LOTO can be removed.	Personal Protective Equipment	2	C		JDN.SP.08.03
Exchange drag head	Motion	Being struck / hit by moving or flying object	P	4	C		After connecting the correct chain blocks to the shackles, all bolts can be disconnected, using an air tool. When all bolts are loose, place the draghead in the determined position: '-The pipe operator should pump out the swell compensator completely, using the winch, until the draghead wire is slack.	Administrative control	4	A		
Check and small maintenance on pipe												
Check bottom and top part of the pipe	Mechanical	Breakdown of Tool or Equipment	A,R	5	C		-Check all bolts and nuts to see if any are loose. -Check for cracks -Check locking plates	Administrative control	3	B		
Check top part of the pipe	Gravity	Fall from a Height	P,R	5	C		-Take a safety harness -Climb on the pipe using the ladder on the gantries -Hook yourself up -Check the pipe	Personal Protective Equipment	2	C		
Changing pickpoints and adapters												
Poor coordination - Poor communication between all parties	Motion	Being struck / hit by moving or flying object	P,R	4	C		- Take radio with you all the time and check communication -Dredge pipe needs to be completely on deck in its saddle. - Wait approval of bridge before start of the activities and all LOTO should be in place. -At least 2 persons to replace pick-points with quadri-lock.	Administrative control	3	B		
Cleaning of drag head -general	Motion	Fall in the Water (> drowning)	P,R	5	B		Ensure guardrails are available on the drag head platform.	Engineering control	5	A		
Manual handling of pick points and chisels	Psychological	Overexertion (> Stress or Strain)	P	2	D		Correct manual handling practices should be applied.	Administrative control	2	B		

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				S	L	R			S	L	R	
Remove pick points with quadri-lock	Gravity	Being struck / hit by dropped object	P,A	4	C		-Stand behind the pick point, facing the draghead; -Place the quadric-lock removing tool against the quadric-lock; -The second person holds the worn out/broken pick point; -Use the hammer to hit the quadric-lock out; -When the quadric lock is removed, the pick point can be removed manually.	Administrative control	4	A		
Remove pick points with quadri-lock	Motion	Impact of Objects / Collision	P	3	C		-In case the pick points are difficult to remove and hammering is required, the use of additional PPE might be considered: Face screen, Dyneema coveralls... -Splinters might come of while hammering pick points.	Personal Protective Equipment	2	B		JDN.PSI.28.17 JDN.SP.08.03
Install new pick points with quadri-lock	Gravity	Being struck / hit by dropped object	P,A	3	C		Use correct tools. -Place the new pick point on the adaptor; -Take a quadri-lock and place it in the opening of the pick point; -Use the hammer to hit the quadri-lock until it is fixed into position.	Administrative control	4	A		JDN.PSI.28.17
Removing pick points connected with bolts	Gravity	Being struck / hit by dropped object	P,A	4	C		-The visor needs to be closed to gain easy access to the pick points. -One person will position himself facing the draghead to remove the lock using a spanner -The second person holds the pick points in position and prevents it from falling.	Administrative control	4	A		
Install new pick points connected with bolts	Gravity	Being struck / hit by dropped object	P,A	3	C		- One person will lift the new pick points into position on the adaptor, -The second person places a lock into the opening of the pick points. -Locks are tightened using a spanner.	Administrative control	4	A		
Replace pick points	Psychological	Overexertion (> Stress or Strain)	P	2	D		A correct posture is essential for the lifting of the piece. The feet should be well supported, knees bent and back straight in the most upright position possible. If required, a lifting device or crane should be used to move the tooth.	Administrative control	1	B		
Cutting of pick points	Motion	Impact of Objects / Collision	P,A	4	C		-Stabilise the pick point before cutting; -Ensure the oxygen and acetylene tip is positioned so that when cutting the pick point, the adaptor underneath is not damaged from the heat -Cut the pick point from the adaptor; -Remove the pick point with hammer	Administrative control	4	A		JDN.INSTR.2013
Inside inspection of loading pipes and valves												
Poor coordination - Poor communication between all parties	Motion	Flooding / Capsizing	P,R	5	B		Strict radio communications at all times by the inspecting person and the operator. Following persons, required for this job, must be equipped with a UHF communication device: • Person entering the loading pipe; • Stand by person near the hatch; • OOW, positioned at the bridge at all times and in charge of the operation; • Operator (in case valve operations need to be inspected).	Administrative control	5	A		
Change rainbow nozzle and bow connection												

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				S	L	R			S	L	R	
Preparation	Motion	Loss of structural integrity / stability	P,A	3	C		The new bow connection piece or rainbow nozzle should be located close to the work area. Also a close by location should be provided to lay down the bow connection or rainbow nozzle that will be removed. Bring spare bolts and nuts to the work area. If not yet foreseen, lifting eyes should be welded on the parts to be exchanged. A hot work permit shall be completed.	Administrative control	2	A		JDN.INSTR.2014
Preparation	Motion	Fall in the Water (> drowning)	P,R	5	B		A scaffold will have to be installed on the bow connection platform to be able to reach all lifting eyes and bolts. Workers shall at all times wear a secured safety harness. The scaffold needs to be erected by competent persons.	Engineering control	3	B		JDN.INSTR.2017
Changing the bow connection	Pressure	Exposed to Noise, Vibration, Pressure or Radiation	P,A	4	C		Disconnect all hydraulics from the bow connection	Elimination	1	A		
Changing the bow connection	Gravity	Being struck / hit by dropped object	P,A	2	D		Slack the wire of the crane or boom a little, to test whether the new bow connection stays in place	Administrative control	2	D		
Changing the rainbow nozzle	Gravity	Being struck / hit by dropped object	P,A	2	D		Slack the wire of the crane or boom a little, to test whether the new nozzle stays in place	Administrative control	2	D		
TSHD - Sailing												
Sailing												
Dredging / vessel movements at borrow area or sailing: Collision with vessels	Motion	Impact of Objects / Collision	P, E, A, R	5	C		Compliance with Port Marine Notice. Continuous monitoring of 3rd party vessels. Radio communication by officer on watch. Always 2 officers on deck during dredging and sailing in critical areas. Agreed communication plan with Port Authorities. Additional communications officer / pilot onboard (if required). Kick-off meeting with vessel to explain scope, safety procedures and past experiences. Respecting COLREG. Sailing routes to dumping location are well considered and communicated.	Administrative control	5	B		JDN.PSI.28.36
Accidental opening of hopper in navigation channel, or as consequence of accident to ensure stability of the vessel	Motion	Impact of Objects / Collision	A,R	5	C		Preventive maintenance system Emergency dump location identified and agreed	Administrative control	5	A		
TSHD - Discharging												
Discharging: Dumping												
Collision, damage, etc.	Motion	Grounding / Stranding	P, E, A	4	B		Trained and competent crew. Compliance with Port Marine Notice. Continuous monitoring of 3rd party vessels and radio communication by officer on watch. Agreed communication plan with client and Port Authorities. Joint coordination / interface meetings with other contractors / stakeholders. Bridge to monitor all vessel movements and anchor positions. Monitoring of current, tide, ... when manoeuvring at dumping area.	Administrative control	1	A		

Accident Prevention Procedure

Hierarchy of Control: Elimination → Substitution → Engineering control → Administrative control → PPE → Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Dumping operations resulting in high turbidity levels	Biological	Incident involving fauna / flora	E	4	C		Dumping procedure and turbidity limits approved by client. Compliance with permits.	Administrative control	4	B		
Dumping operations resulting in high turbidity levels	Biological	Incident involving fauna / flora	E	4	C		Turbidity valve installed inside hopper	Engineering control	4	B		
Dumping operations resulting in high turbidity levels	Biological	Incident involving fauna / flora	E	4	C		Turbidity monitoring, modeling with sampling results.	Administrative control	4	B		
Damage to bottom doors during dumping operations due to bulking and previous incorrect dumps	Motion	Impact of Objects / Collision	E, A	4	B		Best available technique; Optimized work process Before dumping, officer on duty shall ensure vessel is positioned on correct location and dumping ground is deep enough Proper briefing of pipe operator and officer by superintendent Correct and updated survey data loaded into survey computer and put on charts	Administrative control	4	A		
Discharging: Rainbowing												
Rainbow nozzle installation	Motion	Loss of structural integrity / stability	P, A	3	C		The rainbow nozzle should be located close to the work area. Also a close by location should be provided to lay down the bow connection or rainbow nozzle that will be removed. Bring spare bolts and nuts to the work area. If not yet foreseen, lifting eyes should be welded on the parts to be exchanged. A hot work permit shall be completed.	Administrative control	2	A		
Rainbow nozzle installation	Motion	Fall in the Water (> drowning)	P, R	5	B		A scaffold will have to be installed on the bow connection platform to be able to reach all lifting eyes and bolts. Workers shall at all times wear a secured safety harness. The scaffold needs to be erected and inspected by competent persons.	Engineering control	3	B		JDN.INSTR.2017
Changing the rainbow nozzle	Gravity	Being struck / hit by dropped object	P, A	2	D		Slack the wire of the crane or boom a little, to test whether the new nozzle stays in place	Administrative control	2	D		
Rainbowing activities	Motion	Being struck / hit by moving or flying object	P, A	4	D		Ensure the range of the rainbow discharging is an exclusion zone, well indicated and barricaded for unauthorized access.	Administrative control	4	B		
Rainbowing activities	Motion	Being struck / hit by moving or flying object	P, A	4	D		Clearly announce to all auxiliary vessels and port authorties rainbowin activities are about to start as well as the instruction to stay clear from the bow area.	Administrative control	4	B		
Rainbowing activities	Mechanical	Black-out / Loss of power / Loss of direction	P, A	4	D		Close communication between engine room and dredge operator to monitor the discharging parameters and intervene in case of black outs / blockages etc.	Administrative control	4	A		
Discharging: Reclamation through pipelines												
(Dis)connecting floating pipeline to TSHD	Motion	Being struck / hit by moving or flying object	P	3	C		Limit the amount of people on the fore deck, especially when the connection wire is under tension. Close off the area by chain or safety sign.	Administrative control	3	B		
(Dis)connecting floating pipeline to TSHD - poor coordination/communication	Motion	Being struck / hit by moving or flying object	P	3	C		Use of portable VHF including spare batteries (charged). Define radio channel for intraship and intership communication. Wait for the message of the chief mate: hydraulics are running. As soon as winch operator and deckhand are positioned on fore deck with remote control unit and spare battery, they inform the bridge.	Administrative control	3	B		
(Dis)connecting floating pipeline to TSHD - poor coordination/communication	Motion	Being struck / hit by moving or flying object	P	3	C		Discuss snapback area with personnel involved before start of the conenction or disconnection. Mention the location of the safety spot on the bordes. Not allowed to stand on the bordes during pumping through the bow coupling.	Administrative control	3	B		

Accident Prevention Procedure

Hierarchy of Control: Elimination → Substitution → Engineering control → Administrative control → PPE → Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
(Dis)connecting floating pipeline to TSHD - poor coordination/communication	Motion	Impact of Objects / Collision	P, A, R	4	B		Ensure no other vessel are in the direct surrounding. Provide clear and positive information between TSHD and work vessel	Administrative control	4	A		
(Dis)connecting floating pipeline to TSHD - poor coordination/communication	Mechanical	Breakdown of Tool or Equipment	A,R	4	C		Winch operator checks the remote control unit and reports malfunctioning to the bridge. Inspection of lifting bridle and winch wire. Ensure spelter socket is never side loaded.	Administrative control	3	B		
(Dis)connecting floating pipeline to TSHD - poor coordination/communication	Motion	Impact of Objects / Collision	P, A, R	4	B		Winch operator reports distance and direction towards assisting vessel and floating line to the bridge.	Administrative control	4	A		
(Dis)connecting floating pipeline to TSHD - Select correct tools and equipment	Motion	Being struck / hit by moving or flying object	P, A	3	C		Connection wire cannot be too long and should be tick enough. Use of talurit clamps instead of bulldog clamps. Use of talurit clamps instead of socket.	Engineering control	3	B		
Throw heaving line attached to runner wire/rope to assisting vessel.	Motion	Being struck / hit by moving or flying object	P, A	2	D		Provide enough slack.	Administrative control	1	B		
Connecting floating pipeline to TSHD - Heaving in running wire/rope	Motion	Being struck / hit by moving or flying object	P, A	3	C		Use of bosun's hook to guide the running wire/rope. This to prevent the wire from going over the side of the drum. Winch operator informs bridge on direction and tension of the wire. TSHD shall sail slowly towards the bridle. This to avoid tension on the running wire/rope and connection wire and too avoid that the connection wire touches the bottom of the foundation of the bow coupling. As soon as connection wire is three times around the winch and there is connection on the connection wire, deckhand shall stay clear of the winch.	Engineering control	3	B		
Male part of floating line is heaved into the female part of bow connection.	Motion	Being struck / hit by moving or flying object	P, A	3	C		In order not to break the pulling wire, only pull the bullet out of the water when there is enough slack on the floating pipeline.	Administrative control	3	B		
Disconnecting of floating line	Motion	Being struck / hit by moving or flying object	P, A	3	C		There should be never tension on the connection wire and the bridle.	Administrative control	3	B		
Disconnecting of floating line	Motion	Impact of Objects / Collision	A	3	C		Ensure pumps are stopped before disconnection of floating line.	Administrative control	1	B		
Floating line is connected/ disconnected	Mechanical	Breakdown of Tool or Equipment	A	3	C		After disconnecting, inspect equipment used for coupling.	Administrative control	2	B		
Preparation - installation bow connection	Motion	Loss of structural integrity / stability	P, A	3	C		The new bow connection piece should be located close to the work area. Also a close by location should be provided to lay down the bow connection that will be removed. Bring spare bolts and nuts to the work area. If not yet foreseen, lifting eyes should be welded on the parts to be exchanged.	Administrative control	2	A		
Preparation - installation bow connection	Motion	Fall in the Water (> drowning)	P, R	5	B		A scaffold will have to be installed on the bow connection platform to be able to reach all lifting eyes and bolts. Workers shall at all times wear a secured safety harness. The scaffold needs to be erected and inspected by competent persons.	Engineering control	3	B		JDN.INSTR.2017
Preparation - installation bow connection	Pressure	Exposed to Noise, Vibration, Pressure or Radiation	P, A	4	C		Disconnect all hydraulics from the bow connection	Elimination	1	A		
Preparation - installation bow connection	Gravity	Being struck / hit by dropped object	P, A	2	D		Slack the wire of the crane or boom a little, to test whether the new bow connection stays in place	Administrative control	2	D		

Accident Prevention Procedure

Risk reduction method:

Elimination | Substitution | Engineering control | Administrative control | PPE | Response & Recovery

Description	Hazard category	Type of Event	P, A, E, R	Risk ranking			Risk reduction measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Preparation												
Sweepbeam installation & operation	Motion	Being struck / hit by moving or flying object	P, A	3	C	9	Ensure competent mechanics, electricians, welders are available. External skilled labour (shore crane operator, dive team...) must be certified and experienced.	Administrative control	3	B	6	
Sweepbeam installation												
Installation location - Preparation												
Unwanted shifting of sweepbeam during installation	Mechanical	Breakdown of Tool or Equipment	A	3	B	6	Installation alongside quaywall or CSD, sheltered waters	Substitution	3	A	3	
Shore crane or CSD crane can't reach / lift SWB	Motion	Being struck / hit by moving or flying object	P,A	4	C	12	Take into account weight beam + water	Engineering control	4	A	4	
Shore crane or CSD crane can't reach / lift SWB	Motion	Being struck / hit by moving or flying object	P,A	4	C	12	Take crane positioning into account when making the lift plan.	Engineering control	4	A	4	JDN.INSTR.2006
Preparations on multicat												
Assembly of A-frame	Mechanical	Loss of structural integrity / stability	A	4	B	8	Verify correct design drawings. Special attention to alignment and correct installation angles to avoid misfit and re-installation	Engineering control	4	A	4	
Misfit of A-frame onto multicat supports, bent flanges	Mechanical	Loss of structural integrity / stability	A	4	B	8	Apply marks (stripes) to ensure proper alignment of A frame onto supports.	Engineering control	4	A	4	
Installation of the A-frame onto the multicat	Mechanical	Loss of structural integrity / stability	P, A	4	B	8	Use of chainblocks / hydraulic jacks to rigg the A frame in such a way to ensure the right inclination for installation.	Engineering control	4	A	4	
Installation of the A-frame onto the multicat	Gravity	Fall from a Height	P	4	B	8	Install A-framewires & turnbuckles to A-frame before installing A-frame on the multicat - to avoid crew climbing the A frame after installation.	Engineering control	4	A	4	
Installation of the A-frame onto the multicat	Motion	Being struck / hit by moving or flying object	P	4	B	8	Secure wires & turnbuckles of A-frame to avoid them from swinging during installation.	Engineering control	4	A	4	
Installation of the A-frame onto the multicat	Mechanical	Loss of structural integrity / stability	A	4	B	8	Connect taglines to the A frame to guide it during the lifting & positioning.	Engineering control	4	A	4	JDN.INSTR.2006
Installation of the A-frame onto the multicat	Mechanical	Loss of structural integrity / stability	A	4	B	8	Temporarily secure 'legs' of the A frame, while fitting turnbuckles in the designated eyes.	Engineering control	4	A	4	
Installation of the A-frame onto the multicat	Mechanical	Loss of structural integrity / stability	A	4	B	8	Correct orientation of the turnbuckles in designated eyes. Paint / mark sides of the turnbuckles.	Engineering control	4	A	4	
Preparing lifting wires: SWB hanging askew	Mechanical	Loss of structural integrity / stability	A	4	B	8	Take into account that the path of the PS hoisting wire on deck is longer due to the asymmetrical setup of the central snatch blocks. Additionally the PS wire is wound further on the reel due to the position of the wire clamps on the winch.	Engineering control	5	A	7	
Preparing pulling wires	Mechanical	Black-out / Loss of power / Loss of direction	P,A,E	4	B	8	Attention shall be taken in order to prevent the wire from getting caught between the vessel and the tyre fenders or any other obstacle.	Engineering control	4	A	4	
Connection SWP to multicat												
Tilting of the SWB	Gravity	Being struck / hit by dropped object	P, A	4	B	8	Topside valves to be opened before lowering SWB. Valves closed when SWB is under waterline, filled with water, to avoid mud from entering.	Engineering control	4	A	4	
Tilting of the SWB	Gravity	Being struck / hit by dropped object	P, A	4	B	8	SWB to be lowered carefully until completely filled with water: the SWB should first be lowered just below the water line to let it fill up in a controlled manner.	Engineering control	4	A	4	
Callibration												

Accident Prevention Procedure

Risk reduction method:

Elimination → Substitution → Engineering control → Administrative control → PPE → Response & Recovery

Description	Hazard category	Type of Event	P, A, E, R	Risk ranking			Risk reduction measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Calibration marks	Motion	Impact of Objects / Collision	A	3	C	9	Mark calibration points on lifting wires, onshore, before installation. Ensure sufficient painting colours to mark the wires.	Administrative control	3	A	3	
Calibration intervals	Motion	Impact of Objects / Collision	A	3	C	9	Ensure sufficient marking steps: intervals small enough - smaller at design depth.	Administrative control	3	A	3	
Calibration marks	Motion	Impact of Objects / Collision	A	3	C	9	Ensure markings per tide and design/overdredge design.	Administrative control	3	A	3	
Calibration marks - legend	Motion	Impact of Objects / Collision	A	3	C	9	Ensure bridge & winch operator both use to the same sweep beam colour code matrix.	Administrative control	3	A	3	
Marks to guarantee hull clearance (needed space between hull & heighest position SWB)	Motion	Impact of Objects / Collision	A	3	C	9	Clearly mark minimum payout for safe distance under hull (min. 2m).	Administrative control	3	A	3	
Verification of SWB depth	Motion	Impact of Objects / Collision	A	3	C	9	Divers verify actual depth of SB blade when f.e. beam in heighest position.	Administrative control	3	A	3	
Conversion colour code to correct sweep depth	Motion	Impact of Objects / Collision	A	3	C	9	Correct calibration formula and respective SWB depths: carefully consider each component in SWB set-up when calculating vertical distances and sweep heights. Thickness of shackles as well to be taken into account, as f.e. an additional 10cm higher or lower can affect the sweeping process significantly.	Administrative control	3	A	3	
Calibration	Motion	Impact of Objects / Collision	A	3	C	9	Keep in mind to verify calibration: since the wires will stretch a bit and thus the measurements will no longer be accurate.	Administrative control	3	A	3	
Calibration	Motion	Impact of Objects / Collision	A	3	C	9	On the hoisting wires markers are indicating the distance from the lowest part of the beam up to the water surface.	Administrative control	3	A	3	
Moving to sweep area												
Damage to vessel and SWB - sailing	Motion	Being struck / hit by moving or flying object	A	3	C	9	When the multicat sails to the sweeping area, the sweep beam must be lifted up and connected to the securing chains in order to avoid any damage. These chains are used to secure the plough on the A-frame without having cables under tension on deck. When the sweep beam is secured like this, the hoisting wires on deck are slacked. People can go on deck, but extra precaution has to be taken to avoid stumbling over these wires.	Administrative control	3	B	6	
Damage to vessel and SWB - sailing	Motion	Impact of Objects / Collision	A	3	C	9	Sail with reduced speed.	Administrative control	3	B	6	
Start-up sweeping												
Interference with marine traffic	Motion	Impact of Objects / Collision	A, R	5	B	10	Initial start-up in an area with no or less vessel traffic.	Substitution	5	A	7	
Reduced visibility	Motion	Impact of Objects / Collision	A	3	C	9	Avoid initial start-up at night. All work areas will be sufficiently lighted.	Substitution	3	A	3	JDN.PSI.28.36 General Marine Operations
Sweeping Operations												
Damage to vessel and SWB - sweeping	Motion	Impact of Objects / Collision	A	3	C	9	Sailing during sweeping at reduced speed (1.5kts - 2 kts)	Administrative control	3	B	6	
Damage to vessel and SWB - manoeuvring	Motion	Hitting against or caught by something fixed or stationary	A	3	C	9	Prior to turning, the beam should be hoisted (high enough). No strong manoeuvring while beam is at sweep depth.	Substitution	3	B	6	

Risk reduction method:

Elimination | Substitution | Engineering control | Administrative control | PPE | Response & Recovery

Description	Hazard category	Type of Event	P, A, E, R	Risk ranking			Risk reduction measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Bogging of SWB, build up of material on top or inside the SWB	Mechanical	Entanglement / Obstruction of equipment or Bogging	A	3	C	9	Flushing of sweep beam to remove material on top of beam (f.e. by sailing with the SWB above the design sweeping depth).	Engineering control	3	B	6	
Bogging of SWB, build up of material on top or inside the SWB	Mechanical	Entanglement / Obstruction of equipment or Bogging	A	3	C	9	Reduce size of flushing holes (avoid buildup of material inside)	Engineering control	3	B	6	
Bogging of SWB, build up of material on top or inside the SWB	Mechanical	Entanglement / Obstruction of equipment or Bogging	A	3	C	9	Don't position SWB too deep from the start – work in steps: better to start with SWB too high and increase depth in small steps (f.e. 10-20cm)	Engineering control	3	B	6	
Bogging of SWB, build up of material on top or inside the SWB	Mechanical	Entanglement / Obstruction of equipment or Bogging	A	3	C	9	Adjust shape of the blade - equip SWB with additional blade on top / bottom to more easily cut through the hard spots.	Engineering control	3	B	6	
Bogging of SWB, build up of material on top or inside the SWB	Motion	Grounding / Stranding	A	3	C	9	Increased survey frequency to give sufficient feedback to the skipper for eventual adjustments of depth	Administrative control	3	B	6	
Dredging close to structures	Motion	Grounding / Stranding	A	4	C	12	Install inclined hinge points on SWB.	Engineering control	4	A	4	
(Dis)connecting the securing wires when starting / finishing operations.	Motion	Fall in the Water (> drowning)	P	4	C	12	Have movable platform for access to SWB at hand.	Engineering control	4	A	4	
Keeping position in case of emergency	Mechanical	Breakdown of Tool or Equipment	A	3	D	12	Lower SWB onto seabed as emergency manner to stop & hold position.	Response & Recovery	2	B	4	
Snapped pulling wire(s)	Mechanical	Breakdown of Tool or Equipment	A	4	B	8	When the multicat is sweeping and a hard object would be touched after which the beam gets stuck, 1 or 2 pulling wires could be snapped off (these wires are most prone to snap, as they are tensioned in the sailing direction of the multicat). In that case, lifting the beam with both hoisting wires is still possible.	Response & Recovery	2	A	2	

Jan De Nul GROUP

Accident Prevention Procedure

Safety Form
JDN.SF.08.10.e
Revision 00

Hierarchy of Control:

Elimination | Substitution | Engineering control | Administrative control | PPE | Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Survey - Bathymetric survey												
General												
Personnel Transfer	Mechanical	Breakdown of Tool or Equipment	P, A	3	D		Inspection of Marine transfer vessel (eg. CMID, OVID, internal...)	Administrative control	3	B		JDN.INSTR.2010
Personnel Transfer	Motion	Fall in the Water (> drowning)	P, A,	3	C		Last Minute Risk Assessment (LMRA)	Administrative control	3	A		
Personnel Transfer	Motion	Fall in the Water (> drowning)	P, A,	3	C		Stop & Reth!nk	Administrative control	3	A		
Personnel Transfer	Motion	Fall in the Water (> drowning)	P, A,	3	C		Never transfer with equipment. The equipment is separately transferred by means of a hook & cord	Administrative control	3	B		
Inspection and monitoring												
Inspection and monitoring	Motion	Fall in the Water (> drowning)	P, A,	3	C		All lifejacket / work jackets must be inspected annually by an external party	Administrative control	2	C		
Inspection and monitoring	Mechanical	Breakdown of Tool or Equipment	A	2	C		survey equipment to be calibrated according to the IMTE procedure. All equipment used to have a valid calibration date and to be tested before use.	Administrative control	2	A		
Inspection and monitoring	Mechanical	Breakdown of Tool or Equipment	P, A	1	C		Small electrical equipment used for the survey purpose to be inspected annually according to the internal JDN procedure	Administrative control	1	B		
Competence and training												
Survey operations	Motion	Flooding / Capsizing	P, A	3	B		all survey to receive project induction receive specific survey related risks on the project acknowledge the emergency response procedure. The Emergency response charts to be hung up iat key locations on site.	Administrative control	3	B		
Insurvey												
Insurvey of work area	Motion	Fall in the Water (> drowning)	P, A	3	C		Navigate on nautical charts (hard copy or electronic) Visually check your location Report malfunctions of navigation equipment	Administrative control	1	A		JDN.PSI.28.36
Bathymetry												
Bathymetry	Motion	Flooding / Capsizing	P, A	3	B		The launch will be in good and sound condition to perform the survey Besides observing the survey computer, the Skipper should never lose focus from the sailing route or vessel traffic. Keep a good visibility from inside the launch. Use the international survey signs (yellow-blue flag, revolving light). Survey team to review area for survey and consider safest access route In areas with a higher risk of grounding, settings in survey software is done in such a way that peaks are not filtered out automatically	Administrative control	1	A		
Bathymetry	Mechanical	Breakdown of Tool or Equipment	A	2	C		Survey equipment to be calibrated according to the IMTE procedure. All equipment used to have a valid calibration date and to be tested before use.	Administrative control	2	A		
Bathymetry	Gravity	Fall, Trip or Slip - same level	P	2	C		Provide adequate communication means for surveyors working alone in remote areas.	Response & Recovery	1	C		JDN.PSI.28.19
Bathymetry	Motion	Fall in the Water (> drowning)	P, A	3	C		Wear lifejackets for transfer on survey vessel, dredgers. Wear lifejacket for works near water or when needed.	Personal Protective Equipment	2	C		JDN.INSTR.2009 JDN.SP.08.03
Bathymetry	Motion	Impact of Objects / Collision	A	2	D		Installation of a cage to protect the multi/ single beam structure. Repositioing of survey equipment (side mounted instead of in the moonpool).	Engineering control	1	B		

Accident Prevention Procedure

Hierarchy of Control:

Elimination | Substitution | Engineering control | Administrative control | PPE | Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Lowering or lifting of multi/single beam structure												
Lifting or lowering of multi/ single beam structure in/ out the water	Motion	Impact of Objects / Collision	A	3	D		Guide the data cable while lifting the multibeam structure Keep control of the MB pole at all times Use guiding rope when needed Use gloves Smart positioning of the hands	Engineering control	2	B		JDN.PSI.28.18
Lifting or lowering of multi/ single beam structure in/ out the water	Motion	Fall in the Water (> drowning)	P,R	5	B		Life jacket is required for crew on floating line and for crew who assist on deck.	Personal Protective Equipment	2	C		JDN.INSTR.2009 JDN.SP.08.03
Lifting or lowering of multi/ single beam structure in/ out the water	Motion	Fall in the Water (> drowning)	P, A	5	B		Secure multibeam structure to a railing. Cover the moonpool as soon as possible.	Engineering control	5	A		
Installation of base station												
Installation of base station	Electrical	Exposed to Electricity (> electric shock)	P	4	B		check for overhead power lines. never deploy mast in vicinity of power line. keep mast at distance > twice its height away from power lines. During deployment of ground stakes, check area for underground cables. Always ground the mast	Administrative control	4	A		
Installation of base station	Mechanical	Loss of structural integrity / stability	P, A	3	C		ensure wind speed is not excessive during deployment/retraction (< 25km/h) all guy ropes & fasteners to be inspected for wear or damage before deployment. secure stakes / anchors in the ground before attaching guy ropes. Never overload the mast or structure. Use only equipment and accessories in quantities described by the manufacture specifications. follow an 8-guy configuration ensure anchor radius of 80% of the mast height	Administrative control	3	B		
Installation of base station	Gravity	Fall, Trip or Slip - same level	P	2	C		Mark guy ropes clearly or delineate area	Administrative control	2	B		
Installation of base station	Gravity	Being struck / hit by dropped object	P	2	C		During icy periods, the area around the antenna/mast should be marked and roped off to avoid falling ice	Administrative control	2	A		
Installation of marine tide gauge												
Lowering of concrete block	Motion	Impact of Objects / Collision	A	2	D		Check the coordinates. Use different ways to track/ find the sensor. Lowering of concrete block with buoy to detect the correct position. Use of mooring/ auxiliary vessel to keep the main vessel into position.	Engineering control	1	C		JDN.PSI.28.18
Lowering of concrete block	Motion	Being struck / hit by moving or flying object	P, A	3	D		Use of taglines to guide the concrete block to the water. Visual, internal and third party inspection of the rigging gear. Check the crane specifications.	Administrative control	2	B		JDN.PSI.28.18
Installation of sensors	Motion	Impact of Objects / Collision	A	2	D		Check GPS where marine tide gauge should be installed. Use of different ways to track/ find the sensors. Testing and regular pick-up of sensors. Installation of buoy to mark the sensor.	Administrative control	1	C		
Diving operations	Pressure	Being struck / hit by moving or flying object	P, R	4	B		Reference is made to RIA of Jan De Nul Group, sheet diving operations: - Alpha flag - PTW and verification checklist diving operations - Presence of hyperbaric chamber - Diving emergency response chart - Etc.	Administrative control	4	A		JDN.INSTR.2010

Accident Prevention Procedure

Hierarchy of Control: Elimination > Substitution > Engineering control > Administrative control > PPE > Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking S	Risk ranking L	Risk ranking R	Control measures	Hierarchy of Control	Residual risk S	Residual risk L	Residual risk R	Reference Documents
Survey checks and callibrations												
Survey checks (position checks/ and callibrations when in deep water	Motion	Fall in the Water (> drowning)	P	5	B		Only perform the check while vessel is in neutral and the ship is not rolling or tilting. Wait for Skippers signal and the skipper warn the surveyors immediately when 'a big roll' is expected. Do not 'hang over the side' when measuring distance to the waterline (freeboard) or when lowering the SVP probe. Wear a life jacket at all times when working around the water line. Have a watch-person standby	Personal Protective Equipment	5	A		JDN.INSTR.2009 JDN.SP.08.03
Personnel marine transfer												
Personnel marine transfer	Motion	Fall in the Water (> drowning)	P, A	3	C		During transfer, a lifejacket is obligatory. Pay attention on closing and fitting the lifejacket well	Personal Protective Equipment	1	C		JDN.INSTR.2009 JDN.SP.08.03
Personnel marine transfer	Motion	Fall in the Water (> drowning)	P, A	3	C		Never transfer with equipment. The equipment is separately transferred by means of a hook & cord	Administrative control	3	B		JDN.INSTR.2009
Survey during hours of darkness												
Survey during hours of darkness	Motion	Fall in the Water (> drowning)	P	3	C		sufficient light to be provided at the work area	Administrative control	3	B		
Survey during hours of darkness	Motion	Fall in the Water (> drowning)	P	3	C		It is recommended to give consideration to equipping personnel with automatic AIS PLB, as an additional safety precaution.	Personal Protective Equipment	1	C		JDN.INSTR.2010 JDN.SP.08.03
Survey - During hours of darkness	Motion	Flooding / Capsizing	P, A	3	B		Planned survey in accordance with the weather forecast and adjusted if required. Deckhand assists as an extra lookout at all times (except if other urgent matters must be done). Reduce sailing speed.	Administrative control	1	A		
Survey during hours of darkness	Security	Theft / Robbery	P, A	2	D		Sufficient security at the offices and on the road has to be assured and implemented for night workers.	Administrative control	2	B		JDN.INSTR.2015
Weather conditions												
Weather conditions	Motion	Fall in the Water (> drowning)	P	3	C		Check 'weather report for the next 12 hrs' prior to start of survey. Survey to be planned in advance in accordance with the weather forecast activities to be adjusted to the specific weather conditions. In case of an unexpected change of weather during the activities, the surveyor / Skipper will make the final decision regarding the continuation of the survey activities based on the weather conditions.	Administrative control	3	B		
Survey - Topographic survey												
Topography												
Topography - general	Motion	Impact of Objects / Collision	P, E, A	2	C		Always keep attention on where you walk during survey on the sandfield	Administrative control	2	B		
Topography - general	Motion	Impact of Objects / Collision	P, E, A	2	B		Take sufficient brakes during the topography, to avoid overexertion due to the heavy weight of the backpack	Administrative control	2	A		

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Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Topography - close to/ in the water	Motion	Fall in the Water (> drowning)	P, A	5	B		Ensure that personnel peforming this task have VHF radio contact at all times. Radio communication to be tested. Survey during low tide and follow up the tide predication. Inform port/ vessels in the direct vicinity. Wear proper PPE (including life jacket, waders with safety boots, etc.). Working alone is not allowed.	Personal Protective Equipment	5	A		JDN.SP.08.03
Working alone	Biological	Incident involving fauna / flora	E	2	C		whereabouts of surveyors to be known means of communication to be arranged Working alone to be avoided when possible	Administrative control	1	C		JDN.PSI.28.19
Survey - Use of drones												
Survey - Use of drones	Motion	Impact of Objects / Collision	A, R	3	D		Competent drone pilot (JDN Drone Training Certificate) who is familiarised with the used manual and the local laws and regulations. Inform personnel of the scheduled flight. Fly within line of sight, in open areas and keep to safe altitudes. Fully charge the drone. Inspect the system and maintain full control (it is not allowed to be under influence of drugs or alcohol and wait for a strong GPS signal). Do not fly during bad weather.	Administrative control	2	C		

Jan De Nul GROUP

Accident Prevention Procedure -Bunkering oil spill

Safety Form
JDN.SF.08.10.e
Revision 00

Hierarchy of Control:

Elimination → Substitution → Engineering control → Administrative control → PPE → Response & Recovery

Description	Hazard Category	Type of Event	P, E, A, R	Risk ranking			Control measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
General concerns												
Hazard Management												
Bunkering operations	Chemical	Loss of containment / Spill	P	5	C	15	Task Risk Assessment (JHA/SWP)	Administrative control	5	A	7	JDN.SP.08.01
Bunkering operations	Chemical	Loss of containment / Spill	P	5	C	15	LMRA for works under 2m to determine if the required controls are in place. Based on the result of the Last Minute Risk Assessment a JHA could still be required.	Administrative control	5	A	7	JDN.SP.08.01
Bunkering operations	Chemical	Loss of containment / Spill	P	5	C	15	Stop and Reth!nk	Administrative control	5	A	7	JDN.SP.08.01
Permit to work												
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Permit to work & subsequent bunkering verification checklist	Administrative control	4	A	4	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Necessary permits shall be applied for with port authorities.	Administrative control	4	B	8	
Communication												
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	The red Bravo Flag shall be raised prior to the start of bunkering operations	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	All crew shall be briefed by the Chief Engineer of the planned bunkering operations	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Correct signage shall be in place prior to the start of bunkering operations: No smoking, no hot works, bunkering ongoing...	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	The bunker barge will be informed by the Chief Engineer about the time of commencement of the fuel transfer	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	The Chief Engineer shall specify and communicate to the supervisor of the bunker barge, the quantities to be bunkered per tank and average/maximum loading rates	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	There will be direct communication between the Able Body supervising the fuel transfer and the supervisor of the bunker barge.	Administrative control	4	B	8	
Communicating planned / ongoing bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Communication lines between bunkering station, duty officer and engine room shall be checked prior to commencement of bunkering operations	Administrative control	4	B	8	
Emergency preparedness and response												
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Emergency Response Plan to be in place covering Oil Spills to the environment. All relevant authorities shall be indentified and contact details shall be readily available	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Quick shut off valve shall be in use and in a good condition	Engineering control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Emergency stop shall be present on the fuel pump	Engineering control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Oil spill equipment kits shall be readily available in a closeby and accessible location	Administrative control	2	C	6	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Oil spill equipment kits shall be fully stocked in accordance with the vessel's SOPEP plan	Administrative control	4	A	4	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Fuel hose shall be of a buoyant type	Engineering control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Connecting flanges shall be secured (e.g. with steel wire)	Engineering control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Only automated fuel dispensers are allowed, open hoses with open ends are not accepted	Engineering control	4	B	8	
Compliance with local and international regulations	Chemical	Loss of containment / Spill	E, R	4	C	12	All marine bunkering shall comply with MARPOL and local requirements	Administrative control	4	B	8	
Relative movements between the vessel and the bunker barge	Chemical	Loss of containment / Spill	E, A, R	4	C	12	Vessel shall take bunkers while on anchor or in port	Administrative control	4	B	8	
Relative movements between the vessel and the bunker barge	Chemical	Loss of containment / Spill	E, A, R	4	C	12	All mooring lines between vessel and bunkering barge will be checked and tightened	Engineering control	4	B	8	
Relative movements between the vessel and the bunker barge	Chemical	Loss of containment / Spill	E, A, R	4	C	12	Independent weather forecasts shall be consulted when planning bunkering activities.	Administrative control	4	B	8	
Relative movements between the vessel and the bunker barge	Chemical	Loss of containment / Spill	E, A, R	4	C	12	If unexpectedly adverse weather would occur, the person in charge will make the decision whether bunkering activities can continue	Administrative control	4	B	8	

Relative movements between the vessel and the bunker barge	Motion	Impact of Objects / Collision	E, A, R	4	C	12	Fenders have been checked and there should be no metal to metal contact between vessel and bunker barge	Engineering control	2	C	6	
Overflowing of fuel tanks	Chemical	Loss of containment / Spill	E, R	4	C	12	Maximum allowable transfer rate and pressure shall not be exceeded to prevent fuel tanks from overflowing	Administrative control	4	B	8	
Preventing spills to reach the open environment	Chemical	Loss of containment / Spill	E, R	4	C	12	Drip trays shall be used to collect small leaks	Engineering control	2	C	6	
Preventing spills to reach the open environment	Chemical	Loss of containment / Spill	E, R	4	C	12	All fuel vents shall be foreseen with a drip tray and drip trays shall be empty	Engineering control	2	C	6	
Preventing spills to reach the open environment	Chemical	Loss of containment / Spill	E, R	4	C	12	Drains and scuppers shall have their corresponding plugs installed	Engineering control	4	A	4	
Preventing spills to reach the open environment	Chemical	Loss of containment / Spill	E, R	4	C	12	Drain off any accumulation of water from deck	Engineering control	4	B	8	
Preventing spills to reach the open environment	Chemical	Loss of containment / Spill	E, R	4	C	12	Overboard valves connected to the engine room bilge and bunker lines are closed and sealed	Engineering control	4	A	4	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Oil Pollution drill every 3 months	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	P, A, R	4	C	12	The fuel supplier will be selected upon effective evidences of Staturoy Authorizations to operate within the relevant country/region	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	P, A, R	4	C	12	For smaller vessels the skipper shall take the position of the Chief Engineer	Administrative control	4	C	12	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Their shall be continuous monitoring of tank levels and pressures in supply lines by a competent person	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	All bunkering activities shall be logged in the Oil Record Book	Administrative control	4	C	12	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Bunkering of fuel will always be in accordance with technical service note	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	A watch system will be instituted on board both vessels/barge, to allow for a quick stop of the fuel transfer pump if necessary	Administrative control	4	B	8	
Bunkering operations	Chemical	Loss of containment / Spill	E, R	4	C	12	Barricade the area in case a spill has occurred	Administrative control	4	B	8	
Monitoring and inspection												
Bunkering operations	Chemical	Loss of containment / Spill	P, E, A, R	4	C	12	The fuel hose shall have the relevant certification	Administrative control	4	A	4	
Bunkering operations	Chemical	Loss of containment / Spill	P, E, A, R	4	C	12	The fuel hose shall be properly inspected and maintained	Administrative control	4	A	4	
Bunkering operations	Chemical	Loss of containment / Spill	P, E, A, R	4	C	12	Fuel hose and connections shall be inspected prior to the start of bunkering operations by the vessels' Chief Engineer	Administrative control	4	A	4	

Jan De Nul GROUP	Accident Prevention Procedure - Sweeping Oil Spill	Safety Form JDN.SF.08.10.e Revision 00

Risk reduction method:

Elimination | Substitution | Engineering control | Administrative control | PPE | Response & Recovery

Description	Hazard category	Type of Event	P, A, E, R	Risk ranking			Risk reduction measures	Hierarchy of Control	Residual risk			Reference Documents
				S	L	R			S	L	R	
Preparation												
Sweepbeam installation & operation	Chemical	Loss of containment / Spill	E	4	C	12	Oil spill equipment present onboard if hydraulic equipment breaks down	Response & Recovery	2	C	6	