MARINE LICENCE CML2365

CONDITION 3.25: CEMP#3 – ACTIVITY 1, CABLE LAYING AND PROTECTION, AND ACTIVITY 4, NEW DOUGLAS CCS PLATFORM

Liverpool Bay CCS Project

Marine and Coastal Access Act 2009

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1. INTRODUCTION

1.1. SCOPE AND PURPOSE

1.1.1. This document is the **Construction Environmental Management Plan #3 (CEMP #3)** for the laying, burial, and protection of electrical cables, and the installation of the Douglas CCS jacket and platform and provides information to fulfil the requirements for the partial discharge of **Condition 3.25** of Marine Licence **CML2365**.

1.1.2. These works, to be carried out from June to September 2026 will represent **Phase 3** of **Licenced Activity 1** (cable installation and protection). **Activity 1** has sub-activities that will be carried out in sequence, which are set out below and in **Table 1.1** and highlighted by blue shading. In addition of **Activity 4 in relation to the installation of Douglas CCS.**

1.1.3. This document is **CEMP #3** and is the third in a sequence of three required CEMPs phased in line with the planned programme of works for **CML2365 Activities 1–5**, as follows:

- **Activity 1 (Cable laying and protection)** will require three separate CEMPs reflecting its delivery in three phases.
    - **CEMP #1 submitted in October 2025**, ahead of the Phase 1 works (HDD exit pit cofferdam on Talacre Beach, and the conduit pipe installation), scheduled for February and March 2026. These works form the Offshore element of an Onshore HDD under Gronant Dunes.
    - **CEMP #2 submitted in January 2026**, in advance of the Phase 2 works, which comprise laying the third-Party crossing protection starting in April 2026, in advance of the Phase 3 (CEMP #3) cable laying works in mid-2026, and mid-2027.
    - **CEMP #3 submitted in April 2026**, in advance of the Phase 3 works, which comprise re-opening of the HDD exit pit cofferdam and beach preparation planned for June–July 2026, and the subsequent cable-lay and protection campaigns from PoA to New Douglas in mid-2026, and New Douglas to satellites in mid-2027.
- **Activity 2 (Pipeline spool laying and protection)** will be included in an updated **CEMP#3**, to be submitted in January 2027, ahead of the offshore pipeline spool installation window in June–August 2027.
- **Activity 3 (Clearance of unexploded ordnance)** is unlikely to be required and would not currently require a CEMP. This is because survey results indicate no UXO clearance is needed prior to installation of any of the activities covered by CML2365.
- **Activity 4 (Installation of the New Douglas CCS Platform and pipeline repurposing)** will be supported by **CEMP #3**, with installation scheduled for September 2026.
- **Activity 5 (Removal of dropped objects)** does not require a CEMP, as it will be managed in accordance with the Liverpool Bay CCS Limited Dropped Objects Plan (DOP), which applies to all five licenced activities throughout the 25-year project duration. The DOP has been included as an Appendix to each CEMP (**Appendix H**), and a summary of its key requirements presented within the main text.

1.1.4. In summary, **Table 1.1** shows that three CEMPs (**CEMPs #1–#3**) will be prepared and submitted in advance of key construction stages for the Marine Licensable Activities in

Welsh Waters, ensuring alignment between environmental management and the staged programme of offshore works.

Table 1.1 Indicative timetable for phased CEMP submission for CML2365 Condition 3.25

Licence Activity	Sub-activity	Installation Dates	CEMP submission date
Activity 1 – Cable laying and protection (Phase 1)	• HDD under Gronant Dunes and conduit pipe installation.	February and March 2026	CEMP #1 – APPROVED
	• HDD Exit pit cofferdam, conduit sump, and conduit pipe bonding/welding.		
Activity 1 – Cable laying and protection (Phase 2)	• Pre-lay grapnel run for all cables. • Pre-laying third-party crossing protection for PoA to New Douglas cable. • Pre-laying third-party crossing protection for New Douglas to satellites cables.	April 2026	CEMP #2 – APPROVED
Activity 1 – Cable laying and protection (Phase 3)	• Re-opening of HDD Exit pit cofferdam, beach preparation, and cable shore pull.	June-July 2026	CEMP #3 – May 2026
	• PoA to New Douglas cable lay and post-lay protection.		
	• New Douglas to satellites inter-platform cable lay and post-lay protection.	July 2027	
Activity 2 – Pipeline spool laying and protection	• Installation of new sections of pipeline spools to connect the new Douglas CCS platform to the existing subsea natural gas pipelines. • Installation of concrete mattresses and external rock protection on sections of pipeline.	June-August 2027	Updated CEMP #3 – January 2027
Activity 3 – Clearance of Unexploded Ordnance (UXO)	• Clearance of a maximum of twelve UXOs within the Licensed Area. The UXO clearance will be undertaken during daylight hours only.	Survey results currently indicate that UXO clearance will not be required prior to installation of any LB CCS infrastructure.	No CEMP required
Activity 4 - Installation of the New Douglas Carbon Capture and Storage (CCS) Platform and connecting to/repurposing existing pipelines	• Installation of a new Douglas CCS Platform to the northwest of the exiting Douglas complex platform. • The installation of the new Douglas CCS platform will include up to eight driven piles. • Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to CO_2 service.	September 2026	CEMP #3 – May 2026
Activity 5 - Removal of accidentally dropped objects	• As approved by the Licensing Authority under condition 3.7	Across 25-year project lifetime.	Incorporated within each CEMP – Activity addressed in

Licence Activity	Sub-activity	Installation Dates	CEMP submission date
pursuant to condition 3.7			Dropped Objects Plan (DOP) relevant to the activities within each of the three CEMPs.

1.1.5. This **CEMP#3** consolidates all applicable Marine Licence conditions, encompassing pollution prevention measures, equipment maintenance standards, refuelling protocols, unexploded ordnance procedures, marine archaeological considerations, and the management of invasive non-native species. It incorporates references to specific sections and appendices detailing plans such as the **Invasive Non-Native Species Management Plan (Appendix B)**, **Marine Pollution Contingency Plan (Section 4.3)**, and the **Written Scheme of Investigation (Appendix C)** for archaeological matters.

1.1.6. The CEMP is designed to prevent unacceptable environmental impacts by ensuring thorough planning and implementation of works. This approach incorporates mitigation measures, compliance audits, and provides assurance to third parties throughout project delivery.

1.1.7. Alongside **Condition 3.25**, other conditions are addressed within different sections of this **CEMP #3**. **Table 1.2** indicates where information required by each condition can be found in this **CEMP #3**.

Table 1.2 Marine Licence CML2365 Requirements in CEMP#3

Reference	Requirement	Location
Condition 3.10 Notified Contractors, Vessels and/or Vehicles only to Carry out Licensed Activities	Only those agent(s), contractor(s), sub-contractor(s), vessels and/or vehicles whose details have been notified to the Licensing Authority may operate under the terms of this Licence. Any changes must be notified to and be approved by the Licensing Authority in writing prior to any such agent, contractor, subcontractors or vehicles carrying out any Licensed Activities pursuant to or otherwise operating under this Licence.	**Section 3.1:** Roles, Responsibility and Authority
Condition 3.11 Refuelling of Plant and Equipment	The Licence Holder must ensure that plant, vehicles and machinery are not refuelled on the foreshore or in the sea.	**Section 4.2** Fuel Storage and Refuelling
Condition 3.12 Equipment, Structures and Access	The Licence Holder must ensure that all equipment, temporary structures, access tracks, waste and/or debris associated with the Licensed Activities are removed on completion of the Licensed activities.	**Section 4.3:** Waste Management Plan
Condition 3.14 Pollution Prevention	The Licence Holder must ensure that pollution prevention best practice is adhered to at all times. Any incidents must be reported to the Licensing Authority as soon as possible using the hotline number **0300 065 3000**.	**Section 4.3:** Marine Pollution contingency Plan
Condition 3.15 Spillage of Pollutants	The Licence Holder must employ bunding, storage facilities and spill kits to contain and prevent the release of fuel, oils and chemicals associated with the plant, refuelling and construction equipment into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity	**Section 4.3:** Marine Pollution contingency Plan

Reference	Requirement	Location
Condition 3.16 Prevention of Disposal of Man-made Debris	The Licence Holder must ensure that all reasonable precautions are taken to prevent the disposal of man-made debris to the marine environment. Such material must be removed immediately and be disposed of appropriately. If it is not possible to prevent manmade debris from entering the marine environment during the Licensed Activities, the Licensed Activities must cease immediately.	**Section 4.3** Waste Management Plan
Condition 3.17 Cleanliness of Equipment	The Licence Holder must ensure that equipment, machinery and PPE are washed with freshwater and/or thoroughly airdried before deployment and before moving between locations.	**Appendix B:** Invasive Non-Native Species Management Plan.
Condition 3.23 Unexploded Ordnance (UXO) Method Statement	The Licence Holder must submit an UXO Method Statement to the Licensing Authority for written approval **at least 4 months** prior to commencement of Licensed Activity 3. No Licensed Activities relating to Licensed Activity 3 may be undertaken prior to written approval from the Licensing Authority.	Survey results currently indicate that UXO clearance will not be required prior to installation of any LB CCS infrastructure.
Condition 3.24 Marine Archaeology	The Licence Holder must submit a **Written Scheme of Investigation (WSI)** which shall be in accordance with the outline WSI (CML2365-LBA CCS Ltd_OFFSHORE ES_Appendix U WSI_NRW_FINAL) to the Licensing Authority for written approval at least **4 months** prior to commencement of the Licensed Activities. No Licensed Activities may be undertaken prior to written approval from the Licensing Authority. The Licence Holder must submit a **Protocol for Archaeological Discoveries (PAD)** to the Licensing Authority for written approval at least 4 months prior to commencement of the Licensed Activities. No Licensed Activities may be undertaken prior to written approval from the Licensing Authority.	**Section 4.6:** Marine Archaeology **Appendix C:** Written Scheme of Investigation – WSI.
Condition 3.25 Construction Environmental Management Plan (CEMP)	The Licence Holder must submit a CEMP to the Licensing Authority for written approval at least **4 months** prior to commencement of the Licensed Activities. No Licensed Activities may be undertaken prior to written approval from the Licensing Authority. The CEMP must:	This document: **CEMP#3:** Activity 1 – Cable laying and protection, and Activity 4 – New Douglas CCS Platform
	3.25 (i) be in accordance with the Outline Environmental Management Plan (CML2365-LBA CCS Ltd_OFFSHORE ES_Appendix R EMP_NRW_FINAL)	
	3.25 (ii) be in accordance with the Outline Invasive Non-Native Species Management Plan (INNSMP) (CML2365-LBA CCS Ltd_OFFSHORE ES_Appendix T INNS_NRW_FINAL)	**Appendix B:** Invasive Non-Native Species Management Plan.
	3.25 (iii) include a Marine Pollution Contingency Plan containing planning for accidental spills, address all potential contaminant releases and include key emergency contact details	**Section 4.3:** Marine Pollution Contingency Plan
	3.25 (iv) include measures to reduce vehicle disturbance to benthic habitats while working in the intertidal area, and	**Section 2.6:** Description of CML2365 Activity 1.
	3.25 (v) include measures to minimise disturbance to birds while working in or near the intertidal area	**Section 2.6:** Phase 2 Activity 4: Standby for CLV and setting of CLV anchors.

Reference	Requirement	Location
Condition 3.33 Post Construction As-Built Report	The Licence Holder must provide to the Licensing Authority the following information within **4 months** of completion of the Licensed activity for written approval: (i) Confirmation of construction completion date; (ii) As built plans, and (iii) Latitude and longitude coordinates of the New Douglas Carbon Capture and Storage (CCS) Platform provided as Geographical Information System data referenced to WGS84 datum.	The preparation and submission for approval of the required '**As-Built**' information will be phased in line with the planned programme of works for Licenced Activities 1–5, as set out in **Table 1.1**. Therefore, on completion of the cable laying and post lay mattresses, and Douglas CCS installation, 'as-built' information for **Activity 1 & 4**, covered by **CEMP #3**, will be provided to the Licensing Authority.

1.2. AIM AND OBJECTIVES

1.2.1. The aim of this **CEMP #3** is to ensure that the works outlined in this document do not result in unacceptable environmental effects. It will set out how the works will be managed to reduce, avoid and mitigate adverse effects. In particular, the **CEMP #3** shall:

- Provide a mechanism for ensuring that measures to mitigate potentially adverse environmental effects are implemented;
- Provide assurance to third parties that their requirements with respect to environmental performance will be met; and
- Provide a framework for compliance auditing and inspection to enable the Project to be assured that its aims with respect to environmental performance are being met.

1.3. STATUTORY GUIDANCE AND BEST PRACTICE

1.3.1. Access to this **CEMP #3** will be provided to each person working on behalf of Liverpool Bay CSS Limited's contractors; Boskalis Subsea Cables (**Activity 1**), and Heerema (**Activity 4**). Boskalis Subsea Cables, and Heerema will each maintain a copy of **CEMP #3** at all work site offices, and on vessels, for reference by the entire workforce. It will be accessible to all personnel and representatives of the relevant enforcement Authority, and all Subcontractors. All works shall be undertaken in compliance with this **CEMP #3** and with all applicable legal and regulatory requirements. Liverpool Bay CCS Limited will take responsibility that their works do not contravene legal requirements and acknowledges adherence to this **CEMP #3** alone cannot be a full defence regarding legal action.

1.3.2. Liverpool Bay CCS Limited shall comply as necessary with the Construction (Design and Management) Regulations 2015 (CDM) and shall comply with all the applicable pollution control regulations in which case Liverpool Bay CCS Limited shall obtain and keep current any necessary consent, authorisation, approval or permission.

1.3.3. Liverpool Bay CCS Limited shall ensure, where relevant, that works are undertaken in accordance with current guidance and best practice.

1.4. ENVIRONMENTAL MANAGEMENT SYSTEM

1.4.1. This CEMP #3 has been produced in accordance with principals outlined in BS EN ISO14001:2015. Boskalis Subsea Cables, and Heerema will mirror the Liverpool Bay CCS Limited environmental values and standards including the promotion of these values and standards among their staff, subcontractors, and suppliers engaged on the works. Both Boskalis Subsea Cables, and Heerema can demonstrate the principles of BS EN ISO 14001:2015 and has an Environmental Management System (EMS) certified to the standard.

1.5. INTERFACE AND ASSOCIATED DOCUMENTS

1.5.1. The considerations, mitigation and measures that are described in this CEMP #3 are informed by relevant assessments and descriptions contained within the Offshore Environmental Statement (ES) that supported the Marine Licence (CML2365) application. The relevant ES chapters are as follows:

- ES Volume 2, Chapter 4: The Proposed Development;
- ES Volume 2, Chapter 6: Physical Processes;
- ES Volume 2, Chapter 7: Marine Biodiversity;
- ES Volume 2, Chapter 8: Offshore Ornithology;
- ES Volume 2, Chapter 9: Shipping and navigation;
- ES Volume 2, Chapter 10: Commercial Fisheries;
- ES Volume 2, Chapter 11: Marine Archaeology; and
- ES Volume 2, Chapter 12: Infrastructure and Other sea users.

1.5.2. This CEMP #3 also interfaces with several other management plans, and method statements. It has been drafted to be consistent with the timings, approaches and controls set out in the preconstruction plans and documents submitted for approval under Marine Licence CML2365. Specifically, implementation of this CEMP #3 will require interface with the following Management Plans, which are all Activity-specific Conditions of Marine Licence CML2365:

- Cable Specification and Installation Plan (CSIP), as required in Condition 3.19;
- Vessel Management Plan (VMP), as required in Condition 3.27;
- Navigation and Safety Plan (NSP), as required in Condition 3.29; and
- Lighting and Marking Plan (LMP), as required in Condition 3.30.

1.5.3. Regarding the 'cable crossing and working agreements', as required in Condition 3.31., confirmation of the acceptance of the proposed design and installation methods has been obtained from the relevant third parties and submitted accordingly.

1.5.4. On completion of the activities LB CCS Limited will undertake the following:

- Compass Deviation Survey, as required in Condition 3.28;
- Installed Cable and Pipeline Report, as required in Condition 3.32; and
- Post Construction As-Built Report, as required in Condition 3.33.

2. CONSTRUCTION ACTIVITIES AND PROGRAMME

2.1. ACTIVITY LOCATION AND DESCRIPTION

2.1.1. The cable laying, and platform installation activities will be carried out in Liverpool Bay during summer 2026. These works are in preparation for the transportation of carbon dioxide (CO_2) into the depleted oil and gas reservoirs. There will be two main activities:

- Activity 1: cable laying and external protection; and
- Activity 4: Installation of the New Douglas Carbon Capture and Storage (CCS) Platform.

2.1.2. The existing pipelines crossed are located close to the new Douglas CCS platform, within the 500m exclusion zone. These comprise a variety of pipelines formerly used to transport oil, natural gas, condensate, produced water, and methanol.

2.1.3. Third-party cable crossings along the planned cable route are export cables and inter-platform cables associated with the Burbo Bank, North Hoyle, and Gwynt y Mor offshore wind farms, and the Western Link HVDC cables, as shown in Figure 2-1.

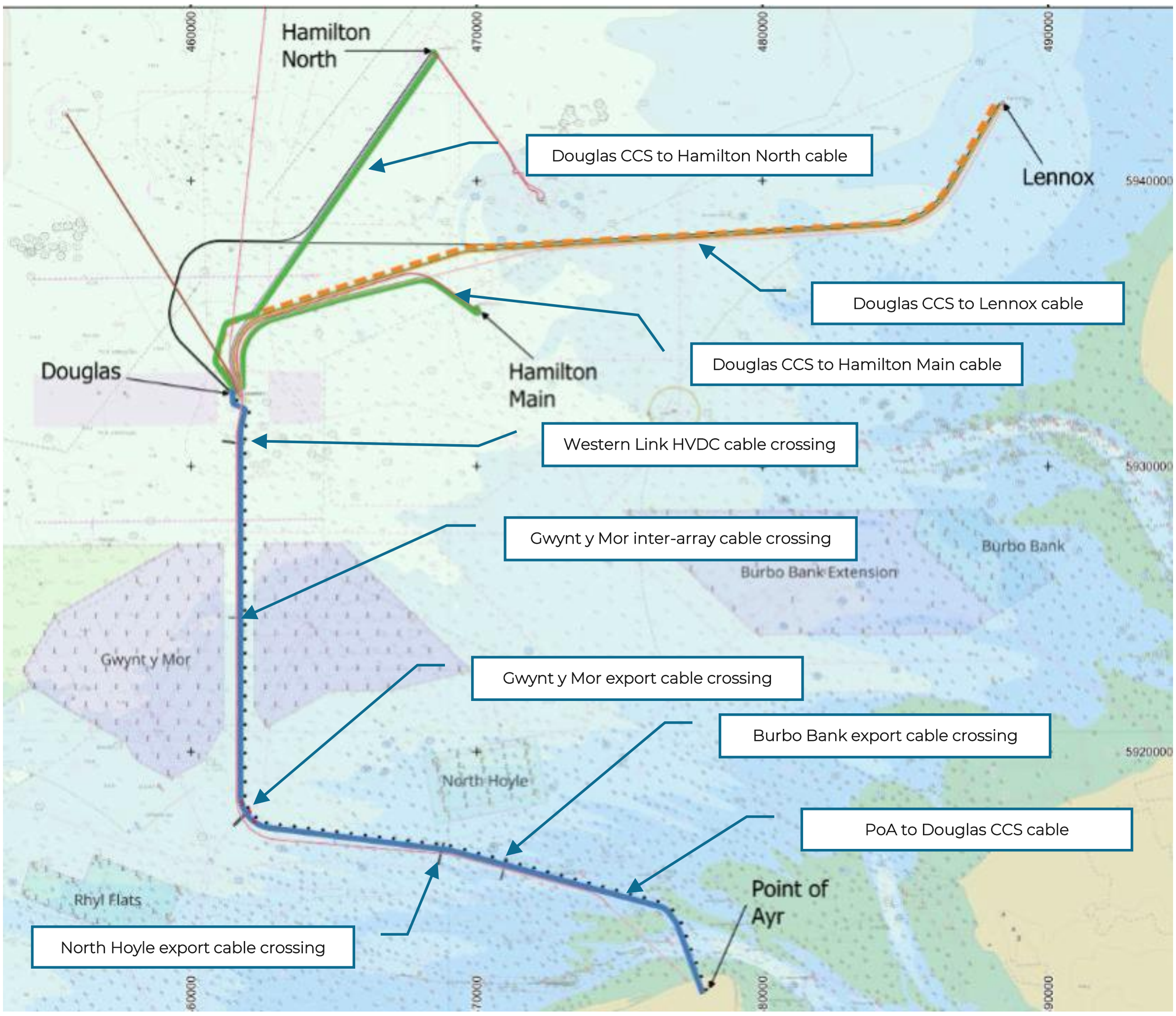


Figure 2-1: Location of cables and crossings for Activity 1

2.1.4. Within **Activities 1 and 4** of **Marine Licence CML2365**, several subordinate activities are also proposed. These are summarised below, with signposting provided to sections where further detail is set out.

2.1.5. **Section 2.6: Description of CML2365 Activity 1: PoA to Douglas CCS Cable laying and Burial – Inter-tidal Area**, describes the methodology for cable installation and burial in the intertidal zone, linking Talacre Beach to the offshore corridor. Works include site mobilisation, beach preparation, cable pull-in via HDD duct, and controlled excavation for conduit connection. Cable burial is achieved using excavators and plough, with activities sequenced around tidal windows to minimise environmental disturbance. Vehicle and vessel movements are restricted to defined corridors, and reinstatement ensures the beach returns to its original condition post-works. Environmental controls and mitigation measures are implemented throughout to protect benthic habitats and sensitive species.

2.1.6. **Section 2.7: Description of CML2365 Activity 1: PoA to Douglas CCS Cable laying and Burial – Subtidal Area**, describes cable installation in the subtidal area, where methods vary according to seabed conditions. Pre-lay seabed preparation is undertaken using slope reduction and mega-ripple levelling, followed by simultaneous cable lay and burial in shallow waters and free-lay with post-lay burial in deeper waters. The Backhoe Dredger (BHD), Trailing Suction Hopper Dredger (TSHD), and Water Injection Dredger (WID) are used for targeted seabed preparation. Surveys before, during, and after construction confirm compliance with design requirements, and sediment release is managed within consented environmental limits.

2.1.7. **Section 2.8: Description of Activity 1: PoA to Douglas CCS Cable Post Lay Mattresses and Rock Protection at Cable Crossings**, describes the installation of concrete mattresses and subsea rock protection at cable crossings to ensure stability and separation from existing infrastructure. Specialist vessels deploy mattresses and graded rock at predetermined locations, with operations scheduled to avoid sensitive periods. The process includes pre-installation surveys, precise placement using installation frames and ROVs, and post-installation inspections. Protection is provided at crossings, with design and placement tailored to minimise environmental and navigational impacts.

2.1.8. **Section 2.9: Description of Activity 1: Inter-Platform Cable laying and Burial**, outlines the programme for cable free-lay from Douglas CCS to satellite platforms, including Hamilton Main, Hamilton North, and Lennox. The cable lay vessel transits, loads cable, and executes pull-in and free-lay operations, followed by post-lay mattress and rock protection at crossings. Activities are scheduled to avoid winter months, and specialist vessels are used for mattress and rock installation. The methodology ensures accurate cable placement, protection at crossings, and minimises disturbance to marine users and habitats.

2.1.9. **Section 2.10: Description of Activity 4: Installation of Douglas CCS**, describes the installation of the Douglas CCS platform jacket and topsides using a heavy lift vessel operating in dynamic positioning mode within the Area to Be Avoided (ATBA) and existing safety zone. The installation is coordinated to minimise interaction with vessel traffic and ensure navigational safety. Temporary overlap with the existing Douglas installation is managed within established safety zones, and guard vessels monitor traffic during operations. The programme includes jacket and topside installation, welding, completions, and subsequent demobilisation, with navigational warnings and stakeholder coordination throughout.

2.2. GENERAL PRINCIPLES

2.2.1. This CEMP#3 sets out the environmental protection principles governing Activity 1, and Activity 4 licensed under Marine Licence CML2365.

2.2.2. All activities will be carried out in full compliance with the Marine and Coastal Access Act 2009, the approved Environmental Statement (ES) and supporting documents, and the conditions of Marine Licence CML2365, as issued by Natural Resources Wales (NRW).

2.2.3. Environmental impacts will be managed through a clear hierarchy of avoidance, minimisation, and mitigation, with seabed disturbance restricted to the minimum necessary to safely install the cables and Douglas CCS platform. Activities will be confined to licensed locations and quantities.

2.2.4. A precautionary approach will be applied throughout the works. The Offshore Environmental Manager will have authority to modify or stop activities if unexpected environmental sensitivities or risks are identified. All operations will comply with licence restrictions on timing (Condition 3.18), depth reduction (Condition 3.21), pollution prevention (Condition 3.14), and biosecurity and protection of marine ecology (Condition 3.25).

2.2.5. Robust procedures (Section 4) for pollution prevention, dropped object management, monitoring, record keeping, and reporting will be implemented. Any incidents, non-compliances, or deviations from approved methods will be promptly reported to NRW. Where monitoring indicates impacts greater than predicted, adaptive management will be applied, with mitigation measures reviewed and updated subject to regulatory approval.

2.2.6. This CEMP#3 provides assurance that the works will be undertaken in a controlled, environmentally responsible manner, fully aligned with the requirements and intent of Marine Licence CML2365.

2.2.7. On completion of the licenced activities, Notification within 10 days will be given to the Licensing Authority (NRW), and UKHO so charting can be updated.

2.3. COMBINED VESSEL MANAGEMENT PLAN AND NAVIGATION SAFETY PLAN

OVERVIEW

2.3.1. The Liverpool Bay CCS Project's approved combined Condition 3.27 & 3.29 VMP & NSP provides a robust framework to ensure safe, environmentally responsible, and compliant vessel operations throughout the offshore construction, operation, and decommissioning phases. It integrates international maritime conventions, regulatory requirements, environmental safeguards, stakeholder engagement, and emergency preparedness to manage complex vessel activities in a busy marine environment effectively.

VESSEL OPERATIONS AND SAFETY MEASURES

2.3.2. The plan mandates strict operational and safety protocols including continuous bridge watchkeeping, dynamic positioning certification, passage planning per SOLAS requirements, and adherence to ballast water management and garbage management plans. Vessels are required to maintain AIS, VHF communication channels, and comply with environmental protection measures such as spill prevention, waste segregation, noise reduction, and fuel management. Exclusion zones around cable-laying and pipeline corridors are enforced, with guard vessels deployed to monitor and prevent unauthorised vessel entry. Emergency response capacity is integrated through the Oil Pollution Emergency Plan (OPEP), and coordination with HM Coastguard and other emergency services.

COMMUNICATION AND COORDINATION

2.3.3. A centralised Marine Coordinator (MC) manages vessel movements, communications, and incident escalation. Communication protocols include use of Marine VHF Radio channels, real-time AIS tracking, and formal reporting to regulators and stakeholders. Notices to Mariners, Kingfisher Bulletins, and Local Notices to Mariners (LNtMs) are issued to inform marine users of construction activities, safety zones, and navigation hazards. The MC liaises with port authorities such as Peel Ports and the Port of Mostyn to coordinate vessel traffic and minimise disruption to commercial and fishing activities. Fisheries Liaison Officers (FLOs) facilitate engagement with the fishing community to manage gear interaction and minimise conflicts.

ENVIRONMENTAL AND FISHERIES LIAISON

2.3.4. Environmental management includes adherence to the Offshore Environmental Statement (ES), implementation of mitigation measures to reduce collision risk, noise emissions, and pollution. Fishing gear interaction protocols are established to facilitate fair resolution of claims and maintain positive relations with fisheries stakeholders. Waste management follows MARPOL requirements, with no discharge of plastics or prohibited substances at sea. Ballast water exchange is conducted in approved offshore zones using treatment systems where fitted. Noise reduction and spill response training are mandatory for vessel crews.

EMERGENCY PREPAREDNESS AND INCIDENT MANAGEMENT

2.3.5. The VMP & NSP includes provisions for emergency response, with vessels equipped with spill kits, oil booms, skimmers, and life-saving appliances. The MC acts as the first response coordinator for vessel-related emergencies such as collisions, fires, man overboard, or oil spills. Incident reporting and escalation pathways are clearly defined, involving Liverpool Bay CCS Limited, HM Coastguard, and regulators. Joint training exercises and drills are conducted to test communication and coordination during major campaigns.

VESSEL ASSURANCE, AUDITS, AND REVIEWS

2.3.6. Pre-mobilisation assurance inspections, certification checks, and post-campaign audits ensure vessels comply with regulatory obligations. A Vessel Assurance Matrix and checklist are maintained for detailed verification of certificates such as Load Line, Safety Construction, and DP system certification. Documentation control ensures all parties have the latest approved versions of the VMP & NSP. The plan is formally reviewed at least annually or upon significant changes to operations or regulations.

CONSTRUCTION AND OPERATIONAL PROGRAMMES

2.3.7. The document presents detailed timelines for key activities including survey and seabed preparation, cable laying, cable burial, pipeline spool laying, platform installation, and mattress placement. Activities are scheduled from 2026 through 2027 with specific vessel movements, transit dates, and operational windows. Coordination with ports such as Mostyn, Liverpool, and Rotterdam supports mobilisation and demobilisation logistics.

EXCLUSION AND ADVISORY ZONES

2.3.8. When carrying out the offshore construction activities, Liverpool Bay CCS Limited, and its contractors, will establish a series of exclusion and advisory zones to ensure the safety of personnel, protection of equipment, and the integrity of existing seabed infrastructure. These zones also support the orderly coordination of multiple vessels working in proximity. The nature, size, and enforcement of these zones may vary depending on the activity, but their purpose remains the same; to provide a controlled and predictable operating environment that reduces the risk of collision, entanglement, or interference.

2.3.9. The exclusion and advisory zones that will be adopted during the works are summarised in Table 2-1. Full details of the exclusion and advisory zones that will be implemented are presented in Section 6: Safety and Mitigation Measures of the approved combined Condition 3.27: & 3.29 VMP & NSP.

Table 2-1 – Exclusion and advisory zones

Zone Type	Radius/Area	Status	Notes
Construction exclusion zone	• 500 m around platforms	• Mandatory	• Enforced by guard vessels
Diver exclusion zone	• 500 m around activity	• Mandatory	• Enforced by guard vessels
Cable corridor	• 500 m width	• Advisory	• Active during laying
Pipeline corridor	• 500 m width	• Advisory	• Active during laying
Anchor spread areas	• As required	• Temporary	• Defined in NtMs

2.4. LIGHTING AND MARKING

2.4.1. All temporary and permanent structures will be marked and lit in accordance with the approved Lighting and Marking Plan (LMP) submitted under CML2365 Condition 3.30.

2.4.2. In summary, during construction, or when a hazard exists, the following temporary marking is required:

- Mark the works/route and any hazards with IALA buoys as agreed with the GLA:
  - Special Marks (yellow) to indicate the works area/route or seabed features related to cables/pipelines. Lights (if fitted) show a yellow flashing rhythm agreed with the GLA.
  - Cardinal or Isolated Danger Marks if there is a discrete obstruction, exposure, crossing, or free span that presents a hazard to navigation.
- Issue Notices to Mariners (local/UKHO) in advance and update them as the work front moves; UKHO will then reflect changes in weekly Admiralty NtMs.
- Use KIS-ORCA / Kingfisher bulletins to notify fishing interests of vessel routes, timings, safety zones and locations.

- **Vessel lighting/shapes:** mattress laying, grapnel run, and boulder relocation vessels must exhibit lights/shapes for "restricted in ability to manoeuvre" and any underwater operations per COLREGS (enforced by MCA). (See MCA navigation safety MGNs and COLREGS obligations).

2.4.3. On completion of the construction activities, after burial and commissioning, **Notification within 10 days** will be given to the **Licensing Authority (NRW) and UKHO** so charting can be updated.

2.5. CONSENTS AND PERMITS

2.5.1. **Table 2.2** identifies the licenses, consents, and permits applicable for the activities covered by this **CEMP#3** Copies of these will be retained on site.

Table 2.2 Consents and permits relevant to CEMP#3

Licence / consent / permit	Authority	Reference number	Relevant section (for conditions)	Responsibility
Marine Licence	• Natural Resources Wales (NRW)	CML2365	Notifications as per 3.1. and 3.2	LBCCS
Written notification of the date of commencement of any works on the site	• NRW	CML2365	Notifications as per 3.1.	LBCCS
Written notification of the date of the material start of each phase of development	• NRW	CML2365	Notifications as per 3.1	LBCCS
Notification of Vessel and/or Vehicles Notification of Agents/ Contractors/ subcontractors	• NRW, and Welsh Government Marine & Fisheries Division (Control & Enforcement Branch)	CML2365	Notifications as per 3.2. and 3.3	LBCCS
CEMP approval	• NRW	CML2365	Condition 3.25	LBCCS
Notices to Mariners, and Kingfisher Bulletins, and Local Navigational Warnings	• VARIOUS	CML2365	Condition 3.25	LBCCS

2.6. DESCRIPTION OF CML2365 ACTIVITY 1: POA TO DOUGLAS CCS CABLE LAYING AND BURIAL – INTER-TIDAL AREA

OVERVIEW OF PHASE 2 INTERTIDAL CABLE INSTALLATION AND BURIAL

2.6.1. The **Phase 2** cable installation works in the intertidal area consist of the activities set out in **Figure 2.2**: **Appendix A** presents a detailed layout of the Phase 2 works.

2.6.2. **Phase 2** comprises the intertidal cable installation works linking Talacre Beach to the offshore installation corridor, undertaken using controlled beach-based operations. The phase is programmed to run from mid-June to early September 2026, with activities sequenced to avoid environmentally sensitive periods where practicable, including the designated wintering birds' periods identified on the programme.

2.6.3. Works commence with site mobilisation and beach preparation, including re-establishment of the HDD entry pit landward of the beach, installation of temporary working areas, and mobilisation of specialist plant and marine support equipment. The HDD duct, installed during Phase 1, will be used as the conduit to guide the cable under the dunes to the connection point in Warren Farm.

2.6.4. The cable installation sequence then proceeds with controlled cable pull-in operations from the HDD entry pit, using a cable mid-support pontoon equipped with a cable tensioner and beach-based cable rollers extending approximately 600 m along the beach. A temporary beach chute is installed at the shoreline to guide and protect the cable during transition between onshore and marine environments, reducing the risk of abrasion or excessive bending.

2.6.5. Following completion of the cable pull-in, excavation works are undertaken from the HDD exit pit, progressing seaward for approximately 600 m. This allows preparation of the conduit and seabed interface for connection with the offshore cable installation activities. A temporary raised working platform and associated plant are used to manage access and maintain stability within the active beach environment.

2.6.6. For the remainder of the intertidal area, from approximately 600 m from the HDD Exit Pit to offshore, the cable will be installed with the plough pulled from the CLV. The coordinated nearshore and offshore operations ensure continuity of cable installation while managing tension control and interface risks at the land-sea boundary.

2.6.7. Once cable installation and connection works are complete, Phase 2 concludes with stand-down, removal of temporary infrastructure, and working areas, and full demobilisation of the site. Reinstatement of the beach will be completed to return the intertidal area to its original condition, as was successfully completed after the Phase 1 works.

2.6.8. Vehicle movements within the intertidal area will be managed to minimise physical disturbance, sediment compaction and unnecessary trampling of benthic habitats. Measures will be incorporated into the construction planning and method statements and implemented for the duration of intertidal works.

2.6.9. Access routes will be defined in advance and vehicle movements restricted, as far as reasonably practicable, to agreed corridors and working areas to avoid unnecessary spread of disturbance. Vehicle numbers, type and frequency will be kept to the minimum necessary to safely undertake the works, with preference given to low-ground-pressure or tracked plant where appropriate to reduce sediment compaction.

2.6.10. Vehicle movements will be confined to designated tidal windows, avoiding prolonged static loading or repeated passes across the same areas where practicable. Turning, reversing and lay-down within undisturbed areas will be minimised, and vehicles will not operate outside the defined working footprint unless required for safety reasons.

2.6.11. The extent and duration of intertidal vehicle activity will be kept as short as reasonably practicable, and disturbed areas will be allowed to recover naturally following completion of works. No permanent vehicle tracks or hardstanding will be created within the intertidal zone.

2.6.12. These measures reflect the generally localised and short-term nature of vehicle-related disturbance and are intended to ensure effects on benthic habitats remain temporary and of limited spatial extent. As was the case following completion of the HDD Works in February and March 2026, natural recovery is expected following cessation of works.

2.6.13. All works are undertaken in accordance with applicable environmental controls and method statements, with temporary works removed promptly following completion.

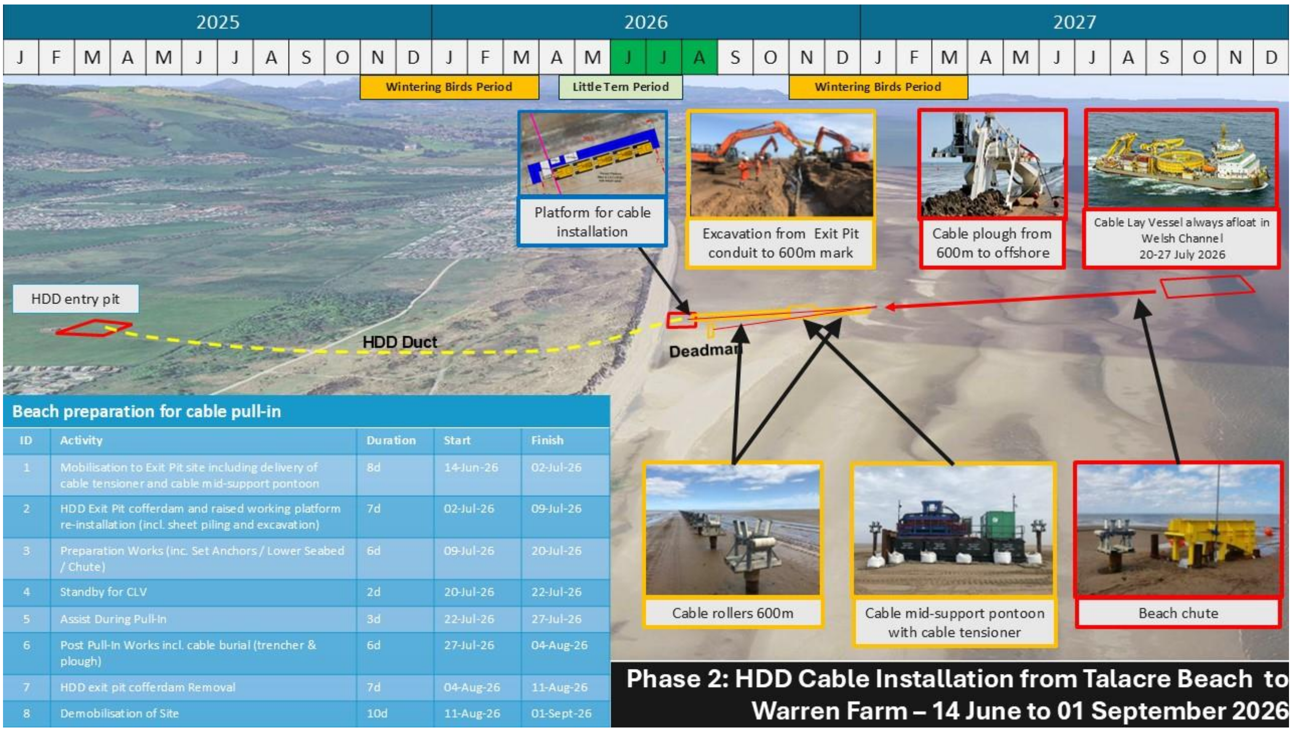


Figure 2.2: Overview of Phase 2 Activities 1-8 and programme

PHASE 2 ACTIVITY 1: MOBILISATION TO EXIT PIT SITE INCLUDING DELIVERY OF CABLE TENSIONER

2.6.14. The Contractor will setup all equipment required for the preparatory works, the pull-in and the post pull-in works, shown in Figure 2.3. This is done both at the onshore site (earlier HDD entry site) and beach site (HDD exit site). As was the case for the Phase 1 HDD works, access to the beach will be from the Talacre beach car park, and the use of temporary matting is not foreseen as such equipment is considered as a risk due to the tidal environment and the trip hazard they present to the public. Regular maintenance of the access route shall be undertaken to remove ruts that can be a risk for the public or workforce. These risks were successfully managed during the completed Phase 1 works.

2.6.15. Signage, like that used for the completed Phase 1 works, will be installed at the beach and in the local notice boards to advise the public of where to safely pass the works. The operational crew will also maintain watch for any persons who may be approaching the works to close, operational crew will advise.

2.6.16. An indicative list of the main plant and equipment for the cable pull and installation required at the Talacre Beach HDD Exit Pit site is presented in Table 2.3.

2.6.17. Mobilisation to the Exit Pit site, including the transportation and delivery of the cable tensioner unit, to ensure the cable is pulled smoothly, safely, and without exceeding design limits, together with all necessary personnel, vehicles, and logistics required to safely position and prepare the equipment for operational use.

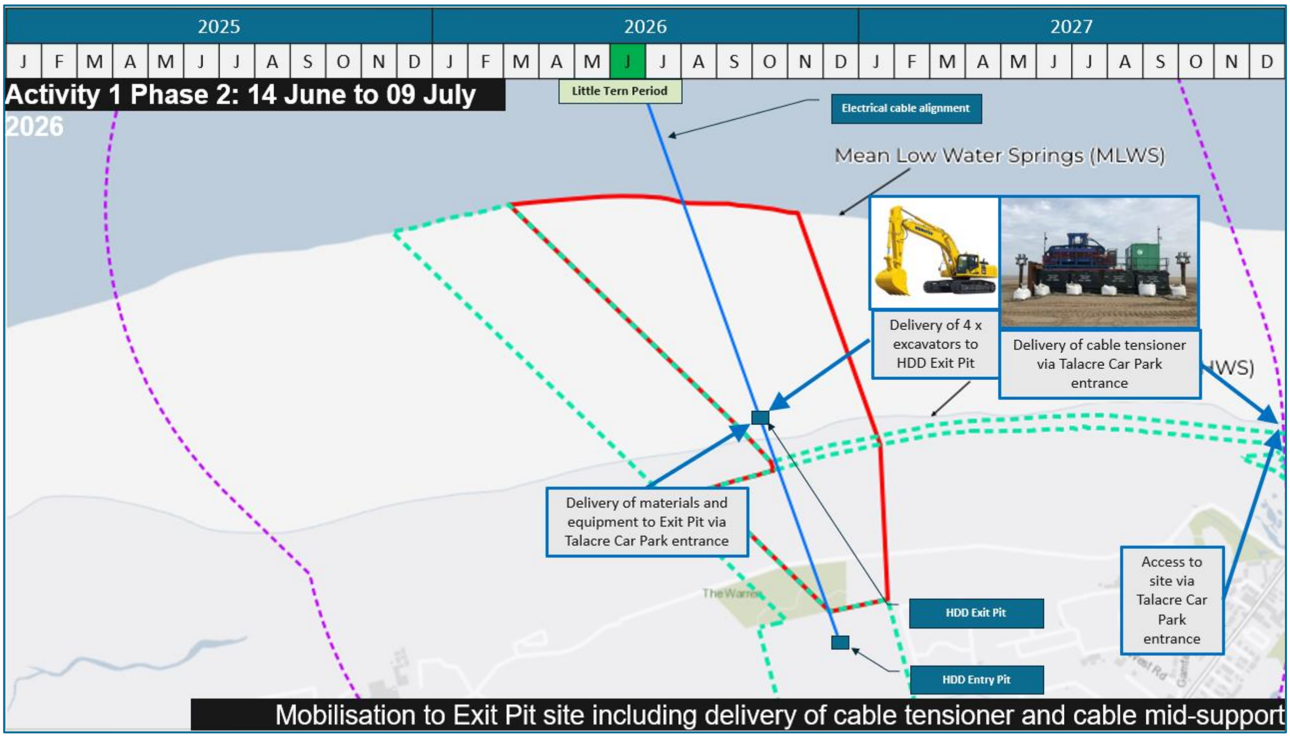


Figure 2.3: Overview of Phase 2 Activity 1

Table 2.3 Indicative list of main equipment to be mobilised to Talacre Beach, HDD exit site, for the cable pull and installation.

Equipment	Quantity	Power generated by	External Generator quantity	Indication size of external generator
Welfare / office facilities	2-3x*	Diesel generator	1x	30-50 kVa
Workshop /storage / control containers	-*	Same generator of welfare containers	-	-
Winch	1x*	Diesel generator	1x	75 kVA*
Excavator	1-3x*	Internal diesel generator	Internal	-
Tractor / trailer (same as Warren Farm)	1-2x	Internal diesel generator	Internal	-
Cranage	0-1x*	Internal diesel generator	Internal	-
Raised excavator	0-1x	Internal diesel generator	Internal	-
Post lay burial machine	0-1x	Internal diesel generator	Internal	-
Towerlights	6-8x*	Diesel generator	Internal / external	5-15 kVA each
Tracked Cable Tensioner	0-2x*	Diesel generator	1x / 1x spare	300 kVA
Dewatering	0-1x*	Diesel generator	1x	50 kVA*
Cable rollers incl steel poles	>150*	N/A	-	-
Beach anchor(s)	2-4x*	N/A	-	-

2.6.18. The mobilisation and delivery of the cable tensioner system will be planned and executed with specific consideration for minimising environmental impacts at and around the Exit Pit worksite. Prior to dispatch, the tensioner and its associated hydraulic and mechanical components shall undergo inspection to verify that all systems are free from leaks, or residual fluids that could pose an environmental risk during transport or operation. All hydraulic lines, fittings, and seals will be checked for integrity.

2.6.19. Waste materials, generated during mobilisation will be segregated and disposed of in line with the project's waste-management hierarchy, emphasising reduction, reuse, and recycling.

2.6.20. All personnel involved in the mobilisation and set-up of the tensioner shall be briefed on site-specific environmental constraints, emergency spill-response procedures, and mitigation measures, ensuring that the equipment is introduced to site in a manner that upholds the project's environmental commitments and minimises potential impacts to land, water, biodiversity, and local communities."

PHASE 2 ACTIVITY 2: HDD EXIT PIT COFFERDAM AND RAISED WORKING PLATFORM RE-INSTALLATION

2.6.21. The scope of works includes the re-installation of the HDD Exit Pit cofferdam and the associated raised working platform, making use of the existing pit, originally installed during the completed Phase 1 HDD activity. By re-using the established location, the works avoid additional land take and prevent disturbance of new habitats or beach profiles.

2.6.22. Re-establishment of the cofferdam will be undertaken following verification that the former pit boundaries, access routes, and ground conditions remain suitable and stable. The installation of the steel sheet piles will be carried out within the existing alignment as far as practicable, minimising ground disturbance and preventing encroachment into undisturbed or sensitive areas. As for the completed Phase 1 works, sheet piling activities will be subject to noise, vibration, and ecological constraints, with monitoring and mitigation implemented to protect nearby receptors, and intertidal habitats.

2.6.23. Re-excavation within the cofferdam will recommence only within the previously excavated and reinstated footprint, thereby reducing the generation of new material and lowering the risk of sediment mobilisation.

2.6.24. All excavated material will be stored near the Exit Pit, following the same procedure used during the completed Phase 1 work.

2.6.25. The platform is constructed to remain above predicted high-tide levels, ensuring a dry, stable, and environmentally resilient work area. This protects stored equipment, temporary containers, and construction plant from tidal inundation, reducing risks of:

- accidental release of fuels, oils, or chemicals into the intertidal zone;
- waterborne transport of waste, packaging, or loose materials;
- environmental incidents during spring tides or storm surges; and
- ground saturation leading to instability or sediment migration.

2.6.26. The raised platform design also supports safe drainage, runoff management, and containment measures that prevent pollutants from entering the surrounding coastal environment.

2.6.27. Throughout the works, all environmental controls will be applied, including spill-response readiness, waste-minimisation procedures, and monitoring of tidal levels. Re-installation activities will be supervised by competent personnel to ensure the cofferdam and platform are reconstructed in a manner that upholds the project's environmental commitments while maintaining the integrity and continuity of the existing HDD Exit Pit infrastructure.

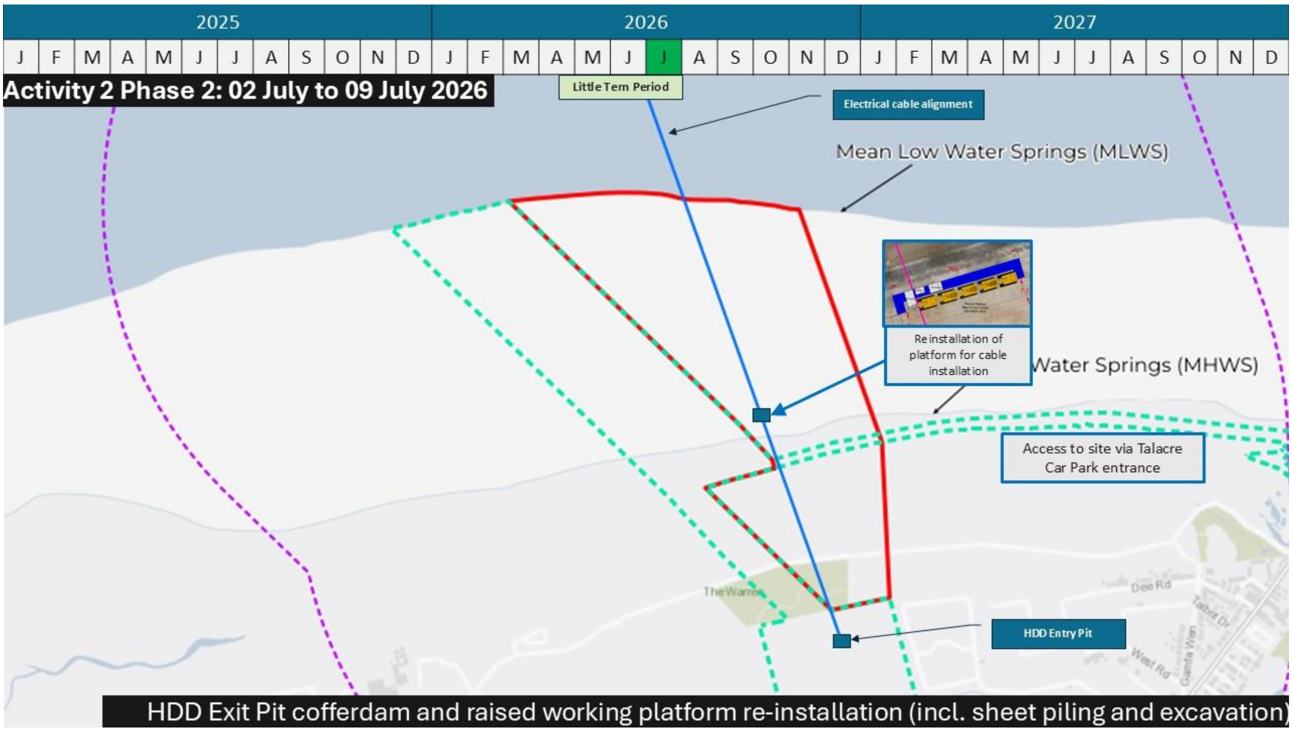


Figure 2.4: Overview of Phase 2 Activity 2

PHASE 2 ACTIVITY 3: PREPARATION WORKS (ROLLERS / CHUTE)

<u>Installation rollers and chute</u>

2.6.28. The rollers and chute are installed to guide the cable safely from the cable lay vessel (CLV) to the beach landing point (likely on piles driven by excavator/vibration) every 3-5m (like those installed during the completed Phase 1 works). The installation of the rollers and the cable chute will be carried out using lightweight, low-impact equipment that generates minimal noise and vibration. This approach ensures limited disturbance to beach users, coastal wildlife, and the surrounding environment. Rollers will be temporarily installed over a length of around 600m.

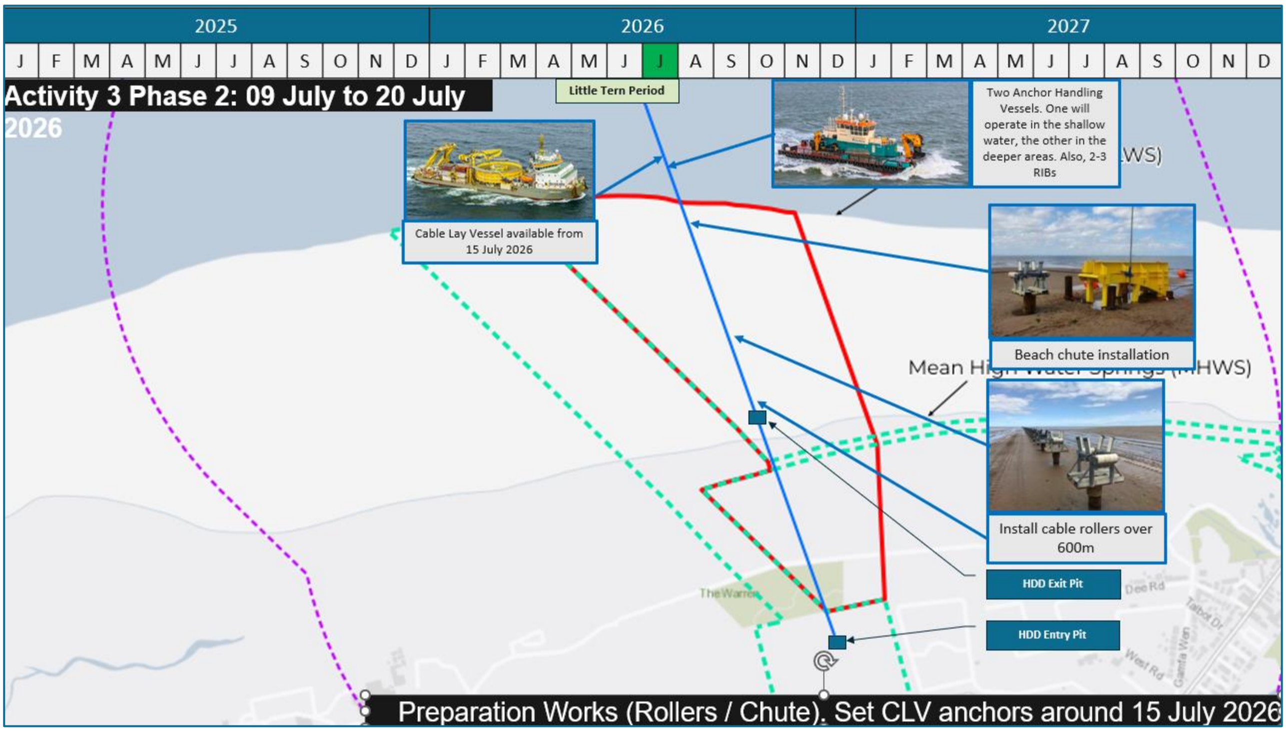


Figure 2.5: Overview of Phase 2 Activity 3

2.6.29. It is also necessary to construct a mid-support pontoon (Figure 2.6) where a cable engine is located, this will be to support the winch and avoid over tensioning the cable during the pulling operations. The chute (Figure 2.6) is used to guide the cable coming from the sea into the cable rollers installed on the beach.

2.6.30. The mid support pontoon is a working platform created to keep critical equipment above the water line during high tide periods, the pontoon can be created from scaffolding, or modular pontoon sections, the cable engine would be secured to temporary sheet piles known as a dead man anchor. Concrete blocks, wooden crane mats, and one tonne sacks filled with locally sourced material may be used to protect the structure from the effects of tidal scour. Electrical and hydraulic powered equipment will be installed on the pontoon, all tanks shall be bunded, refuelling will be mitigated wherever possible and when undertaken best practice shall be followed with appropriate spill kits at the point of use. Welfare and lighting will be installed to ensure the safety of the workforce.

Figure 2.6: Cable tensioner pontoon (left), and shoreline beach chute (right)

2.6.31. All the equipment required for the cable pulling will be delivered to the beach by means of agricultural tractor and trailer, as per the completed Phase 1 works.

PHASE 2 ACTIVITY 4: STANDBY FOR CLV AND SETTING OF CLV ANCHORS

Standby for CLV

2.6.32. While the beach is being prepared for the cable shore pull, the CLV (Ndurance) will wait offshore north of the West Hoyle Spit, until the equipment is ready.

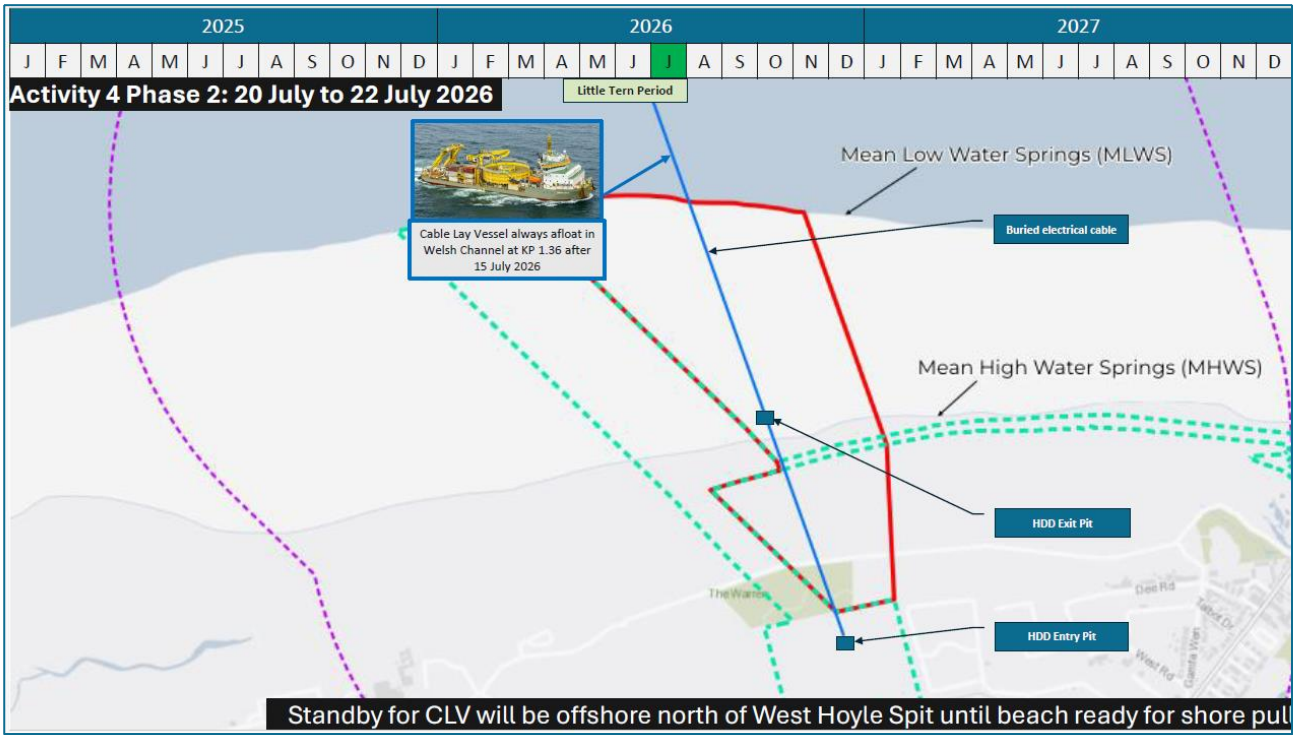


Figure 2.7: Overview of Phase 2 Activity 4

CLV anchors setting

2.6.33. The CLV requires temporary anchors to stabilise the vessel during cable pull-in. The CLV at the nearshore will be deployed using seven anchors, using two shallow water anchor handling tugs (AHT), for stability during shore pull and manoeuvrability in the shallow water. There will be two anchors positioned on Talacre Beach from the stern of the CLV, and they will be placed on the beach by an excavator with their positions indicated in Figure 2.8.

2.6.34. The AHTs play a central role in deploying, positioning, recovering, and relocating anchors for the CLV, using a combination of mechanical handling, survey guidance, and real-time monitoring. The detailed Anchor Handling Procedure is presented in Appendix D. The Anchor Handling Procedure includes Appendix C, which presents a series of 'Storyboards' that illustrate the deployment, relocation, and recovery of the anchors and mid-line buoys while the CLV is operating on anchors. The detailed Anchor Handling Procedure explains that safety, communication, and adaptability to site conditions are emphasised throughout the process.

2.6.35. Preparation and Planning: Before operations, communication lines are established among all parties, equipment is checked, and anchor plans are reviewed based on site conditions and updated charts. Safety drills and toolbox talks are conducted to ensure readiness.

2.6.36. Anchor Deployment: The CLV prepares anchors, pennant wires, and buoys for deployment. The AHT moves alongside the CLV to receive these components. The CLV passes the anchor, pennant wire, and buoy to the AHT, which connects the pennant wire to its winch and winds it onto the spool. The AHT then moves to the designated anchor deployment position, guided by the Tug Management System (TMS) and survey data. At the planned location, the anchor is lowered to the seabed with minimum tension. The CLV slowly increases tension to test anchor holding; if the anchor does not hold, it is recovered and redeployed.

2.6.37. Anchor Positioning and Monitoring: Anchor patterns are adjusted by the CLV Master according to prevailing site conditions (currents, weather, etc.). The TMS ensures anchors are deployed as close as possible to planned locations within anchor corridors. Anchor positions, wire tension, and wire length are continuously monitored and logged. Anchors are made visible with buoys and lights for safety.

2.6.38. Midline Buoy Installation: When anchor wires cross existing subsea assets, midline buoys are installed to maintain required clearance. The AHT spools anchor wire, sails to the midline buoy location, installs the buoy, and then deploys the anchor.

2.6.39. Anchor Recovery and Relocation: For recovery or relocation, the AHT uses a grapple hook to retrieve the pennant buoy and wire, secures them on deck, and then hauls in the anchor. If relocation is needed, the anchor is moved to the new position as instructed by the CLV Master and survey team.

2.6.40. Special Procedures Near Third-Party Assets: When anchoring near or over third-party assets, accuracy is increased, midline buoys are used, and anchors may be recovered to AHT decks when traversing subsurface assets. Anchor wire tension is managed to minimise seabed dragging, and exclusion zones are enforced in the TMS.

2.6.41. Transition to Dynamic Positioning (DP): During simultaneous cable lay and burial, the CLV transitions from anchor spread to DP system as water depth allows. Anchors are recovered as per procedure, except for the plough towing anchors.

2.6.42. An important consideration when deploying the anchors for the CLV at Talacre Beach, ready for the electrical cable shore-pull, is the relative proximity of the Gronant Dunes Little Tern colony. The colony is located approximately 2 km to the west of where the CLV will anchor, with the port, and starboard side stern anchors deployed on Talacre Beach.

2.6.43. To minimise disturbance to the Little Tern colony, further mitigation will be implemented to manage vessel activity within and adjacent to the Liverpool Bay SPA. This mitigation is described in the following section. When mobilising to the nearshore area, operating within it, and completing works in this zone, support vessels will adopt a slow-speed, no-wake approach. This will be typically around 5–6 knots or less to reduce noise, wake, and sudden approach cues that may otherwise lead to disturbance or flushing of sensitive bird species. The CLV while manoeuvring on anchors will move at <1 knot. Vessel movements will be kept steady and predictable wherever practicable.

2.6.44. Figure 2.8 and Figure 2.9 illustrate the spatial relationship between how the CLV and its anchors are positioned relative to the Little Tern colony and foraging grounds at Gronant Dunes, North Wales. It highlights the importance of maintaining safe distances and minimising disturbance to sensitive wildlife during the marine cable installation operations.

2.6.45. CLV and Anchor Spread: The central yellow marker represents the CLV, which is positioned in the Welsh Channel at KP 1.56. The orange lines radiating from the CLV show the locations of its anchors, which are deployed in various directions to secure the vessel during cable installation. Two Anchor Handling Tugs (AHT) are also depicted, manoeuvring port and starboard anchors.

2.6.46. Distances from Little Tern Colony: Blue lines indicate measured distances from the Little Tern colony to key construction points:

- The distance from the colony to the CLV is 2.04 km.
- The distance from the colony to the southwest anchor is 1.77 km.
- The distance from the colony to the HDD Exit Pit is 2.17 km.

2.6.47. Little Tern Nesting Site and Foraging Area: The green boxes highlight the Gronant Dunes Little Tern nesting site and viewing platform. It is noted that over 90% of Little Tern foraging occurs within 1.5 km of the colony, emphasising the ecological sensitivity of the area.

2.6.48. A pre-start ecological check will be undertaken where required. Lighting will be minimised and directed away from sensitive receptors. In the event of significant disturbance, works will be modified or temporarily halted following consultation with the Environmental Manager.

2.6.49. Cable Alignment and Beach Anchors: The orange line represents the alignment of the cable as it comes ashore. Southwest and southeast anchors are placed on the beach by excavator, with their positions marked for reference.

2.6.50. Additional Context: The map background in Figure 2.8 and Figure 2.9 is a satellite image showing Gronant Beach, Gronant Sands Peak, and surrounding areas. Measurement tools from Google Earth are used to provide accurate spatial data.

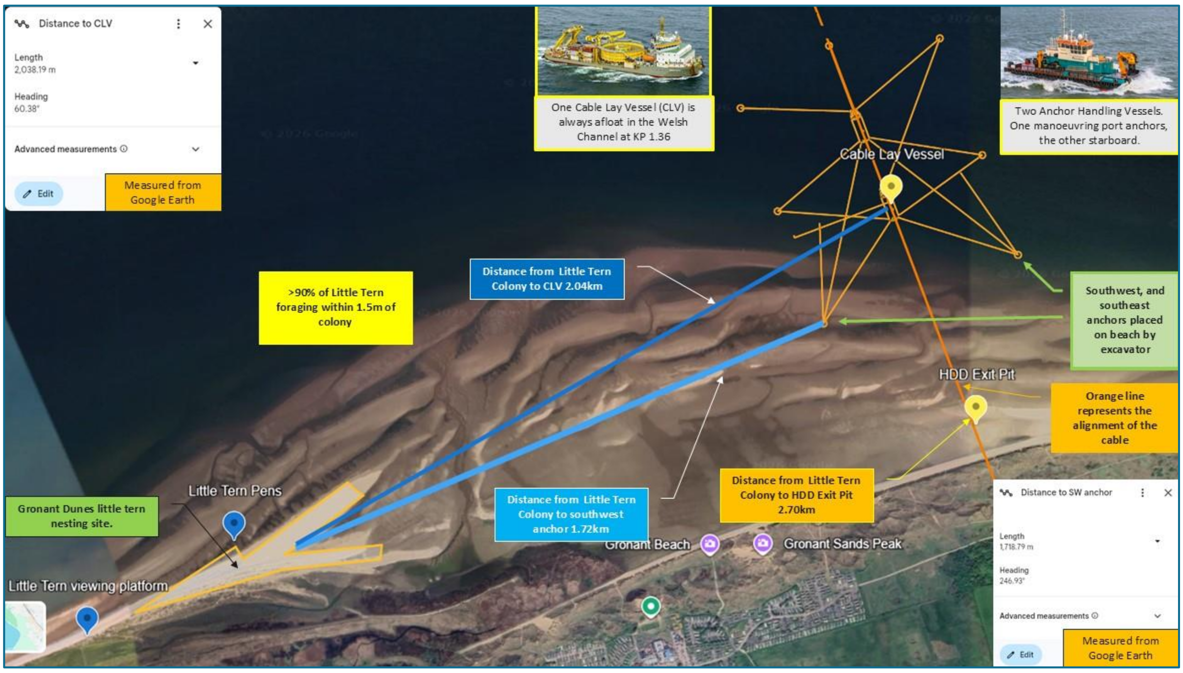


Figure 2.8: Position of CLV ready for electrical cable shore pull

PHASE 2 ACTIVITY 5: CABLE PULL IN

2.6.51. To perform the shore pull, the CLV is positioned close to MLWS but remains afloat (see Figure 2.9). Once stabilised, the beach winch wire connects to the cable, which is then pulled across the cable highway to the HDD exit point. The cable enters the conduit and continues until its pulling head reaches the beach winch at the HDD entry site.

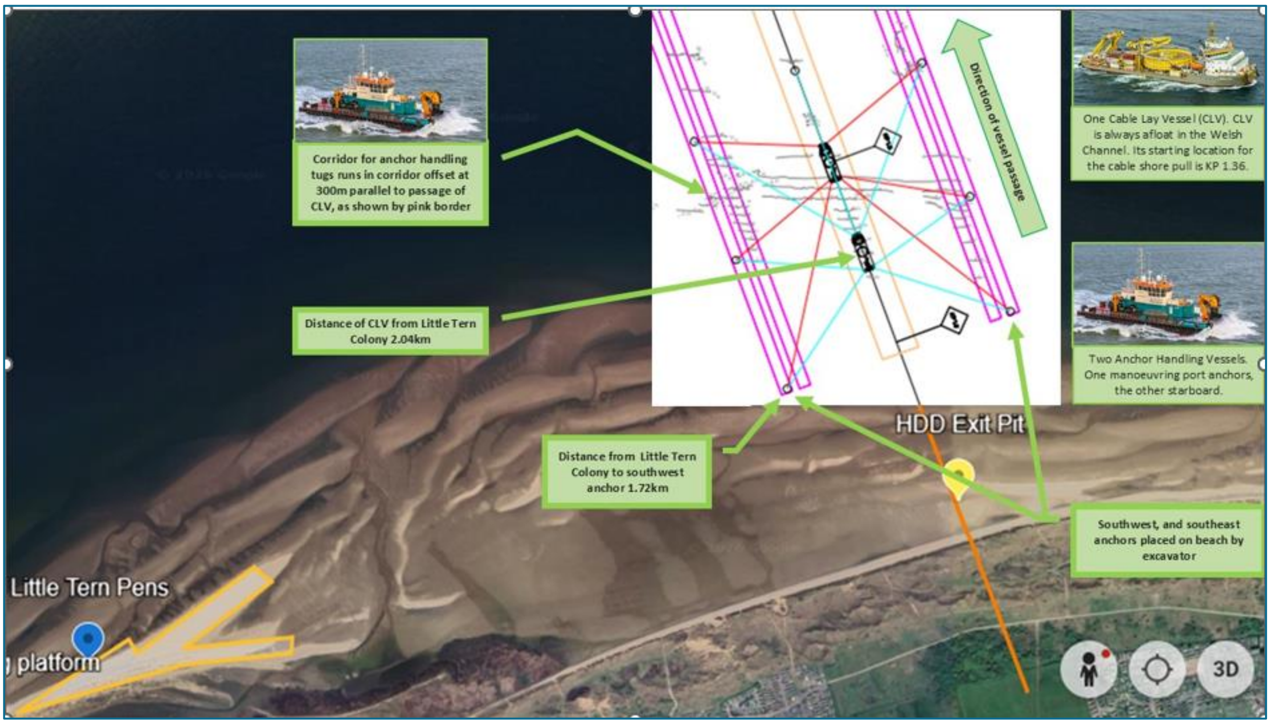


Figure 2.9: Position of CLV ready for electrical cable shore pull also showing corridor for AHTs parallel to passage of vessel (pink polygons) Activity 6

2.6.52. When the cable highway is prepared, the winch wire shall be pulled across the cable highway by means of a secondary winch located near MLWS, this winch will be temporarily secured to a tracked excavator.

2.6.53. At the arrival of the CLV, beach anchors will be required to position the vessel at the shallow waters near the shore, as shown in Figure 2.9. These anchors are transported by tractor and trailer towards the beach and are dug in by excavator. A forerunner is then placed on the beach for a vessel to collect at highwater and transfer to the CLV.

2.6.54. When the CLV has been positioned (on anchors) and is ready for the cable pull-in, the beach winch pull in wire will be recovered by the CLV team. Once connected to the cable, the cable is pulled over the chute of the CLV, and once on the roller highway installed on the beach, will be pulled over the beach, and through the HDD conduit until it emerges at the HDD entry site.

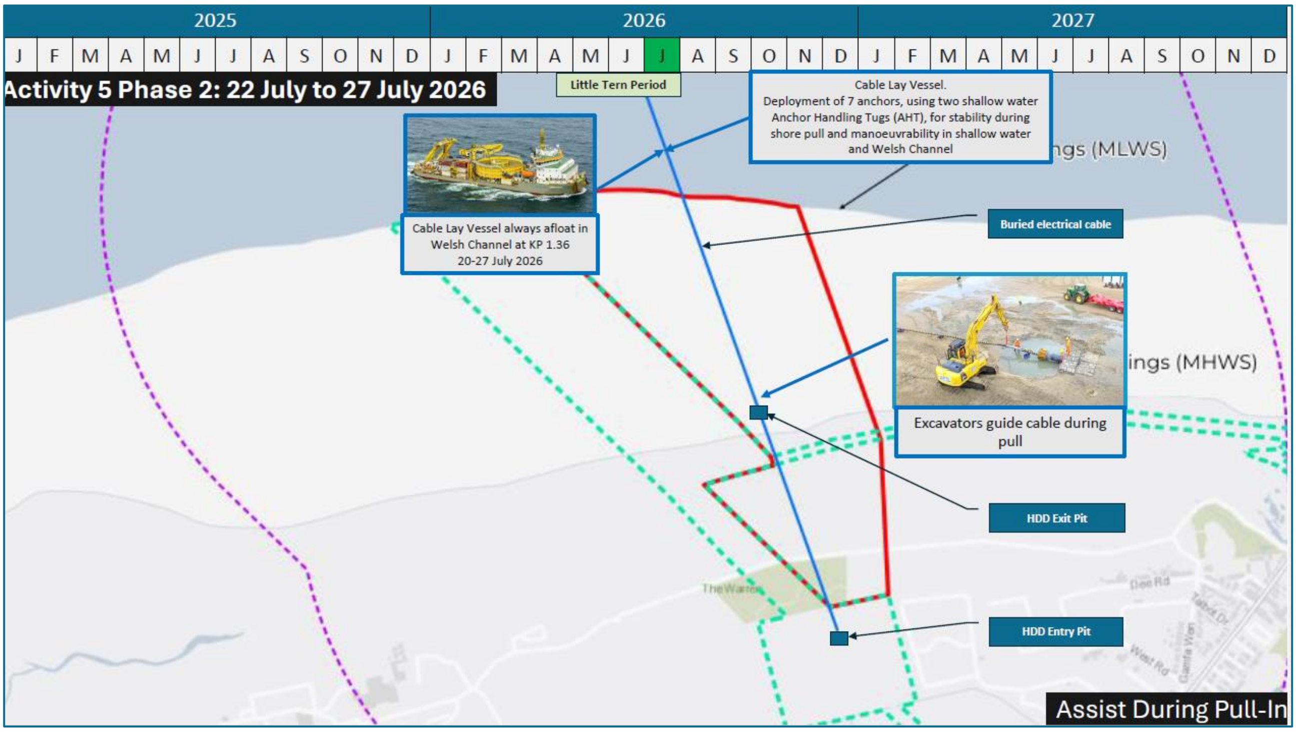


Figure 2.10: Overview of Phase 2 Activity 5

PHASE 2 ACTIVITY 6: POST PULL IN WORKS INCLUDING CABLE BURIAL

2.6.55. The method for the installation of the cables across the intertidal area, given the known geological conditions, is to pull the cable across a roller highway using a winch, once the cable is pulled ashore it will be buried by means of excavators and a plough. Typical cable installation equipment is shown Figure 2.11.

2.6.56. The intertidal section, extending from the HDD exit pit to approximately 600 m along Talacre Beach, will be installed using a controlled excavator-based excavation methodology. This approach will be applied along the full intertidal extent, with supplemental use of excavators in areas where access constraints prevent the use of trenching equipment.

2.6.57. The chosen methodology is informed by recent, site-specific construction experience and the prevailing ground conditions encountered during the Phase 1 HDD works. During these operations, it became apparent that mobilising a trencher, with an approximate operating weight of 40 tonnes, from Station Road across Talacre beach park could not be done without major disruptive access modifications, to avoid potentially damaging existing infrastructure. These constraints highlighted that the use of heavy trenching equipment at this location poses significant practical and logistical issues, including an elevated risk of ground disturbance and limited access.

2.6.58. Site observations indicate that the intertidal zone primarily consists of sandy sediments, which are well suited for controlled excavation with tracked excavators. These conditions facilitate precise trench formation, reliable cable installation, and efficient reinstatement through timely backfilling with the excavated material. Accordingly, an excavator-driven sectional excavation method has been determined to be the most practical, safe, and environmentally responsible approach for cable burial within the 600m intertidal zone extending from the HDD Exit pit.

2.6.59. This methodology is necessary because of the extremely shallow and dynamic characteristics of the 1,200m foreshore at Talacre Beach. The total inter-tidal range restricts the deployment of a towed burial plough from approximately the midpoint, covering 600 meters to the MLWS line, towards the CLV, as illustrated in Figure 4.12.

Figure 2.11: Digging from both sides of the cable

2.6.60. The purpose of the intertidal excavation works is to achieve the required burial depth of the export cable between the HDD exit point and the offshore plough grade-in location.

Works will be carefully programmed around tidal windows and undertaken in short, sequential sections to minimise the duration of open excavations and associated environmental disturbance.

2.6.61. Excavation and burial activities will typically be confined to one low-tide working window per day. Environmental, archaeological, and unexploded ordnance (UXO) specialists will attend the works as required, in accordance with the approved management plans.

2.6.62. Where necessary, controlled cable pull-back (in steps of up to a maximum of 5 m) will be undertaken through the HDD duct to create sufficient slack on the beach. Excavators fitted with Humber rollers will be used to lift and guide the cable, ensuring compliance with the minimum bending radius and avoiding excessive cable stresses.

2.6.63. Cable installation will be undertaken in short sections of approximately 60 m. For each section, a trench will be excavated along the approved cable alignment using tracked excavators. One excavator will excavate to the required depth (typically 2–3 m), while additional excavators equipped with rollers will support cable handling and positioning. Trenches will be formed with stable side slopes, and excavators will maintain a minimum clearance from the trench edge to reduce the risk of collapse.

2.6.64. The cable will be progressively lowered into the trench, primarily under its own weight as material is removed beneath it. Rollers will be used where required to maintain alignment and prevent contact between the cable and excavation equipment.

2.6.65. Once each 60 m section of cable has been installed, a survey will be undertaken to confirm the as-laid position and burial depth relative to the pre-construction beach profile. Survey points will be taken at regular intervals and at changes in direction to verify compliance with minimum top-of-cable burial requirements.

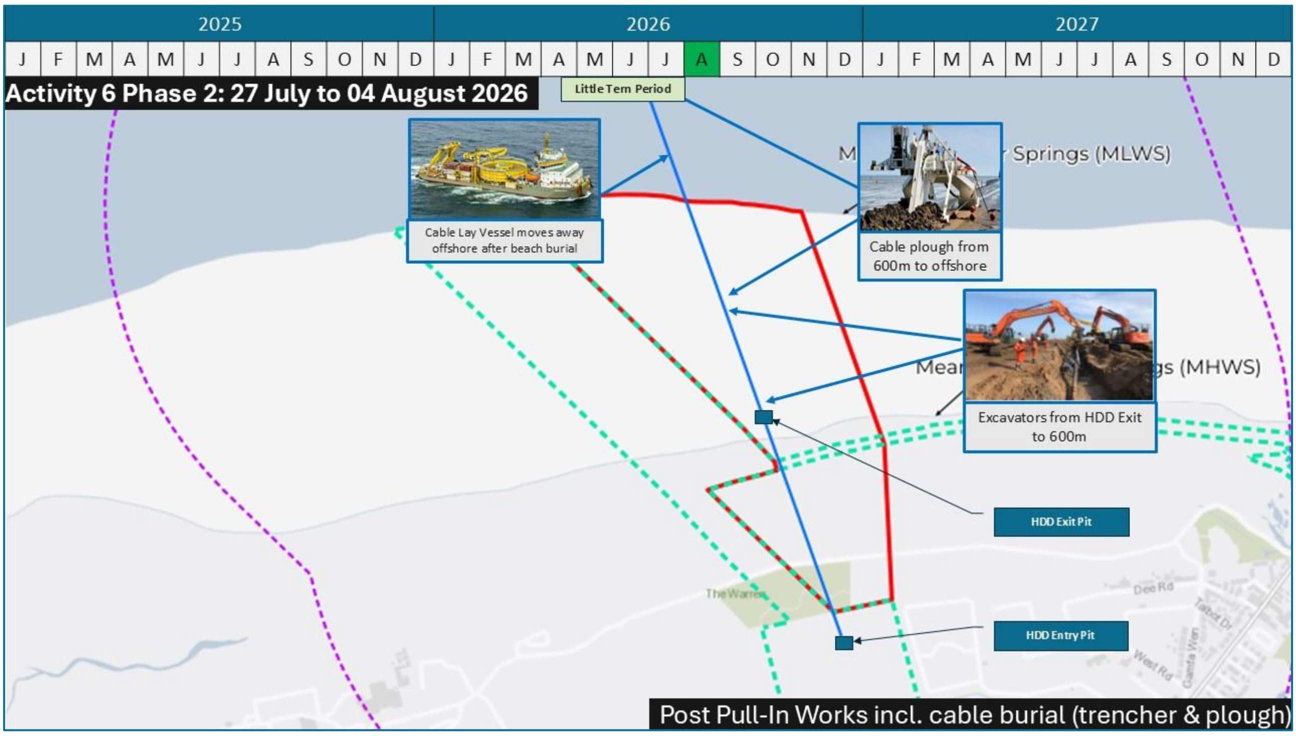


Figure 2.12: Overview of Phase 2 Activity 6

2.6.66. Following confirmation of compliance, backfilling will be undertaken immediately using the original excavated material. Prompt backfilling minimises the duration of open trenches and reduces risks to public safety, environmental exposure, and tidal inundation.

2.6.67. Works will then progress to the next adjacent section, following the same sequence of excavation, installation, survey, and backfilling. Where tidal constraints require works to be suspended before reinstatement is complete, temporary protection measures (such as trench boxes) will be installed to safeguard the cable until works resume.

2.6.68. For deployment in the remaining 600m of intertidal areas, commencing where the excavation methodology concludes approximately 600m from the HDD exit pit, a narrow-bladed cable plough mounted on skids will be drawn toward the CLV, which will be anchored in shallow waters seaward of MLWS. This approach utilises low ground pressure and creates a narrow trench that self-backfills. The combined use of a trencher and plough is necessary because the CLV, anchored in the Welsh Channel below the MLWS mark, cannot feasibly pull a cable plough with a burial depth of up to 3m across more than 1 km of beach.

2.6.69. In summary Intertidal excavation and cable handling activities are carefully planned and managed to minimise environmental disturbance and are characterised by the following principles:

- Tide-limited working: All intertidal works are undertaken within defined low-water windows, with activities programmed around local tidal cycles at Talacre Beach. This approach limits the duration of exposure of excavated areas and reduces the potential for sediment mobilisation or prolonged disturbance.
- Short-term and progressive works: Excavation, cable placement and reinstatement are closely sequenced for each 60m excavation so that disturbed sections of the beach are immediately reinstated. Open trenches and exposed sediments are therefore temporary, localised and typically constrained to a single tidal cycle or short series of low-tide windows.
- Restricted working corridors: Works are confined to clearly defined access routes and working corridors within the intertidal zone, thereby avoiding unnecessary disturbance to surrounding beach areas and maintaining the integrity of undisturbed sediments and habitats.

2.6.70. Excavated sediment is temporarily displaced only where required to accommodate the cable installation sequence and is retained within the working area. Where practicable, excavated material is reused immediately for backfilling following cable placement, supporting rapid reinstatement of the beach surface. Long-term stockpiling of excavated material on the beach is not permitted, and no material is removed from site.

2.6.71. This approach ensures that intertidal works associated with the onshore landing are temporary, reversible and compatible with the dynamic nature of the beach environment, with no long-term alteration to the beach profile or sediment regime anticipated.

PHASE 2 ACTIVITIES 7 AND 8: DEMOBILISATION AND SITE REINSTATEMENT

2.6.72. As shown in Figure 2.13 and Figure 2.14, all equipment, including temporary fencing and signage will be removed upon completion of the works. Traffic and access management including a Construction Traffic Management Plan (CTMP) has been consented under FUL/000246/23 and will be implemented for the execution of the cable installation works.

2.6.73. On the beach, both the cable and HDD cable conduit will be buried to the specified depth and will subsequently be covered with sand. All remaining equipment on the beach will be demobilised accordingly.

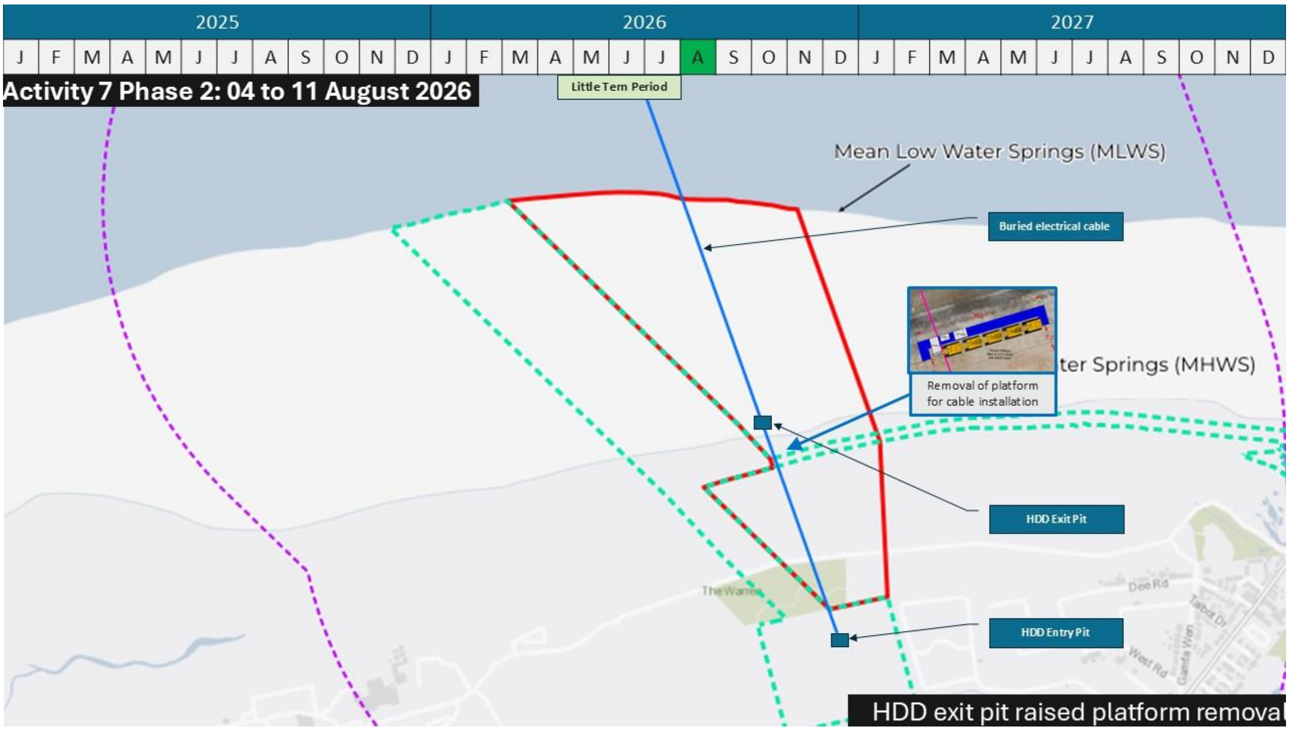


Figure 2.13: Overview of Phase 2 Activity 7

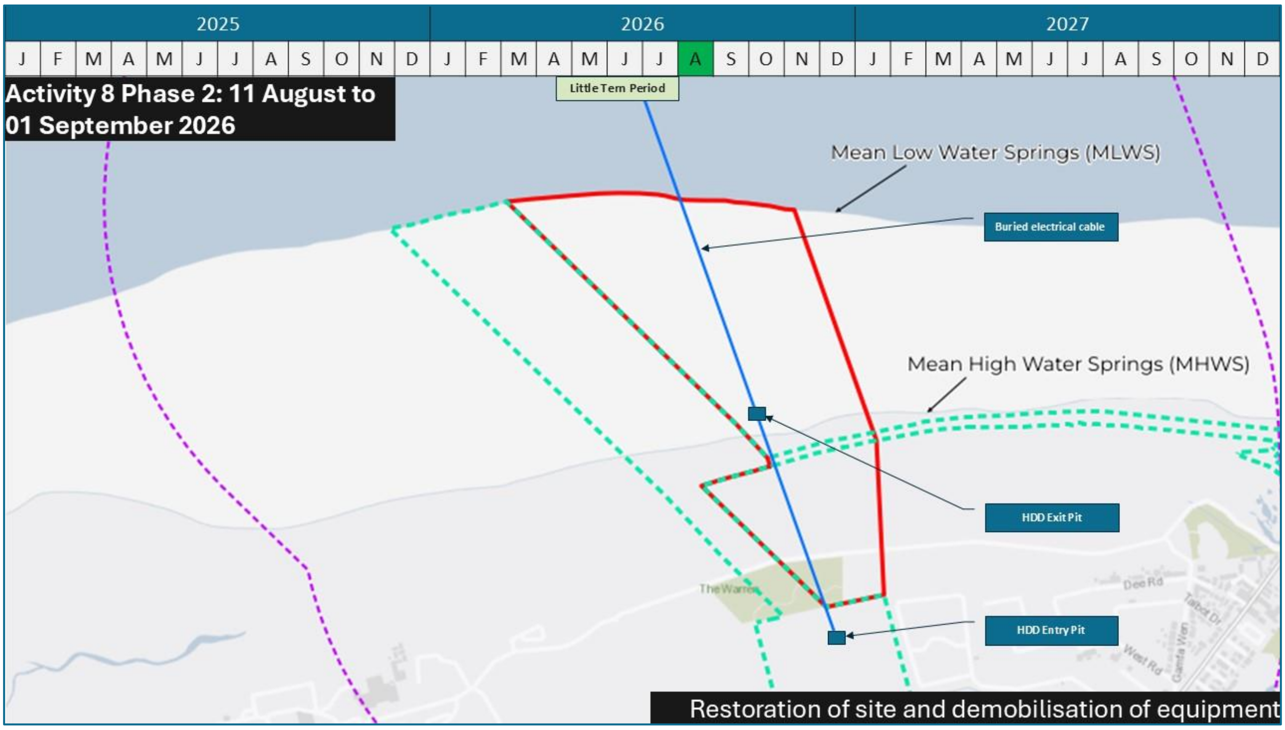


Figure 2.14: Overview of Phase 2 Activity 8

2.7. DESCRIPTION OF CML2365 ACTIVITY 1: POA TO DOUGLAS CCS CABLE LAYING AND BURIAL – SUBTIDAL AREA

OVERVIEW AND PROGRAMME

2.7.1. Due to the varying geological and topological conditions across the Liverpool Bay area, the methodology of cable installation varies by cable route and the PoA to Douglas CCS cable route will require some pre-lay seabed preparation. Table 2-4 provides a summary of the planned methods of installation for each cable.

Table 2-4 – Summary of planned methods of cable installation

Cable	Methods
Point of Ayr to Douglas CCS	• Nearshore (shallow water) pre-lay seabed preparation followed by Simultaneous Cable Lay and Burial (SCLB). • Offshore (deeper waters) Cable Free Lay. • Offshore (deeper waters) Post Lay Burial.
Douglas CCS to Hamilton Main	• Cable Free Lay • Post Lay Burial • Pre-trenching • SLB (Simultaneous Lay and Burial)
Douglas CCS to Hamilton North	• Cable Free Lay • Post Lay Burial
Douglas CCS to Lennox	• Cable Free Lay • Post Lay Burial

SEABED PREPARATION

Overview

2.7.2. The seabed preparation works for the Liverpool Bay CCS Project comprise targeted slope reduction and mega-ripple levelling to prepare the seabed for safe beaching and operation of the Cable Lay Vessel during cable installation. Works are undertaken along defined sections of the route between approximately KP2.0 and KP5.7, based on pre-engineering survey data.

2.7.3. Slope reduction is carried out primarily using a Backhoe Dredger (BHD), with material excavated and side-cast adjacent to the working area. A Trailing Suction Hopper Dredger (TSHD) subsequently completes pre-sweeping of the upper seabed layer to achieve the final design tolerances, operating in a non-standard configuration where material is continuously re-discharged (side-cast) to the seabed rather than stored. Mega-ripple levelling is undertaken using a Water Injection Dredger (WID), which fluidises the crest material and allows it to migrate under gravity into adjacent lower areas, smoothing the seabed profile.

2.7.4. The works are supported by pre-, during- and post-construction surveys to confirm seabed levels and compliance with design requirements and are planned with consideration of tidal constraints and sediment release, which is assessed as low and within the limits assumed in the consented environmental assessments.

Backhoe Dredger (BHD)

2.7.5. The BHD undertakes the primary slope reduction works in the nearshore and shallow water sections of the route. Material is excavated mechanically from the seabed using a hydraulic excavator mounted on a pontoon and is side-cast underwater adjacent to the working area. Side-cast material is placed parallel to the excavation corridor within the reach of the excavator, allowing potential re-use as backfill if required. The BHD performs the bulk removal to achieve the target seabed profile, operating in tidal-restricted conditions with positional stability provided by spud poles.

Trailing Suction Hopper Dredger (TSHD)

2.7.6. The TSHD is used for final pre-sweeping and profile refinement, where higher vertical accuracy is required. The TSHD operates in a non-standard configuration, with dredged material recovered via a draghead and suction pipe and immediately re-discharged back to the seabed rather than stored in the hopper. Discharge is achieved either via a hydraulic discharge pipe (rainbowing) or through bottom doors while sailing. This approach ensures continuous sediment movement, prevents hopper loading, and delivers a smooth seabed finish suitable for safe beaching of the Cable Lay Vessel.

Water Injection Dredger (WID)

2.7.7. The WID is used for mega-ripple levelling within defined sections of the route. The WID injects low-pressure water into the seabed through a submerged nozzle beam, fluidising the crest material of seabed ripples. The mobilised sediment then migrates under gravity as a controlled density flow into adjacent lower areas, smoothing the seabed without mechanical excavation or sediment removal. The extent and direction of sediment movement are managed through nozzle settings and vessel sailing patterns, making this method particularly suited to shallow, sandy seabed conditions.

Table 2-5 – Summary of planned methods of cable installation

Method	Primary purpose	Key activities	Method of material handling	Outcome / design intent
BHD	Slope reduction in shallow and nearshore areas	Mechanical excavation of seabed slopes using a hydraulic excavator mounted on a pontoon	Excavated material is side-cast underwater adjacent to the working area, placed parallel to the excavation corridor within the reach of the dredger	Achieves bulk slope reduction and initial seabed profile to meet safe beaching and installation requirements
TSHD	Final pre-sweeping and profile refinement	Recovery of seabed material via draghead and suction pipe along defined sailing tracks	Operated in a non-standard configuration with material continuously re-discharged to the seabed via hydraulic discharge pipe (rainbowing) or bottom doors; hopper not used	Provides higher vertical accuracy and smooth final seabed profile suitable for Cable Lay Vessel beaching
WID	Mega-ripple levelling	Injection of low-pressure water into the seabed to fluidise ripple crests	Fluidised sediment migrates as a controlled density flow under gravity into adjacent lower areas; no mechanical excavation	Levels seabed mega-ripples and smooths seabed morphology without removal of material

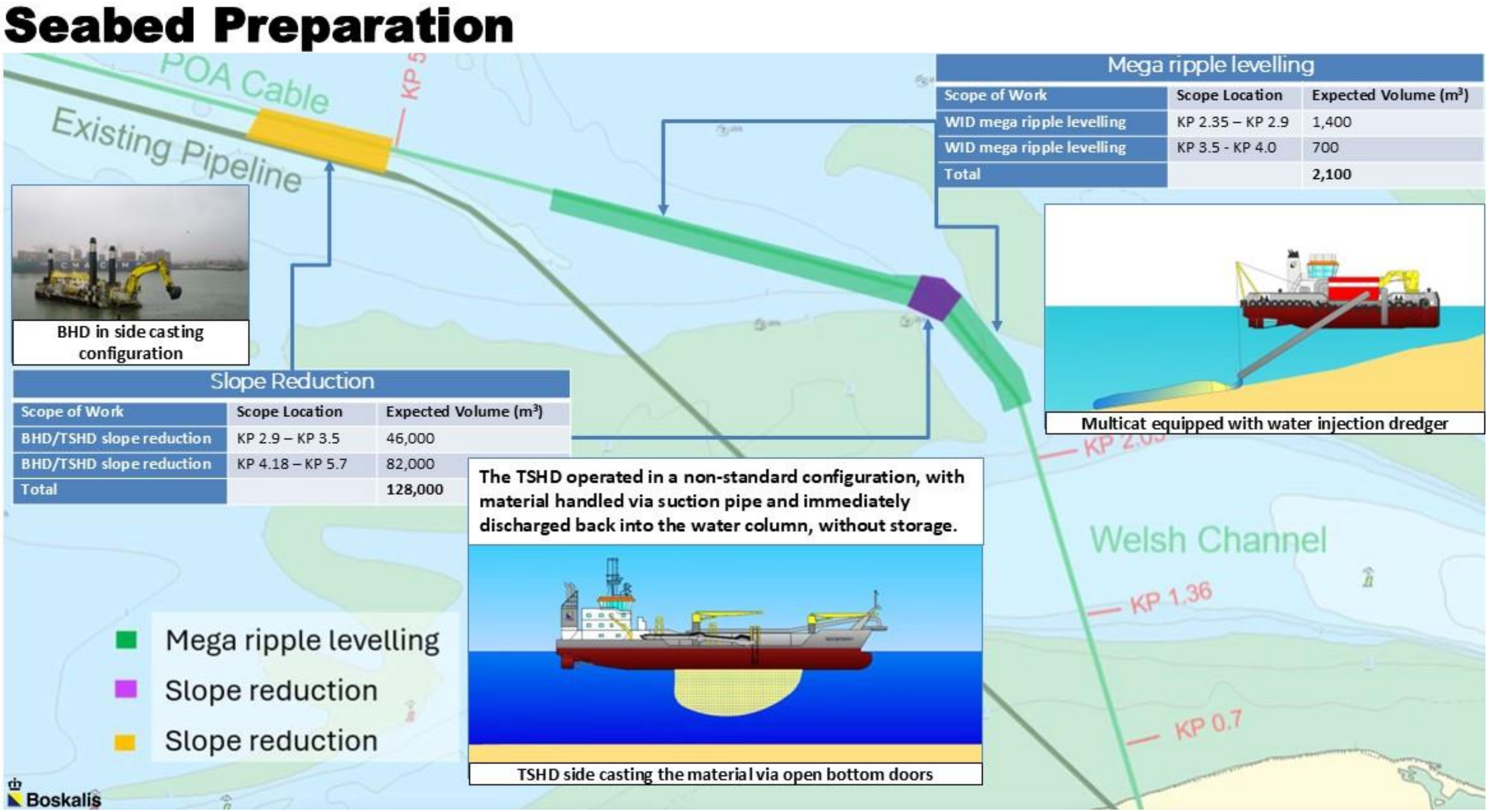


Figure 2-15: Location and method of seabed preparation

SIMULTANEOUS LAY AND BURIAL

2.7.8. A cable lay vessel, with 7-point anchor mooring system, beaching classification notation and equipped with cable lay system and plough, will be employed to execute the cable installation along the shallow portion of the PoA – Douglas CCS cable route.

2.7.9. For shallow water operations the vessel will be positioned and manoeuvred by a 7-point anchor mooring system. Anchor placement, relocation and removal shall be achieved using shallow draft anchor handling tugs.

2.7.10. For the onshore landing, the vessel will be positioned close to or within the intertidal region of the shore and will supply the cable to the onshore landing location through use of its cable lay system.

2.7.11. The vessel's cable lay system, and plough shall be used to simultaneously lay and bury the cable from the intertidal region, throughout the shallow waters, until deeper waters.

2.7.12. During the simultaneous lay and burial of the cable in the shallow water section, the vessel will be beached during the low water portion of the tidal cycle. During this process, the simultaneous lay and burial process will be stopped. The process will be restarted once sufficient water depth returns.

2.7.13. When the vessel reaches sufficiently deep water, positioning and manoeuvring shall be undertaken using the cable lay vessel's dynamic positioning (DP) system. The DP system may be operated either independently or in combination with the anchor mooring system. A forward pull anchor will still be required during DP operations to provide sufficient pull force for plough progression.

2.7.14. The trench created by the plough during simultaneous lay and burial is backfilled by natural collapse immediately after the plough passes and by subsequent seabed movement. For clarity, the plough does not form a persistent open trench; rather, a transient scar is created, which backfills progressively behind the plough through natural collapse and ongoing seabed processes

CABLE FREE LAY

2.7.15. A cable lay vessel, with dynamic positioning system, and equipped with cable lay system, will be employed to execute the cable lay along part of the PoA – Douglas CCS cable route and the interconnector routes. The cable will be free-laid along the pre-determined cable route with sufficient installation accuracy to remain within the pre-determined installation corridor.

2.7.16. On approaching the platform, depending on the determined approach, the cable shall be either pulled into the platform or wet stored for future pull-in. For the platform pull-in the vessel will supply the cable to the platform pull-in location through use of its cable lay system. A winch system, mounted on the platform, shall perform the platform pull-in.

2.7.17. Temporary stabilisation of the cable may be applied either; through the installation of rock bags (or suitable equivalent) on to the cable on the seabed, or shallow cable burial by the means of controlled flow or jetting.

2.7.18. The temporary stabilisation will either be: removed, prior to cable burial; relocated to a position outside of the cable installation corridor; or determined to be part of the permanent stabilisation and left in place.

CABLE WET STORAGE

2.7.19. The PoA to Douglas CCS cable will be wet-stored until it can be pulled-into the Douglas CCS platform. The installation philosophy is based on maintaining continuous cable stability and minimising exposure throughout wet storage and recovery operations. Following installation, the cable section intended for wet storage shall be stabilised through a combination of shallow burial and/or targeted protection (mattresses at crossings and critical locations), as required. This approach ensures that the cable is not left exposed on the seabed for extended periods and remains stable under prevailing environmental conditions.

2.7.20. Preparatory works (e.g. pre-trenching) may be applied where required to facilitate achieving the target Depth of Lowering; however, these are not a governing requirement and shall be subject to Contractor optimisation.

2.7.21. Cable recovery, testing and final pull-in to the Douglas CCS platform will be performed in a subsequent campaign. Upon completion of pull-in, final burial and protection measures shall be completed to achieve the specified Depth of Lowering and ensure long-term stability.

2.7.22. Figure 2-16 and Figure 2-17 illustrate two potential wet storage configurations within the Douglas CCS 500m safety zone. The final methodology shall be selected by the Contractor, subject to the requirement to maintain cable stability and minimise exposure between installation phases.

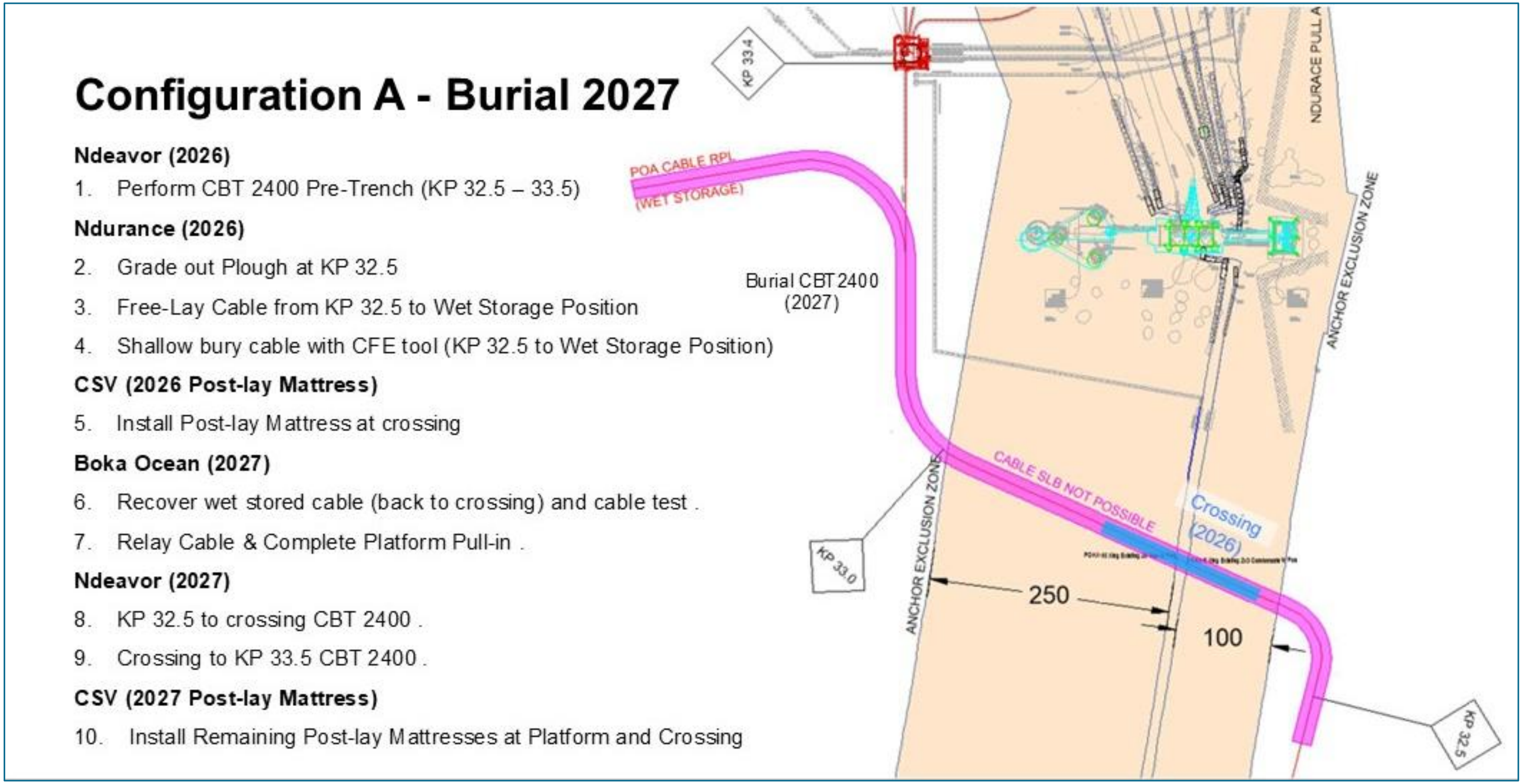


Figure 2-16: Cable Wet Storage Configuration A

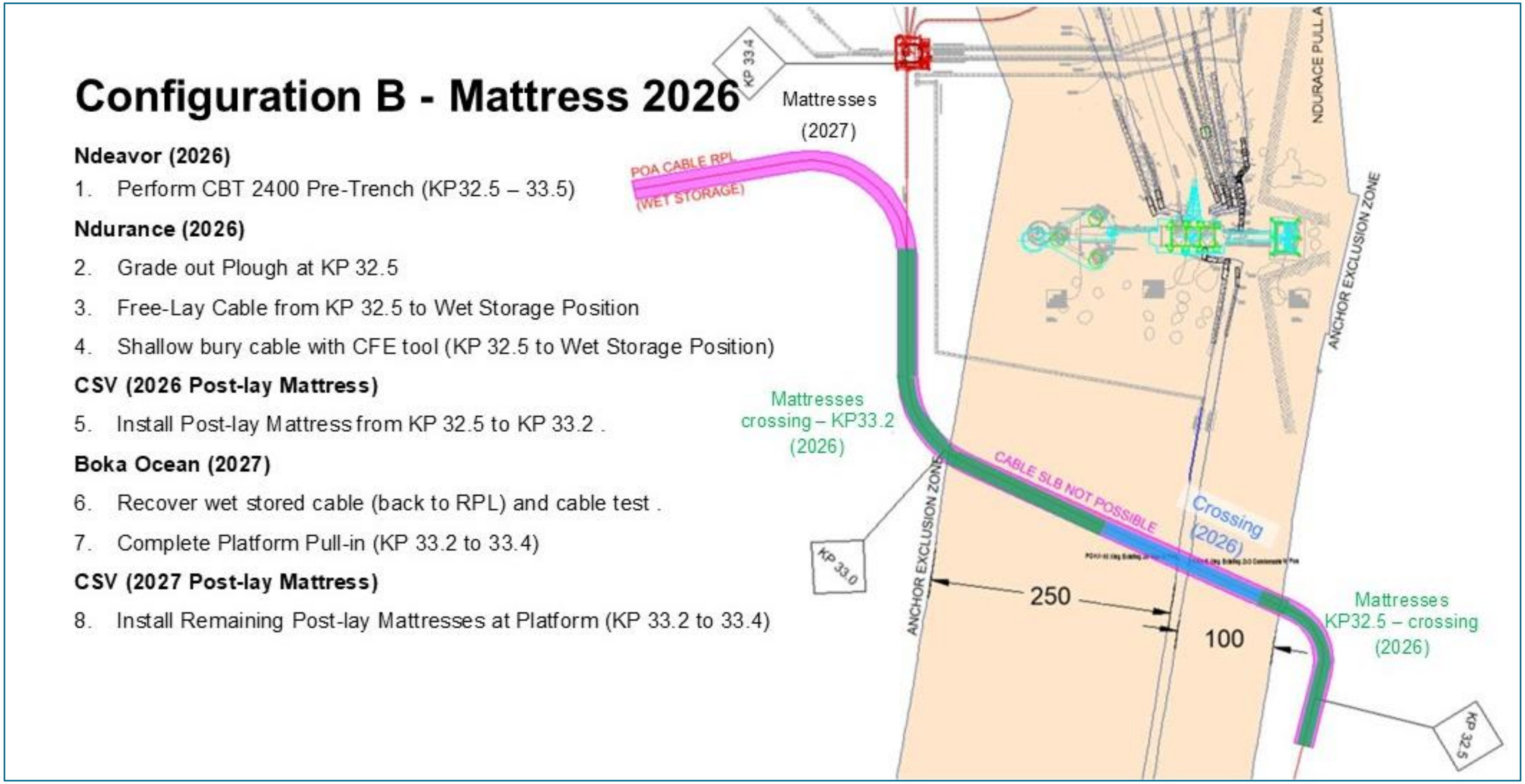


Figure 2-17: Cable Wet Storage Configuration B

POST LAY BURIAL

2.7.23. A trenching support vessel equipped with cable trenching tool, shall be employed to execute the post lay burial. The post lay burial shall be performed using a tracked trencher with, jetting, cutting and/or jetting and cutting capabilities. The trench, created by the trenching tool during post lay burial, shall be back filled through both the collapse of the trench, following departure of the trenching tool, and natural seabed movement.

VESSELS AND EQUIPMENT

Overview

2.7.24. The following sections present examples of the vessel types that are likely to be used during the construction works. Precise vessels to be used are not currently known, however indicative specifications are given based on the information available at the time. Any vessel names quoted are to be considered indicative only, are provided for the purposes of illustrating a typical vessel of that type and should not be interpreted as a commitment that vessel will be used.

2.7.25. Several types and numbers of vessels will be used for cable laying and burial:

- Construction vessels on site at any one time will include main installation/ support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels).
- Installation vessel return trips during construction will include main installation/ support vessels, tug/anchor handlers, cable lay vessels, guard vessels, survey vessels, seabed preparation vessels, CTVs, scour protection installation vessels and cable protection installation vessels).

2.7.26. The confirmed individual vessel details will be notified to NRW in writing no later than 14 days prior to the commencement of the development, and thereafter, any changes to the details supplied will be notified, as soon as practicable, prior to any such change being implemented in the construction or operation of the Liverpool Bay CCS Project.

2.7.27. Liverpool Bay CCS Limited will ensure that for any vessel appointed to engage in the works, the following details are available (where applicable) in the Vessel Report at least five days prior to its engagement in the construction phase of the Development, which will be made available on the Liverpool Bay CCS webpage:

- Vessel name;
- Vessel function;
- Vessel type;
- IMO Number; and
- Vessel owner or operating company.

2.7.28. The following sections provide the details of the vessels proposed for the laying and burial of the cables, and the installation of the mattresses, and rock protection.

Seabed preparation vessels

2.7.29. A summary of the different vessels that could be used for seabed preparation activities on the Liverpool Bay CCS Project, based on the information in this CEMP#3 and the Method Statement at Appendix E, is presented in the following sections.

2.7.30. The characteristics of some of the main vessels required for seabed preparation are set out Table 2-6.

Table 2-6 – Vessels for seabed preparation

Vessel characteristics	Details
Vessel name	Magnor
Vessel function	Back Hoe Dredger
Vessel type	Towed Barge
IMO number Call sign MMSI	9632466 5BVH3 209851000
Vessel owner	Boskalis
Vessel key characteristics	Backhoe dredger with spud legs. Length 72m, Breadth 20.4m, and Draught 3.39m
Propulsion Mooring/station keeping	Under tow by tug.

Vessel characteristics	Details
Vessel name	Shoalway
Vessel function	Seabed preparation
Vessel type	TSHD
IMO number Call sign MMSI	9397951 C6ZS2 311064500
Vessel owner	Boskalis
Vessel key characteristics	Length 90m, Breadth 19m, Draught 6.8m
Propulsion Mooring/station keeping	2 x 1,491kW

Vessel characteristics	Details
Vessel name	Norma II
Vessel function	Seabed preparation
Vessel type	Water Injection Dredger
IMO number Call sign MMSI	9397951 C6ZS2 311064500
Vessel owner	Boskalis
Vessel key characteristics	Length 24.9m, Breadth 9.5m, and Draught 1.96m
Propulsion Mooring/station keeping	Twin screw, 4-blade Fixed pitch props 1,380mm

2.7.31. BHD: A pontoon-mounted hydraulic excavator (e.g., Magnor) equipped with spud legs for stability. Used for mechanical excavation and slope reduction in shallow and nearshore areas, with material side-cast adjacent to the working area. Typically towed to site by tug.

2.7.32. TSHD: Self-propelled seagoing vessel (e.g., Shoalway, Causeway) with draghead and suction pipe. Operates in a non-standard configuration for seabed preparation, continuously re-discharging dredged material to the seabed via hydraulic discharge pipe (rainbowing) or bottom doors. Provides high vertical accuracy for final profile refinement.

2.7.33. WID: Compact vessel (e.g., Norma II) with submerged nozzle beam and water pumping installation. Injects low-pressure water into the seabed to fluidise ripple crests, enabling sediment migration and mega-ripple levelling without mechanical excavation. Twin screw propulsion for precise manoeuvring.

2.7.34. AHT / Multicat: Support vessels (e.g., Odin) used for anchor deployment, positioning, and recovery during cable lay and seabed preparation operations. Shallow draft and versatile propulsion systems allow operation in restricted areas.

2.7.35. Survey Vessel: Small, road-transportable vessel (e.g., Porthos) equipped for hydrographic surveys before, during, and after seabed preparation to confirm compliance with design requirements.

Cable laying vessels

2.7.36. The characteristics of vessels required for cable laying are set out in **Table 2-7**.

Table 2-7 – Vessels for cable laying

Vessel characteristics	Details
Vessel name	NDurance
Vessel function	Cable Lay Vessel
Vessel type	Cable Layer
IMO number Call sign MMSI	9632466 5BVH3 209851000
Vessel owner	Boskalis
Vessel key characteristics	Cable layer with beaching capabilities. Length 99m, Breadth 30m, and Draught 4.8m/7.0m
Propulsion Mooring/station keeping	DP2 and 7 point mooring system

Vessel characteristics	Details
Vessel name	Boka Ocean
Vessel function	Cable Lay Vessel
Vessel type	Cable Layer
IMO number Call sign MMSI	9397951 C6ZS2 311064500
Vessel owner	Boskalis
Vessel key characteristics	Cable layer. Length 120m, Breadth 27m, and Draught 7.0m
Propulsion Mooring/station keeping	DP2 mooring system

Support vessels for cable pull-in to shore

2.7.37. During the Pull-in of the cable to shore, support vessels are required assist in the shallow water operations. During the works NDurance will be on anchors, and two anchor handling tugs will be used to place the anchors. Multicat Odin is a possible anchor handler to assist in the works.

Vessel characteristics	Details
Vessel name	Odin
Vessel function	Anchor handling
Vessel type	Multicat
IMO number	9572824
Call sign	PCCQ
MMSI	245307000
Vessel owner	Herman Senior
Vessel key characteristics	Shallow draft anchor handler. Length 29.9m, Breadth: 13.5m, and Draught 2.6/2.8m
Propulsion Mooring/station keeping	3x Promarin fixed propellers in Optima nozzles

Vessel characteristics	Details
Vessel name	CRC Gladiator
Vessel function	Crew Transfer vessel (CTV)
Vessel type	CTV
IMO number	9572824
Call sign	2IUR3
MMSI	235112943
Vessel owner	Commercial Rib Charter
Vessel key characteristics	CTV – 12 pax. Length: 13m, Breadth: 5.4m, Draught: 0.8m
Propulsion Mooring/station keeping	2 x Iveco FPT Cursor C90 620 2 x MJP. Ultrajet 377 waterjets

Vessel characteristics	Details
Vessel name	Ndeavor
Vessel function	Trenching Support Vessel (TSV)
Vessel type	Cable burial
IMO number	9650212
Call sign	5BVG3
MMSI	209852000
Vessel owner	Boskalis
Vessel key characteristics	Cable layer with beaching capabilities Length: 99m, Breadth: 30m, Draught: 4.8m/7.0m
Propulsion Mooring/station keeping	DP2 2x 1,250kW + 2x 1,000kW Azimuth Thrusters & 1x 550kW Bow Thruster

Vessel characteristics	Details
Vessel name	Causeway
Vessel function	Trailer suction Hopper dredger
Vessel type	Hopper dredger
IMO number	9653197
Call Sign	5BVB3
MMSI	210523000
Vessel owner	Boskalis
Vessel key characteristics	Length: 92m, Breadth: 19m, Draught: 7.2m
Propulsion/ Mooring/station keeping	2x 1,491 kW

Vessel characteristics	Details
Vessel name	GV Haulbowline
Vessel function	Guard vessel
Vessel type	Monohull
IMO number	8847179
Call Sign	MEZW9
MMSI	232021354
Vessel owner	Haulbowline Ltd
Vessel key characteristics	Length: 23m, Breadth: 7m, Draught: 3.6m

Cable burial equipment

2.7.38. A subsea plough or cable trencher would be used to bury sections of the new electrical cable where seabed conditions are suitable and where burial is required to provide protection from external interactions. The burial tool, either a towed plough or a tracked trencher or ROV-operated jetting trencher, would be deployed from the installation vessel and guided along the predetermined route. The equipment creates a narrow trench by cutting or fluidising seabed sediments, allowing the cable to be placed at the required depth either during the same operation or during a subsequent burial pass.

2.7.39. The choice of tool depends on sediment type, required burial depth, and the need to minimise disturbance to the surrounding seabed. Ploughs are typically used in softer, more homogeneous sediments, while trenchers are employed in more variable or compacted ground conditions. Trenching activities would be planned to limit seabed disturbance to the smallest practicable footprint, with sediment expected to naturally backfill the trench over time as part of the normal seabed recovery process. The process ensures controlled and consistent burial to provide mechanical protection and long-term stability for the subsea cable.

2.7.40. The characteristics of equipment required for cable burial are set out in Table 2-8.

Table 2-8 – Equipment for cable burial

Equipment Characteristics	Details
Equipment name	HD3 Plough
Equipment function	Cable Burial
Key characteristics	Depth rating: 500m Length: 16m Width: 6.5m Height: 7.m Trench Depth: 2.75m Cable Diameter: 30 – 300mm
Trenching Method	Plough share and Jetting (optional)

Equipment Characteristics	Details
Equipment name	CBT 2400
Equipment function	Cable Burial
Key characteristics	Depth rating: 4-1000m Length: 8.5m Width: 8.3m Height: 6.4m Trench Depth: 3.3m Cable Diameter: up to 500mm (depending on configuration)
Trenching Method	Jetting, Cutting or hybrid

2.7.41. Figure 2-18 shows an overview of the location, vessels, and timing for the installation of electrical cables and the crossing points of third-party infrastructure. Details of the design and location coordinates for the crossings are presented in the Figures and Tables in Section 2.8.

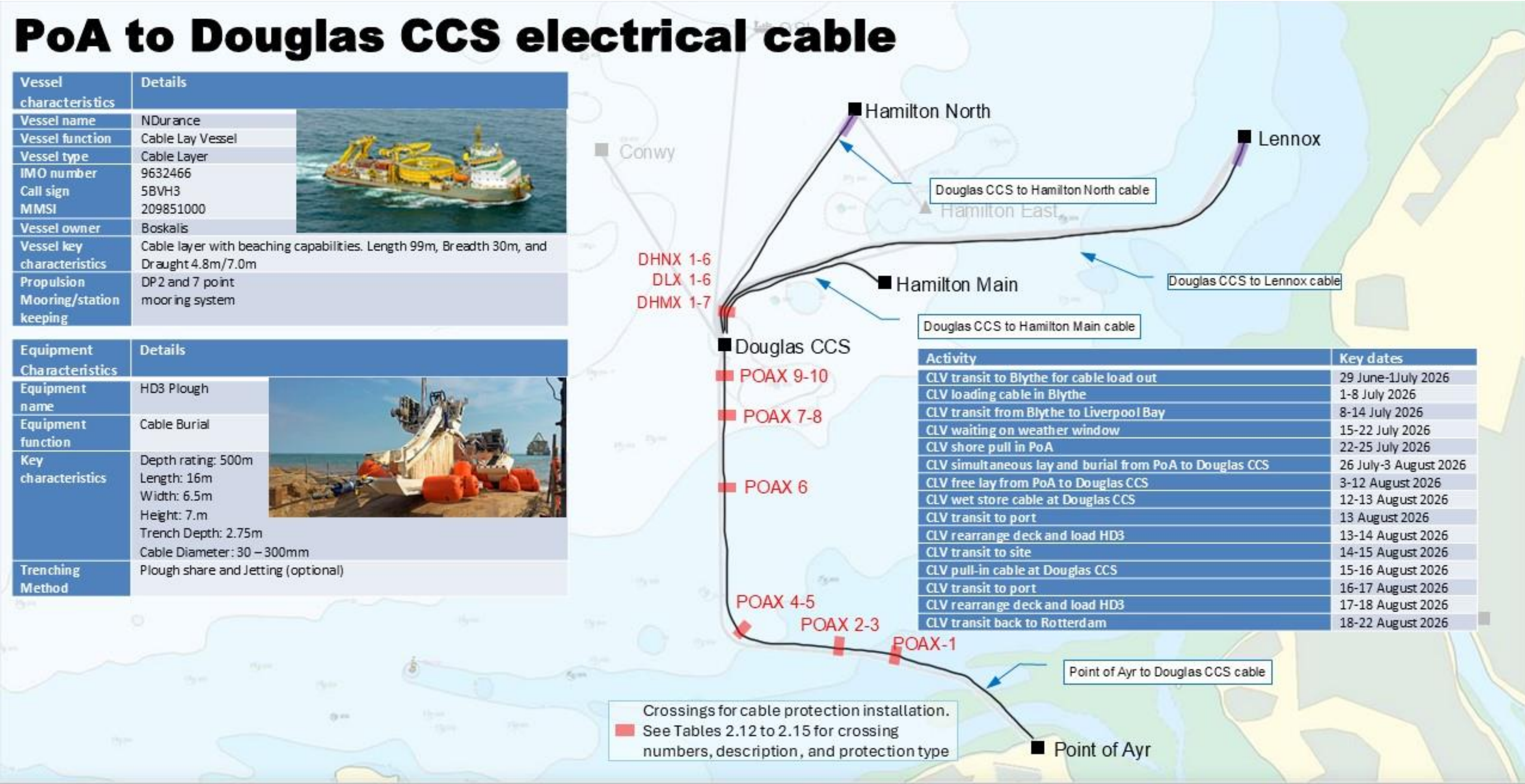


Figure 2-18: Location, method, and programme for cable laying

2.8. DESCRIPTION OF ACTIVITY 1: POA TO DOUGLAS CCS CABLE POST LAY MATTRESSES AND ROCK PROTECTION AT CABLE CROSSINGS

OVERVIEW AND PROGRAMME

2.8.1. Following the execution of cable lay and burial, the cable installation shall be completed by means of the following activities:

- Post-lay mattress installation.
- Rock installation.

2.8.2. The installation of concrete mattresses and subsea rock protection at the cable crossings would be carried out using specialist marine construction vessels. Pre lay concrete mattresses would typically be deployed on a dedicated mattress installation vessel or a multipurpose offshore construction vessel equipped with a crane or A-frame, mattress deployment chute, and dynamic positioning (DP) capability to ensure accurate placement. An overview of the location and methods is presented in Figure 2-19.

2.8.3. Rock protection would be installed using a purpose-built fallpipe vessel capable of placing graded rock with high precision via inclined fallpipe system or fallpipe ROV, depending on water depths and accuracy requirements. These vessels allow for safe and efficient installation activities around existing seabed infrastructure and ensure the required stability and separation between the new electrical cable and the crossed assets. Further details are provided in the following sections.

2.8.4. The planned schedule for the installation of post-lay mattresses and rock protection on third-party assets along the PoA to Douglas CCS cable only, is detailed in Table 2-9. The programme has been developed to avoid activity between 01 November and 31 March inclusive (CML2365 Condition 3.18).

2.8.5. This operation will utilise two primary vessel types: the Offshore Support Vessel (OSV) will be responsible for mattress deployment, followed by the Fall Pipe Vessel (FPV), which will install rock protection at cable crossings.

Table 2-9 – Programme for PoA to Douglas CCS cable post-lay mattresses and rock protection at crossings

Activity	Key dates
Mattress Installation	
OSV transit to port	26-31 August 2026
OSV load mattresses (approx. 95 pieces)	1-2 September 2026
OSV lay mattresses PoA to Douglas CCS cable (approx. 95 pieces)	2-4 September 2026
OSV transit to home port (Netherlands)	4-7 September 2026
Rock Protection	
FPV mobilisation to site	4-8 September 2026
FPV install rock protection	8-18 September 2026
FPV waiting on weather	18-19 September 2026
FPV to home port (Netherlands)	19-22 September 2026

VESSELS FOR POST LAY MATTRESS INSTALLATION

2.8.6. A light construction vessel equipped with a UTROV positioned mattress frame, or suitable alternative spread, will be employed to install the post-lay mattresses. The post-lay mattresses will be installed on the seabed at the predetermined crossing locations, along the cables approach to the platforms.

2.8.7. Additional, post-lay mattresses may be installed along the cable route, in locations where the cable is identified to be at an insufficient depth of lowering.

2.8.8. Additional, post-lay mattresses (or equivalent) may be installed along the cables approach to the platforms, to stabilise the cable catenary between the platform J-Tube and seabed.

Table 2-10 – Vessel proposed for mattress laying

Vessel characteristics	Details
Vessel name	Geoquip Elena
Vessel function	Post lay mattress campaign / crossings
Vessel type	OSV
IMO number Callsign MMSI	9249439 YJVL7 576431000
Vessel owner	Benemare Shipping
Vessel key characteristics	DP vessel Length: 91m Breadth: 20m Draught: 5m
Propulsion / Mooring/station keeping	2 x 2200 kW Aquamaster Contaz15 CRP DP

VESSELS FOR ROCK INSTALLATION

2.8.9. A rock installation vessel with fall pipe shall be employed to execute the rock installation. The rock shall be installed on the seabed at the predetermined crossing locations.

2.8.10. Additional, rock may be installed along the cable route, in locations where the cable is identified to be at an insufficient depth of lowering. Or along the cables approach to the platforms, to stabilise the cable catenary between the platform J-Tube and seabed.

Table 2-11 – Vessel proposed for placement of rock protection

Vessel characteristics	Details
Vessel name	Rockpiper
Vessel function	Subsea rock Installation vessel
Vessel type	Rock installation
IMO number Callsign MMSI	9583861 5BML3 209449000
Vessel owner	Boskalis
Vessel key characteristics	Dp vessel Length: 158,6m Breadth: 36m Draught: 9,4m
Propulsion / Mooring/station keeping	DP-2 - 2x 4,500 kW (2 x azimuth thrusters)

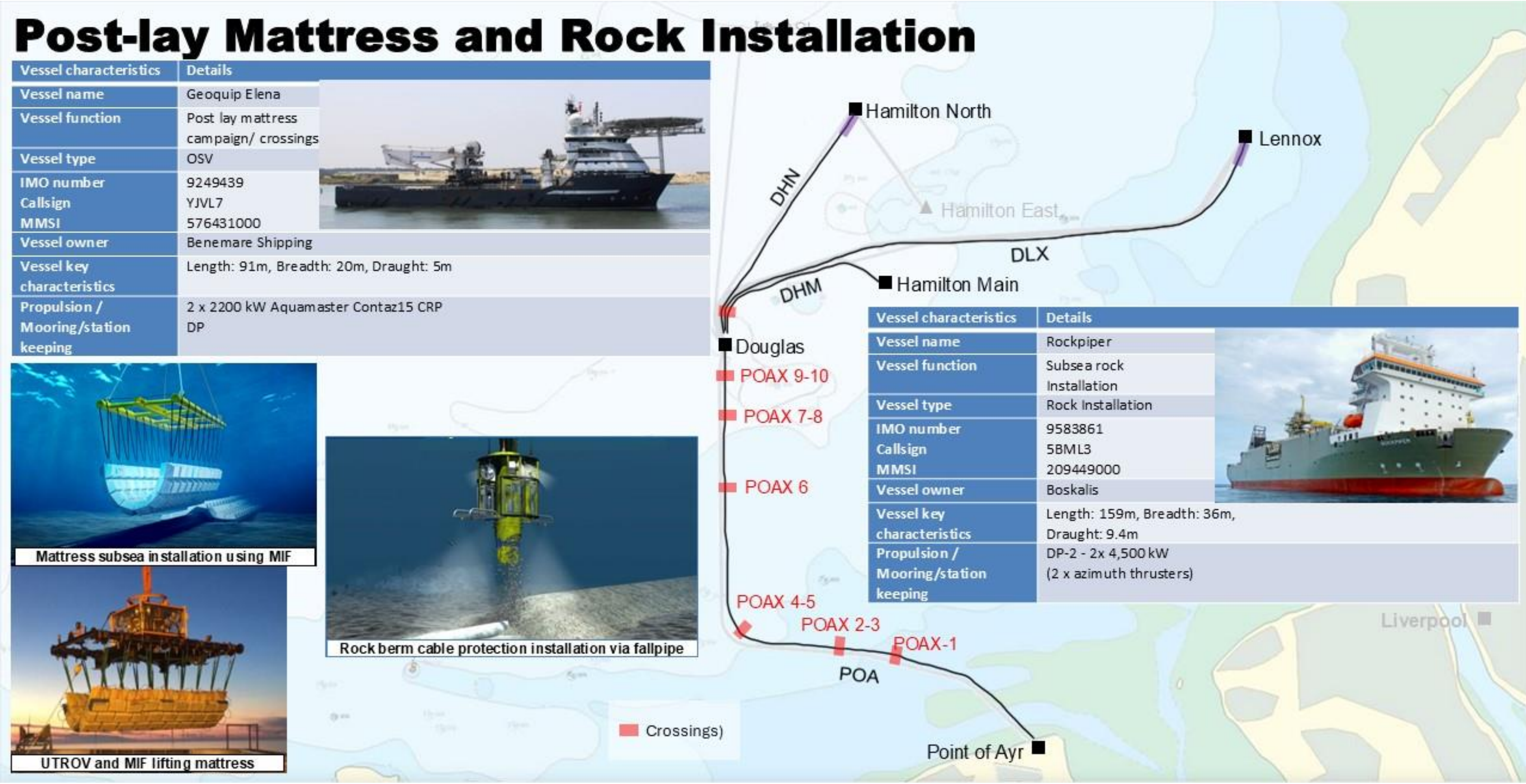


Figure 2-19: Location, and method for post-lay mattress and rock berm installation

DESIGN AND LOCATION OF CROSSING PROTECTION

2.8.11. Post-lay protection will be installed at 29 crossing locations in Welsh Waters, and four in English Waters. Appendix A presents a chart of the crossing locations and their relationship to other infrastructure. Crossing protection will be provided by either mattresses (Figure 2-20) or rock (PoAX-6) or a combination of the two (Figure 2-22). Appendix F presents the design drawings for the PoA to Douglas CCS electrical cable crossing protection.

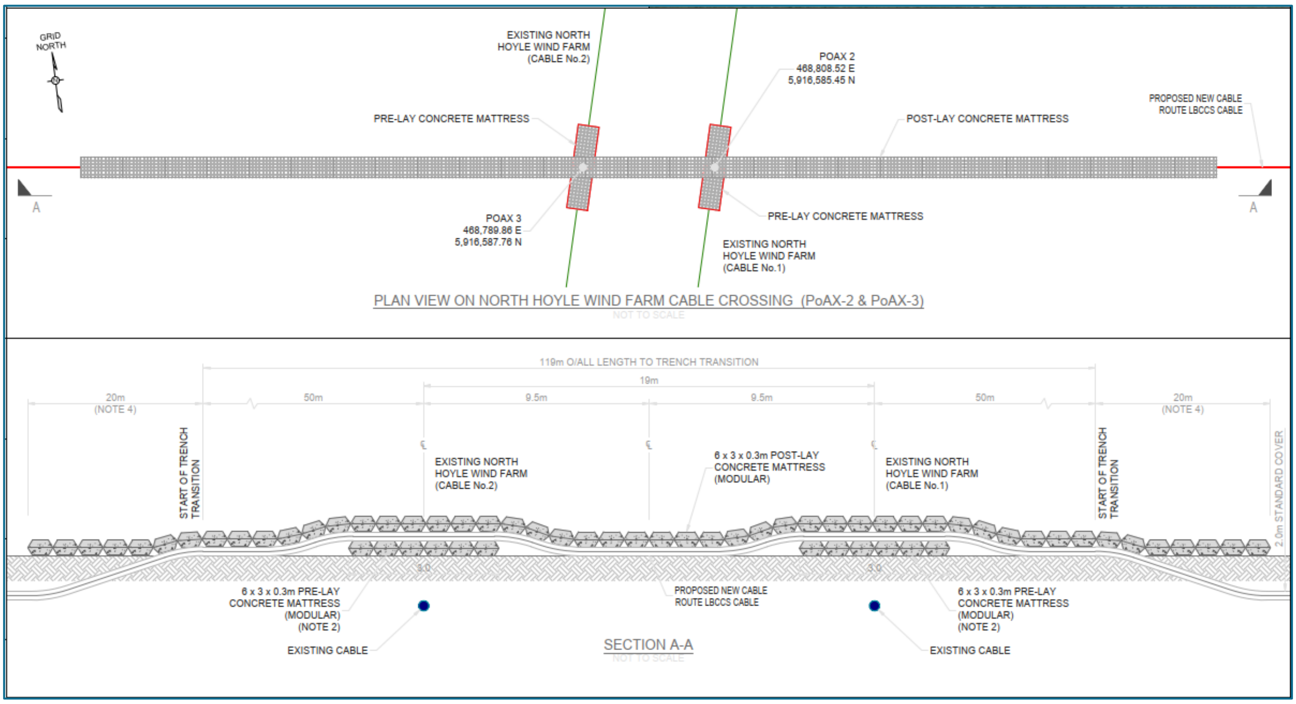


Figure 2-20: Plan view, and elevation of PoAX-2 and PoAX-3 crossings with mattress protection

2.8.12. The mattresses used at crossings will be a standard design, 6m in length, 3m in width, and 0.3m in height, each weighing approximately 9,400kg. Figure 2-21 shows a plan and elevation of the bi-tapered mattress standard design.

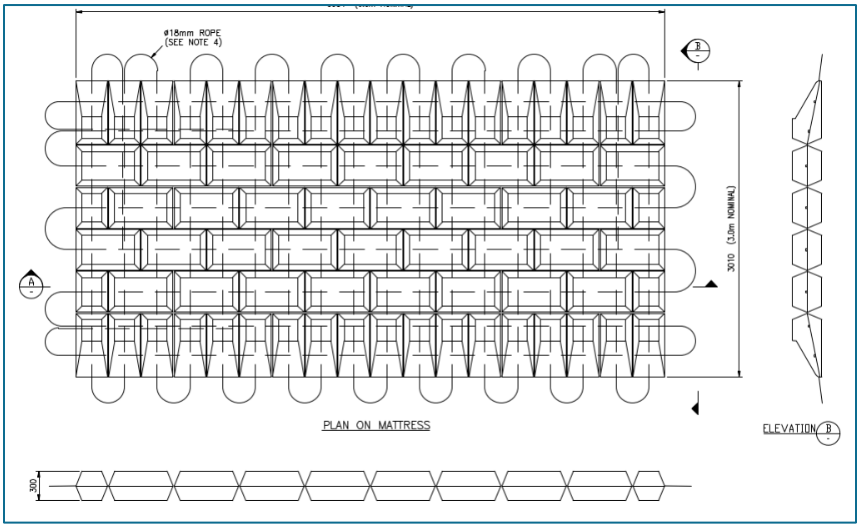


Figure 2-21: Plan view, and elevation of bi-taper mattress

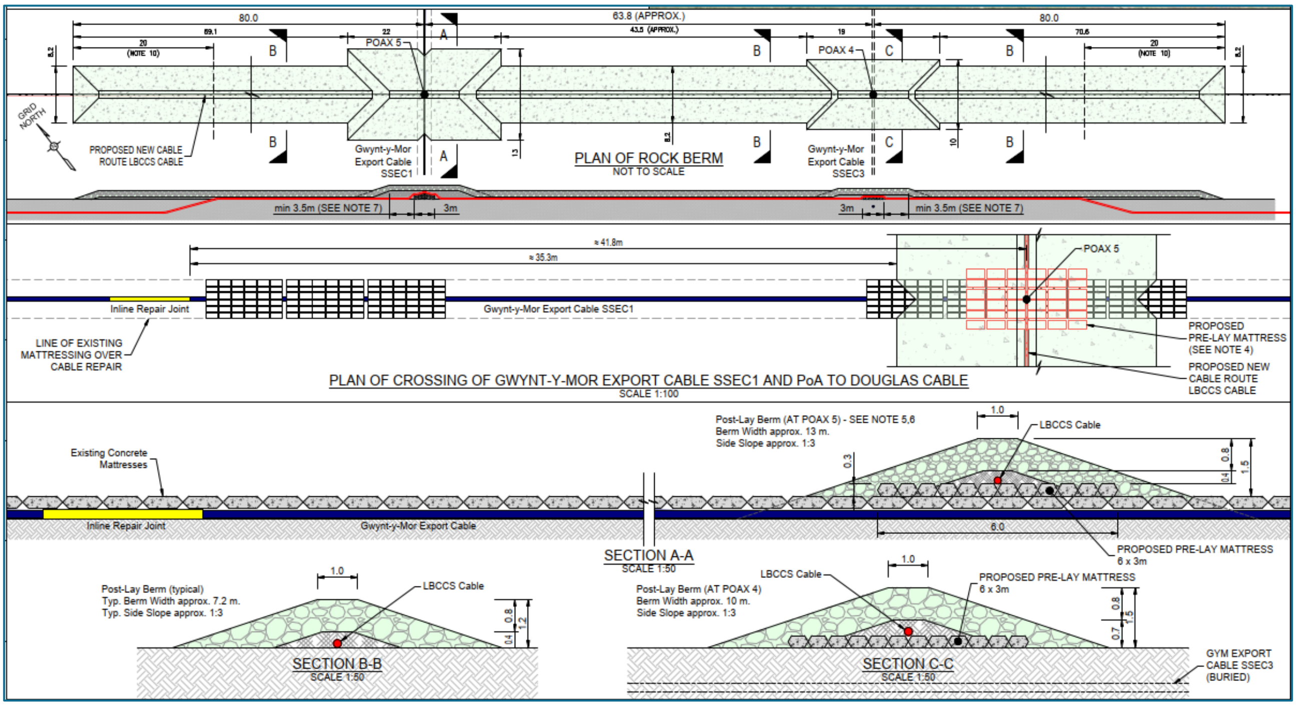


Figure 2-22: Plan view, and elevation of PoAX-4 and PoAX-5 crossings with mattress and rock protection

2.8.13. An MPSV like the Glomar Worker, as shown in Error! Reference source not found., or the Voe Vanguard, as shown in Figure 2-19, equipped with dynamic positioning, and a crane, will be mobilised for the operation. It will not be necessary to deploy anchors when carrying out the post-lay mattress installation.

2.8.14. Following pre-installation surveys to confirm seabed conditions and exact placement locations, concrete mattresses will be lifted from deck using the vessel crane. The mattresses are carefully lowered to the seabed using specialised Mattress Installation Frames (MIF). These frames ensure stability and control during lowering operations, minimising the risk of damage to the mattress, or the subsea cable, and limiting disturbance to the seabed.

2.8.15. Positioning is monitored using Echoscope (real-time 3D sonar) that can offer a 3D visualisation during the mattress installation process, and it helps ensure mattresses are placed accurately even in low-visibility conditions without the need of the UTROV cameras.

2.8.16. Once on the seabed, the mattresses will be adjusted as required using the ROV to achieve full contact and stability. Installation is completed in accordance with the predefined layout and tolerances. A post-installation inspection will then be carried out to verify the correct placement and readiness of the route for the subsequent cable installation.

2.8.17. Coordinates and descriptions for the crossings along the PoA to Douglas CCS cable are presented in Table 2.12.

Table 2.12 Coordinates of crossings for PoA to Douglas CCS platform cable

Crossing ID	Easting WGS84 (DDMMSS)	Northing WGS84 (DDMMSS)	Post-lay Protection	Description of crossing
PoAX-1	03 26 16.63	53 23 25.2	23 Concrete Mattresses Total Length 140 m	Ørsted Burbo Bank wind farm
PoAX-2 & 3	03 28 14.81	53 23 41.99	27 Concrete Mattresses Total Length 159 m	Greencoat UK Wind North Hoyle wind farm
PoAX-4 & 5	03 34 28.38	53 24 20.1	1515m³ Rocks Total length 224 m	Gwynt y Môr OFTO, Gwynt y Môr wind farm
PoAX-6	03 34 41.76	53 28 4.58	675m³ Rocks Total length 140 m	Gwynt y Môr OFTO, Gwynt y Môr wind farm
PoAX-7 & 8	03 34 44.44	53 31 21.46	735m³ Rocks Total length 171 m	National Grid/Scottish Power, Western Link HVDC cable
	03 34 44.46	53 31 22.48		National Grid/Scottish Power, Western Link HVDC cable
PoAX-9 & 10	03 34 42.59	53 32 1.96	25 Concrete Mattresses Total length 153 m	2 x 3" Condensate (PL1032 and PL1033) to PoA
	03 29 17.26	53 32 3.56		20" Gas (PL1030) to PoA

2.8.18. Coordinates and descriptions for these crossings along the Douglas CCS to Hamilton North cable are presented in Table 2.13. Cable crossing locations and numbers are shown in Figure 2-19.

Table 2.13 Coordinates of crossings for Douglas CCS platform to Hamilton North cable

Crossing ID	Easting WGS84 (DDMMSS)	Northing WGS84 (DDMMSS)	Post-lay protection	Description of crossing
DHNX-1 , 2 & 3	03 35 29.52	53 33 3.27	925m³ Rock Total length 183 m	8" Production (PL2939) to CONWY
	03 35 29.52	53 33 3.27		3" Condensate PL (PL2941) to CONWY
	03 35 28.93	53 33 4.52		8" Water Injection Pipeline (PL2940) to CONWY
DHNX-4	03 34 58.92	53 33 41.09	560m³ Rock Total length 140 m	14" Oil Export (PL1031) to OSI
DHNX-5 & 6	03 34 27.15	53 33 47.24	800m³ Rock Total length 186 m	14" Gas Export (PL1041 + 2" Methanol (PL1042) from Hamilton North
	03 34 24.76	53 33 47.7		Existing power cable to Hamilton North

Note: The crossings highlighted in grey are in English Waters. They are included here for completeness and cumulative impact reasons, as they will be installed close to the Wales/England border in the same campaign as those in Welsh Waters.

2.8.19. Coordinates and descriptions for these crossings along the Douglas CCS to Hamilton Main cable are presented in Table 2.14. Cable crossing locations and numbers are shown in Figure 2-19.

Table 2.14 Coordinates of crossings for Douglas CCS platform to Hamilton Main cable

Crossing ID	Easting WGS84 (DDMMSS)	Northing WGS84 (DDMMSS)	Post-lay protection	Description of crossing
DHMX-1	003 34 54.29	53 32 24.82	100-120 mattresses over 500-600m length across all crossings	8" Production (PL2939) + 3" Condensate (PL2941) to CONWY
DHMX-2	003 34 54.29	53 32 24.82		8" Water Injection (PL2940) to CONWY
DHMX-3	003 34 52.37	53 32 25.25		14" Oil Export (PL1031) to OSI
DHMX-4	003 34 51.31	53 32 25.5		14" Gas (PL1041) + 2" Methanol (PL1042) from Hamilton North
DHMX-5	003 34 49.89	53 32 25.82		Existing power cable to Hamilton North
DHMX-6	003 34 48.25	53 32 26.21		Existing power cable to Hamilton Main
DHMX-7	003 34 47.26	53 32 26.42		16" Gas Injection (PL1035) from Lennox
DHMX-8	003 34 45.91	53 32 26.73		14" Oil Export (PL1034) + 2" Methanol (PL1037) from Lennox
DHMX-9	003 34 44.63	53 32 27.02		12" Gas Injection (PL1036) + 2" Wax Inhibitor (PL1038) to Lennox
DHMX-10	003 34 43.45	53 32 27.29		20" Gas Export (PL1039) + 2" Methanol (PL1040) from Hamilton Main
DHMX-11	003 34 41.35	53 32 27.77		12" Gas Injection (PL1036A) to Lennox

2.8.20. Coordinates and descriptions for these crossings along the Douglas CCS to Lennox cable are presented in Table 2.15. Cable crossing locations and numbers are shown in Figure 2-19.

Table 2.15 Coordinates of crossings for Douglas CCS platform to Lennox cable

Crossing ID	Easting WGS84 (DDMMSS)	Northing WGS84 (DDMMSS)	Post-lay Protection	Description of crossing
DLX-1, 2 & 3	03 21 12.72	05 21 58.82	925m^3 Rock Total Length 182 m	8" Production (PL2939) to CONWY
	03 35 28.33	53 33 2.19		3" Condensate PL (PL2941) to CONWY
	03 35 27.76	53 33 3.41		8" Water Injection Pipeline (PL2940) to CONWY
DLX-4	03 34 59.06	53 33 40.05	560m^3 Rock Total Length 140 m	14" Oil Export (PL1031) to OSI
DLX-5 & 6	03 34 28.69	53 33 45.92	805m^3 Rock Total Length 168 m	14" Gas Export (PL1041 + 2" Methanol (PL1042) from Hamilton North and
	03 34 26.27	53 33 46.39		Existing power cable to Hamilton North

Note: The crossings highlighted in grey are in English Waters. They are included here for completeness and cumulative impact reasons, as they will be installed close to the Wales/England border in the same campaign as those in Welsh Waters.

2.8.21. The proposed programme for the installation of cable protection along the cable routes for the PoA to Douglas CCS, and Douglas CCS to satellites cables, planned for 2026, is presented in Table 2-9 and Table 2-17.

2.9. DESCRIPTION OF ACTIVITY 1: INTER-PLATFORM CABLE LAYING AND BURIAL

OVERVIEW AND PROGRAMME

2.9.1. The anticipated programme during **2027** for the CLV to be used for the free-lay of the cables from Douglas CCS to the three satellite platforms is presented in Error! Reference s ource not found.. The programme has been developed to **avoid activity between 01 November and 31 March inclusive** (**CML2365 Condition 3.18**).

Table 2-16 – Programme for cable free-lay from Douglas CCS to satellite platforms

Activity	Key dates
CLV transit to Blythe for cable load out	14-16 June 2027
CLV loading cable in Blythe	16-26 June 2027
CLV transit from Blythe to Liverpool Bay	26-30 June 2027
CLV – cable pull-in Douglas CCS	1 July 2027
CLV free-lay Douglas CCS to Hamilton Main	1-3 July 2027
CLV – cable pull-in Hamilton Main	3-4 July 2027
CLV in-field transit	4 July 2027
CLV – cable pull-in Douglas CCS	4-5 July 2027
CLV free-lay Douglas CCS to Hamilton North	5-6 July 2027
CLV cable pull-in Hamilton North	6-8 July 2027
CLV – in-field transit	8 July 2027
CLV tidal delay at Lennox	8 July 2027
CLV weather downtime at Lennox	8-9 July 2027
CLV – cable pull-in Douglas CCS	9-10 July 2027
CLV free-lay Douglas CCS to Lennox	10-14 July 2027
CLV – cable pull-in Lennox	14-15 July 2027
CLV transit to Rotterdam	15-18 July 2027

CABLE CROSSINGS

2.9.2. The anticipated programme during **2027** for the installation of post-lay mattresses and rock protection on third-party assets along the Douglas CCS to satellite cables is detailed in **Error! Reference source not found.**. The programme has been developed to **avoid a ctivity between 01 November and 31 March inclusive** (**CML2365 Condition 3.18**).

2.9.3. This operation will utilise two primary vessel types: the Offshore Support Vessel (OSV) will be responsible for mattress deployment, and the Fall Pipe Vessel (FPV), which will install rock protection at cable crossings.

Table 2-17 – Programme for Douglas CCS to satellite platforms cables post-lay mattresses and rock protection at crossings

Activity	Key dates
OSV transit to loading port	02-06 August 2027
OSV load mattresses (approx. 96 pieces)	06-08 August 2027
OSV transit to site	08 August 2027
OSV lay mattresses Douglas CCS to Hamilton Main cable (96 pieces)	08-11 August 2027
Transit to loading port	11 August 2027
OSV load mattresses (approx. 96 pieces)	11-13 August 2027
OSV transit to site	13 August 2027
OSV lay mattresses Douglas CCS to Hamilton Main cable (10 pieces)	14 August 2027
OSV lay mattresses Douglas CCS to Hamilton North cable (61 pieces)	14-15 August 2027
OSV lay mattresses Douglas CCS to Lennox cable (25 pieces)	15-16 August 2027
Transit to loading port	16 August 2027
OSV load mattresses (approx. 35 pieces)	16-17 August 2027

Activity	Key dates
OSV transit to site	17-18 August 2027
OSV lay mattresses Douglas CCS to Lennox cable (35 pieces)	18-19 August 2027
OSV transit to home port (Netherlands)	19-22 August 2027
FPV mobilisation to site	19-23 August 2027
FPV install rock protection	23 August-02 September 2027
FPV waiting on weather	02-03 September 2027
FPV to home port (Netherlands)	03-06 September 2027

2.10. DESCRIPTION OF ACTIVITY 4: INSTALLATION OF DOUGLAS CCS

2.10.1. This section describes the installation of the Douglas CCS Platform jacket, and topsides (Activity 4). Also described is the exchange of topsides at the satellite platforms.

2.10.2. The installation of the Douglas CCS platform will be undertaken by the Heavy Lift Vessel SSCV Balder, operating in Dynamic Positioning (DP) mode. As the vessel will operate on DP during platform installation, no anchor mooring spread will extend beyond the existing 500 m Safety Zone surrounding the Douglas installation.

2.10.3. The Douglas CCS platform lies within the Area to Be Avoided (ATBA) established within the Liverpool Bay Traffic Separation Scheme (TSS) as shown in Figure 2-23 and Figure 2-25. The ATBA is intended to provide safe operational access to the Douglas installation and restrict general vessel traffic from transiting in proximity. As installation activities will occur within this existing restricted area and the heavy lift vessel will operate on DP, navigable sea room for vessels transiting the Liverpool Bay TSS will not be restricted.

2.10.4. The Douglas CCS platform will be installed as a four-legged steel jacket structure, measuring approximately 20 m x 20 m at the base and 17.5 m x 17.5 m at the upper level. This jacket is designed to support both lateral environmental loads (wind, waves) and vertical loads from the topsides. It will accommodate risers, J-tubes, caissons, and cathodic protection monitoring equipment.

2.10.5. The jacket will be secured to the seabed using eight vertically driven piles. Each pile is approximately 1.5 m in diameter and 39.5 m in length, with a penetration depth of around 20 m. The piles are driven through pile sleeves attached to the jacket legs using shear plates, yoke plates, and stiffeners. The foundation piles transfer the combined weight of the jacket and topsides directly to the soil, ensuring stability.

2.10.6. Where the piling activities are undertaken, mitigation measures will be implemented in accordance with the Marine Mammal Mitigation Plan, including soft-start procedures Marine Mammal Observers, Passive Acoustic Monitoring (PAM), and monitoring of exclusion zones prior to commencement of piling.

2.10.7. The Douglas CCS installation is located between the eastbound and westbound traffic lanes of the Liverpool Bay Traffic Separation Scheme, within the existing ATBA associated with the Douglas field. The traffic lanes pass approximately 750 m from the Douglas installation, ensuring separation between offshore installation activities and transiting commercial shipping.

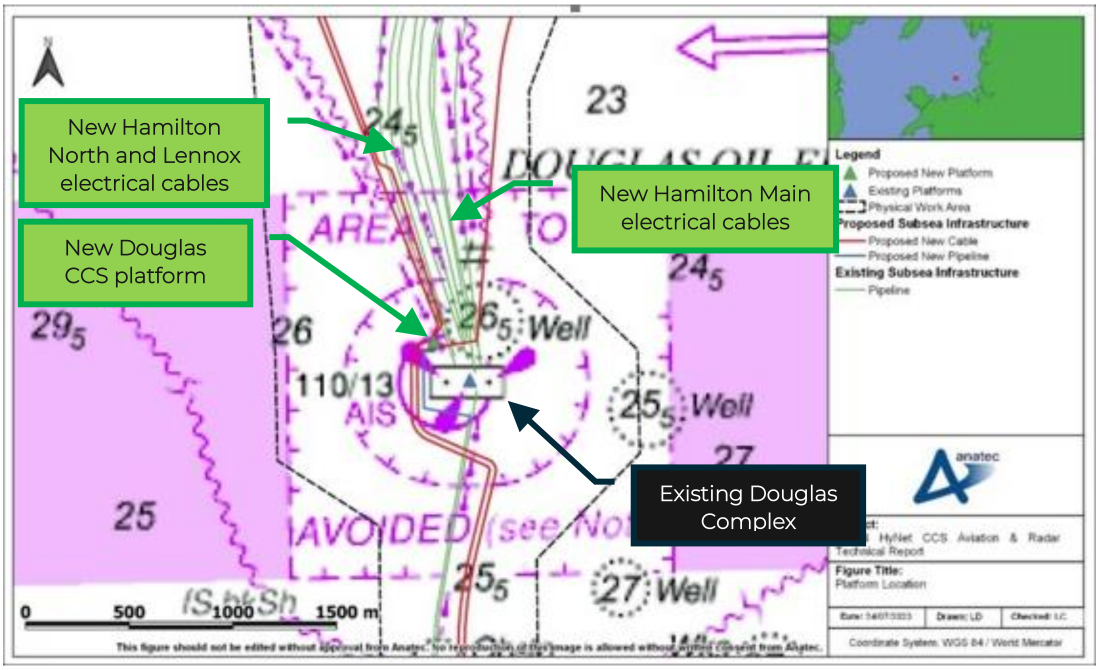


Figure 2-23: Area to be Avoided (ABTA) at Douglas CCS

2.10.8. Offshore installation activities have been designed to minimise interaction with the Liverpool Bay Traffic Separation Scheme. The Douglas CCS platform is located within the Area to Be Avoided (ATBA) established within the TSS, where general vessel traffic is already restricted. Platform installation will be undertaken by SSCV Balder operating in Dynamic Positioning (DP) mode (Figure 2-24), ensuring no anchor mooring spread extends beyond the existing 500 m safety zone. Cable installation activities will be coordinated by the Marine Coordinator with guard vessels monitoring vessel traffic where required.

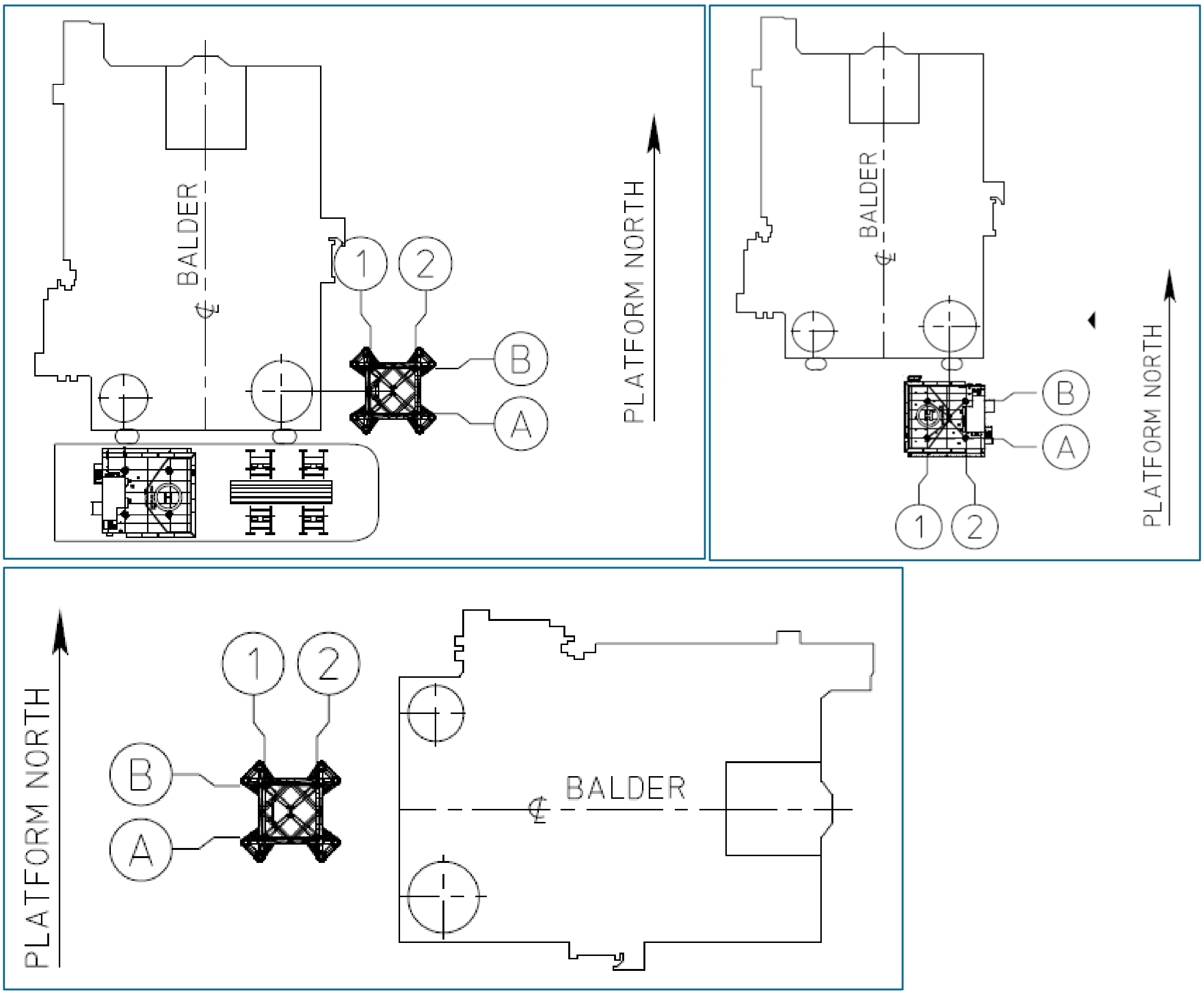


Figure 2-24: Position of Balder HLV operating on dynamic positioning during installation of Douglas CCS

2.10.9. A temporary period will occur during which both the existing Douglas installation and the new Douglas CCS platform will be present within the Douglas field area. The existing installation is currently non-operational and subject to a separate decommissioning programme managed under OPRED regulatory approval. As both structures remain within the ATBA and existing safety zone, this temporary overlap does not introduce additional navigational restrictions. It is expected in next 5 years that existing Douglas Complex is removed.

2.10.10. The Douglas CCS platform will be installed within the existing Douglas field ATBA and safety zone arrangements. Safety zone provisions therefore remain consistent with the current navigational restrictions associated with the Douglas installation. During construction activities navigational warnings and guard vessels will provide additional operational control where required. Once Douglas CCS is commissioned, a new 500m safety zone shall be established around platform.

2.10.11. Satellite platform works within the wider Liverpool Bay field occur at separate locations remote from the Douglas installation. For these satellite installation activities, the SSCV Balder may operate using an anchor mooring spread due to shallow water depths limiting DP capability. However, these activities take place significantly distant from the

Liverpool Bay TSS, and therefore the anchor spread associated with satellite installations will not affect navigable sea room within the TSS or in the vicinity of the Douglas platform.

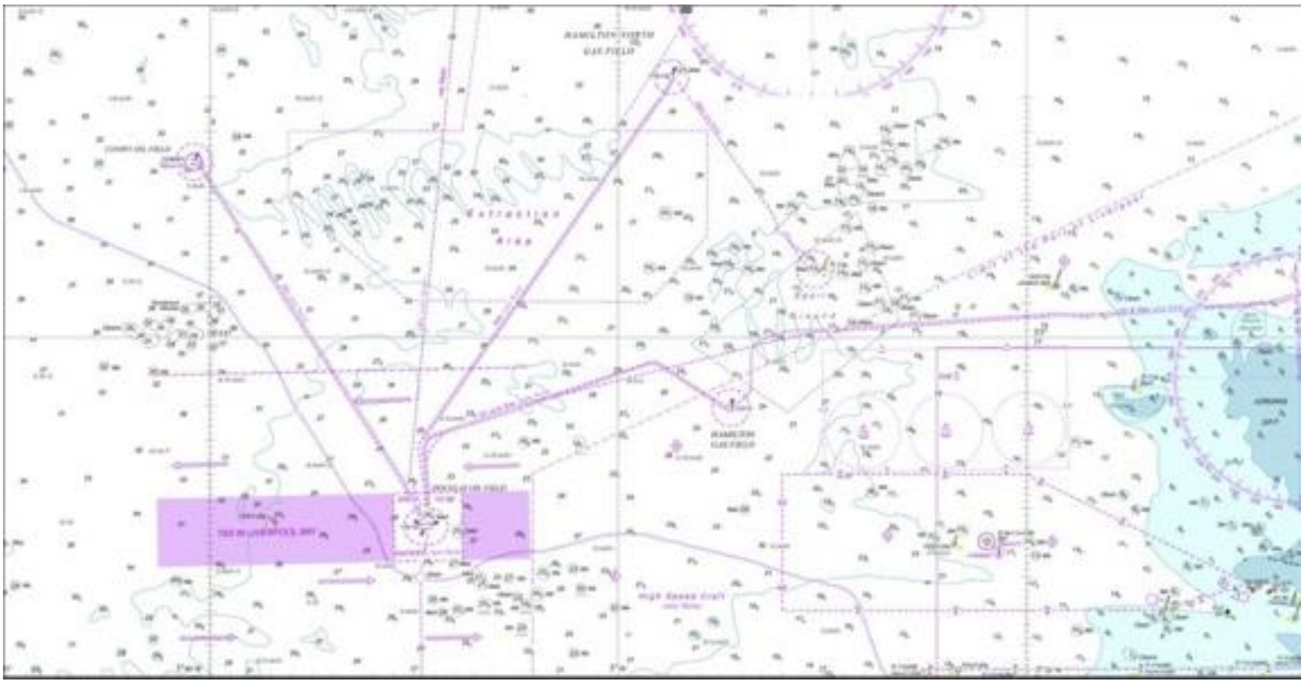


Figure 2-25: Area to be Avoided (ABTA) at Douglas CCS

2.10.12. The export cable route crosses the Welsh Channel between approximately KP 1.5 and KP 2.0, which provides navigational access to the Port of Mostyn. Cable installation in this area will be undertaken using a cable lay vessel supported by Anchor Handling Tugs (AHTs). The anchor patterns have been designed such that a navigable corridor through the Welsh Channel remains available for transiting vessels during operations. Cable installation activities will be coordinated by the Marine Coordinator with guard vessels monitoring vessel traffic where required

2.10.13. Operations in this area will be undertaken in coordination with the Port of Mostyn Harbour Authority, in accordance with the agreed Memorandum of Understanding between Liverpool Bay CCS Ltd and the Port of Mostyn, which provides for coordination of cable laying activities with port vessel traffic and ensures safe vessel passage around the cable lay vessel where required.

2.10.14. During cable installation activities within the Welsh Channel, assisting Anchor Handling Tugs will act as guard vessels when not engaged in anchor handling operations to monitor vessel traffic and facilitate safe passage through the channel. Installation activities within this section will be temporary and of limited duration, after which the cable will be buried below seabed level and will not present any obstruction to navigation.

2.10.15. This area lies outside the Liverpool Bay Traffic Separation Scheme but is used by vessels transiting to and from the Port of Mostyn.

2.10.16. Submarine cable installation between Point of Ayr and Douglas CCS will be undertaken using a Cable Lay Vessel (CLV) operating along the approved cable route.

2.10.17. Cable installation activities will be coordinated by the Marine Coordinator with guard vessels monitoring vessel traffic where required.

2.10.18. The installation methodology includes:

- limited anchoring during nearshore installation up to approximately KP11.
- cable burial using a plough system supported by a single bow anchor beyond KP11.

2.10.19. This approach significantly limits the spatial footprint of installation activities. Cable laying vessels will operate in accordance with Rule 10 of the International Regulations for Preventing Collisions at Sea (COLREGs) governing conduct within Traffic Separation Schemes.

2.10.20. AIS monitoring will be used to coordinate vessel movements where necessary and to ensure safe passage for transiting vessels.

2.10.21. Cable installation activities have been planned to avoid unnecessary encroachment into the TSS. The cable lay vessel will operate at controlled lay speeds and will be supported by AHT vessels. Installation operations are of limited duration, with marine coordination ensuring safe vessel passage where required. Notices to Mariners and navigational warnings will be issued prior to operations.

2.10.22. Vessel traffic will be managed through the project Marine Coordinator, supported by guard vessels when required during cable installation activities. Vessel movements and anchor positions will be monitored through the vessel navigation and Tug Management System. Standard offshore procedures regarding operational limits, including reduced visibility conditions, will apply.

2.10.23. The proposed programme for installation of the Douglas CCS Platform jacket, and topsides by the Balder construction and installation vessel, and the Thialf heavy lift vessel (HLV) is presented in At the satellite platforms, SeaFox7 will be positioned according to specified approaches within each respective ATBA.

2.10.24. Table 2-18, and programme for Hamilton Main, and Hamilton North topsides in Table 2-19. The specifications of the vessels that will be used for the installation works are presented in Table 2-20, and

2.10.25. **Table** 2-21.

2.10.26. A jack up barge named **Seafox7** as presented in **Table 2-22** connects to Douglas CCS around 06 October 2026 for mechanical hook-up activities that will be carried out after the Balder HLV has completed the installation of the Douglas CCS. The nominal duration of the works is 3 months, with completion expected around early January 2027.

2.10.27. According to the latest assessment of seabed conditions, the necessity for rock pads to stabilise jack-up legs at this site for the SeaFox7 appears minimal. If rock placement becomes necessary, it will be carried out within the quantities approved under CML2365.

2.10.28. At the satellite platforms, SeaFox7 will be positioned according to specified approaches within each respective ATBA.

Table 2-18 – Programme for Douglas CCS jacket and topsides installation

Activity	Key dates
Balder transit to site from Netherlands	12-20 September 2026
Balder move in to platform location	21 September 2026
Jacket installation	21-22 September 2026
Skirt piles installation	22-26 September 2026
Topsides installation	25-26 September 2026
Welding topsides	26-27 September 2026
Completions	27-28 September 2026
Balder to Hamilton	8-12 September 2026

Table 2-19 – Programme for Hamilton Main, and Hamilton North topsides installation

Activity	Key dates
Thialf or Similar transit to site from Netherlands	8-16 March 2027
Thialf or Sleipnir move in to Hamilton Main	16 March 2027
Hamilton Main topsides installation	16-19 March 2027
Welding topsides	19-20 March 2027
Completions	20 March 2027
Thialf or Similar move in to Hamilton North	20-21 March 2027
Hamilton North topsides installation	21-24 March 2027
Welding topsides	25-26 March 2027
Completions	26 March 2027
Thialf or similar to home port (Netherlands)	27 March-5 April 2027

Table 2-20 – Installation of new Douglas Platform. Preparations, hook down and construction activities on Hamilton Main and Hamilton North platforms

Vessel characteristics	Details
Vessel name	Balder
Vessel function	Construction & Installation vessel
Master's name	Marcelis van Ravenstijn, Bart Lablans
Vessel type	Semi-submersible Heavy lift Crane vessel
IMO number	7710226
Vessel owner/operating company	Heerema Marine Contractors Nederland SE

Vessel key characteristics	Semi-Submersible Crane vessel, self-propelled & DP AAA Tandem lift of 6,300 tonnes
Propulsion	Main propulsion 4416 kW (2 pc)
Mooring/station keeping	DP Class 3, Thrusters Lips FS 3500-571/NU : 3500 kW (6 pc)

Table 2-21 – Exchange of topside on Hamilton Main and Hamilton North Platforms, including installation of future riser and J-tube

Vessel characteristics	Details
Vessel name	SSCV Thialf 
Vessel function	Heavy Lift Vessel (HLV)
Master's name	Jeroen Klein, Arjan Udo
Vessel type	Semi Submersible Construction Vessel
IMO number	8757740
Vessel owner/operating company	THIALF SHIPPING B.V.
Vessel key characteristics	2 x 7100mT revolving cranes. Tandem lift of 14,200 tonnes
Propulsion	Wärtsilä thrusters, 6 x 5,500 kW - 360 degrees azimuth, total thrust 420 t
Mooring/station keeping	NMD Class III Dynamic Positioning / mooring 12 Delta Flipper anchors of 22.5 t each, on 3 1/8 inch wire ropes of 2,400 m (7,874 ft) long.

Table 2-22 – Jack up Barge Seafox 7 for mechanical hook up.

Vessel characteristics	Details
Vessel name	Seafox 7 
Vessel function	Accommodation & Multi-support Unit
Vessel type	Self-elevating jack-up unit
IMO number Callsign MMSI	8769717 2BGC6 235065812
Vessel owner	Seafox 7 B.V.
Vessel key characteristics	4-legged with spud cans, 4 mooring winches and anchors Length: 55.50m Max length: 75.50m Breadth: 32.20m Depth: 5.0m Loadline draft: 3.35m
Propulsion / Mooring/station keeping	Electricity Diesel/Electric: 2 x 630 kW, 2x 150 kW, 400 V, 50 Hz Emergency Diesel Generator: 1 x 150 kW

3. PART 1: MANAGEMENT, IMPLEMENTATION, AND COMMUNICATION

3.1. ROLES AND RESPONSIBILITIES

3.1.1. This section defines accountability and operational roles across the following key entities:

- Liverpool Bay CCS Limited (Developer / Marine Licence Holder); and
- Vessel Owners, and Marine Contractors
  - Boskalis Subsea Cables for cable installation; and
  - Heerema for installation of the Douglas CCS jacket and topsides.

3.1.2. Each role is structured by "Activity" and "Description," establishing a clear governance chain from legal accountability (Developer) down to real-time operations and stakeholder engagement.

LIVERPOOL BAY CCS LIMITED

3.1.3. Liverpool Bay CCS Limited holds ultimate responsibility for navigational safety associated with the project. They must ensure that all lighting and marking measures are approved, implemented, maintained, and verified in accordance with the Marine Licence, UK maritime law, and GLA/MCA guidance, and that any failure or change is promptly reported and rectified.

3.1.4. Table 3-1 presents a structured overview of the roles and responsibilities of Liverpool Bay CCS Limited in conducting the works.

Table 3-1 – Roles and responsibilities of Liverpool Bay CCS Limited as the Marine Licence holder

Activity	Description
Overall compliance governance	• Act as the **duty holder under the Marine Licence**, responsible for compliance with all licence conditions relating to navigational safety, lighting, marking and notification. • Retain **ultimate legal responsibility** for ensuring the **CEMP** meets all Marine Licence conditions and statutory requirements, regardless of delegation to contractors. • Hold ultimate responsibility for ensuring **all vessel activities comply with the Marine Licence** and other consents. • Ensure contractors, subcontractors, and vessel operators meet **legal, environmental, and safety obligations**. • Act as the single point of accountability to the **Regulator** for vessel-related compliance. • Ensure the **Lighting and Marking Plan (LMP)** is prepared, approved, implemented, and maintained in accordance with the conditions of the Marine Licence and relevant UK legislation (Energy Act 2008, Merchant Shipping Act 1995, and IALA standards). • Maintain **auditable evidence** that all measures remain compliant throughout the project lifecycle.
Development and approval of the management plans	• Set the **scope, structure, and minimum content of the CEMP**, ensuring alignment with the Marine Licence, Environmental Statement / EIA commitments, and regulatory guidance. • Ensure that the **CEMP reflects all relevant Marine Licence conditions**, deemed consent conditions, and other environmental permits.

Activity	Description
	• Prepare and submit the **Lighting and Marking Plan** to **Natural Resources Wales (NRW)** and the **Maritime and Coastguard Agency (MCA)** for review, and obtain **formal approval from Trinity House (GLA)** for all Aids to Navigation (AtoN). • Ensure the plan references relevant standards and guidance (IALA O-139, MCA MGNs 401, 543, 654, and DECC "Standard Marking Schedule"). • Update the plan as required following design or programme changes, and circulate revisions to all stakeholders.
Implementation and operation	• Ensure the **Principal Contractor and subcontractors implement the CEMP** measures in full during construction. • Ensure **sufficient resources**, competence, and authority are available to deliver the CEMP requirements. • Ensure the **CEMP is aligned** with the Vessel Management Plan (VMP), OPEP, Emergency Response Plan, and other project management documents. • Ensure all vessel operations are conducted in line with: – The Construction Environmental Management Plan (CEMP). – The Oil Pollution Emergency Plan (OPEP). – MARPOL requirements for waste, fuel, ballast, and emissions. • **Provide oversight** of environmental risk mitigation measures, including spill prevention and noise reduction. • Ensure **monitoring programmes** (e.g. noise, marine mammal observers, fisheries liaison) are in place where required by licence. • Ensure all **temporary and permanent AtoN** (lights, buoys, fog signals, identification panels, AIS AtoN etc.) are installed, commissioned, and operated in accordance with the approved plan and the GLA's requirements. • Confirm that each AtoN has appropriate **autonomy (≥ 96 hours), photocell / visibility control**, and **availability** per IALA Category 1 standards (≥ 99.8 % availability). • Maintain clear operational control of all AtoN through the appointed **Marine Coordinator (MC)** or AtoN maintenance contractor. • Arrange for regular inspection, maintenance and testing of all navigation lights and marks, and keep verifiable records.
Notifications and stakeholder communication	• Ensure effective stakeholder engagement is carried out, including: – Fisheries Liaison Officer (FLO) appointment and oversight. – Regular consultation with fisheries organisations, ports, and maritime authorities. – Transparent communication with stakeholders before, during, and after offshore operations. • Support fair and timely resolution of **fishing gear interaction** incidents. • Ensure timely issue of **Local and Admiralty Notices to Mariners (NtMs)** prior to, during, and following construction activities, as required under the Marine Licence. • Notify the **UK Hydrographic Office (UKHO)** within the specified period (usually **within 10 days of completion**) so that all new or removed structures are correctly charted. • Coordinate with the **Kingfisher Information Service (KIS-ORCA)** to inform fishing and maritime communities of vessel routes, safety zones and locations of works. • Maintain open communication with **NRW, MCA, Trinity House**, and **local harbour authorities.** • Ensure regulators are informed of vessel mobilisation/demobilisation and incidents in a timely manner.
Incident, defect, and outage management	• Require and oversee **corrective and preventive actions** where non-compliance with the CEMP is identified. • Ensure **material non-conformances or incidents are reported** to the Regulator in line with licence conditions. • Ensure all **vessel-related incidents** (safety, environmental, or navigational) are reported to the Regulator.

Activity	Description
	• Oversee the **implementation of emergency response plans**, including **OPEP** and **SAR** coordination. • Ensure that any failure, defect or outage of AtoN or lighting/fog signal is: o **Reported immediately** to Trinity House, MCA and NRW; o **Rectified as soon as practicable** (normally within 24 hours); and o **Recorded in a maintenance and incident log** for audit purposes. • Investigate any navigation incident, near miss, or complaint arising from the project, and implement corrective actions.
Removal and demobilisation	• Remove all **temporary AtoN** promptly when no longer required and only after **written authorisation from Trinity House**. • Provide confirmation to NRW and UKHO that all marks and lights have been removed or replaced by permanent AtoN as appropriate. • Ensure seabed and navigational hazards are cleared and verified safe post-construction.
Oversight and audit	• Conduct internal **compliance audits** of the CEMP implementation during construction and prior to handover to operations. • Ensure vessels comply with: – **Marine Licence conditions** (e.g. notifications, safety zones, pollution prevention). – **IMO conventions** (MARPOL, SOLAS, COLREGs, STCW). – **National requirements** (e.g. MCA guidance, fisheries regulations). • Submit reports, notifications, and evidence of compliance to the Regulator as required. • Make all inspection, maintenance and reporting records available to **NRW**, **MCA**, and **Trinity House** on request. • Review and update the CEMP as necessary • Drive continuous improvement by capturing and applying **lessons learned** across project phases..

BOSKALIS SUBSEA CABLES, AND HEEREMA

3.1.5. Vessel owners and operators are responsible for the execution of project requirements. Their duties include operating vessels safely, maintaining statutory and regulatory compliance, ensuring proper crewing and maintenance, and meeting both international law and project-specific standards. Table 3-2 presents a structured overview of the roles and responsibilities of Boskalis Subsea Cables, and Heerema in conducting their respective works.

3.1.6. They must ensure their vessels comply with lighting, marking, and operational requirements specified in the Lighting and Marking Plan, COLREGS, and the Marine Licence. This includes deploying, monitoring, and reporting all temporary AtoN as required. They will contribute to the project's navigational safety assurance framework under the direction of Liverpool Bay CCS Limited.

3.1.7. These tasks are defined by UK maritime law and Marine Licence conditions, with the purpose of maintaining navigational safety, personnel welfare, and marine environmental protection.

Table 3-2 – Roles and responsibilities of Vessel Owners and Operators

Positions	Responsibilities
Director Operations	• Delegated Corporate responsibility for Environment

Positions	Responsibilities
	• Ensure Environmental Management is followed according to Liverpool Bay CCS Limited's policy, relevant legislation and Liverpool Bay CCS Limited requirements
Manager HSE-Q	• Advises Director Operations on all aspects of the Environment • Develop a management system to comply with environmental legislation, consents, objectives, targets and other environmental commitments • Assigns a Project SHE-Q Manager to the project in consultation with the relevant Project Manager
Project Manager	• Assigns an offshore SHE-Q Advisor as required, in consultation with the relevant Project Manager Project Manager • Ultimate responsibility for Environmental aspects on the project • Responsibility of Environmental aspects on operational affairs • Investigates any environmental observations and takes corrective action as required • Ensures that Project personnel comply with the requirements imposed by the Project Management System, Contract and Legal requirements. • Carries out risk assessments (HAZID / RAMS Study) during engineering phase. • Ensures that project personnel are made fully aware of their respective environmental responsibilities.
Works Manager	• Ensures that all operations are carried out in accordance with safe working practices • Ensures that the Project Manager is made aware of any environmental matters and copy all relevant reports to the Project SHE-Q Manager
Site Manager	• Arranges transport of personnel between the airport and vessel, including local accommodation, checking personnel certification, performing project induction and registration • Carry out environmental inductions to (new) project personnel, subcontractors and other actors involved.
Vessel Master	• Liaises with the Offshore Construction Manager to ensure that all Project-related environmental matters are dealt with effectively • issues written statement of facts on any incident to Project Manager
Offshore Construction Manager, Supervisors, Foremen,	• Direct responsibility for SHE-Q supervision at the actual work site and of their team • Responsible for the operational management of vendors under their control • Completes the formal procedures prior to commencement of any work activity Job Safety Analysis (JSA), Permit to Work (PTW), Toolbox Talk (TBT), Management of Change (MoC) as necessary) • Issues written statement of facts on any incident to Project Manager / SHE-Q Advisor
(Lead) Project Engineers	• Devise and prepares methodologies/procedures for installation operations • Makes sure that the safest and most efficient solutions are implemented within the project • Prepares and executes interface management • Co-ordinates production of storyboards and other visual aids • Liaises with technical support services where required between parent organisations and Boskalis Subsea Cables • Prepares task plans to ensure key elements within procedures are complied with • Provides support for the provision of verification points based on procedural Task Plans (Lead) Project Engineers

Positions	Responsibilities
	• Define the technical requirements for provision of vendor services (Design/Manufacture/Supply) • Conducts evaluation (technical) of received proposals from vendors • Participates in project meetings with Liverpool Bay CCS Limited

Project SHE-Q Manager	• Prepares project SHE-Q Management Plans
	• Regularly reviews (and updates as necessary) the SHE-Q Management Plans
	• Monitors implementation of the SHE-Q Management Plans for the project
	• Completes any incident investigations and reports to Project Manager
	• Additional responsibilities, which may be delegated:
	  ◦ Undertaking random spot-checks on the project site and vessels to verify compliance with the Project Environmental Plan
	• Monitor:
	  ◦ SHE-Q performance complies with all Boskalis Subsea Cables', Liverpool Bay CCS Limited's and Legal requirements

Offshore SHE-Q Advisor (Medic where required by contract or risk assessment)	• Act as the on board SHE-Q representative for Boskalis Subsea Cables • Advises Supervisors and crew on all aspects of Environmental • Monitors implementation of the Project Environmental Plan on the vessel
All project personnel (each person on the project, including Liverpool Bay CCS Limited, vendors and visitors)	• All Project personnel are responsible for their own impact on Environment, and that of their colleagues • No person shall be expected to work in a situation they consider unsafe (for people and / or environment). • Each person is responsible to STOP a job when they consider it deviates from requirements. • Complies with the SHE-Q Policy and with the specific project SHE-Q Instructions • Uses and maintains the supplied Personal Protective Equipment (PPE) and other rescue equipment in an appropriate manner • Maintains the relevant environmental measures
Subcontractor (where applicable)	• Ensures that all their project personnel have been given site induction training and adhere to the given environmental instructions • Reports any deviation during the execution of the subcontracted works to the Boskalis Subsea Cables Project Manager • Ensures that own personnel are compliant with the BSC trainings matrix

Table 3-3 – Activities required of Boskalis Subsea Cables

Activity	Description
Compliance with statutory requirements	• Ensure compliance with the **Merchant Shipping (Safety of Navigation) Regulations 2002, COLREGS 1972**, and relevant **MCA Marine Guidance Notes (MGNs)**, including **MGNs 543, 654, and 372**. • Operate in accordance with this approved **Lighting and Marking Plan** and any site-specific requirements agreed with the **General Lighthouse Authority (GLA)** and **MCA Navigation Safety Branch**. • Maintain an auditable record of all navigational aids, warning signals, and lights fitted and operated on board.
Lighting and marking of vessels during construction	• During the construction and installation phases (including platform installation, cable lay, pipeline lay, mattress and rock placement), all project vessels must: **Display Required COLREGS Lights and Shapes**

Activity	Description
	o Display the correct lights, day shapes, and signals for "Vessels Restricted in Their Ability to Manoeuvre" (Rule 27), towing, underwater operations, or anchored status, as applicable. o Ensure obstruction-side and safe-side lights (red/red and green/green) are correctly exhibited where required. o Operate deck and work lights so that they do not obscure or reduce visibility of prescribed navigational lights. Support Temporary Aids to Navigation (AtoN) o Assist in the deployment, monitoring, and maintenance of temporary buoys, beacons, or lighted marks established under the LMP. o Notify the Marine Coordinator and Trinity House of any AtoN malfunction, damage, or displacement immediately. o Record all checks, outages, and rectifications in vessel logs and communicate these through the project reporting chain. Ensure Safe Operations and Marking During High-Risk Activities o Maintain an active AIS signal, VHF watch, and appropriate radar reflector visibility. o Display additional lighting or warning beacons as specified in the LMP when operating at night or in reduced visibility, provided these do not conflict with COLREGS lights. o Use guard vessels where required to maintain exclusion or advisory zones and to warn third-party traffic.
Communication and notification responsibilities	• Communicate daily with the Marine Coordinator to confirm vessel positions, lighting status, and operational plans. • Notify the Marine Coordinator immediately of any: o Failure of navigational lights, fog signals, or AtoN equipment; o Navigational hazard, debris, or dropped object; o Any change to vessel configuration that affects marking or safety zones. • Cooperate with the issue of Notices to Mariners (NtMs) and the Kingfisher Information Service (KIS-ORCA) by supplying accurate operational and positional information.
Maintenance and inspection	• Conduct daily inspection and functional checks of all vessel navigation lights, shapes, and fog signals. • Maintain spare bulbs, lenses, fuses, and backup power supplies to ensure redundancy and ≥96-hour autonomy where required. • Support periodic audits of lighting and marking arrangements undertaken by the Marine Coordinator, NRW Compliance Officer, or GLA.
Reporting and record keeping	• Maintain vessel navigation logbooks detailing daily lighting and marking status, including checks and outages. • Record all dropped objects or debris recoveries in coordination with the Dropped Object Plan and report to the Marine Coordinator. • Provide reports on AtoN or light failures to Liverpool Bay CCS Limited, as Licence Holder, and relevant authorities within 24 hours of detection.
Demobilisation	• Remove or deactivate all temporary lights, marks, and signals upon completion of construction activities and only after authorisation by the Marine Coordinator and Trinity House. • Confirm in writing that no residual hazards remain and that the seabed and navigational area are left clear of unmarked obstructions (see Dropped Objects Plan).

3.2. COMPETENCE, TRAINING, AND AWARENESS

3.2.1. Boskalis Subsea Cables shall ensure that appropriate awareness training is delivered to all site operatives and only appropriately qualified Subcontractors are appointed.

3.2.2. Every member of the workforce shall be required to participate in a site induction prior to starting work on the site. The level of induction training will depend upon the position and duties the person is to perform. The site induction will include:

- A brief overview of the works to be undertaken and any potential environmental aspects associated with construction.
- A summary of the sensitive environmental receptors near the site.
- An overview of the applicable environmental mitigation and pollution control measures.
- An overview of the health and safety management measures in particular emergency response procedures required at the site.

3.2.3. Liverpool Bay CCS Limited will require Boskalis Subsea Cables to provide continuing training and awareness raising of the workforce. This can be delivered in the form of Toolbox Talks tailored to the specific environmental mitigation measures required dependent on the work activities being undertaken and to raise awareness on environmental best practice.

3.2.4. Records of all inductions and Toolbox Talk deliveries shall be maintained at the site office. Copies shall be made available to Liverpool Bay CCS Limited on request.

3.2.5. The Boskalis Subsea Cables Human Resources Management (HRM) and Crewing Department determines the necessary competency for personnel performing work affecting product quality in consultation with the Project Manager and the Project SHE-Q Advisor and considering specific project requirements. The competency requirements are included in the Training Matrix, which is part of BSC Way of Working in the integrated management system (WoW). Trainings will be planned via the HRM Department and records of the trainings are kept at the office and are available at project level.

3.2.6. Personnel will be made aware of the relevance and importance of their activities and how they contribute to the achievement of the project objectives. The appropriate records of training, education, skill and experienced will be maintained in the head office.

3.2.7. Employees who are engaged in special work will attend special training. Training records will be registered, and the training records will be available on site.

3.3. COMMUNICATIONS AND REPORTING

3.4. INTERNAL COMMUNICATION

3.4.1. Boskalis Subsea Cables' CM, Field EM or equivalent person and other relevant team members shall meet weekly to review the status of environmental aspects including but not limited to:

- Works activities underway and planned.
- Mitigation measures required to be implemented.
- Results of weekly inspections and any audit results/feedback.
- Any corrective and preventative actions required to be implemented.
- Identification of areas for continual improvement.
- Status of staff competence and training needs.
- Status of CEMP #3 and of any required consent and approvals and the need for review and updating.

3.4.2. Liverpool Bay CCS Limited shall be informed of the outcome/minutes of all such meetings.

3.4.3. Additional and ongoing communication of environmental performance and requirements is to be determined by the Boskalis Subsea Cables and provided as appropriate.

NOTICE BOARDS

3.4.4. Boskalis Subsea Cables provides and maintains project environmental notice board(s) which are positioned to ensure all operatives can review the notice board a daily basis. The notice boards should be updated at least monthly. As a minimum, the notice boards shall contain:

- Clients Environmental Policy.
- Emergency contacts list.
- Relevant statutory and non-statutory advice and guidance.
- Description of the key environmental risks and intended risk mitigation measures.

3.4.5. These environmental notice boards will be situated in prominent positions including the main reception area of the site office.

TOOLBOX TALKS

3.4.6. Toolbox Talks will be used to inform all site personnel of key information concerning the management of the site, procedures to be followed and expected standards / controls when working on the project. The Toolbox Talks will cover a broad range of topics including those related to best practice environmental management.

3.4.7. A record of Toolbox Talks will be kept on site, starting date, description of non-conformance, potential implications, proposed corrective actions, individual responsible and target data. Toolbox Talks shall include, but will not be limited to, instances where:

- There is a change to existing legislation, which requires an operation change.
- Site inspections or audits have identified corrective actions which require communicating.
- There are significant changes in environmental conditions i.e. heavy rainfall.

3.4.8. The frequency and topics of the Toolbox Talks shall depend upon the phase construction. They shall be provided as often as necessary to address site-specific environmental requirements.

3.5. EXTERNAL COMMUNICATIONS

OVERVIEW

3.5.1. Effective communication is central to ensuring safe, coordinated, and compliant construction activities in the UK offshore marine environment. Because operations often involve multiple vessels, complex marine spreads, divers, ROVs, subsea infrastructure, and potentially congested shipping or fishing areas, a robust communication protocol is required to manage risk and maintain situational awareness.

3.5.2. This protocol defines how information flows between all offshore parties. This includes construction vessels, support vessels, guard vessels, marine coordination centres, and third-party mariners. The following sections establish the communication methods, reporting structure, and escalation procedures necessary to maintain safe operations.

PRE-OPERATION COMMUNICATION FRAMEWORK

3.5.3. Before offshore works begin, the communication protocol is established and circulated through:

- Notices to Mariners (NtMs): Issued to alert the maritime community to upcoming activities, exclusion zones, and navigational hazards.
- Project Induction and Toolbox Talks: All vessel crews and contractors are briefed on communication requirements, channels to monitor, reporting frequencies, and emergency signals.
- Coordination with Regulatory and Stakeholder Groups: Including the UK Hydrographic Office, Coastguard, fisheries organisations, and nearby asset operators.

3.5.4. This pre-operation framework ensures all relevant parties are aware of the scope, risks, and boundaries associated with the construction activity. Further details are contained in the combined 'CONDITION 3.27: VESSEL MANAGEMENT PLAN & CONDITION 3.29: NAVIGATION AND SAFETY PLAN'.

STANDARD COMMUNICATION CHANNELS

3.5.5. During operations, a consistent set of communication channels is maintained:

- Marine VHF Radio: Channel 16 for distress and initial contact and dedicated working channels assigned by the Marine Coordinator.
- Automatic Identification System (AIS): Used for continuous vessel tracking and identification.
- Daily and Shift Reports: Construction vessels, guard vessels, and support units submit operational updates to the Marine Coordination Centre.
- Direct Communication Lines: Phone, satellite link, or digital messaging for coordination between the OIM, Marine Coordinator, and vessel masters.

3.5.6. These channels are always kept active to support real-time decision-making.

COMMUNICATIONS FOR SAFETY AND MITIGATION MEASURES

3.5.7. Clear, timely communication supports the implementation of safety controls and mitigation measures, including:

- Monitoring of Exclusion Zones: Guard vessels and construction units report vessel movements, potential incursions, and boundary breaches immediately to the Marine Coordinator.
- Dynamic Positioning (DP) Alerts: Any loss of redundancy, DP event, or instability is reported instantaneously to all vessels within the operational area.
- Diving and ROV Operations: Dedicated communication lines remain open between the Dive Supervisor/ROV Supervisor and support vessels, with clear protocols for halting vessel movements or thruster use when divers are in the water.

- Weather and Environmental Updates: Forecast changes, rising sea states, or visibility reductions are communicated to all vessels to trigger standby conditions or cease operations if necessary.
- Anchor Spread and Tow Operations: Vessel repositioning, anchor handling movements, and line tension changes are communicated in advance to avoid entanglement or collision risks.

3.5.8. These measures allow the project team to prevent incidents before they develop.

REPORTING STRUCTURE AND FREQUENCY

3.5.9. To maintain situational oversight, specific communication routines are enforced:

- Hourly vessel position reporting where required.
- Regular guard vessel perimeter reports noting traffic and potential risks.
- Daily coordination calls led by the Marine Coordinator or Offshore Construction Manager.
- Shift-change briefings to ensure continuity of information.

3.5.10. All communication is logged to document the operational status and safety conditions throughout the activity.

ESCALATION AND EMERGENCY COMMUNICATION

3.5.11. The communication protocol includes a clearly defined escalation pathway:

- Immediate notification to all vessels in the vicinity in the event of a safety incident, near miss, or equipment failure.
- Marine Coordinator or OIM assumes control, issuing instructions for vessel movement, work suspension, muster, or resource allocation.
- External authorities, such as HM Coastguard, are contacted as required using established emergency procedures.
- Post-incident reporting and debriefing ensures lessons learned are documented and shared.

3.5.12. Fast, structured communication is critical during emergencies to safeguard personnel and assets.

COMMUNICATION RESPONSIBILITIES

3.5.13. Key communication roles include:

- Marine Coordinator: central communication hub, manages zone control and vessel traffic.
- OIM / Offshore Construction Manager: oversees safety decisions and operational authorisation.
- Vessel Masters: maintain listening watch, report status changes, and enforce onboard communication procedures.
- Guard Vessels: provide external communication with third-party mariners and relay information back to the project.

3.5.14. Each party is accountable for timely and accurate communication within their area of responsibility.

SUMMARY

3.5.15. A disciplined communication protocol ensures that all marine construction activities in UK offshore waters are executed safely and efficiently. By maintaining clear information flow, real-time monitoring, and structured escalation, the protocol supports the successful implementation of safety barriers, protects personnel and equipment, and minimises risk to the wider maritime community.

3.6. MONITORING

DAILY INSPECTIONS

3.6.1. Daily inspections shall be undertaken by the Boskalis Subsea Cables, and Heerema and recorded as follows:

- Vessel, equipment and plant inspections shall be completed to check the absence of damage or maintenance issues and that it is correctly functioning.
- Visual inspection of waste containers and waste storage areas to verify wastes are being correctly segregated and to confirm the absence of mixing of hazardous and non-hazardous wastes.

3.6.2. Any elements of the site management found to be in an unsatisfactory condition during the site inspection shall be addressed on the day. In the event it is not possible to address the matter on the day it is raised; a note of the reason why shall be made on the inspection record sheet.

4. PART 2: ENVIRONMENTAL IMPACTS AND CONTROL MEASURES

4.1. OVERVIEW

4.1.1. In this section, commitments stated in the Offshore ES **(Appendix G)** have been translated into an appropriate format allowing their practical implementation by Boskalis Subsea Cables and Heerema. This follows the IEMA Practitioner Guide, which states that "*the overall objective of an [C]EMP is to provide a continuous link or 'bridge' between the design phase of a Proposed Development, conditions attached to consents, Proposed Development construction, and into the operational phase*" (IEMA, 2008).

4.1.2. The complete list of enhancement, mitigation and monitoring commitments, relevant to the activities in this **CEMP#3**, is provided in **Appendix G** as a **Commitments Register**. The Commitments Register has been developed from the commitments made within the Offshore ES, and in compliance with conditions in **CML2365**. Adherence to this **CEMP#3** and accompanying appendices, will therefore ensure compliance with the consents in relation to environmental considerations.

4.2. SUMMARY

4.2.1. This section sets out the environmental management measures governing **Activity 1**, and **Activity 4** licensed under **Marine Licence CML2365**. **Table 4-1** sets out how all the activities will be undertaken in accordance with **Marine Licence CML2365**.

Table 4-1 – Environmental management measures

Aspect	Requirement	Relevant CML2365 Conditions
Compliance with CML2365	All **Activity 1**, and **Activity 4** works shall be undertaken in compliance with: • Marine Licence CML2365 • The Approved Application and Approved Supporting Documents • All relevant conditions contained in Section 3 of the licence	• 3.25 (CEMP submission and implementation) • 3.10 (Notified contractors, vessels, plant only)
Adherence to approved plans and method statements	All **Activity 1**, and **Activity 4** works shall be undertaken in accordance with: • The approved CEMP (Condition 3.25) • The approved Cable Specification and Installation Plan (CSIP) (Condition 3.19) • Any approved method statements forming part of the Approved Supporting Documents • Any change to approved methods shall be submitted to NRW for written approval prior to implementation.	• 3.19.1–3.19.2 (CSIP approval and implementation) • 3.25.2 (No deviation from approved CEMP)
Precautionary principle and stop-work authority	A precautionary approach shall be always applied. If unexpected seabed features, environmental sensitivities, or risks are identified during installation: • Works shall be modified, suspended, or stopped as necessary • NRW shall be notified where required	• 3.7 (Accident or emergency response) • 3.14 (Pollution prevention)

Aspect	Requirement	Relevant CML2365 Conditions
Limitation of Seabed Disturbance	Seabed interaction shall be limited to the minimum necessary to safely install and protect the cables and platform jacket. • Seabed disturbance is restricted to the minimum area and volume required for cable installation and platform placement, avoiding unnecessary excavation or modification. • Mattress and rock protection are installed only at locations and in quantities defined by licence conditions and engineering requirements, avoiding over-installation and unnecessary overlap. • Works are confined to clearly defined access routes and working corridors, maintaining the integrity of undisturbed sediments and habitats. • Conduct detailed geophysical and ecological surveys to identify sensitive habitats, archaeological features, and UXO (unexploded ordnance) before any seabed intervention. • Use ROVs and survey vessels to monitor cable touchdown, burial depth, and seabed disturbance in real time, allowing for immediate corrective action. • Excavated sediment is temporarily displaced only where required and is reused immediately for backfilling; no material is removed from site or stockpiled long-term. • Activities restricted to locations and quantities defined in Appendix 1 of the licence. • Environmental controls and monitoring are implemented throughout, with adaptive management applied if impacts exceed predictions. • Conduct post-installation surveys to verify seabed recovery, burial success, and absence of residual impacts, with remedial action if required.	• 2.1 Activity 1 (Cable laying and protection) • Appendix 1 (Authorised quantities and dimensions)
Depth, Navigation, and Seabed Profile Control	All works shall be designed and undertaken such that: • There is no more than a 5% reduction in surrounding depth referenced to Chart Datum • Safe navigation is not compromised • Any exceedance shall require prior written approval from NRW.	• 3.21 (Depth reductions) • 3.13 (Removal of deposits if required for navigational safety)
Seasonal and Temporal Restrictions	• Installation activities associated with Licensed **Activity 1** and **Activity 4** shall not take place between **01 November and 31 March inclusive**, unless prior written approval is obtained from NRW. • All activities are programmed around tidal windows to limit the duration of exposure and reduce sediment mobilisation or prolonged disturbance.	• 3.18.1 (Time restrictions)
Pollution Prevention and Water Quality Protection	All works shall comply with pollution prevention best practice: • Spill kits and secondary containment always available • Immediate cessation of works if man-made debris enters the marine environment	• 3.11 (Refuelling restrictions) • 3.14 (Pollution prevention) • 3.15 (Spillage of pollutants)

Aspect	Requirement	Relevant CML2365 Conditions
	• All pollution incidents shall be reported immediately using the NRW hotline.	• 3.16 (Prevention of man-made debris)
Biosecurity and Invasive Non-Native Species (INNS)	All vessels, equipment, machinery, and PPE shall be: • Cleaned, washed with freshwater and/or air-dried prior to deployment • Managed in accordance with the approved INNS Management Plan at Appendix B.	• All vessels, equipment, machinery, and PPE shall be: • Cleaned, washed with freshwater and/or air-dried prior to deployment • Managed in accordance with the approved INNS Management Plan.
Marine Ecology and Fauna Protection	Activity 1 and Activity 4 installation shall be managed to minimise disturbance to marine fauna, including marine mammals and fish, in line with: • The approved Marine Mammal Management Plan (MMMP) • The approved CEMP	• 3.26 (Marine Mammal Management Plan) • 3.25.1 (CEMP implementation)
Notification, Monitoring, and Record Keeping	Liverpool Bay CCS Limited will: • Provide all required pre-commencement notifications • Maintain accurate records of cable, and platform installation activities • Report completion of works and provide as-built data in accordance with licence requirements • Engage with fisheries, local communities, and conservation bodies before and during works to address concerns and adapt controls as needed.	• 3.1–3.6 (Notifications and completion) • 3.32 (Installed cable and pipeline report) • 3.33 (Post-construction as-built report)
Dropped Objects and Emergency Response	• Any dropped objects or accidental deposits shall be managed in accordance with the approved Dropped Object Plan (DOP) (Appendix H). Recovery methods shall be approved by NRW prior to implementation.	• 3.7.2–3.7.4 (Dropped Object Plan and recovery)
Adaptive Management	If monitoring or observations indicate that installation works are resulting in greater environmental impact than predicted: • Methods shall be reviewed and adapted • Additional mitigation shall be implemented subject to NRW approval	• 3.25.2 (Implementation of approved CEMP and changes subject to approval)

4.3. MANAGEMENT OF KEY ENVIRONMENTAL ASPECTS AND COMPLIANCE OBLIGATIONS

MARINE PHYSICAL ENVIRONMENT

4.3.1. Potential impacts are increases in suspended sediment concentrations (SSC), sediment deposition, and changes to seabed morphology.

4.3.2. Although there may be localised and temporary increases in SSC, and sedimentation during mattress installation, these areas remain highly resilient to change. This is due to the nature of the activity, which involves lowering mattresses on the seabed at crossing locations that are quickly recoverable and have minimal lasting impact on the seabed.

4.3.3. There is a potential for cable crossing protection installed during the construction phase to impact the seabed morphology and cause secondary scour. Crossing protection will be consistently present throughout the operation and maintenance phase.

4.3.4. Cable crossing protection is the only cable protection measure proposed for the cable installation. This is because the nature of the seabed sediment within the LBCCS Area of Development accommodates cable burial to the required depth. Also noting that the dynamic and highly mobile nature of the Liverpool Bay seabed, means the introduction of artificial habitats and colonisation of hard structures is very low.

4.3.5. These changes may affect habitats over time, but any short-term impacts on seabed morphology will stay within the normal range due to the sand waves' mobility. The eastern migration of sand waves will not be disrupted, and displaced sediment is expected to remain nearby within the same sediment cell.

MARINE BIOLOGICAL ENVIRONMENT

Designated Sites

4.3.6. The statutory nature conservation sites of international importance within 10km of the works, are shown in Table 4.2.

Table 4.2 Designated Sites

Site	Designation	Distance from closest crossing
Dee Estuary/Aber Afon Dyfrdwy	Site of Special Scientific Interest (SSSI)	1km
The Dee Estuary	Special Protection Area (SPA) & Ramsar	1km
Dee Estuary/Aber Dyfrdwy	Special Area of Conservation (SAC)	1km
Dee Estuary/Aber Afon Dyfrdwy	Ramsar	1km
Gronant Dunes and Talacre Warren	SSSI	1km
Liverpool Bay/Bae Lepwl	SPA	Within RLB
Mersey Narrows and North Wirral Foreshore	SPA	7km
Mersey Narrows and North Wirral Foreshore	Ramsar	7km
Dee West	Shellfish Protected Area	1km

Benthic Subtidal Ecology

4.3.7. Potential impacts on the benthic subtidal ecology receptors due to the activities, were identified in relation to:

- Temporary and long-term habitat loss/disturbance: the impact of seabed preparation, placing the cables, mattresses and rock protection will be negligible. This is because there will be a very small proportion of habitat loss predicted in the context of available habitats in Liverpool Bay and, as most of the disturbed habitat is sedimentary, the habitat is likely to recover rapidly following disturbance/loss. Additionally, there will be no impacts on protected potential reef habitats, as these features are not located where activities will take place.

- Increased SSCs and associated deposition: The short-term nature of the impact when laying the cables, and lowering the mattresses and rock berms, with sediments quickly dispersing and most of the sensitive receptors being of low sensitivity to this type of impact. No significant effects were predicted on protected potential reef habitats, on the assumption that measures to avoid direct impacts to these features will be implemented. Long-term Subtidal Habitat Loss, offshore cable crossing protection will be required at 33 crossings.

4.3.8. Given the small scale of cable protection to be installed (9,950m^2), and further measures such as tapered profiles and compliance with the MCA navigation guidance, it is not expected that impacts from cable crossings would be sufficient to disrupt offshore bank morphological processes or experience significant secondary scour. Any colonisation of cable crossing protection is therefore not expected to be hindered or facilitated by changes in physical processes or secondary scour.

MARINE ARCHAEOLOGY

4.3.9. The area of potential archaeological impact will be within the footprint of the works. Shallow archaeological remains may be affected by the activities, for example through cable burial. A Written Scheme of Investigation (WSI) has been prepared as 'Project Design for Archaeological Monitoring and Recording'. The WSI is presented at Appendix C.

4.3.10. In the unlikely event that remains of very high significance are identified, the Archaeological Fieldwork Contractor will inform the Archaeological Consultant immediately, who will then consult with the Heneb Archaeological Advisor.

4.3.11. The WSI has been prepared to comply with Marine Licence Condition# 3.24. The following outlines the strategy for managing any archaeological finding within the LBCCS project.

4.3.12. TAEZs have been assigned where remains are thought to be of medium, high or uncertain archaeological. All wreck remains which lie within the Area of Physical Project Work and LBCCS Development Area, have been recommended either AEZs or TAEZs.

4.3.13. If new finds of archaeological importance are made during construction (or any subsequent stage of the Project) they may be subject to the implementation of additional AEZs. Establishment of new AEZs may for example occur where full coverage data of the area is collected and archaeologically reviewed, or where activities such as UXO investigations identify additional features.

4.3.14. A WSI and PAD has been prepared and will be implemented during all CEMP #3 activities and is presented in Appendix C (CML2365- Condition #3.24). It addresses the reporting of unexpected finds of archaeological material, recovered from the sea during these activities

4.3.15. Supporting documentation to reported finds will be implemented through the measures set out in the PAD, including further surveys or establishment of new AEZs if appropriate, Geophysical and GIS maps showing find locations, photographic log, video stills, stratigraphic drawings and specialist appendices, raw data tables, WSI and PAD.

SHIPPING AND NAVIGATION, COMMERCIAL FISHERIES, AND OTHER MARINE USERS

4.3.16. The potential impacts on shipping and navigational receptors due to Activity 1, and Activity 4 in this CEMP#3 would be: vessel displacement leading to increased vessel-to-vessel collision risk between third-party vessels; increased vessel-to-vessel collision risk between a third-party vessel and a project vessel; vessel-to-platform allision risk; reduced access to local ports; fishing gear interaction with mattresses; and vessel grounding due a reduction in under keel clearance.

4.3.17. Most of these impacts were deemed to be of broadly acceptable adverse significance to the shipping and navigation receptors. Mitigation measures include regulations to reduce collision likelihood, a 500m safety zone around infrastructure, circulation of information to mariners and fishers, and the use of guard vessels where necessary. Cumulative effects were assessed, and no significant cumulative effects were identified for any plans, projects, or activities in the CEA for shipping and navigation. No transboundary effects regarding shipping and navigation from Activity 1, and Activity 4 were predicted on the interests of other states.

4.3.18. Potential impacts on commercial fisheries due to Activity 1, and Activity 4 were identified, including loss or restricted access to fishing grounds; impacts on commercially valuable fish and shellfish species/resources; interference with fishing activity; temporary increases in steaming distances to fishing grounds; and loss or damage to fishing gear due to snagging on project infrastructure.

4.3.19. Most of these impacts, with the implementation of mitigation measures, would be negligible or minor, and not significant. However, loss or restricted access to fishing grounds was deemed of moderate adverse significance to the UK potting fishery, and minor adverse significance to shipping and navigation receptors.

4.3.20. Additional mitigation is proposed to reduce this impact to minor adverse significance through the justifiable disturbance payment procedure. Impacts on commercially valuable fish and shellfish species/resources were deemed of minor adverse significance, with temporary noise and seabed disturbances potentially displacing populations but with a lessened impact due to localised spatial extent. Interference with fishing activity, temporary increases in steaming distances, and loss or damage to fishing gear were all deemed minor.

4.3.21. The potential impact on infrastructure and other users due to Activity 1, and Activity 4 to existing cables or pipelines or restrictions on access to cables or pipelines would be minor. With the measures adopted as part of the activities in place (e.g., commercial crossing agreements), these impacts are not significant.

4.3.22. Displacement of recreational activities was deemed to be negligible, allowing recreational vessels to alter their routes. Increased SSCs and associated deposition affecting recreational diving and bathing sites were deemed to be negligible. Impacts to existing cables or pipelines or restrictions on access to cables or pipelines were deemed to be minor, with established mechanisms for controlling the level of impact. Cumulative effects were assessed for displacement of recreational activities and increased SSCs and associated deposition affecting aggregate extraction areas, with no significant cumulative effects identified.

4.3.23. The approach to management and mitigation of potential impacts on shipping and navigation, and other marine users is described in the following plans prior to construction, which are not included under the CEMP:

- Vessel management plan (VMP) (submitted under Condition 3.27); and
- Lighting and marking plan (LMP) (submitted under Condition 3.29).

4.3.24. Some of the specific measures adopted by these plans are:

- the adoption of advisory safety zones;
- appropriate notification of activities to other marine users;
- a clear process of marine coordination of all vessels and vessel activity;
- appropriate marking and lighting of vessels; and
- vessel transit planning, commercial fisheries relations, and management of commercial fisheries interactions.

WASTE MANAGEMENT PLAN

General Principles

4.3.25. Boskalis Subsea Cables, and Heerema will follow a waste hierarchy approach: eliminate, reduce, reuse, recycle, and dispose, and will comply with the Waste Duty of Care Code of Practice.

4.3.26. All waste management activities onboard the cable laying vessel will be conducted in accordance with UK legislation and applicable international maritime requirements, including the provisions of MARPOL as administered by the International Maritime Organisation, and enforced within UK waters by the Maritime and Coastguard Agency.

4.3.27. As the producer of the waste, it is the duty of BSC vessel management to ensure that the waste is contained and stored, so the risks of discharge during transfer are as Low as Reasonably Practicable (ALARP).

4.3.28. Prior to the transfer of waste, the containers shall be inspected and properly secured. The labelling of waste for transport is governed by legislation and IMDG Code. Regulations define the packaging and labelling requirements that apply to defined waste types. As a minimum, the description should cover the following key points:

- Labelling and packaging of waste according to local regulations.
- Waste Classification & Identification Code Numbers.
- The quantity of the waste.
- The name and / or address of the site where it is originated.

4.3.29. BSC employees and contractors will only transfer their wastes to an authorised person who is licensed to accept the material being disposed of.

4.3.30. Each transfer of waste (Project → Waste Carrier; Waste Carrier → Waste Processing Facility) will be supported by a Controlled Waste Transfer Note.

4.3.31. Boskalis Subsea Cables, and Heerema and contractors will maintain records of all waste transfers in a Hazardous Waste Consignment Note (HWCN), which can be made available to NRW, if requested. HWCN will be returned to Boskalis Subsea Cables, and Heerema and filed for the proper duration in accordance with the relevant legislation.

4.3.32. ISM classed vessels will maintain a log of discharged hazardous wastes in the vessel's Garbage Record Book in accordance with MARPOL.

4.3.33. To reduce spills and leaks, hazardous materials storage and refuelling will be managed as follows:

- Plant nappies of suitable size will be always placed under static plant & equipment. Drip trays will be used if plant nappies are not available.
- Regularly check the equipment for leaks. Leaking equipment will be taken out of service and maintained.
- Use secondary containment systems with a 110% capacity.
- Keep spill kits available near storage areas. If spill kits are utilised to contain a spill on site, the products will be replenished for future use.
- Refuel in designated areas away from water bodies.
- Supervise all fuel transfers and ensure appropriate protective measures are in place.
- Where possible, refuelling should only be carried out in a designated area, which will be secured/locked out of hours.
- Refuelling will always be supervised by a competent supervisor and according to a strict and monitored process..
- All hazardous materials shall be labelled, sealed and stored with their Control of Substances Hazardous to Health (COSHH) assessment in a bunded and lockable container away from drains and watercourses when not in use.
- COSHH datasheet will be read and understood before using any hazardous materials.
- Any spent (contaminated) spill kits, absorbent granules, sheets or fibres must be disposed of in accordance with COSHH regulations requirements.
- Hazardous liquids shall be transferred using a funnel and drip tray and sealed and returned to the container immediately after use. Damaged containers shall be reported to the Field Environmental Manager.
- All usages shall comply with its requirements.
- Hazardous liquids must be re-sealed after use. Empty containers are to be disposed of to the designated container within the waste compound.

WASTE SEGREGATION AND STORAGE

4.3.34. Vessel-specific Waste Management Plans are implemented and maintained onboard all the vessels used for the works. These require all waste streams to be segregated at source into clearly labelled containers, including:

- General (non-hazardous) waste.
- Recyclable materials (e.g. metals, plastics, paper, and cardboard).
- Food waste.
- Hazardous waste (e.g. oily rags, chemicals, batteries, paints, and aerosols).

4.3.35. Dedicated, enclosed waste storage areas will be provided to prevent loss overboard, cross-contamination, or exposure to weather. Containers will be always secured, particularly during deck operations and adverse weather conditions.

Food Waste and Domestic Waste

4.3.36. Food waste will be managed in compliance with applicable discharge regulations. Where discharge is not permitted, food waste will be macerated and retained onboard for disposal at a licensed port reception facility. Domestic waste generated by crew activities will be compacted where practicable to minimise storage volumes and returned to shore for appropriate treatment or recycling.

Hazardous and Oily Wastes

4.3.37. Hazardous wastes will be stored in designated, bunded containers and handled only by trained personnel. Oily wastes, including bilge water and used lubricants, will be managed using approved onboard systems such as oily water separators and sludge tanks. No discharge of oily waste will occur except when fully compliant with regulatory limits and monitoring requirements.

Operational and Project-Specific Wastes

4.3.38. Waste generated from cable installation activities (e.g. packaging, protective materials, damaged components) will be collected promptly from work areas and transferred to designated storage locations. Cable drums, pallets, and other reusable items will be returned to suppliers or shore bases where practicable.

Shore Disposal and Record Keeping

4.3.39. All waste landed ashore will be transferred to licensed waste contractors at approved port facilities. Waste transfer notes and disposal records will be retained onboard and made available for inspection. The vessel's Garbage Record Book and Oil Record Book will be maintained in accordance with regulatory requirements.

Training and Environmental Awareness

4.3.40. All crew members will receive waste management and environmental awareness training as part of vessel induction. Regular toolbox talks and audits will be conducted to ensure continued compliance, promote waste minimisation, and prevent accidental discharges to the marine environment.

MARINE POLLUTION CONTINGENCY PLAN

Emergency Response Plan

4.3.41. Both Boskalis Subsea Cables, and Heerema and Subcontractor's employees, plus all others involved in the project are required to adhere to the Project specific Emergency Response Plan (ERP), which is outlined in the following sections. The ERP forms an integral part of the Project and is the primary document for Emergency Response activities. The ERP sets out the specific policies, practices, resources and activities relevant to the project.

4.3.42. In the event of any uncontrolled spillage into the marine environment, the initial response shall focus on identifying the source, containing the discharge and assessing the location and potential spread. If the spill originates from a vessel or from a vessel-based operations, the initial offshore response shall be led by the Vessel Master, who is required to activate the vessel's Shipboard Oil Pollution Emergency Plan (SOPEP). All project vessels and sites are equipped with Spill kits compliant to their respective SOPEP requirements. Where necessary, additional containment and clean-up equipment will be mobilised to meet project or location-specific risk levels. In the event of a spill, Boskalis Subsea Cables, and Heerema are responsible for:

- Ensuring spill response procedures are in place before work is initiated.
- Immediately notify Liverpool Bay CCS Limited.
- Liaising with statutory bodies (e.g. MCA, NRW) as required.
- Coordinating and executing the initial spill response actions.
- Managing follow-up actions in compliance with applicable marine pollution legislation.

4.3.43. Pollution incidents are categorised under a Tiered Response Framework based on severity and the scale of required resources:

- Tier 1: Minor spills that can be handled using onboard equipment and crew;
- Tier 2: Moderate spills requiring external support within regional capacity;
- Tier 3: Major spills with potential for widespread environmental damage. Spills originating from vessel operations on this project are expected to fall under Tier 1, barring a catastrophic incident. All spillages are to be reported in the 1st instance to the MCC.

4.3.44. In the event of a dropped object (see Appendix H) in the marine environment, initial focus will be on identification of the dropped object and assessment of the location. In the case that recovery is required; an assessment shall be made to the viability of recovery operations. In case Report any dropped objects left behind to MCC and local authorities

- Environmental Hazard: Coastguard, Fishery Department
- Shipping Hazard: Coastguard, Fishery Department
- Marine Hazard: Coastguard, Fishery Department, Environmental Department

4.3.45. Regarding notification Minimum communication equipment available on the vessels, are VHF that operate within 30 nautical miles of the nearest point of land. A VHF radio using the digital selective calling (DSC) is also used to allow notifying all the nearby vessels for assistance in case of an incident.

4.3.46. While the first notification is taking place, every emergency is managed by Boskalis Subsea Cables site-specific emergency response plan and then all the notifications are made to:

- the Project Management Team (PMT).
- the Marine Control Centre (MCC) that informs Liverpool Bay CCS Limited about the situation.
- Liverpool Bay CCS Limited will coordinate external notifications, including to HM Coastguard, where applicable and in line with jurisdictional boundaries.

- In the CDM area, Boskalis Subsea Cables, and Heerema are responsible for immediate notification to HM Coastguard.
- Boskalis Security Office at the Head Office in Papendrecht will provide 24/7 coverage to handle emergency notification in the event direct communication with the PMT proves difficult.

Spill Kits

4.3.47. Spill kits for hydrocarbon and chemical spills will be available at all worksites, with clear signage for easy identification. The site team shall ensure:

4.3.48. Additional spill kits are located at construction compounds, fuel storage points, and COSHH stores.

4.3.49. Each kit will include:

- Absorbent pads.
- Absorbent booms.
- Absorbent granules.
- Hazardous waste disposal sacks.

4.3.50. Regular checks will ensure spill kits are fully stocked and ready for use.

4.3.51. Spill drills will be conducted periodically to ensure the workforce can effectively handle spills.

4.3.52. All drills will be documented, with records kept throughout the project.

Extreme Weather

4.3.53. Boskalis Subsea Cables' Site Manager shall register to receive Met Office weather warnings. All warnings issued by the Met Office with the potential to impact upon the works shall be communicated by the Construction Manager to the workforce in a timely manner so that measures can be implemented where necessary. In the absence of the Construction Manager the Field Environmental Manager or equivalent person shall also receive and act upon all alerts.

INCIDENT REPORTING AND INVESTIGATION

Incident Response

4.3.54. All pollution incidents should be managed through the STOP – CONTAIN – NOTIFY concept. As soon as an incident is identified, the first action should be STOP and prevent further discharge to drainage/river/ground.

4.3.55. CONTAIN may constitute control of discharge in the event of a spill, or cessation of works if it is the works that are resulting in the incident, e.g. halting excavations until silt runoff is contained. It is recognised that due to personal health and safety risks it may not always be safe to stop the source of the spill, for instance if a significant volume of an unidentified substance has been released.

4.3.56. NOTIFICATION should take place as soon as practicable and frequently can take place while further release is being stopped or while a spill is being contained. The emergency contact numbers outlined in Table 4.3 should be used.

Reporting

4.3.57. Specific details concerning how different types of emergencies will be responded to, and the key responsibilities of the parties involved, will be documented in the Operational Interface Document currently being finalised within LBCCS to ensure an efficient and timely response to any emergency.

4.3.58. Reporting and Investigating of Incidents will follow Boskalis procedure. Below serves as a summary of Boskalis policy, highlighting Environmental aspects for this Project

4.3.59. In line with Boskalis Subsea Cables' policy on open reporting, Boskalis Subsea Cables will report all incidents to the Liverpool Bay CCS Limited's Project Team and HSE Manager without delay (within 24hr in any case) and subsequently by initial written report within 3 working days. A final written report will be issued once any necessary investigations have been carried out.

4.3.60. The final report will contain details of any root cause of the incident, along with details of the agreed corrective and / or preventative measures being taken to prevent a similar occurrence.

4.3.61. All environmental accidents and near-misses will be reported and investigated in line with Boskalis Subsea Cables' stated procedures.

4.3.62. Any incident which has resulted in an environmental impact, and any significant environmental impact incident shall be reported immediately and without delay by the OCM to the Liverpool Bay CCS Limited's Offshore Site Representative, the Liverpool Bay CCS Limited HSE Manager and the Marine Coordinator without delay by telephone.

4.3.63. Roles and responsibilities are clearly defined within the process and will be followed accordingly.

Environmental Incidents (Oil or Chemical Discharge)

4.3.64. Any release to sea of oil or offshore chemicals from a vessel must be reported to NRW and (Condition 3.14) /or OPRED via a PON1 form.

4.3.65. Reporting to OPRED is done through the Integrated Reporting Service (IRS) on the UK Energy Portal by LBCCS.

4.3.66. No minimum threshold applies even small discharges must be reported.

Loss of Materials to Sea

4.3.67. If a vessel loses equipment or materials overboard, report via PON2 (Loss or deposition of materials to sea) through IRS. Dropped Objects Plan will be submitted with this CEMP#3 to prevent and manage the risk of dropped objects, ensuring compliance with UK regulations and industry best practice (DROPS) applicable to vessels and associated activities within the UK.

4.3.68. Reporting to NRW will be compliant to condition 3.7.

Safety of Major Accident Events

4.3.69. Report to OMAR (Offshore Major Accident Regulator) using the ROGI form for incidents under:

- Offshore Safety Directive Regulations (SCR2015)
- RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations)
- Submit ROGI forms by email to OMAR.reporting@hse.gov.uk

Emergency Contacts

4.3.70. In the event of an emergency occurrence at the Site, the Client and Boskalis Subsea Cables shall determine the relevant statutory and regulatory bodies that must be notified. Notification shall be in accordance with the measures outlined above in Section Error! Reference source not found..

Table 4.3 Emergency Contacts

Emergency Contacts	
Contact	Contact Details
Paul Gibson – project manager BSC	+44 (0) 7976 720 597
Willem de Wit- Package Manager Offshore BSC	+31 6 1928 3902
Guy Lister - Package Manager (Onshore) BSC	+44 (0) 780 1161 7526
Tito Dimitri- Project Manager- LBCCS	+44 7717 715 342
National Resources Wales	0300 065 3000
Health and Safety Executive (HSE Construction)	01519 229 235
Local Authority – Flintshire County Council	Switchboard 01352 752121
Fire	999 / 112
Police	999 / 112
Ambulance	999 / 112

Dropped Objects

4.3.71. A 'Dropped Object' is one of the unplanned event scenarios identified in the Boskalis Subsea Cables risk identification processes. In the event of a dropped object in the marine or intertidal environment, the initial priority shall be to identify the dropped item, assess the location and evaluate any risk to personnel, equipment, the marine environment and Liverpool Bay CCS Limited assets. If recovery is feasible and does not introduce additional unacceptable risks, recovery operations shall be undertaken promptly and safely. The following graphic gives an overview of the procedure.

M. Scenario – Dropped object

Vessel / Marine related

Emergency location

A dropped object is considered any object, larger than 0.5 m³, unintentionally dropped into the sea.

- Any dropped, floating objects to be retrieved on board if reasonably practicable
- Any dropped, non-floating objects to be considered to be retrieved
  (Include possible hazard to shipping or the environment in the consideration)
- On any dropped objects left afloat or sinking and left on the seabed, record:
  - Date and time
  - Position (latitude, longitude)
  - Description of object
  - Possible hazard to shipping or the environment
- Report any dropped objects left behind to MCC and local authorities
  - Environmental Hazard → Coastguard, Fishery Department
  - Shipping Hazard → Coastguard, Fishery Department
  - Marine Hazard → Coastguard, Fishery Department, Environmental Department

Crew vessel / Other vessels

- Maintain listening watch
- Assist if possible, to retrieve dropped object

COMPANY's Marine Coordinator / BSC Site Coordinator

- Gather information about dropped object
- Assist Project Team to relay information to local authorities if requested
- When the situation is closed or under control, please inform MCC

4.3.72. If recovery is not viable, the unrecovered dropped object shall be reported as an environmental and safety incident and notified to the relevant authorities and Liverpool Bay CCS Limited within 24 hours, in accordance with Liverpool Bay CCS Limited and regulatory requirements.

4.3.73. Prior to mobilisation, an assessment shall be conducted to identify potential dropped object hazards associated with all lifting and over-side operations, including:

- Cable laying, mattress and rock berm installation operations;
- Installation of Douglas CCS platform jacket, piles, and topsides;
- Transfers of equipment and materials to or from Liverpool Bay CCS Limited platforms and vessels; and
- Any mobilisation or demobilisation activities at quaysides, vessels or platforms.
- Note: Flexible Bulk Carriers shall not be used for lifting equipment or materials, as their design does not ensure load stability during hoisting.

4.3.74. Potential causes of dropped objects include:

- Poorly secured tools or equipment within a slung load;
- Uncontained fluids (fuel, oils inadvertently discharged or spilled;
- Failure of lifting equipment or use of equipment outside its designed purpose; and
- Inadequate securing of components during transfers to or from Liverpool Bay CCS Limited platforms or during over-boarding operations.

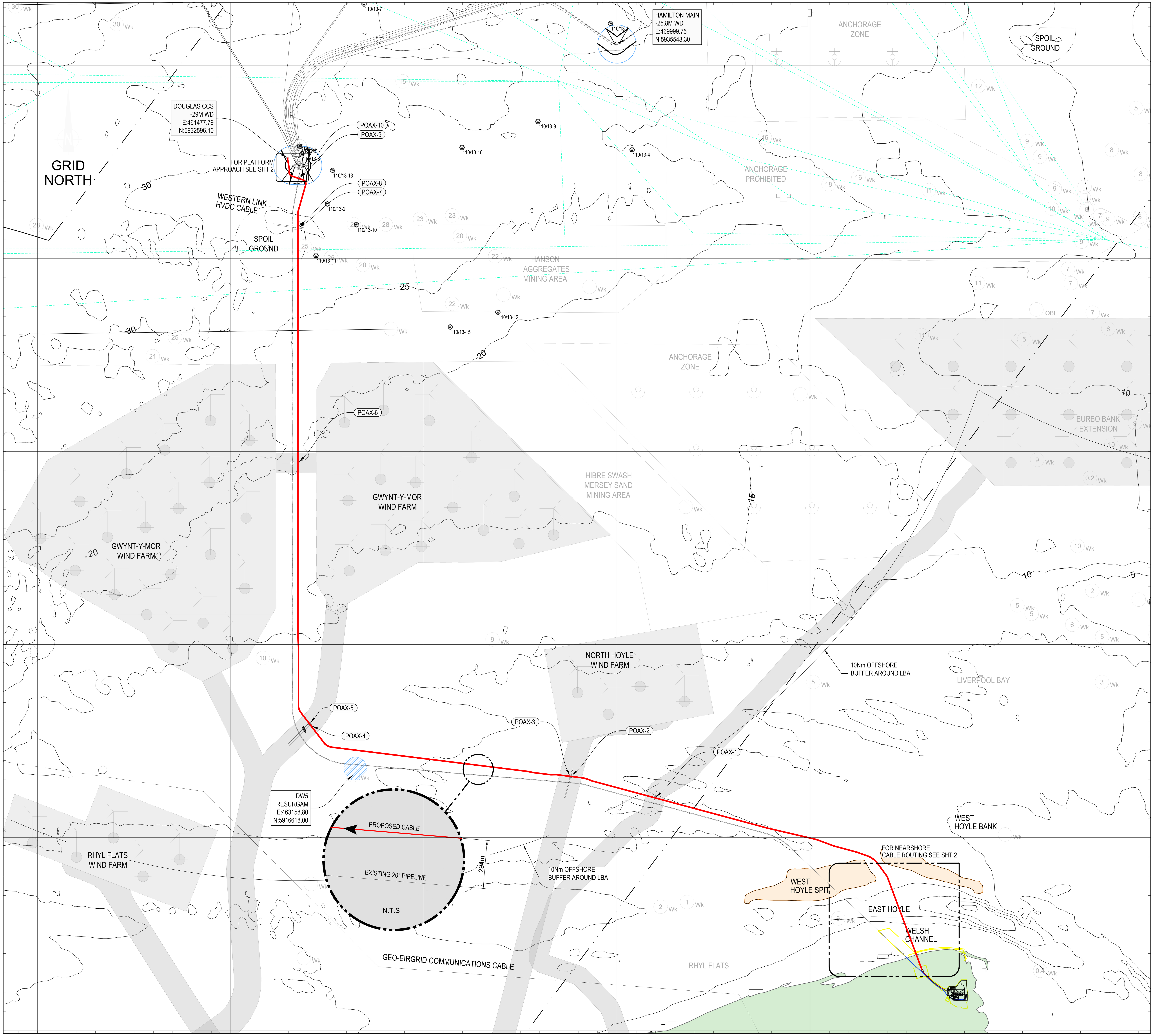
4.3.75. Mitigation measures shall include:

- Use of certified and inspected lifting equipment;

- Development of site- and operation-specific lifting plans that cover marine and platform operations;
- Tool & equipment tethering wherever practicable;
- Designated spotters during critical lifts or transfers to/from platforms;
- Pre-task briefings and toolbox talks to ensure awareness of dropped object hazards; and
- Immediate securing or recovery of any item at risk of falling overboard or from height.

4.3.76. All personnel shall remain vigilant for dropped object hazards and report any incidents or near-misses immediately to the Supervisor or Project Manager. A Dropped Objects Reporting Form, and Spill Notification Form are presented in Appendix H, and Appendix I, respectively.

APPENDIX A: PROJECT LAYOUT PLAN (CHART WITH COORDINATES AND ZONES).



REFERENCE DOCUMENTS

NUMBER	TITLE

KEY PLAN

GENERAL NOTES

1. ALL DIMENSIONS AND COORDINATES ARE IN METRES UNLESS NOTED OTHERWISE.
2. GLOBAL COORDINATE REFERENCE SYSTEM: European Datum 1950 UTM Zone 30N (EPSG: 23030)

PROJECTED COORDINATE SYSTEM	European Datum 1950 UTM Zone 30N
PROJECTION	TRANSVERSE MERCATOR
LINEAR UNIT	METERS (1.0)
FALSE EASTING	500000.0
FALSE NORTHING	0.0
CENTRAL MERIDIAN	-3.0
SCALE FACTOR	0.9996
LATITUDE OF ORIGIN	0.0
GEOGRAPHIC COORDINATE SYSTEM	European Datum 1950
ANGULAR UNIT	DEGREE (0.0174532925199433)
PRIME MERIDIAN	GREENWICH (0.0)
DATUM	European 1950
SPHEROID	Iternational 1924
SEMIMAJOR AXIS	6378388.0
SEMIMINOR AXIS	6356911.946127946
INVERSE FLATTENING	297

3. CABLE ROUTING AND CROSSINGS ARE PRELIMINARY AND SUBJECT TO CHANGE BASED ON SURVEY INFORMATION.
4. WATER DEPTHS AND SHIPWRECKS (Wk) ARE GIVEN FOR INFORMATION ONLY.
5. LAYOUT IS COMPILED FROM VARIOUS SOURCES AND THEREFORE IS SUBJECT TO CONFIRMATION.
6. PRELIMINARY ROUTING BASED ON EXISTING SEABED ARCHITECTURE AROUND EACH PLATFORM.
7. CABLE APPROACH TO EACH PLATFORM TO BE CONFIRMED.
8. FIELD LAYOUT BASED ON THE PRELIMINARY LOCATION OF NEW J-TUBES AT EXISTING PLATFORMS (HAMILTON MAIN, HAMILTON NORTH, LENNOX) AND DOUGLAS CCS PLATFORM.
9. FINAL LOCATION OF J-TUBES AT DOUGLAS CCS PLATFORM TO BE CONFIRMED.
10. DRILLING JACK-UP CORRIDOR AND FOOTPRINT AROUND PLATFORMS TO BE CONFIRMED.
11. FIELD LAYOUT TO BE REVIEWED AGAINST THE DECOMMISSIONING SCOPE FOR THE PROJECT.

LEGEND

- PROPOSED BOSKALIS CABLE ROUTE (POINT OF AYR - DOUGLAS CCS)
- MARINE TRAFFIC (SHIPPING LANES)
- EXISTING POWER CABLES
- EXISTING PIPELINES / UMBILICALS / POWER CABLES
- AREA LIMITS
- XX Wk — SHIPWRECK LOCATION
- 110/XX-XX — ABANDONED WELL LOCATION AND IDENT
- WIND TURBINE (NOT INDICATIVE OF LOCATION)
- OFFSHORE WIND FARM POWER CABLE CORRIDORS
- RESURGAM EXCLUSION ZONE

Validity Status	Rev. Number	Date	Description	Prepared	Checked	Approved	Approved Eni UK
CD-FE	00	10.02.2026	ISSUED FOR INFORMATION	R.D	M.R	S.G	

Revision index

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Job. N. JA0614

Facility and Sub Facility Name: POINT OF AYR GAS PLANT - GENERAL

Project Name: LBA CCS Transport and Storage

Scale: 1:50k @A1

Sheet of Sheets: 1 / 2

Document Title: **NEW OFFSHORE POWER CABLE AND FIBRE OPTIC FIELD LAYOUT (OFFSHORE SECTION)**

Supersedes N.

Superseded by N.

Plant Area: N/A

Plant Unit: N/A

A1 (841 x 594)

Software:AutoCad

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APPENDIX B: INVASIVE NON-NATIVE SPECIES MANAGEMENT

Liverpool Bay CCS Ltd

HYNET CARBON DIOXIDE TRANSPORTATION AND STORAGE PROJECT - OFFSHORE

Environmental Statement
Volume 4, appendix T: Invasive Non-Native Species Management Plan

EHE7228B
Liverpool Bay CCS Limited
Final
February 2024
Offshore ES
Invasive Non-Native
Species Management Plan

rpsgroup.com

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Date**
FINAL	Final	RPS	Eni UK Ltd	Eni UK Ltd	February 2024

Prepared by:

RPS

Prepared for:

Liverpool Bay CCS Limited

Glossary

Term	Meaning
INNS	Any non-native animal or plant that can spread causing damage to the environment, the economy and human health.
Non-native Species	The equivalent of 'alien species' (as used by the Convention on Biological Diversity (CBD)) and 'non-indigenous species' (as used by the OSPAR Commission and the UK Marine Strategy); it refers to a species intentionally or unintentionally introduced outside its native range by human actions.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.
Proposed Development	The offshore components of the Project which are subject of this Environmental Statement, as described in Chapter 3: Proposed Development Description.

Acronyms and Initialisations

Acronym/ Initialisation	Description
CBD	Convention on Biological Diversity
CCS	Carbon Capture Storage
CMS	Construction Method Statement
CO_2	Carbon Dioxide
EIA	Environmental Impact Assessment
ES	Environmental Statement
EMP	Environmental Management Plan
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
INNSMP	Invasive Non-Native Species Management Plan
LAT	Lowest Astronomical Tide
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
MMMP	Marine Mammals Mitigation Plan
MMV	Monitoring, Measurement and Verification
PDE	Project Design Envelope
PWA	Pipeline Works Authorisation
SAC	Special Area of Conservation
UK	United Kingdom
WFD	Water Framework Directive

Units

Unit	Description
m	Metre (distance)
km	Kilometre (distance)
kV	Kilovolt (electrical potential)

Contents

Tables

Figures

1 INVASIVE NON-NATIVE SPECIES MANAGEMENT PLAN

1.1 Introduction

1.1.1 Background

This Invasive Non-Native Species Management Plan (INNSMP) has been prepared by RPS on behalf of Liverpool Bay CCS Ltd (the Applicant) to support the Environmental Statement (ES) for the HyNet Carbon Dioxide Transportation and Storage Project - Offshore (hereinafter referred to as the 'Proposed Development'). This INNSMP considers the installation, operation and maintenance and decommissioning of the Proposed Development within the waters of Liverpool Bay (Figure 1.1).

Several invasive non-native species (INNS), including the high – medium risk American lobster *Homarus americanus*, Chinese mitten crab *Eriocheir sinensis*, the kelp wakame *Undaria pinnatifida*, Japanese skeleton shrimp *Caprella mutica*, wireweed *Sargassum muticum* and Pacific oyster *Crassostrea gigas* have been recorded within Liverpool Bay (Hurst, 2016; Solway Firth Partnership, 2015) although the majority of records were only single or a few individuals found within ports and harbours.

This management plan has been drawn up using the Precautionary Principle to assess the risk of the introduction and spread of INNS associated with the Proposed Development and to present appropriate measures to minimise these risks as much as possible following best guidance (GB INNS, 2023; Cook *et al.,* 2014; Payne *et al*., 2015). Furthermore, the INNSMP addresses a comment made within the Scoping Opinion by The Offshore Petroleum Regulator for Environment and Decommissioning whereby:

'*Section 7.2.7: Potential Mitigation, where it states 'Compliance with available guidance on mitigating the introduction and spread of INNS', we advise that a full Biosecurity Risk Assessment and Invasive Non-Native Species (INNS) Management Plan is completed in relation to all marine operation activities associated with the Project. The risk assessment and management plan should include consideration of all activities, vehicles and equipment used as well as how the risk will be minimised through appropriate mitigation and adherence to best-practice guidance and management measures. The risk assessment should include a review of all the available data in relation to the presence of marine INNS where applicable to the Project, and the potential risks associated with each species identified.'*

1.1.2 Scope

The scope of the INNSMP is for the activities taking place within the Proposed Development seaward of Mean High Water Springs (MHWS). This INNSMP considers the installation, operation and maintenance and decommissioning of the Proposed Development within the waters of Liverpool Bay (Figure 1.1).

1.1.3 Purpose

This document provides an outline INNSMP aimed at providing an overview of the aspects that will form the basis of the INNSMP. The INNSMP will be further developed post-application in advance of the construction phase of the Proposed Development.

The purpose of the INNSMP is to set out the approach to INNS management and mitigation in respect of the Proposed Development. The management plan will provide an outline of the measures proposed to be implemented to facilitate biosecurity control and to minimise potential impacts on the local and wider environment.

The INNSMP will ensure all procedures pertaining to marine works (including construction, operation and maintenance and decommissioning of subsea structures) and vessel operations follow best practice guidance, preventing and reducing the risk of the possible spread or introduction of INNS into the waters of the Proposed Development.

The method employed follows the principles of the 'Great Britain (GB) INNS Strategy' (GB NNSS, 2023). The INNS Strategy follows a hierarchical approach which emphasises prevention, followed by early detection and rapid response, and finally long-term management and control. The key outcomes of the GB INNS Strategy are that by 2030 it will have achieved:

- **Prevention:** reduce establishments of INNS by at least 50% compared to 2000 levels.
- **Surveillance, early detection and monitoring:** significantly improve our detection and monitoring capability, including increasing inspections and investigations.
- **Management:** eradicate, control or contain INNS – prioritised by greatest impact and the likelihood of success.
- **Prioritisation and risk analysis:** set out an agreed approach to the prioritisation of species based on risk and likelihood of success to ensure our efforts are focused on where they can achieve the greatest benefit.
- **Evidence:** commission the research priorities outlined in the Evidence Strategic Plan, to ensure that the strategy is based on the best available evidence and identify gaps and priority areas for further development.
- **Awareness raising:** increase awareness of INNS issues and promote appropriate changes in behaviour or attitudes throughout all relevant sectors and among the general public.
- **Coordination:** improve coordination of actions within governments, government-associated bodies, and key actors outside government.

This INNSMP will be finalised prior to construction and will remain a 'live' document throughout the lifetime of the Proposed Development, with periodic updates by the Applicant during the construction, operational and maintenance, and decommissioning phase, as outlined within Section 1.4.7 (Evaluation and Review).

1.1.4 Document structure

The INNSMP is structured as follows:

- Section 1.2: Project Description;
- Section 3: Legislative Context and Consenting Process
- Section 4: Invasive Non-Native Species Management Plan Methodology; and
- Section 5: Invasive Non-Native Species Management Plan.

1.2 Project Description

This section provides the project characteristics, policies and consents relevant to the Proposed Development for the management of INNS, and how this INNSMP links with other management plans.

1.2.1 Proposed Development location

The Proposed Development is located in the Irish Sea, within Liverpool Bay, approximately 12 km to the north of the Welsh coastline and 2 km west of the English coastline. It covers an area of approximately 576.82 km^2. The application for a marine licence for the Proposed Development is shown as a red line boundary which encompasses all the planned and modified infrastructure (Figure 1.1). This includes the pipeline and cables corridor (up to Mean High Water Springs (MHWS)). The pipeline and cables corridor shore approach are located to the north of Talacre in Flintshire, Wales based at the mouth of the Dee Estuary (Figure 1.1).

1.2.2 Proposed Development characteristics

The key offshore infrastructure of the Proposed Development will include both new and repurposed existing infrastructure. The new and re-purposed infrastructure will be located within the Proposed Development (Figure 1.1).

The key offshore infrastructure of the Proposed Development will include:

- New Infrastructure:
  - Installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive CO_2 from the onshore Point of Ayr (PoA) Terminal and distribute CO_2 to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating to the CO_2 stream. Installation of the new Douglas CCS platform will include up to eight driven piles.
  - Installation of new sections of pipeline to connect the new Douglas CCS platform and the existing subsea natural gas pipelines.
  - Installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms to receive and inject CO_2 into the depleted hydrocarbon reservoirs.
  - Implementation of a programme of Monitoring, Measurement and Verification (MMV) activities - This includes the drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main.
  - Installation of two submarine 33 kilovolt (kV) power cables, with integrated fibre-optic cable connections (35 kilometres (km) from PoA Terminal onshore to the modified Douglas platform, including within the intertidal/foreshore area up to MHWS, within Welsh waters only).
  - Installation of new submarine 33 kV power cables with integrated fibre-optic connecting the modified Douglas platform with the Hamilton Main (12 km; 33 kV), Hamilton North (15 km; 33 kV) and Lennox (35 km; 33 kV) platforms.
  - Installation of cable and/or pipeline protection, at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved.
- Repurposing infrastructure:
  - Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to CO_2 service.
  - Development of the Hamilton Main, Hamilton North and Lennox reservoirs for CO_2 storage through the drilling and re-completion of injection wells by side-tracking existing production wells. This includes drilling and recompletion operations, all of which will be within the existing footprint (template) of each platform.
  - Implementation of a programme of MMV activities - Additional monitoring wells will be created from the recompletion of existing wells within the existing footprint (template) of each platform: one monitoring well created by side-tracking an existing well in Lennox; and two sentinel wells, one in Hamilton North and one in Lennox.

To facilitate the construction, operation and maintenance, and decommissioning of the Proposed Development, vessels will be used.

For further information on the Project Description, see volume 1, chapter 3 of the ES.

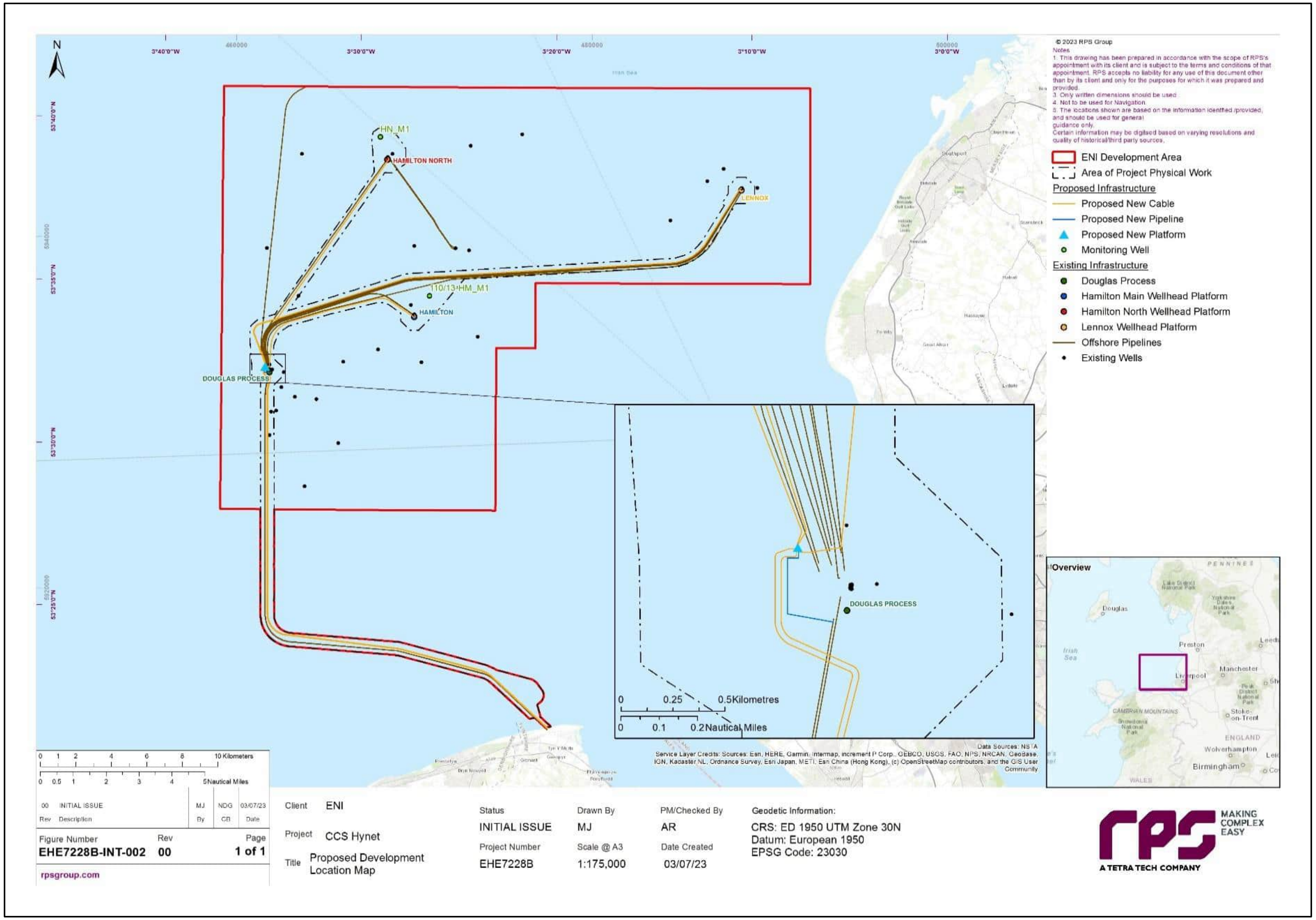

Figure 1.1: Location Overview Of The Proposed Development

1.3 Legislative context and consenting process

1.3.1 Policy

1.3.1.1 International

Convention on Biological Diversity (CBD)

This convention arose from the United Nations Conference on Environment and Development held in Rio in 1992. Within the framework of the convention, there are 15 Guiding Principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species. These principles provide an international framework for governments and other organisations to develop effective strategies to prevent the introduction, control and eradicate invasive non-native species. Article 8(h) states that each Contracting Party shall prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

Acknowledging the growing threat from INNS, the CBD has provided a major driver for international action. One of its guiding principles calls for national strategies on INNS. In response to this, devolved governments across the UK have produced the ‘GB INNS Strategy’ (GB NNSS, 2023) as described in Section 1.1.3. This Strategy provides the framework to support the coordination of policy and action across GB and aligns these efforts with national and international biosecurity and environmental strategies.

1.3.1.2 National

EU Regulation (1143/2014) on the prevention and management of the introduction and spread of invasive alien species.

EU Regulation 1143/2014 was retained in domestic law under the European Union (Withdrawal) Act 2018. It was amended through several statutory instruments to ensure operability following the UK’s exit from the EU but applies to Great Britain only.

This Regulation sets out rules to prevent, minimise and mitigate the adverse impact on the biodiversity of the introduction and spread within the Union, both intentional and unintentional, of invasive alien species.

The Invasive Alien Species (Enforcement and Permitting) Order 2019

The Invasive Alien Species (Enforcement and Permitting) Order 2019 came into force on 1 December 2019 and pertains to England and Wales. It contains provisions relating to offences, penalties, enforcement, licensing and permitting to meet the requirements of the Regulation.

1.3.2 Consents

This section provides a summary of the consenting process and associated legislative requirements being followed for the Proposed Development.

Table 1.1 sets out the permits and licences pertinent to the Proposed Development and to which the following legislation applies. The applications will be supported by an ES, as well as a Water Framework Directive (WFD) assessment, and a Report to Inform Appropriate Assessment (RIAA).

Should additional pre-construction licences be required, these will be discussed and agreed upon with the relevant consent authority during the pre-construction phase of the Proposed Development.

Table 1.1: Consents Applicable To The Proposed Development

Activity	Permit / Licence / Requirement	Key Legislation
Benthic Ecology Baseline Surveys: – Intertidal Benthic Survey – Subtidal Benthic Survey	• Marine Licence (Band 1) from Natural Resources Wales-Marine Licensing Team (Marine Management Organisation exemption) • OPRED Survey Notification • Crown Estate seabed survey licence	• Marine and Coastal Access Act (MCAA) 2009
Pipeline repurposing / Installation of new pipeline spools to new platform	• Pipeline Works Authorisation updates/renewals for the repurposed pipeline • Marine Licence Band 3	• The Pipeline Safety Regulations 1996 • The Offshore Chemicals Regulations 2002 (as amended) • MCAA
New Platform Installation	• Marine Licence Band 3 • Consent to Locate for fixed installation	• MCAA 2009 • Energy Act 2008
Drilling	• Master Application Templates and Subsidiary Application Templates for new wells, side-track drilling and well intervention	• Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020 • The Offshore Chemicals Regulations 2002 (as amended) • Part 4A of The Energy Act 2008 (as amended) • The Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005 (as amended) • Consent for a Marine Geological Survey or Investigation under The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended)
Environmental Impact Assessment	• Scoping • ES Production • Screening and appropriate assessment • WFD assessment • Submission and Public Notice	• The Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020; • The Offshore Environmental Impact Assessment (The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)); • Habitat Regulations Assessment (Conservation of Habitats and Species Regulations 2017 (as amended); Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended)); • EU (Withdrawal) Act 2018 • The Habitats and Birds Directive • Water Framework Directive;
Carbon Storage	• Carbon Dioxide Appraisal and Storage Licence already awarded by Oil and Gas Authority (now North Sea Transition Authority) • Crown Estate Lease • Carbon Storage Permit	• Energy Act 2008

Activity	Permit / Licence / Requirement	Key Legislation
Cable Laying and associated activities	• Marine Licence Band 3 in Welsh Waters • Pipeline Works Authorisation for inter-platform cables in English Waters	• MCAA 2009 • The Pipeline Safety Regulations 1996 • The Offshore Chemicals Regulations 2002 (as amended)

1.3.3 Linkages with other consents management plans

The INNSMP is consistent as far as possible with other relevant consent management plans prepared to inform the implementation of the Proposed Development. Additionally, management plans will be added as and when available. These are set out in Table 1.2 below with details of the linkages presented.

Table 1.2: Linkages With Other Consent Management Plans

Consents Management Plan	Linkage with the INNSMP
Environmental Management Plan (EMP)	The EMP provides the overarching framework for environmental management during the construction, operational and maintenance, and decommissioning phases of the Proposed Development. This can include proposed monitoring, methodologies and timings, along with a range of management plans including stakeholder engagement, traffic, waste, emergency response, invasive non-native species management and decommissioning and restoration.

1.4 Invasive Non-native Species Management Plan Methodology

This section outlines the process of creating an INNSMP using the best available evidence and following best practice guidance (Cook *et al.,* 2014, Payne *et al*., 2015). To make an accurate risk assessment of the Proposed Development, and derive a suitable INNSMP, a stepwise approach was taken as outlined in Figure 1.2 and described in detail below.

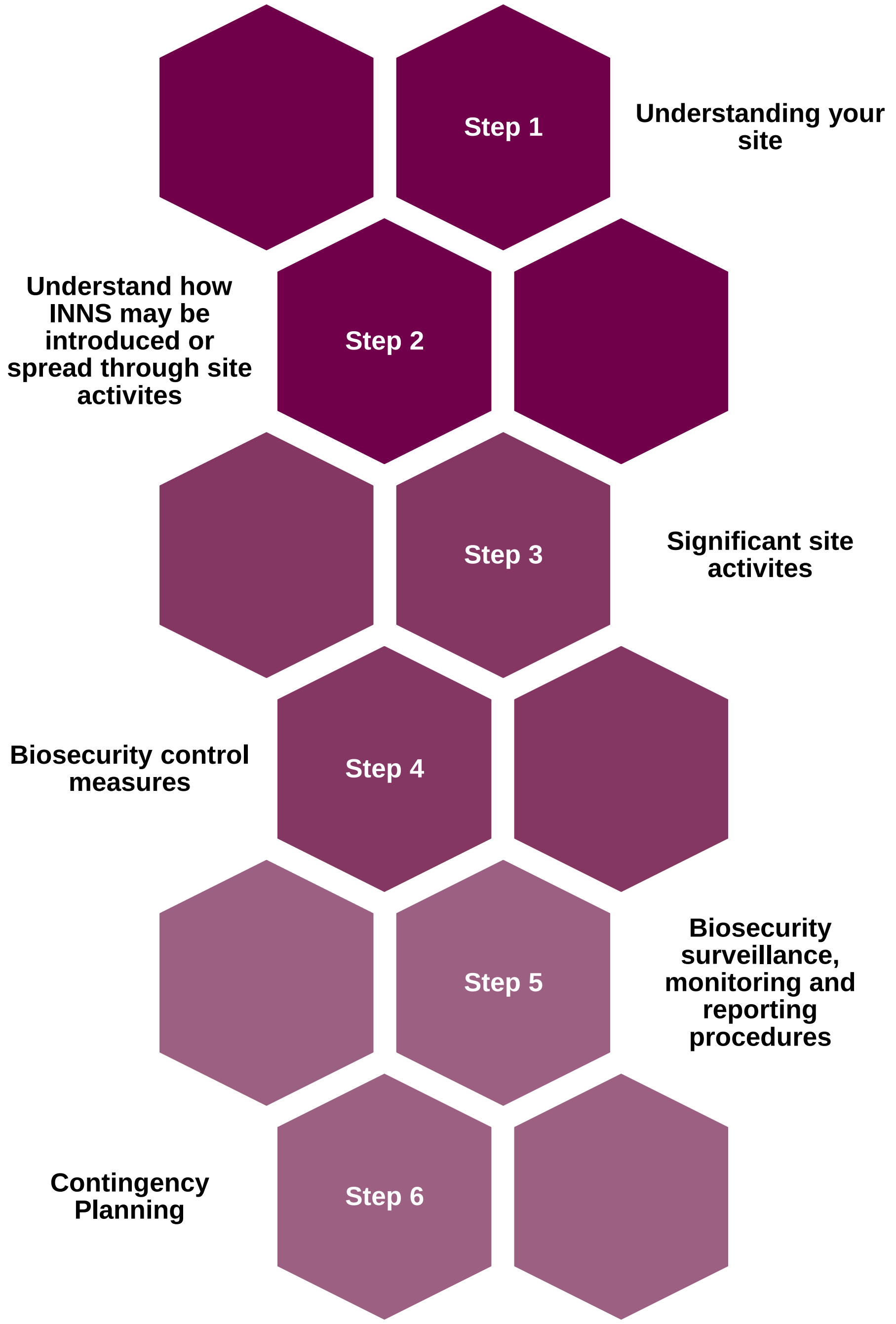

Figure 1.2: Six Steps Used To Produce The INNSMP For The Proposed Development

1.4.1 Step 1: Understanding your site

The first step in creating an INNSMP is to provide a detailed description of the site. This information should include the environmental conditions of the site, such as salinity, depth and the availability of hard substrate (Zaiko, 2007), details of any man-made structures, and if INNS are present within the site.

Understanding the salinity of the site will determine if INNS are present. The majority of marine flora and fauna are unable to tolerate freshwater due to osmoregulatory effects leading to death (Evans, 1980). An increased volume of freshwater flowing into a site will likely result in less hospitable conditions, decreasing the risk of INNS on-site; conversely, a fully marine site tends to represent a greater risk of INNS introduction to communities of native species (Tang *et al*., 2022).

The depth profile of a site can influence the ability of a species to colonise a site. Species live within an ecological range of tolerances, should a site be too deep for a species to live there, then it won't establish. Equally, within shallow environments, periods of tidal inundation and air exposure may decrease the likeliness of a species to establish.

The establishment of a species can also be influenced by the presence of a suitable hard substrate, for more sessile-encrusting organisms (Zaiko, 2007). Should a site only have gravel or sand present, then the likeliness of an INNS that requires a hard substrate to establish is reduced. Therefore, the presence of artificial structures increases the risk of INNS establishment, even if the structure has only been present for just a few weeks as INNS are quick to establish populations (Bax *et al*., 2003). Information related to any slow or stationary periods of work or climatic conditions that may increase biosecurity risk should be included.

If INNS have been found on-site, then the INNSMP should focus on reducing the risk of introducing new INNS and consider how to prevent the spread of existing INNS to other sites. Throughout the whole process, the precautionary principle should be followed, even if no INNS are present on site.

Using this information, a site can be assessed as having a low or significant risk of introducing or spreading INNS. Table 1.3 provides an example of this.

Table 1.3: Example Of Low And Significant-Risk Sites (Payne *et al*., 2015)

Low-Risk Site	Significant Risk Site
• Supply of fresh water from a local river. • Isolated from surrounding environments by walls or breakwaters (i.e. closed or semi-enclosed areas with little to no flow of water). • Anti-fouling is used on artificial structures with periodic removal for air drying.	• Full salinity with no freshwater inflow. • Artificial structures have no antifouling coating with no management in place for maintenance. • The site has connectivity to similar environments.

1.4.2 Step 2: Understand how INNS may be introduced or spread through site activities

In addition to understanding the site, consideration of pathways by which INNS may be introduced or spread is needed. This step should be iterative and revisited when the INNSMP is due for review. The questions and associated risks included in Table 1.4 have been adapted from Payne *et al*. (2015) and provide the type of questions to consider when creating an INNSMP.

Table 1.4: Example Of Questions And Risks To Consider Whilst Creating An INNSMP (Payne *et al*., 2015)

Question	Yes = High	Yes = Medium	Yes = Low
1. Has the vessel/ equipment just arrived from the local area?			
2. Has the vessel/ equipment had an anti-fouling coating applied to submerged structures within the last 12 months (or the time recommended by the manufacturer)?			
3. Are all the visible submerged surfaces of vessels or equipment to be deployed free of biofouling (a green ‘slime’ is OK)?			
4. Do the visible submerged surfaces of vessels or equipment to be deployed have more than a green ‘slime’ coating?			
5. Does the vessel or equipment to be deployed have noticeable clumps of algae and/ or animals clinging to the visible parts?			
6. Has the vessel/ equipment just arrived from another country or region with similar environmental conditions (e.g. seawater temperature)?			
7. Has the vessel/ equipment just arrived from a water body known to have INNS present?			
8. Does the vessel/ equipment spend long periods of time stationary at sites in between anti-fouling treatments?			
9. Is the vessel ‘slow moving’, such as a construction barge or drilling rig?			

For example, a recreational vessel showing no signs of biofouling on the hull or below the waterline would be considered a low risk for introduction of INNS; conversely, a work vessel/barge that moves from site to site and is present on site for long periods may have a medium–high risk, and therefore a significant risk of introducing INNS to site. For this step, information on the vessels and equipment to be used will be obtained from the Project Description, see volume 1, chapter 3 of the ES. A condition assessment of all vessel/equipment to be used will be performed based on the questions in table 3.2. Any results from this assessment that fall within the ’Low’ category will be assessed as ’Low’ Risk. Any results that fall within the ’Medium’ or ’High’ category will be assessed as a ’Significant’ Risk. This is considered to present a conservative approach to assessing the risk of introducing INNS.

1.4.3 Step 3: Identify significant site activities

The outputs from Step 2 will be used to compile a list of all the significant risks of introducing INNS as a result of the Proposed Development. This will include all vessels and equipment and the associated activities which have been assessed as being of significant risk of introducing INNS and their associated activities within the different phases of the Proposed development. Once this list has been created, the next step is to develop relevant and proportionate control measures.

1.4.4 Step 4: Biosecurity control measures

The outcomes of Steps 1 – 3 will be used to guide the biosecurity measures which should be implemented. Measures to control the introduction or spread of INNS must be effective, clear, realistic and easy to communicate to others. These measures must also consider how much control is enforceable over the site. A list of example control measures can be found within Cook *et al*. (2014), and Payne *et al*. (2015), many of which are included in the INNSMP (see section 1.5.4). Where possible, biosecurity measures should be included in the in-design stage of a new development and aim to ‘design out’ any possible significant risk of introducing or spreading INNS.

1.4.5 Step 5: Biosecurity surveillance, monitoring and reporting procedures

This step will outline what procedures should be followed in the event of discovering and positively identifying an INNS on-site. All staff and other site users should be encouraged to report any unusual sightings to the biosecurity officer.

1.4.6 Step 6: Contingency plan

In the event of the failure of the 'prevention', 'early detection' and 'rapid response' methods to effectively manage INNS introduction (section 1.5.6), a contingency plan will be created. This document should be short, provide a step-by-step approach to action and be accessible to all staff. This plan will review the identified listed activities, identify potential biosecurity control failures and recommend actions for effective management. For example, if a vessel had been wrongly assessed as low risk and introduced an INNS to the site, the introduced species would be sampled and identified, with the relevant authorities notified, followed by further containment and management measures being sought.

1.4.7 Evaluation and review

Following completion of the INNSMP, a clear recording system and review cycle date will be put in place to refine and update the INNSMP as required in line with relevant regulations and legislation.

1.5 Invasive Non-Native Species Management Plan

1.5.1 Step 1: Understanding your site

1.5.1.1 Site description

The Proposed Development is located in Liverpool Bay in the Irish Sea, covering an area of about 576.82 km^2. It is positioned 12 km north of the Welsh coast and 2 km west of the English coast. The marine licence application area for the Proposed Development is shown as a red line boundary which encompasses all the planned and modified infrastructure including the pipeline and cables corridor up to MHWS, near the mouth of the Dee Estuary. The cable and pipeline make landfall within the Dee Estuary SAC. For further information see Section 1.2.1.

1.5.1.2 Environmental conditions affecting biosecurity

Liverpool Bay is a region of freshwater influence with strong horizontal density gradients. The bay is also strongly tidally dominated, with a high tidal range and extensive intertidal areas. Freshwater enters Liverpool Bay from several rivers, including the Mersey, Dee, Ribble, Conwy and Clwyd, which collectively maintain a strong salinity gradient and freshwater plumes (Bricheno *et al.* 2014; Polton *et al.*, 2011; Howarth and Palmer, 2011).

The Proposed Development is located in water depths that range from 0.72 m Lowest Astronomical Tide (LAT) to 35 m LAT, with average water depths across the development area being approximately 20 m LAT. Shallower water is generally present towards the southern and eastern boundaries of the Proposed Development, including the pipeline and cables, situated in inshore waters.

Tidal currents in the area are relatively weak, with spring tides indicating a current flow speed of up to 1m/s, flooding to the east, and ebbing to the west, at a current flow speed of circa 0.8 m/s, as determined through the desktop study for volume 2, chapter 6 of the ES.

The 2019 EUSea Map datasets, describe the Proposed Development area as being composed predominantly of EMODnet seabed substrate folk classification 311 gravelly Sand, 212 (gravelly) Sand, and 211 Sand (EMODnet, 2019). Fine and sandy sediments are dominant in inshore waters and particle sizes range from

260 to 420 µm in areas with stronger currents and from 190 to 250 µm in areas with contrasting, weaker currents (Eni, 2019). This has been corroborated through volume 2, chapter 6 of the ES.

Overall, the influx of freshwater into Liverpool Bay and through the Proposed Development is likely to reduce the presence of INNS. Furthermore, tidal currents and a higher proportion of sand fractions, with no rock, found throughout the Proposed Development are likely to reduce the likeliness of INNS being present within the area. Therefore, the environmental conditions of the site can be assessed as **Low-Risk.**

1.5.1.3 Man-made structures

Section 1.2.2 listed the existing hard structures present within the Proposed Development area. These hard structures include the platforms, injection, monitoring and sentinel wells and pipelines. It is important to note that some of these structures may be buried, such as the power and fibre optic cables and pipelines. Furthermore, Gwynt y Mor offshore wind farm is located within the south-western most corner of the Proposed Development. These structures are likely to increase the potential for INNS to establish. Therefore, the presence of man-made structures are likely to increase the risk of INNS to the site and is assessed as a **Significant-Risk**.

1.5.1.4 INNS within the Proposed Development

The Proposed Development is located within the Dee Estuary Special Area of Conservation (SAC), which is primarily tidal rivers, estuaries, mud flats, sand flats and lagoons (including saltwork basins) (81% coverage). The SAC is designated for a range of Annex I habitats including mudflats and sandflats not covered by seawater at low tide, as well as Annex II species, such as sea and river lamprey (*Petromyzon marinus* and *Lampetra fluviatilis*, respectively). The Natura 2000 - Standard Data Form (JNCC, 2015) for the SAC identifies INNS as a high ranked negative impact pressure. However, it should be noted that this pressure is attributed to the terrestrial invasive saltmarsh species, common cord grass *Spartina anglica*. No marine INNS have, as of yet, been identified as a negative pressure on the Dee Estuary SAC.

National Biodiversity Network (NBN) data (2023) indicated no INNS are present within the Proposed Development area. However, within the wider area of the Proposed Development, Liverpool Bay is known to have INNS present within ports and harbours. As the Proposed Development will require the use of vessels during the construction, operational and maintenance, and decommissioning phases, INNS that have been identified within ports and harbours have been listed on a precautionary basis (Table 1.5).

Table 1.5: Non-Native Species Known To Be Present Throughout Liverpool Bay

	Non-native Species[1]	Environmental risk to native Great Britain species[2]
Present throughout Liverpool Bay:	• American lobster *Homarus americanus* • Chinese mitten crab *Eriocheir sinensis* • Wakame *Undaria pinnatifida*	High Risk
	• Slipper limpet *Crepidula fornicata* • Japanese skeleton shrimp *Caprella mutica* • Wireweed *Sargassum muticum* • Pacific oyster *Crassostrea gigas*	Medium Risk
	• Acorn Barnacle *Elminius modestus*	Risk not assessed / available

[1] Sources: Hurst (2016); Solway Firth Partnership (2015); NBN Gateway (2023).

[2] According to assessment by GB Non-Native Species Secretariat (Risk assessment » NNSS (nonnativespecies.org)).

	Non-native Species[1]	Environmental risk to native Great Britain species[2]
	• Bay barnacle *Amphibalanus improvisus* • Bryozoan *Bugulina simplex* • Bryozoan *Bugulina stolonifera* • Carpet sea squirt *Didemnu vexillum* • Colonial sea squirt *Aplidium cf. glabrum* • Compass sea squirt *Asterocarpa humilis* • Chain Tunicate *Botrylloides violaceus* • Darwin's barnacle *Austrominius modestus* • Devil's tongue weed *Grateloupia turuturu* • Green sea fingers *Codium fragile fragile* • Polychaete *Goniadella gracilis* • Orange-striped anemone *Diadumene lineata* • Orange-tipped sea squirt *Corella eumyota* • Red ribbon bryozoan *Watersipora subatra* • Tufty buff byozoan *Tricellaria inopinata* • Trumpet tubeworm *Ficopotamus enigmaticus* • Leathery sea squirt *Styela clava*	

A species account has been provided for those with a high to medium risk:

- High Risk:
  - American Lobster: A large crustacean from the north-west Atlantic. Slightly larger than (but very similar to) the native lobster (GB NNSS, 2015). The species has been recorded in Solway, at Workington (Solway Firth Partnership, 2015).
  - Chinese mitten crab: The Chinese mitten crab measures up to 56 mm in carapace length. Its carapace has a square outline, tapering towards the front, and features four teeth on each side. The most prominent characteristic of this crab is the thick layer of hair covering its claws and legs. The species have been found to be distributed within the River Dee, Mersey, Ribble and at the mouth of the River Duddon (NBN Gateway, 2023).
  - Wakame*:* A large species of kelp native to Japan, which has a broad frond with fingered edges and a conspicuous midrib. The holdfast is compact and root-like, and the stipe above it bears many folded reproductive frills. Grows on hard substrates from low intertidal to approximately 18 m, tolerant of salinities as low as 20 (GB NNSS, 2019a). The species has been recorded in Liverpool Bay and is currently contained within Fleetwood Marina, located near Blackpool, however, it has increased in abundance in recent years (Hurst, 2016).
- Medium Risk:
  - Slipper Limpet: Shell is oval and up to 5 cm in length. The large shell opening has a shelf, extending half its length. Shell is smooth and white, cream, yellow or pinkish in colour with streaks or blotches of red or brown. The species is now distributed in Europe from Norway to the Mediterranean, with population explosions on the south and south-west England. Within Liverpool Bay, the species has been recorded along the north-west of Wales around Anglesey and at the mouth of the River Mersey (NBN Gateway, 2023).

– Japanese skeleton shrimp: An aggressive skeleton shrimp originally from northeast Asia, which is rapidly invading and has established populations in the North Sea, the West coast of Scotland and the Irish Sea (GB NNSS, 2012). The species has been recorded in Loch Ryan and can be found in harbours and marinas amongst fouling growth on boat hulls, ropes and nets where it can clog equipment and nets as well as outcompete native species (Hurst, 2016).

– Wireweed: A highly distinctive large olive-brown seaweed, often over 1m long. Its lateral branches hang like washing from a line when held out of the water. Wireweed competes with native seaweeds and sea grasses through rapid growth, shading and abrasion. It is a nuisance in harbours and shallow waters where it is a hazard to boating due to the entanglement of propellers (GB NNSS, 2019b). The species is distributed widely along the coasts of south and west England, Wales and West Scotland. It was first recorded in Scotland in Loch Ryan in 2004 and has since populated various areas further north up the west coast (Hurst, 2016).

– Pacific oyster: There are extensive beds of naturally recruited Pacific oysters in some southern estuaries of England and sparse settlements are known from the north coast of Wales near Conwy. Mature individuals were first recorded on the Galloway coast at Ravenshall in October 2012, Ross Bay in December 2012 and Balcary Bay in January 2013. A survey published in 2015 confirmed the Solway Firth to be an ideal habitat for the species although densities were low (Solway Firth Partnership, 2015).

Volume 3, Marine Biodiversity Technical Report (RPS Group, 2024) appendix I of the ES highlights the discovery of an INNS, the polychaete worm *Goniadella gracilis*, at the partially decommissioned station GS28 by Hamilton North (Figure 1.1).

The presence of INNS within and near to the Proposed Development area is considered to be of **Significant-Risk**.

Should any further INNS be recorded in the area prior to finalising the plan, these should be highlighted here, identifying the risk that each species represents to the UK's native species. Table 1.6 presents a summary of the results of Step 1.

Table 1.6: Summary Of The Site Risk Of The Introduction And Spread Of INNS

Site factor effecting risk of INNS	Assessment Result	Risk of INNS
Environmental conditions affecting biosecurity	The influx of freshwater into Liverpool Bay, tidal currents and a higher proportion of sand fractions, with no rock, found throughout the Proposed Development are likely to reduce the likeliness of INNS being present within the area. Therefore, the environmental conditions of the site can be assessed as Low-Risk.	Low
Man-made Structures	The presence of existing hard structures within the Proposed Development, as well as the presence of Gwynt y Mor offshore wind farm located within the south-westernmost corner of the Proposed Development are likely to increase the potential for INNS to establish. Therefore, the presence of man-made structures is assessed as a Significant-Risk.	Significant
INNS within the Proposed Development	NBN data (2023) indicated no INNS are present within the Proposed Development area. However, within the wider area of the Proposed Development, Liverpool Bay is known to have INNS present within ports and harbours. Additionally, volume 3, Marine Biodiversity Technical Report (RPS Group, 2024) appendix I of the ES highlights the discovery of an INNS, the polychaete worm *Goniadella gracilis*, at the partially decommissioned station GS28 by Hamilton North within the Proposed Development area. Therefore, the presence of this INNS is considered to be of Significant-Risk.	Significant

Given the results of Step 1 indicate two areas where the risk of INNS is significant, the INNSMP should focus on reducing the risk of further introducing new INNS and consider how to prevent the spread of existing INNS to other sites.

1.5.2 Step 2: Understand how INNS may be introduced or spread through site activities

1.5.2.1 Vessels and equipment to be used in the Proposed Development

Table 1.7 lists the vessels and equipment to be used for the Proposed Development with a 'risk' indicator for the potential to introduce or spread INNS. This risk assessment will be updated once the final project parameters have been confirmed and will be based on professional judgement, the final Proposed Development design, INNS present within the area (see Section 1.5.1), and available guidance.

The ES is based on the Proposed Development design parameters, which include the use of several vessels, planned infrastructure, such as cables and CO_2 injection, sentinel and monitoring wells, and the modification of existing installations (Figure 1.1). Additionally, there may be a requirement to use concrete mattresses and rock armour. These will be refined post-consent, such that the risk can be accurately assessed. As stated previously, this is a 'live' document and as such, if specific details of the Proposed Development undergo review or are changed, this document will be updated accordingly.

The results of Step 2 as presented in Table 4.2 indicate that the use of vessels in all phases of the Proposed Development presents a significant risk for the introduction of INNS. However, operational speeds of the vessels combined with the implementation of standard control measures to comply with relevant regulations such as MARPOL and those to manage ballast water will reduce the risk to low.

Man-made structures also present a significant risk to the introduction of INNS and given the identified presence of an INNS within the Proposed Development. Additional project specific control measures will be required to manage this risk.

Table 1.7: Vessel, Foundation Types, And Substrates To Be Used In The Proposed Development

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
Vessels (Construction phase)	Various	• Vessel types and sizes to be used in the construction phase for the: – Oil Platform and wells include: Main installation and support vessels, tug/anchor handlers, cargo barges, support vessels, survey vessels, pre-comm vessels, seabed preparation vessels and crew transfer vessels; and – Cables and pipe include: cable lay installation & support, vessels, jack-up, multicat, working boat, support vessel (for trenching), dsv/lcv (for cable pull-in), survey vessel, seabed preparation vessel, crew transfer vessel, cable protection installation vessel and cable burial installation vessel. • Indicative construction port: – Port of Belfast Shipyard, Belfast, N.Ireland, UK (150 nm from the Proposed Development), and – Arnish Point Yard, Isle of Lewis, Scotland, UK (380 nm from the Proposed Development), with the final decision still to be made.	Significant	Vessels will be slow moving during construction and are expected to come from the Port of Belfast, approximately 150 nm from the Proposed Development. Vessels will be required to have an anti-fouling coating, inspection history complying with relevant regulations (MARPOL Regulations) and to manage ballast water. Anti-fouling coating and adherence to the MARPOL regulations and ballast standards will reduce the risk of INNS being present on the hulls of vessels.	Low
Vessels (operation and maintenance)	Various	• Vessel types and sizes to be used in the operation and maintenance phase include a jack-up barge and a multi-purpose support vessel. • The indicative operation and maintenance port is yet to be confirmed.	To be confirmed	Vessels will be required to have an anti-fouling coating and inspection history complying with relevant regulations (MARPOL Regulations).	To be confirmed

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
Vessels (Decommissioning phase)	Various	• Vessel types and sizes to be used in the decommissioning phase include decommissioning and support vessels, tug/anchor handlers, cargo barges, cable decommissioning and support vessels, survey vessels, and crew transfer vessels. • Indicative decommissioning port: – Port of Belfast Shipyard, Belfast, N.Ireland, UK (150 nm from the Proposed Development), and	Significant	Vessels will be slow moving when removing structures during decommissioning and are expected to come from the Port of Belfast, approximately 150 nm from the Proposed Development. Vessels will be required to have an anti-fouling coating, inspection history complying with relevant regulations (MARPOL Regulations) and to manage ballast water. Anti-fouling coating and adherence to the MARPOL regulations and ballast standards will reduce the risk of INNS being present on the hulls of vessels.	Low
New Infrastructure	• CCS platforms • Topsides	• Infrastructure, pile jacket and topsides will be delivered via heavy lift vessel, crane or transport barge.	Low	The piles will be prefabricated at an onshore facility and delivered offshore by means of a transportation barge and are unlikely to come into contact with the water, (and therefore INNS), until installation.	Low
	• Pipeline	• A 595 m length of the pipeline is to be installed and laid on the seabed. This is likely to be transported via barge.	Low	The pipeline will be delivered offshore by means of a transportation barge and is unlikely to come into contact with the water, (and therefore INNS), until installation.	Low
	• Monitoring Wells	• Monitoring wells are to be drilled.	Low	INNS are unlikely to colonise the drilled wells.	Low
	• Cables	• Cables will be installed from onshore through to the connection point via the installation vessel.	Significant	Cables are to be installed throughout a wide range of environmental conditions and habitats, with vessels likely to have come from ports where INNNS may be present. There is therefore an increased risk of introducing an INNS along the cable.	Low

Name	Type	Details & Risk factors	Risk before control measures: Low/Significant	Assumptions and Standard Control Measures	Risk after control measures: Low/Significant
				However, according to the Project Description cables are expected to be burried thereby mitigating any colonisation of INNS on the cable	
	• Concrete Mattresses/ Other External Cable Protection	• Concrete mattresses and other external cable protection will be installed at crossings of existing cables, and in areas where cable burial is not deemed feasible, or as a remedial secondary protection measure if the target cable depth of lowering cannot be achieved	Low	Concrete mattresses/ other external cable protection are to be delivered to the site via barge and will not come into contact with the water, (and therefore INNS), until installation.	Low
Repurposed infrastructure	• Repurposing of existing pipelines • Redevelopment of reservoirs • Recompletion of monitoring wells	• Existing infrastructure is to be repurposed for the Proposed Development.	Significant	Volume 3, Marine Biodiversity Technical Report (RPS Group, 2024)appendix I of the ES has reported that one specimen, the polychaete worm *Goniadella gracilis* was recorded at the partially decommissioned station GS28.	Significant

1.5.3 Step 3: Significant site activities

Based on the results of Step 2, a list of the Proposed Development activities per phase, that may have a significant risk of introducing or spreading INNS is provided in Table 1.8. The assessment in Step 2 was derived from information provided in the Project Description and will be updated based on the final project design as explained in Step 2 (section 1.5.2), with these activities predicted to represent a significant risk of INNS introduction during the construction, operation and maintenance and decommissioning phases.

Table 1.8: Site Activities Which Have A Significant Risk Of Introducing Or Spreading INNS

Phase	Activity Description
Construction	• Presence of existing man-made structures that may have INNS present.
Operation and Maintenance	• Presence of man-made structures that may have INNS present. • Maintaining man-made structures and ancillary equipment that may have INNS present.
Decommissioning	• Removal of man-made structures and ancillary equipment that may have INNS present. • Cleaning and disposal of biofouling from man-made structures and ancillary equipment.

1.5.4 Step 4: Biosecurity control measures

This section provides information on site-specific risks and control measures associated with the Proposed Development.

1.5.4.1 Presence/maintenance/ removal of existing man-made structures that may have INNS present

Risk

This may pose one of the greatest risks of INNS spreading associated with the Proposed Development. New or clean surfaces, such as vessels and infrastructure are typically the first colonisation sites for INNS due to their ability to settle and rapidly proliferate, replacing native populations (Huxel, 1999). Newly available hard surfaces (e.g. new platforms and auxiliary infrastructure) associated with the Proposed Development may be susceptible to colonisation by INNS found at the partially decommissioned station GS28 (near Hamilton North and Hamilton) in the first few weeks/months after installation (Bax *et al*., 2003).

Control measures

Any man-made structure to be used for the Proposed Development should be of terrestrial origin (i.e. not coming from another marine environment) and inspected for INNS prior to placement in the marine environment. During maintenance, the structure should be inspected for any INNS present, and if detected, then actions should be followed as presented in Section 1.5.6.

It should be noted that the INNS *Goniadella gracilis* is a species of polychaete worm, these worms are unlikely to adhere themselves to structures but will be inhabiting the surrounding sediments of the station GS28. As the species does not adhere to structures, this is likely to decrease the risk of spreading the INNS to other areas. However, caution should be advised if dredging within the vicinity of GS28 is required.

1.5.4.2 Cleaning and disposal of biofouling from structures during operation and maintenance activities and decommissioning

Risk

During routine operations and maintenance activities (e.g. jet washing of marine growth from the splash zone, or component replacement where required), there is potential for any established INNS to be detached from subsea structures. Where there is an identified risk that these activities may lead to the spread of INNS in the marine environment, additional control measures may be required.

Following the removal of marine structures during the decommissioning phase, INNS, if present, may still be attached to the surface. Should the INNS be removed without due care and washed back into the marine environment surrounding the Proposed Development, these INNS may represent a risk of spreading to areas previously unaffected.

Control measures

Where there is an identified risk that operation and maintenance activities (e.g. periodic cleaning of infrastructures) may lead to the spread of INNS (e.g. if there is a high risk that INNS are present on infrastructure), control measures may be required to minimise the amount of material entering the marine environment.

Large volumes of material detached or removed from decommissioned subsea infrastructure should be prevented from re-entering the marine environment. The material should be taken away and properly disposed of onshore. Control measures taken in relation to the disposal of biofouling will be aligned with the relevant Port Authority ‘Waste Management Plan’.

Biosecurity action

Prior to the installation of subsea structures or operation of new vessels to the Proposed Development, the Applicant and their contractors must include the following biosecurity clauses in any contract agreement:

- The contractor must submit a Biosecurity Risk Assessment to the Project Environmental Manager at least six weeks prior to installation/operations; and
- The contractor must ensure that all equipment, materials, machinery, Personal Protection Equipment (PPE) and vessels used are in a clean condition prior to their arrival on-site to minimise the risk of INNS introduction into the marine environment.

1.5.4.3 Additional biosecurity measures

The Proposed Development has been assessed as Significant in Step 1, therefore, using the precautionary approach, additional biosecurity measures have been presented.

1.5.4.4 Using vessels from outside of the Proposed Development

Risk

Using vessels from outside the Liverpool Bay area poses a significant risk of introducing INNS to the area (Minchin and Gollasch, 2010), especially vessels coming from areas of a similar marine environment. Information on the origin of the vessels to be used in all phases of the Proposed Development will be included within the INNSMP once the exact details and origins of vessels are specified following the appointment of construction contractors.

Control measures

All vessels to be used for construction, operation and maintenance and decommissioning activities must follow the guidelines as directed by the 'Guidelines for the Control and Management of Ships' biofouling to minimize the transfer of invasive aquatic species'[3], and where applicable, to comply with the 'International Convention for the Control and Management of Ships' Ballast Water and Sediments'[4].

1.5.5 Step 5: Biosecurity surveillance, monitoring and reporting procedures

Table 1.9 outlines who is responsible for carrying out certain checks of INNS, where these checks are to be carried out and when. Note that these positions are indicative, and roles and responsibilities will be confirmed upon contract award.

Table 1.9: Roles, Responsibilities, And Instructions For Staff, Contractors, And Site Users

Who	What	Where	When
Project Operations & Environment Manager - developers and contractors	• Oversee removal of flora and fauna from infrastructure, concrete mattress etc. and ancillary equipment, ensure material is properly disposed of and that no material is released into the water as per the relevant Port/Harbours 'Waste Management Plan'. • Awareness of INNS, including identification guidance on the key risk species. If uncertainty arises, follow the contingency plan.	At Port	Beginning of works
Project Operations & Environment Manager or appropriate contractor	• Oversee installation and removal of infrastructure, concrete mattress etc. and ancillary equipment, checking for INNS or unknown organisms. • For operations and maintenance, periodic checks should be carried out to ensure no growth/settlement of INNS, when possible. • Be aware of any slow-moving or inactive craft and take steps to assess risk. • Ensure a Check, Clean and Dry message is sent to any new developers or contractors. • Where possible, collaborate with the relevant port/Harbours and other users of Liverpool Bay to raise INNS awareness.	At Port	Beginning of works
Developers and contractors	• Confirm the origin of the material used in infrastructure, concrete mattress etc. and ancillary equipment (i.e. terrestrial origin, not previously submerged in marine water). • Encourage 'toolbox' talks on INNS prevention and monitoring.	N/A	Throughout works
Project Operations & Environment Manager - developers and contractors	• Through collaboration with the Regulators (including relevant stakeholders) will develop measures appropriate to the Proposed Development deployment specific to the site, nature, and duration of activities on a case-by-case basis.	N/A	Beginning of works

[3] For more information, see: Biofouling (imo.org)

[4] For more information, see: Ballast Water Management (imo.org)

1.5.6 Step 6: Contingency plan

Table 1.10: Contingency Plan In The Event Of Failure Of Prevention Of Inns Introduction

Action	Responsibility
Stage One – Suspected arrival of high-alert species	
Take photographs of the sample and collect the sample in a plastic bag.	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project), or any member of staff at the site of INNS discovery.
Check the organism against the identification sheet (see ID sheets » NNSS (nonnativespecies.org)) Report to Recording » NNSS (nonnativespecies.org)	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project), or any member of staff at the site of INNS discovery.
Stage Two – Presence of high-alert species confirmed	
Initiate immediate containment measures, including restricted vessel movements.	Designated biosecurity officer, site manager, Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project).
Carry out a wider survey of vessels and structures.	Designated biosecurity officer, and qualified ecologist.
Stage Three – Eradication/employ long-term control measures	
Seek advice from the GB Non-Native Species Secretariat on appropriate measures and actions for long-term control.	Designated biosecurity officer and Contractor Environmental Manager or Client Environmental Manager (depending on the phase of the project).

1.5.7 Evaluation and review

1.5.7.1 Location of biosecurity logbook

A biosecurity logbook will be kept (in electronic form) for the Proposed Development and will be made available for inspection and review as and when required.

1.5.7.2 Plan review date

This plan will be updated prior to construction to include the final project design and include an updated risk assessment based on that final design. This will include all measures to manage INNS during the construction, phase as agreed with the relevant regulatory authorities.

The plan will be updated following the completion of construction and at the beginning of the operational and maintenance phase to ensure the plan is appropriate for the next phase of the development and the risks and activities associated with it. The plan will be updated at regular intervals during the operational and maintenance phase and prior to the decommissioning phase to ensure all measures are appropriate and any changes in the environment and risk of INNS (e.g. records of INNS being present on site) are reflected in the INNSMP, as agreed with the relevant regulatory authorities.

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APPENDIX C: WRITTEN SCHEME OF INVESTIGATION.

HyNet Carbon Dioxide Transportation and Storage Project: Liverpool Bay

Offshore Written Scheme of Investigation and Protocol for Archaeological Discoveries

Prepared for:

Liverpool Bay CCS Ltd

Prepared by:

Tetra Tech RPS Energy

3rd Floor, Quay 2, 139 Fountainbridge, Edinburgh,
EH3 9QG

MC000089

16 March 2026

Rev03

Document status

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Approval for issue

Kevin O'Connell – Project Director	16/03/2026

Prepared by:	Prepared for:
Tetra Tech RPS	**Liverpool Bay CCS Limited**
Bob MacKintosh	Alistair Billington and Lamia Gherbi
3rd Floor, Quay 2, 139 Fountainbridge, Edinburgh, EH3 9QG	10 Ebury Bridge Road, SW1W 8PZ London
T +44 1315 555 011 E bob.mackintosh@tetratech.com	T +44 (0)7554008227 E Alistair.Billington@external.eni.com Lamia.Gherbi@eni.com

Glossary

Term	Meaning
Effect	The consequence of an impact.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Impact	A change that is caused by an action.
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact.
Palaeoenvironmental	An environment of a past geological age.
Project	The HyNet Carbon Dioxide Transportation and Storage Project.

Acronyms

Acronym	Description
AD	Anno Domini
ADS	Archaeological Data Service
AEZ	Archaeological Exclusion Zone
BP	Before Present
CCS	Carbon Capture and Storage
CIfA	Chartered Institute for Archaeologists
CLV	Cable Lay Vessel
COWRIE	Collaborative Offshore Wind Research Into The Environment
DAC	Data Archive Centre
ED50	European Datum 1950
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Geographic Information System
HDD	Horizontal Directional Drilling
HE	Historic England
JCCC	Joint Casualty and Compassionate Centre
LAT	Lowest Astronomical Tide
MBES	Multi-beam bathymetry
MEDIN	Marine Environment Data and Information Network
MPS	Marine Policy Statement
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MOD	Ministry of Defence
NLO	Named Locations
NRW	Natural Resources Wales

NSC	Non-submarine contact
NSTA	North Sea Transition Authority
OASIS	Online Access to the Index of Investigations
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
PAD	Protocol for Archaeological Discoveries
POA	Point of Ayr
RCAHMW	Royal Commission on the Ancient and Historic Monuments of Wales
ROV	Remotely Operated Vehicle
SBI	Sub-Bottom Imaging
SCAUM	Standing Conference of Archaeological Unit Managers
SPVA	Service Personnel and Veterans Agency
SSS	Side scan sonar
TAEZ	Temporary Archaeological Exclusion Zone
UKHO	United Kingdom Hydrographic Office
UXO	Unexploded Ordnance
UTM	Universal Transverse Mercator
WIS	Western Irish Sea
WIS-A	Western Irish Sea Formation - A
WWII	World War II
WSI	Written Scheme of Investigation

Units

Units	Description
%	Percentage
km	Kilometres (distance)
km^2	Square kilometres (area)
kV	Kilovolt (electrical potential)
m	Metres (distance)
Mt	Million tonnes (weight)
nm	Nautical miles (distance; 1 nm = 1.852 km)

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Appendices

1 Outline Written Scheme of Investigation (WSI)

1.1 Introduction

1.1.1.1 This Offshore Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) has been produced to address the specific requirements of the relevant conditions attached to the marine consents issued to the HyNet Carbon Dioxide Transportation and Storage Project (hereafter referred to as "the Project").

1.1.1.2 The purpose of the document is to set out details of the mitigation for the Project, and how this mitigation will be enacted. This includes work which has been recommended within the Project's consent application (Liverpool Bay CCS Ltd, 2024). The PAD and WSI has been prepared by the retained archaeologist to ensure that those involved in the construction and operation of the Project, including Liverpool Bay CCS Ltd personnel and all of the associated contractors, are aware of and understand archaeological mitigation measures, and how and when to apply them.

1.1.1.3 This document is based on the Outline Written Scheme of Investigation and Protocol for Archaeological Discoveries submitted as part of the consent application for the Project (Liverpool Bay CCS Ltd, 2023b). This document has also been produced in line with best practice guidance, in particular, Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects by The Crown Estate (2021). While this guidance was prepared for renewable energy projects, it has wider relevance to other industries and has therefore been referred to here.

1.1.2 Project Consents

1.1.2.1 The Project has received the following relevant marine consents:

- Marine licence (number CML2365) from Natural Resources Wales (NRW) under the Marine and Coastal Access Act 2009.
- Consent (reference number ES/2022/009) from the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) under Regulation 14(5) of the Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020.

1.1.2.2 The relevant consent conditions, along with how they are addressed in this document, are listed in Table 1.1.

Table 1.1 Project consents

Consent	Condition Number or Reference	Text	Where addressed in this document
Marine licence number CML2365	3.24.1	The Licence Holder must submit a Written Scheme of Investigation (WSI) which shall be in accordance with the outline WSI (CML2365-LBA CCS Ltd_OFFSHORE ES_Appendix U WSI_NRW_FINAL) to the Licensing Authority for written approval at least 4 months prior to commencement of the Licensed Activities. No Licensed Activities may be undertaken prior to written approval from the Licensing Authority.	This document is the WSI which will be submitted to the Licensing Authority for written approval prior to commencement of the Licensed Activities. It is in accordance with the outline WSI (Liverpool Bay CCS Ltd, 2023b).
	3.24.2	The Licence Holder must submit a Protocol for Archaeological Discoveries (PAD) to the Licensing Authority for written approval at least 4 months prior to commencement of the Licensed Activities. No Licensed Activities may	The PAD is contained in Appendix A and will be submitted to the Licensing Authority for written approval with this WSI prior to

Consent	Condition Number or Reference	Text	Where addressed in this document
		be undertaken prior to written approval from the Licensing Authority.	commencement of the Licensed Activities.
	3.24.3	The Licence Holder must ensure that any actions outlined in the documents detailed in conditions 3.24.1 and 3.24.2 are implemented as approved in writing by the Licensing Authority. Any proposed changes to the actions outlined in the documents must be submitted to and approved in writing by the Licensing Authority prior to any changes being enacted.	Responsibilities and processes for implementing, reviewing and monitoring compliance with the WSI are set out in Section 1.2.
Regulation 14(5) Consent (ref. ES/2022/009)	Marine Archaeology	Should unrecorded marine archaeology features be identified, mitigation measures (establishment of Archaeological Exclusion Zone (AEZs) and Temporary Archaeological Exclusion Zone (TAEZs)) would be implemented to avoid and mitigate any potential impacts.	The PAD contains the process for reporting unrecorded marine archaeology features (Appendix A). The implementation of AEZs and TAEZs is discussed in Section 1.5.2, along with the procedure for establishing new AEZs and TAEZs.

1.1.3 Location

1.1.3.1 The Project is located in the CS004 CO2 Appraisal and Storage Licence area (NSTA, 2020), approximately 12 km to the north of the Welsh coastline and 2 km west of the English coastline (Figure 1.1). The licence area covers approximately 576.82 km^2 and encompasses the depleted hydrocarbon reservoirs of the Hamilton, Hamilton North, and Lennox fields. The corridor shore approach is located to the north of Talacre in Flintshire, Wales, near the mouth of the Dee Estuary.

1.1.3.2 The area to which this WSI and PAD applies can be broken down into two parts (Figure 1.1):

- the Area of Project Physical Work; and
- the Eni Development Area.

1.1.3.3 The Area of Project Physical Work covers a restricted area in which Project activities and the insertion of new infrastructure including cable laying, well drilling and platform construction, as well as associated activities such as sand wave clearance are to be focused.

1.1.3.4 The Eni Development Area covers a wider area. While the main Project impacts will be focused within the Area of Project Physical Work, associated impacts such as vessel anchoring may occur within the Eni Development Area. As such both areas have been treated as the ‘Site’, and all archaeological remains within have been assessed.

1.1.3.5 A third area, termed the Marine Archaeology Study Area, was used in the consent application (Liverpool Bay CCS Ltd, 2023a; Liverpool Bay CCS Ltd, 2024). This comprised a 2 km buffer around the Eni Development Area, up to Mean High Water Springs (MHWS) and was defined to better characterise the archaeological resource within the Eni Development Area. The mitigation set out within this document is focused on the Area of Project Physical Work and the Eni Development Area. No direct impacts will occur within the Marine Archaeology Study Area and therefore no mitigation is proposed in that area.

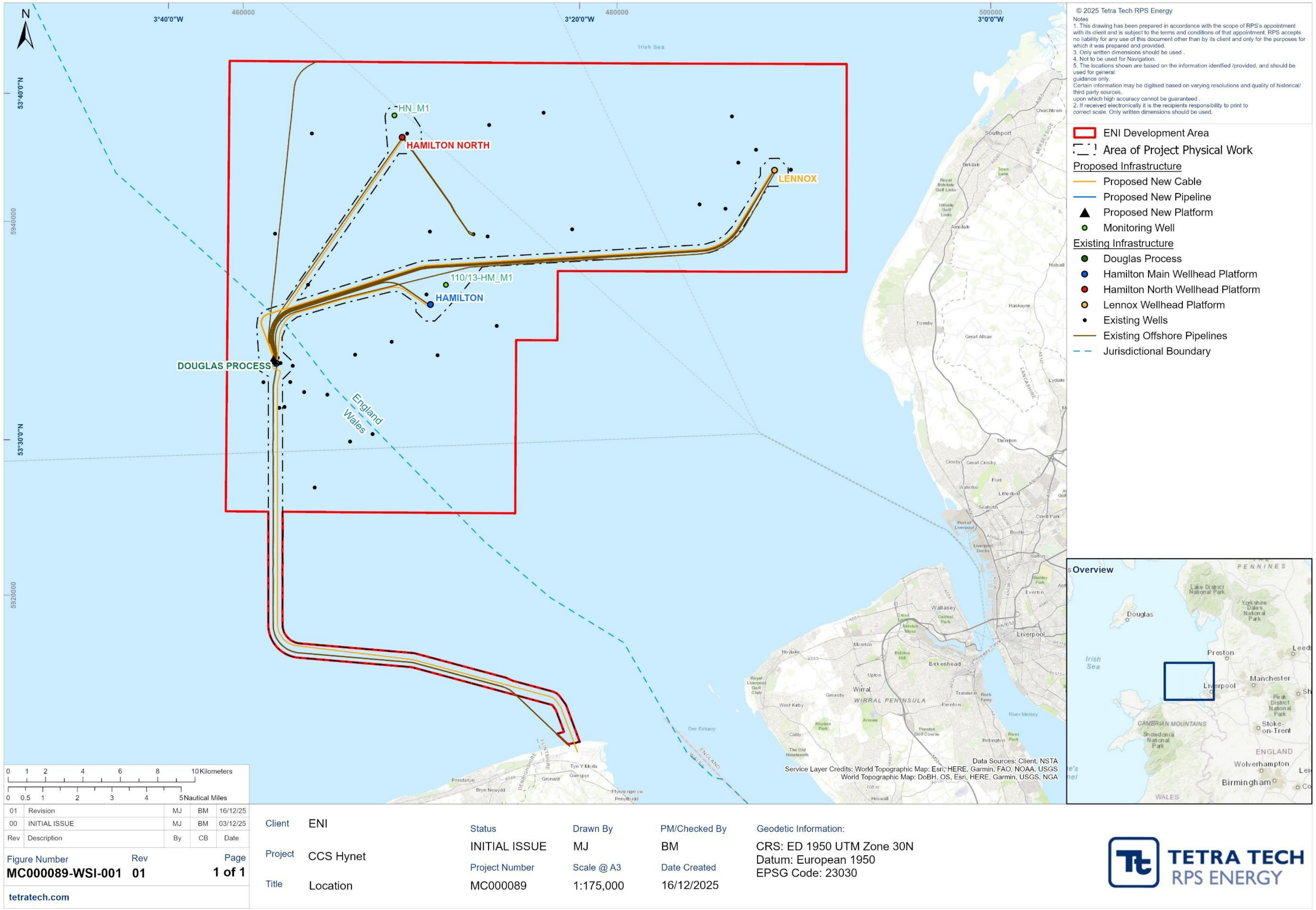

Figure 1.1 Site Location

1.1.4 Project description and licenced activities

1.1.4.1 As part of the offshore components of the Project, the existing offshore natural gas import pipeline from Point of Ayr (PoA) Gas Terminal will be repurposed to become a CO2 export pipeline and will transport the CO2 to the newly constructed Douglas Carbon Capture and Storage (CCS) platform. From the Douglas CCS platform, CO2 will be transported along re-purposed natural gas pipelines to the Hamilton Main platform for injection into the Hamilton Main reservoir, to the Hamilton North platform for injection into the Hamilton North reservoir, and to the Lennox platform for injection into the Lennox reservoir. The Project will also require new electrical and fibre optic transmission infrastructure seawards of MHWS, connecting the PoA Terminal to the offshore infrastructure. The offshore components of the Project will be confined within the Eni Development Area shown in Figure 1.1.

1.1.4.2 The licenced activities (within Welsh waters only) under marine licence CML2365 to which this WSI and PAD relate are:

- Laying, burial and dredging, of two submarine 33 kV armoured power cables with integrated fibre-optic cable connections from PoA Terminal onshore to the new Douglas CCS platform. The landfall connection will be made using Horizontal Directional Drilling (HDD). HDD will be used to pass under the Talacre dunes and exit at the MHWS point, within the beach area;
- Laying, burial and dredging, of three submarine 33 kV armoured power cables with integrated fibre-optic cable connections, one each from the new Douglas CCS platform connecting with the Hamilton Main, Hamilton North, and Lennox platforms;
- Installation of concrete mattresses and external rock protection at crossings of existing cables;
- Installation of new sections of pipeline spools to connect the new Douglas CCS platform to the existing subsea natural gas pipelines;
- Installation of concrete mattresses and external rock protection on sections of pipeline;
- Installation of a new Douglas CCS platform to replace the existing Douglas Process platform to receive CO2 from the onshore PoA Terminal and distribute CO2 to the Hamilton Main, Hamilton North, and Lennox wellhead platforms and when necessary, provide heating to the CO2 stream. Installation of the new Douglas CCS platform will include up to eight driven piles;
- Repurposing of the existing subsea natural gas pipelines for their change of use from hydrocarbon to CO_2 service;
- Clearance of a maximum of 12 items of Unexploded Ordnance (UXO);

1.1.4.3 Additional Project activities subject to the Regulation 14(5) OPRED consent, and therefore to which the PAD has to be implemented, and which may lead to the establishment of further AEZs and TAEZs are:

- installation of new topsides on the Hamilton Main, Hamilton North, and Lennox wellhead platforms;
- drilling and re-completion of injection wells by side-tracking existing production wells;
- drilling of two new monitoring wells, one at Hamilton North and one at Hamilton Main;
- recompletion of existing wells within the existing footprint (template) of each platform:
  - one monitoring well created by side-tracking an existing well in Lennox;
  - two sentinel wells, one in Hamilton North and one in Lennox.
- Presence of the jack-up drilling rigs; and
- Discharges from the drilling of the wells.

1.1.4.4 All other ancillary Project activities not mentioned above should also be undertaken in line with the WSI. This includes the anchoring or positioning of vessels or jack-ups.

1.1.4.5 All mitigation committed to during the application (Liverpool Bay CCS Ltd, 2024; section 1.5) should be applied to all Project activities and locations, whether in Welsh or English waters.

1.1.4.6 The pre-construction and construction phases are currently planned to be phased according to location, with works between PoA Terminal to the new Douglas CCS platform being undertaken in 2026, and works between the new Douglas CCS platform and the Hamilton Main, Hamilton North, and Lennox platforms being undertaken in 2027.

1.1.4.7 Operation and maintenance activities will take place for the 25 anticipated years of the project. The activities will include monitoring, for example for any unexpected leaks, additional cable repair, pipeline maintenance, and associated surveys will also take place using supply and standby vessels. Well interventions will be undertaken from a jack-up barge.

1.1.4.8 Decommissioning will include removal of all installations and injection facilities, as well as other equipment, infrastructure and materials.

1.1.4.9 This WSI and PAD may be amended to apply to any future marine licences or consents that may be acquired for the Project.

1.1.5 Aims and objectives

1.1.5.1 The objectives of the WSI follow best practice guidance set out by The Crown Estate (2021). The objectives are to:

- Set out the roles and respective responsibilities of Liverpool Bay CCS Ltd, Contractors, and Retained Archaeologist and Archaeological Contractor(s) and formal lines of communication between the parties and with Archaeological Curator(s) (section 1.2.2).
- Outline the known and potential archaeological receptors that could be impacted by the project (section 1.3).
- Outline the agreed mitigation and archaeological actions that are to take place in various circumstances (section 1.5).
- Set out the importance of research frameworks in setting objectives that are delivered through realisation of the work (section 1.4), provide methodologies for these archaeological actions, to be employed on archaeological work conducted in the post consent period (sections 1.5 and 1.6).

1.1.6 Consultation

1.1.6.1 Consultation relevant to the WSI and how it has been addressed in this document is listed in Table 1.2.

Table 1.2 Consultation

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Document
10 May 2024	Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) Consultation on CML2365	Agreement with the use, selection and location of AEZs, and RCAHMW are happy to discuss any variation to these as required.	The location and extents of AEZs have not been altered since they were recommended in the outline WSI (Liverpool Bay CCS Ltd, 2023b). The process for revising AEZs and for the creation of new AEZs is set out in Section 1.5.2.
		Any consultation with 'Archaeological Curators' (for example on refinement to AEZs) should include the RCAHMW	The Archaeological Curators include the RCAHMW and Cadw, and consultation will be with both of these

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Document
		alongside Cadw to ensure the most efficient response	institutions as specified in paragraph 1.2.2.5.
		For material of an archaeological nature, within Welsh Waters, the RCAHMW acts as a Marine Environment Data and Information Network (MEDIN) Data Archive Centre (DAC), so material can be archived directly with RCAHMW.	Paragraph 1.6.5.3 has been updated to reflect that the RCAHMW is a MEDIN DAC.
		Survey data for the medium and high potential archaeological anomalies to be archived with the RCAHMW. Data may be constrained to the AEZ for each site.	Liverpool Bay CCS Ltd has committed to archiving relevant geophysical survey data covering high and medium potential archaeological anomalies with the RCAHMW. Paragraph 1.6.5.3 has been updated.
29 and 30 April 2025	Joint Casualty and Compassionate Centre (JCCC) of the Ministry of Defence	Confirmed that the two records of Second World War aircraft crash sites within the intertidal zone in the Eni Development Area are far enough away to not require a licence but if any remains relating to the crashes are observed, their disturbance or removal would need to be undertaken under licence (Eni, 2025b).	The PAD will be implemented for works in the intertidal zone and any discoveries of aircraft material will be reported (Appendix A).
30 January 2026	RCAHMW Consultation on CML2365 - Discharge of Condition 3.24	The archaeological curators are Cadw and the RCAHMW. The latter holds the expertise for maritime archaeological matters within Wales.	Paragraph 1.2.2.5 updated to reflect this.
		This should be revised following the merger of the four Welsh Archaeological Trusts. As such Clwyd-Powys Archaeological Trust should be replaced with Heneb, the Trust for Welsh Archaeology who join Cadw and RCAHMW as curators for the area between MHWS and Mean Low Water Springs (MLWS). Ideally, a Heneb contact would be added to Table 1.3.	Paragraph 1.2.2.6 updated to note that Heneb are Archaeological Curators between MHWS and MLWS. Neil Bayliss added as Heneb contact to Table 1.3.
		There are a number of references in the document to "Section 0"	Cross references updated.
		We welcome the acknowledgement of the limitations of survey data in some areas. And welcome the commitment to ensure that full data coverage is achieved, as well as archaeological review of the data that has not been included thus far, and as such has not been able to inform the development of the WSI. The data gaps, presumably the same gaps, were noted in the original draft WSI submitted with the original license application for CML2365. As such its disappointing that they have not been filled in the intervening period. It will be appreciated that we cannot sign-off a WSI that admits that there are gaps	The data gaps identified in section 1.3.9 related to the intertidal zone and potentially to areas where cables may have required re-routing. An archaeological analysis of geophysical data has been undertaken for the intertidal zone and is reported in section 1.3.8. In addition, an intertidal walkover survey was undertaken on 01 April 2025 (Eni, 2025a). This data gap has been addressed. Any potential data gap caused by cable re-routing will be addressed by archaeological analysis of UXO survey data which will cover the entire footprint of cable installation (section

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Document
		in the data that need to be addressed, two years after first noting that there were gaps that need to be addressed. So the further surveys need to be completed and archaeologically assessed in order to allow a final, comprehensive WSI to be created.	1.5.7). The process for the analysis of this is the subject of a further Method Statement (MSDS Marine, 2026b).
		The situation regarding a number of the AEZs covered in this paragraph is unclear. If the AEZs need potentially amending, then this should be discussed and a decision taken, in conjunction with the archaeological curators, about amending the AEZ or moving the cable route. Its not clear from the WSI at what point this will take place, or when the additional survey work to investigate them will be carried out, or who will make the decision about whether or not the work needs to be done. The further survey work is noted as being discussed in 'Section 0' and its not clear if this section is within the WSI. As with the additional survey data above, this discussion needs to take place and be completed, in order to finalise the AEZs, and therefore finalise the WSI. As with the data gaps, the need/desire to do this work was included in the original draft WSI, but as with the data gaps, it does not seem to have been progressed.	AEZs have not been amended since they were recommended in the outline WSI (Liverpool Bay CCS Ltd, 2023b). Design of the cable route has taken into account these AEZs. The proposed cable route no longer intersects any AEZs so it is unlikely that AEZs will need to be amended. TAEZs may need amended during and following UXO surveys and will either become AEZs or be removed. This process will be through written approval by RCAHMW. It is possible that new AEZs may need designated, through discoveries of unknown archaeological assets during the UXO surveys or through implementation of the PAD. Section 1.5.2 has been updated to reflect the updated understanding of the proposed cable route and of the UXO surveys.
		RCAHMW is the MEDIN DAC for marine historic environment data within Welsh Waters. As such we can act directly as the archive for project material that requires archiving. I can act as a point of contact for this. This was also part of our feedback on the draft WSI in May 2024 as part of the original application.	Paragraph 1.6.5.3 has been updated to reflect that the RCAHMW is a MEDIN DAC.
		Our original response to CML2365 noted the following with regard to archiving of survey data for AEZs: "we would like to see the survey data for the medium and high potential archaeological anomalies archived with the RCAHMW to ensure that these sites can be monitored in the future, and also to ensure that the knowledge enhancement facilitated by the work of this scheme is properly realised by the archaeological data making its way into the National Monuments Record… We would envisage that the data would be constrained to the Archaeological Exclusion Zone for each site, and I am	Liverpool Bay CCS Ltd has committed to archiving relevant geophysical survey data covering high and medium potential archaeological anomalies with the RCAHMW. Paragraph 1.6.5.3 has been updated.

Date	Consultee and Type of Consultation	Summary of Issue(s) Raised	Response to Issue Raised and/or Where Considered in this Document
		happy to act as the point of contact to arrange the deposition of this material." Such material has not yet been archived with ourselves, so it would be good to receive a timescale for doing this.	
16 March 2026	RCAHMW Consultation meeting with Liverpool Bay CCS Ltd, TTRPSE and MSDS Marine	Discussion of RCAHMW comments on Rev02 of the WSI, including data gaps, archiving and AEZs.	WSI to be updated and resubmitted to RCAHMW.

1.1.7 Guidance

1.1.7.1 This document has been produced in line with best practice guidance, including:

- Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (The Crown Estate, 2021).
- Planning Policy Wales Technical Advice Note 24: The Historic Environment.
- Managing the Marine Historic Environment of Wales (Cadw/Welsh Government, 2020).
- Historic England's (HE) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England), 2008).
- Conservation Principles for the Sustainable Management of the Historic Environment in Wales (Cadw, 2011).
- Code of Conduct (Chartered Institute for Archaeologists (CIfA, 2014 (updated 2022)).
- Standard and Guidance for Historic Environment Desk Based Assessment (CIfA, 2014 (updated 2020)).
- COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector (Wessex Archaeology, 2007).
- Offshore Renewables Protocol for Archaeological Discoveries (The Crown Estate, 2014).
- Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011).
- Marine Geophysics Data Acquisition, Processing and Interpretation, Guidance Notes (English Heritage, 2013).
- Marine Geophysics: Data Acquisition, Processing, and Interpretation Guidance Notes (2nd Edition) (Historic England, 2025).
- Identifying and Protecting Palaeolithic Remains (English Heritage, 1998).
- Military Aircraft Crash Sites (English Heritage, 2002).
- Aircraft Crash Sites at Sea (Wessex Archaeology, 2008).
- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2006).

1.2 Implementation of the WSI

1.2.1.1 This section sets out the responsibilities of Liverpool Bay CCS Ltd and other relevant parties, and the lines of communication during the pre-construction, construction, operation, maintenance and decommissioning process for the Project with the aim of ensuring that the archaeological mitigation measures described are fully implemented in a timely manner that does not interfere with the smooth running of the Project programme. Contact details of relevant parties are listed in Table 1.3.

Table 1.3 Key contacts

Role	Name	Organisation	Telephone	E-mail
Environmental Coordinator	Alistair Billington	Liverpool Bay CCS Ltd	+44 (0)7554008227	Alistair.Billington@external.eni.com
Environmental Advisor	Lamia Gherbi	Liverpool Bay CCS Ltd	+44 (0)777 150 1100	Lamia.Gherbi@eni.com
Nominated Contact	Dimitri Tito	LBCCS project Manager	+44 (0) 7717 715 342	Dimitri.Tito@eni.com
Retained Archaeologist	Dr Bob MacKintosh	Tetra Tech RPS Energy	+44 (0) 1315 555 011	bob.mackintosh@tetratech.com
Archaeological Contractor	Mark James	MSDS Marine	+44 (0) 1332 300 043	Mark@msdsmarine.co.uk
Archaeological Curator	Nicola Smith	Cadw	+44 (0) 3000 256007	nichola.smith001@gov.wales
Archaeological Curator	Dr Julian Whitewright	RCAHMW	+44 (0) 1970 621 217	Julian.whitewright@rcahmw.gov.uk
Archaeological Curator	Neil Bayliss	Heneb	+44 (0) 1938 532766	Neil.Bayliss@heneb.org.uk heritagemanagement@heneb.org.uk
Archaeological Curator		Historic England		northwest@HistoricEngland.org.uk customers@HistoricEngland.org.uk

1.2.2 Responsibilities and communications

1.2.2.1 Primary responsibility for the delivery of this WSI lies with Liverpool Bay CCS Ltd. Through project documentation and procedures, the implementation of this WSI will involve a range of archaeological contractors and curators.

1.2.2.2 Liverpool Bay CCS Ltd have employed the services of Tetra Tech RPS Energy as the Retained Archaeologist to ensure the effective implementation of the WSI and other relevant commitments in relation to archaeology.

1.2.2.3 Additional Archaeological Contractors may be employed, on an ad hoc basis, by either Liverpool Bay CCS Ltd or the Retained Archaeologist if this task is delegated to them by Liverpool Bay CCS Ltd. Suitably qualified Archaeological Contractors may be called to provide a range of services relating to specialist archaeological provision (e.g. fieldwork, geotechnical analysis, etc.). MSDS Marine has been contracted to archaeologically assess geophysical survey data from UXO surveys and in the intertidal zone, and for other archaeological work packages (MSDS Marine, 2026a; 2026b).

1.2.2.4 The Historic England Marine Planning Unit is the Archaeological Curator responsible for heritage matters offshore in English waters. Historic England's Science Advisor for the North West region, where relevant, will also be consulted with regard to activities undertaken as part of this WSI.

1.2.2.5 In Welsh waters the relevant Archaeological Curators are Cadw and the RCAHMW. Both will be consulted with regard to activities undertaken as part of this WSI. RCAHMW holds the expertise for maritime archaeological matters, and so it is expected that consultation will be led by them.

1.2.2.6 Heneb: The Trust for Welsh Archaeology are also Archaeological Curators down to MLWS. This is relevant for the intertidal zone. Heneb will be consulted with regard to activities undertaken as part of this WSI which fall within the intertidal zone.

1.2.2.7 Contact with the Archaeological Curator(s) will be administered by Liverpool Bay CCS Ltd under advice from the Retained Archaeologist. In relation to the implementation of the WSI, the Retained Archaeologist will report to Liverpool Bay CCS Ltd's appointed project contact. Interaction with Liverpool Bay CCS Ltd's construction team will be administered by the project contact, advised by the Retained Archaeologist.

1.2.2.8 The responsibilities of the Retained Archaeologist will include:

- maintaining, reviewing and updating the WSI, as required;
- advising Liverpool Bay CCS Ltd on the necessary archaeological works and input required to the stipulations of this WSI are met;
- advising Liverpool Bay CCS Ltd which elements warrant archaeological involvement;
- advising Liverpool Bay CCS Ltd in the course of evaluating scope of work specifications on their capacity to meet archaeological requirements;
- advising Liverpool Bay CCS Ltd on the necessary interaction with third parties with archaeological interests, including the Archaeological Curator;
- advising Liverpool Bay CCS Ltd on the implementation of generic archaeological requirements applicable to all construction activities;
- advising Liverpool Bay CCS Ltd on the micrositing of infrastructure covered by this WSI, based upon archaeological results from Environmental Impact Assessment (EIA) and pre-construction surveys;
- advising Liverpool Bay CCS Ltd on Method Statements for archaeological investigations;
- preparing Method Statements for archaeological activities;
- ensuring that the project contact copies Method Statements to the Archaeological Curator for approval;
- implementing and monitoring the Protocol for reporting finds of archaeological interest based on the Protocol for Archaeological Discoveries;
- monitoring the work of and liaising with the Archaeological Contractor(s) where this is not the Retained Archaeologist;
- monitoring the preparation and submission of Archaeological Reports, as appropriate, and making them available to the Archaeological Curator;
- preparing provisions for the management of the project archives in consultation with an appropriate Museum; and
- advising Liverpool Bay CCS Ltd on final arrangements for analysis, archive deposition, publication and popular dissemination and the necessary schedule for these deliverables.

1.2.2.9 Where Method Statements, reports or other deliverables are submitted by Liverpool Bay CCS Ltd to the Archaeological Curator, their agreement/acceptance will be assumed if no contrary response is received within 30-working days of submission.

1.2.2.10 All relevant key contractors engaged in the construction of the project shall:

- familiarise themselves with the generic requirements of the WSI and make them available to their staff and / or subcontractors;
- obey legal obligations in respect of 'wrecks' and 'treasure' under the Merchant Shipping Act 1995 and the Treasure Act 1996 respectively;
- respect constraint maps, Archaeological Exclusion Zones (AEZs) and Temporary Archaeological Exclusion Zones (TAEZs);
- assist and afford access to relevant activities by the archaeologists employed by Liverpool Bay CCS Ltd;
- inform the Retained Archaeologist of any environmental constraint or matter relating to health, safety and welfare of which they are aware that is relevant to the archaeologists' activities; and
- implement the Protocol for reporting finds of archaeological interest.

1.2.2.11 Other roles are referred to within this document. Where this is the case these roles, and associated definitions, can be found within the Protocol for Archaeological Discoveries (section 1.5.5 and Appendix A). These roles include the Site Champion and Nominated Contact.

1.2.3 Arrangements for reviewing the WSI

1.2.3.1 Provision will be made for the WSI to be revised as appropriate should elements of the project change or particular archaeological issues come to light. Any revisions will be prepared by the Retained Archaeologist and submitted to Liverpool Bay CCS Ltd who will ensure they are submitted to, and approved by, the relevant Regulator, including NRW, in addition to other relevant licencing and consenting bodies in consultation with the relevant Archaeological Curator. Approval by the Curator will be assumed if no response is received within 30 working days of submission.

1.2.4 Monitoring compliance with the WSI

1.2.4.1 Compliance with this WSI will be ensured by regular meetings between the Retained Archaeologist and Liverpool Bay CCS Ltd. The regularity of meetings may alter during different phases of the development. However, regular contact will be maintained to ensure compliance with the WSI. These meetings ensure compliance through agendas which include discussions of the construction programme and any upcoming work which may require archaeological input, as per the stipulations of this WSI. The Retained Archaeologist also advises Liverpool Bay CCS Ltd of the required scope of any necessary works, and plans these works at the meetings and other meetings as required.

1.2.4.2 Following this advice, appropriate method statements will be prepared as required for each element of the project which requires archaeological involvement, in line with the requirements of the WSI. These will be submitted to the Regulator and the Archaeological Curator for approval. Approval by the Curator will be assumed if no response is received within 30 working days of submission. The Retained Archaeologist will ensure compliance with these method statements during the subsequent works, thereby also ensuring compliance with the WSI.

1.2.4.3 The performance of the WSI will also be monitored through the provision of archaeological reports, prepared to inform on the results of various activities undertaken under its auspices. These include a review of new geophysical, geotechnical and environmental data; and the implementation of the PAD across all works associated with the project. These reports will be submitted to Liverpool Bay CCS Ltd who will ensure their dissemination to the Archaeological Curators.

1.2.4.4 The responsibility for ensuring the implementation of the PAD (Appendix A) rests with Liverpool Bay CCS Ltd, who will ensure that its agents and contractors are contractually bound to implement the PAD.

1.2.4.5 Based on section 1.5.5 and Appendix A below, Liverpool Bay CCS Ltd and the Retained Archaeologist will agree the system for archaeological reporting through the PAD.

1.2.4.6 During any site evaluation/investigation or construction work that has the potential to affect any archaeological heritage assets, the Retained Archaeologist will advise Liverpool Bay CCS Ltd who will liaise directly with the Archaeological Curator with regard to site monitoring and reporting. Liverpool Bay CCS Ltd will be kept informed of any contact between the Retained Archaeologist and the Archaeological Curator. A programme of monitoring visits (if deemed appropriate) by the Archaeological Curator and Liverpool Bay CCS Ltd may be agreed in advance of the commencement of work on site.

1.2.5 Health and safety

1.2.5.1 Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times.

1.2.5.2 All work will be carried out in accordance with the requirements of Liverpool Bay CCS Ltd's Health and Safety Plans for the project, as well as the Health and Safety at Work etc. Act 1974, the Management of Health and Safety at Work Regulations 1999, the SCAUM (Standing Conference of Archaeological Unit Managers) health and safety manual Health and Safety in Field Archaeology (SCAUM, 2007) and all other relevant Health and Safety legislation, regulations and codes of practice in force at the time.

1.3 Summary of known and potential archaeology

1.3.1.1 A baseline assessment including desk-based assessment and archaeological assessment of geophysical survey data was undertaken in support of the ES (Liverpool Bay CCS Ltd, 2023a). An intertidal walkover survey was undertaken on 01 April 2025 to determine the extent of any visible surviving remains of known historic assets and to assess the potential for previously unrecorded remains in the intertidal zone (Eni, 2025a). An archaeological assessment of intertidal geophysical survey data has also taken place (MSDS Marine, 2026a). The following sections contain a summary of the findings.

1.3.2 Summary of designated heritage assets

1.3.2.1 One designated heritage asset lies within the Area of Project Physical Work. This is:

- the Protected Wreck of the *Resurgam* (Liverpool Bay CCS Ltd, 2023a: E_001). The *Resurgam* was an experimental submarine built in 1870. It is designated under the Protection of Wrecks Act 1973, and has an associated designated area with a 300 m radius. The wreck itself lies outside the Eni Development Area but the designated circle extends to within the Area of Project Physical Work and Eni Development Area.

1.3.2.2 Two other designated heritage assets lie beyond the Area of Project Physical Work and the Eni Development Area, but are relevant as they were identified within the Marine Archaeology Study Area (Liverpool Bay CCS Ltd, 2023a). These are:

- the Scheduled wreck of the *Lelia*, a paddle steamer built in 1864 and associated with the British involvement in the American Civil War (Liverpool Bay CCS Ltd, 2023a: E_002). It is designated under the Ancient Monuments and Archaeological Areas Act 1979 and lies approximately 10 m beyond the Eni Development Area boundary, on its eastern side. It has been given an AEZ that extends to within the Eni Development Area.
- the Grade II Listed Point of Ayr Lighthouse, thought to have been built in c. 1776 (Liverpool Bay CCS Ltd, 2023a: E_003). It is designated under the Planning (Listed Buildings and Conservation Areas) Act 1990, and lies approximately 1 km to the east of the proposed Landfall site and Eni Development Area.

1.3.3 Summary of non-designated heritage assets

1.3.3.1 A series of non-designated heritage assets lie within the Area of Project Physical Work and the Eni Development Area. These are summarised below and are based on all available desk based and geophysical data, tying in information from pre-existing datasets and the archaeological assessment of geophysical survey data undertaken as part of this project (Liverpool Bay CCS Ltd, 2023a; MSDS Marine, 2023). Magnetic anomalies are listed separately in the Marine Archaeology Technical Report (Liverpool Bay CCS Ltd, 2023a).

1.3.3.2 There is a total of 176 records within the Eni Development Area, and 110 within the Area of Project Physical Work, giving a total of 286 records. The majority relate to heritage assets, however, a number of geophysical anomalies have been interpreted as of being geological in nature. These are included in Table 1.4 below for completeness but are not considered further.

1.3.3.3 The remainder of the records include a range of wreck and potential wreck sites, other maritime remains (ranging from the remains of oil platforms, to navigation beacons, unidentified obstructions, and other potential debris), terrestrial features and records deriving from documentary evidence, including Named Locations (NLOs) of vessels lost in the area where there are currently no known seabed remains.

Table 1.4 Summary of Non-designated Heritage Assets

Broad Category	Type	Number of Heritage Assets in Area of Project Physical Work	Number of Heritage Assets in Eni Development Area
Wreck remains	Wreck	2	30
	Wreck (probable)		1
	Wreck or Ballast mound		1
	Wreck or beacon		2
	Wreck or debris		2
	Wreck or Wreckage (possible)		1
	Wreckage		13
	Possible wreck	3	
	Possible wreckage		1
Other maritime remains	Anchor, chain and cable		2
	Beacon		3
	Chain, Cable, or Rope	4	
	Collapsed platform		1
	Debris	5	3
	Debris - likely infrastructure	20	
	Fisherman’s fastener		1
	Fishing gear	3	
	Tower		2
	Foul		2
	Geophysical anomaly - debris		1
	Geophysical anomaly - origin unknown		3

Broad Category	Type	Number of Heritage Assets in Area of Project Physical Work	Number of Heritage Assets in Eni Development Area
	Geophysical anomaly - possible debris		2
	Mound	1	
	Obstruction		3
	Obstruction: Non-submarine contact		3
	Platform		1
	Possible oil rig leg		1
	Potential debris	32	1
	Unidentified obstruction	9	75
	Unknown	1	
	Seabed disturbance	1	
	Linear feature	3	
	Mattresses	2	
	Spoil ground		1
Geological features	Geology	5	10
	Likely geological	14	1
Terrestrial and Coastal Features	Terrestrial - position in error	2	1
	Test record.		4
Documentary Records	Aircraft (NLO)		2
	Wreck (NLO)	2	1
	Wreck (not found)	1	1
Total		**110**	**176**

1.3.4 Submerged prehistoric archaeology

1.3.4.1 The prehistoric archaeological record of the UK covers the period from the earliest hominin occupation, potentially as far back as 970,000 BP, to the end of the Iron Age and the Roman invasion of Britain by Claudius in AD 43. The coastline of the UK changed drastically during this period and large tracts of what is now the seabed were once subaerially exposed. The UK has been affected by several glacial events over the last 1 million years; including the Anglian (480 ka BP to 430 ka BP), the Wolstonian (350 ka BP to 132 ka BP), and the Devensian (122 ka BP to 10 ka BP), and intervening marine transgressions all of which have influenced archaeological potential.

1.3.4.2 Prehistoric archaeological potential is gauged with reference to evidence for human activity in the UK during each period, and the contemporary environment within the Eni Development Area. Depositional environment and post-depositional factors are also key to understanding potential, and as such geological deposits present within the Eni Development Area form an important consideration in understanding archaeological, palaeoenvironmental and palaeolandscape potential. Deposits with potential for prehistoric archaeological remains, or palaeoenvironmental information are generally those laid down during periods of aerial exposure or by fluvial process, rather than sub-glacial or marine deposits. However, there is also potential for archaeological material to be redeposited or reworked within secondary contexts as a result of fluvial erosion or glacial processes (Hosfield and Chambers, 2004), this has been taken into account within the assessment.

1.3.4.3 Assessment of geophysical, geotechnical and desk based sources has led to the identification of three main Quaternary units within the Eni Development Area, overlying bedrock (Liverpool Bay CCS Ltd, 2023a; MSDS Marine, 2023; Fugro, 2023). The Quaternary units represent the environmental shift from glacially and proglacially dominated conditions of the Devensian (represented by Unit III and II), to later potentially pre-transgressional environments (possibly represented by Units II and I), followed by the modern active marine environment which characterises the Eni Development Area today (Unit I). These units, and their archaeological and palaeoenvironmental potential are summarised below.

Middle and Upper Palaeolithic

1.3.4.4 Unit III and Unit II derive from these periods. Unit III is associated with the Cardigan Bay Formation, thought to have been laid down as a sub-glacial deposit in the Wolstonian or Devensian glaciation. Unit III therefore holds very limited archaeological potential. However, material may survive on the surface of the unit where later subaerial exposure may have occurred.

1.3.4.5 Unit II represents the late Devensian Western Irish Sea (WIS) A Formation. This unit is thought to reflect glacial, glaciomarine or deltaic/prodeltaic conditions during the Devensian, and evidence of channelling to the west of the Eni Development Area may reflect outwash deposits or other glacial features which may extend to within the Eni Development Area. The inhospitable conditions represented by the bulk of the unit indicate limited archaeological potential, though the surface of the unit (if subaerially exposed following glacial retreat) may hold archaeological potential where not eroded by later forces. Palaeoenvironmental remains may also survive within this unit.

1.3.4.6 The chronology of landscape changes in the area during the Upper Palaeolithic to Mesolithic indicate the likelihood that the western half of the Eni Development Area was submerged by 10 k BP (by the end of the Upper Palaeolithic), with eastern areas and the cable route being submerged from 8 k BP to 6 k BP.

Mesolithic

1.3.4.7 Unit I is interpreted as the Surface Sands Formation. This formation includes two members, SL1 and SL2. The lower (earlier) SL2 member, represents intertidal to marine environments. A borehole taken to the South-west of the Eni Development Area produced evidence of reed beds dating to 9,200 BP within this member, indicating a potential pre-inundation land surface dating to the early Mesolithic. Landscape modelling by Fitch *et al.* (2011) also indicate potential for fluvial features within this Unit, which (when coupled with current sea level curve data) indicate potential within the eastern half of the Site from 10 k BP. The southern part of the cable route also holds particular potential for Mesolithic remains, given the proximity of Mesolithic remains on the North West coastline (e.g. at Rhyl and early Neolithic middens within 1 km of the Landfall site). There is potential for both palaeoenvironmental and archaeological remains to be present within this unit, however, subsequent marine transgression has eroded the upper parts of this deposit, potentially affecting preservation. The Unit may also hold evidence of the modern marine sediments represented by the SL1 member of the Surface Sands Formation. There is potential for redeposited archaeological remains in this member.

1.3.5 Maritime and coastal remains

1.3.5.1 This section considers the potential for remains relating to coastal and maritime cultural landscapes defined as evidence of ‘human utilisation of maritime space by boat, settlement, fishing, hunting, shipping and its attendant subcultures, such as pilotage, lighthouse and seamark maintenance’ (Westerdahl, 1992). Remains considered therefore range from shipwrecks or other durable evidence such as cargos and ballast, to features including navigational aids, sailing marks, ports, harbours and jetties. Other coastal remains which do not necessarily relate to boat use are also considered, including fish traps and other evidence of human interaction with the sea or coast, such as coastal wartime features.

Prehistoric to Romano-British

1.3.5.2 While trade networks and maritime travel are evidenced throughout prehistory by the movement of ideas, goods and people, faunal assemblages indicate that maritime activities such as fishing were focused in coastal areas during the prehistoric and Roman periods, with limited evidence for marine exploitation from the Neolithic and throughout much of prehistory. Direct physical evidence of maritime craft dating to the prehistoric or Romano-British periods is very rare, though examples of watercraft exist from the Mesolithic period onward. There have been no finds of maritime remains dating to the prehistoric or Romano-British periods within the Area of Project Physical Work nor the Eni Development Area. Mesolithic and later footprints and a findspot of a Roman brooch are recorded from the wider Marine Archaeology Study Area, the former in the intertidal zone at Formby, and the latter at the mouth of the River Dee, indicating general activity in these periods (further supported by the presence of major Roman centres such as at Chester, approximately 30 km South-east of the Marine Archaeology Study Area, and other scattered settlement on the Wirral and North Wales coast (Allen *et al.,* 2016), though given the rarity of maritime remains the potential for such remains to occur within the Eni Development Area is extremely limited.

Early Medieval to Medieval

1.3.5.3 Maritime technology and activity continued to develop in the early medieval and medieval periods. Invaders, and then settlers from Scandinavia and other areas brought new boat building technologies and opportunities for trade which led to the growth of a number of major ports around the coast of the UK (Hutchinson, 1997; Friel, 2003). In the North-west of England and North Wales activity in this period is attested to by place name evidence and historical records. A possible Norse ship has also been identified at Meols, approximately 12 km east of the Eni Development Area. The results of radiocarbon dating and dendrochronology are awaited to confirm the date and origin of the vessel, however, its potential presence and the wider evidence of Scandinavian activity in the area demonstrates the potential for maritime activity in the area during this period.

1.3.5.4 During the medieval period major centres were active at Parkgate, Chester and Burton on the River Dee, and during the 13th century Liverpool, which had previously been a fishing village, developed trade routes across the Irish Sea, gradually increasing its dominance through trade, first with Ireland and later with other British colonies. More locally, the remains of the 12th-century Prestatyn Castle have been excavated approximately 2.5 km south of the Eni Development Area, indicating medieval activity in the area.

1.3.5.5 The early medieval and medieval periods were therefore characterised by increasing maritime activity within the Eni Development Area. However, while activity increased maritime finds from these periods are still rare. Additionally, no remains dating to these periods are known from within the Eni Development Area and the potential for any remains of maritime craft or coastal activity dating to these periods is considered to be limited.

Post-medieval to modern

1.3.5.6 Maritime activity increased during the post-medieval period, led by local trading ports such as Liverpool, which by the 17th century had seen vast expansion and was trading with British colonies around the world. Numerous historic trading routes, active in the post-medieval period, are thought to have crossed the Eni Development Area and Area of Project Physical Work (Alvarez-Palau and Dunn, 2019), mirrored by aids to navigation including the Point of Ayr Lighthouse (Grade II Listed), which lies 1 km west of the landfall site, and other navigational aids such as buoys are mapped on charts.

1.3.5.7 Potential for maritime remains therefore increases from the post-medieval period onward with the development of ports along adjacent coastlines, such as Liverpool, and increases in the number of shipping routes crossing the area. The modern period, with its increase in trade, transport and two World Wars also marks a period in which potential is increased, and the role of Liverpool in the convoy system in addition to other wartime activity increases potential in the area. In addition to these changes, developments in shipbuilding technology also occurred: vessels were increasingly constructed of iron (from the 18th century), and then steel, leaving more durable traces on the seabed which can be detected using modern survey techniques. Documentation of losses also increased, and a total of 30 records of lost vessels are recorded within the Area of Project Physical Work, Eni Development Area and Marine Archaeology Study Area, with the majority (21 records) dating from the 19th century, and others dating from the 18th century (1 record) and 20th century (7 records). Only 3 records of lost vessels are recorded within the Area of Project Physical Work and the Eni Development Area.

1.3.5.8 The potential for remains of these periods to occur within the Area of Project Physical Work and Eni Development Area is relatively high, and is borne out by some of the recorded maritime sites, discussed below.

Known and recorded maritime and coastal archaeology

1.3.5.9 Assessment of geophysical data and desk based sources has demonstrated the presence of maritime remains within the Area of Project Physical Work and the Eni Development Area. The assessment has found evidence of wrecks and possible wreck sites, other maritime remains (ranging from debris, mounds potentially indicating wreck sites, remains of tower bases which are thought to represent the remains of anti-aircraft forts dumped after the Second World War, to modern infrastructure and unidentified obstructions), terrestrial and coastal features with evidence of wartime activity, navigational aids, documentary records demonstrating the loss of vessels within the area, and geological features. Of particular note, are the presence of:

- Five sites indicating wreck remains within Area of Project Physical Work.
- fifty-one sites indicating wreck remains within the Eni Development Area.
- two sites representing possible tower bases which are thought to represent the remains of anti-aircraft forts dumped after WWII within the Eni Development Area.
- the Protected Wreck (the *Resurgam*), the designated circle for which extends to within the Area of Project Physical Work and Eni Development Area.
- other remains including mounds (which could indicate wreck sites), debris, fouls of unknown origin, and other unidentified obstructions are also present within the Area of Physical Project Work and Eni Development Area.
- magnetic anomalies of potential archaeological significance, including anomalies of high and medium potential (Liverpool Bay CCS Ltd, 2023a). The origin of the anomalies is unknown, but they have potential to be of archaeological significance.

1.3.5.10 The majority of the wrecks are undated, but where dates are indicated they demonstrate a focus on 19th and 20th century craft, which is also borne out by the documented losses within the area. All maritime and coastal remains are summarised within Table 1.4 (Liverpool Bay CCS Ltd, 2023a).

1.3.5.11 The assessment has also found potential for other remains, including wartime coastal features and navigational aids. Pillboxes are present around the Landfall site, though beyond both the Eni Development Area and Area of Physical Project Work. There are no known remains within the Eni Development Area and Area of Physical Project Work at the landfall site. The closest are low potential geophysical anomalies identified just offshore of the landfall location, seaward of the point where the Eni Development Area and Area of Physical Project Work widen.

1.3.5.12 The key known maritime remains are therefore those which occur below MLWS and include the wrecks and potential wreck sites enumerated above.

1.3.6 Aviation remains

1.3.6.1 There are no known aircraft crash sites within the Area of Project Physical Work nor the Eni Development Area. However, the assessment has identified potential for aircraft crash sites to occur, in particular associated with the use of Talacre Warren (which lies 1.5 km to the east of the landfall site) as a WWII Spitfire training camp. This potential is further demonstrated by records of nine documented losses of aircraft within the Eni Development Area and Marine Archaeology Study Area, of which around half are Spitfires. Two of these records are located in the intertidal zone within the Eni Development Area (Coflein IDs 544351 and 544352). While aircraft crashes tend to result in disarticulated remains, there is potential for remains of aircraft within the Area of Project Physical Work and the Eni Development Area. Aircraft can fall under the automatic designation of the Protection of Military Remains Act 1986 and therefore their early identification and protection is vital.

1.3.7 Historic seascape character

1.3.7.1 The assessment identified a variety of characteristics within the Eni Development Area and Area of Project Physical Work. These can be summarised as:

- Modern installations and activities such as hydrocarbon wells, pipelines, submarine cables, aggregate extraction, spoil and waste dumping.
- A range of fishing methods used in the modern period.
- Navigation routes, both modern and post medieval.
- Wrecks and maritime debris (in some cases undated).
- Seabed types and characteristics including shoals and flats and fine sediment plains.

1.3.8 Intertidal Survey

1.3.8.1 An intertidal walkover survey was undertaken on 01 April 2025 to determine the extent of any visible surviving remains of known historic assets and to assess the potential for previously unrecorded remains in the intertidal zone (Eni, 2025a). A wooden object constructed of three and half planks of degraded wood, approximately 1.5 m in length, was observed near MLWS. This object appeared to have been washed onto the foreshore during storm activity and was not considered to be indicative of associated further remains. No other archaeological remains were observed during the intertidal survey.

1.3.8.2 A photogrammetric and geophysical survey of the intertidal zone within the Eni Development Area on Talacre Beach, North Wales was undertaken by Boskalis between 21 and 24 June 2025 using a drone survey platform. The survey mobilised a DJI Matrice 350 drone equipped with a DJI Zenmuse L2 LiDAR sensor for the photogrammetric data and a drone mounted magnetometer.

1.3.8.3 Survey operations were undertaken within a pre-defined survey area of the intertidal zone between the MHWS and MLWS. The survey was planned with a line spacing of 100% coverage of photogrammetric data across the intertidal area. In addition, Magnetometer data were collected along each of the survey lines.

1.3.8.4 The archaeological assessment of data was undertaken by MSDS Marine, by a qualified and experienced maritime archaeologist with a background in geophysical and hydrographic data acquisition, processing, and interpretation (MSDS Marine, 2026a).

1.3.8.5 One surface anomaly of potential archaeological interest was identified within the geophysical survey data extents (MSDS Marine, 2026a). It was interpreted as a small item of debris with no features indicating archaeological potential and therefore of low archaeological potential.

1.3.8.6 The assessment also identified 123 magnetic anomalies, ranging between 5 nT and 10 nT. Of these, 122 do not directly correlate with known, or visible, features or infrastructure (MSDS Marine, 2026a). All isolated magnetic anomalies of 50 nT or less are considered to be of limited potential to be of archaeological significance.

1.3.8.7 No AEZs were proposed by MSDS Marine, and no watching brief for works in the intertidal zone recommended. The works in the intertidal zone will have to implement the PAD and report discoveries of currently unknown archaeological assets.

1.3.9 Data limitations

1.3.9.1 Limitations relating to a lack of full coverage geophysical data for the area, including within the Area of Project Physical Work and Eni Development Area, were identified in the Marine Archaeology Technical Report, and the supporting archaeological assessment of geophysical survey data (Liverpool Bay CCS Ltd, 2023a; MSDS Marine, 2023). Data gaps were present for example in areas where cables may require re-routing, in the intertidal zone, and in the area to the north of the *Resurgam* designated circle.

1.3.9.2 Data limitations in the intertidal zone have been addressed through collection and archaeological analysis of intertidal magnetometry data and drone survey (section 1.3.8; MSDS Marine 2026a), as well as intertidal walkover survey (Eni, 2025a).

1.3.9.3 Any potential data gaps relating to cable re-routing will be covered by the archaeological analysis of UXO gradiometer, multi-beam bathymetry (MBES), side scan sonar (SSS) and (if appropriate) Sub-Bottom Imaging (SBI) survey data collected over the entire area of marine impacts (section 1.5.7). The process for archaeological analysis, input into route selection, and reporting of the results is subject to a specific Method Statement (MSDS Marine, 2026b).

1.4 Research agendas

1.4.1.1 The best practice guidance for Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects indicates that a WSI should 'set out the importance of research frameworks in setting objectives that are delivered through realisation of the work' (The Crown Estate, 2021).

1.4.1.2 A number of research frameworks are of relevance to the archaeological remains and area of the Project. These include:

- People and the Sea: A Maritime Archaeological Research Agenda for England (Ransley et al., 2013);
- The Research Agenda for Wales: Maritime and Coastal Archaeology (Cadw, 2004);
- Research Framework for the Archaeology of Wales 2021-2026: Maritime Chapter (Groom, 2022);
- The research framework for the archaeology of Wales (IfA Wales/Cymru, 2008); and
- The North West England regional research framework (Research Frameworks, 2023).

1.4.1.3 Other frameworks, including with different themes than those set out above, may also be relevant depending on the specific work package undertaken. Any archaeological activities and reporting under this WSI will tie research into the relevant research frameworks, ensuring that the project makes a contribution to archaeological knowledge focused on areas where research frameworks demonstrate a need for further understanding. The objectives of the research framework will be used to guide work and recommendations made by the Retained Archaeologist to Liverpool Bay CCS Ltd.

1.4.1.4 The connection with the specific work package to be undertaken, and the relevant research framework, aims and objectives, will be identified within the Method Statements which will proceed archaeological work. The Method Statement will also set out how the work undertaken will be tied into the relevant research framework during OASIS reporting (section 1.6.2).

1.5 Mitigation

1.5.1 Embedded mitigation and project commitments

Embedded mitigation

1.5.1.1 A series of embedded mitigation measures have been adopted as part of the project (Liverpool Bay CCS Ltd, 2024). The below list also contains reference to the relevant section of this WSI which describes details and methods relevant to each of the measures.

- implementation of Exclusion Zones:
  - the identification and implementation of AEZs around those sites identified as having high and medium archaeological potential. Final cable routing, well drilling and platform construction to avoid any known archaeological constraints identified in pre-construction site investigation surveys through micrositing. AEZs are discussed further in section 1.5.2.
  - the identification and implementation of Temporary Archaeological Exclusion Zones (TAEZs) based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for wrecks, obstructions, debris and other sites of archaeological potential outside of the survey data coverage but within the Project boundary. TAEZs are discussed further in section 1.5.2.
- Archaeological input into specifications for, and archaeological analysis of, any further pre-construction geophysical and geotechnical surveys (section 1.5.7).
- project archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV)/diver surveys and, if appropriate, in monitoring/checking of data (section 1.5.7).
- operational awareness of the location of those archaeological anomalies identified as having a low potential. Reporting through the agreed protocol will be undertaken should material of potential archaeological interest be encountered (section 1.5.5, and Appendix A).
- implementation of a protocol for recording finds of archaeological interest, following the guidance for the PAD (section 1.5.5, and Appendix A).
- archaeologists to be consulted in the preparation of pre-construction cable route clearance or other pre-construction operations and, if appropriate, to carry out archaeological monitoring of such work (section 1.5.3).
- mitigation of unavoidable direct impacts on known sites of archaeological significance: Options include i) preservation by record; ii) stabilisation; iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere. Direct impacts upon archaeological sites are not planned and all known sites of potential significance are protected by AEZs and will be avoided by development impacts. Should potential for any unforeseen and unavoidable impacts be identified, a Method Statement will be produced in agreement with Archaeological Curators, detailing how these will be handled, and general archaeological practices (section 1.5.4) will be followed where preservation by record or detailed analysis of sites elsewhere is an agreed approach. Methods for any stabilisation and safeguarding will be site-specific and will be detailed within a Method Statement should the need for these interventions arise.
- commitment to implementation of the Offshore WSI (the current document) prior to any post-consent works within the Eni Development Area and Area of Physical Project Works.

Additional commitments

Archaeological assessment of full coverage data

1.5.1.2 In addition to the embedded mitigation measures, the project has committed to collection and archaeological review of full coverage geophysical survey data prior to project impacts. This will address gaps in the data (section 1.3.8) and ensure that mitigation can be recommended for all areas where project impacts may occur, and these recommendations will be based on recent and high resolution surveys which are appropriate for archaeological assessment. These surveys will consist of the UXO geophysical surveys undertaken from March 2026 onwards. Further details in relation to this commitment are set out in section 1.5.7. Archaeological analysis has already been undertaken on geophysical data in the intertidal zone (section 1.3.8; MSDS Marine, 2026a). While recommendations for mitigation cannot be made prior to the assessment of the data, potential outcomes may be recommendations for further AEZs (section 1.5.2).

Publicly available data

1.5.1.3 The ES also made a commitment to enhance understanding of the historic environment (through assessment of geophysical and geotechnical data), and to make this data publicly available (Liverpool Bay CCS Ltd, 2024). This commitment will be secured through reporting, publication and use of OASIS V, and through archiving relevant geophysical survey data with RCAHMW (section 1.6).

1.5.2 Exclusion zones

Archaeological exclusion zones

1.5.2.1 Best practice favours the preservation *in situ* of archaeological remains, therefore the ideal preferred mitigation for archaeological remains is avoidance (COWRIE, 2007). For the Project, AEZs have been proposed that prohibit development-related activities within their extents, which vary depending upon the nature of the site. All AEZs agreed with the archaeological curators, through this Offshore WSI, will be marked on the Design Plan. If impacts cannot be avoided, measures to reduce, remedy or offset disturbance will be agreed in advance of impacts.

1.5.2.2 In view of their potential archaeological significance, AEZs (either in the form of individual AEZs or clusters) will be placed around nine locations which include the Protected Wreck of the *Resurgam*, and Scheduled wreck of the *Lelia*, both of which have statutory designated areas, included here as AEZs. The other seven represent high and medium potential anomalies identified by the geophysical data assessment (Liverpool Bay CCS Ltd, 2023a; MSDS Marine, 2023). These anomalies have been recommended AEZs based on the size of the anomaly, the extents of any debris, the potential significance of the anomaly, the potential impact of the development and the seabed dynamics within the area. Dependant of the form of the anomaly, AEZs have either been recommended as a radius from the centre point of the anomaly or as a distance from the extents. Particularly in the case of shipwrecks, which tend to be longer in length than width, the use of a circle provides unequal protection around the extents. This not only impacts the protection afforded but does not present proportional mitigation. The proposed AEZs are listed in Table 1.5 and shown in Figure 1.2 to Figure 1.4. All positions are given in the European Datum 1950 (ED50) and Universal Transverse Mercator (UTM) Zone 30 North projection (ED50 Z30N).

1.5.2.3 The designated wreck of the *Resurgam* and the statutory protected area (Statutory Instrument 1996 No. 1741), have been included within this section. Whilst the wreck lies outside of the Eni Development Area and the Area of Project Physical Work the statutory protected area extends into these areas. To note, the designated area is not centred on the location of the wreck as provided by UKHO (detailed in Table 1.5), the location of the designated area is presented in Figure 1.2 and Figure 1.3 (note that cables routed through the protected area are already in existence, pre-dating the designation of the wreck, but proposed cable routes avoid the designated area). Likewise, the scheduled wreck of the *Lelia* has also been included to ensure awareness due to proximity to the Eni Development Area.

Table 1.5 Archaeological Exclusion Zones

ID	Geophysical ID	Description	Easting (ED50 UTM30N)	Northing (ED50 UTM30N)	AEZ (m)	Type
E_001		*Resurgam*. Protected Wreck. Submarine	463157.66	5916617.67	300	Radius (not centred)
E_002		*Lelia*. Scheduled. Paddle Steamer	474625.65	5926786.95	50	Radius
E_005	CCS23_052	Wreck	475696.8	5914362.7	75	Extents
E_006	CCS23_020	Potential wreck	461786.6	5933019.5	75	Extents
E_010	CCS23_054	Mound	472907.1	5915455.1	25	Extents
E_095	CCS23_092	Debris	461580.3	5928986.4	25	Extents
E_096	CCS23_094	Debris	476748.4	5914455.3	15	Radius
E_097	CCS23_095	Debris	476667.2	5914598.3	15	Radius
E_098	CCS23_104	Debris	476023.9	5937756.2	50	Extents

1.5.2.4 Design of the cable route has taken into account these AEZs. Although the AEZs are fixed, they may be refined or removed with the agreement of the Archaeological Curators, particularly RCAHMW. This process may require additional archaeological assessment including further geophysical, ROV, or diver surveys. It is not currently anticipated that any AEZs will need refined. The UXO surveys will cover the entire area of impact from cable installation (MSDS Marine, 2026b). Any potential intersection of the cable route with any AEZs will be highlighted to RCAHMW during these surveys, and further measures agreed in advance of any impacts.

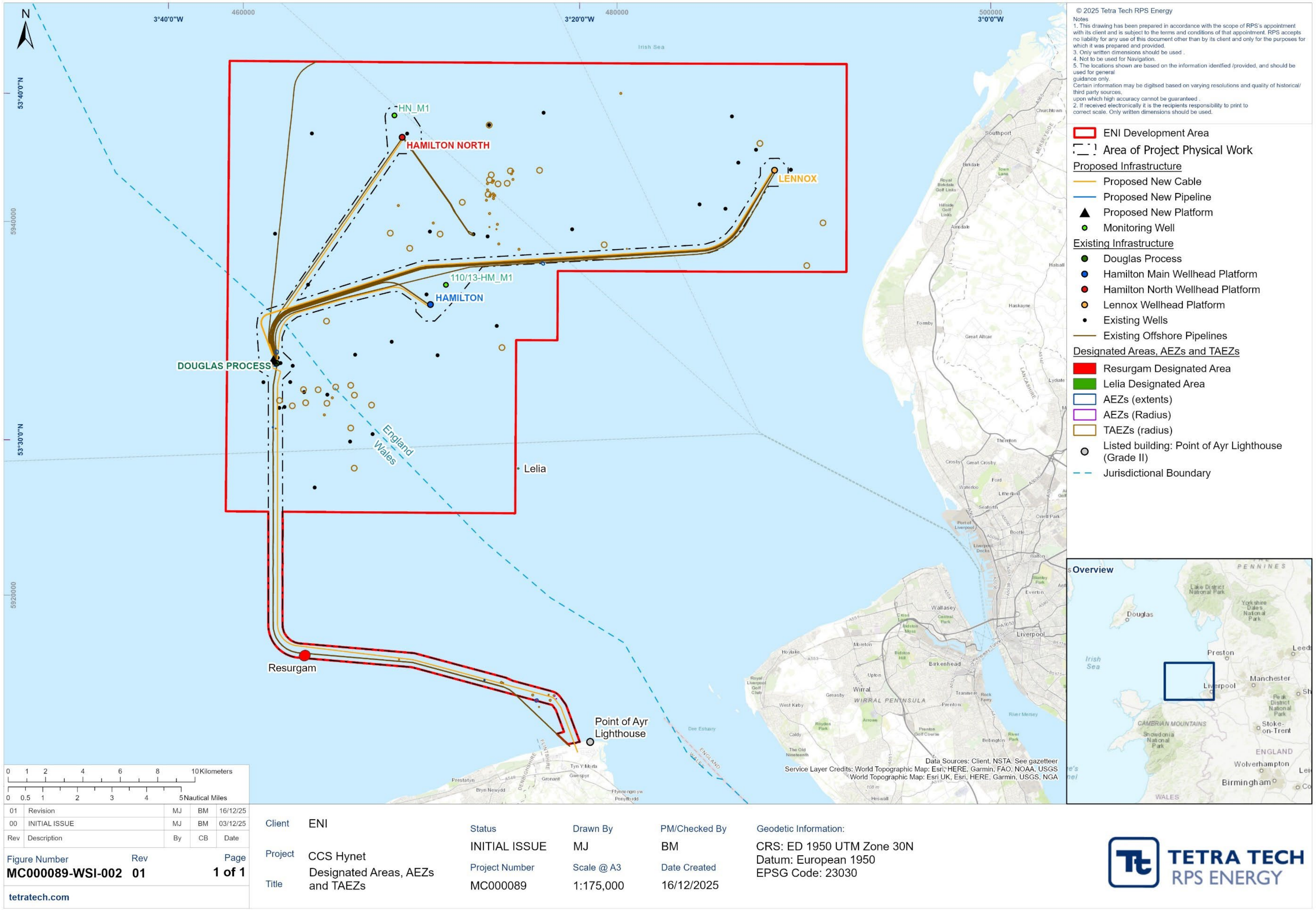

Figure 1.2 Distribution of Designated Areas, AEZs, TAEZs

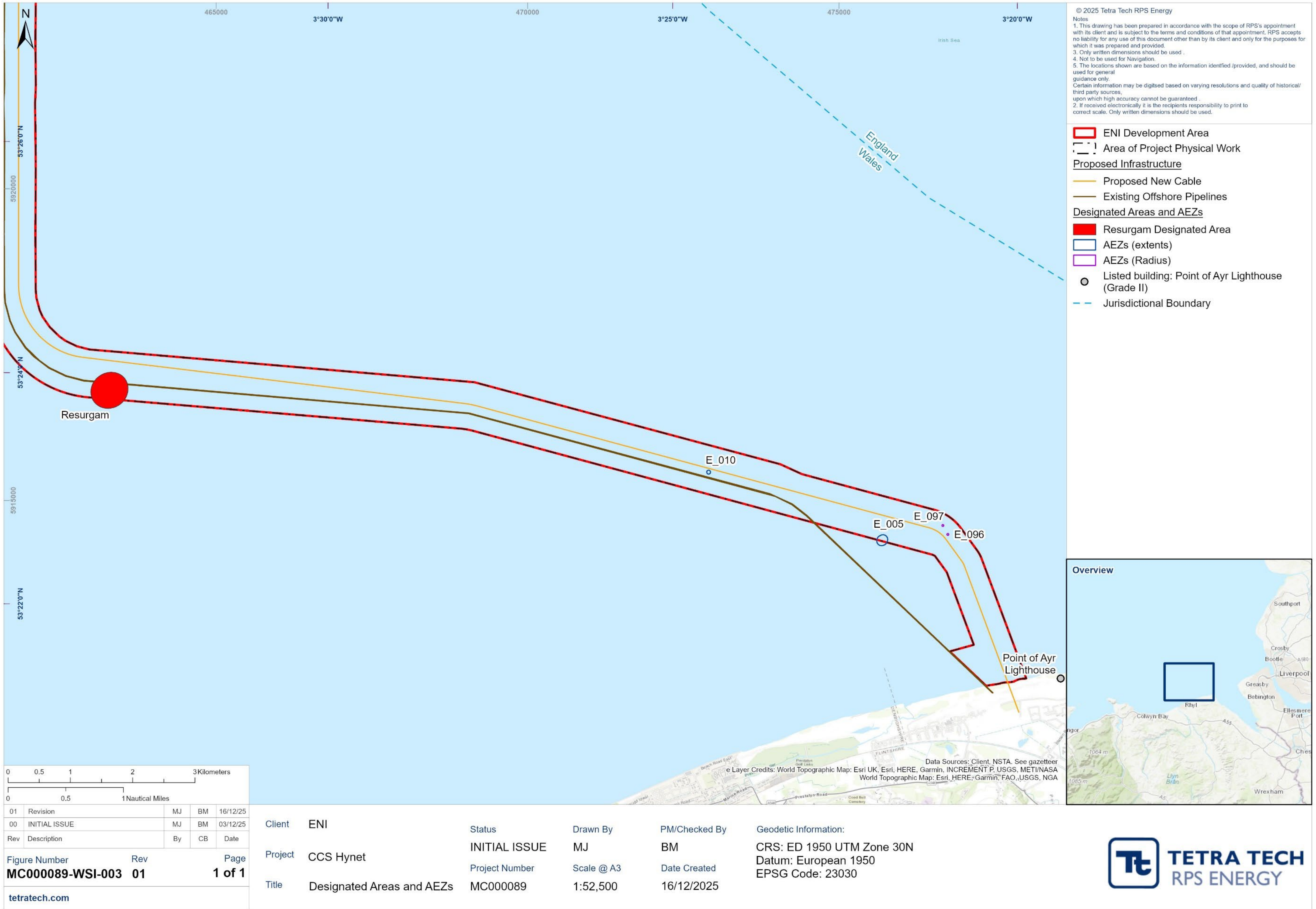

Figure 1.3 Distribution of Designated Areas and AEZs (South)

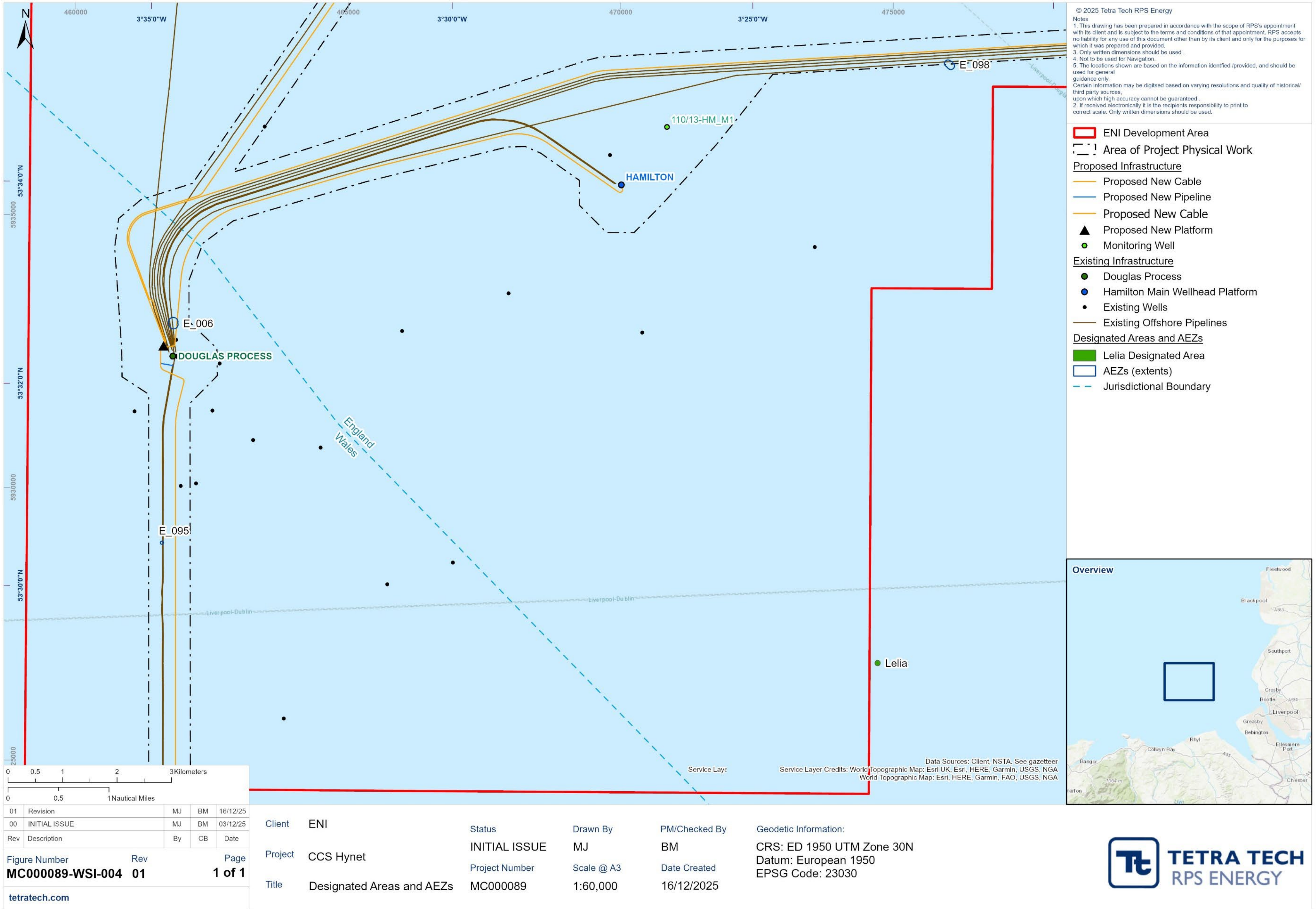

Figure 1.4 Distribution of Designated Areas and AEZs (North)

Temporary archaeological exclusion zones

1.5.2.5 Sixty-seven TAEZs have been recommended within the Eni Development Area and Area of Physical Project Work. TAEZs are recommended where an anomaly is not visible in the geophysical dataset but is known to exist based on information from other datasets (e.g. UKHO data), where the position cannot be determined with enough accuracy for refined exclusion zones, or where the extents are not fully known. They are often larger than AEZs but are identified as temporary. TAEZs may be investigated during the UXO surveys in March 2026 (MSDS Marine, 2026b). With the project then progressing into the construction phase, and no further surveys planned, any TAEZs that have been surveyed will either be removed or be considered permanent AEZs, with the agreement of RCAHMW.

1.5.2.6 TAEZs have been assigned where remains are thought to be of medium, high or uncertain archaeological potential. All wreck remains which lie within the Area of Physical Project Work and Eni Development Area, listed in Table 1.4 have been recommended either AEZs or TAEZs. Other maritime remains including wreck sites or potential wreck sites, wreckage, the two potential WWII anti-aircraft towers, and unidentified fouls, obstructions, debris and magnetic anomalies have been recommended for TAEZs where they are considered to be of potential high or medium archaeological significance or where the significance is as yet unknown. Those remains which have not been recommended for protection by a TAEZ have been excluded following assessment which has determined their low archaeological potential. This is the case for maritime remains including chain cable or rope, collapsed oil platforms, likely infrastructure, fishing gear, concrete mattresses and other similar remains. Other remains which have not been recommended for protection by a TAEZ have been excluded where assessment has determined an unlikelihood of remains being present at the given location (e.g. fisherman's fastenings and unidentified obstructions connected with records of fisherman's fastenings, unidentified non-submarine contacts, and spoil ground, the extents of which are unknown). All terrestrial assets (see summary in Table 1.4) lie beyond the Area of Physical Project Work and Eni Development Area, and are therefore not recommended AEZs. Likewise documentary records are not recommended for TAEZs due to the low likelihood of physical remains at the given locations. In summary, the assessment has determined the following groupings of remains, and has made the following recommendations:

1.5.2.7 Remains identified as of high archaeological potential, which have been recommended TAEZs:

- wrecks, wreckage and wreck remains.

1.5.2.8 Remains identified as of medium archaeological potential within the geophysical assessment, which have been recommended TAEZs:

- debris;
- mounds; and
- two potential WWII anti-aircraft towers.

1.5.2.9 Unidentified remains with uncertain archaeological interest, which have been recommended TAEZs. These include:

- fouls;
- obstructions; and
- magnetic anomalies of high and medium archaeological potential.

1.5.2.10 Remains identified as of low archaeological potential within the geophysical assessment or by the desk-based assessment which have not been recommended AEZs/TAEZs:

- debris and potential debris;
- beacons (discarded navigation beacons);

- geophysical anomalies (debris and origin unknown);
- unknown anomalies;
- seabed disturbance; and
- linear features.

1.5.2.11 Modern elements with no archaeological interest which have not been recommended AEZs/TAEZs. These include:

- anchor, chain and cable and chain, cable or rope;
- collapsed platforms;
- platforms;
- possible oil rig leg;
- debris (likely infrastructure);
- fishing gear; and
- concrete mattresses.

1.5.2.12 Remains where the extents or positions are unknown or questionable which have not been recommended AEZs/TAEZs:

- unidentified obstructions and fisherman's fasteners;
- obstruction: Non-submarine Contact (NSC); and
- spoil ground.

1.5.2.13 The size of the TAEZs takes into consideration the proximity of available survey data, the potential to represent material of archaeological significance, the perceived accuracy of the position, and other anomalies that may be present within the surrounding area. Anomalies and their recommended exclusion zones are detailed in Table 1.6 and the distribution presented in Figure 1.2, with detailed distributions in Figure 1.5 to Figure 1.9.

1.5.2.14 E_421 is a magnetic anomaly that is now located outside the Eni Development Area following alteration of the area near the landfall. It has been retained for completeness.

Table 1.6 Temporary Archaeological Exclusion Zones

ID	Geophysical ID	Type	Easting (ED50 UTM30N)	Northing (ED50 UTM30N)	TAEZ (m)	TAEZ Type
E_013		Wreck	461936.41	5930419.47	150	Radius
E_016		Wreck	465945.89	5930704.11	150	Radius
E_017		Wreck	464004.01	5930992.88	150	Radius
E_018		Wreck	462622.61	5930132.13	150	Radius
E_019		Wreck	464944.29	5931135.99	150	Radius
E_020		Wreck	465748.98	5928944.17	150	Radius
E_021		Wreck	463219.55	5931000.80	150	Radius
E_022		Wreck	463335.60	5930295.26	150	Radius
E_023		Wreck	464473.68	5930268.00	150	Radius
E_025		Wreck	479313.15	5938753.40	150	Radius
E_026		Wreck	475854.12	5942736.87	150	Radius

ID	Geophysical ID	Type	Easting (ED50 UTM30N)	Northing (ED50 UTM30N)	TAEZ (m)	TAEZ Type
E_027		Wreck	471718.37	5941023.76	150	Radius
E_030		Wreck	466862.89	5930172.27	150	Radius
E_031		Wreck	464452.73	5934664.68	150	Radius
E_032		Wreck	474292.18	5942705.61	150	Radius
E_033		Wreck	473631.37	5942010.22	150	Radius
E_034		Wreck	473171.83	5942226.08	150	Radius
E_035		Wreck	473101.25	5941451.39	150	Radius
E_036		Wreck	473268.12	5942491.94	150	Radius
E_037		Wreck	467864.91	5939373.83	150	Radius
E_038		Wreck	468907.26	5938563.40	150	Radius
E_040		Wreck	470529.80	5939325.49	150	Radius
E_043		Wreck	487647.24	5944174.28	150	Radius
E_044		Wreck	491021.93	5939923.43	150	Radius
E_045		Wreck	465747.15	5931230.86	150	Radius
E_048		Wreck	474120.98	5942040.87	150	Radius
E_052		Wreck	490156.38	5937636.74	150	Radius
E_054		Wreck	465936.15	5926795.95	50	Radius
E_058		Wreck	473841.36	5933249.41	150	Radius
E_059		Wreck	473159.97	5945159.62	150	Radius
E_060		Wreck (probable)	464763.21	5930562.51	50	Radius
E_061		Wreck or ballast mound	480201.19	5946851.51	50	Radius
E_062		Wreck or debris	464336.38	5929649.71	50	Radius
E_063		Wreck or debris	473072.83	5941685.19	50	Radius
E_065		Wreck or beacon	473179.16	5940423.67	50	Radius
E_066		Wreck or beacon	473009.02	5941134.83	50	Radius
E_070		Possible wreck	475487.92	5914655.71	50	Radius
E_071		Possible wreck	476423.40	5914374.67	50	Radius
E_077		Wreck or wreckage (possible)	473394.94	5941332.89	50	Radius
E_078		Wreckage	473064.82	5942019.01	50	Radius
E_079		Wreckage	473389.80	5942176.62	50	Radius
E_080		Wreckage	473345.74	5942182.43	50	Radius
E_081		Wreckage	470165.92	5939914.90	50	Radius
E_082		Wreckage	473371.50	5941477.66	50	Radius
E_083		Wreckage	473320.94	5942089.94	50	Radius
E_084		Wreckage	474352.15	5942547.71	50	Radius
E_085		Wreckage	473458.15	5941397.43	50	Radius
E_086		Wreckage	473598.25	5939846.47	50	Radius
E_087		Wreckage	474751.24	5938506.90	50	Radius
E_088		Wreckage	474431.87	5942248.70	50	Radius

ID	Geophysical ID	Type	Easting (ED50 UTM30N)	Northing (ED50 UTM30N)	TAEZ (m)	TAEZ Type
E_089		Wreckage	473195.50	5941352.57	50	Radius
E_090		Wreckage	473230.14	5941433.96	50	Radius
E_091		Possible wreckage	473391.01	5941223.52	50	Radius
E_093		Debris	473446.03	5941399.36	50	Radius
E_094		Debris	474424.38	5942693.77	50	Radius
E_179		Tower	468297.63	5940854.15	50	Radius
E_180		Tower	473671.77	5938796.54	50	Radius
E_188		Obstruction	480525.48	5938531.93	25	Radius
E_194		Foul	473550.44	5939581.58	25	Radius
E_195		Foul	473170.61	5939698.70	25	Radius
E_421	CCS23_M206	Magnetic anomaly	475824.10	5914015.10	25	Radius
E_422	CCS23_M220	Magnetic anomaly	473906.20	5915305.70	25	Radius
E_423	CCS23_M221	Magnetic anomaly	468331.60	5916557.80	25	Radius
E_424	CCS23_M235/237	Magnetic anomaly	473810.20	5915328.80	50	Radius
E_425	CCS23_M268	Magnetic anomaly	461729.30	5928916.40	25	Radius
E_426	CCS23_M199	Magnetic anomaly	476341.72	5914668.39	25	Radius
E_427	CCS23_M215	Magnetic anomaly	476634.56	5914622.80	50	Radius

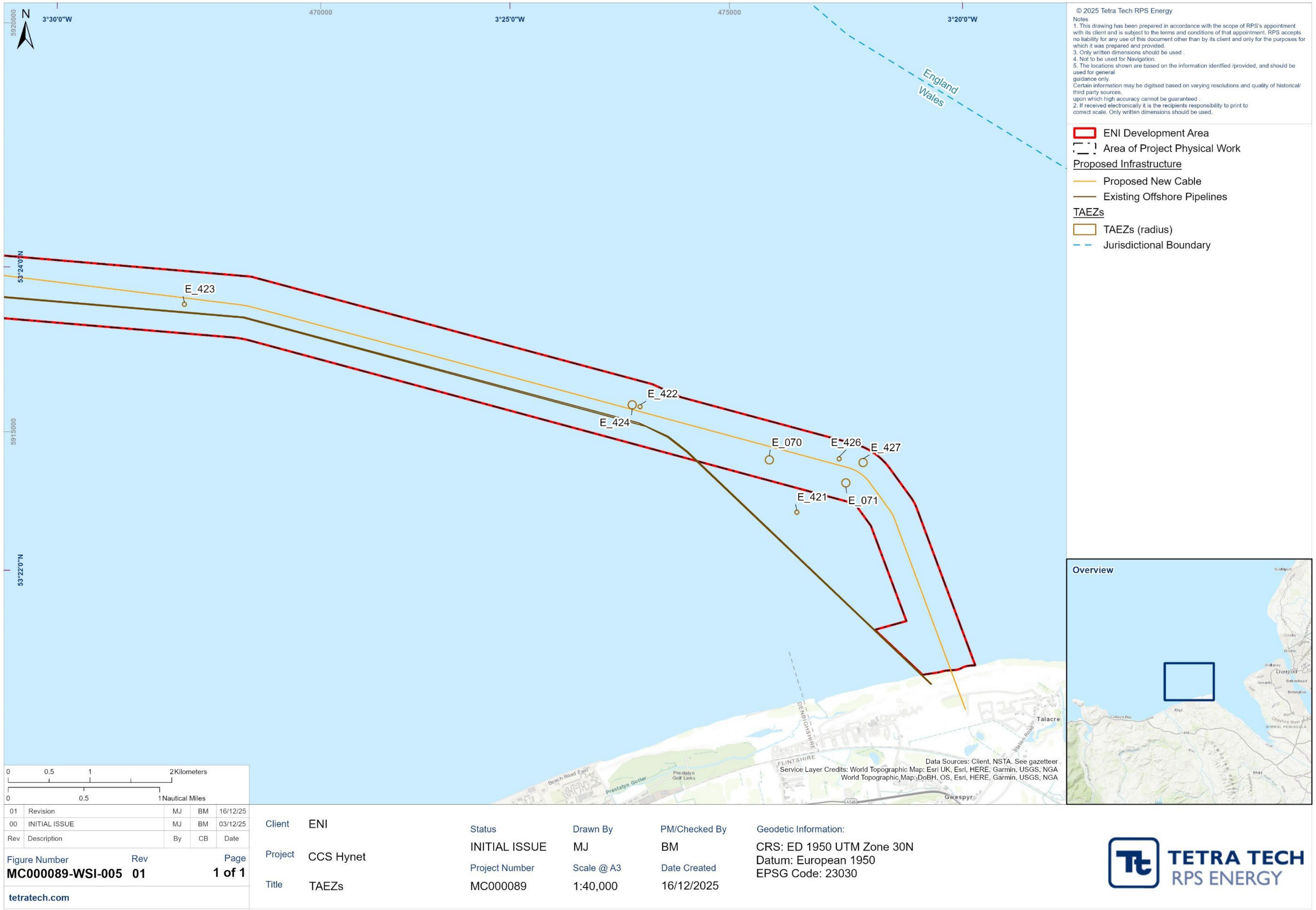

Figure 1.5 Distribution of TAEZs (Southern Cable Route and Landfall)

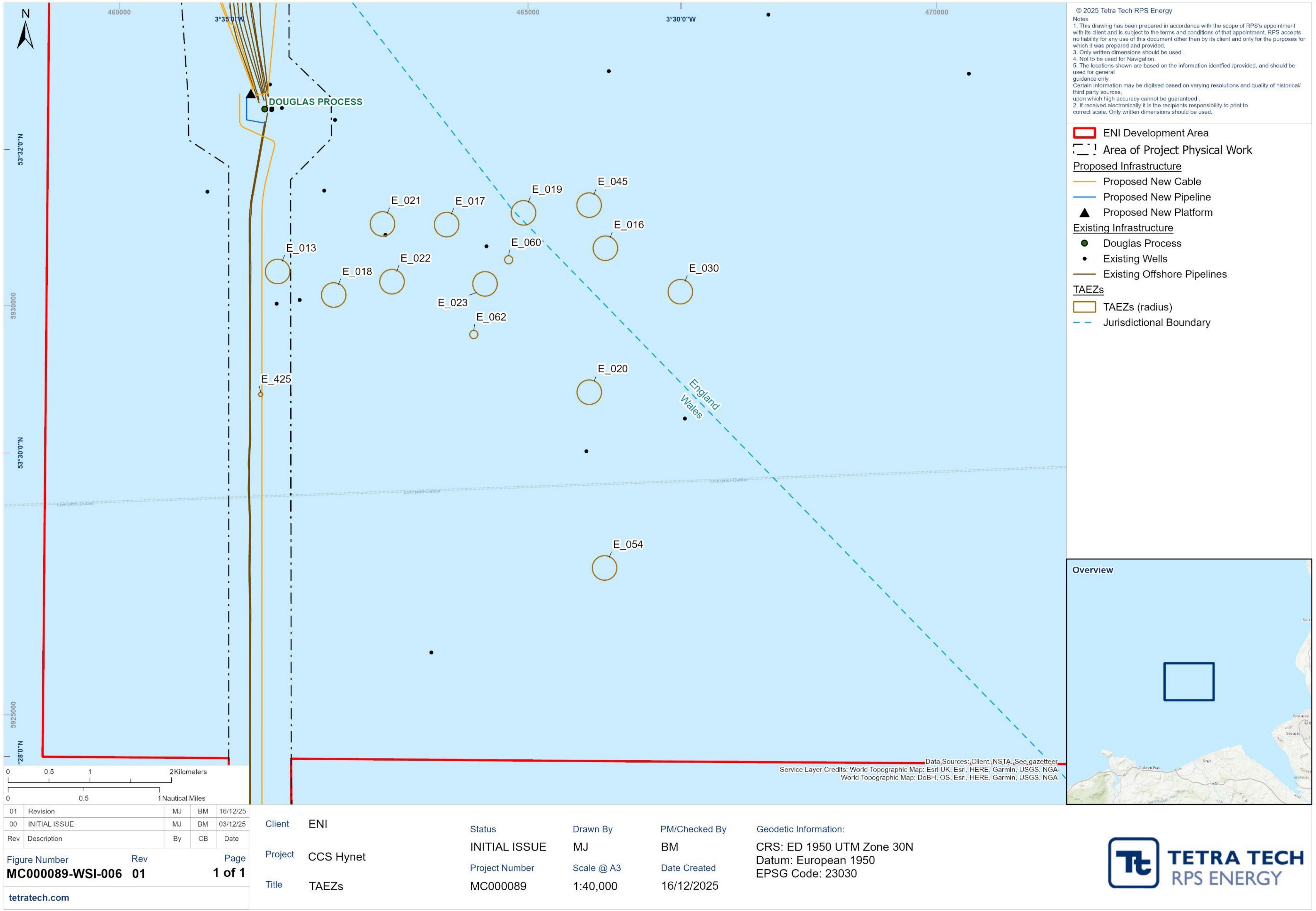

Figure 1.6 Distribution of TAEZs (South of Douglas Platform)

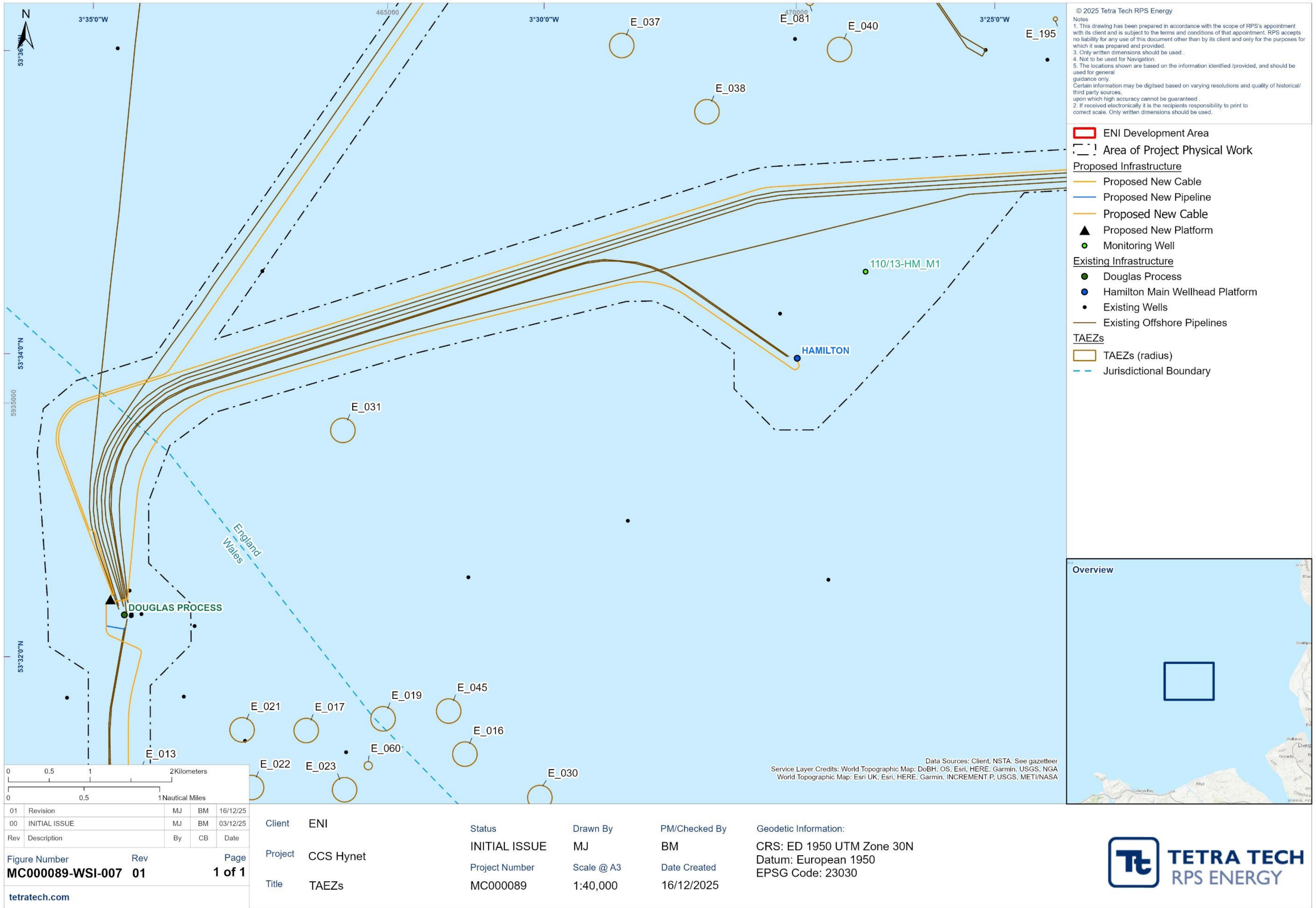

Figure 1.7 Distribution of TAEZs (North of Douglas Platform)

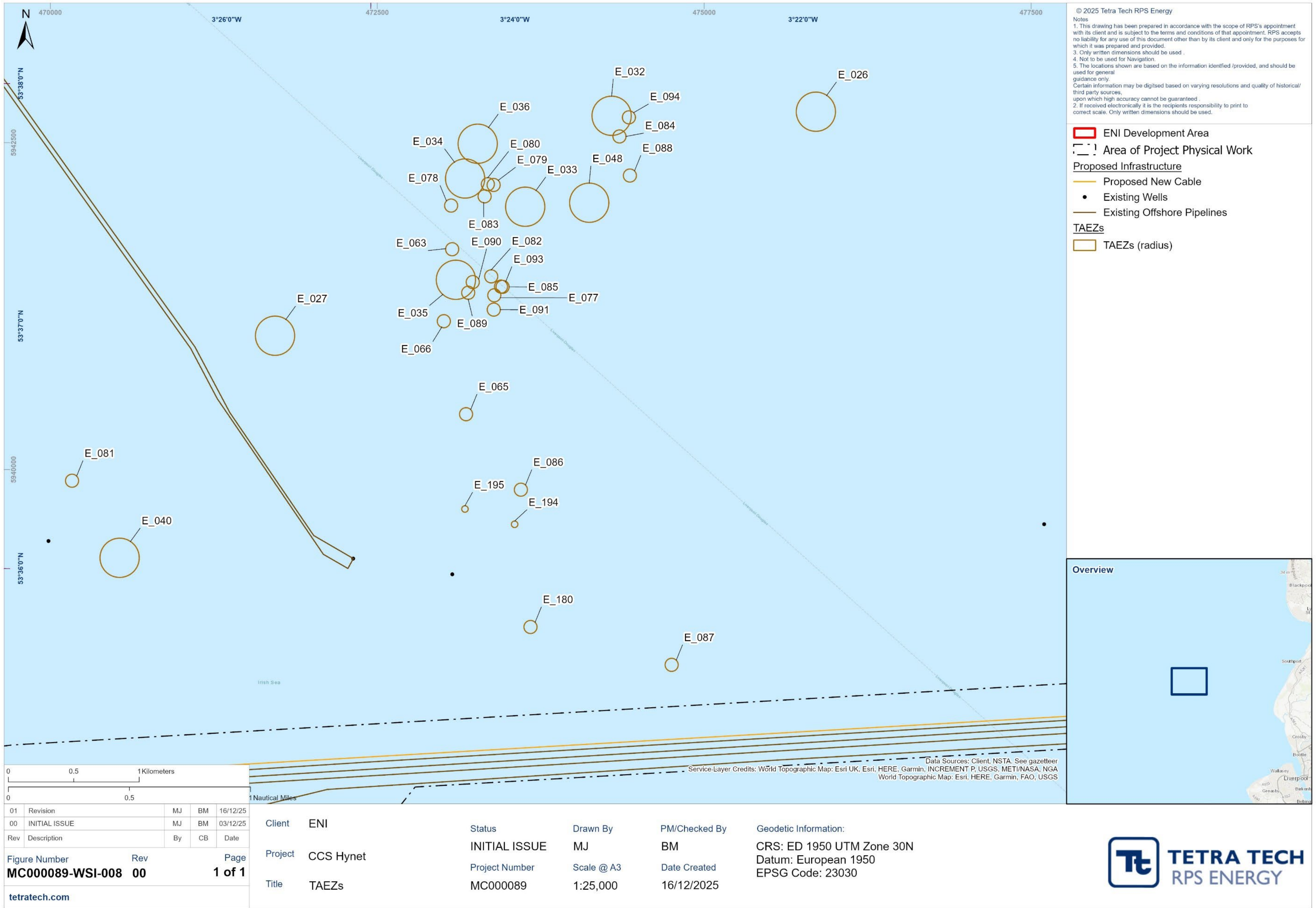

Figure 1.8 Distribution of TAEZs (Between Hamilton Platforms)

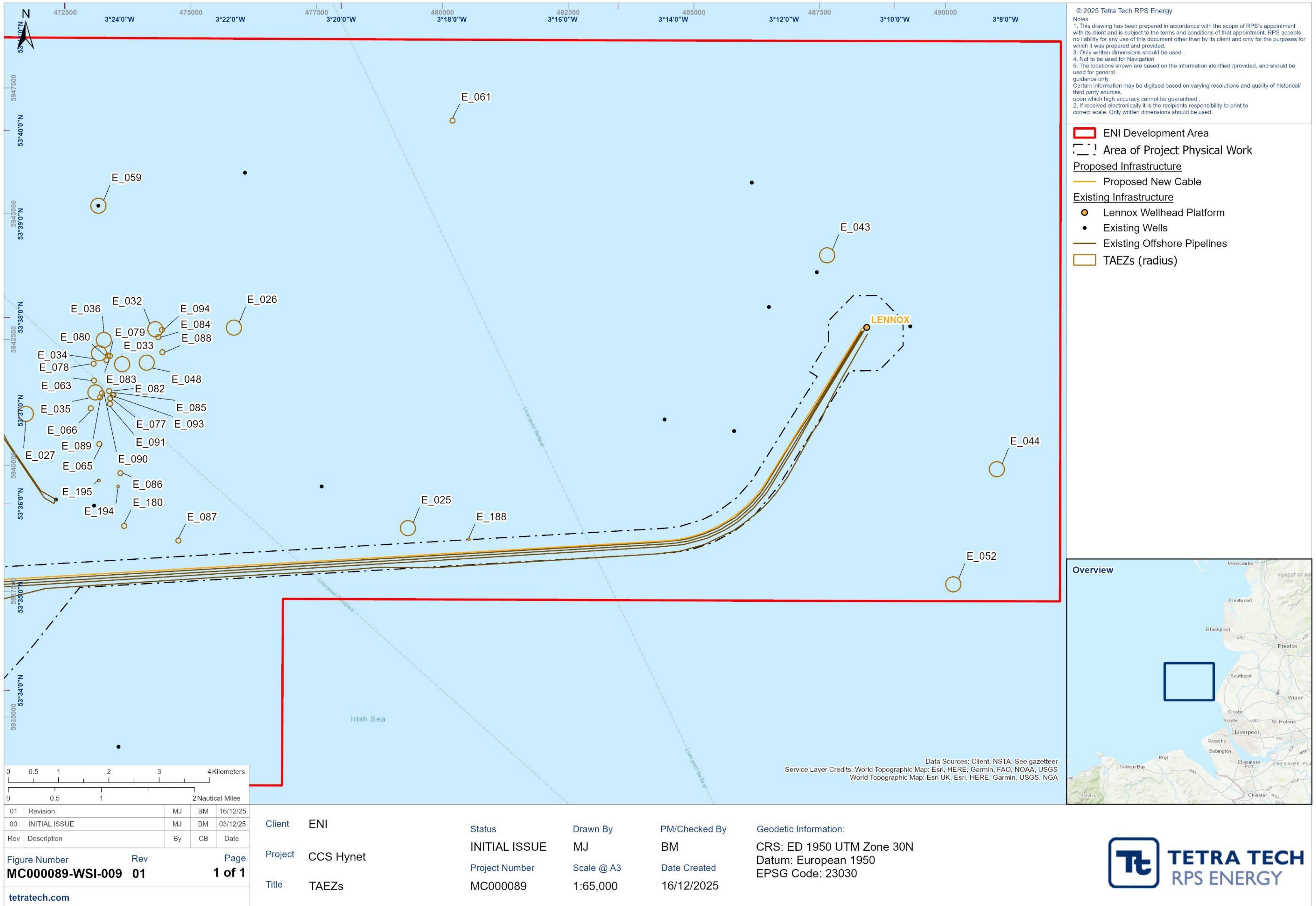

Figure 1.9 Distribution of TAEZs (Eastern Area to Lennox Platform)

Establishing new archaeological exclusion zones

1.5.2.15 If new finds of archaeological importance are made during the course of UXO surveys, construction (or any subsequent stage of the Project) they may be subject to the implementation of additional AEZs. Establishment of new AEZs may for example occur where full coverage data of the area is collected and archaeologically reviewed and additional features identified.

1.5.2.16 If any finds of archaeological material are made during project activities they will be reported to the Nominated Contact by the Construction Contractor(s), in accordance with the PAD (Section 1.5.5 and Appendix A). The Nominated Contact will inform the Retained Archaeologist and then the Archaeological Curator of all reports.

1.5.2.17 All activities that may affect the seabed in the vicinity of any find will cease until archaeological advice has been sought and received and, if necessary, an archaeological inspection of the material and site has taken place.

1.5.2.18 The Archaeological Curators will be consulted by the Retained Archaeologist on the need for, and the design (position, extent) and implementation of any new AEZs.

Altering archaeological exclusion zones

1.5.2.19 AEZs may be altered (enlarged, reduced, moved or removed) due to the results of future geophysical or ROV surveys and/or archaeological field evaluation. Archaeological field evaluation may include suitable high-resolution marine geophysical survey, and/or survey by diver or ROV.

1.5.2.20 The alteration of AEZs will only be undertaken following consultation with the Archaeological Curators, particularly RCAHMW. Following alteration, a new plan giving details of the revised AEZs will be drawn up for Liverpool Bay CCS Ltd by the Retained Archaeologist and issued by Liverpool Bay CCS Ltd to its Construction Contractor(s) and onboard vessel representatives.

Monitoring archaeological exclusion zones

1.5.2.21 The effectiveness of the AEZs and TAEZs will be monitored by regular review by the Retained Archaeologist of vessel track plots and anchor spots supplied by Liverpool Bay CCS Ltd. This data will be reviewed monthly by the retained archaeologist, at a minimum.

1.5.2.22 Should a breach of an AEZ be suspected this will be resolved by further investigation, which may include carrying out a geophysical or diver/ROV survey of the area thought to be affected.

1.5.2.23 On completion of the construction phase, the Retained Archaeologist will compile a report on the effectiveness of the AEZs, any alterations to them, and the results of monitoring.

1.5.3 Archaeological monitoring

1.5.3.1 The following commitment in regard to monitoring has been made:

Archaeologists are to be consulted in the preparation of pre-construction cable route clearance or other pre-construction operations and, if appropriate, to carry out archaeological monitoring of such work (Liverpool Bay CCS Ltd, 2024).

1.5.3.2 The following section sets out methods for monitoring, should this be required.

Marine watching brief

1.5.3.3 The proposed mitigation strategy, which is based on the current understanding of archaeological remains and construction techniques, does not require a marine watching brief. Should future work lead to the identification of further archaeological remains, or should the construction methods or locations be altered, a marine watching brief may be required.

Intertidal watching brief

1.5.3.4 Drone survey data including magnetometry data covering the area from below the HDD exit pits to the area below MLWS (which was previously identified as a data gap (section 1.3.9)) were analysed by the Archaeological Contractor (section 1.3.8; MSDS Marine 2026a). An intertidal walkover survey was also conducted in 2025 (Eni, 2025a). An archaeological watching brief covering the cable trench between the HDD exit pit and MLWS is not currently recommended. This is consistent with the terms of the onshore WSI (Eni, 2025b), which states that those works will be monitored through the implementation of the PAD (Appendix A).

1.5.3.5 The excavation of the HDD exit pits has been subject to a watching brief intended to discharge an archaeological planning condition (ref. FUL/000246/23, dated 06 April 2023) attached to the planning permission given under the Town and Country Planning Act 1990 (Eni, 2025b).

Watching brief methods

1.5.3.6 If a marine watching brief is required, it would be conducted by a suitably qualified and experienced marine archaeologist, in line with the CIfA Standards and Guidance for Archaeological Watching Briefs (CIfA, 2014a). A detailed method statement would also be produced and approved by the Archaeological Curators before any watching brief activities are undertaken.

1.5.3.7 Excavated surfaces and up-cast material will be inspected by the Archaeological Contractor. Any standing section of trench edge will be inspected by the Archaeological Contractor, where safe to do so.

1.5.3.8 Archaeological features or structures will be examined and/or excavated. A sufficient sample of each layer/feature type will be investigated in order to elucidate the date, character, relationships and function of the feature/structure. Development activities will include provision for sampling of features and deposits in order to recover artefacts, ecofacts and dating evidence, and in order to determine stratigraphic relationships. Recording will include written, drawn, and photographic elements as conditions allow.

1.5.3.9 Where appropriate, sieving of bulk environmental samples will be undertaken to enhance levels of artefact recovery. Bulk soil samples may be taken specifically for artefact recovery. Any finds will be collected and allocated a record number and their position will be logged.

1.5.3.10 Suitable time will be allowed, and resources made available within the construction programme for each such intervention.

1.5.3.11 If significant archaeological or palaeoenvironmental deposits are encountered then Liverpool Bay CCS Ltd, in consultation with the relevant Curator, will make provision for the Archaeological Contractor to undertake a programme of investigation commensurate with the evidence discovered.

Recording and reporting

1.5.3.12 A site plan at an appropriate scale will be annotated with the position of areas observed in relation to the construction footprint and provided to the relevant Contractors. The plan will show the location of features observed and recorded during the investigations. The site plan should include a note of the position-fixing method and the accuracy achieved.

1.5.3.13 The basic record of each feature/structure identified during the watching brief should include:

- A full photographic record;
- Drawn record (plans and sections);
- Position in three dimensions; and
- A written description including initial interpretation and contextual relationships.

1.5.3.14 Positions will be related to National Grid and Ordnance Datum (landward of MLWS) or ED50 UTM Zone 30N for the offshore elements of the scheme.

1.5.3.15 The archaeological results will be compiled in a report by the Archaeological Contractor, in accordance with the requirements outlined in Standard and Guidance for archaeological watching briefs (CIfA, 2014a), and in accordance with reporting procedures set out in section 1.6.3.

1.5.4 General archaeological practices

1.5.4.1 During seabed preparation, construction and future activities associated with the Project, archaeological finds and deposits may be encountered, and records may need to be produced. This situation may arise under a number of different circumstances, for example during watching brief activities. However, where it does arise the following general methods will be employed.

Survey and recording

1.5.4.2 All finds and seabed archaeological deposits will be recorded using a pro forma recording system, and a running matrix of assigned contexts will be maintained.

1.5.4.3 A full photographic record will be maintained using video and digital stills photography. The photographic record will illustrate both the detail and the general context of the principal features, finds excavated, and the site as a whole.

Positioning

1.5.4.4 Surveys should be carried out to a single datum and coordinate system, preferably the ED50 UTM Zone 30N for the offshore elements of the scheme.

Finds and conservation

1.5.4.5 Objects relating to human exploitation of the area that may be identified during the Project will be recovered by the Archaeological Contractor or, where recovery is impracticable, recorded. All finds will be recorded by context and significant objects ('special finds') in three dimensions using a sequence of unique numbers.

1.5.4.6 Finds and other items of archaeological interest recovered offshore during investigation are the property of the Crown Estate as the landowner, with the exception of all human remains, items that are 'treasure' for the purposes of the Treasure Act 1996 (relevant in the intertidal zone) and 'wreck' for the purposes of the Merchant Shipping Act 1995. Liverpool Bay CCS Ltd will seek permission from the landowner to donate finds to an appropriate Museums Service prior to depositing the archive.

1.5.4.7 In the event of the discovery of items that fall under the Treasure Act 1996 (as amended) Liverpool Bay CCS Ltd with support from the Retained Archaeologist will notify the District Coroner within 14 days. The Archaeological Curator will be notified as soon as possible. Items falling under the Treasure Act will be removed from the site by the Archaeological Contractor and stored in a secure location, pending a decision by the Coroner.

1.5.4.8 Subject to these legal requirements and to the agreement reached with the Museum regarding selection, retention and disposal of material, the Archaeological Contractor will retain all recovered objects unless they are undoubtedly of modern or recent origin. The presence of modern objects will, however, be noted on context records. In these circumstances, sufficient material will be retained to elucidate the date and function of the deposit from which it was recovered.

1.5.4.9 Any finds and environmental samples will be processed according to professional standards for finds analysis, environmental sampling and archive preparation, and in accordance with the Chartered

Institute of Archaeologists' Standard and Guidance for the collection, documentation, conservation and research of archaeological materials (CIfA, 2014b).

1.5.4.10 Finds will be primarily conserved, bagged and boxed in accordance with guidelines set out in the United Kingdom's Institute for Conservation's Conservation Guidelines No 2 (ICON, 1984). In consultation with Liverpool Bay CCS Ltd and the Archaeological Curator, the Retained Archaeologist will advise on the implementation of passive conservation for smaller objects pending more detailed conservation strategies. Liverpool Bay CCS Ltd will also make provision for a professional conservator to undertake a conservation assessment of assemblages, including recommendations and timescales for the conservation of the object.

1.5.4.11 Specialist work approved by Liverpool Bay CCS Ltd and the Archaeological Curator on metalwork, bone (including worked bone, human remains and other organic remains), industrial waste, ceramic material, glass and lithic material will be carried out by suitable Archaeological Contractors, monitored by the Retained Archaeologist.

1.5.4.12 In the event of the discovery of unexpected, unusual or extremely fragile and delicate objects and deposits, such as waterlogged wood, the Nominated Contact will be notified immediately. Additional work required to recover, record, analyse, conserve and archive such objects and deposits will be agreed with the Archaeological Curator.

Human remains

1.5.4.13 In the event of the discovery of any confirmed human remains, the Construction Contractor or Archaeological Contractor will immediately inform Liverpool Bay CCS Ltd and the Retained Archaeologist. The Retained Archaeologist will inform the Archaeological Curator, and where appropriate the Coroner and the Police.

1.5.4.14 It is proposed that any such remains will be left *in situ* until the Coroner and the Archaeological Curator have been informed. Where development will unavoidably disturb them, they will be fully recorded, excavated, and removed from the site subject to compliance with the relevant Ministry of Justice Licence for such activities which will be obtained by the Retained Archaeologist.

1.5.4.15 The final placing of human remains following analysis will be subject to the requirements of the Ministry of Justice Licence.

1.5.5 Protocol for reporting finds of archaeological interest

1.5.5.1 A PAD will be implemented during all activities relating to construction, operation, maintenance and decommissioning (Appendix A). It will address the reporting of unexpected finds of archaeological material, recovered from the sea during these activities.

1.5.5.2 The PAD largely follows the format laid down in the document PAD: Offshore Renewables Projects (The Crown Estate, 2014). The Retained Archaeologist will operate to administer the PAD and provide initial advice to Liverpool Bay CCS Ltd and will liaise with the Archaeological Curators as necessary. The details of the PAD, including key roles and communication steps are set out in Appendix A.

1.5.5.3 Once agreed by Liverpool Bay CCS Ltd and the Archaeological Curator, the PAD will be distributed in a form suitable for use on board construction vessels. Liverpool Bay CCS Ltd will ensure that the relevant staff on all construction vessels are informed of and have access to the PAD, including supporting material, detailing the find types that may be of archaeological interest, and the potential importance of any archaeological material encountered.

1.5.5.4 All finds of archaeological material will be reported by the Construction Contractor(s), to the Site Champion, and then on to the Nominated Contact who will inform the Retained Archaeologist and then the Archaeological Curator. If the find is 'wreck' within the meaning of the Merchant Shipping Act 1995 then the Nominated Contact will also make a report to the Receiver of Wreck, with support of the Retained Archaeologist. Full contact details for all relevant parties are included in Table 1.3.

1.5.5.5 The response to reported finds will be implemented through the measures set out in the PAD, including further surveys or establishment of new AEZs if appropriate.

1.5.5.6 The PAD will be implemented by means of toolbox talks presented by the Retained Archaeologist or an Archaeological Contractor to the relevant vessel crews to ensure that all staff are made aware of what constitutes an appropriate find. The frequency and timing of these toolbox talks is determined in relation to ongoing activities. The PAD will be supported by a package of awareness training for Liverpool Bay CCS Ltd and its contractors' and sub-contractor's staff.

1.5.5.7 At the end of the construction phase, the Retained Archaeologist will prepare a report on the results of the PAD. The results will be included in the final archaeological report in the section covering maritime sites and finds within the area affected by the development.

1.5.6 Crashed aircraft procedures

1.5.6.1 There is potential for remains of crashed aircraft to occur within the Eni Development Area and Area of Project Physical Work (section 1.3.6). This section sets out the specific procedures to be followed in the event that remains of an aircraft are identified.

1.5.6.2 The majority of aircraft wrecks are military and so fall under the legal protection of the Protection of Military Remains Act 1986. Archaeological Contractors should refer to guidance outlined in Collaborative Offshore Wind Research into the Environment (COWRIE) Historic Environment Guidance (Wessex Archaeology, 2007), Draft Interim Guidance on the use of the Protocol for Reporting Finds of Archaeological Interest in relation to Aircraft Crash Sites at Sea (Wessex Archaeology, 2008) and Military Aircraft Crash Sites: Archaeological guidance on their significance and future management (English Heritage, 2002).

1.5.6.3 Any finds that are suspected of being military aircraft will be reported immediately to the Nominated Contact and then the Retained Archaeologist. The Service Personnel and Veterans Agency (SPVA: JCCC) - SO3 Historic Casualty Casework) will then be informed. The Retained Archaeologist should seek specialist advice for the identification of aircraft remains where necessary.

1.5.6.4 Any subsequent actions will be guided by Crashed Military Aircraft of Historical Interest: Licensing of Excavations in the UK – Guidance Notes for Recovery Groups (MOD and SPVA, 2007) and by advice received from SPVA. In the case of a military aircraft being investigated under licence, any human remains will be reported immediately in accordance with paragraph 14 of the Guidance Notes for Recovery Groups (MOD and SPVA, 2007).

1.5.7 Archaeological involvement in further work

1.5.7.1 Archaeological involvement in further work is a key component in the ongoing process of assessing known and potential archaeological remains within the Eni Development Area, to ensure robust and proportionate mitigation for heritage assets which may be impacted by the Project.

1.5.7.2 If appropriate a detailed Method Statement will be produced by the Retained Archaeologist, for agreement with and approval by Liverpool Bay CCS Ltd, and the Archaeological Curator in advance of each archaeological element discussed below. A Method Statement has been produced for the archaeological assessment of the UXO surveys (MSDS Marine 2026b). Approval by the Archaeological Curator will be assumed if no response is received within 30 working days of submission of individual method statements. Overviews of methods are given below. These methods are in line with best practice guidance, set out within The Crown Estate (2021) Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects.

Further surveys requiring archaeological involvement

1.5.7.3 Further surveys requiring archaeological involvement include:

- New geophysical surveys. This includes UXO surveys comprising gradiometer, MBES, SSS and SBI in 2026;
- Previous geophysical surveys. The 2026 UXO surveys will be supported if appropriate by MBES, SSS and magnetometry data collected by Boskalis in 2025; and
- New geotechnical investigations. These require geoarchaeological assessment and, where necessary, analysis following the staged approach set out below (paragraph 1.5.7.29).

1.5.7.4 Should archaeological material be encountered by these works, sufficient time and resources will be made available to ensure the archaeological assessment of such material. In areas where there are to be further impacts, no impacts will take place until the assessment has been conducted and mitigation actions agreed and implemented. The scope of any further assessment will be agreed with the Archaeological Curator and, where necessary, further suitable mitigation measures will be instigated in agreement with the Archaeological Curator.

1.5.7.5 Analysis of surveys may be phased in line with the construction programme, with, for example, analysis of surveys located between PoA Terminal to the new Douglas CCS platform being undertaken in 2026, and analysis of surveys between the new Douglas CCS platform and the Hamilton Main, Hamilton North, and Lennox platforms being undertaken in 2027.

Planning surveys

1.5.7.6 When planning geophysical and geotechnical surveys, Liverpool Bay CCS Ltd will advise the Retained Archaeologist well in advance and seek their input into the scope of work. Archaeological input will take the form of advice from the Retained Archaeologist on measures to optimise archaeological results from the planned geotechnical, geophysical and other surveys or work (such as benthic grabs, for example). Areas to be considered will include:

- the available details on previously identified sites and/or anomalies and areas of heightened archaeological potential;
- the archaeological potential of areas where no existing sites and/or anomalies are yet known;
- the equipment, equipment settings, survey methodology(s) and data collection points that will optimise the recovery of archaeological information; and
- the requirements for data analysis, interpretation and archiving.

1.5.7.7 The required response to elements of archaeological input may include:

- altering vibrocore/borehole positions in order to maximise the potential for the collection of archaeological data;
- ‘boxing’ wreck sites in order to provide the best possible images and positional data; and
- altering grab sample positions in order to maximise the potential for the collection of archaeological data.

Fieldwork

1.5.7.8 Where further survey work has, as one of its objectives, the ensonification of previously identified sites and / or anomalies in order to alter or remove an AEZ, Liverpool Bay CCS Ltd may make provision for a suitably qualified Archaeological Geophysical Contractor to be available to provide advice and input into the survey and as the survey is ongoing. In some cases, this may include the presence of the Archaeological Contractor on the vessel alongside the vessel crew, or, in most cases, this advice may be given remotely. In all cases the archaeologist will ensure that the best possible data is collected for those anomalies subject to review.

Archaeological assessment of marine geophysical survey data

1.5.7.9 The project has made a commitment to collection of full coverage survey data (covering the area of proposed impacts) prior to any impacts taking place. The UXO gradiometer and SBI surveys will cover the entire area of proposed impacts. This data will be archaeologically assessed and is subject to a specific Method Statement (MSDS Marine, 2026b).

1.5.7.10 Additionally, further new marine geophysical data that covers areas of development impact and AEZs will be subject to analysis by a suitably qualified Archaeological Geophysical Contractor. Any such assessment will be preceded by a method statement which will set out in detail the methods to be used, along with the aims and objectives of the work. The method statement will be submitted to the archaeological curators prior to the work being conducted. Approval by the Archaeological Curator will be assumed if no response is received within 30 working days of submission of individual method statements.

1.5.7.11 In order to maximise the potential benefits of any geophysical survey, Liverpool Bay CCS Ltd will seek archaeological input at the planning stage of any such works.

1.5.7.12 Surveys will be carried out to a single datum and co-ordinate system. All survey data, including navigation (position, heading and velocity) will be acquired digitally in industry-standard formats. Care will be taken to maintain the orientation and altitude of sensors online. Track plots will be corrected for layback (including catenary effects) and made available in digital (geographical information system (GIS)) form.

1.5.7.13 Once the surveys have been processed to meet their primary objectives, the survey data, together with factual reports, will be made available in digital formats to Liverpool Bay CCS Ltd's Retained Archaeologist, or a suitably qualified Archaeological Contractor for archaeological analysis and interpretation.

1.5.7.14 Archaeological interpretation may include:

- examination of side scan sonar, magnetometer, multi-beam and seismic data, where acquired, for areas within the vicinity of known wreck sites and previously identified geophysical anomalies;
- examination of side scan sonar, magnetometer, multi-beam and seismic data, where acquired, within areas that will be subject to development to identify any as yet unknown wreck remains; and
- the assessment of seismic data and the Ground Investigation Report to plot the general trend of the subsurface sediments with archaeological potential.

1.5.7.15 An example of the criteria for assessing the archaeological potential of contacts is set out in Table 1.7.

Table 1.7 Criteria for the Assessment of Potential

Potential	Interpretation
Low	A contact potentially of anthropogenic origin but that is unlikely to be of archaeological significance – Examples may include; discarded modern debris such as rope, cable, chain or fishing gear, small, isolated contacts with no wider context or small boulder like features with associated magnetometer readings.
Medium	A contact believed to be of anthropogenic origin but that would require further investigation to establish its archaeological significance – Examples may include; larger unidentifiable debris or clusters of debris, unidentifiable structures or significant magnetic anomalies.
High	A contact almost certainly of anthropogenic origin and with a high potential of being of archaeological significance – high potential contacts tend to be the remains of wrecks, the suspected remains of wrecks or known structures of archaeological significance.

1.5.7.16 The archaeological interpretation or findings of any further geophysical surveys will be compiled as a report by the Archaeological Contractor and will include likely requirements (if any) for further work or any required changes to mitigation including the addition, removal or alteration of AEZs. The report will be submitted to Liverpool Bay CCS Ltd by the Retained Archaeologist and then to the Archaeological Curator. The scope of any further work will be agreed by Liverpool Bay CCS Ltd and the Archaeological Curator.

Archaeological assessment of diver/ROV survey data

1.5.7.17 Diver and ROV surveys are not currently planned, with the UXO identification campaign that would usually utilise these methods being undertaken using SBI.

1.5.7.18 If diver and ROVs were to take place, seabed photography and video footage will be subject to archaeological assessment and analysis by a suitably qualified Archaeological Contractor. Any such assessment will be preceded by a method statement which will set out in detail the methods to be used, along with the aims and objectives of the work. The method statement will be submitted to the archaeological curators prior to the work being conducted. Approval by the Archaeological Curator will be assumed if no response is received within 30 working days of submission of individual method statements.

1.5.7.19 To maximise the potential benefits of any proposed diver/ROV surveys, Liverpool Bay CCS Ltd will seek archaeological input at the planning stage of any such works.

1.5.7.20 Archaeological input will take the form of advice from the Retained Archaeologist on measures to optimise archaeological results from the planned survey. Advice may include:

- the available details of sites and/or anomalies identified in the desk based assessment;
- the archaeological potential of areas where no existing sites and/or anomalies are yet known;
- the type and level of diver/ROV positioning, voice recording and video/still recording to be utilised;
- the provision of clear guidance on the types of sites and finds that are to be reported and recorded;
- wherever possible input into the scope of works to include potential archaeological sites/AEZs where more detailed mitigation planning is required; and
- other specific advice will be given depending on the nature and purpose of the investigations. All such areas would be outlined within the method statement for the work.

1.5.7.21 Consideration will be given to having an Archaeological Contractor (or archaeological team) present during any diver or ROV surveys, either as an observer(s) or participating diver(s) to optimise archaeological results and thereby reduce the need for repeat survey. However, operational constraints as well as the relevance and scope of the operation, will have to be taken into account when trying to accommodate archaeologists aboard.

1.5.7.22 Following the completion of the diver/ROV survey all data, including video footage if relevant, will be reviewed by the Archaeological Contractor. This review will identify any anomalies or sites that are potentially of archaeological interest. A report will identify those sites and/or geophysical anomalies that are of sufficient archaeological interest to warrant further investigation and/or mitigation. It will also identify those sites that are no longer of archaeological interest, and hence may be removed from the list of AEZs.

1.5.7.23 The archaeological results of any diver/ROV survey will be compiled in a report by the Archaeological Contractor. The report will include a statement of the likely requirements (if any) for further archaeological work and mitigation.

1.5.7.24 The report will be forwarded to the Retained Archaeologist, who will submit it to Liverpool Bay CCS Ltd and then the Archaeological Curator for a decision on the scope of any further work where required.

Geoarchaeological assessment of geotechnical data

1.5.7.25 Broadly, the aim of the archaeological assessment of geotechnical data as set out within COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011) is to:

- investigate the deposition sequence of sediments within the area represented by the cores to identify, as far as possible, the environments within which this deposition took place;
- evaluate the potential for past human exploitation and occupation of these past environments;
- produce an overview of the geological stratigraphy to provide an indication of the prehistoric archaeological potential for the area; and
- comment on the archaeological importance of the identified deposits, within the context of the wider palaeoenvironmental history of the region and the UK.

1.5.7.26 In line with these aims, and the COWRIE guidance (Gribble and Leather, 2011) new geotechnical surveys will be subject to archaeological input. Following best practice guidance this input should begin prior to core collection, and should proceed to a staged process of assessment and analysis (The Crown Estate, 2021).

1.5.7.27 Early input should seek to determine methods and specifications for geotechnical sampling (e.g. vibrocores, boreholes etc.) and engagement with Liverpool Bay CCS Ltd and their geotechnical team should aim to find ways to ensure archaeological aims and sampling can be conducted alongside any other requirements. Following these discussions a Method Statement for Core Collection, Transport, Retention and Storage should be produced, ensuring that cores are stored in a way which facilitates later assessment or analysis, if required. This Method Statement may also include methods for the Stage 1 and 2 geoarchaeological assessment (see below).

1.5.7.28 Early input should also include recommendations on core locations from a geoarchaeologist. Typically, this process involves close collaboration with the Site Investigation team. Archaeological input into geotechnical core locations can allow for the greatest insights into the palaeolandscape. Round-table discussions and the review of seismic profiles tends to be a conducive method of allowing engineering and archaeological requirements to be taken into consideration when micro-siting geotechnical cores.

1.5.7.29 Following the collection of geotechnical cores, it is recommended that they undergo a staged program of geoarchaeological assessment and analysis as the primary means of ground-truthing the potential identified in this report, and of mitigating impacts to remains. In brief the process is as follows:

- **Stage 1: Geoarchaeological review of core logs:** This stage involves a desk-based assessment of the geotechnical core logs performed by a professional geoarchaeologist in order to determine which cores may be of interest. The selected cores will then be recommended for further study (Stage 2). Stage 1 assessment requires all cores to be recorded such that sediments that may be of archaeological interest can be identified. The scope of any further work will be agreed by Liverpool Bay CCS Ltd and the Archaeological Curator before proceeding to the next stage of assessment. If no further work is recommended a final report will be produced by the Archaeological Contractor.
- **Stage 2: Geoarchaeological recording:** This stage involves further study of the cores that may be of archaeological interest identified in Stage 1 to identify archaeological potential. The cores will be physically assessed by a geoarchaeologist who will confirm the sediments present within the cores and determine their archaeological potential and make recommendations for any suitable cores to be assessed further (Stage 3). At this point a report will be produced presenting the results of the Stage 1 and 2 analyses, recommending further study if necessary, and methodologies for any further work. The scope of further work will be agreed by Liverpool Bay CCS Ltd and the Archaeological Curator. If no further work is recommended, a final report will be produced by the Archaeological Contractor.

- **Stage 3: Geoarchaeological assessment:** This stage involves taking samples from the cores with archaeological potential identified in Stage 2. The samples will be analysed to determine the age and the value surviving paleoenvironmental material contained within the samples. The aims for the palaeoenvironmental analysis included establishing the preservation, diversity, and quantity of palaeoenvironmental material for the purpose of better characterising its origin environment. Any suitable material can be recommended for further study (Stage 4) if necessary. A report for the results of the Stage 3 analysis will be produced, it will also outline whether further analysis is necessary or will state if no further work is recommended.
- **Stage 4 and 5: Geoarchaeological analysis and publication:** This stage involves further, more detailed analysis of core samples. A report will be produced after this Stage including the results of all previous work, core location maps, sediment sequences, 2D and 3D images of the cores where necessary. The report will discuss the interpretation of palaeoenvironments in detail based on analysis of the cores and present all relevant information gathered during the desk-based assessments. The work will be undertaken to publication standard. The report will be forwarded to the Retained Archaeologist, who will submit it to Liverpool Bay CCS Ltd and the Archaeological Curator.

1.5.7.30 This work should be undertaken by a trained geoarchaeologist. Each stage should inform the scope of the next, and work may cease at any point where no recommendations for further work are made. This would be the case if, for example, cores were determined to hold no geoarchaeological potential at the end of Stage 2.

1.5.7.31 This geoarchaeological assessment and analysis should aim to deliver conclusions on the prehistoric archaeological and palaeoenvironmental remains within the area. Further mitigation may be required based on the results of this assessment. The geoarchaeological work should follow guidance set out within COWRIE's Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector (Gribble and Leather, 2011).

1.5.7.32 The use of an appropriate protocol for archaeological discoveries such as the Crown Estates Protocol for Archaeological Discoveries: Offshore Renewables Projects also provides mitigation for prehistoric and palaeoenvironmental remains.

1.6 Activities subsequent to investigations

1.6.1.1 Following the stipulations of the Marine Policy Statement (MPS) that "opportunities should be taken to contribute to our knowledge and understanding of our past by capturing evidence from the historic environment and making this publicly available, particularly if a heritage asset is to be lost" (Defra, 2011, paragraph 2.6.6.3), the project recognises that any future geophysical and geotechnical surveys undertaken will produce new archaeological data and understandings of the historic marine environment of the area. The results of these investigations will ultimately be made publicly available (Liverpool Bay CCS Ltd, 2024). This commitment will be satisfied by reporting, deposition of reports through the OASIS system, archiving relevant geophysical survey data with the RCAHMW, and archiving of the project. In addition, should the results warrant it, publication will be undertaken.

1.6.2 OASIS V

1.6.2.1 In late 2020 the Online Access to the Index of Investigations (OASIS) version V was launched by the Archaeological Data Service (ADS). OASIS is an online form which allows for archaeological investigations to be reported to regional HERs and national heritage bodies. The system also allows for reports to be shared for public release through the ADS library. Reporting through OASIS has been incorporated within this WSI, in line with best practice.

1.6.2.2 In contrast to previous iterations of OASIS, OASIS V is a new, flexible system that is kept live throughout the course of a project. The new system recommends that an overarching OASIS record be established at project inception (for example on receipt of marine licenses and production of a WSI).

1.6.2.3 An OASIS record will therefore be set up following approval of the WSI by the Archaeological Curators, to notify the relevant authorities of future work that is taking place. Liverpool Bay CCS Ltd must then ensure that archaeological reports are submitted to NRW, OPRED, Cadw, Historic England and (if the work is within the intertidal zone) CPAT following completion of any survey and subsequent investigation. The contents of this report must be agreed and accepted by the archaeological curator(s) and NRW/OPRED. Liverpool Bay CCS Ltd must then ensure that a copy of the agreed archaeological report is submitted through the OASIS form within 2 weeks of acceptance by the relevant archaeological curator(s), NRW and OPRED. Sign off on the OASIS record will be by the RCAMHW who is responsible for administering the OASIS reporting system. Liverpool Bay CCS Ltd should notify NRW and OPRED that the OASIS report has been submitted within 2 weeks of the submission.

1.6.3 Reports

1.6.3.1 Reports should be prepared in accordance with the guidance provided in the relevant CIfA Standard and Guidance (see http://www.archaeologists.net/codes/cifa) and with reference to any other activity or analysis specific guidance. Reports will also satisfy all requirements set out within the relevant method statement covering the work package.

1.6.3.2 The timetable for depositing archives with the receiving institution after completion of the post-fieldwork programme will be set out in the relevant Method Statement.

1.6.3.3 In the event that little of significance is found during the course of the scheme construction, a final report on the investigative work will be prepared by the Archaeological Contractor within six weeks of completion of all construction.

1.6.3.4 If significant archaeological sites and finds are recorded, then this final report will be preceded by the submission to the Retained Archaeologist by the Archaeological Contractor(s) of investigation reports following the completion of fieldwork.

1.6.3.5 The Archaeological Contractor will also be required to produce an assessment report which will establish the value of the recorded archaeology and provide a costing for the post-excavation analysis, publication and archiving (including deposition of archive).

1.6.3.6 Reports are expected to detail the work undertaken and the archaeological evidence encountered. They should discuss the importance of the results including their potential contribution to archaeological knowledge and understanding, including relevant research frameworks.

1.6.3.7 In accordance with guidance issued by the Crown Estate (2021) reports will typically include:

- a non-technical summary;
- the aims and methods of the work;
- the results of the work including finds and environmental remains;
- a statement of the potential of the results;
- an explanation of how this work is relevant to the objectives and research agendas from applicable local and national archaeological research frameworks;
- proposals for further analysis and publication; and
- illustrations and appendices to support the report.

1.6.3.8 Where appropriate the report should provide recommendations for further assessment and/or analysis requirements.

1.6.3.9 Liverpool Bay CCS Ltd will provide a digital (pdf) copy of each report to the Archaeological Curator, NRW and OPRED (as appropriate) following survey completion.

1.6.3.10 Decisions regarding the level of post-excavation work, if required, will be taken following submission of investigation reports and consultation by Liverpool Bay CCS Ltd and the Retained Archaeologist with the Archaeological Curator.

1.6.3.11 Following the production and acceptance of archaeological reports they will be deposited with the relevant repositories, including the NRHE and RCAHMW, by submitting an OASIS form with a digital copy of the report.

1.6.4 Publication

1.6.4.1 In consultation with Liverpool Bay CCS Ltd and the Archaeological Curator, the Retained Archaeologist will ensure that the results of important archaeological investigations undertaken in connection with the project will be published in an integrated manner at a level that is appropriate to their significance. Publication media and all publication matters will be discussed and agreed in advance with Liverpool Bay CCS Ltd and the Archaeological Curator.

1.6.5 Archives

1.6.5.1 Archive planning will be included within detailed Method Statements for each activity undertaken. Archiving will follow best practice as laid out within:

- Brown, D. 2011. Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation. Archaeological Archives Forum.
- CIfA. 2020c. Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives.
- The Crown Estate. 2021. Archaeological Written Schemes of Investigation for Offshore Wind Farm Projects (Section 13.5: Archiving).

1.6.5.2 The Archaeological Curator will be notified of any archaeological investigation in advance of fieldwork and any specific requirements relating to the preparation and deposition of project archives will be accommodated as appropriate.

1.6.5.3 For offshore digital data, the RCAHMW acts as a MEDIN DAC, so data may be archived directly with RCAHMW. Geophysical survey data for the medium and high potential archaeological anomalies (i.e. those subject to AEZs), will be archived with the RCAHMW. Data may be clipped to the AEZ for each site. Should existing or new AEZs be covered by future geophysical survey, the relevant data will also be archived with the RCAHMW.

1.6.5.4 Where there is the likelihood of any archaeological fieldwork, the Retained Archaeologist will contact an appropriate receiving institution to discuss the intended fieldwork and seek its agreement to accept the site archive for long-term storage and curation. The Retained Archaeologist will consult the receiving institution regarding its policy on the selection, retention and disposal of excavated material, and to confirm the requirements in respect of the format, presentation and packaging of archive records and materials. A museum Accession Number will also be sought on each occasion.

1.6.5.5 Project archives, including written, drawn, photographic and material elements (together with a summary of the contents of the archive) will be prepared and deposited by the Retained Archaeologist in accordance with the requirements of the receiving Museum, repository or digital archive.

1.6.5.6 Written, drawn and photographic archives will be compiled to a standard that allows for the publication of a summary report. Written archives will be on clean, stable materials, and will be suitable for photocopying. The materials used will be of the standard recommended in Guidelines for the Preparation of Excavation Archives for Long-term Storage (Walker, 1990).

1.6.5.7 Born-digital records, including digital photographs, will be stored and deposited in accordance with guidelines issued by the receiving repository, CIfA (2023), Historic England (2015), and the ADS (2023).

1.6.5.8 The timetable for depositing archives with the receiving repository after completion of the post-fieldwork programme will be agreed with Liverpool Bay CCS Ltd and Archaeological Curator.

1.6.5.9 On completion of the scheme, the OASIS form will be updated, and copies of all archaeological reports will be attached as data files. Notification of the completion of the OASIS form will be sent to Archaeological Curators and NRW and/or OPRED (where appropriate).

1.6.5.10 The costs of archiving (whether digital, paper or object) will be met by Liverpool Bay CCS Ltd. Tenders or costings by contractors for work packages should include provision for the preparation and deposition of the expected archive.

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Appendix A - Protocol for Archaeological Discoveries

A.1 Purpose of the document

This appendix sets out the procedure for reporting discoveries of potential archaeological interest made during construction, operation, maintenance and decommissioning activities associated with the Project.

The aim of the protocol for reporting finds of archaeological interest is to reduce any adverse effects of the development upon the historic environment by enabling people working on the project to report their finds in a manner that is both convenient to their every-day work and effective regarding curatorial requirements.

The archaeological finds made during these works are important because they shed light on past human use of the landscape, sea, and seabed. The information that such discoveries bring to light can help archaeologists to better understand what happened in the past, and therefore to better protect those aspects of our history and pre-history that should be conserved on behalf of future generations.

A.2 Protocol Details and Version

The Protocol that will be used is based on the Protocol for Archaeological Discoveries (PAD) for Offshore Renewables Projects introduced by The Crown Estate (The Crown Estate, 2014).

A.3 Circumstances of Discovery

This PAD addresses finds of archaeological interest made on the seabed, intertidal zone or on board vessels during a wide range of activities associated with construction, operation, maintenance and decommissioning of the Project.

A.4 Scope of the Protocol

Liverpool Bay CCS Ltd will employ a Retained Archaeologist to provide archaeological consultancy and to liaise with and report as appropriate to the Contractors, Liverpool Bay CCS Ltd, and the Archaeological Curator.

A.5 Operations of the Protocol

A.5.1 Introduction

The PAD has been designed to allow Applicants to report unexpected finds of archaeological interest made on the seabed during development works. A series of actions is defined for such cases.

The Protocol anticipates that discoveries made by Project Staff are reported to the Site Champion (e.g. Vessel Master or Site Foreman) on their vessel or site, who then reports to the Nominated Contact (the Retained Archaeologist is the recommended Nominated Contact).

The Retained Archaeologist will liaise with Liverpool Bay CCS Ltd and the Archaeological Curator, along with any additional relevant stakeholders depending on the nature and significance of the find, and planned activities within the area. Additional mitigation may be recommended depending on the nature of the find.

A.5.2 Terms and Roles

A summary of the key roles and steps in the PAD process are set out in

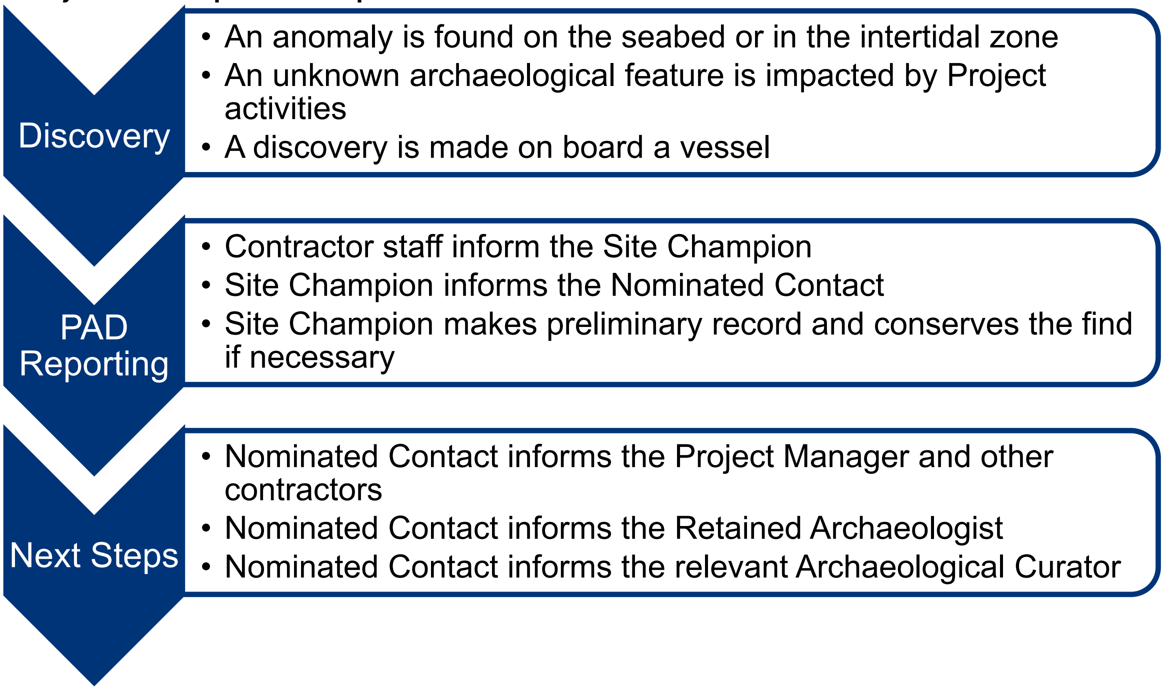

Figure 2.1.

On the vessel or site, the person responsible for reporting anomalies or finds will be the Site Champion. Anomalies or finds will be brought to the attention of the Site Champion by the Contractors or Project Staff. The Site Champion will inform the Nominated Contact.

The Nominated Contact will then report the find to varies relevant stakeholders including the Retained Archaeologist, Archaeological Curators (with the aid of the Retained Archaeologist if necessary) and relevant other Contractors. The Retained Archaeologist can provide specialist advice on finds identification, assessments of significance, and technical support services relating to the mitigation of the impacts of the project on the historic environment.[1]

[1] Note, the Crown Estate (2014) Protocol for Archaeological Discoveries includes an additional step whereby the report is passed to the Implementation Service who provide additional support on identification and input into mitigation. This Service is run by an archaeological contractor. The Retained Archaeologist, who has access to all project datasets and typically has a strong understanding of the archaeological potential of the area, along with specialists in maritime archaeology, is best placed to give this advice. As such there is no need for the inclusion of the additional step of corresponding with the Implementation Service, who do not have access to the up to date project data. They will therefore not be included within the Protocol for Archaeological Discoveries implemented during this project. The 2021 Crown Estate guidance on Archaeological Written Schemes of Investigation, which post-dates the 2014 PAD guidance, indicates that although the 2014 guidance sets out one protocol, others can also be used and further states that the 2014 guidance can be used to '*support the development of a protocol for any OWF* project' (Crown Estate, 2014: 42). The approach set out here is therefore in line with existing guidance.

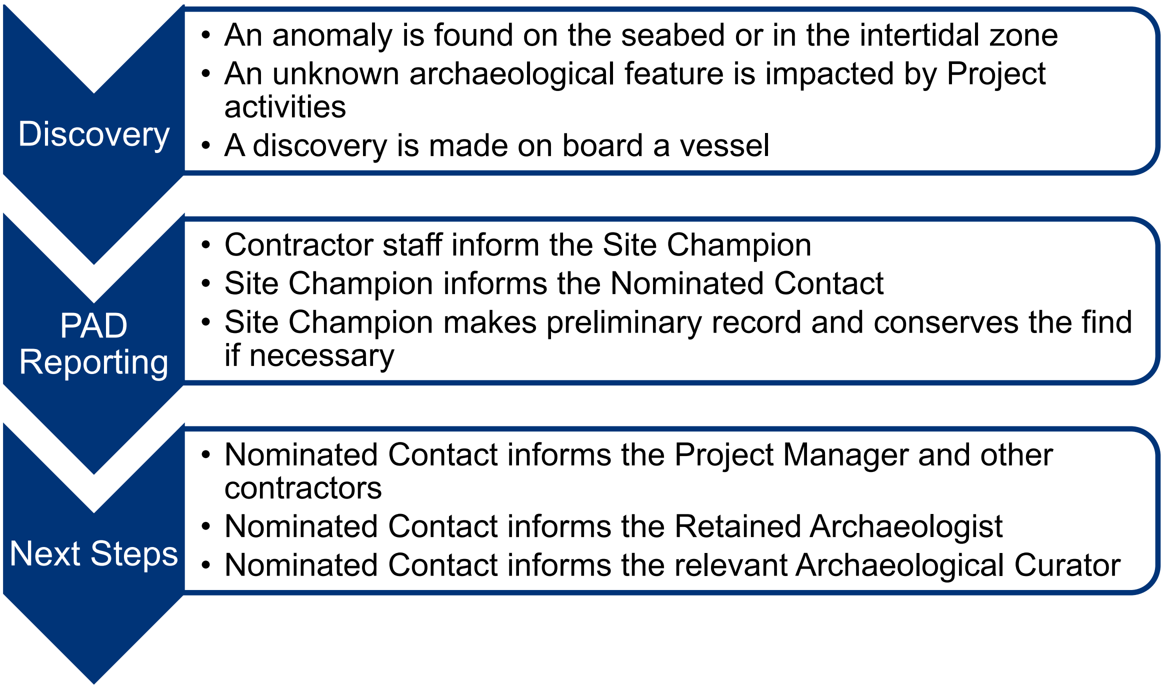

Figure 2.1 A summary of the key roles and steps in the PAD process.

The Retained Archaeologist, along with Liverpool Bay CCS Ltd and their contractors shall draw to the attention of all relevant staff the potential for archaeological material to be found during survey and inform them of the possible importance of such finds.

Personnel working on the project will be briefed on the Protocol for Archaeological Discoveries and copies of this Protocol will be available onboard the survey vessels and on all sites.

A.5.3 Legal Implications

It should be noted that if the wreck of an aircraft is encountered it may be automatically protected as a protected place under the terms of the Protection of Military Remains Act 1986 and it is an offence to tamper with, damage, or move the wreck or to remove items.

Furthermore, all items of ‘wreck’ are reportable to the Receiver of Wreck under the terms of the Merchant Shipping Act 1995. Appropriate finds will be reported to the Receiver of Wreck within the required timescales (28 days) by the Retained Archaeologist, thereby satisfying this legal requirement.

A.6 Guidelines for Identifying and Handling Finds

The following guideline can be used to identify any discovered material and must be referred to when planning appropriate handling and storage. Advice on the identification of finds has been provided following the accepted advice provided by The Crown Estate in their Protocol for Archaeological Discoveries (2014). Further advice on finds can be sought from the Retained Archaeologist.

Archaeological material can come in a variety of sizes, shapes and materials. Materials can degrade in different ways so it is important that they are handled with care and that the appropriate handling and storage techniques are applied.

Finds are vulnerable to deterioration at all times, whether they are recovered or not. Fragile material, such as wood, can be damaged by the force of passing machinery. It is crucial that all finds be treated carefully and interfered with as little as possible.

Leaving finds in situ is the best way to manage them. Once a find is recovered to the surface, it requires conservation which can be difficult and expensive to administer.

DO

- Handle all finds carefully
- Photograph all sides of a find with a scale
- Take close up photographs of any markings, glazing, or imagery
- Keep finds wet and ensure the water is changed regularly if biological growth is detected
- Keep finds cool and ideally in the dark
- Keep finds in protective containers where possible
- Label any finds
- Follow the information below on finds storage and contact the Retained Archaeologist if further advice is required

DO NOT

- Do not attempt to clean the find by removing any sediment build up, concretion, or marine life
- Do not allow finds to dry out
- Do not handle finds more than necessary.

A.6.1 Metal

Metal is likely to survive in marine environment, though it may corrode when in water or form concretions of material (a hard mass of material which typically has a mineral matrix, commonly formed around ferrous objects in particular). Typical metal finds might include ingots, ballast, coins, ornaments, tools, weapons, aircraft or ship parts, and personal items. The Crown Estate Guidance for the identification of metals is as follows:

A.6.1.1 Iron and Steel

The potential range and date of iron and steel objects is so wide that it is difficult to provide general guidance. In broad terms, iron and steel objects which are covered by a thick amorphous concrete-like coating (‘concretion’) are likely to be of archaeological interest and should be reported. Pieces of metal sheet and structure may indicate a wreck and should be reported. Specific operational measures are likely to apply in respect of ordnance (cannonballs, bullets, shells) which should take precedence over archaeological requirements. However, discoveries of ordnance may be of archaeological interest, and they should be reported.

A.6.1.2 Other Metals

Items made of thin, tinned or painted metal sheet are unlikely to be of archaeological interest. Aluminium objects may indicate aircraft wreckage from World War Two, especially if two or more pieces of aluminium are fixed together by rivets. All occurrences should be reported and remains of this nature may be subject to the Protection of Military Remains Act 1986. ‘Copper and copper alloy (bronze, brass) objects might indicate a wreck, or they may be very old. All occurrences should be reported. Precious metal objects and coins are definitely of archaeological interest because they are relatively easy to date. All occurrences should be reported’ (The Crown Estate 2014: 19).

Actions to take:

If possible, do not recover metal. It can be difficult and expensive to conserve and some types of site, such as aircraft, are covered by specific legislation which prohibits recovery without appropriate licences.

For metals which are lifted, lifting should be carried out carefully and the find should be photographed. All metals should be stored in cool seawater. Different metals should not be stored together. The shape of the concretion can be used to identify the item and as such concretions should not be removed. If the find is too large to cover in seawater, wrap it in soaked material and keep wet. Some metal products (e.g. lead, pewter and copper salts) can be toxic, so handle with gloves or wash hands thoroughly after contact.

Metals can sometimes be identified from the colour of their corrosion. Below is a table to help identify the type of metal used.

Table 2.1 Metals and corrosion patterns

Metal	Corrosion
Gold	No corrosion.
Silver	White, waxy layers that turn lilac in the light.
Copper/Copper Alloy (e.g. Bronze)	Dark red/purple/green/blue.
Iron/Steel	Black or rusty with a crust of concretion.
Lead	Grey or white crystals.
Pewter/Tin/Lead Alloy	Grey surface, possibly crystalline, soft or friable.
Aluminium	Little corrosion.

A.6.2 Ceramics

Pottery can be made from china, porcelain, terracotta, earthenware and other clay-based materials. Typical finds might include crockery, ornaments, clay pipes, lamps, containers and tableware. Any fragment of pottery is potentially of interest, especially if it is a large fragment. Items which look like modern crockery can be discarded, but if the item has an unusual shape, glaze or fabric it should be reported (The Crown Estate, 2014: 19). Additionally, clay pipes should be reported.

Actions to take:

Photograph finds with a scale, especially if they have any glazing or markings. Store in saltwater.

A.6.3 Ceramic Building Material

Ceramic building material can be in the form of bricks, building blocks, mudbricks, and tile. Bricks and tile can appear unusually shaped. Ceramic building material can be evidence of a ship, or submerged settlement.

Bricks with modern proportions and v-shaped hollows (‘frogs’) are of no archaeological interest. Unfrogged, ‘small’, ‘thin’ or otherwise unusual bricks may date back to Medieval or even Roman times and should be reported (The Crown Estate, 2014: 19). Occurrences of tile should also be reported.

Actions to take:

Photograph finds with a scale, especially if they have any glazing or markings on them. Store in saltwater.

A.6.4 Stone

Stone has been used by humans for thousands of years and it very durable underwater, making it a common find. There are different types of stone; quartz, limestone, marble, granite, obsidian, slate, sandstone, and flint. Typical finds might include ballast, anchors, millstones building material, shot, carvings, tools, sculptures, whetstones, flint or stone tools and other personal items.

Small to medium size stones that are shaped, polished and/or pierced may be prehistoric axes. All occurrences should be reported. Objects such as axe heads or knife blades made from flint are likely to be of prehistoric date and should be reported. Large blocks of stone that have been pierced or shaped may have been used as anchors or weights for fishing nets. All occurrences should be reported. The recovery of numerous stones may indicate the ballast mound of a wreck, or a navigational cairn. All occurrences should be reported (The Crown Estate, 2014: 19).

Actions to take:

Photograph with a scale and then store in water, or wrap in soaked towelling.

A.6.5 Skeletal Material and Faunal Remains

Skeletal finds and faunal remains can come in the form of bone, ivory, tooth, antler, baleen, tortoiseshell, tusk, or shell. Typical finds might include human or animal remains, personal items such as combs or jewellery, carvings and tool handles.

Discoveries of animal bone, teeth and tusks are of archaeological interest because they may date to periods when the seabed formed dry land, and should be reported. Such bones, teeth, tusks etc. may have signs of damage, breaking or cutting that can be directly attributed to human activity. Large quantities of animal bone may indicate a wreck (the remains of cargo or provisions) and should be reported. Human bone is definitely of archaeological interest, and may, if buried and found within territorial waters, be subject to the provisions of the Burial Act 1857. Alternatively, it may be subject to the Protection of Military Remains Act 1986. Any suspected human bone should be reported, and treated with discretion and respect.

Objects made out of bone – such as combs, harpoon points or decorative items – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate, 2014: 19).

Actions to take:

Skeletal finds are vulnerable to environment change, so if any are recovered, ensure they are photographed with a scale and then immediately submerge in seawater and seal in a suitable container. Change the water if biological growth occurs (e.g. algae mould).

A.6.6 Wood

Wooden finds could be evidence of a wrecked vessel. Typical wooden finds might include small personal items (e.g. tools and bottle corks), or larger finds (e.g. ships timbers, furniture, chests, barrels, dwelling posts, and wattle panels).

Light coloured wood, or wood that floats easily, is probably modern and is unlikely to be of archaeological interest. ‘Roundwood’ with bark – such as branches – is unlikely to be of archaeological interest, although it may provide paleo-environmental evidence. However, roundwood that has clearly been shaped or made into a point should be reported. Pieces of wood that have been shaped or jointed may be of archaeological interest, especially if fixed with wooden pegs, bolts or nails – all occurrences should be reported. Objects made out of dark, waterlogged wood – such as bowls, handles, shafts and so on – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate, 2014: 19).

Actions to take:

Timber finds are often very fragile and so must be lifted with care. Photograph with a scale. Do not allow the wood to dry out and ensure that it has sufficient support to stop it falling apart and submerge it in seawater. Keep the find in a cool and dark area. Change the water if biological growth is detected (e.g. algae or mould). If the find is too large to store in water, try to keep it damp and cool in a darkened area.

A.6.7 Peat and Clay

Peat is black or brown fibrous soil that formed when sea level was so low that the seabed formed marshy land, for example on the banks of a river or estuary. Peat is made up of plant remains, and also contains microscopic remains that can provide information about the environment at the time it was formed. This information helps us to understand the kind of landscape that our predecessors inhabited, and about how their landscape changed. It can also provide information about rising sea-level and coastline change, which are important to understanding processes that are affecting us today. Prehistoric structures (such as wooden trackways) and artefacts are often found within or near peat, because our predecessors used the many resources that these marshy areas contained. As these areas were waterlogged, and have continued to be waterlogged because the sea has risen, 'organic' artefacts made of wood, leather, textile and so on often survive together with the stone and pottery which are found on 'dry' sites.

Fine-grained sediments such as silts and clays are often found at the same places as peat. These fine-grained sediments also contain the microscopic remains that can provide information about past environments and sea level change. Any discoveries of such material would be of archaeological interest, and their occurrence should be reported (The Crown Estate, 2014: 20).

Actions to take:

Any sediments collected should be stored in a sealed container with seawater and keep cool. Do not try to break apart the deposits.

A.6.8 Fibre and Textiles

Fibrous finds are unlikely to survive in marine conditions, but occasionally they do. Typical fibrous finds might include ropes and rigging, weaving, sailcloth, sacks, clothing, basketry, fishing nets etc.

Actions to take:

Due to the incredibly fragile nature, once any fibrous or textile find has been recovered it must be dealt with quickly. Take photographs with a scale, but do not use flash. Carefully place it in a sealed container. Try to keep it out of the light. If possible, keep the find in its original burial deposit (e.g. the sediment it was found in, and seawater). This will help to protect the material.

A.6.9 Plastic, Robber, etc

In most cases, rubber, plastic, Bakelite and similar modern materials are not of archaeological interest and can be disregarded. One exception is where such materials are found in the same area as aluminium objects and structures, which may indicate aircraft wreckage from World War Two. Such material should be reported (The Crown Estate, 2014: 14).

Actions to take:

Do not bend or clean any plastic or rubber finds. Photograph the find with a scale and then store in seawater in a cool and dark area.

A.6.10 Resinous or Mineral Substance

These materials include amber, jet, coal, or bitumen. Typical finds might include ornaments, jewellery, beads, sealants or caulking materials, all of which would be of archaeological interest and should be reported.

Actions to take:

These finds might appear stable, but if they are not stored properly, they may begin to deteriorate. Photograph a find with a scale, and then keep stored in seawater.

A.6.11 Glass

Glass artefacts are found on the seabed. Finds may include bottles, beads, panes of glass from ship's windows. Unless obviously modern (beer bottles etc) glass finds should be reported, particularly where it occurs alongside other finds as this may represent a wreck site.

Glass is likely to survive in marine conditions, but it does degrade; glass deterioration is usually categorised by leaching, with causes an iridescent pattern to form on the glass, it looks somewhat like an oil slick. It can also begin to flake away.

Actions to take:

Photograph with a scale before packing carefully to avoid breakage. Ensure it is covered in cool seawater in the dark.

Appendix B - Protocol for Archaeological Discoveries: Preliminary Record Form

Protocol for Archaeological Discoveries	
Preliminary Record Form: Discoveries on the seabed/ on board/ in the intertidal zone / on land	
Company Name	
Vessel/Team Name	
Site/Sea Area Name	
Date	
Time of compiling information	
Name of compiler (Site Champion)	
Name of finder (if different from above)	
Time at which discovery was encountered	
Vessel position at time when anomaly was encountered	
Latitude	Longitude
Datum (if different from WGS84)	
Original position of the anomaly on the seabed, if known	
Notes on likely accuracy on position stated above:	
How accurate is the position?	
Is the position the original position or has the material been moved by operations?	
Details of circumstances that led to the discovery	
Description of the find / anomaly	
Apparent size /extent of the anomaly	
Details of any find(s) recovered	
Details of any photographs, drawings of other records made of the find(s) (e.g. location figure)	
Details of treatment or storage of find(s)	
Date and time Nominated Contact informed	
General notes if discovered on the seabed:	
Derived from (e.g. Obstacle Avoidance Sonar, Cable Tensiometer?)	
Apparent size/ extent of anomaly (length, width, height above seabed)	
Extent of deviation/ route development	
Signed	Date

APPENDIX D: ANCHOR HANDLING PROCEDURE.

LBA CCS PROJECT

Sealine DOUGLAS CCS – POINT OF AYR GAS PLANT
Onshore plant at Point of Ayr to Douglas CCS Platform cable connection

Anchor Handling Procedure

EX-DE	00	19/12/2025	Issued for Design	R. Van. de Walle	W.de. Wit	P. Gibson	N/A	G. Ceruti
Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approved	Company Approved
Revision Index								

Company logo and business name liverpool bay ccs	LCI Activity Code: **GB20240007** Project code: **000593**	Company Document ID: **10562701DNPK6029N** Job N.: JA1130
Contractor logo and business name Boskalis		Contractor Document ID: **0059359-BOS-ENG-PRO-5005** Contract N.: 5010005029
Vendor logo and business name		Vendor Document ID: **N/A** Purchase Order N.:

Sealine DOUGLAS CCS – POINT OF AYR GAS PLANT Onshore plant at Point of Ayr to Douglas CCS Platform cable connection	Project and SoW description LBA CCS PROJECT WP2 – Laying of Submarine Composite Cables	Scale N/A	Sheet of Sheets 1 /111
Document Title Anchor Handling Procedure		Supersedes N.: Superseded by N.:	
		Plant Area 01	Functional Unit 000

Software: Microsoft Word File Name: 10562701DNPK6029N_EXDE00_111.docx

REVISION LIST

00	Issued for Design

HOLD RECORD

ANCHOR HANDLING PROCEDURE

Project Name	**Composite Cable Installation LB CCS Project**
Project Document Reference	**0059359-BOS-ENG-PRO-5005**
COMPANY Document Reference	**10562701DNPK6029N**
COMPANY Revision Code	**00**

Rev.	Issue Purpose	Date	Initiated	Checked	Verified	Approved
001	Issued for Approval	19/12/2025	R. Van de Walle	T. Plant	W.de. Wit	P. Gibson

Revision History		
Revision	**Section**	**Change**
01	All	First Issue

HOLD point register			
Nr.	**Description / Ref of HOLD point**	**Responsible Party**	**Status**
01	Finalization of crossing agreements	BSC	Open
02	Selection of anchor type following analysis results of pre-engineering survey	BSC	Open
03	Station keeping result Survival pattern Welsh Channel	BSC	Open
04	Finalization of onshore landing methodology for beach anchor deployment	BSC	Open

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LIST OF FIGURES

LIST OF TABLES

1. PROJECT INTRODUCTION

For a general overview of the project and its scope reference is made to the Project Introduction, [01]. For a general overview of all available project documentation reference is made to the Project Master Document Register, [02].

1.1 Purpose of document

The purpose of this document is to:

- Describe the methodology for anchor handling operations for the CLV during the Liverpool Bay CCS Project with the objective to inform Employer and MWS and get approval for the planned works where applicable;
- Serve as a manual to the offshore crew for the scope as described in section 1.2;
- Ensure a safe and smooth execution of the planned operations.

1.2 Scope of document

The scope of the document summarized as:

- Present indicative anchor patterns for the CLV;
- Positioning of the anchors by AHT;
- Recovering of the anchors by AHT;
- Measuring, Installation and recovery of midline buoys;
- Anchor operations in the vicinity of third-party assets;
- Positioning of anchor wires and connection to beach anchor forerunners.

The scope of work described in this document interfaces with the scopes described within the following project procedures:

- Onshore Landing Procedure – CLV [09];
- Onshore Landing Procedure – Land Side [010];
- Site Setup & Mobilization Procedure [011] ;
- Lay & Burial Procedure NDurance [012];
- Beaching Procedure Ndurance [015].

1.3 Organogram

The organogram presented in the figure below is applicable to the execution of the works presented within this document. For the overall Project Organogram reference is made to [03].

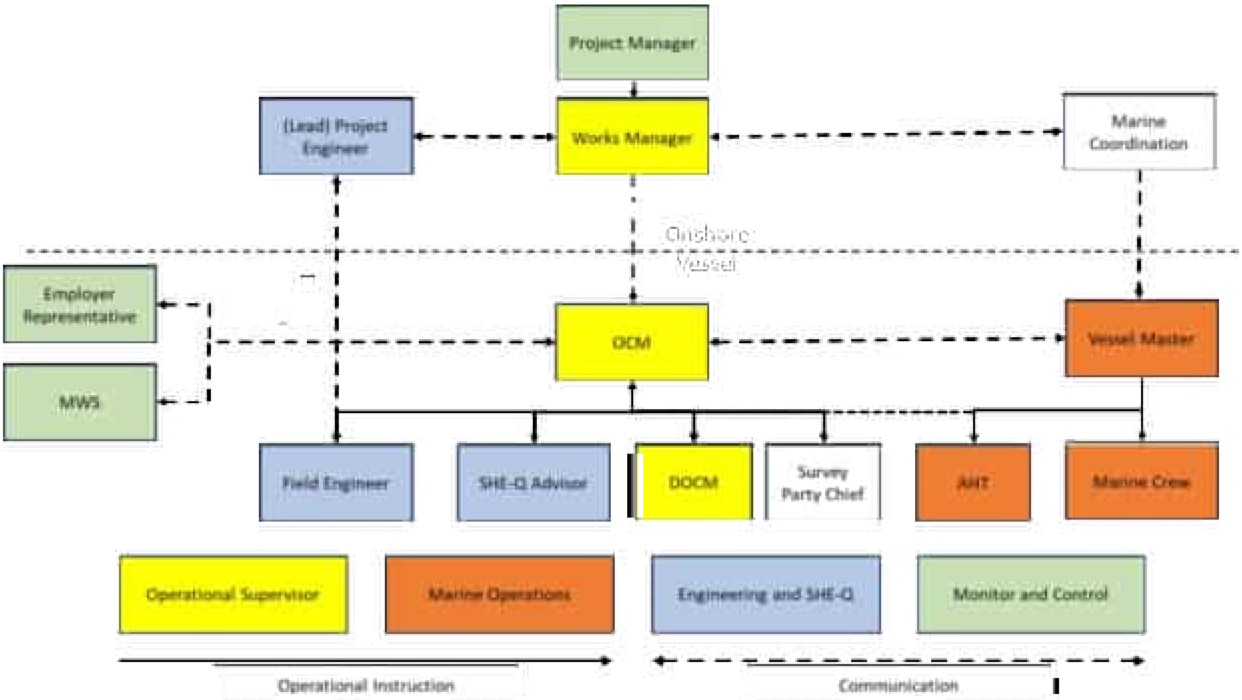


Figure 1: Operational organogram

2. ABBREVIATIONS & DEFINITIONS

2.1 Abbreviations

Table 1 – Document and project specific abbreviations

Abbreviation	Definition	Abbreviation	Definition
AMS	Anchor Management System	NM	Nautical Mile (=1,852 meter)
AHT	Anchor Handling Tug	OCM	Offshore Construction Manager
CLV	Cable Lay Vessel	PLGR	Pre-Lay Grapnel Run
CPS	Cable Protection System	PML	Project Material List
DGPS	Differential Global Positioning System	RA	Risk Assessment
DMS	Document Management System	RPL	Route Position List
DNV	Det Norske Veritas	SI	Système International d' Unités (International System of Units)
DP	Dynamic Positioning	SOLAS	Safety of Life at Sea
HAZID	Hazard Identification	TBT	Toolbox Talk
JSA	Job Safety Analysis	TMS	Tug Management System
KP	Kilometer Point	TP	Task Plan
MDR	Master Document Register	UKC	Under keel clearance
MOC	Management of Change	UXO	Unexploded Ordnance
MWS	Marine Warranty Surveyor	WOW	Way of Working

2.2 Units

The following table provides a definition of non- SI units used throughout this document.

Table 2 – SI Units

Symbol	Non-SI-Unit	Expressed in SI-Units
t	Ton	1000 kg
NM	Nautical Mile	1.852 m
kn	knots	1 NM/h
N	Newton	m·kg·s-2

2.3 Definitions

Table 3 – Definitions

Term	Definition
Employer	Liverpool Bay CCS
Contractor	Boskalis Subsea Cables B.V.
LBA CCS	Liverpool Bay Carbon Capture and Storage
Subcontractor	N/A

3. REFERENCES

3.1 BSC Project Documents

Table 4 – Boskalis Project Documents

Ref.	Document Title	BOS Document Number	External Document Number
[01]	Project Introduction	0059359-BOS-PMT-REP-1002	105627-01-D-G-RV-0102N
[02]	Master Document Register	0059359-BOS-DCC-REG-1001	10562701DGED0101N
[03]	Project Organigram	0059359-BOS-PMT-CHA-1005	10562701DGFD0105N
[04]	Project Schedule	0059359-BOS-PLA-SCH-1006	10562701DGPR0106N
[05]	As-Built Documentation Procedure	0059359-BOS-ENG-PRO-1007	105627-01-D-G-PT-0107N
[06]	Emergency Response Plan	0059359-BOS-SHE-PLA-1010	10562701DFPA0501N
[07]	Emergency Notification Chart	0059359-BOS-SHE-CHA-1011	105627-01-D-B-QV-0050N
[08]	Project Health Safety Plan	0059359-BOS-SHE-PLA-1014	10562701DFQW0503N
[09]	Onshore Landing Procedure – CLV	0059359-BOS-ENG-PRO-5103	105627-01-D-N-PK-6036N
[010]	Onshore Landing Procedure – Land Side	0059359-BOS-ENG-PRO-5807	105627-01-D-N-PK-6045N
[011]	Site Setup & Mobilization Procedure	0059359-BOS-ENG-PRO-5801	105627-01-D-N-PK-6038N
[012]	Lay & Burial Procedure NDurance	0059359-BOS-ENG-PRO-5104	105627-01-D-N-PK-6039N
[013]	PLGR Procedure	0059359-BOS-ENG-PRO-5001	105627-01-D-N-PK-6025N
[014]	Survey & Positioning Procedure NDurance	0059359-BOS-SUR-PRO-3205	105627-01-D-Y-PT-9006N
[015]	Beaching Procedure Ndurance	0059359-BOS-ENG-PRO-5108	105627-01-D-N-PK-6084N
[016]	Station Keeping Analysis NDurance – Anchor	0059359-BOS-ENG-REP-2204	105627-01-D-N-CA-6009N

3.2 WOW Documents

Table 5 – Boskalis WOW Documents

Ref.	Document Title	WOW Document Number	External Document Number
[101]	Toolbox Talk Form	BSCF-SHEQ-203-02-01-FM-01	-
[102]	MD Management of Change	BSCF-SHEQ-110-MD	-
[103]	Management of Change Form	BSCF-SHEQ-110-FM-01	-

3.3 Third Party and Employer Supplied Documents

Table 6 – Third Party and Employer Supplied Documents

Ref.	Document Title	BOS Document Number	External Document Number
[201]	Marine-Operations-and-Marine-Warranty	N/A	DNVGL-ST-N001
[202]	Cable Design Report	N/A	10245601DERV00129
[203]			

4. TECHNICAL INFORMATION

4.1 Weather

Contractor will receive weather forecasts from 2 independent sources for the duration of the operations. Forecasts are received at least every 12 hours, and are checked against the known weather limits by the OCM, Vessel Master, MWS onboard and Client Representative in order to assess whether operations should to commence, continue or be halted.

In accordance with DNVGL [201] the operation(s) described in this document are considered significant and are characterized by a moderate sensitivity with regards to environmental conditions.

Applicable operational limits based on DNVGL standard Marine-Operations-and-Marine-Warranty [201] Table 2-4, are presented within Table 7 below. The second part of the table provides applicable limits for ceasing operations. Further contingencies in case of adverse weather are described in section 6.

The weather limits in Table 7, are determined by the safe operability limits of the AHTs for the operations described. The CLV Master and AHT Master will have a final decision in operation limits during the operations. They have the responsibility to verify the limit based on planned operations, wave heading, wave period, current conditions, etc.

Table 7 – Operational limits and ceasing operations

Installation – Operational and Weather Limits										
Operation	Planned duration T_{POP}	maximum contingency time T_C	Operation reference period T_R	OP_{LIM}			α-factor	OP_{WF}		
	[hr]	[hr]	[hr]	Limit	Value	Unit	[-]	Limit	Value	Unit
Anchor handling operations	2	1	3	Hs	1.4*	[m]	0.73	Hs	1.0	[m]
				Wind	15	[m/s]	0.80	Wind	12	[m/s]
				Current	-	[m/s]	-	Current	-	[m/s]
Anchor handling operations Reduced UKC	2	1	3	Hs	1.0*	[m]	0.68	Hs	0.68	[m]
				Wind	15	[m/s]	0.80	Wind	12	[m/s]
				Current	-	[m/s]	-	Current	-	[m/s]
*Hs limits depend on wave period and resulting vessel motions.										

4.2 Site Overview

An overview of the nearshore area is provided in Figure 2. The image shows the POA cable RPL from KP 0 – 15 , anchor corridors, nearby 3rd party assets and exclusion zones. In addition, it shows the West Hoyle Spit sandbank between KP 2.2 – 4 in green.

The nearshore area has large variations in seabed elevation. Over a length of 3 km the seabed changes from 0 mLAT in the shore landing area to 9 mLAT in the Welsh Channel, back up to 0 mLAT around KP 3 – 4 on the West Hoyle Spit and then steadily increases in depth to 10 mLAT around KP 15. The bathymetry is presented in Figure 3. Furthermore, the bathymetry in Figure 3 shows shallow water for anchor handling operations between KP 2.3 – KP 6.

The Welsh Channel is a shipping channel that provides access to the Port of Mostyn. It is draught restricted and access should be planned with regards to vessel's draught and tidal planning. The channel crosses the RPL between KP 1.5 – 2.0. The slopes of the channel steeply go down from 0 mLAT at KP 1.3 to 9 mLAT at KP 1.6 and up again to 1.5 mLAT at KP 2.3, Figure 3.

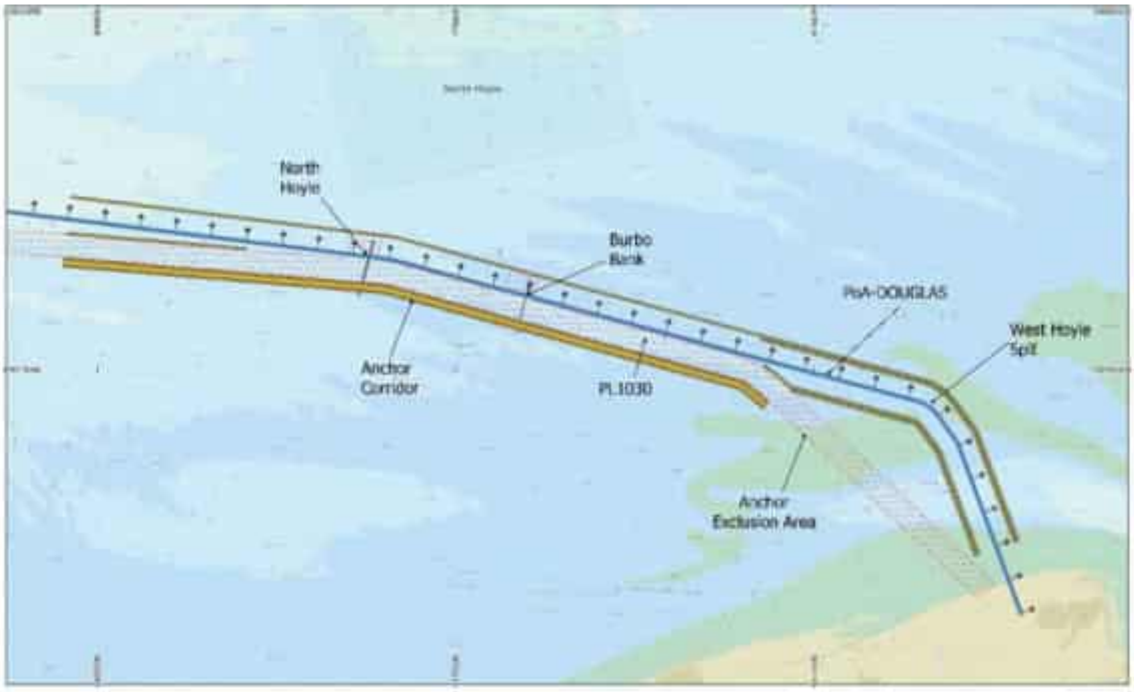


Figure 2: Nearshore site overview KP 0 - 15

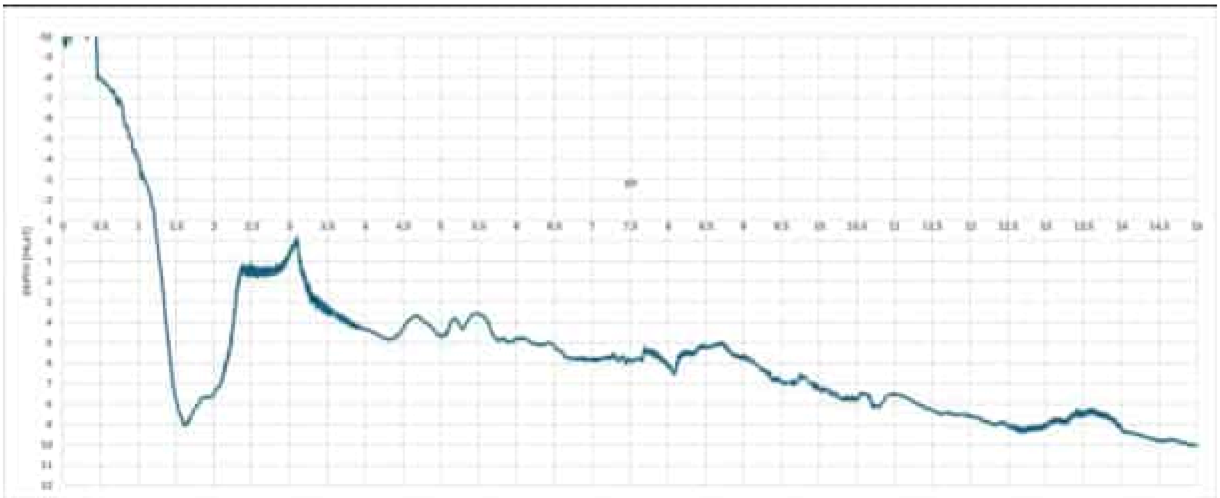


Figure 3: Nearshore bathymetry.

4.2.1 Tidal information

A local current model of the nearshore area has been prepared. The anticipated current directions are presented in Figure 4.

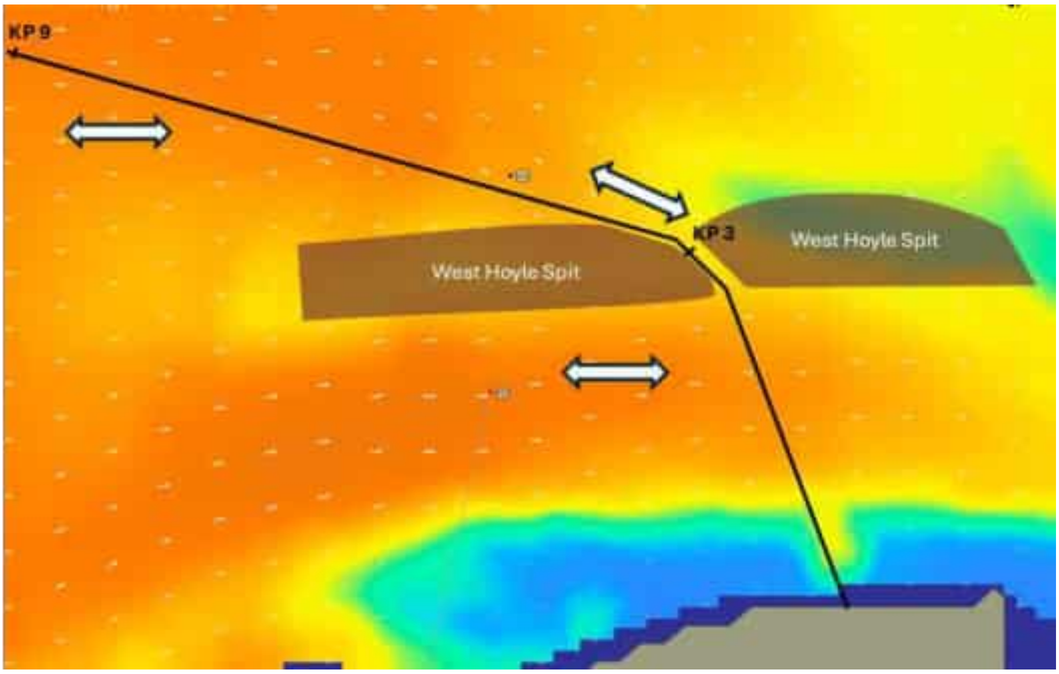


Figure 4: Current directions in nearshore area.

Astronomical tidal predictions on the nearshore area for the months July - October are given below, showing a tidal range of 0 – 8 m. Predicted heights are in meters LAT and the tide is semi-diurnal.

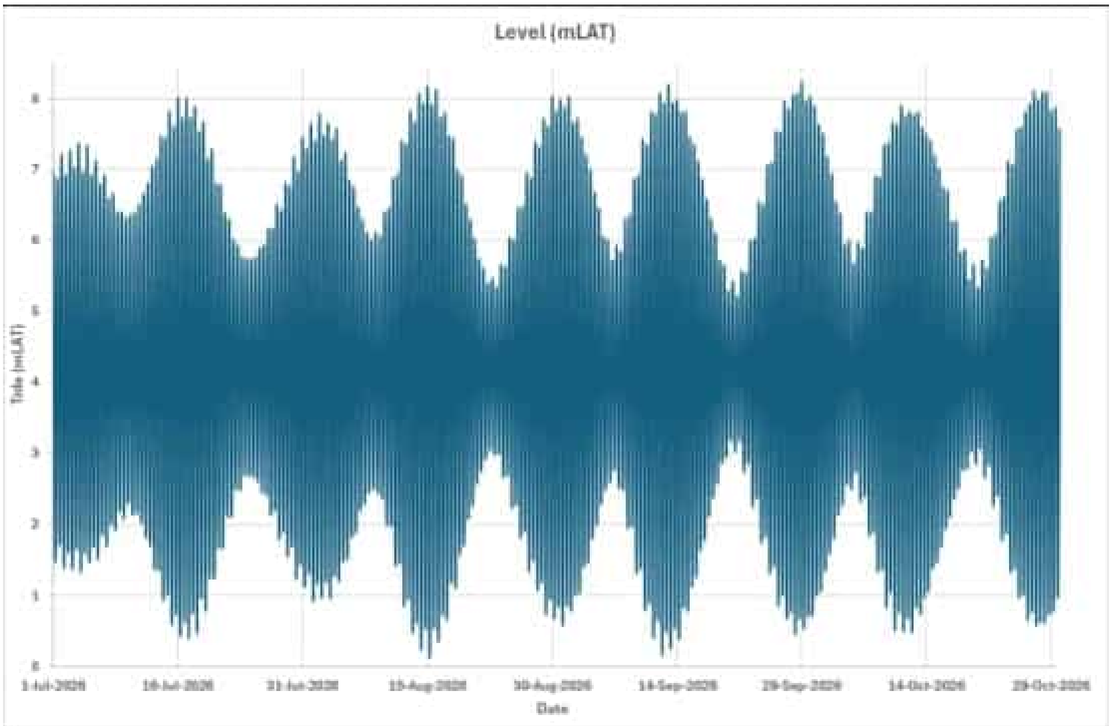


Figure 5: Tidal information nearshore area.

4.3 3rd party assets

The 3rd party assets that are to be crossed by the POA cable route and will be spanned over by the CLV's anchor wires are listed in Table 8. POAX 1 – 3 are expected to be crossed by all 7 anchor wires, an overview of the nearshore crossings is provided in Figure 6. The remaining crossings are expected to be crossed with the pull anchor wire. Minimum clearances and exclusion zones have been agreed with the asset owners in crossing agreements [HOLD01].

In addition, the following ENI pipeline runs parallel south of the cable route and will be spanned by the CLV's Port side anchor wires:

- PL1030 – start KP 5.5, offset 100 m – End KP 32, offset 100m.

The burial depth of the 3rd party assets will be assessed prior to the start of the anchor handling operations following a pre-lay survey of the cable route. Table 9 shows that in data from 2025 the pipeline is buried less <1.0m between KP 10.7 – KP 11.2. Further information on the actions taken when anchoring over this section and over the crossings is given in section 4.14.

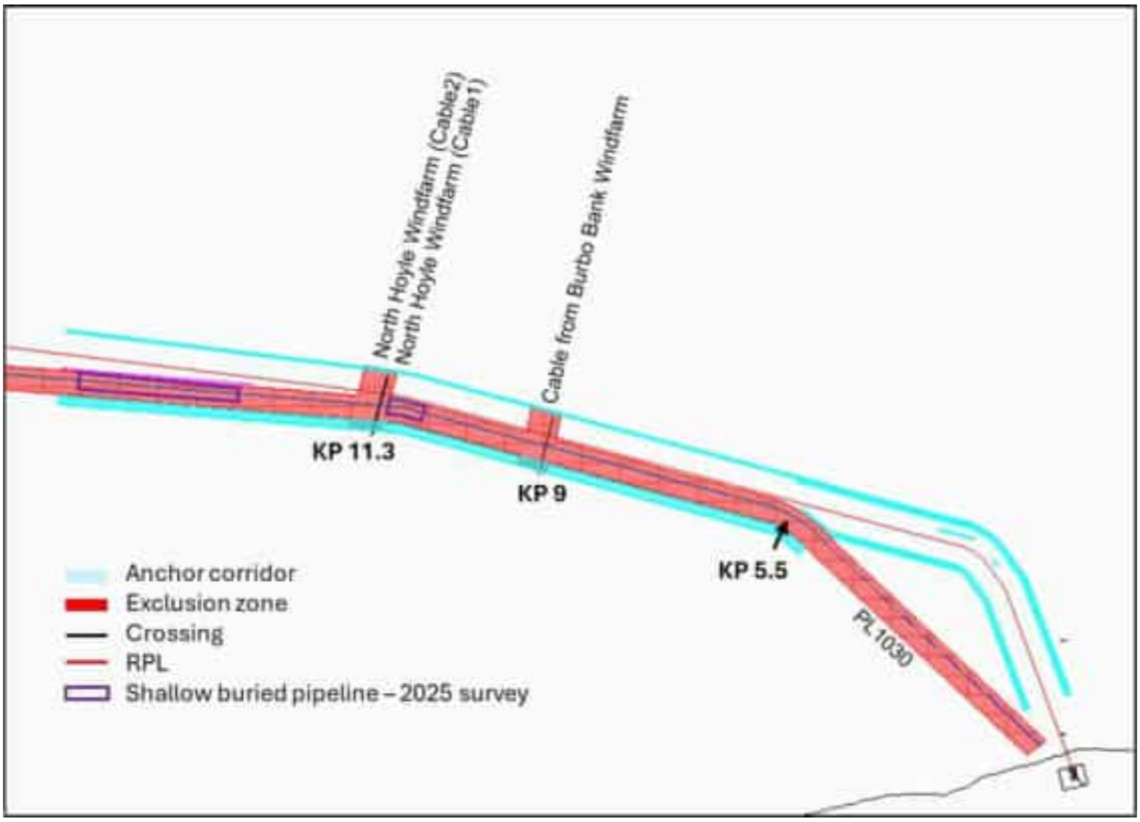


Figure 6: Schematic overview nearshore area with 3rd party assets POAX 1 – 3 and PL1030.

Table 8 – Crossing overview.

Crossing	Crossing ID	Crossing KP	Exclusion zone* [m]		Min. vertical clearance
			Pull towards	Pull away	
Burbo Bank Windfarm cable	POAX-1	9.02	300	100	[HOLD01]
North Holy Windfarm cable1	POAX-2	11.26	250	100	[HOLD01]
North Holy Windfarm cable2	POAX-3	11.28	250	100	[HOLD01]
Gwynt y Môr Wind Farm (Export Cable)	POAX-4	18.32	300	100	[HOLD01]
Gwynt y Môr Wind Farm (Export Cable)	POAX-5	18.38	300	100	[HOLD01]
Gwynt y Môr Wind Farm (Inter Array Cable)	POAX-6	25.26	300	100	[HOLD01]

Western Link HVDC Cable - Pole 1	POAX-7	31.37	300	100	[HOLD01]
Western Link HVDC Cable - Pole 2	POAX-8	31.37	300	100	[HOLD01]
2 x 3” Condensate to PoA	POAX-9	32.72	300	100	[HOLD01]
20” Gas to PoA (PL1030)	POAX-10	32.73	250	100	[HOLD01]
Pipeline PL1030 parallel	N/A	See Table 9.	250	100	See Table 9.
*Exclusion zones have been agreed with asset owner [HOLD01]					

Table 9 – PL1030 pipeline information.

3rd party asset		Value	Unit
Pipeline parallel to RPL	Start	5.5	[KP]
	End	32.7	
Coordinates pipeline parallel to RPL start	Easting	474489	-
	Northing	591473	-
Coordinates pipeline parallel to RPL end	Easting	461762	-
	Northing	5932068	-
Exclusion zone pull towards		250	[m]
Exclusion zone pull away		100	[m]
Pipeline burial depth >1.0 m*		5.5 – 10.7	[KP]
		11.2 – 13.5	
Pipeline burial depth <1.0 m*		10.7 – 11.2	[KP]
		13.5 – 15.5	
*Data from 2025 pre-survey			

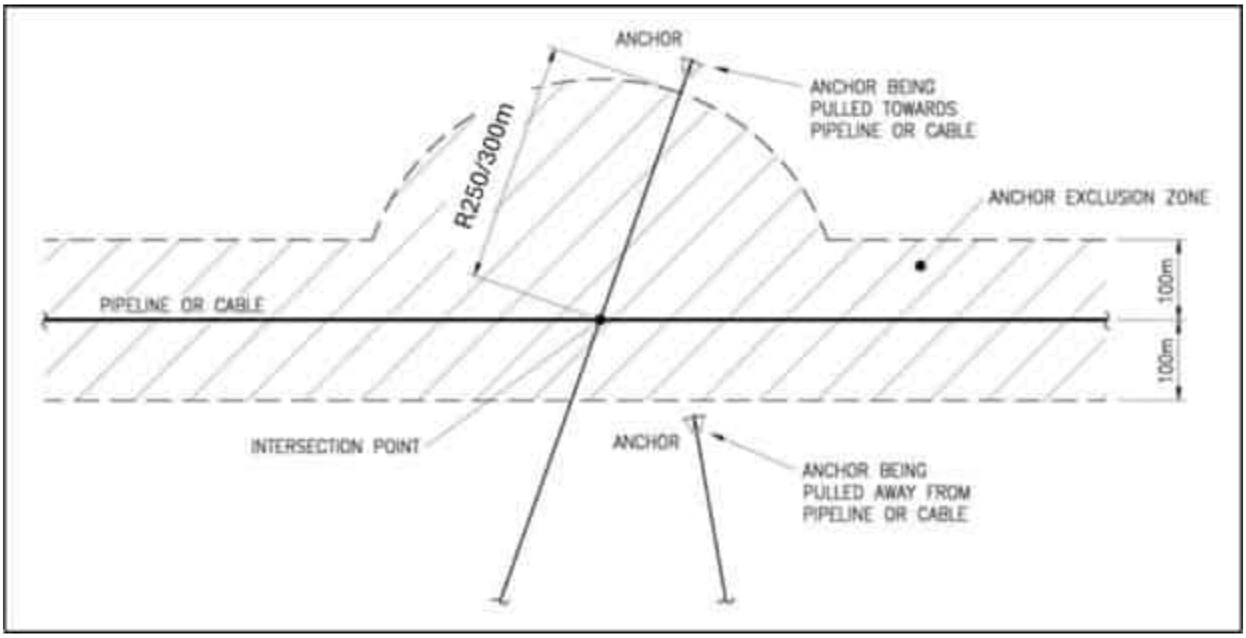


Figure 7: Exclusion distances with respect to anchoring in vicinity of 3rd party assets.

4.4 CLV NDurance

Detailed information on the CLV NDurance can be found in Appendix I, a summary is given in Table 10 below.

Figure 8: CLV NDurance.

Table 10 – Main specifications CLV Ndurance

CLV specifications		
Specification	**Value**	**UNIT**
CLV		
Name	Ndurance	[-]
Type of vessel	DP2 Cable Laying Vessel	[-]
Length x width x depth	99.0 x 30.0 x 7.0	[m x m x m]
Class	Bureau Veritas	[-]
Design draught	4.8	[m]
Cable Lay Spread on CLV		
Carrousel capacity	4,400	[t]
Carousel inner dimensions (D_{outer} x D_{inner} x H)	25.98 × 10.00 × 5.50	[m]
Carrousel rotation	loading: counter-clockwise laying: clockwise	[-]
Maximum loading speed	1,000	[m/h]
Loading tower tensioner pulling capacity	3.0	[t]
Deck tensioner pulling capacity	15	[t]
Chute radius (minimum)	5.0	[m]
Cable track radius (minimum)	5.0	[m]

4.4.1 Mooring system components

On the CLV, seven individually controlled constant tension winches are installed. All seven winches will be utilized for the operations. The specifications of the mooring system components and anchors are included in Table 11 and typical rigging drawings for the anchors are included in Appendix D and Appendix E.

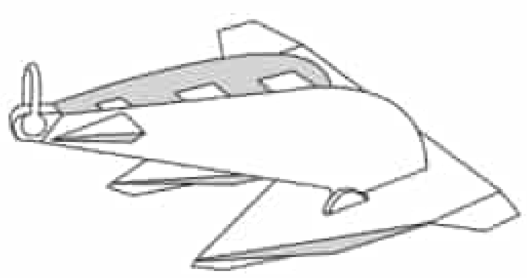


Figure 9: Example of Stevpris Anchor

Table 11 – Mooring System Components

Mooring system components				
Leg 1 - 6	Lines	Length	850	[m]
		Type	6 x 36 WS 48 mm	[mm]
		MBL	1610	[-]
		ULS Load	966	[kN]
		ALS Load	1288	[kg/m]
		Weight	9.42	[t]
		EA @ 20% load	110 000	[t]
	Winches	Pull force Constant tension	500	[-]
		Brake Holding Force	1177	[t]
	Anchors	Type	Delta Flipper 7t / Stevpris Mk5 5t [HOLD02]	[-]
		UHC sand / clay	1648 / 1236 Delta flipper 1720 Stevpris	kN
Leg 7	Anchor Wire	Length	2000	[m]
		Type	6x41 WS IWRC	[-]
		MBL	4238	[kN]
		ULS Load	2543	kN
		ALS load	3390	kN
		Weight	20.4	[kg/m]
	Winches	Brake Holding Force	200	[t]
		Pulling Force	150	[t]
	Anchors	Anchor type	Stevpris MK5	[-]
		Anchor Weight	12	[t]

4.5 AHTs

Anchor Handling Tugs (AHTs) are used for the anchor handling of the CLV. The main tug for handling of the pull anchor is the Lingestroom, or similar, see Figure 10. In addition, the Coastal Crown (Figure 11) or similar, will be assisting with shallow water anchor handling of the positioning anchors. The vessel specification sheets are provided in the Appendix J and Appendix K. A summary of the specifications are given in Table 12 and Table 13 for the Lingestroom and Coastal Crown respectively.

Figure 10: Typical main AHT

Table 12 – Main specifications typical AHT

Description		Value	Unit
Name		Lingestroom	[-]
Type of vessel		Anchor Handling Tug	[-]
Classification		BV - I HULL • MACH / Tug, Special service- multipurpose ship / Unrestricted navigation • AUT-UMS - Notation: Anchor Handling/ Notation: Clean ship NSI - Unrestricted navigation # IMO - Inventory of Hazardous Materials (Green Passport)	[-]
Dimensions	Length	34.80	[m]
	Width	12.00	[m]
	Depth	4.30	[m]
Draft	Minimum	2.90	[m]
	Maximum	3.40	[m]
Gross tonnage		476	[t]
Bollard pull		61.8	[t]

Figure 11: Typical shallow draft AHT

Table 13 – Main specifications typical shallow draft AHT

Description		Value	Unit
Name		Coastal Crown	[-]
Type of vessel		Multicat / Anchor Handling Tug Anchor handling Tug, Special Service Multipurpose ship, Unrestricted Navigation	[-]
Classification		1 ✠ Hull ● Mach ✠ AUT-UMS Dynapos AM/AT-R DP-2 class certified	[-]
Dimensions	Length	37.00	[m]
	Width	11.84	[m]
Draft	Minimum	1.74	[m]
	Maximum	2.12	[m]
Gross tonnage		420	[t]
Bollard pull		61.8	[t]

4.6 Positioning equipment

A dedicated navigation system for the vessel is utilized throughout the project, including a full Tug Management System (TMS) for the AHT's. Anchor positionings and all the involved marine fleet are monitored via TMS. The coordinates for each specific target are given to the relevant assisting vessel via the TMS and remotely supervised via the survey screen on the CLV. The anchor buoys shall be fitted with AIS beacons to allert the anchor positions to 3rd party vessels. Details of this system are included in the Survey & Positioning Procedure NDurance [014].

Anchor patterns as in Appendix H for the CLV are produced as a guide to anchor handling operations in critical anchoring locations and shall be adjusted by the Master according to the prevailing site conditions (current directions, current speed, etc.) and other conditions. The TMS is used to ensure that anchors are deployed as close as reasonably possible to as-planned locations and in the anchor corridors.

At all times, information on position of anchors, anchor wire tension and length of wire paid out are displayed in the vessel control room. All the anchor positions and other relevant data shall be logged.

4.7 Mid-line buoys

Midline buoys are installed on anchor wires crossing existing subsea assets to maintain the required clearance between them, when applicable. See section 4.3 for an overview of the 3rd party assets.

The anchor buoy's minimum buoyancy requirement is sized according to the anchor wire diameter. A schematic overview of the rigging arrangement is provided in Figure 12, a detailed overview is given in Appendix G.

The vessel measures and marks the distance for the midline buoys with the assistance of the survey system. The AHT first spools anchor wire on its work drum (winch). Then the AHT sails to the midline buoy location and installs the midline buoy on the anchor wire. The AHT shall deploy the anchor once the midline buoy is installed.

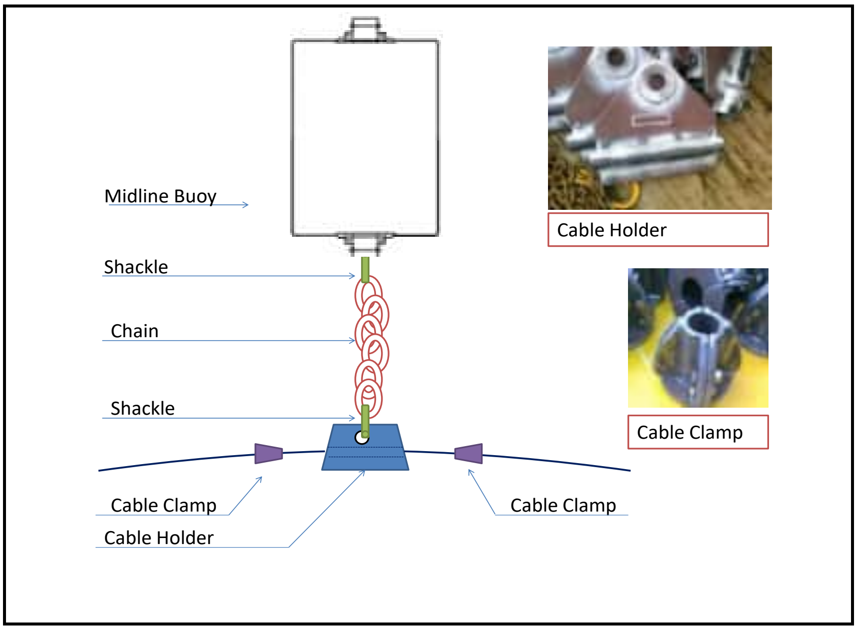


Figure 12: Midline buoy arrangement

4.8 Preparations Before Approaching the Site

The vessel and the AHTs shall be ready for the anchor handling operations when arriving on site. The following steps shall be taken before approaching the site:

- Establish communication lines with all parties involved;
- Test and run the equipment: appliances on the deck + positioning equipment;
- Prepare deck to allow for a smooth operation;
- Inform crew and ensure their availability and understanding;
- Perform and complete relevant Safety Drills;
- Hold Toolbox Talks with the involved crew;
- Approval for crossing or working in close proximity to third party assets is a pre-requisite. Note that obtaining approval/consent from third party asset owners is under Employer's responsibility

The AHT shall organize the winch drums to be cleared of all pennants other than the work wire.

4.9 Anchor patterns

Figure 13 shows 5 areas on the nearshore cable route, with corresponding anchor patterns as given in Appendix H:

- Shore landing position – Nearshore anchor pattern
- Pre-beaching position – Survival pattern Welsh Channel [HOLD03]
- Alter course – Any applicable anchor pattern
- Post-alter course – Standard pattern
- Crossing – Crossing pattern with mid-line buoys (Survival)

The anchor patterns given in Appendix H are indicative and anchor planning shall be modified on board on the day of operations considering the dynamic nature of the weather, and other local conditions on site. Anchor patterns are on the CLV master's discretion, see also section 4.13. A station keeping analysis for the relevant anchor patterns is provided in Station Keeping Analysis NDurance – Anchor [016].

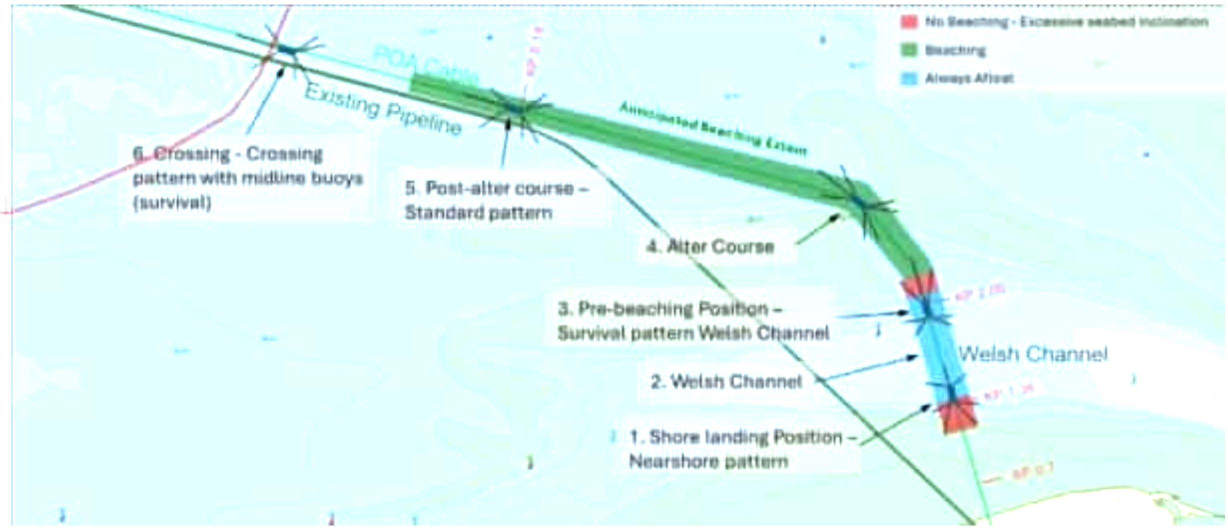


Figure 13: Anchor areas on nearshore cable route.

4.9.1 Shore landing position

At the shore landing position, the indicated Nearshore anchor pattern, Appendix H, is intended for the CLV to set up in after arriving to site. In this pattern the CLV awaits the start of the shore landing operations and performs these operations. The pattern is designed to allow for the Welsh Channel to remain partially open while the CLV is in position, see also section 4.12.

4.9.2 Welsh Channel

Over the Welsh Channel, any of the indicated anchor patterns is intended to be used, as best suited to accommodate the local environmental conditions.

4.9.3 Survival pattern Welsh Channel [HOLD03]

At the pre-beaching position, the indicated Survival pattern Welsh Channel, Appendix H, is intended for the CLV to remain in while awaiting a weather window for the beaching operations to cross the West Hoyle Spit. This pattern addresses the expected beam-on current conditions in the Welsh Channel, Figure 4. The pattern is designed to allow for the Welsh Channel to remain partially open while the CLV is in position, see also section 4.12.

4.9.4 Alter course

At the alter course over the West Hoyle Spit, any of the indicated anchor patterns is intended to be used, as best suited to accommodate the required vessel heading changes.

4.9.5 Post-alter course

After the alter course over the West Hoyle Spit, the indicated Standard anchor pattern, Appendix H, is intended for the CLV to proceed with the simultaneous lay and burial operations over the remainder of the nearshore section of the RPL.

4.9.6 Crossing / Survival pattern

At the nearshore crossing at KP9 (POAX 1) and potentially at the crossing at KP12 (POAX 2 – 3), the indicated Crossing pattern with mid-line buoys, Appendix H, is intended for the CLV to cross the subsea asset. The 3rd party assets are described in Table 8.

This anchor pattern may also serve as a survival pattern for the section of the RPL beyond the later course over the West Hoyle Spit. This pattern addresses survival conditions for bow-on currents that are expected in this section of the RPL, Figure 4.

4.10 Moving into Position

CLV will arrive in deeper waters and switch to DP2 mode. The CLV will perform DP trials. Then she will move towards the RPL to position herself in the first anchoring position at the edge of the Welsh Channel, see 4.9.1 and Appendix H for the proposed anchor pattern. The CLV will aim to setup its anchor spread to minimize hindrance to the shipping lane in the Welsh Channel. In this anchor spread the CLV will connect to 2 beach anchors [HOLD04]. After setting up on anchors, the CLV will move into position to await the onshore cable landing, reference is also made to Onshore Landing Procedure – CLV [09].

4.11 Anchor Proof Loading Test

CLV stays on DP until the completion of the anchor spread setup. Thereafter, proof loading test is to be conducted on all anchors to test and confirm the anchor holding on the seabed.

CLV applies approx. 15-20t tension for 10-15mins on each anchor during the test. Anchor movement is closely monitored via AMS – Anchor Management System. An anchor with excessive slippage shall be immediately recovered and redeployed within the designated area. Following anchor slippage, the anchor is to be repositioned and a re-test of 15-20t for 10-15 mins applies.

Operations will proceed once proof loading test is successfully completed. During operations, when an anchor is to be redeployed, it will be proof loaded again for a short duration of time under the discretion of vessel Master.

4.12 Guard vessels

While the CLV is operating in and around the Welsh Channel, the AHTs shall serve as guard vessels when they are not performing anchor handling operations. This to minimize the required safety exclusion zone around the anchor spread and allow for 3rd party vessels to pass through the shipping channel. The exclusion zones shall remain under the CLV Master's discretion.

4.13 Anchor Handling Operations

4.13.1 Preparing anchor plan

During the planning phase of the project, the complete cable installation route shall be inspected and evaluated by the Vessel Master, Chief Surveyor, Offshore Construction Manager (OCM) and, where possible, the Anchor Handling Tug (AHT) Master. Prior to commencing operations, the anchor plan shall be discussed and studied, the following parameters shall be considered. These parameters will also be displayed on the TMS / AMS and survey screens:

- Required cable route;
- Water depth (bathymetry) in combination with tide levels;
- Seabed features;
- Anchor exclusion zones, e.g. UXO, AEZ, etc.;
- Crossing areas;
- Other nearby 3rd party assets
- Shipping lanes/vessel routes;
- Surveyed anchor corridor;
- Actual weather conditions;
- Expected soil type;
- As-built location cable.

Given the dynamic nature of the weather, and other local conditions on site, anchor planning shall be modified on board the vessel on the day of operations to suit the actual site conditions. Final approval to proceed shall be granted by the CLV Master. The anchors shall be set out in such a way that minimal anchor movement is required.

Prior to the operations Employer shall notify Third-Party Asset Owner(s) and the Port of Mostyn authorities for anchor handling operations in the notification area.

4.13.2 Operations

Throughout anchor handling operations, the crews on CLV and on AHT's will make visual checks on the anchor handling equipment, whenever possible. All damages or malfunctioning shall be directly reported to AHT/CLV Master and the OCM shall proceed accordingly as far as practicable possible to repair and/or replace and warrant for the functionality.

The anchors shall be made visible by fitted lights to the buoy(s) so that the anchors are also visible during hours of darkness.

Before permission is given to lower the anchor, the position of the AHT's shall be checked by Surveyor, as per task plans in the appendix. After receiving confirmation from the CLV, an anchor can be deployed.

The anchor is lowered with tension on the seabed, keeping the pennant wire under an angle. Adequate pennant wire is to be deployed without creating buoyance to the anchor. Once the pennant buoy departs from the AHT, the buoy shall show the "as installed" position of each anchor. Anchor deployment locations are included in the TMS / AMS as well as on the survey screens of the vessel and the AHTs. Contractor, if required, shall inform intended and as laid anchor positions to traffic/ marine coordinator.

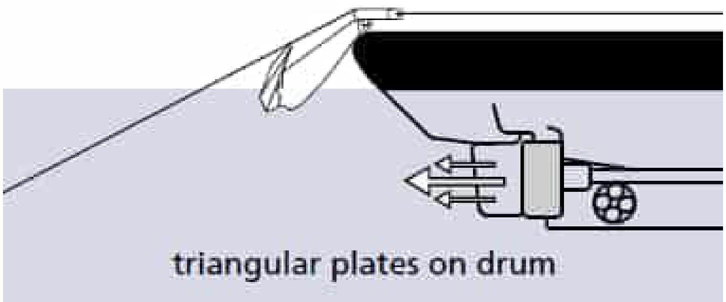


Figure 14: Anchor lowering from AHT

After the anchor has been deployed a proof loading test shall be done as per section 4.11. An anchor slip alarm is in place that continuously monitors anchor positions, line tensions and line lengths, with a threshold set to 50 m.

Generally anchor handlers will deploy the anchors with in an accuracy of approx. 25m from provided anchor deployment coordinate. When anchoring near nearshore 3rd party assets, POAX 1 – 3 and PL1030 in Table 8, the accuracy range of the TMS / AMS system is scaled down to provide 10m accuracy during anchor placement. This will be visual on the AHT's TMS / AMS system.

4.14 Anchoring over 3rd party assets

Anchor handling near and over the third-party assets described in Table 8 shall be kept to a practical minimum. Prior to commencing of operations, the Employer and Third-Party Asset Owner(s) shall be notified as per section 4.13. For every asset that is crossed with an anchor wire a method statement has been shared with the 3rd party asset owner.

When anchoring over the crossings and shallow buried areas of the PL1030 pipeline, special attention is paid to the operations and the following precautions are taken:

- Mid-line buoys are to be applied to obtain sufficient vertical clearance between anchor wire and asset, section 4.7;
- TMS / AMS system is set to 10 m accuracy for anchor deployment, section 4.13;
- Anchors to be recovered to the AHT decks when traversing over subsurface assets;

- Management of anchor wire tension to minimize anchor wires dragging along the seabed;
- Exclusion zones to be included in the TMS, section 4.13;
- Coordinates for each specific target given by TMS and supervised by CLV section 4.13;
- Continuous monitoring of anchor slip alarm, section 4.13;
- Recovery and deployment of anchors via pennant wires and buoys, section 4.13.

5. OPERATIONS

Description of planned operations
TP/01 Preparations
The main activities include: • Communication checks • Readiness checks • Familiarization meetings • Review of functionality of tools, equipment and all relevant systems • Review of required as-built data to be recorded • Assessment on weather and environmental conditions • Review of anchor plans and adjust whenever necessary • Review of sensitive areas • Notification from Employer after Employer has obtained the approval to commence works in proximity to third party assets
TP/02 Setup and deployment of anchors
The main activities include: • Preparation and transfer of anchor deployment materials from vessel to AHT wherever applicable • Deployment of anchors • Anchor holding checks and recovery and redeployment if necessary
TP/03 Recovery and relocation of anchors
The main activities include: • Recovery of anchor recovery rigging • Anchor breakout • Recovery of anchors • Relocation and redeployment of anchors
TP/04 Recovery of anchors after completion of operations
The main activities include: • Recovery of anchors and anchor wires • Transfer of anchors and anchor wires from AHT to vessel wherever applicable
TP/05 Midline buoy and anchor deployment
The main activities include: • Spooling of anchor wire onto AHT winch • Installation of midline buoy onto anchor wire • Deployment of midline buoy • Deployment of anchor
TP/06 Midline buoy and anchor recovery
The main activities include: • Recovery of anchor

- Recovery of midline buoy
- Dismantling of midline buoy off anchor wire

TP/07 Connect/disconnect to pre-Installed beach anchors
The main activities include: • Transfer of anchor wire from vessel to AHT • Recovery of beach anchor forerunner • Connection of forerunner and anchor wire • Deployment of the connection For details about beach anchors, reference can be made to Appendix H.
TP/08 Transition from anchor spread to DP system during simultaneous lay and burial
The main activities include: • Transition from anchor spread to DP • Continuation of lay and burial operation

6. CONTINGENCY OPERATIONS

In addition to the chapter above, which is providing a summary of all planned operations, this chapter contains a summary of several contingency operations including reference to task plans and storyboards, which may be applied in response to prepared deviations from the base plan.

For any unexpected or undesired event which is not listed in the table below, the onshore project team must be consulted and possible solutions to be identified. Depending on the magnitude of the unexpected or undesired event the available BSCF WOW Management of Change process can be made use of ref. [102] and [103].

All contingencies discussed below are being listed in the document specific risk register Appendix A.

Table 14 – Contingency operations

Description of event and anticipated response
1. Loss of station keeping
In the unlikely case that the CLV loses positioning on anchors or that the weather / events give the Master concer that the vessels station keeping capabilities may be jeopardized, the following actions can be taken: • Engage vessel's thrusters and main propulsion system, if water depth allows. • Adjust anchor positions into 'survival position'. • Spool cable and plough umbilical and tow wire onto sea bed, weather vane and set anchors into 'survival position'. This may result in anchor being placed outside of ALARP areas. • Request assistance from AHT to position itself against the CLV to assist the CLV to maintain positioning.
2. Anchor Dragging
Anchors shall be continuously monitored for dragging. If the tension drops unexpectedly it is possible that the anchor is or could start dragging over the seabed. Operations shall be halted immediately, and the anchor position shall be checked. Further taking up anchor wire may not regain tension. In this case operations may cease and an AHT shall be instructed to recover and re-deploy the dragging anchor. If appropriate a new anchor deployment location shall be assigned.
3. Loss of Anchor Buoy
In the event of an anchor buoy detached from the anchor, the buoy shall be recovered as soon as possible. After the recovery of the buoy, the AHT shall recover the anchor with the assistance of a chaser and install a new pennant wire and buoy to the anchor. An assessment as to why the buoy was lost will be done and the anchor shall be redeployed back to its predetermined position.

4. Loss of Midline Buoy

In the event of a midline buoy detached from the anchor wire, the buoy shall be recovered as soon as possible. Operations shall be halted if the corresponding anchor wire goes over a 3rd party asset as per Table 8. After recovering the buoy, the AHT shall check the rigging and re-install the buoy.

5. Anchor Wire Breakage

In the event of a broken anchor wire, the AHT shall recover the anchor as soon as possible. Depending on the location of the breakage, the existing wire shall be either reconnected to the anchor or a spare wire shall be installed after the evaluation why the breakage occurred.

The parted anchor wire will be paid in along the seabed to vessel if there are no other living subsea assets on the route. Otherwise, near the vessel the AHT connects a wire runner onto the parted anchor wire and runs it along the wire. When over a live subsea asset, the AHT recovers and spools the anchor wire onto the AHT deck winch so that the wire will not be dragged over the subsea asset. Then the AHT returns the anchor wire to the vessel.

6. Loss of Anchor

In an unlikely event where both the anchor wire and pennant wire are broken, the AHT shall recover the buoy to deck first and log the location of the lost anchor.

Depending on the location of the breakage, either:

(1) The remaining anchor wire shall be refitted onto a spare anchor

or

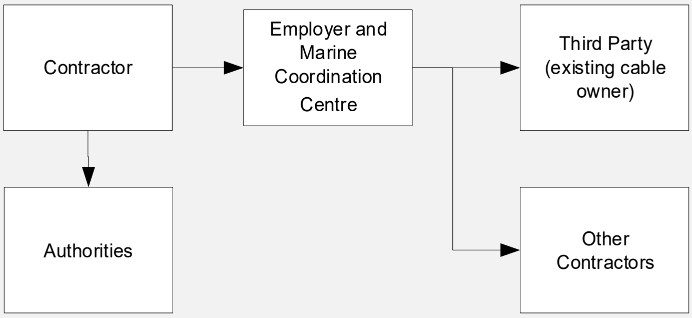
(2) A spare wire shall be installed on to the winch and a spare anchor attached to the new wire.

After the completion of the cable installation an AHT (or suitable vessel) may attempt to recover the anchor and parted anchor wire left on seabed by any method available. If successful, the anchor wire shall be spooled onto the AHT deck winch and the anchor shall be recovered onto AHT deck. The recovered items can then be returned to the vessel.

If the recovery of the anchor is deemed to be too time-consuming for the operation, the anchor position shall be recorded, and the local authorities and Employer/Contractor shall be informed accordingly with an Initial Incident Notification about the situation and the anchor position.

Contractor shall submit a PON2 form to Marine Coordination Centre immediately using a PON2 form. The MCC shall then inform the relevant authorities within 6 hours. Follow-up actions shall be agreed among all involved parties (Authorities, Employer and Contractor). The Employer shall inform any other concerned Third Party of the loss of an anchor in the vicinity of any existing assets, and also other associated works contractors if required. The anchor is to be recovered at a later stage. A replacement anchor shall be ordered immediately.

Notification and information flowchart in case of loss of anchor:



7. Dug-in Anchor

A dug-in anchor shall only be recovered via the pennant wire. When an anchor seems to be stuck the AHT shall make several attempts to recover it. If all attempts fail, AHT and vessel shall decide to cut the anchor wire and leave the anchor in the seabed. The wire will be cut in a natural state with guillotine cutter or similar, the position of the anchor shall be logged, and the local authorities shall be informed about the position. At a convenient time, the anchor shall be recovered.

8. Trapped-in Anchor Wire

In the case an anchor wire is trapped or stuck to an obstacle on the seabed, e.g. a wreck or boulder, the AHT shall try to clear the anchor wire. This shall be accomplished by lifting the anchor and moving it around the obstacle whilst the vessel hauls in on the anchor wire. When moved around the obstacle, the wire shall be tensioned to check if the wire has come loose.

If the AHT's attempts fail, the anchor shall be removed from the anchor wire. The anchor wire shall then be connected to and guided by the AHT whilst hauled in by the vessel in order to run it through the obstacle. The anchor wire shall be hauled in as far as practicably possible and then cut if necessary. The position of the anchor wire left on seabed shall be logged and the vessel shall fit a new socket to the wire. If the remaining length of the anchor wire limits the planned operations, the anchor wire shall be replaced.

9. Mooring Pattern Compromised

In a highly rare case, the mooring pattern is compromised by e.g. a passing vessel, all operations shall be stopped. The compromised anchor wire shall be slackened to prevent any risks. The vessel Master shall command the compromising vessel to move out of the anchor spread zone and shall write an incident report of the event.

10. Mooring Winch Breakdown

In the event of a breakdown of a mooring winch, the remaining anchors are sufficient for safe anchorage of the vessel. The vessel shall assess the incident and attempt to repair. In the situation where the winch cannot be repaired, the anchor wire shall be cut on board and the associated anchor shall either be recovered and disconnected from the anchor wire or be left on the seabed connected to the anchor wire and recovered later. Measures taken due to a non-repairable winch are dependent on OCM's discretion.

11. Presence of Hidden Seabed Obstructions

During the placement of anchors, it might happen that an anchor is deployed on top of a hidden obstruction, e.g. a boulder located just below the seabed. This might hinder the anchor's holding on seabed. The anchor might also be caught behind the obstruction during recovery.

To prevent deploying an anchor on an obstruction the alignment sheets are to be used to give the AHT clear indications (on the survey screen and/or in the anchor planning) on where anchors can, and more importantly, cannot be deployed.

In a rare event where an anchor is still deployed on an obstruction, the vessel can decide to replace the anchor if the placement compromises the anchor pattern. If one of the anchors is caught behind an obstruction, the AHT shall first try to recover the anchor in the standard manner, i.e. via the pennant wire.

If an anchor cannot be recovered due to interference with an obstruction, the method as described in 6 Dug-in Anchor and 8. Trapped-in Anchor Wire shall be performed. To prevent interference with obstructions it is important that Survey has the latest updates on the alignment charts/Navigation screen and that there are clear agreements among vessel, Survey and AHT regarding where to place anchors and where not.

Appendices

Appendix A - Risk Assessment

Appendix B - Task Plans

Number	Title
Appendix B1	TP/01 Preparations
Appendix B2	TP/02 Setup and deployment of anchors
Appendix B3	TP/03 Recovery and relocation of anchors
Appendix B4	TP/04 Recovery of anchors after completion of operations
Appendix B5	TP/05 Midline buoy and anchor deployment
Appendix B6	TP/06 Midline buoy and anchor recovery
Appendix B7	TP/07 Connect/disconnect to pre-Installed beach anchors
Appendix B8	TP/08 Transition from anchor spread to DP system during simultaneous lay and burial

Appendix C - Storyboards

Number	Title
Appendix C1	Setup and deployment of anchors
Appendix C2	Recovery and relocation of Anchors
Appendix C3	Recovery of anchors after completion of operations
Appendix C4	Midline buoy and anchor deployment
Appendix C5	Midline buoy and anchor recovery
Appendix C6	Connect to pre-installed beach anchors

Others

Number	Title
Appendix D	Overview anchor buoy connection Stevpris anchor (plough 7th anchor)
Appendix E	Overview Anchor Buoy Connection Deltaflipper Anchor (mooring 1,2,3,4,5 & 6 anchors)
Appendix F	Rigging Beach anchor and recovery
Appendix G	Rigging midline buoy arrangement
Appendix H	Indicative anchor patterns –
Appendix I	Specification sheet CLV Ndurance
Appendix J	Specification sheet typical AHT
Appendix K	Specification sheet typical AHT

Appendix A Risk Assessment

BSC Risk Management with Starting Conditions
The BSC risk assessment process includes below "starting conditions". When quantifying a risk, the assessment should take these conditions into account. Additional safeguards may be identified in addition to these starting condition if the initial risk is believed to be too high, or believed possible to be reduced.

BSC Starting Conditions

1. WOW processes implemented, including but not limited to:
   - ☐ Safe Working Practices understood and implemented
   - ☐ Training and certification of personnel; competent personnel
   - ☐ Audits and inspections of equipment / work places / companies
   - ☐ Emergency response procedures in place, including drills, plans, etc.
   - ☐ Emergency response equipment in place, including first aid, SOPEP, fire fighting, evacuation, etc.
   - ☐ Service, test, calibration and maintenance of equipment
   - ☐ Hazardous substances identified, MSDS available and personnel trained
   - ☐ Rigging and PPE recertified as applicable; certificates accessible
   - ☐ Applicable contractual and legal requirements understood and implemented
   - ☐ Existing underground facilities, nature reserves or other field no-go areas identified
2. ☐ All actions and precautions as identified in project method statements are implemented
3. Operational precautions in place
   - ☐ Vessels and equipment fit for purpose
   - ☐ Tug management system available and installed on all applicable vessels
   - ☐ Sufficient light, safe walk ways and escape routes available, work area clear of unnecessary obstacles
   - ☐ License conditions and permit conditions from authorities adhered to; relevant authorities informed
   - ☐ Relevant navigational day marks and lights shown
   - ☐ Latest survey data available and updated on all applicable locations
   - ☐ Interfaces with other contractors identified and agreed
   - ☐ SIMOPS on site / with other contractors identified and agreed
   - ☐ Organisation chart, roles and responsibilities communicated and understood
   - ☐ Approval from MWS and Marine Coordinator received
   - ☐ Project site induction, daily briefings, regular meetings implemented
   - ☐ Operational communication lines agreed and functional, spare batteries available
   - ☐ All communication in English
   - ☐ No-go areas on board identified and understood for specific operations
   - ☐ Site security set up as applicable (both on board and at local site)
   - ☐ Weather forecasts monitored, sufficient favourable weather window available
   - ☐ PPE available and correctly used
   - ☐ Lift plans prepared and available
   - ☐ Use of JSA, PTW, LMRA, TBT

Boskalis

Risk Assessment process	Anchor Handling Procedure	Project Document number	
Risk Assessment number		Rev.	
Project number	59539	Client Reference	
Project name	Liverpool Bay CCS Project	Client Rev.	

(R)S = (Residual) Severity
(R)P = (Residual) Probability
(R)R = (Residual) Risk

Hazard Description					Initial Risk				Residual Risk				Accountability		
ID	Activity	Hazard	Consequences	Existing Safe Guards (in addition to starting conditions)	S	P	R	Additional Safe Guards	RS	RP	RR	Target date	Responsible Party or Person	BSC Responsible contact	Completion Status (%)
1.0 General risks															
1.1	3rd party vessels in vicinity	- Collision - Undersired vessel movements - Encroachment by another vessel - 3rd party vessel sailing over anchor line	- Personnel injury - Delay - Damage to asset - Damage to equipment	- Inform relevant authorities and stakeholders (Coastgaurd, Notice to Mariners, local marinas if applicable) - Warn by radio when approaching anchor spread - Bridge/ deck crew continual monitoring of 3rd party vessel(s) - Monitoring of Port Authority and 3rd party radio chatter - Monitoring of onboard AIS systems - Anchors to be marked with buoy	3	1	3								
1.2	Liting operations	- Lifting with limited space available - Dropped objects	- Personnel injury - Damage to equipment - Damage to vessel	- Lift plan to be in place for non-routine lifts - Dropped object sweep to be performed before lifting	3	1	3								
1.3	SIMOPS	- Unclear communication between vessels - Proximity between vessels - Loss of communication	- Personnel injury - Damage to equipment - Delay - Damage to vessel	- Communications check prior to start of operations - Clear 'ALL STOP' command known to all personnel - Operate within weather limits	3	1	3								
2.0 Anchor handling operations															
2.1	Vessel positioning	- Hazard to other shipping - Enchroachment of other vessels - Loss of positioning	- Delay - Civil loss - Damage to equipment - Damage to asset	- Planned anchor patterns for operations to be used as a guide depending on prevailing weather conditions - Information on position of anchors, line tensions and anchor line TDP to be available on bridge - Vessel movements to be timed to limit impact on other vessels - Notice to mariners to be issued - Vessel thruster available for back-up positioning (DP2)	2	1	2								
2.2	Connection of tugger hook / pennant wire	- Manual handling rigging - Pinch points - Wires under tensions - Personnel near unprotected water edge	- Personal injury - Struck by wire - Delay - Damage to equipment	- Personnel to be aware of cable / rope bights on deck - Good hand safety practices - Life jackets with PLB to be worn when working close to unprotected water edge - Mechanical aids to be used as much as possible - Use of towing pin to secure pennant wire	2	1	2								
2.3	Storage of anchor on deck of AHT	- Unexpected movement of anchor on deck	- Damage to equipment - Damage to vessel - Personal injury - Loss of anchor - Delay	- Anchors to be completely recovered and secured on deck when necessary - Authorities to be informed in case of loss of anchor (PON2 report completed) - Maintain suitable walkway	2	1	2								
2.4	Lifting anchor to CLV	- Dropped object - Uncontrolled vessel movement during lift	- Damage to vessel - Damage to equipment - Loss of anchor - Personal injury	- AHT to be moored alongside CLV - Authorities to be informed in case of dropped anchor to sea bed (PON2 report completed)	3	1	3								
2.5	Anchor deployment	- Lines under tension - Release of stored energy - Equipment failure - Personnel near unprotected water edge - Anchor placed on UXO	- Damage to equipment - Delay - Personal injury - Damage to equipment - MOB	- Safety zones on deck to be identified and highlighted - Personnel working near unprotected water edge to wear life vest with PLB - Vessel MOB procedure in place - UXO ALARP certificate	3	1	3								
2.6	Spooling anchor line	- Rotating machinery - Lines under tension	- Personal injury - Damage - Delay	- Rotating machinery to be guarded as required and guards checked - Remotely operated winches - Personnel placement to be optimised to avoid working next to rotating machinery - Safety zones on deck to be identified and highlighted	3	1	3								

Hazard Description					Initial Risk				Residual Risk				Accountability		
ID	Activity	Hazard	Consequences	Existing Safe Guards (in addition to starting conditions)	S	P	R	Additional Safe Guards	RS	RP	RR	Target date	Responsible Party or Person	BSC Responsible contact	Completion Status (%)
2.7	Anchor positioning	- Incorrect anchor placement - Site exclusion zones - Dynamic weather impact - Wires under tension	- Damage to existing assets - Delay - Weakening of mooring position - Damage to vessel - Damage to equipment	- Planned anchor pattern as guide for operations - Anchoring locations to be verified with authorities - Anchor placement sequence to be confirmed and communicated to all involved parties and personnel - Final position anchor to be confirmed to survey after placement - Maintain communication between bridge and deck crew - Constantly monitor anchor wire tensions	2	1	2								
2.9	Anchor handling in shallow water	- Grounding of AHT due to insufficient water depth	- Damage to AHT - Delay	- Tidal data to be monitored - Use of tug with shallow draft - Minimum for under keel clearance to be agreed before operations	3	1	3								
2.10	Anchoring near 3rd party assets	- Anchor placed on 3rd party asset	- Damage to 3rd party asset	- Reduce TMS/AMS accuracy to 10 m - Anchors to be recovered to the AHT decks when traversing subsurface assets; - Management of anchor wire tension to minimize anchor wires dragging along the seabed; - Proof loading test on each anchor placement; - Dedicated navigation system, including full Tug Management System (TMS) for AHT and all involved marine fleet; - All exclusion zones to be included in the TMS; - Coordinates for each specific target given by TMS and supervised by CLV; - Continuous monitoring of anchor position, line tension and line length, including anchor slip alarm (threshold max 50m); - Recovery and deployment of anchors via pennant wires and buoys.	3	1	3								
3.0 Mid-line buoy deployment / Recovery															
3.1	Connecting / Disconnecting mid-line buoys	-Wire under tension - Manual handling - Pinch points - Entrapment	-Personal injury - Damage to equipment - Delay	- Mechanical aids to be used as much as possible - Good hand safety practices - Snapback zones to be identified on deck - No unauthorized personnel in work area	2	1	2								
4.0 Recovery of anchor															
4.1	Vessel positioning	- Hazard to other shipping - Enchroachment of other vessels - Loss of positioning	- Delay - Civil loss - Damage to equipment - Damage to asset	- Planned anchor patterns for operations to be used as a guide depending on prevailing weather conditions - Information on position of anchors, line tensions and anchor line TDP to be available on bridge - Vessel movements to be timed to limit impact on other vessels - Vessel thruster available for back-up positioning (DP2)	3	1	3								
4.2	Recovery of anchor	- Lines under tension - Equipment failure - Under water current	- Lines under tension - Delay - Injury to personnel	- Safety zones on deck to be identified and highlighted - No unauthorized personnel in working area - Remotely operated winches - Equipment inspection before start of operations - Use of lift plans for non-routine lifts	3	1	3								
5.0 Contingeny anchor getting stuck															
5.1	Recovery of stuck anchor	- Failure pennant wire - Failure messenger wire - Lines under tensions - Under water current	- Lines under tension - Delay - Injury to personnel - Damage to asset - Loss of anchor	- Sufficiently long pennant wire to be used - AHT to ensure straight pull to pennant wire - Sufficient strength messenger wire to be used - Safety zones on deck to be identified and highlighted - No unauthorized personnel in working area - Remotely operated winches - Equipment inspection before start of operations - Use of lift plans for non-routine lifts	3	1	3								

Appendix B Task Plans

Task Plan Symbol Specification

Symbol	Description
	The Safety Flash symbol denotes an activity with increased risk, e.g. working at height, electrocution, etc.
	A Toolbox Talk is required at the start or during certain activities. These are to be repeated at each shift handover.
	A mandatory verification point, beyond which an activity may not proceed without approval by a designated party/authority. As agreed per applicable ITP or otherwise.
	A witness point, meaning all parties as agreed per applicable ITP to be invited to witness or sign off before proceeding.
	Information statements are given to avoid doubt in certain instances and for clarity.
	A task which is required to be performed due to a project specific contract requirement and therefore may deviate from BSCF standards/way of working.
	This item indicates when a lift plan is required to support the execution of a specific task step.

Appendix B1 TP/01 Preparations

TP/01 Preparations		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements.	All parties
2.	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3.	Ensure that all necessary survey data related to anchor handling operation is available. Including: - Anchor exclusion zones - Anchor corridors - Beaching corridor - RPL	Master/Survey
4.	Check and review anchor wire ringing and associated equipment.	CLV Master
5.	A meeting will be held to ensure the logistical plan of how to collect all rigging equipment is understood by AHT teams. Likewise, any anchors, wires or buoys to be transported on the AHTs will be agreed, loaded and sea fastened whilst in port.	Masters/AHT
6. 	Prior of any operations, perform: • Full communications check among all relevant parties prior to commencement of the operations. At this stage the key personnel shall explain the communication chain during the operations.	All parties
7. 	Prior to the arrival of vessel on site, review: • Anchor plans based on the latest charts and RPL • Weather conditions based on the latest weather forecasts, including tide. • Functionality of the TMS, AMS and all the relevant systems • Sensitive areas, e.g. crossings, etc.	Masters/Survey
8.	Prior to starting anchoring operations: • Receive confirmation from Employer that stakeholders (e.g. Port of Mostyn, fisheries, etc.) are informed of operations	Field Engineer
9.	Prior to anchoring over 3rd party assets • Receive notification from Employer after Employer has obtained the approval to commence works in proximity of assets	Field Engineer
	END OF TP/01	

Appendix B2 TP/02 Setup and deployment of anchors

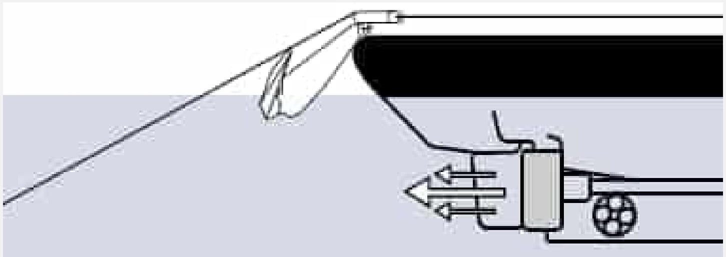
TP/02 Setup and deployment of anchors		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2.	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3. 	Perform full communications check between all relevant parties prior to commencement of the operations. Perform full operation readiness check of required equipment and materials.	All parties
4.	Retract front thruster at Master's discretion while CLV is approaching the position for anchor deployment. NOTE: Station keeping will be switched from DP to anchor spread at approximately KP1.6, while location for the front thruster retraction is independent from the route.	Vessel
5.	Depending on where the anchoring materials are stored, either AHT to prepare the anchor, pennant wire and buoy for deployment, or vessel to do so and pass them to AHT. *Rigging drawing in Appendix D for pull anchor or Appendix E for station keeping anchors*	Vessel/AHT
6.	AHT to connect and spool the pennant wire onto the AHT winch. The other end of the pennant wire to be connected to the anchor, as indicated in Appendix C1	AHT
7. 	Vessel to pass anchor wire to AHT via messenger wire and AHT to connect the anchor wire to the anchor. Depending on the anchor deployment location, the AHT may first spool certain amount of the wire onto its drum before moving out.	Vessel/AHT
8.	AHT to move to the anchor deployment position marked by survey on the TMS while vessel to continuously pay out anchor wire and keep it slack. During anchor positioning by AHT, vessel to visually monitor vessel fairlead and anchor wire movements. Slack in anchor wire shall be maintained at all time. In case of subsea asset crossing, AHT to bring anchor on deck prior to crossing any subsea assets.	Vessel/AHT/Survey

TP/02 Setup and deployment of anchors		
9.	Survey to confirm once AHT arrives at the planned anchor deployment position. AHT to commence anchor deployment once at the correct deployment position.	Survey
10.	Vessel to pay in anchor wire with minimum tension while AHT to pay out pennant wire. The anchor is drawn over the AHT stern and further lowered onto seabed.	Vessel/AHT
11. 	AHT to inform vessel the touchdown of the anchor, and vessel to confirm that the anchor is at the correct position which is then logged by Survey.	AHT/Vessel/Survey
12.	Vessel to slowly increase the anchor wire tension to test if the anchor holds in position. If the anchor fails to hold in position, vessel instructs AHT to recover and redeploy the anchor as described in TP/03 Recovery and relocation of anchors.	Vessel/AHT
13. 	If the anchor holds position, Surveyor to take a fix of the final anchor position and updates the AMS. If the anchor is not holding position, the anchor will be deployed as per TP/03 Recovery and relocation of anchors	Survey
14.	AHT to disconnect pennant wire deploy pennant buoy.	AHT
15.	After the completion of the pennant buoy deployment, AHT to continue with the rest of the anchors by repeating the previous steps.	Vessel/AHT/Survey
	END OF TP/02	

Appendix B3 TP/03 Recovery and relocation of anchors

TP/03 Recovery and relocation of anchors		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2. 	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3. 	Continue good communications between all relevant parties prior to commencement of the operations.	All parties
4.	Vessel to instruct Survey which planned anchor(s) to recover and relocate.	Vessel/Survey
5.	Survey to enter new position(s) of anchor(s) in the TMS and the AHT(s) to be informed accordingly.	Survey/AHT
6.	Vessel to instruct AHT to move to the anchor location as provided via TMS and commence recovery and relocation.	Vessel/AHT
7.	AHT to move to the anchor position and use a grapple hook to hook and recover the polypropylene rope from the pennant buoy. *Rigging drawing in Appendix D for pull anchor or Appendix E for station keeping anchors*	AHT
8. 	NOTE: During the recovery, AHT to inspect the conditions of recovered items for signs of damage, and record, replace and quarantine any items deemed no longer fit for purpose.	AHT
9.	AHT to connect the recovered polypropylene rope to the winch and start to pay in the rope until pennant wire eye comes over the stern/bow roller. Secure the pennant wire on deck.	AHT
10.	Once the pennant wire is secured, if necessary, disconnect the polypropylene rope and pennant buoy from the pennant wire and move and secure them aside on deck. Then connect the pennant wire to AHT winch.	AHT

TP/03 Recovery and relocation of anchors

11.	Prior to anchor breakout, AHT to inform vessel that the pennant buoy and wire are recovered and AHT is ready to break out and recover the anchor.	AHT
12.	Vessel to pay out anchor wire to reduce anchor wire tension and inform AHT once there is enough slack in the anchor wire.	Vessel
13.	AHT to haul in the pennant wire. 	AHT
14.	AHT to continue pay in pennant wire until the anchor comes on the stern/bow roller and is stoppered off by deck pins. NOTE: In case the route to the next anchor location crosses any subsea assets, the anchor shall be recovered completely.	AHT
15.	AHT to inform vessel once anchor is fully recovered and secured.	AHT
16.	Vessel to pay in/out anchor wire while AHT is moving towards the next anchor deployment position provided via TMS. NOTE: During AHT moving to the next anchor deployment position, Vessel shall visually monitor the fairlead and anchor wire movements and tension to prevent AHT from running over slack anchor wire.	AHT/Vessel

END OF TP/03

Appendix B4 TP/04 Recovery of anchors after completion of operations

TP/04 Recovery of anchors after completion of operations		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2. 	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3. 	Continue good communications between all relevant parties prior to commencement of the operations.	All parties
4.	Vessel to instruct Survey on which anchor(s) to be recovered. Survey to enter the anchor position(s) in TMS and inform AHT.	Vessel/Survey
5.	Vessel to instruct AHT to move to the anchor location.	Vessel
6.	AHT to move to the anchor location and conduct anchor recovery as described in TP/03 Recovery and relocation of anchors.	AHT
7.	AHT to inform vessel once anchor is fully recovered and secured.	AHT/Vessel
8. 	Vessel to pay in/out anchor wire while AHT is moving towards the vessel. NOTE: During AHT's moving, vessel shall visually monitor the fairlead and anchor wire movements and tension to prevent AHT from running over slack anchor wire.	AHT/Vessel
9.	AHT to come alongside and be temporary moored to vessel in preparation of returning anchor wire, anchor, pennant wire and buoy (alternatively, anchor, pennant wire and/or buoy may be stored on AHT).	AHT/Vessel
10.	AHT to pass the anchor wire back to vessel via messenger wire.	AHT/Vessel
11. 	Depending on where the anchoring materials are stored, either AHT to keep the anchor and possibly (some of) the other anchoring materials, or vessel to maneuver the crane on deck to lift the anchor, pennant wire and buoy from AHT back to vessel.	Crane Operator/AHT
12.	Relieve anchor, pennant wire and buoy from the crane and sea fasten the anchor.	Vessel

TP/04 Recovery of anchors after completion of operations		
13.	Under the instruction of vessel, AHT to be relieved from vessel and move to the next anchor position for recovery.	AHT/Vessel
	END OF TP/04	

Appendix B5 TP/05 Midline buoy and anchor deployment

TP/05 Midline buoy and anchor deployment		
Item	**Task Description**	**Responsible**
1.	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2.	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3.	Continue good communications between all relevant parties prior to commencement of the operations.	All parties
4.	Based on the distance between the anchor deployment location and the midline buoy deployment location, AHT to spool the required amount of anchor wire onto its own winch according to Appendix C4. Once the spooling is completed, AHT to apply a holdback (stopper) to secure the anchor wire to deck pins. AHT to install midline buoy to the anchor wire. If deemed necessary, anchor can also be sailed out according to TP/02 in combination with a second AHT to attach the midline buoys to the anchor wire.	AHT/Vessel
5.	Install mid-line buoy rigging arrangement as per Appendix G. Start with the wire suspension bracket. Fasten bolts (M16 x 50) and ensure all bolts have 2 nuts installed.	AHT
6.	Confirm all nuts and bolts are fastened hand tight with wrenches	AHT
7.	Continue installing wire clamps 10 mm from wire suspension bracket. Fasten bolts (M12 x 80) and ensure all bolts have 2 nuts installed. Confirm all nuts and bolts are fastened hand tight with wrenches.	AHT
8.	Repeat for second wire clamp.	AHT
9.	Ensure midline buoy has been installed according to Appendix G.	AHT

TP/05 Midline buoy and anchor deployment		
10.	AHT to move to the midline buoy location whilst vessel to pay out the anchor wire.	AHT/Vessel
11.	Once AHT reaches the midline buoy deployment location, vessel to stop paying out anchor wire and AHT to deploy midline buoy by paying out the spooled anchor wire.	AHT/Vessel
12.	If more buoys are required, AHT to sail towards next location and repeat step 5 till 11. When last buoy is installed AHT to anchor deployment process as in TP/02.	AHT/Vessel
END OF TP/05		

Appendix B6 TP/06 Midline buoy and anchor recovery

TP/06 Midline buoy and anchor recovery		
Item	**Task Description**	**Responsible**
1.	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2.	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3.	Continue good communications between all relevant parties prior to commencement of the operations.	All parties
4.	AHT to move to the anchor location and conduct anchor recovery as described in TP/03 Recovery and relocation of anchors.	AHT
5.	AHT to inform vessel that anchor is fully recovered and secured, and anchor wire is attached to AHT winch.	AHT/Vessel
6.	AHT to pay in anchor wire while move towards the midline buoy position, until the midline buoy come over the stern/ bow roller. Halt the recovery.	AHT
7.	Once the buoy is on deck, AHT to apply a holdback (stopper) to secure the anchor wire to deck pins.	AHT
8.	Once the midline buoy is fully recovered and secured, AHT to instruct vessel to pay in anchor wire while AHT to move towards vessel.	AHT/Vessel
9.	Once vessel pays in the rest of the anchor wire and AHT arrives at vessel, AHT to remove the midline buoy from anchor wire and prepare it for vessel crane to lift it back to vessel.	AHT/Vessel
10.	Vessel to lift the midline buoy onboard, and secure.	Vessel

TP/06 Midline buoy and anchor recovery
END OF TP/06

Appendix B7 TP/07 Connect/disconnect to pre-Installed beach anchors

TP/07 Connect/disconnect to pre-Installed beach anchors		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2.	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3. 	Perform full communications check between all relevant parties prior to commencement of the operations. Perform full operation readiness check of required equipment and materials.	All parties
4. 	The onshore crew to pre-install beach anchors and ensure that all riggings are fit for purpose for AHT to recover and connect. *Rigging drawing in Appendix F.* Onshore Surveyor to take fixes of the as-installed positions of beach anchors with forerunners and pass the data to CLV Surveyor to update the onboard TMS.	Survey
5.	CLV to confirm which anchor wire to be deployed first, prepare the winch and confirm the readiness to commence pay-out operation.	CLV
6.	CLV to instruct AHT which beach anchor forerunner to be picked up first.	CLV
7.	AHT to move towards the pre-installed anchor wire forerunner recovery rigging. NOTE: tidal conditions shall be monitored and assessed continuously.	AHT

TP/07 Connect/disconnect to pre-Installed beach anchors

8. SAFETY FLASH	AHT to recover the forerunner recovery rigging with a grapple hook or boat hook, connect the rigging to a tugger winch, and pull the forerunner end on deck. Once the forerunner end is on deck, AHT to apply a holdback (stopper) to secure the forerunner to deck pins. *Rigging drawing in Appendix F.* NOTE: During the recovery, where possible, AHT to inspect the condition of the recovery rigging materials for signs of damage that could result in unsafe handling, inform CLV if any items are not fit for purpose, record, replace and quarantine any items where applicable.	AHT
9.	AHT to move towards CLV with the forerunner in the direction according to the planned anchor pattern.	AHT
10.	Once AHT has brought the forerunner as far as possible, AHT to deploy the forerunner end with the recovery rigging back onto the seabed, and then move back to CLV. If the CLV can move close enough (tidal dependent) and the forerunner has sufficient length, the AHT may bring the forerunner to the CLV without deploying it to the seabed.	AHT
11.	CLV to instruct AHT which anchor wire to deploy first. AHT to come alongside in preparation to receive anchor wire.	CLV/AHT
12.	CLV to pass anchor wire to AHT via messenger wire. If the distance between the CLV and the forerunner recovery rigging deployment location is considered long enough, CLV to pay out anchor wire while AHT to spool it onto the AHT winch until sufficient amount of anchor wire has been spooled.	CLV/AHT
13. SAFETY FLASH	AHT to move towards the forerunner recovery rigging deployment location while CLV to pay out anchor wire. If the anchor wire is spooled onto the AHT winch, CLV to instruct when she stops paying out anchor wire and AHT in turn to start paying out anchor wire NOTE: tidal conditions shall be monitored and assessed continuously. During AHT's moving, CLV shall visually monitor the fairlead and anchor wire movements and tension to prevent AHT from running over slack anchor wire.	CLV/AHT
14.	AHT to inform CLV of the arrival at the forerunner recovery rigging position.	AHT

TP/07 Connect/disconnect to pre-Installed beach anchors		
15.	AHT to recover forerunner end and secure it on deck.	AHT
16.	AHT to connect anchor wire to forerunner end via shackles (85t) and swivel (231t MBL) and inform CLV of the completion of the connection. *Rigging drawing in Appendix F.*	AHT
17.	AHT to remove deck pin holdbacks to both anchor wire and forerunner and deploy the connection onto seabed via deck winch. NOTE: Forerunner recovery rigging, incl. buoys, shall remain as part of the deployed system for future recovery.	AHT
18.	AHT to inform CLV the completion of the deployment	AHT
19.	CLV to slowly increase tension on the anchor wire to check if the pre-installed beach anchor is holding in position.	CLV
20.	Once it is confirmed that the beach anchor is holding in position, CLV to instruct AHT to return for the preparation of the next beach anchor connection. AHT to inform CLV once moving back to CLV.	AHT/CLV
21.	If CLV identifies a significant drag of beach anchor, tension to be reduced immediately and anchor to be put back to its original position by land-based equipment, e.g. excavator, etc.	Onshore Team
22.	The disconnection of anchor wire and beach anchor forerunner to be conducted mainly by following the above steps in reverse order. In addition, forerunners to be recovered by land-based equipment once sea conditions permit, and depending on the operation, anchor wires may be directly fitted with offshore anchors or recovered back to CLV.	CLV/AHT/Onshore Team
END OF TP/07		

Appendix B8 TP/08 Transition from anchor spread to DP system during simultaneous lay and burial

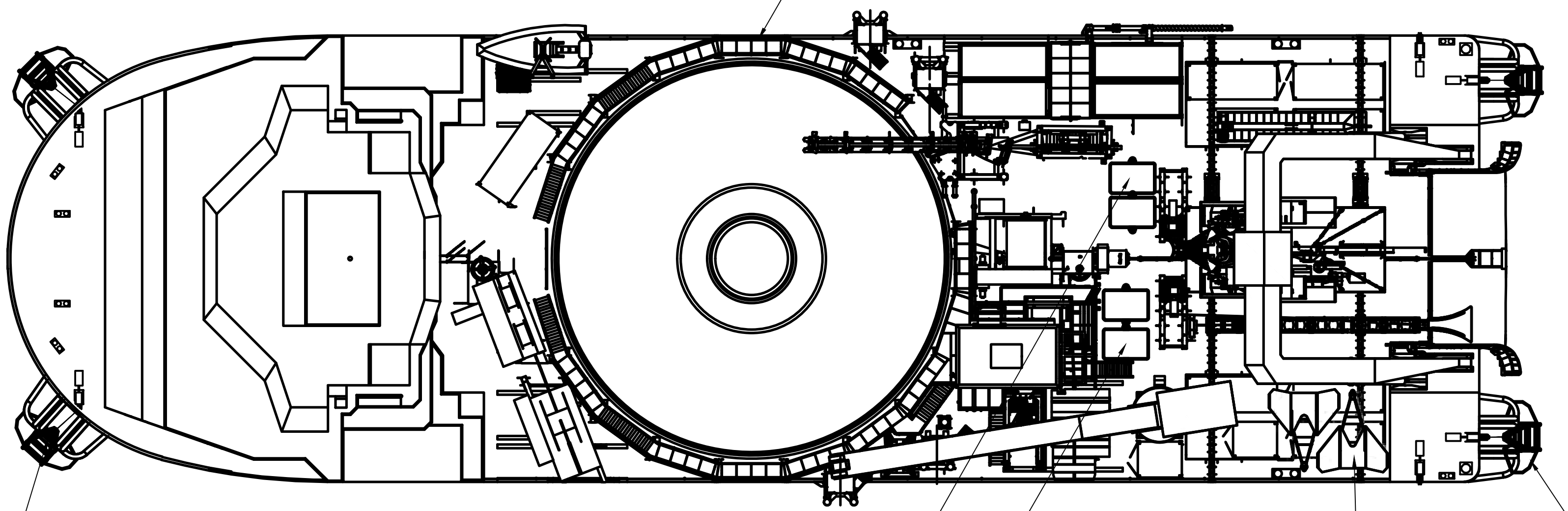
TP/08 Transition from anchor spread to DP system during simultaneous lay and burial		
Item	**Task Description**	**Responsible**
1. 	Hold TBT with relevant personnel. All parties involved in the operation to be briefed. Command and control structure to be agreed. TBT to be held at the commencement of each shift to review and update safety and operational requirements. Record TBT on Toolbox Talk Form [101]	All parties
2. 	Ensure that all as-built requirements are known and clear and required data shall be recorded.	Field Engineer
3. 	Perform full communications check between all relevant parties prior to commencement of the operations. Perform full operation readiness check of required equipment and materials.	All parties
4. 	CLV master to confirm the KP location where there is enough water depth to deploy retractable thrusters.	CLV/Survey
5.	Simultaneous lay and burial to continue while CLV is transitioning from anchor spread to DP system. CLV Master to decide the exact timing and location for the transition based on weather and environmental conditions.	CLV
6.	After the CLV has deployed the thrusters and activated the DP system, follow TP/04 Recovery of anchors after completion of operations except for the plough towing anchor while transitioning.	CLV/AHT
7.	AHT to continue following and assisting CLV during the rest of the operations, e.g. plough anchor relocation, etc.	AHT Master
	END OF TP/08	

Appendix C Storyboards

Appendix C1 Setup and deployment of anchors

STEP 1

PLAN VIEW SCALE 1:500



SEE 2 NOTE

GENERAL NOTES

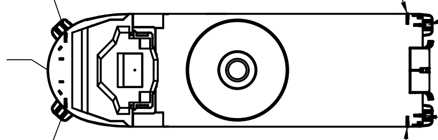
1. ALL MEASUREMENTS ARE IN mm UNLESS NOTED OTHERWISE
2. ANCHOR: STEVPRIS / DELTA FLIPPER (TBC)

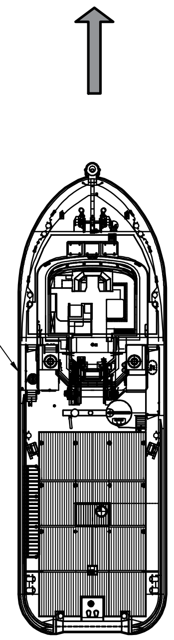
Reference is made to:
0059359-BOS-ENG-PRO-5005-Anchor procedure

STEP 1:

- AT ARRIVAL THE TWO ANCHORS AT THE BOW AND TWO AT THE STERN ARE RACKED.
- THE TWO ANCHORS FOR THE REAR STARBOARD SIDE AND PORT SIDE AS WELL AS THE TOWING ANCHOR HAVE BEEN PLACED ON DECK AT THE VESSEL MASTERS DECRETURE.
- THE 6 MID LINE BUOYS, THE PENNANT BUOYS AND OTHER RIGGING HAVE BEEN PLACED SOMEWHERE ON DECK AS DETERMINED BY THE VESSEL MASTER.
- (5) CLV CREW TO PREPARE ANCHOR, PENNANT WIRE AND BUOY FOR DEPLOYING.
- THE AHT MOVES TO THE CLV TO RECEIVE THE ANCHOR AND ATTACHED PARTS.

CLV nDURANCE ANCHOR KEY PLAN





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DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: SETUP AND DEPLOYMENT OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

BOSKALIS SUBSEA CABLES

P.O.BOX 43, 3350 AA PAPENDRECHT - E-MAIL: ROYAL@BOSKALIS.COM

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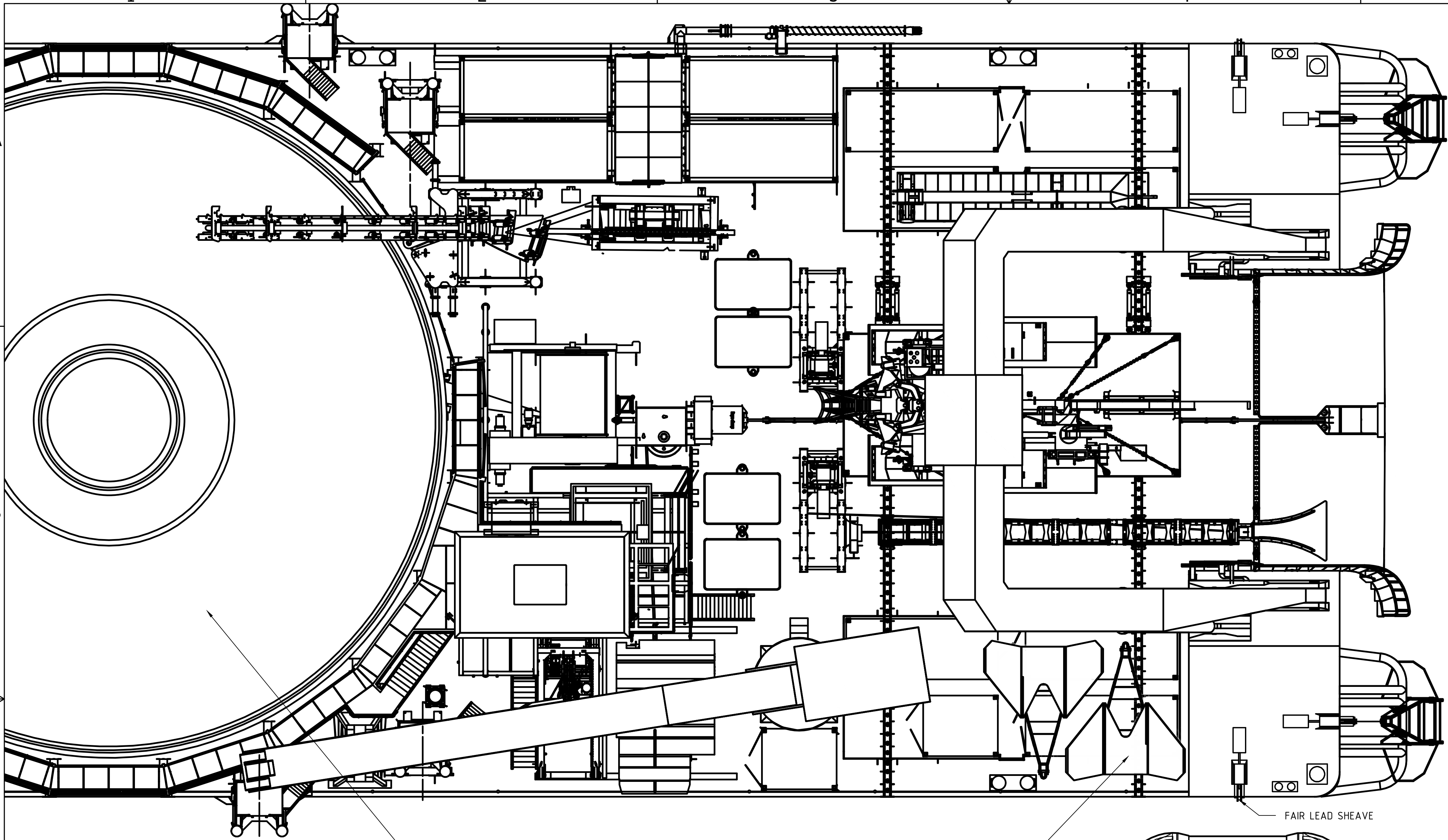
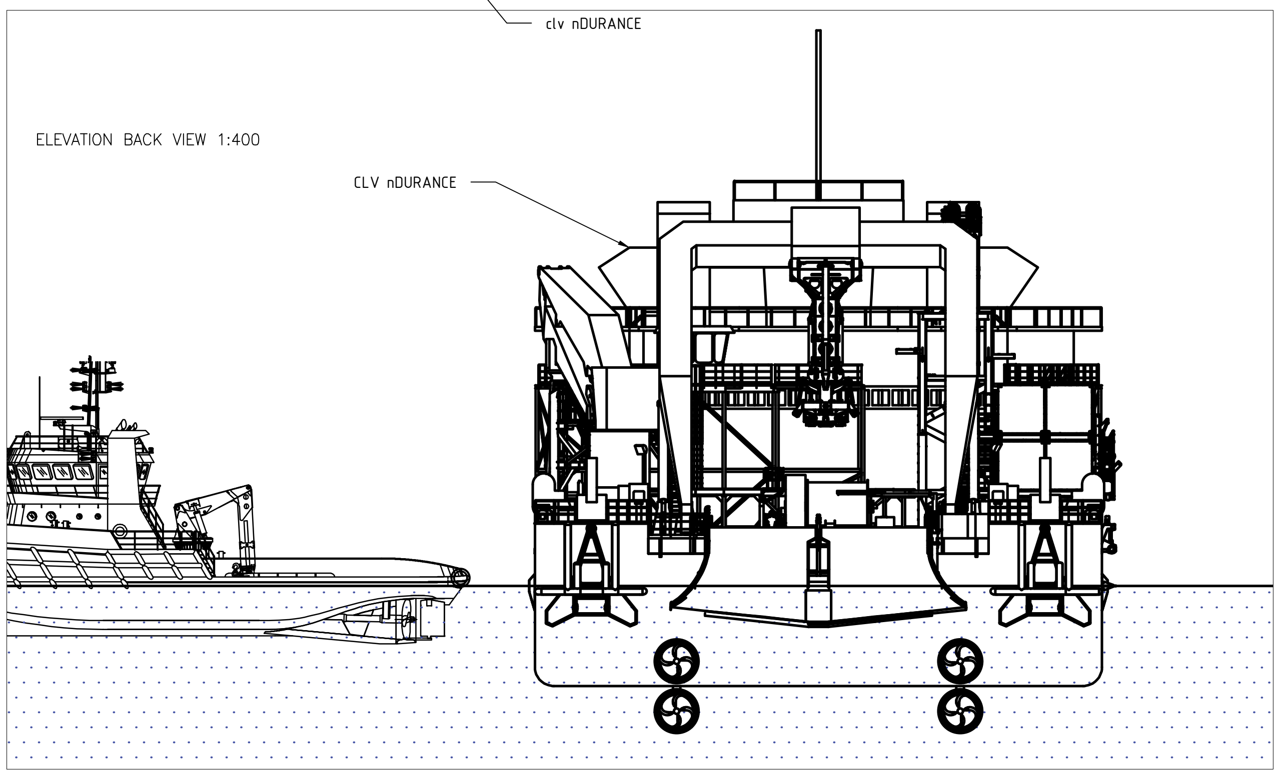
NOTES

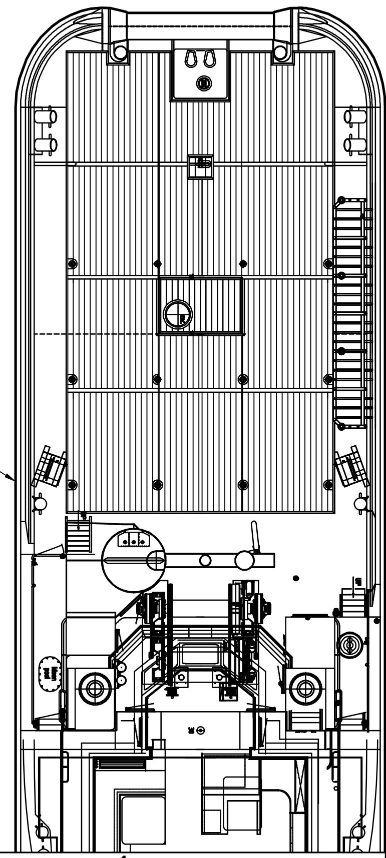
1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 2:

- (6) THE CLV WILL PASS (WITH MESSENGER WIRE OF CRANE ASSISTANCE) THE PENNANT BUOY, PENNANT WIRE AND ANCHOR TO THE AHT (PRE-CONNECTED TO THE ANCHOR WINCH WIRE AS PER C/01 OR C/02).
- CLV MASTER TO DECIDE WHICH ANCHOR(S) TO START WITH.







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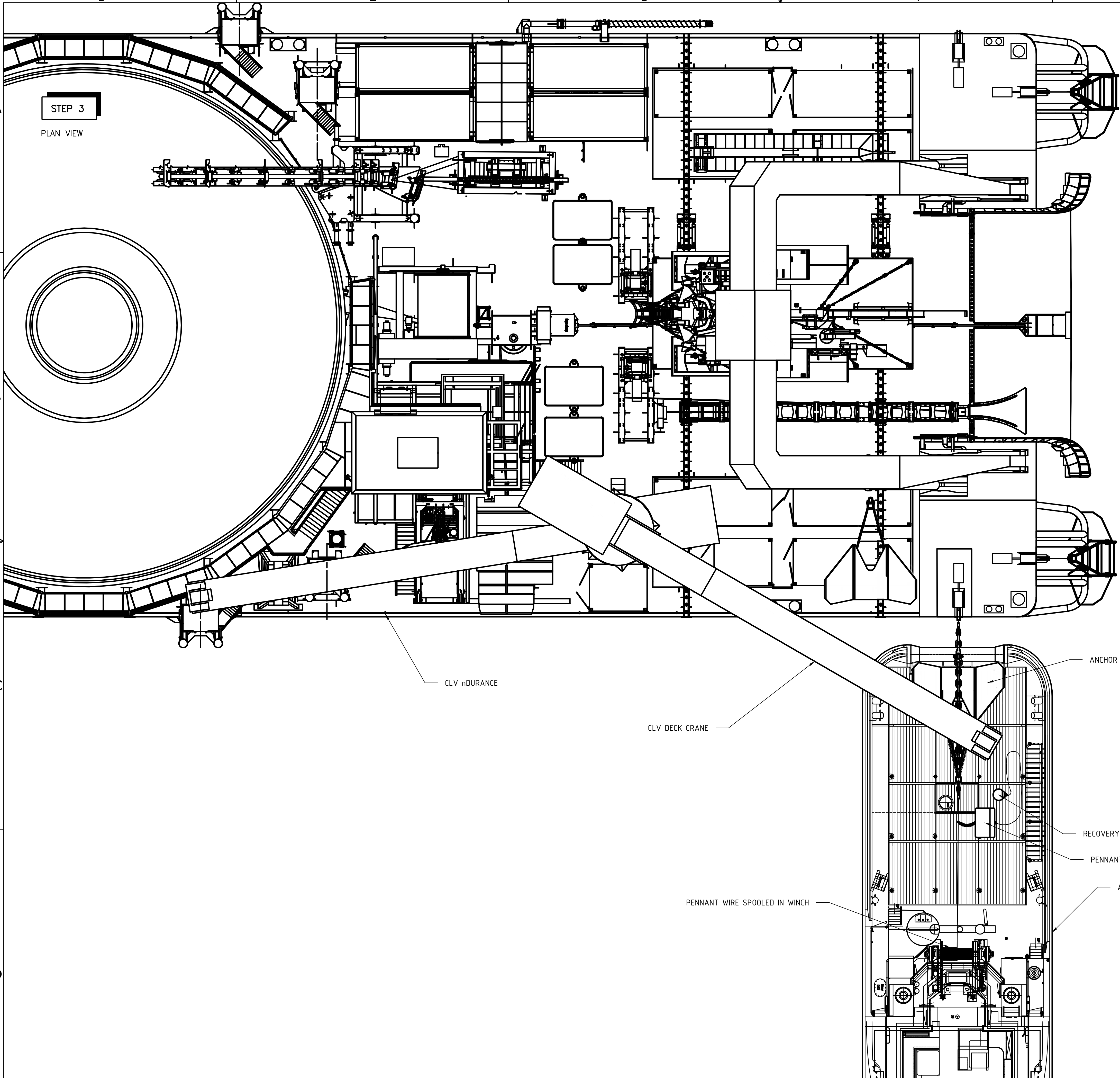

NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 3:

- IF THE ANCHORS ARE STORED ON THE AHT, CLV WILL PASS A MESSENGER WIRE TO CONNECT THE ANCHOR WIRE TO THE ANCHOR.
- (7) AHT CREW CONNECTS THE PENNANT WIRE TO THE DECK WINCH BY A 7.5T HAMMERLOCK AND SPOOL THE WIRE ON THE WINCH. THE PENNANT WIRE WILL BE CONNECTED TO THE ANCHOR AS PER C/01 OR C/02 DEPENDING ON ANCHOR SIZE.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

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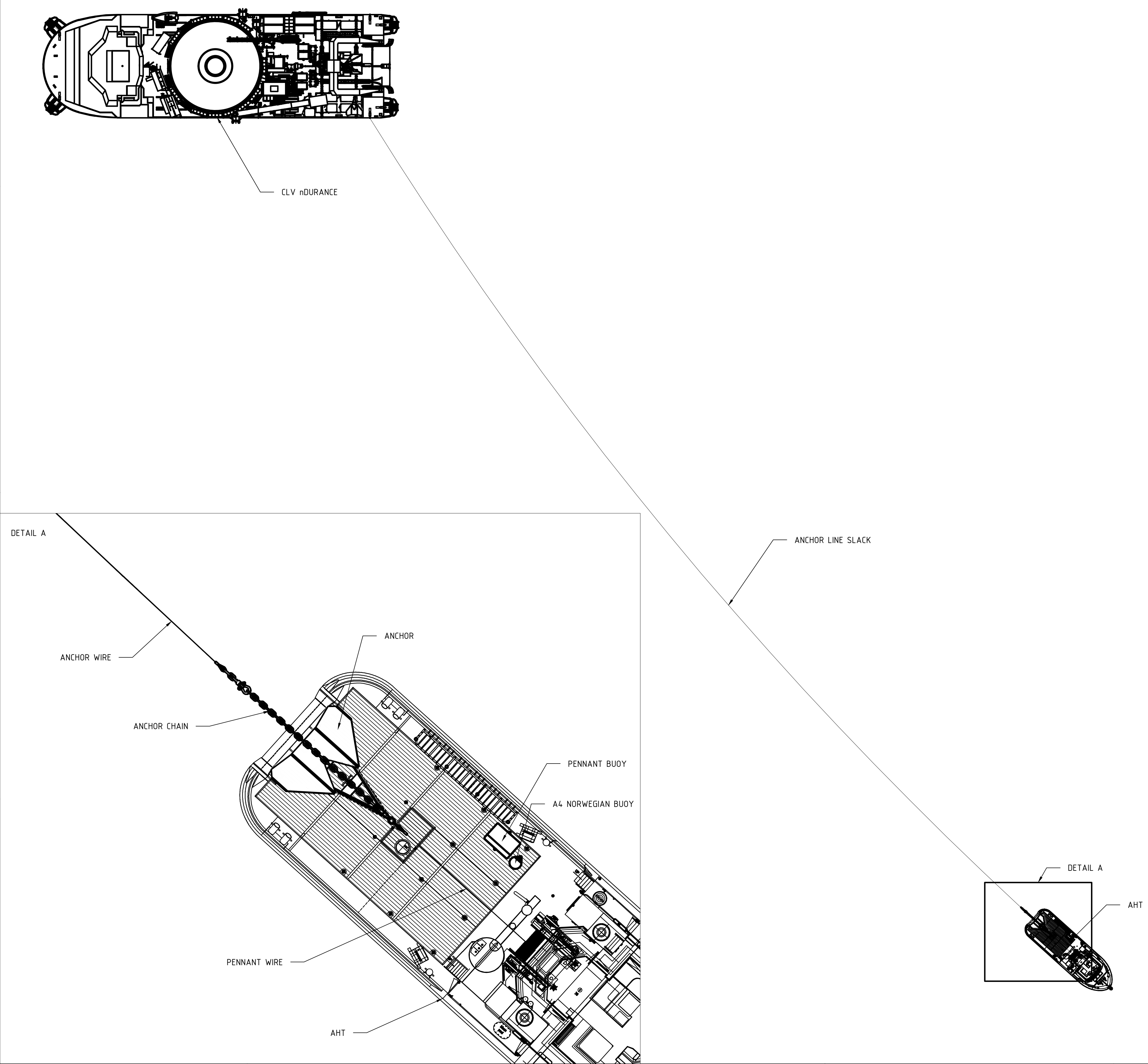
STEP 4

PLAN OVERVIEW SCALE 1:1200



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 4:

- (8) AHT WILL MOVE TO THE ANCHOR POSITION MARKED BY SURVEY ON THE AMS. CLV WILL KEEP ANCHOR LINES SLACK.
- AHT WILL SPOOL REQUIRED AMOUNT OF WIRE ON IT'S OWN DRUM.
- AHT WILL MOVE TO ANCHOR POSITION MARKED BY SURVEY ON THE AMS. CLV WILL KEEP ANCHOR LINES SLACK.
- ONCE THE AHT SAILED TOWARDS THE DISTANCE FROM THE VESSEL MINUS THE WIRE LENGTH ON ITS OWN DRUM, THE AHT STARTS PAYING OUT WINCH WIRE AND THE CLV STOPS IT'S WINCH.

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

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SUBJECT: SETUP AND DEPLOYMENT OF ANCHORS

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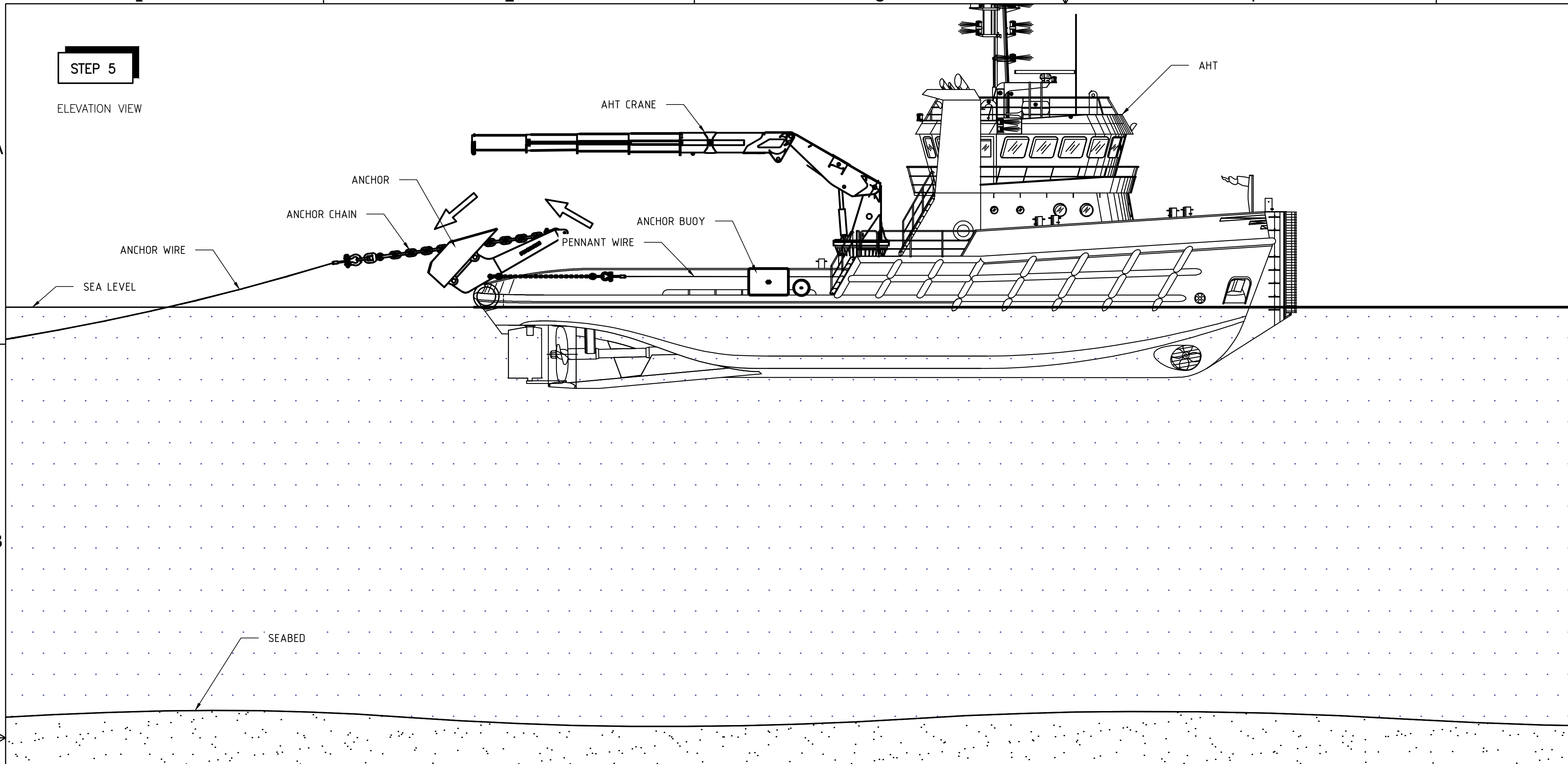
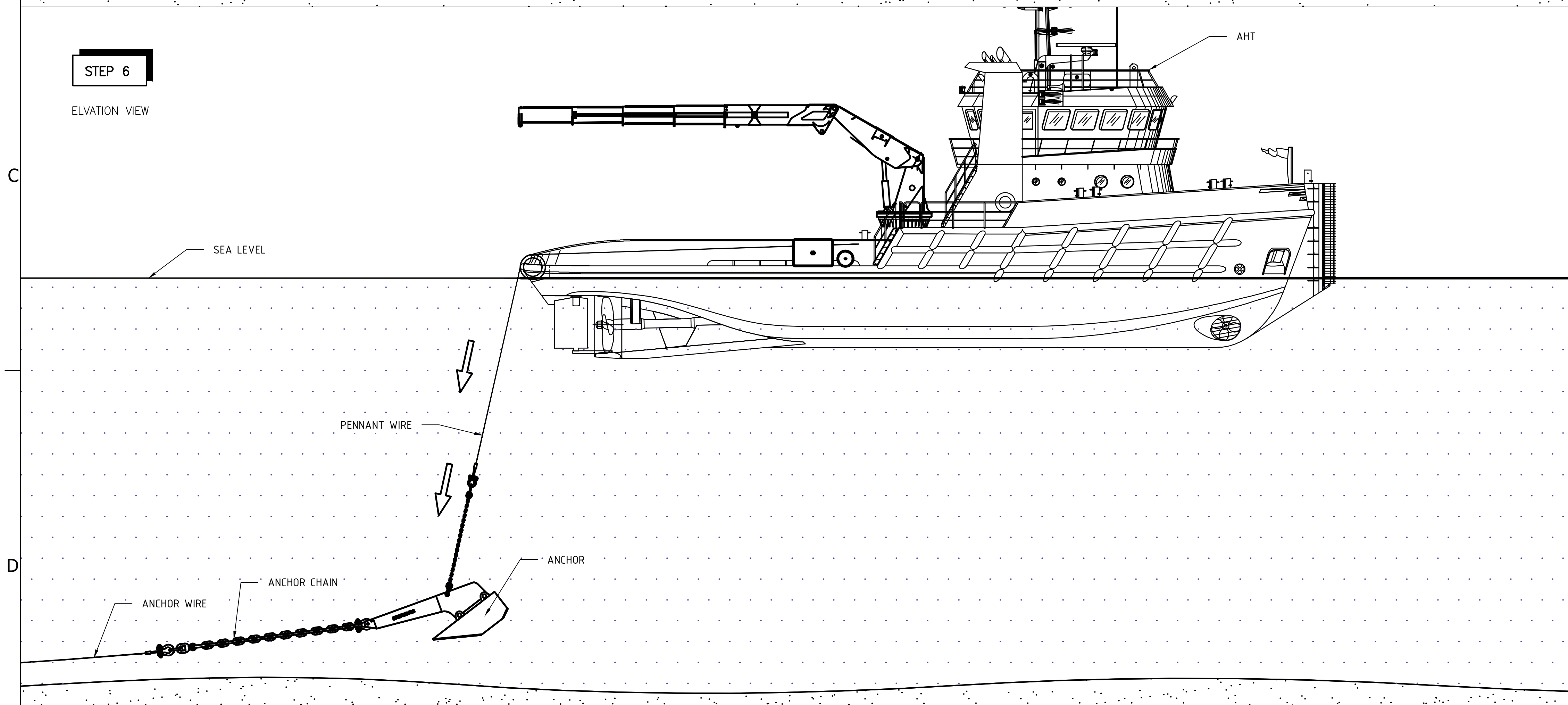
STEP 5

ELEVATION VIEW



STEP 6

ELVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 5:

- (9) AT POSITION, THE CLV MASTER TENSIONS UP ON THE ANCHOR WIRE AND AT THE SAME TIME THE AHT MASTER PAYS OUT THE PENNANT WIRE.
- THIS DRAWS THE ANCHOR OVER THE STERN OF THE AHT AND COMMENCES LOWERING TO THE SEABED.

STEP 6:

- (10) WHEN AHT IS 3-5m ABOVE THE ANCHOR DEPLOYMENT POSITION, SURVEY TO CONFIRM PLANNED POSITION
- (11) IF ANCHOR IS IN PLANNED POSITION, AHT TO COMPLETE THE DEPLOYMENT OF THE ANCHOR BUOY.
- (12) MONITOR TENSION ON WIRE. KEEP ANCHOR LINE VERY SLACK.
- THE WINCH OPERATOR SHOULD APPLY MINIMUM TENSION ON THE ANCHOR WIRE BEFORE THE AHT WILL LOWER THE ANCHOR AT THE PLANNED POSITION.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: SETUP AND DEPLOYMENT OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

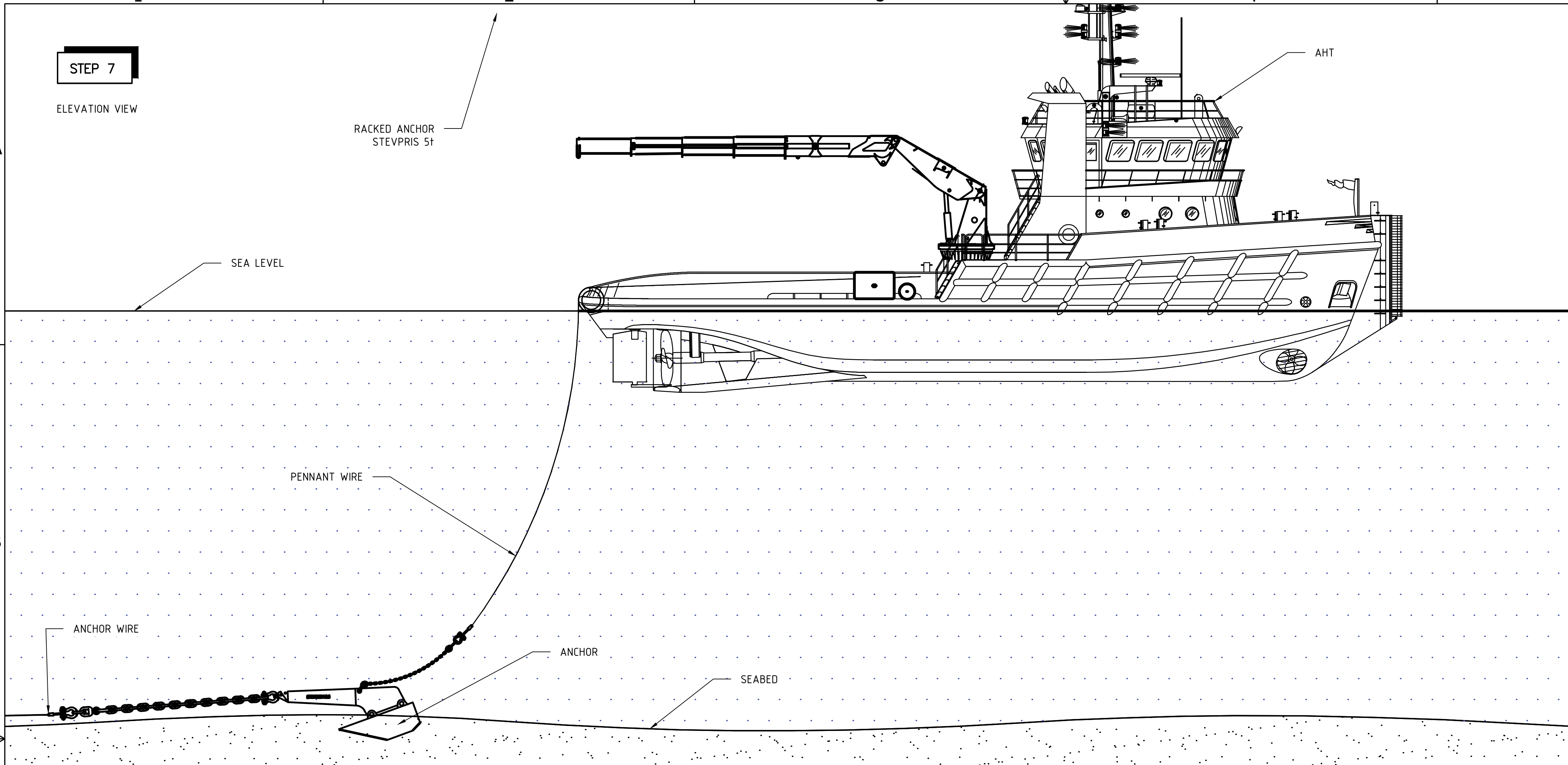
BOSKALIS SUBSEA CABLES

P.O.BOX 43, 3350 AA PAPENDRECHT - E-MAIL: ROYAL@BOSKALIS.COM

FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-
SCALE		BOSKALIS DRAWING NO. / SHEET	REV.
1 : 1		0059359-BOS-CAD-DRW-5008 / 05 of 06	A

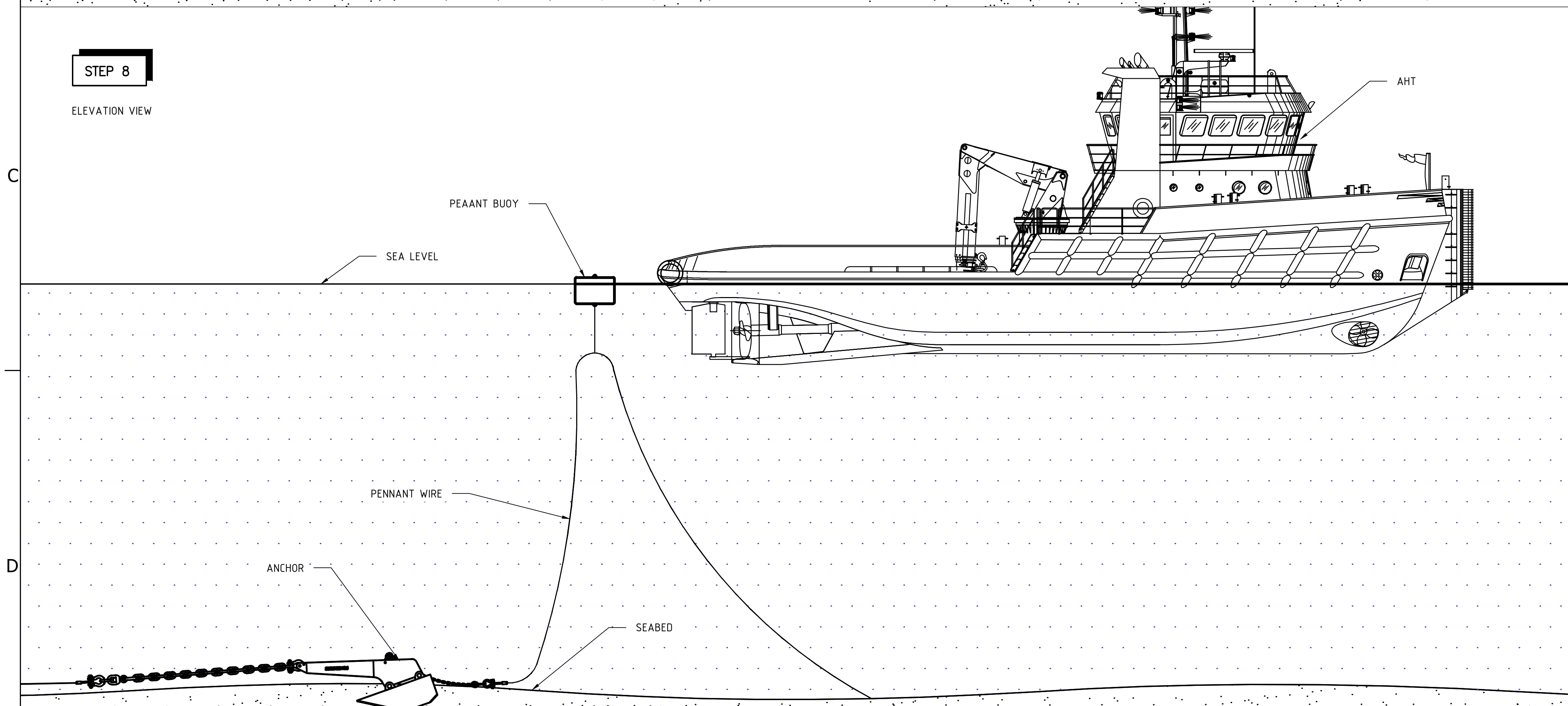
STEP 7

ELEVATION VIEW



STEP 8

ELEVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 7:

- (13) CLV SLOWLY TENSIONS UP ANCHOR WIRE TO ENSURE THE ANCHOR HOLDS
- (14) IF ANCHOR HOLDS AND DOES NOT DRAG OVER SEABED, SURVEYOR TAKES FIX OF THIS POSITION.
- (15) AHT TO DISCONNECT FROM ANCHOR PENNANT WIRE BY SPOOLING OFF ANY REMAINING PENNANT WIRE ON THE WINCH AND INSTALLING A BUOY AS PER RELEVANT DRAWING.

STEP 7:

- (16) AHT WILL CONTINUE WITH OTHER ANCHORS AND ABOVE STEPS CAN BE REPEATED.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: SETUP AND DEPLOYMENT OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

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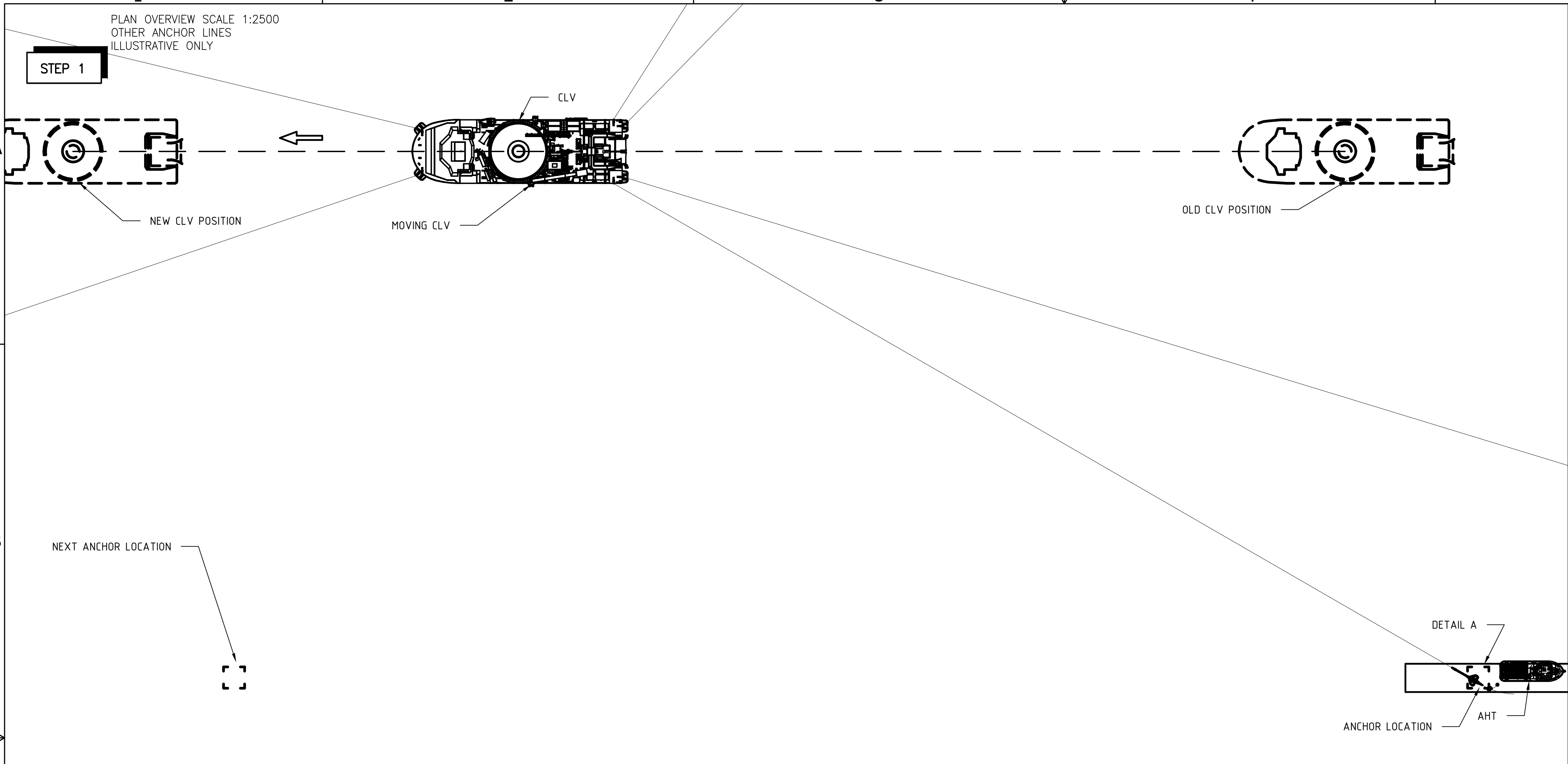
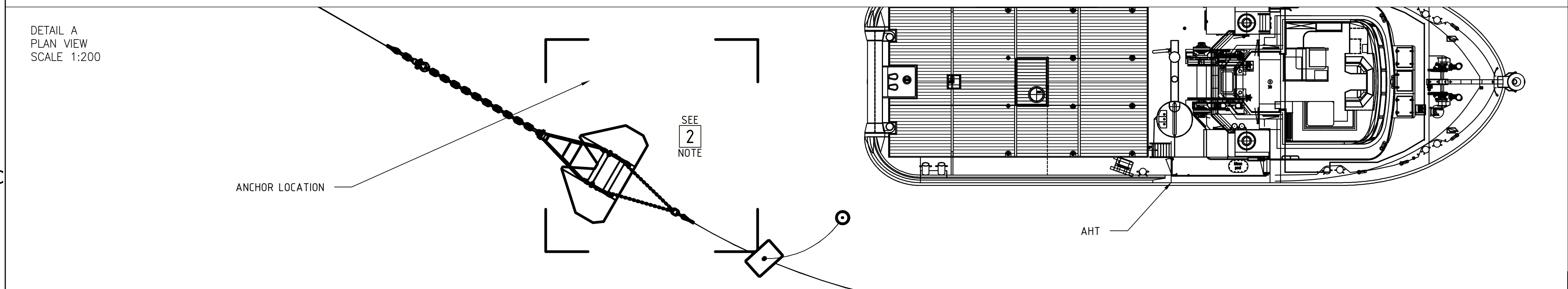
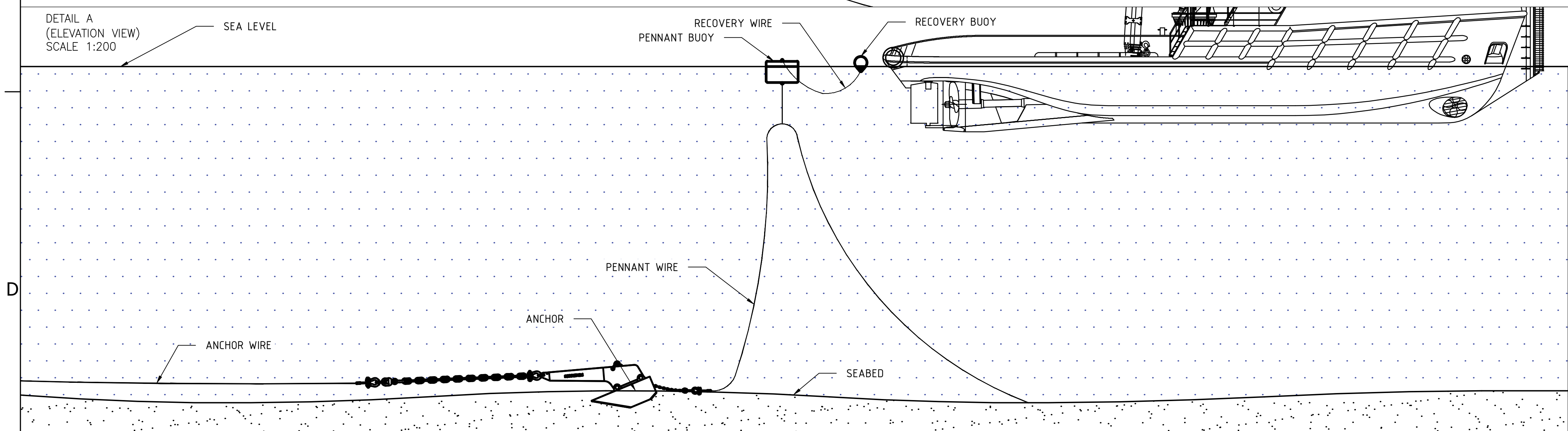
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 1	0059359-BOS-CAD-DRW-5008	06 of 06	A

Appendix C2 Recovery and relocation of Anchors







GENERAL NOTES

1. ALL MEASUREMENTS ARE IN mm UNLESS NOTED OTHERWISE
2. ANCHOR: STEVPRIS / DELTA FLIPPER (TBC)

Reference is made to:
0059359-BOS-ENG-PRO-5005-Anchor procedure

STEP 1:

- (3) CLV'S MASTER OR HIS DEPUTY WILL INSTRUCT SURVEY WHICH ANCHOR(S) HAS/HAVE TO BE RELOCATED.
- (4) SURVEY ENTERS NEW POSITION(S) OF ANCHOR(S) IN THE AMS AND SENDS THESE TO THE AHT(S).
- (5) CLV MASTER INSTRUCTS AHT TO MOVE TO LOCATION OF THE ANCHOR THAT HAS TO BE RELOCATED.

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
RECOVERY AND RELOCATION OF ANCHORS
-

CLIENT
LIVERPOOL BAY CCS

liverpool bay ccs

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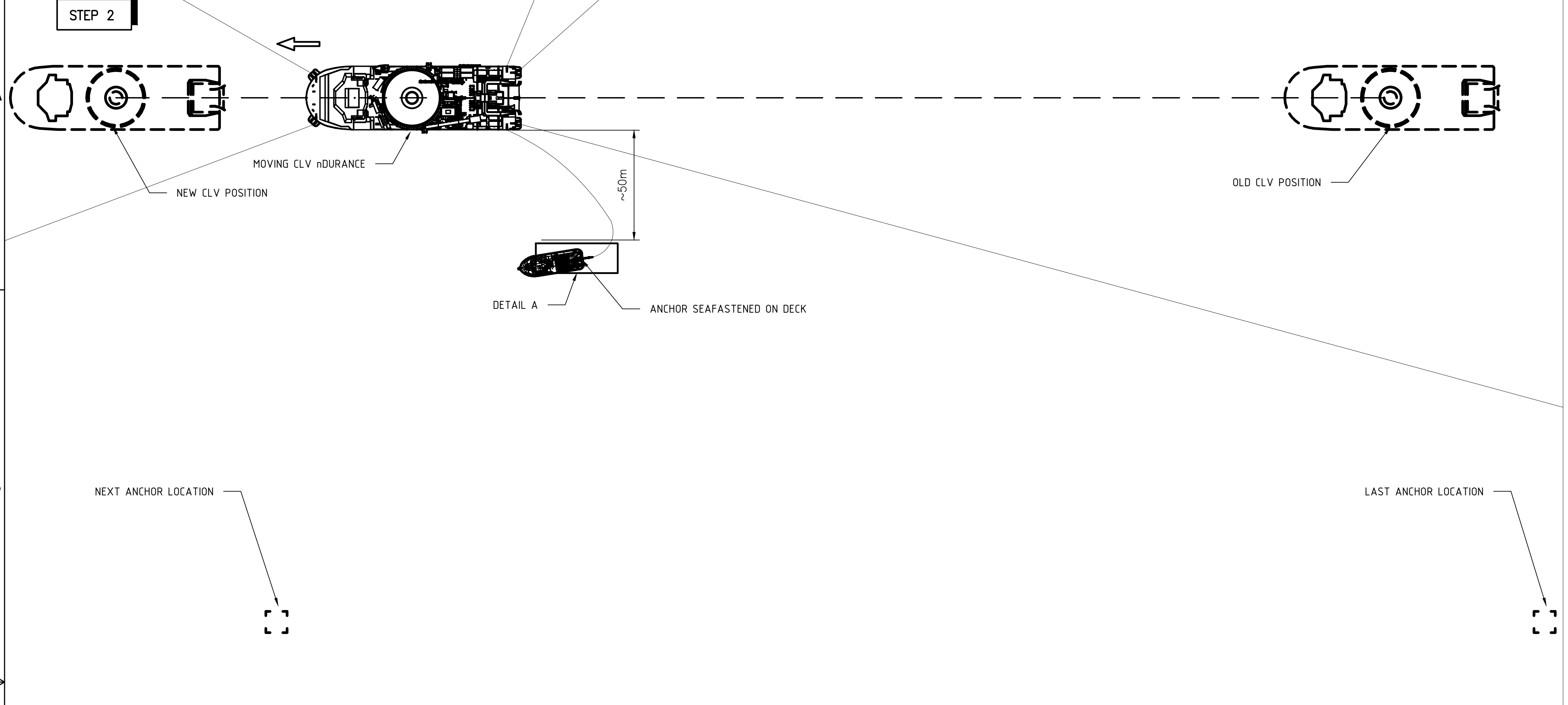
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 1	0059359-BOS-CAD-DRW-5009	01 of 04	A

STEP 2

PLAN OVERVIEW SCALE 1:2500
OTHER ANCHOR LINES
ILLUSTRATIVE ONLY



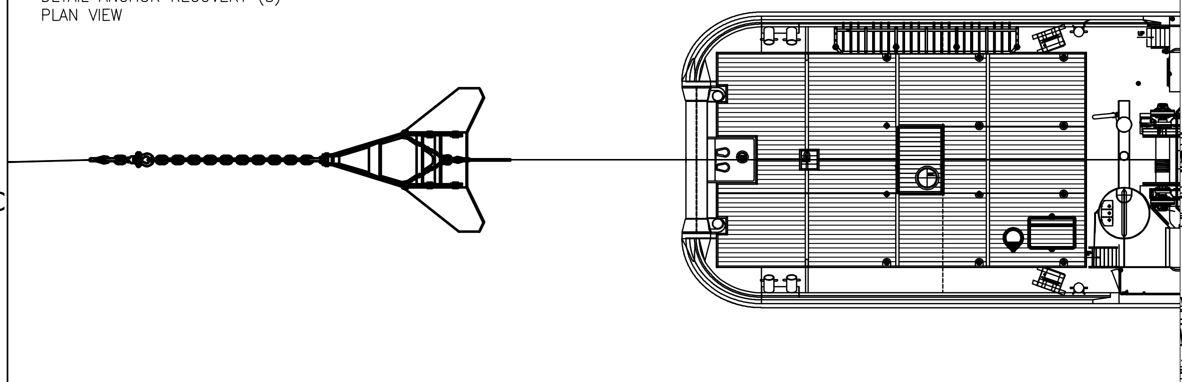
NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

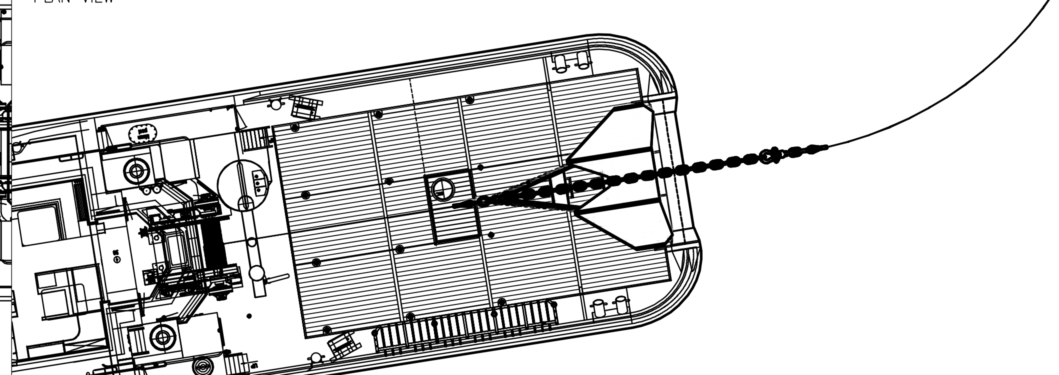
STEP 2:

- (6) THE AHT WILL SAIL TO ANCHOR POSITION AND WILL MAKE AN ANGLE OF 20° TO 30° BETWEEN THE VERTICAL AND THE WORK WIRE.
- (7) AHT TO MOVE AHEAD MAINTAINING CONSTANT DISTANCE FROM THE CLV (DON'T BACK DOWN).
- (8) AHT MOVES TO POSITION AND RECOVERS PENNANT WIRE BY THROWING A SMALL GRAPPLE HOOK TO HOOK ON THE POLYPROPYLENE RUNNER AND RECOVER BUOY TO DECK.
- (9) AHT MASTER SPOOLS POLYPROPYLENE RUNNER WITH BUOY TO WINCH, CLEAR DECK AND WINCH UP UNTIL PENNANT WIRE EYE IS ON DECK.
- (10) DISCONNECT POLYPROPYLENE ROPE FROM PENNANT WIRE.
- (11) CLV SLACKENS THE ANCHOR WIRE AND CONFIRMS AHT MASTER THE WIRE IS SLACKED.
- (12) AHT BREAKS OUT THE ANCHOR WITH THE PROPER RETRIEVAL ANGLE (20-30 DEGREES TO THE VERTICAL). PENNANT WIRE IS LOCKED BY DECK PINS.
- IN CASE THERE IS A CABLE/PIPELINE ON THE ROUTE DURING RELOCATION, THE COMPLETE ANCHOR NEEDS TO BE TAKEN ON DECK OF THE AHT AND NEEDS TO BE SEAFASTENED TO STRONG POINTS. SURVEY TO CONFIRM CROSSING LOCATIONS ALONG ROUTE.

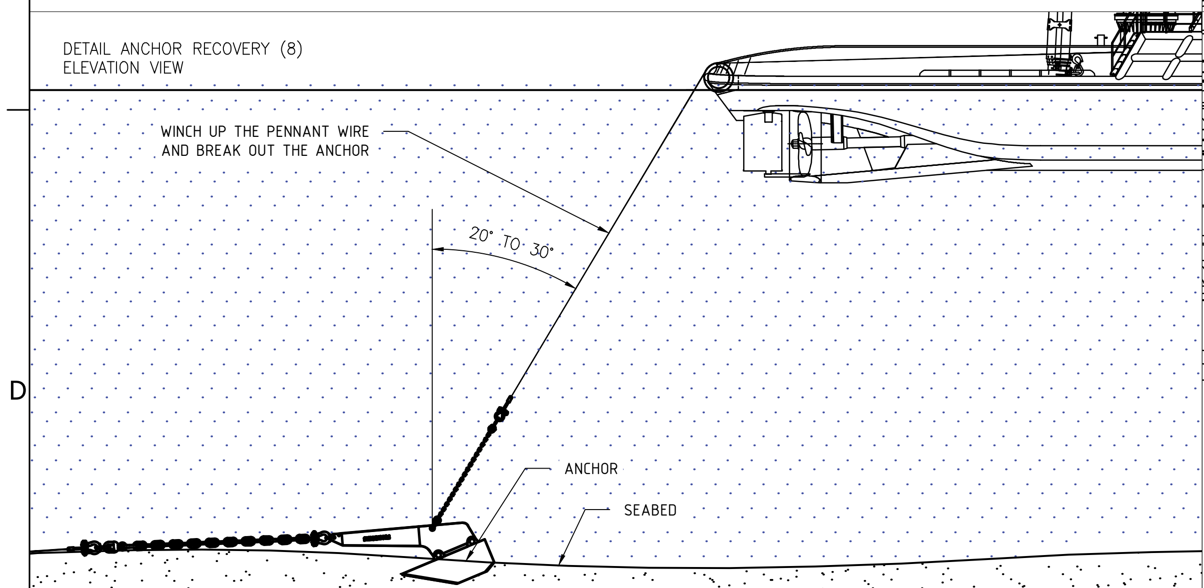
DETAIL ANCHOR RECOVERY (8)
PLAN VIEW



DETAIL A
PLAN VIEW

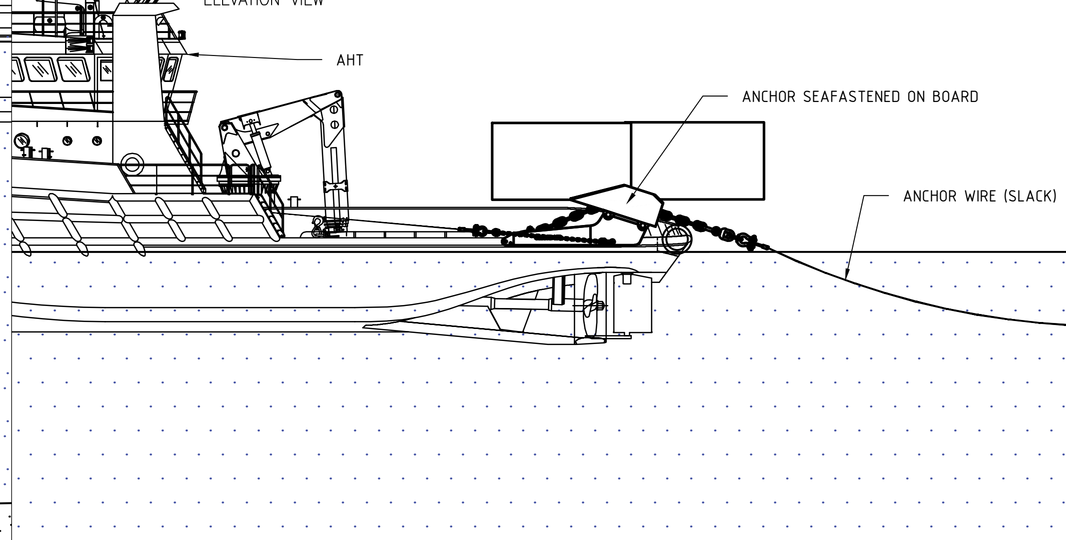


DETAIL ANCHOR RECOVERY (8)
ELEVATION VIEW



DETAIL A
ELEVATION VIEW

IN CASE OF CROSSING 3rd PARTY ASSET



A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: RECOVERY AND RELOCATION OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

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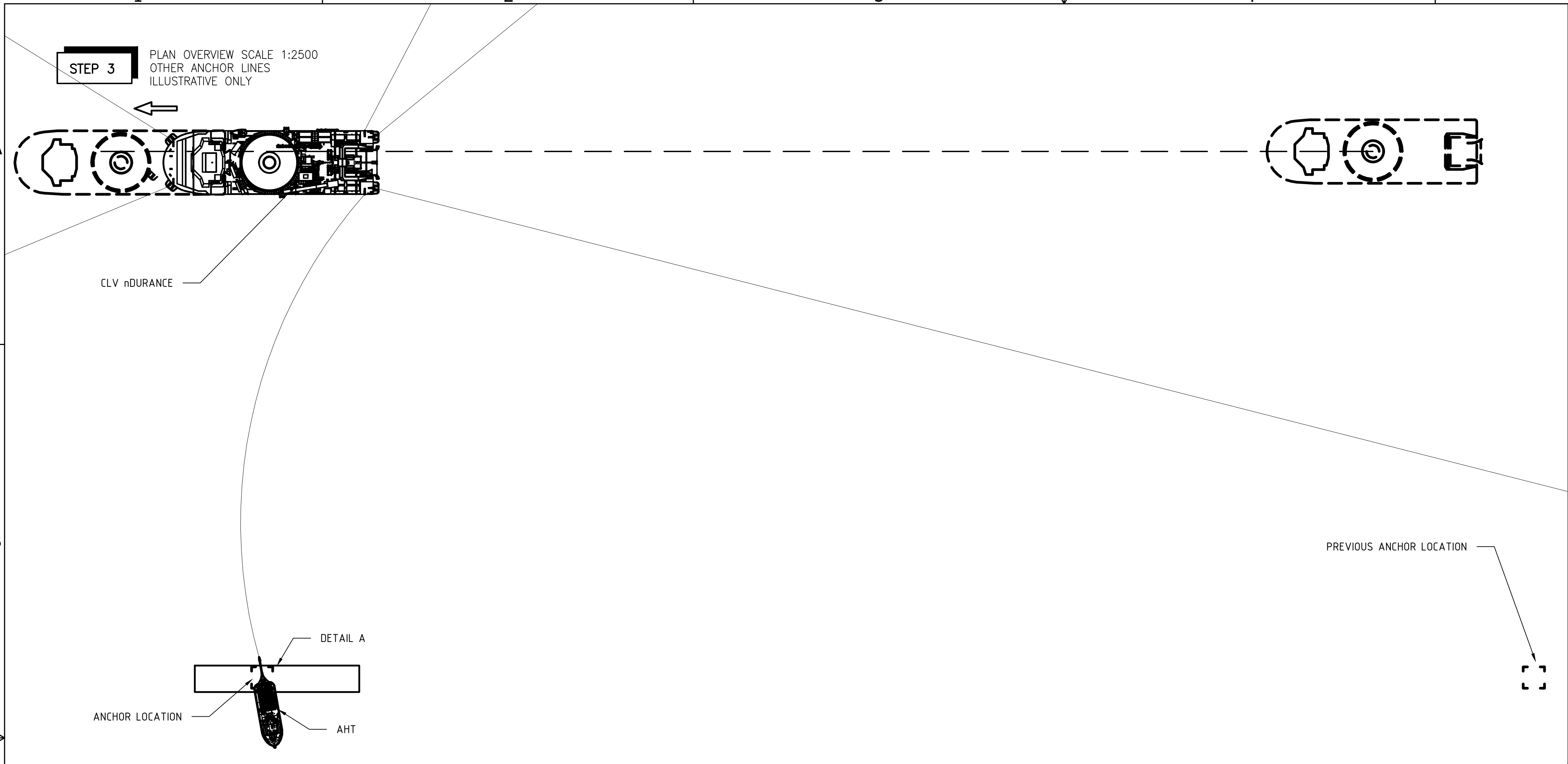
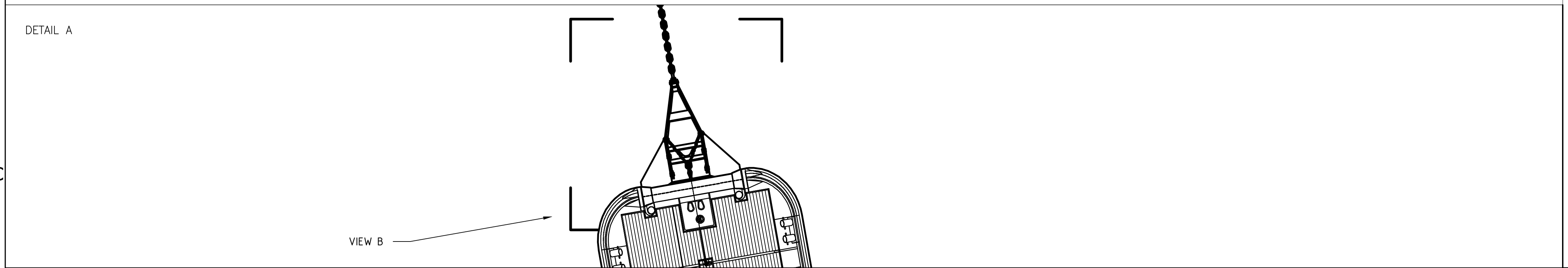
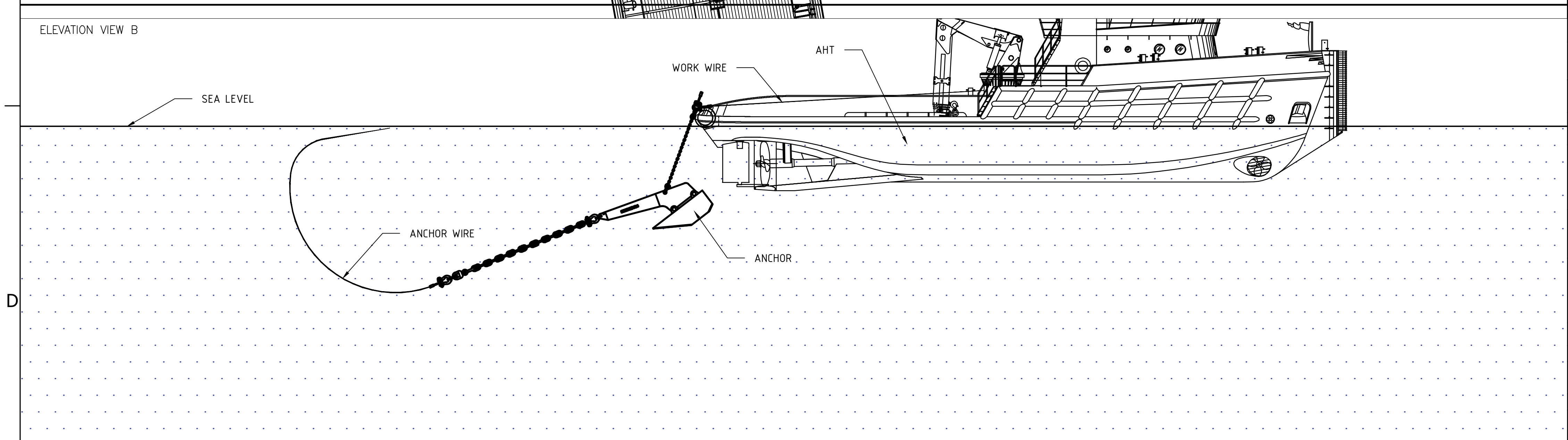
SCALE		BOSKALIS DRAWING NO.	SHEET	REV.
1 : 1		0059359-BOS-CAD-DRW-5009	02 of 04	A







NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 3:

- (13) CONTINUE WITH ANCHOR DEPLOYMENT

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: RECOVERY AND RELOCATION OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

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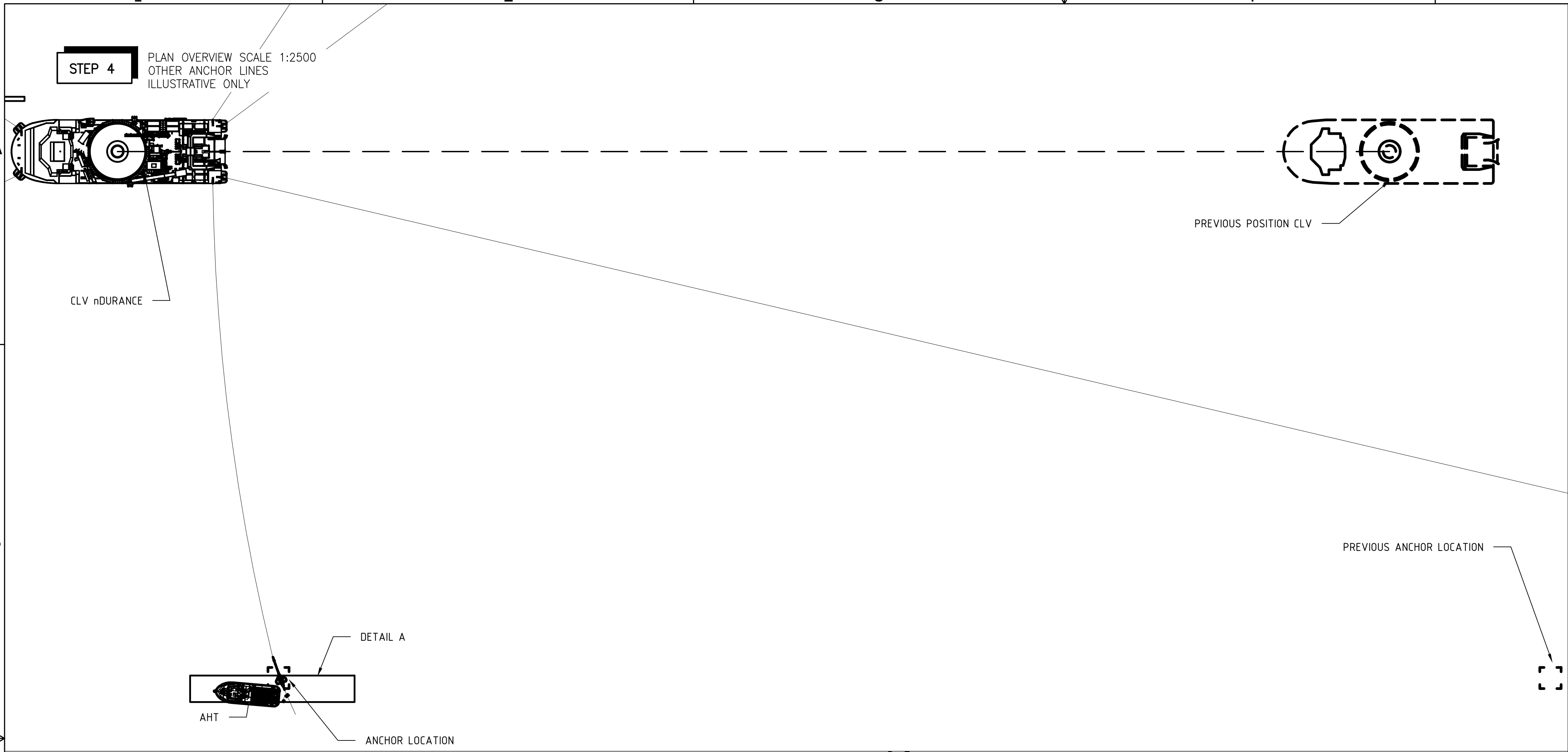
A3		-	-
SCALE		BOSKALIS DRAWING NO.	SHEET	REV.

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
	0059359-BOS-CAD-DRW-5009	03 of 04	A



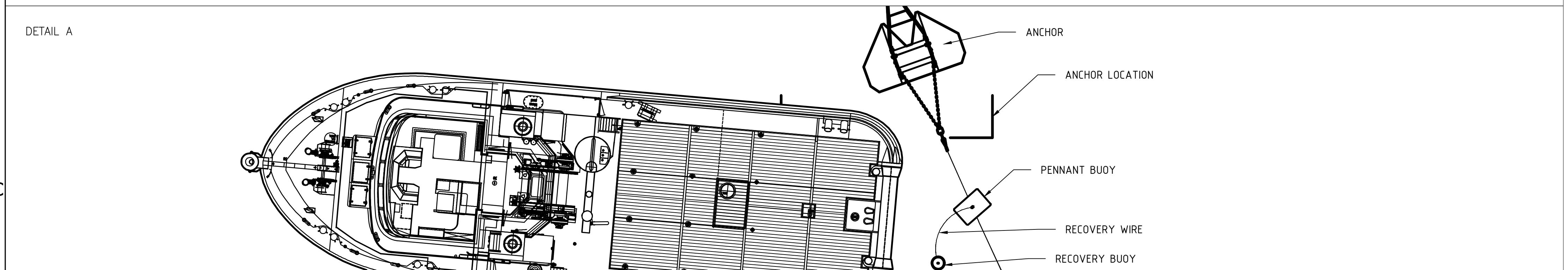
NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

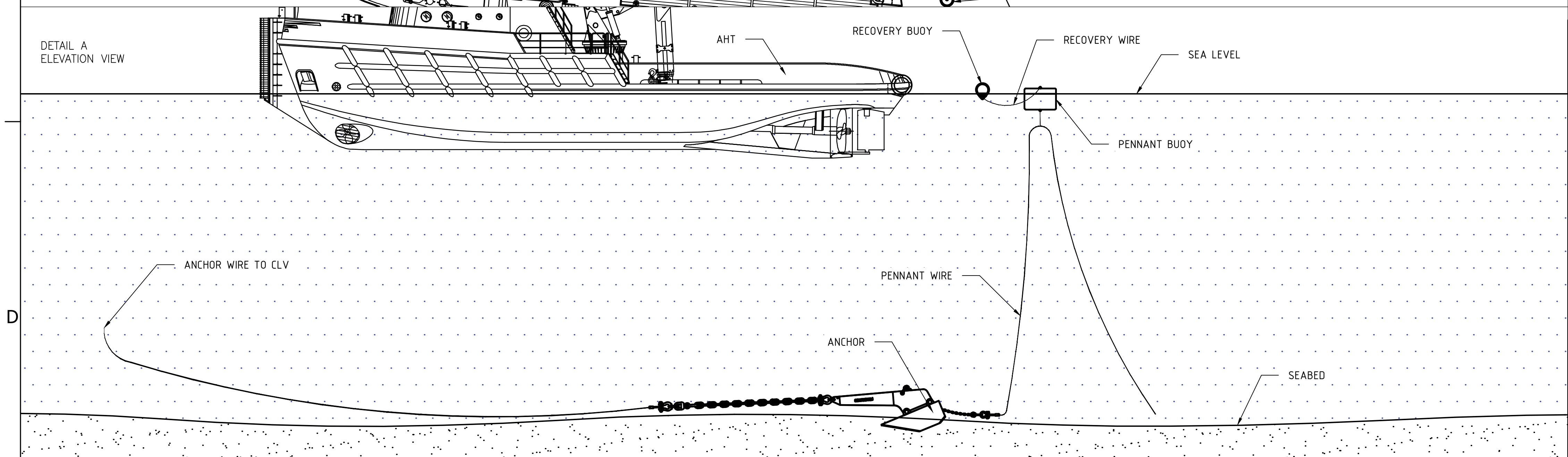
STEP 4:

- ANCHOR RELOCATED.
- CONTINUE WITH STEP 1 FOR THE NEXT ANCHOR

DETAIL A



DETAIL A
ELEVATION VIEW



REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: RECOVERY AND RELOCATION OF ANCHORS

-

CLIENT: LIVERPOOL BAY CCS

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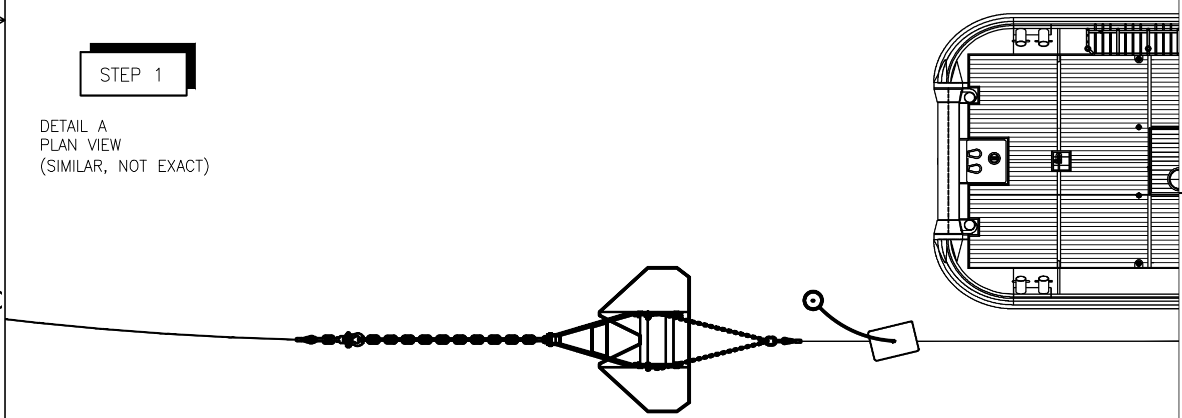
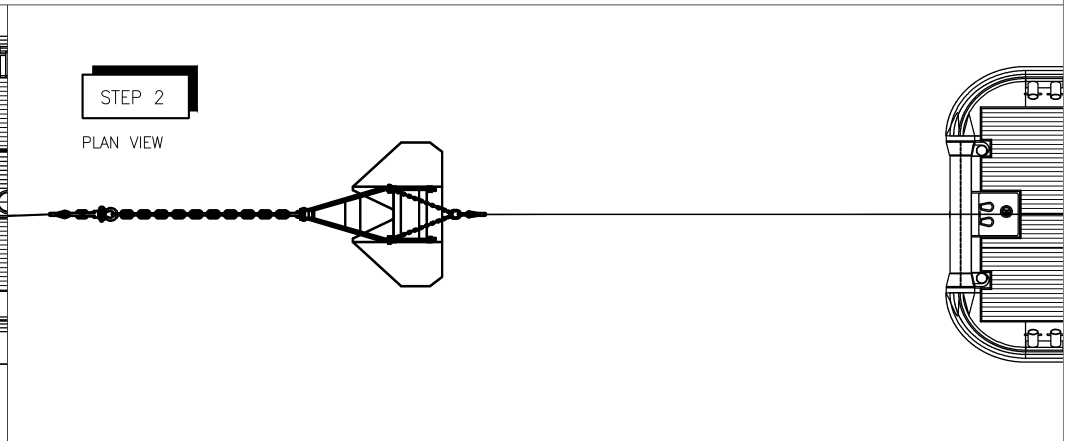
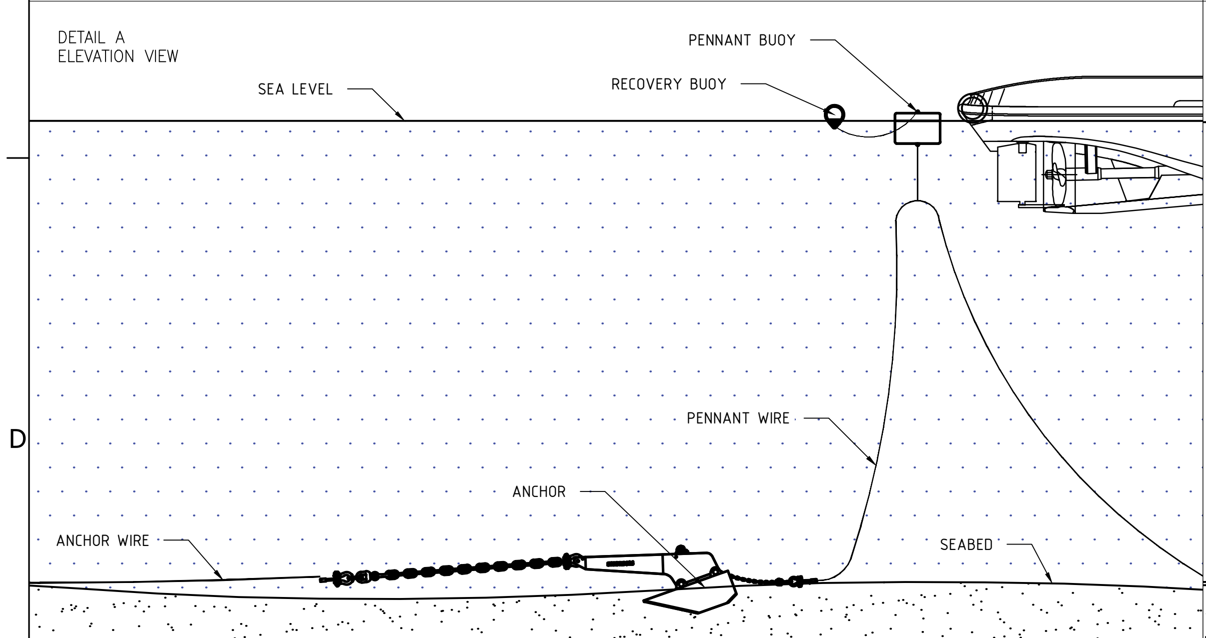
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

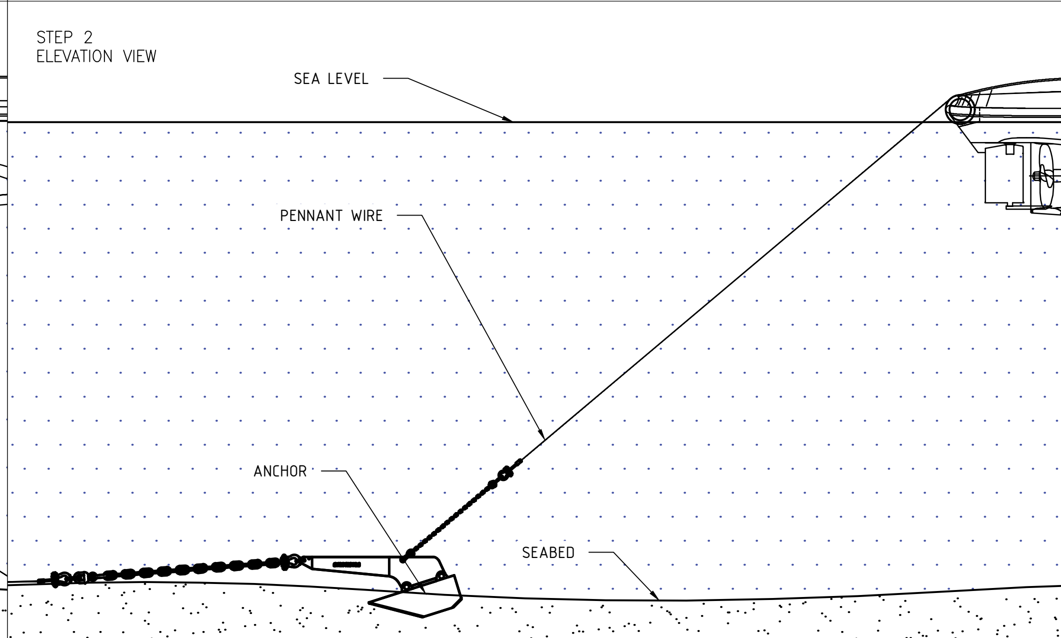
SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
	0059359-BOS-CAD-DRW-5009	04 of 04	A

Appendix C3 Recovery of anchors after completion of operations









GENERAL NOTES

1. ALL MEASUREMENTS ARE IN mm UNLESS NOTED OTHERWISE
2. ANCHOR: STEVPRIS / DELTA FLIPPER (TBC)

Reference is made to:
0059359-BOS-ENG-PRO-5005-Anchor procedure

STEP 1:

- (5) THE AHT WILL SAIL TO ANCHOR POSITION AND WILL MAKE AN ANGLE OF 20° TO 30° BETWEEN THE VERTICAL AND THE WORK WIRE.
- (6) AHT TO MOVE AHEAD MAINTAINING CONSTANT DISTANCE FROM THE CLV (DO NOT BACK DOWN).
- (7) AHT MOVES TO POSITION AND RECOVERS PENNANT WIRE BY THROWING A SMALL GRAPPLE HOOK TO HOOK ON THE POLYPROPYLENE RUNNER AND RECOVER BUOY TO DECK.
- (8) AHT MASTER SPOOLS POLYPROPYLENE RUNNER WITH BUOY TO WINCH, CLEAR DECK AND WINCH UP UNTIL PENNANT WIRE EYE IS ON DECK.
- (9) DISCONNECT POLYPROPYLENE ROPE FROM PENNANT WIRE.

STEP 2:

- (8) AHT MASTER SPOOLS POLYPROPYLENE RUNNER WITH BUOY TO WINCH, CLEAR DECK AND WINCH UP UNTIL PENNANT WIRE EYE IS ON DECK.
- (9) DISCONNECT POLYPROPYLENE ROPE FROM PENNANT WIRE.
- (10) CLV SLACKENS THE ANCHOR WIRE AND CONFIRMS AHT MASTER THE WIRE IS SLACKED.
- (11) AHT BREAKS OUT THE ANCHOR

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
RECOVERY OF ANCHORS AFTER COMPLETION OF OPERATIONS
-

CLIENT
LIVERPOOL BAY CCS

liverpool bay ccs

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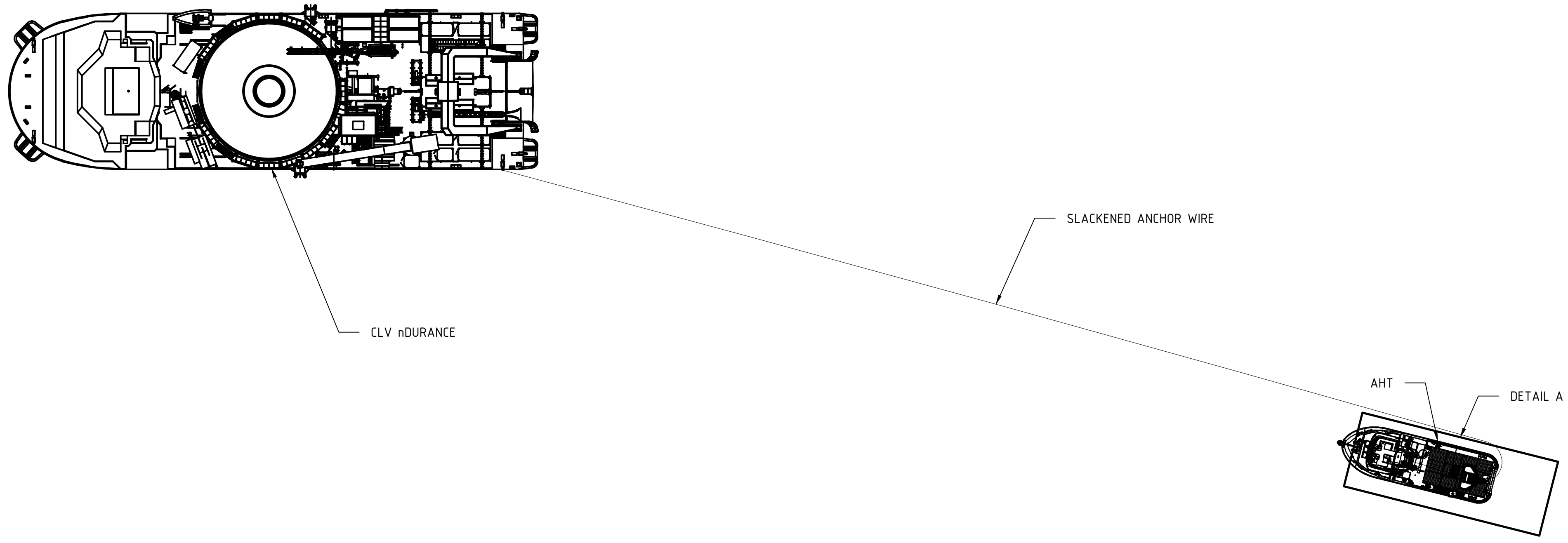
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 200	0059359-BOS-CAD-DRW-5010	01 of 03	A

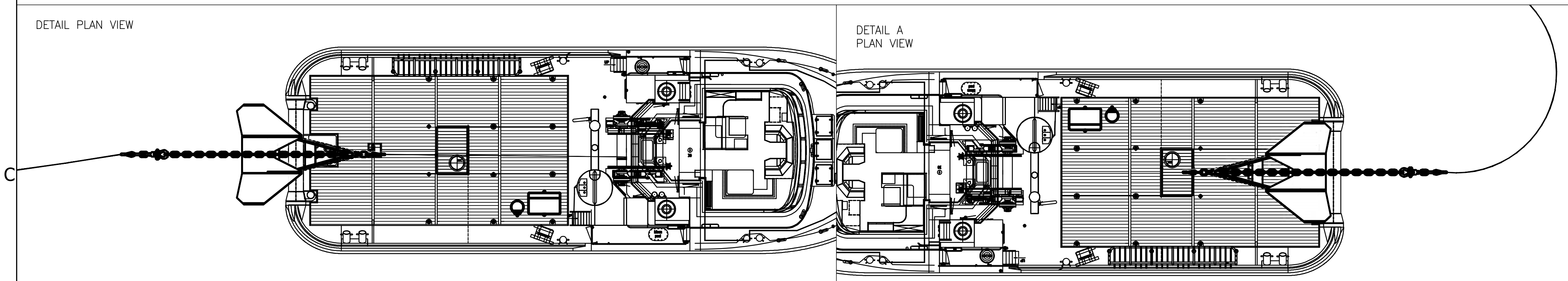
STEP 3

PLAN OVERVIEW SCALE 1:1200



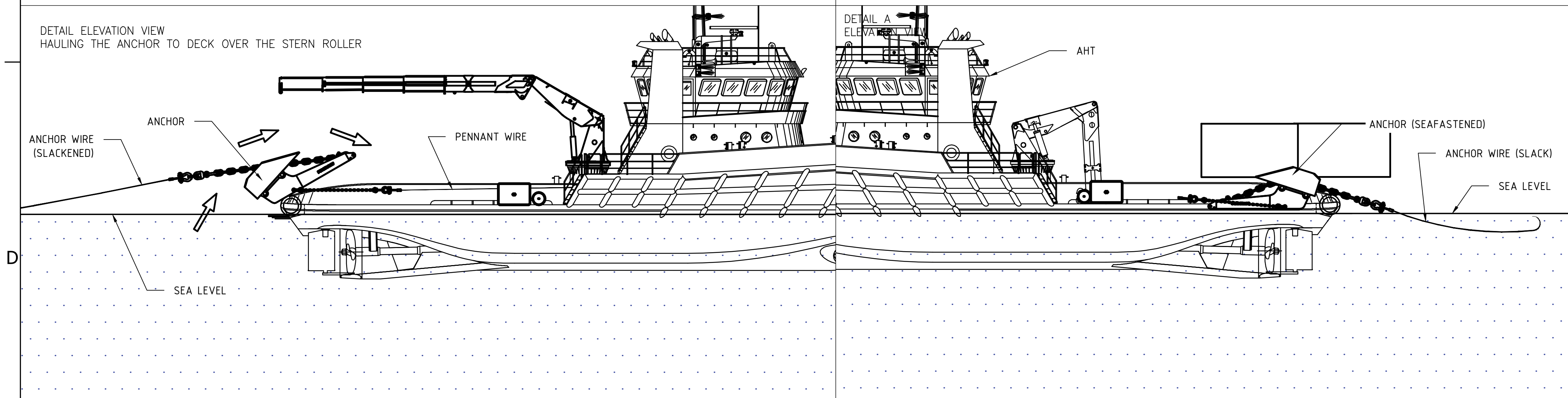
DETAIL PLAN VIEW

DETAIL A
PLAN VIEW



DETAIL ELEVATION VIEW
HAULING THE ANCHOR TO DECK OVER THE STERN ROLLER

DETAIL A
ELEVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 3:

- (11) AHT BREAKS OUT THE ANCHOR AND HAUL IN PENNANT WIRE IN UNTIL THE ANCHOR IS JUST ON THE STERN/BOW ROLLER.
- THE COMPLETE ANCHOR NEEDS TO BE TAKEN ON DECK OF THE AHT AND NEEDS TO BE DOUBLE SECURED ON BOARD.
- (12) WHEN ANCHOR IS SEAFASTENED ON DECK OF THE AHT, AHT WILL SAIL TOWARDS CLV.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: RECOVERY OF ANCHORS AFTER COMPLETION OF OPERATIONS

-

CLIENT: LIVERPOOL BAY CCS

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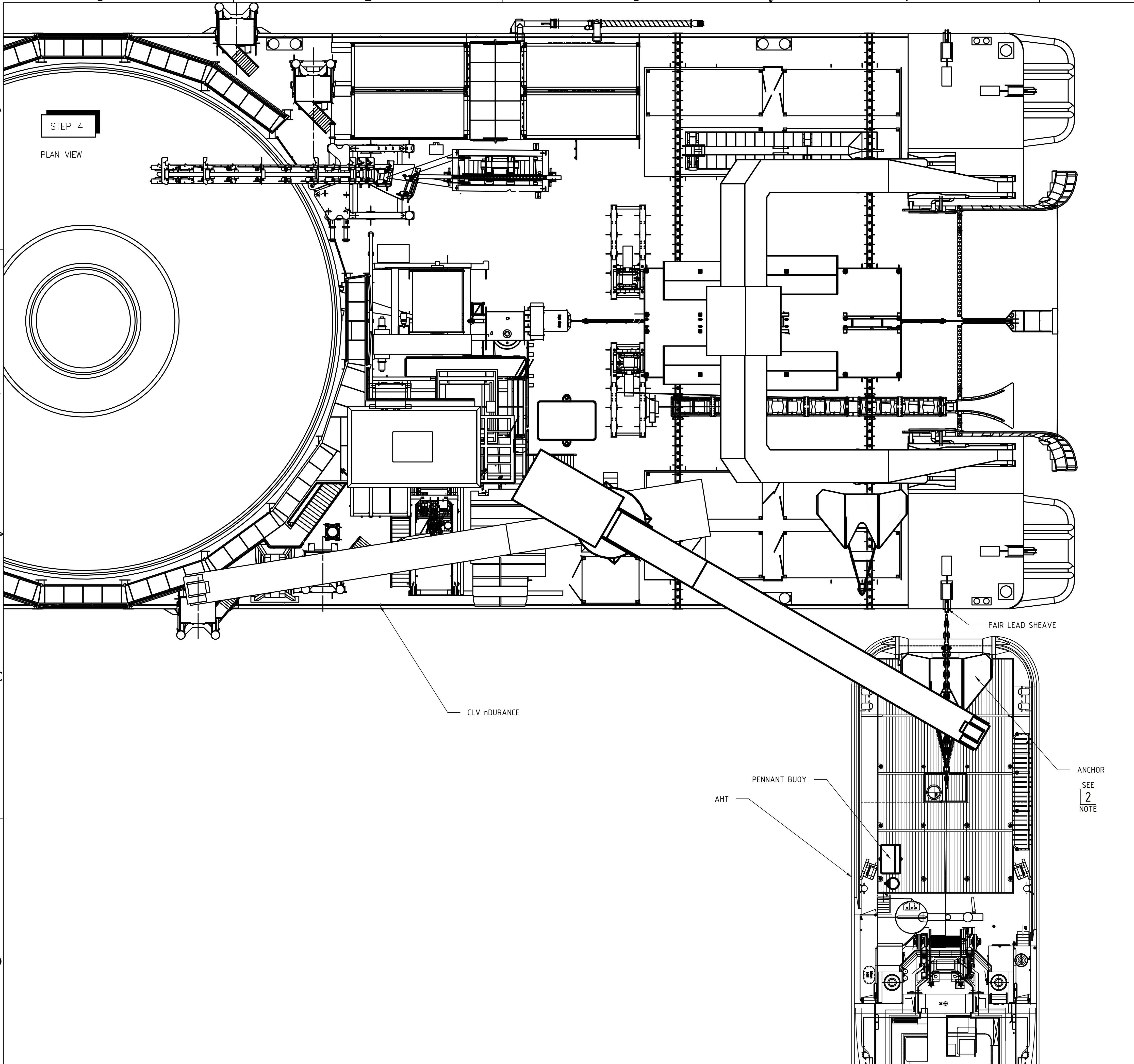
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-
SCALE		BOSKALIS DRAWING NO. / SHEET	REV.
1 : 1		0059359-BOS-CAD-DRW-5010 / 02 of 03	A



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 4:

- (13) CLV WILL REDUCE THE TENSION ON THE WIRE AND KEEP MONITOR THE TENSION AND MOVING IN OF THE AHT.
- (14) WHEN AHT IS NEARBY CLV, REMOVE THE WINCH WIRE FROM THE ANCHOR.
- UNTIL COMPLETE JOB IS DONE, ANCHORS 3 AND 4 ARE TO BE WET STORED. ANCHORS 1, 2, 5 AND 6 ARE RACKED.
- CLV WILL SLEW CRANE INTO POSITION AND THE ANCHOR WILL BE CONNECTED TO THE CRANE HOOK.
- CLV WILL LIFT ANCHOR INTO STORAGE POSITION ON CLV AND THE DECK CREW WILL SEAFASTEN TO STRONG POINTS ON THE DECK.
- IN CASE NO DECK SPACE IS AVAILABLE, THE ANCHORS WILL BE STORED AT THE DESIGNATED WET-STORE LOCATION.
- (16) AHT CAN CONTINUE RECOVER REMAINING ANCHORS.

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: RECOVERY OF ANCHORS AFTER COMPLETION OF OPERATIONS

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

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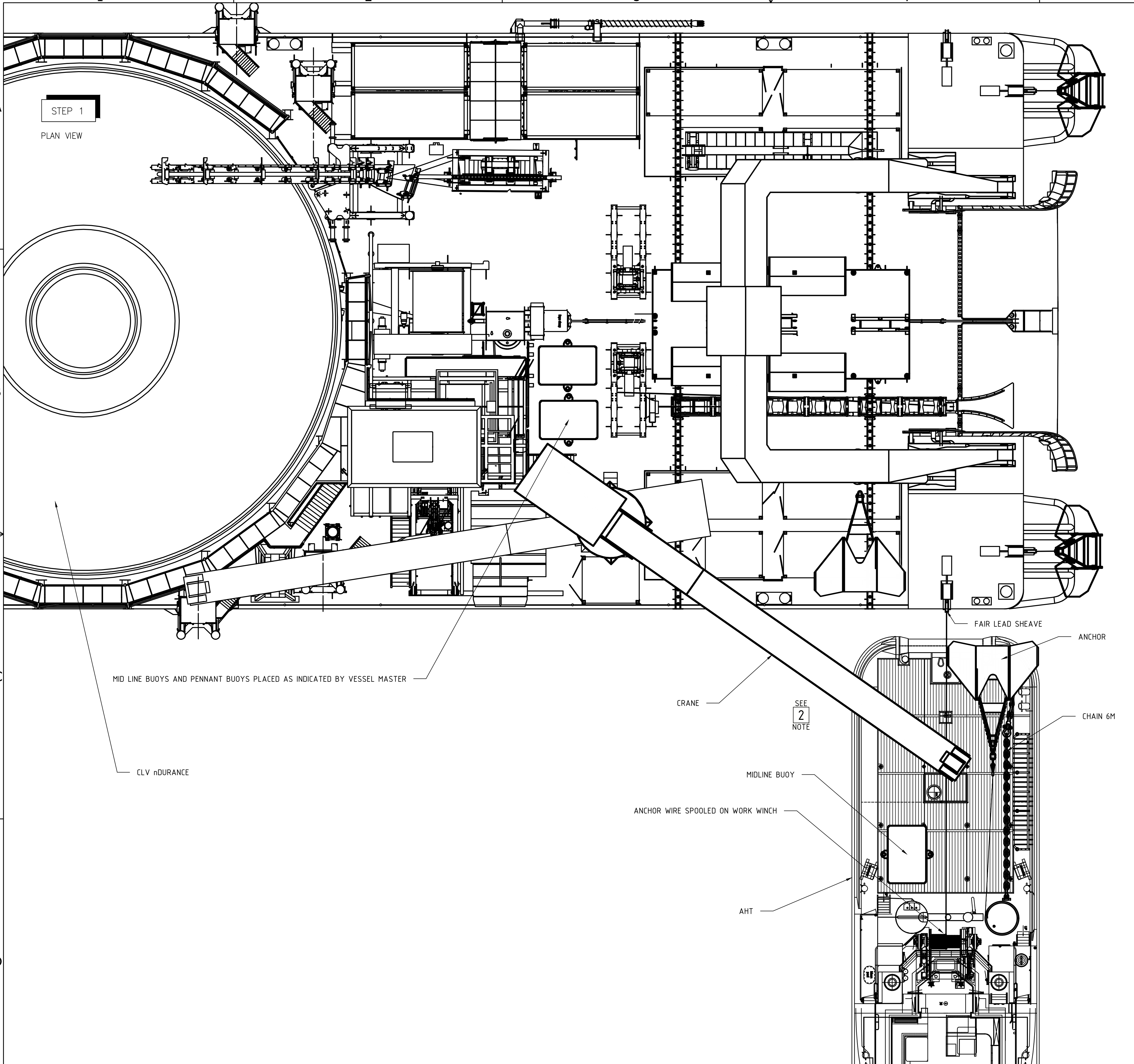
FORMAT	PROJECTION	CLIENT DRAWING NO.		REV.
A3		-		-
SCALE		BOSKALIS DRAWING NO.	SHEET	REV.
1 : 200		0059359-BOS-CAD-DRW-5010	03 of 03	A

Appendix C4 Midline buoy and anchor deployment



GENERAL NOTES

1. ALL MEASUREMENTS ARE IN mm UNLESS NOTED OTHERWISE
2. ANCHOR: STEVPRIS / DELTA FLIPPER (TBC)

Reference is made to:
0059359-BOS-ENG-PRO-5005-Anchor procedure

STEP 1:

- (4) CLV MEASURE LOCATION(S) FOR MIDLINE BUOY(S) WITH SURVEY SYSTEM.
- (5) THE CLV WILL PASS (WITH MESSENGER WIRE AND/OR CRANE ASSISTANCE) MIDLINE BUOY, PENNANT BUOY, PENNANT WIRE AND ANCHOR TO THE AHT.
- (PRE-CONNECTED TO THE ANCHOR WINCH WIRE AS PER MID -LINE BUOY ARRANGEMENT DRAWING IF THEY ARE STORED ON THE CLV.
- IF THE ANCHORS ARE STORED ON THE AHT, CLV WILL PASS A MESSENGER WIRE TO CONNECT THE PENNANT WIRE TO THE ANCHOR.
- CLV MASTER TO DECIDE WHICH ANCHOR(S) TO START WITH.
- (6) THE COMPLETE ANCHOR NEEDS TO BE TAKEN ON DECK OF THE AHT AND NEEDS TO BE DOUBLE SECURED ON BOARD.
- THE MIDLINE BUOY(S) ARE ALSO ON DECK OF THE AHT AND SECURED ON BOARD.
- (7) CLV APPLY MARKER TAPE ON CLV DECK AT MIDLINE BUOY LOCATIONS.
- AHT SPOOL ANCHOR WIRE ON WORK WINCH AHT.

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY AND ANCHOR DEPLOYMENT

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

BOSKALIS SUBSEA CABLES

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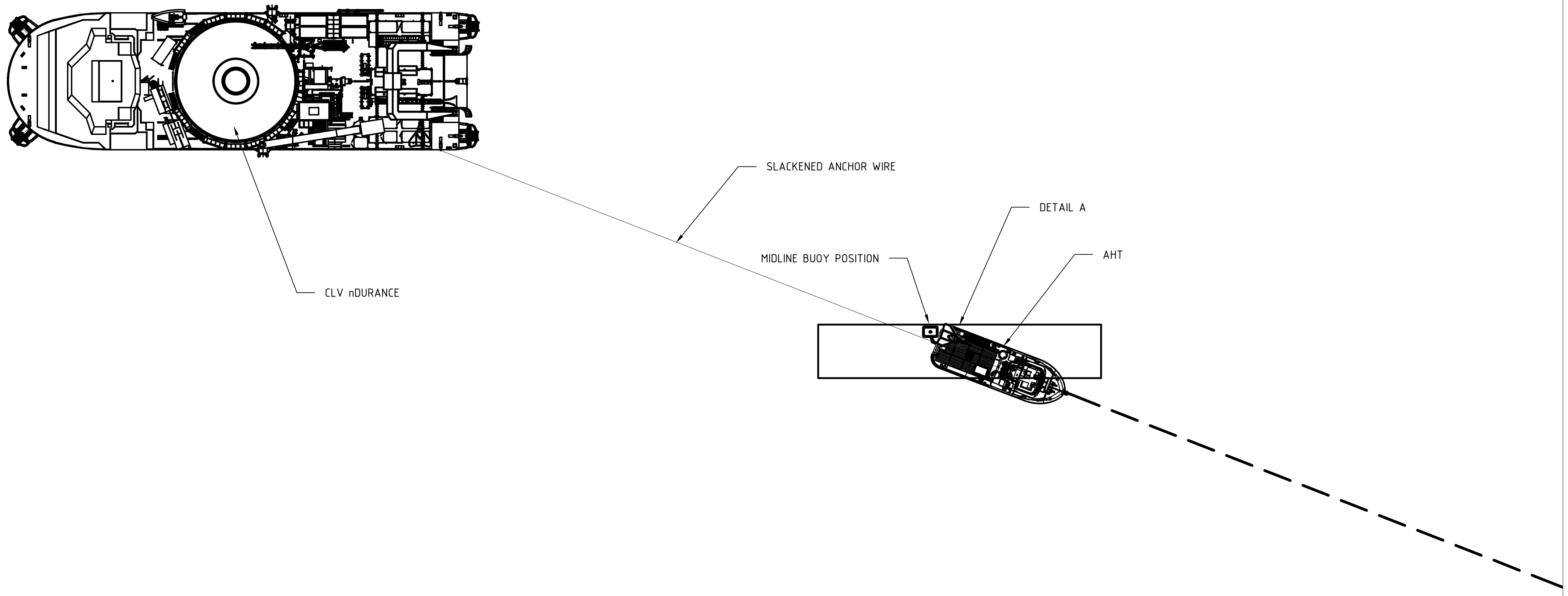
FORMAT	PROJECTION	CLIENT DRAWING NO.		REV.
A3		-		-
SCALE		BOSKALIS DRAWING NO.	SHEET	REV.
1 : 200		0059359-BOS-CAD-DRW-5011	01 of 03	A

STEP 2

PLAN OVERVIEW SCALE 1:1200



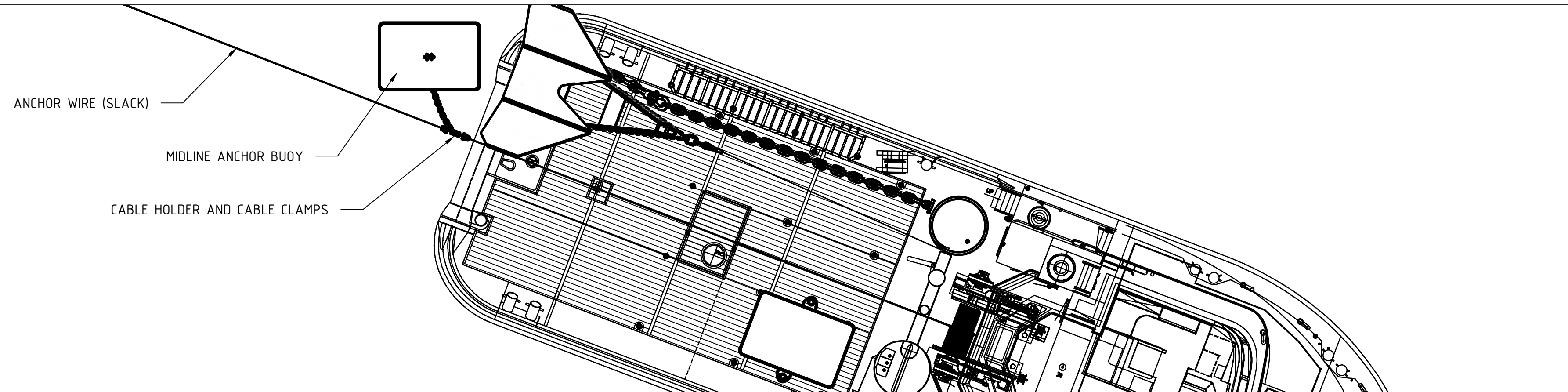
NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

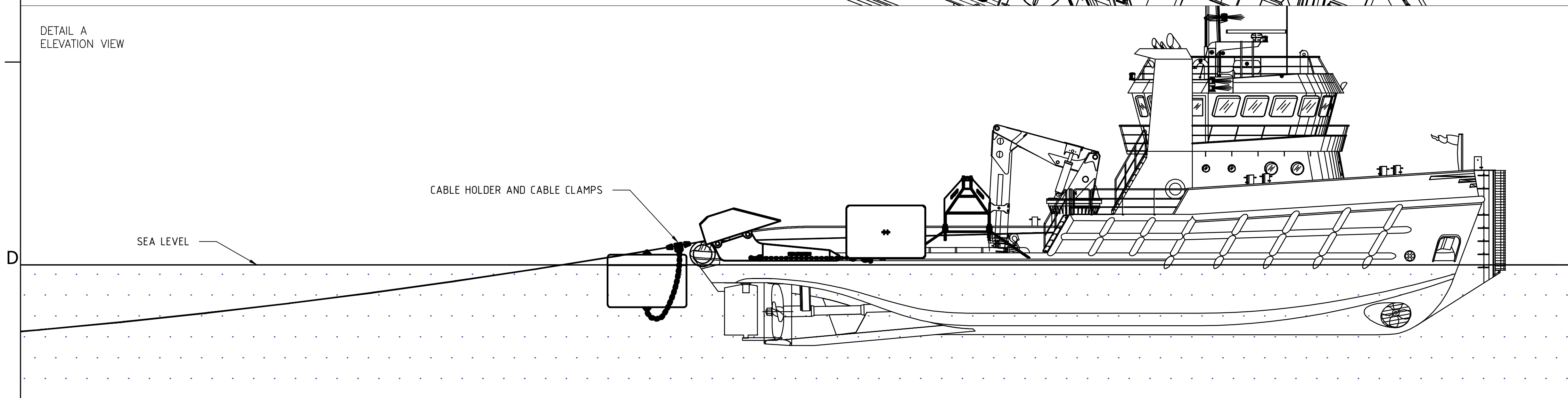
STEP 2:

- (8) PLACE ANCHOR WIRE BETWEEN THE TOWING PINS (IF APPLICABLE WITH SAILING DIRECTION).
- (9) AHT SAIL TO FIRST/NEXT MIDLINE BUOY LOCATION (SAILS FORWARD OR BACKWARD, DEPENDING ON AHT CONFIGURATION, DECISION IS MADE BY AHT CAPTAIN).
- (10) INSTALL THE CABLE HOLDER AND CABLE CLAMPS ON THE ANCHOR WIRE.
- (11) CONNECT THE MIDLINE BUOY CHAIN WITH A SHACKLE TO THE CABLE HOLDER, AS PER DRAWING IN APPENDIX C/06.
- (12) AHT OVERBOARD MIDLINE BUOY AND POLYPROPYLENE ROPE (ATTACHED TO MIDLINE BUOY TO RECOVER THE MIDLINE BUOY) ABOVE CABLE AND START PAYING OUT AHT WORK WINCH WHILE SAILING TO ANCHOR DROP POSITION.
- MIDLINE BUOY IS CONNECTED TO THE WINCH WIRE AND IS DEPLOYED AS THE ANCHOR WIRE IS PAID OUT OVER THE AHT STERN.

DETAIL A



DETAIL A
ELEVATION VIEW



REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY AND ANCHOR DEPLOYMENT

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

BOSKALIS SUBSEA CABLES

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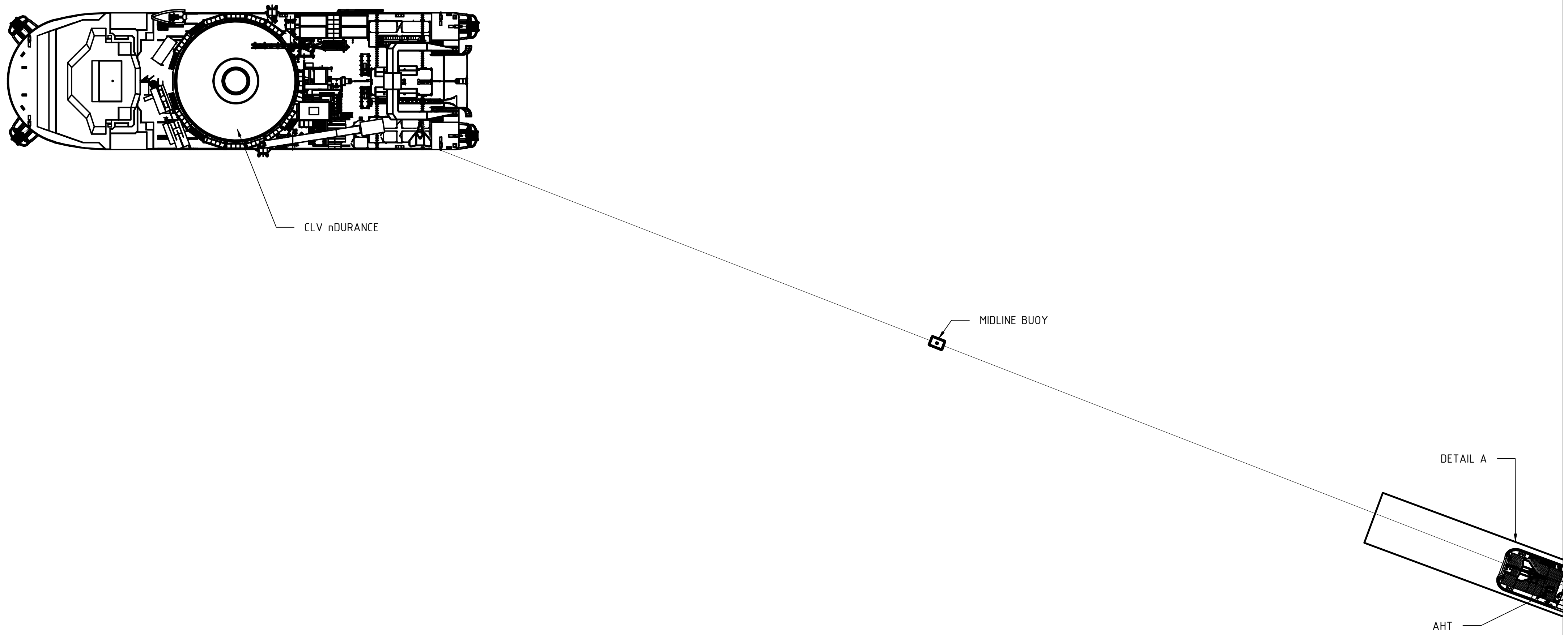
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 1	0059359-BOS-CAD-DRW-5011	02 of 03	A

STEP 3

PLAN OVERVIEW SCALE 1:1200



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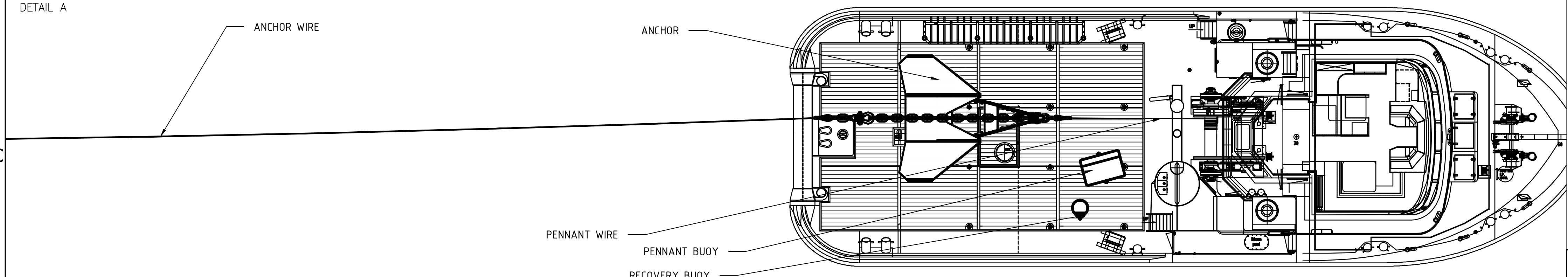
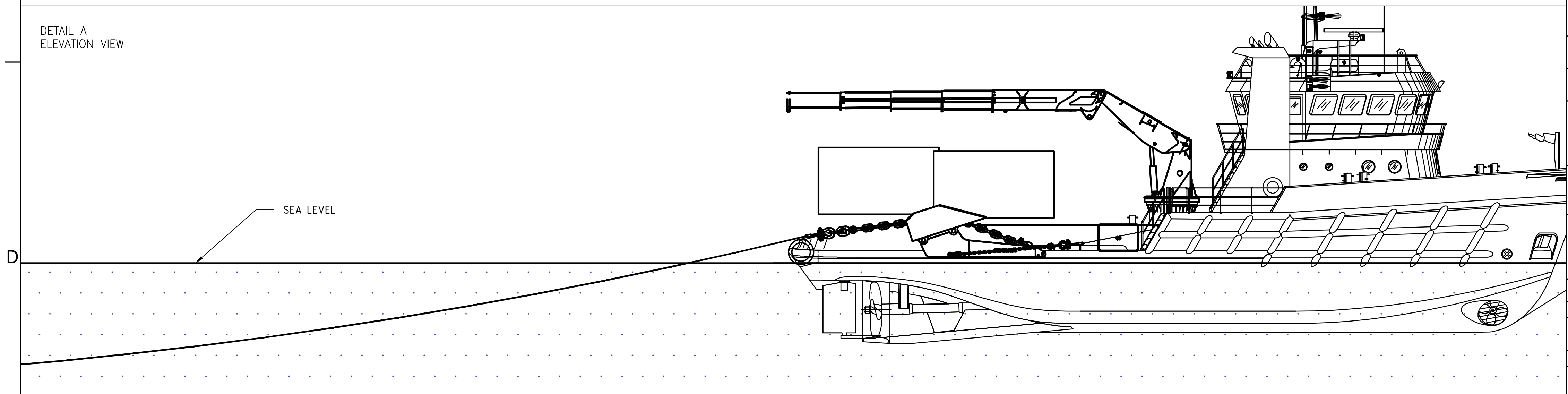


DETAIL A
ELEVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 3:

- ONCE IN POSITION SPOOL OFF THE REMAINING WIRE OFF THE AHT WINCH (IF NECESSARY).
- CONNECT THE ANCHOR WINCH WIRE ON TO THE ANCHOR, AS PER DRAWING IN APPENDIX C/01 OR C/02.
- AHT CREW CONNECTS THE PENNANT WIRE TO THE WINCH AND SPOOLS THE WIRE ON THE WINCH.
- CONTINUE WITH TP/01 STEP 9

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY AND ANCHOR DEPLOYMENT

-

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

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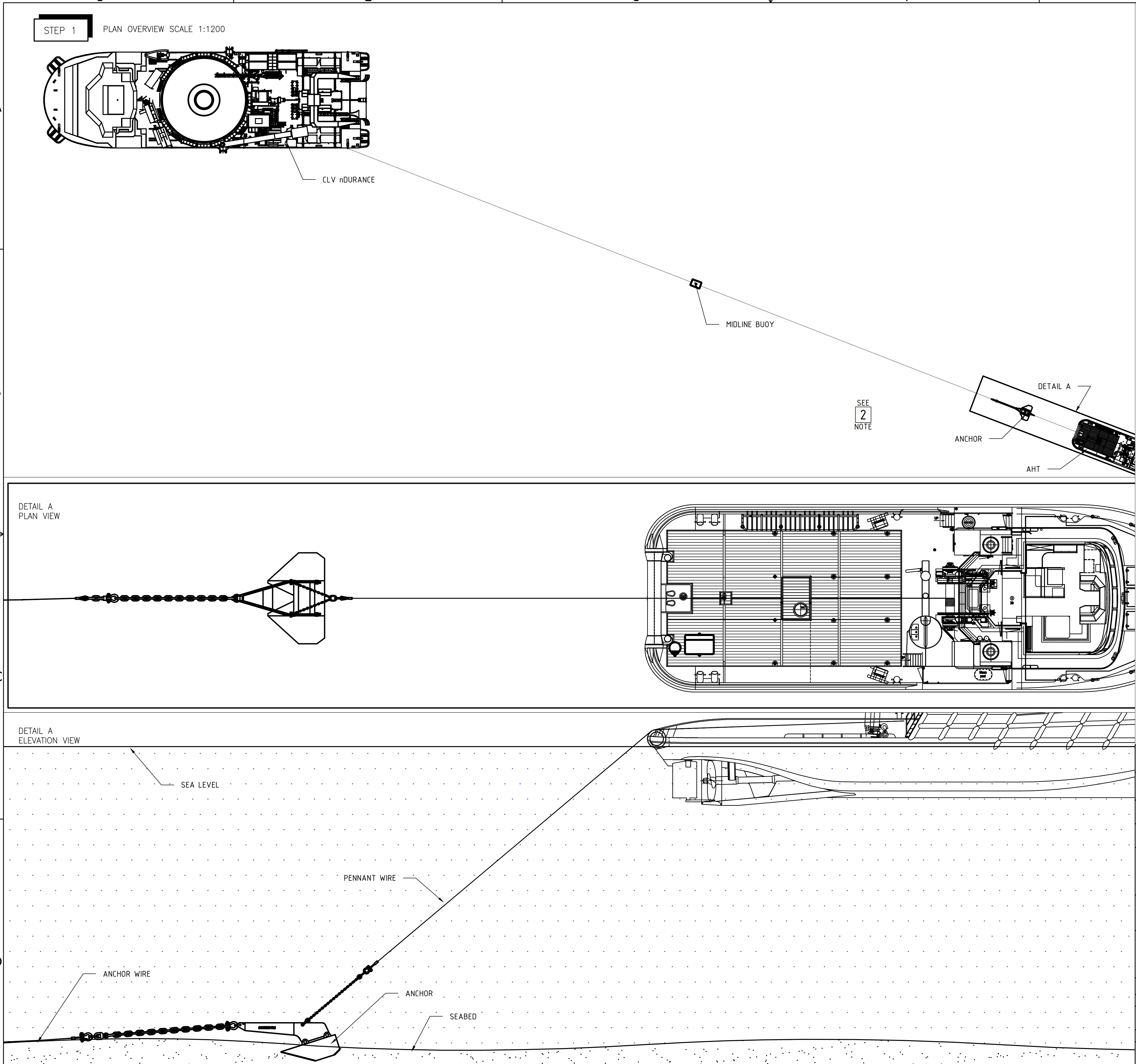
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 1	0059359-BOS-CAD-DRW-5011	03 of 03	A

Appendix C5 Midline buoy and anchor recovery



GENERAL NOTES

1. ALL MEASUREMENTS ARE IN mm UNLESS NOTED OTHERWISE
2. ANCHOR: STEVPRIS / DELTA FLIPPER (TBC)

Reference is made to:
0059359-BOS-ENG-PRO-5005-Anchor procedure

STEP 1:

- (3) START WITH THE RECOVERY OF THE ANCHOR, FOLLOWING RELEVANT TASK PLAN.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
MID-LINE BUOY AND ANCHOR RECOVERY
-

CLIENT
LIVERPOOL BAY CCS

liverpool bay ccs

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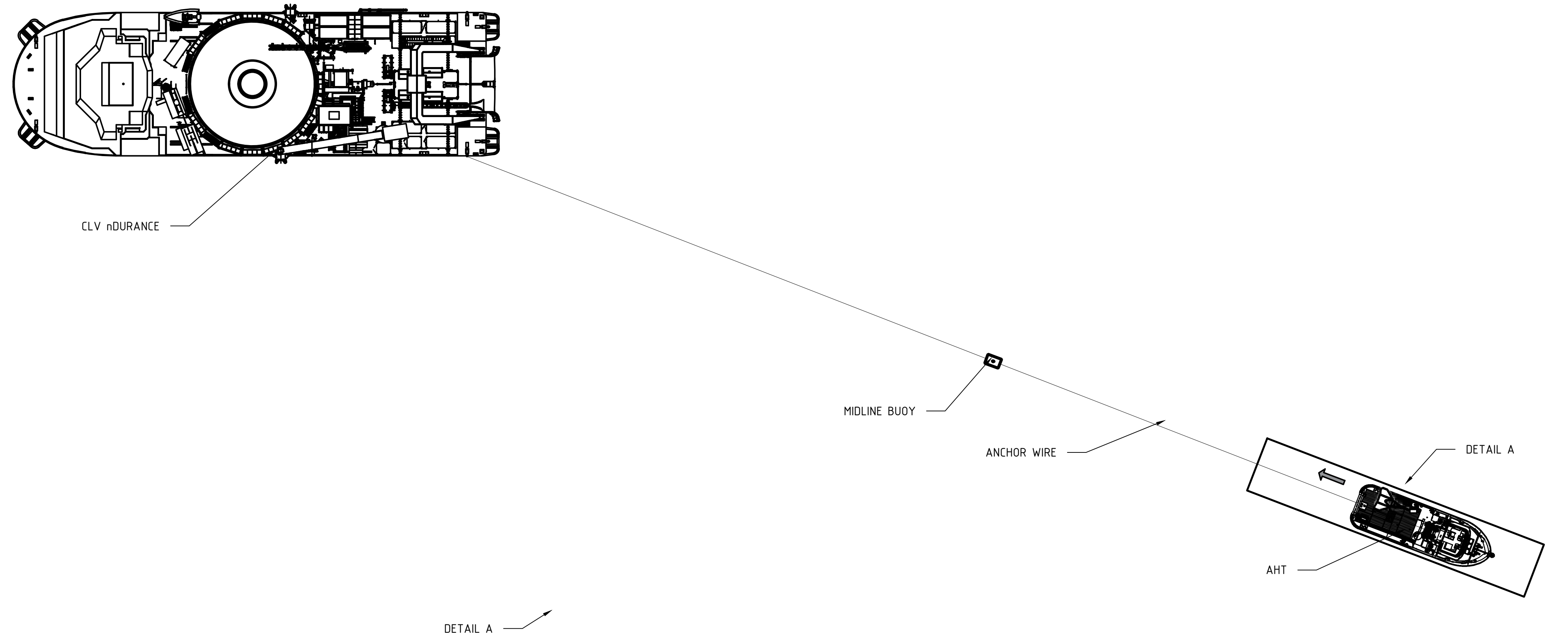
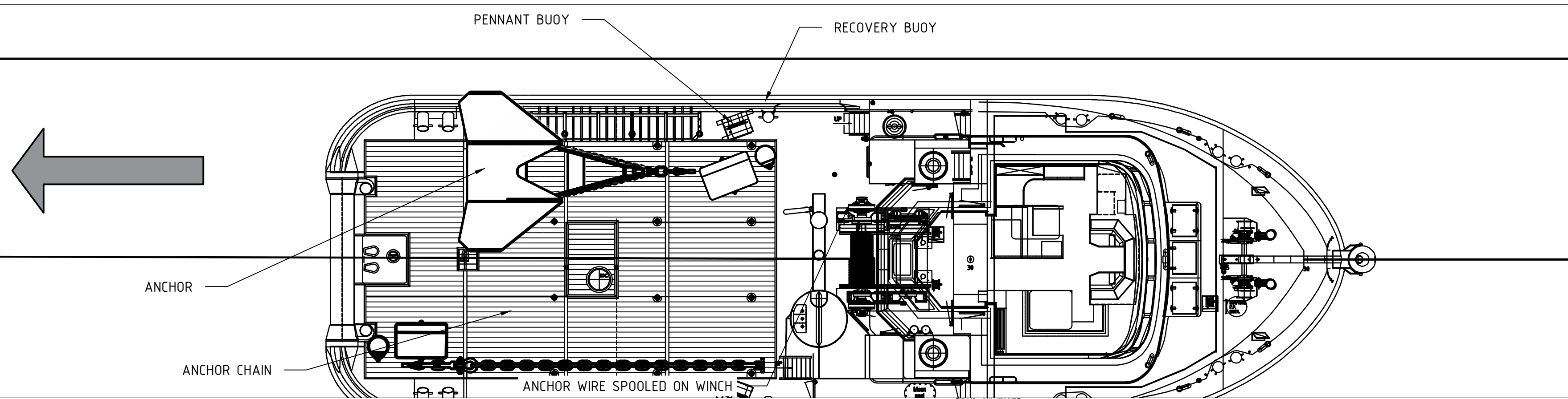
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 200	0059359-BOS-CAD-DRW-5012	01 of 04	A

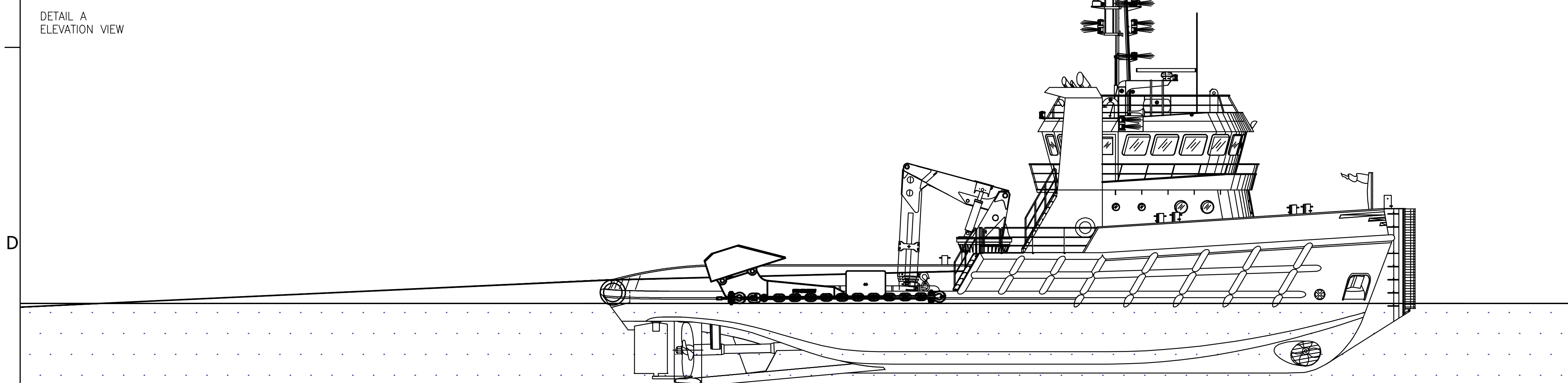
STEP 2 PLAN OVERVIEW SCALE 1:1200



DETAIL A
PLAN VIEW



DETAIL A
ELEVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 2:

- (5) AHT SPOOL OFF PENNANT WIRE FROM THE WORK WINCH.
- (6) AHT DECK CREW DISCONNECT ANCHOR WIRE SHACKLE.
- AHT SPOOL ANCHOR WIRE ON WORK WINCH AHT.
- (7) THE AHT WILL SAIL TO MIDLINE BUOY POSITION AND AT THE SAME TIME REELING IN ANCHOR WIRE ON THE WORK WINCH.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY AND ANCHOR RECOVERY

-

CLIENT: LIVERPOOL BAY CCS

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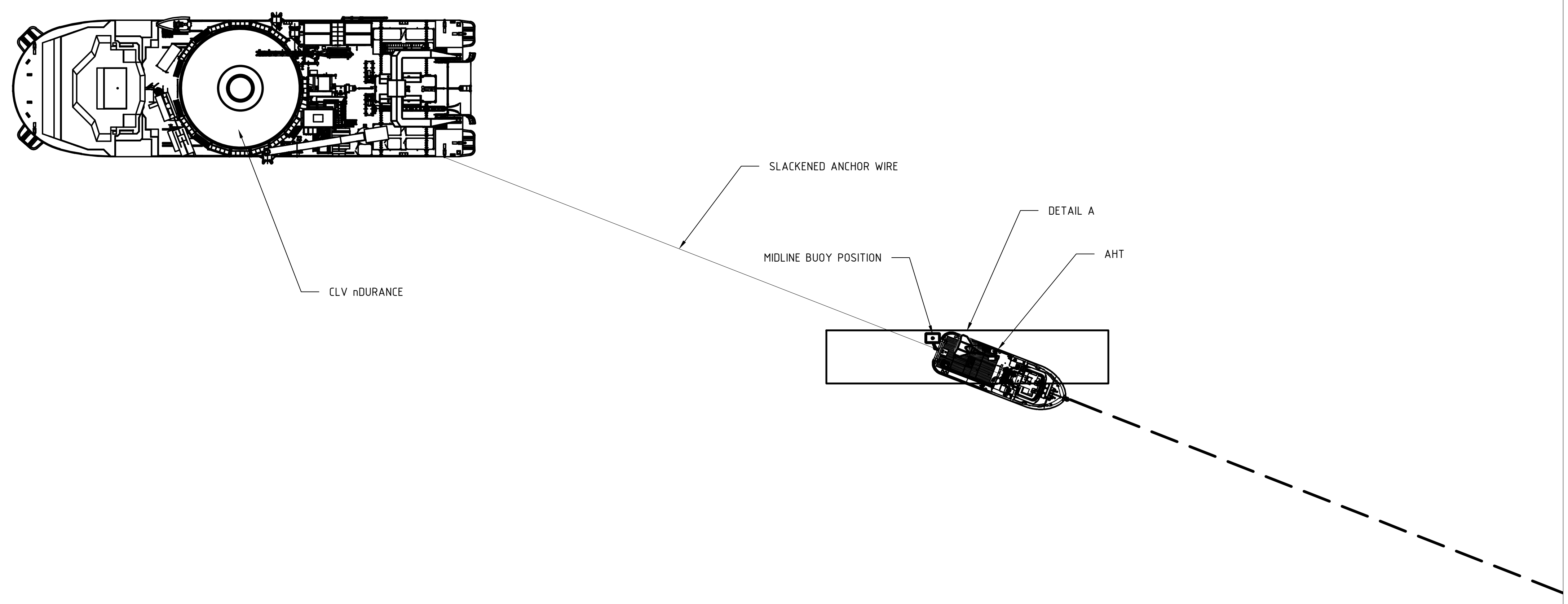
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3		-	-

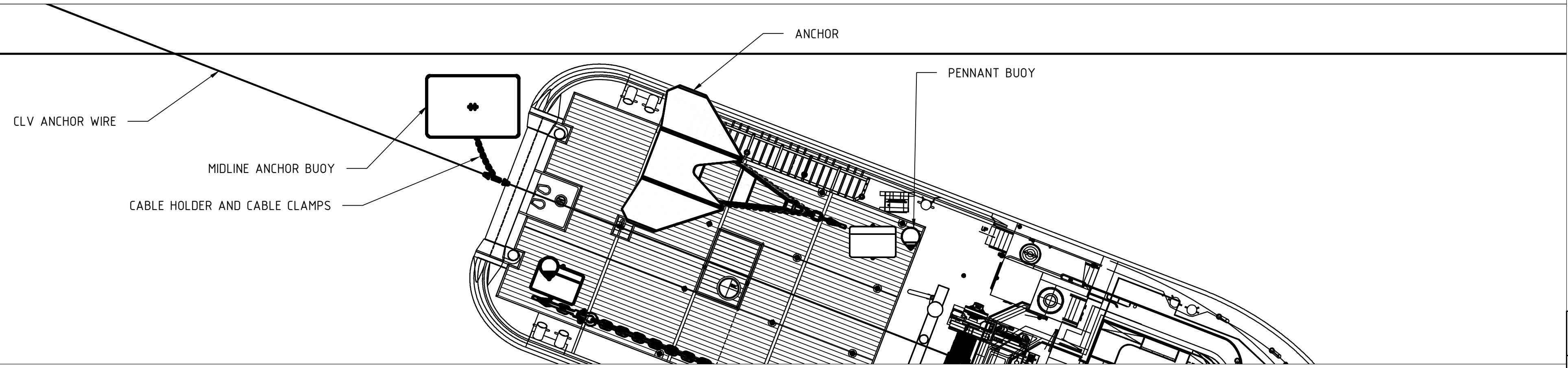
SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
1 : 200	0059359-BOS-CAD-DRW-5012	02 of 04	A

STEP 3

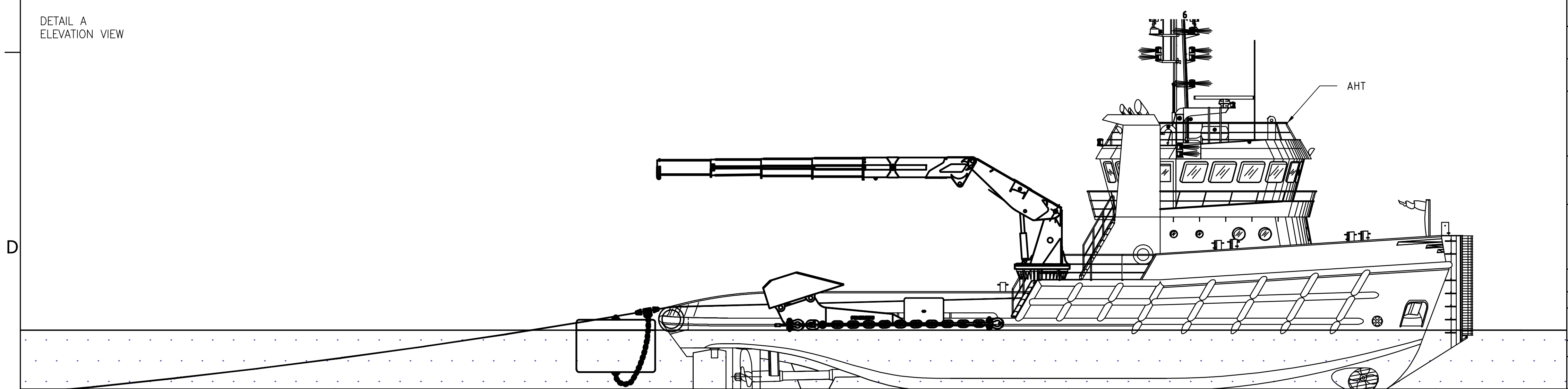
PLAN OVERVIEW SCALE 1:1200



DETAIL A
PLAN VIEW



DETAIL A
ELEVATION VIEW



NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 3:

- (8) AHT DECK CREW DISCONNECT THE MIDLINE BUOY.
- (9) AHT DECK CREW REMOVE THE CABLE HOLDER AND CABLE CLAMPS FROM THE ANCHOR WIRE.
- DECK CREW TO EXAMINE WIRE TO ENSURE CLAMPS HAVE NOT CAUSED ANY DAMAGE.
- IF DAMAGE ALL STOP TO BE CALLED AND OCM NOTIFIED.
- (10) FOR RECOVERING FOLLOWING MIDLINE BUOY (ON SAME ANCHOR WIRE) CONTINUE WITH STEP 7. CONTINUE WITH STEP 12 WHEN ALL MIDLINE BUOYS ARE RECOVERED (FROM THE SAME ANCHOR WIRE).
- (11) THE AHT SAIL TO CLV AND AT THE SAME TIME REELING IN ANCHOR WIRE ON THE WORK WINCH OF THE AHT

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
MID-LINE BUOY AND ANCHOR RECOVERY
-

CLIENT
LIVERPOOL BAY CCS

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A3		-	-

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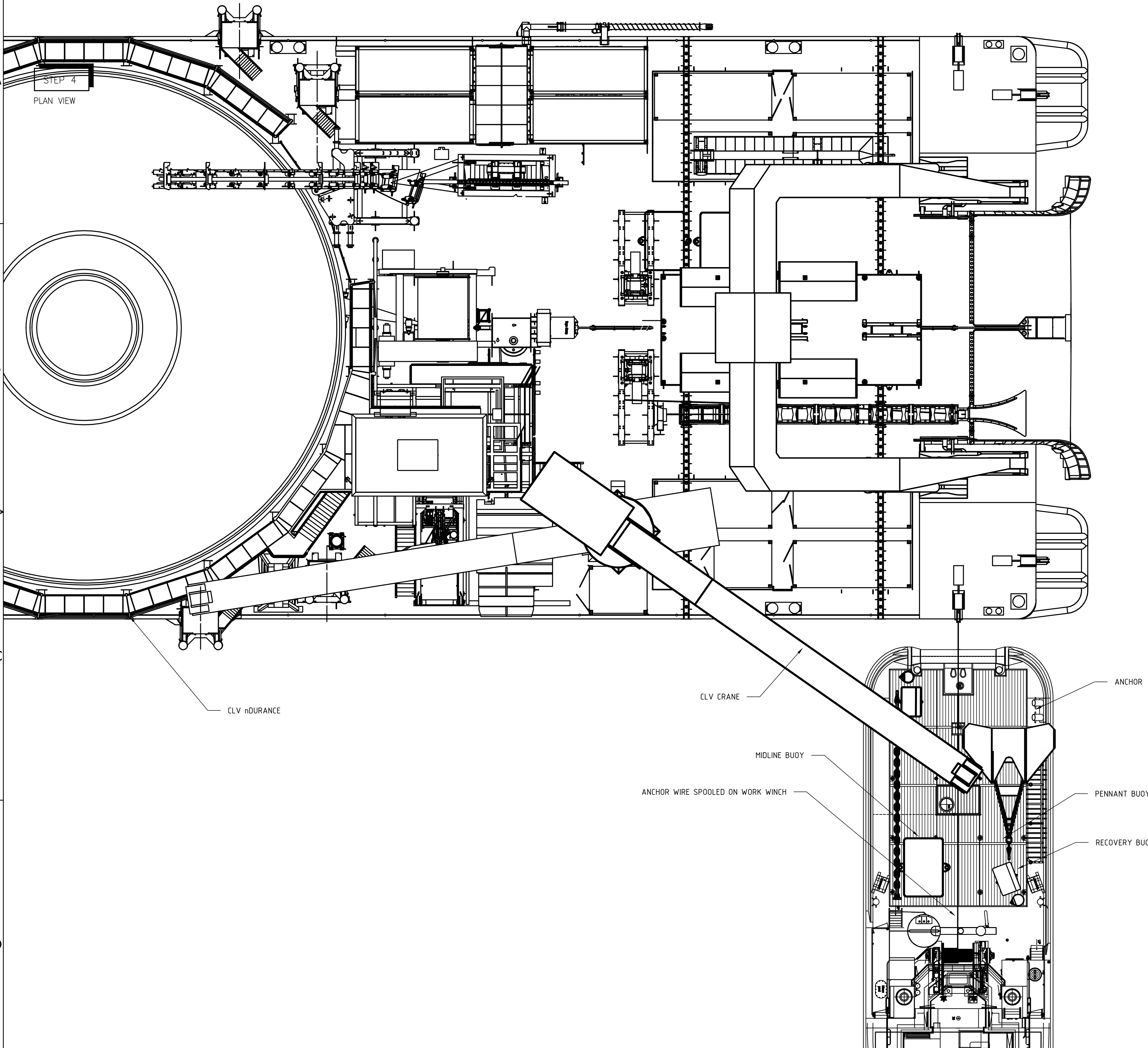

NOTES

1. FOR GENERAL NOTES AND REFERENCES, SEE SHEET 01

STEP 4:

- (12) AHT SPOOL ANCHOR WIRE OFF AND CLV RETREAT THE ANCHOR WIRE.

A	09/12/2025	ISSUED FOR REVIEW	MLPZ	ELSC	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY AND ANCHOR RECOVERY

-

CLIENT: LIVERPOOL BAY CCS

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A3		-	-

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
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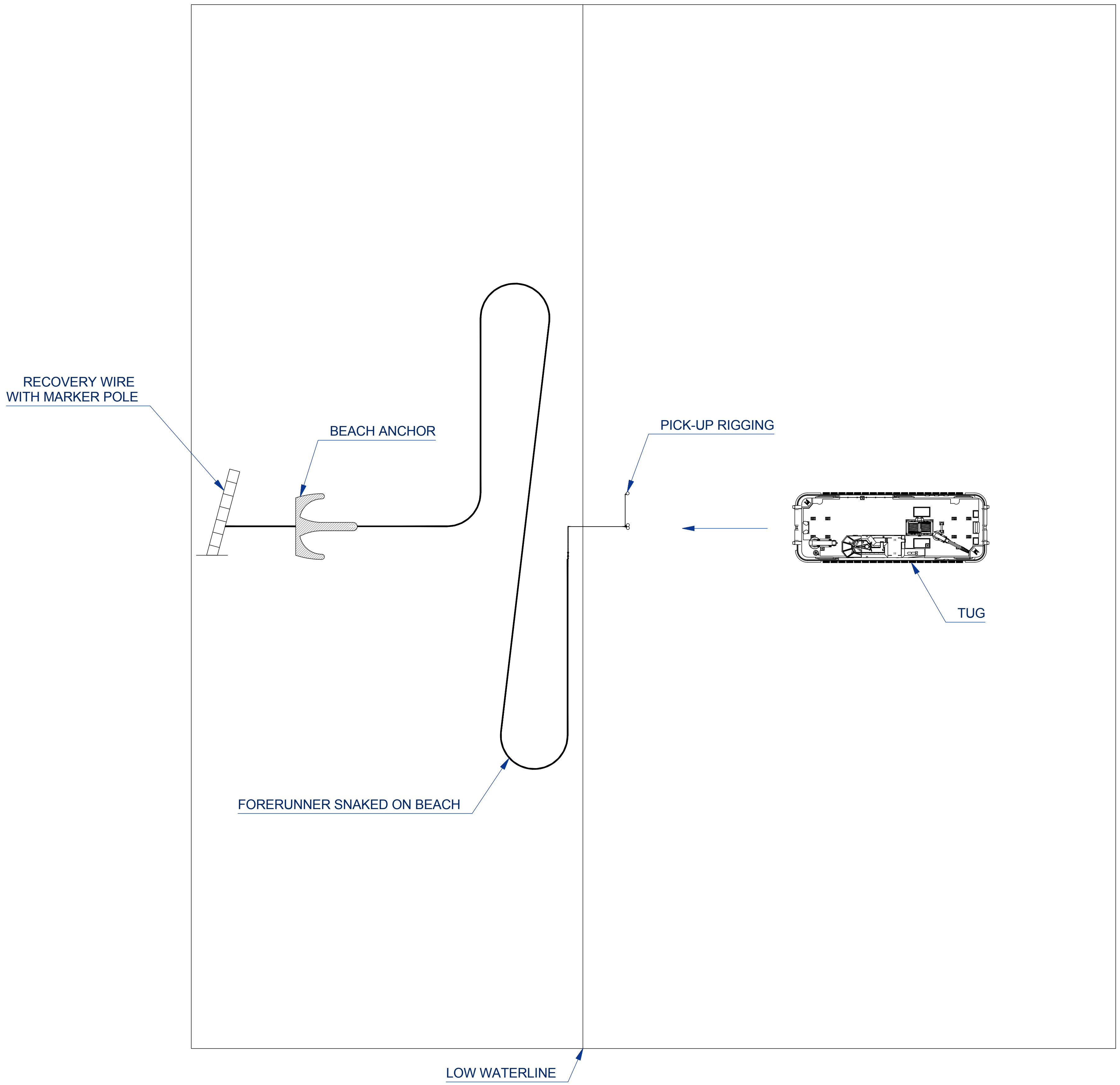
Appendix C6 Connect to pre-installed beach anchors [HOLD03]

STEP 1



FOR PROCEDURE SEE TP/07 CONNECT / DISCONNECT TO PRE-INSTALLED BEACH ANCHORS

1. ONSHORE CREW TO PRE-INSTALL BEACH ANCHORS
2. TUG TO MOVE TOWARDS PRE-INSTALLED FORERUNNER PICK-UP RIGGING
3. TUG TO RECOVER THE FORERUNNER PICK-UP RIGGING WITH A GRAPPLE HOOK OR BOAT HOOK
4. CONNECT RIGGING TO TUGGER WINCH
5. PULL FORERUNNER END ON DECK
6. APPLY HOLDBACK (STOPPER) TO SECURE FORERUNNER TO DECK PINS

Example

REV No.	DATE OF DRG	DRAWN BY	STATUS	CHECKED BY CAD	APPROVED BY PE
P1	02-03-20	HICO	FOR IFORMATION		
P0	25-02-20	HICO	FOR INTERNAL REVIEW		

COMPANY:

Boskalis

Subsea
Rosmolenweg 20, 3356 LK Papendrecht,
PO Box 282, 3350 AG Papendrecht
The Netherlands
T +31(0)78 696 9000
www.boskalis.com/offshore

PROJECT NAME: HORNSEA II

CLIENT COMPANY NAME: ØRSTED

DRAWING TITLE:
ANCHOR HANDLING PROCEDURE NDURANCE
CONNECT TO PRE-INSTALLED BEACH ANCHOR

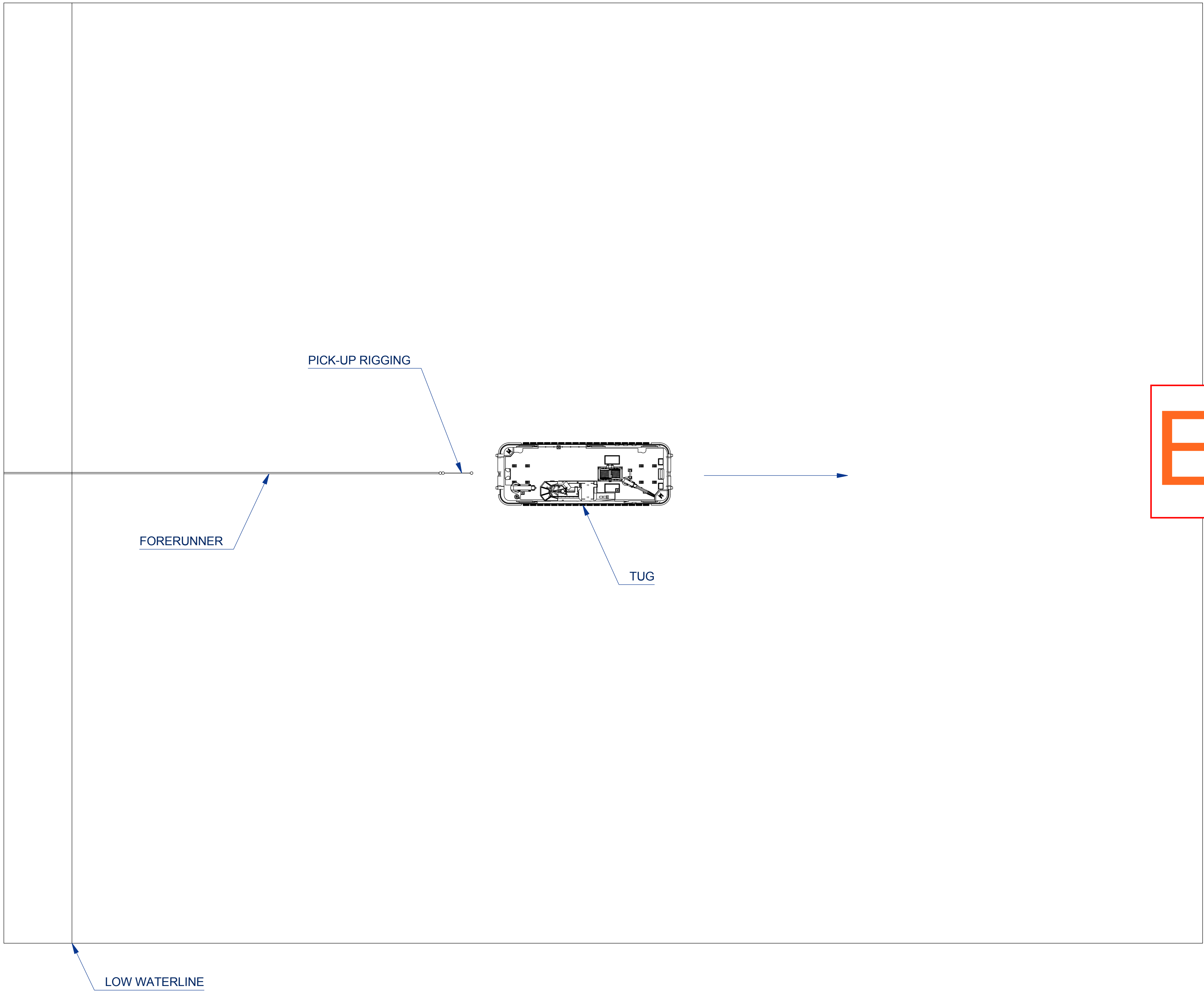
DOCUMENT No:	MATERIAL: N/A	WEIGHT: N/A

SCALE:	SIZE: A3	DRAWING NUMBER: P0036341-BSCF-STB-DWG-13395	SHEET: 1 OF 4	REV.No.: P1

STEP 2

FOR PROCEDURE SEE TP/07 CONNECT / DISCONNECT TO PRE-INSTALLED BEACH ANCHORS

1. TUG TO MOVE AWAY FROM COAST AND PULL FORERUNNER TOWARDS CLV
2. SNAKED FORERUNNER SLOWLY PULLED FROM BEACH INTO SEA UNTIL ALMOST STRAIGHTENED
3. TUG AHT TO REMOVE DECK PIN HOLDBACK TO FORERUNNER AND DEPLOY ONTO SEABED



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P0	25-02-20	HICO	FOR INTERNAL REVIEW		

COMPANY:

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Subsea
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PO Box 282, 3350 AG Papendrecht
The Netherlands
T +31(0)78 696 9000
www.boskalis.com/offshore

PROJECT NAME: HORNSEA II

CLIENT COMPANY NAME: ØRSTED

DRAWING TITLE: ANCHOR HANDLING PROCEDURE NDURANCE CONNECT TO PRE-INSTALLED BEACH ANCHOR

DOCUMENT No:	MATERIAL: N/A	WEIGHT: N/A	
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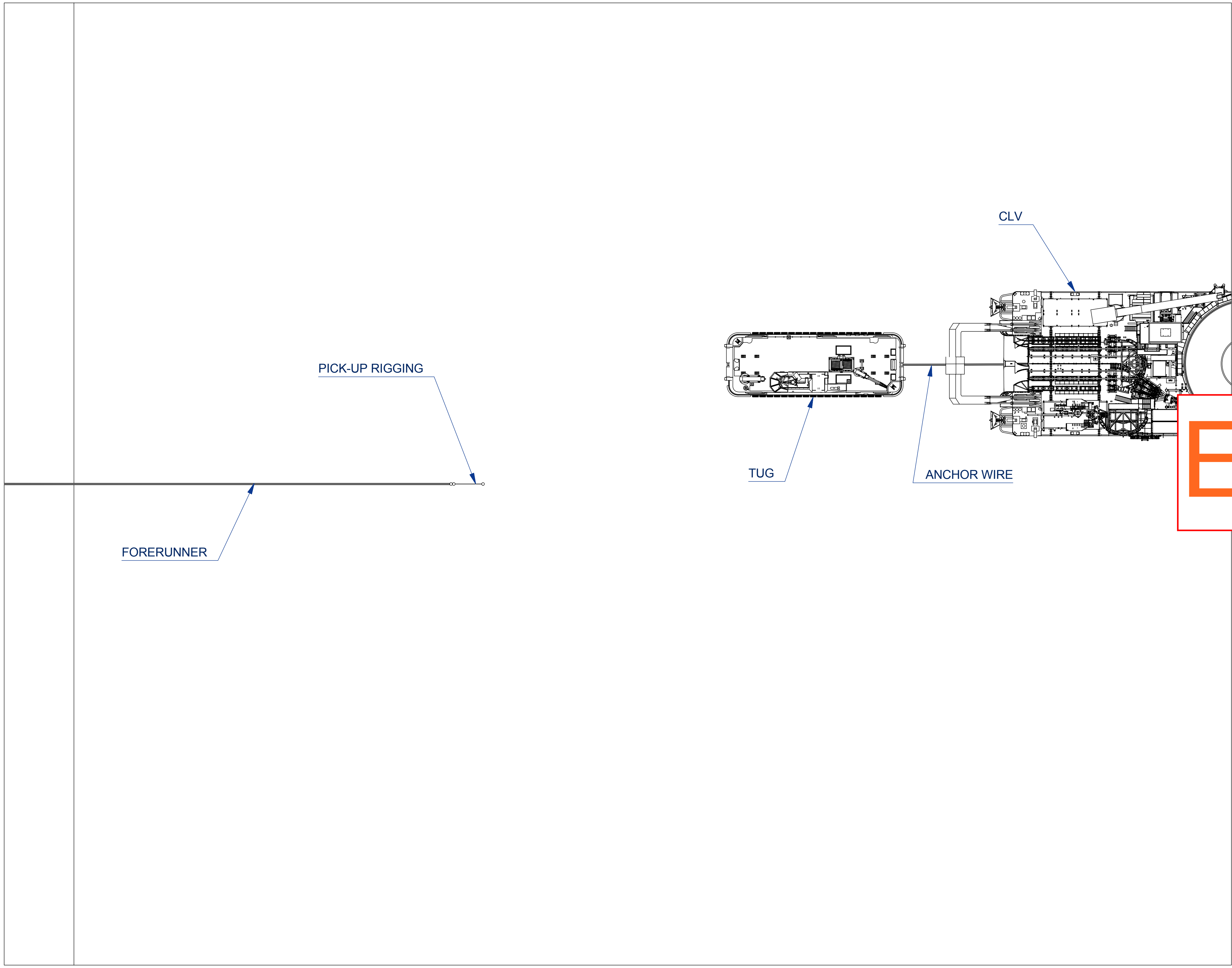
STEP 3



FOR PROCEDURE SEE TP/07 CONNECT / DISCONNECT TO PRE-INSTALLED BEACH ANCHORS

1. TUG TO COME ALONGSIDE CLV IN PREPARATION TO RECEIVE ANCHOR WIRE
2. CLV TO PASS ANCHOR WIRE TO AHT VIA MESSENGER WIRE
3. CLV TO PAY OUT ANCHOR WIRE AND AHT TO SPOOL IT ON WINCH UNTIL SUFFICIENT AMOUNT IS SPOOLED
4. TUG TO MOVE BACK TOWARDS THE FORERUNNER PICK-UP RIGGING. CLV TO INSTRUCT WHEN CLV STOPS PAYING OUT ANCHOR WIRE AND AHT IN TURN STARTS PAYING OUT ANCHOR WIRE

REV No.	DATE OF DRG	DRAWN BY	STATUS	CHECKED BY CAD	APPROVED BY PE
P1	02-03-20	HICO	FOR IFORMATION		
P0	25-02-20	HICO	FOR INTERNAL REVIEW		

COMPANY:
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The Netherlands
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PROJECT NAME: HORNSEA II

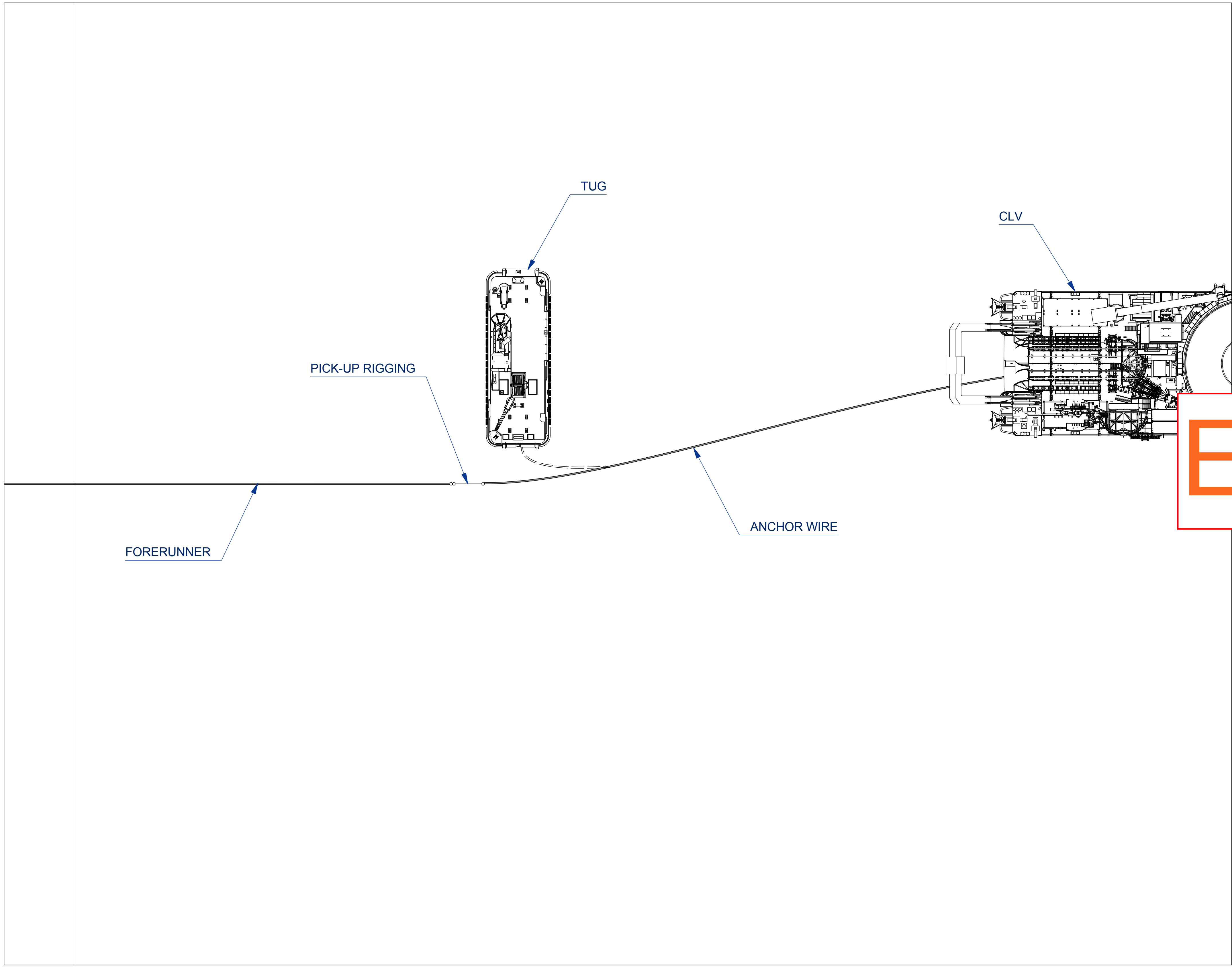
CLIENT COMPANY NAME: ØRSTED

DRAWING TITLE: ANCHOR HANDLING PROCEDURE NDURANCE CONNECT TO PRE-INSTALLED BEACH ANCHOR

DOCUMENT No:	MATERIAL: N/A	WEIGHT: N/A

SCALE:	SIZE: A3	DRAWING NUMBER: P0036341-BSCF-STB-DWG-13395	SHEET: 3 OF 4	REV.No.: P1

STEP 4



FOR PROCEDURE SEE TP/07 CONNECT / DISCONNECT TO PRE-INSTALLED BEACH ANCHORS

1. TUG TO PICK UP FORERUNNER THROUGH PICK-UP RIGGING AND SECURE TO DECK PINS USING HOLDBACK (STOPPER)
2. TUG TO CONNECT ANCHOR WIRE TO FORERUNNER END VIA SHACKLES (85t) AND SWIVEL (231t MBL)
3. TUG TO REMOVE DECK PIN HOLDBACKS TO BOTH ANCHOR WIRE AND FORERUNNER AND PAY OUT FROM DECK TUGGER WINCH TO DEPLOY CONNECTION ONTO SEABED
4. AFTER CONNECTION, CLV TO SLOWLY INCREASE TENSION ON ANCHOR WIRE TO CHECK IF THE PRE-INSTALLED BEACH ANCHOR IS HOLDING IN POSITION

NOTE: FORERUNNER PICK-UP RIGGING, INCL. BUOYS, SHALL REMAIN AS PART OF THE DEPLOYED SYSTEM FOR FUTURE RECOVERY

P1	02-03-20	HICO	FOR IFORMATION		
P0	25-02-20	HICO	FOR INTERNAL REVIEW		
REV No.	DATE OF DRG	DRAWN BY	STATUS	CHECKED BY CAD	APPROVED BY PE

COMPANY:

Boskalis

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PO Box 282, 3350 AG Papendrecht
The Netherlands
T +31(0)78 696 9000
www.boskalis.com/offshore

PROJECT NAME: HORNSEA II

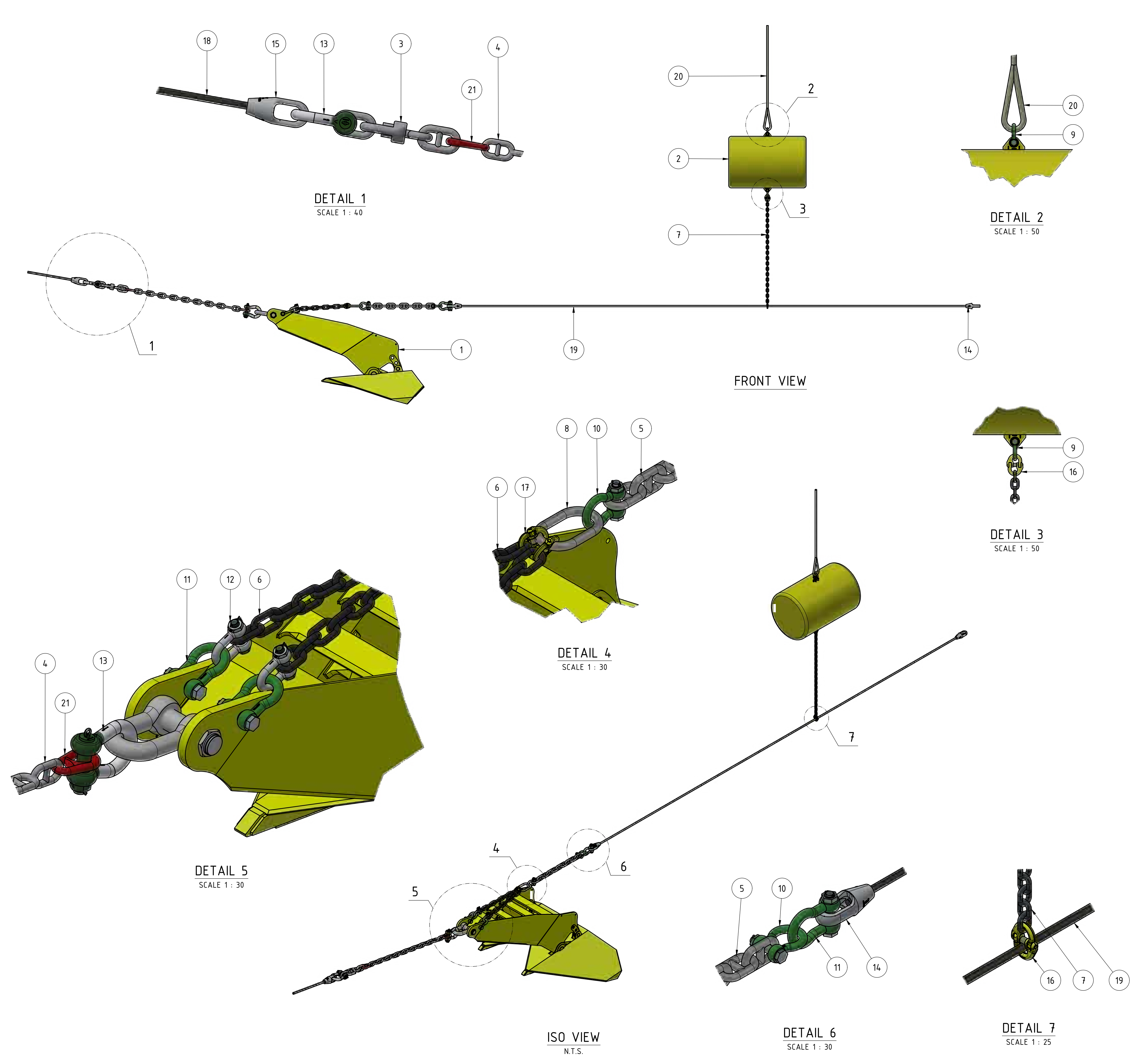
CLIENT COMPANY NAME: ØRSTED

DRAWING TITLE:

ANCHOR HANDLING PROCEDURE NDURANCE
CONNECT TO PRE-INSTALLED BEACH ANCHOR

DOCUMENT No:	MATERIAL: N/A	WEIGHT: N/A	
SCALE:	SIZE: A3	DRAWING NUMBER: P0036341-BSCF-STB-DWG-13395	SHEET: 4 OF 4	REV.No.: P1

Appendix D Overview anchor buoy connection Stevpris anchor (plough 7th anchor)



RIGGING LIST

POS	QTY	DESCRIPTION	TYPE	MBL [t]	WLL [t]	LENGTH [m]	DIAMETER [mm]
1	1	VRYHOF STEVPRIS ANCHOR	MK6 12000 KG				
2	1	MIDLINE ANCHOR BUOY				3	2000
3	1	SWIVEL FORERUNNER		438			
4	1	ANCHOR CHAIN-Ø72			185		
5	1	ANCHOR CHAIN-Ø64		318			
6	2	CHAIN SLING-Ø52	GRADE U3	200			
7	1	CHAIN-Ø32			31.5	4	
8	1	MASTER LINK			84		
9	2	GP BOW SHACKLE BN	G-4163		25		
10	2	GP BOW SHACKLE BN	G-4163		55		
11	3	GP BOW SHACKLE BN	G-4163		85		
12	2	GP DEE SHACKLE FN	G-4133		55		
13	2	GP POLAR HEAVY DUTY BOW SHACKLE BN	P-6031		150		
14	2	GP CLOSED SPELTER SOCKET (Ø55-60mm)		360			
15	1	GP CLOSED SPELTER SOCKET (Ø69-75mm)		460			
16	2	COUPLING LINK	G-32-8		32		
17	2	COUPLING LINK	G-32-10		40		
18	1	ANCHOR WIRE		292			70
19	1	PENNANT WIRE		247		20	58
20	1	POLYPROPYLENE ROPE		41		4	68
21	2	PEAR LINK No.7 - TYPE SC4					

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm U.N.O.
2. ALL MATERIALS AND FABRICATION SHALL BE ACCORDING TO OE-GE-ENG-SPE-0001, FABRICATION SPECIFICATIONS: STEEL STRUCTURES.
3. PENNANT WIRE MAY CHANGE WITH WATER DEPTHS AND MAY CONSIST OF MULTIPLE SECTIONS OF PENNANT WIRE. CONNECTION TO BE MADE WITH 85t SHACKLE.
4. IN SHALLOW WATER DEPTHS A 35m OR 40m PENNANT WILL BE USED.

A	09/12/2025	ISSUED FOR REVIEW	SHAS	MLPZ	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
RIGGING 12T STEVPRIS ANCHOR
ANCHOR-BUOY CONNECTION OVERVIEW

CLIENT
Liverpool Bay CCS

BOSKALIS SUBSEA CABLES
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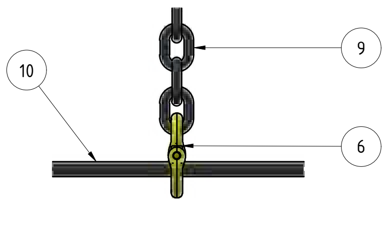
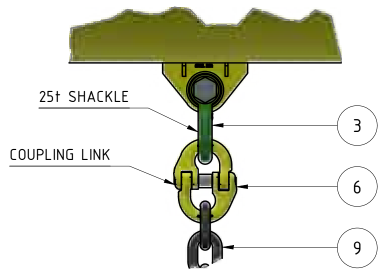
FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3			

SCALE	BOSKALIS DRAWING NO. SH NO.	SHEET	REV.
1 : 150	0059359-BOS-CAD-DRW-4007	1 of 1	A

Appendix E Overview Anchor Buoy Connection Deltaflipper Anchor (mooring 1,2,3,4,5 & 6 anchors)



DETAIL 1
SCALE 1 : 25



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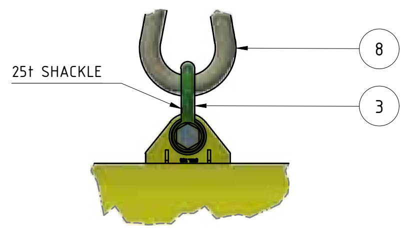
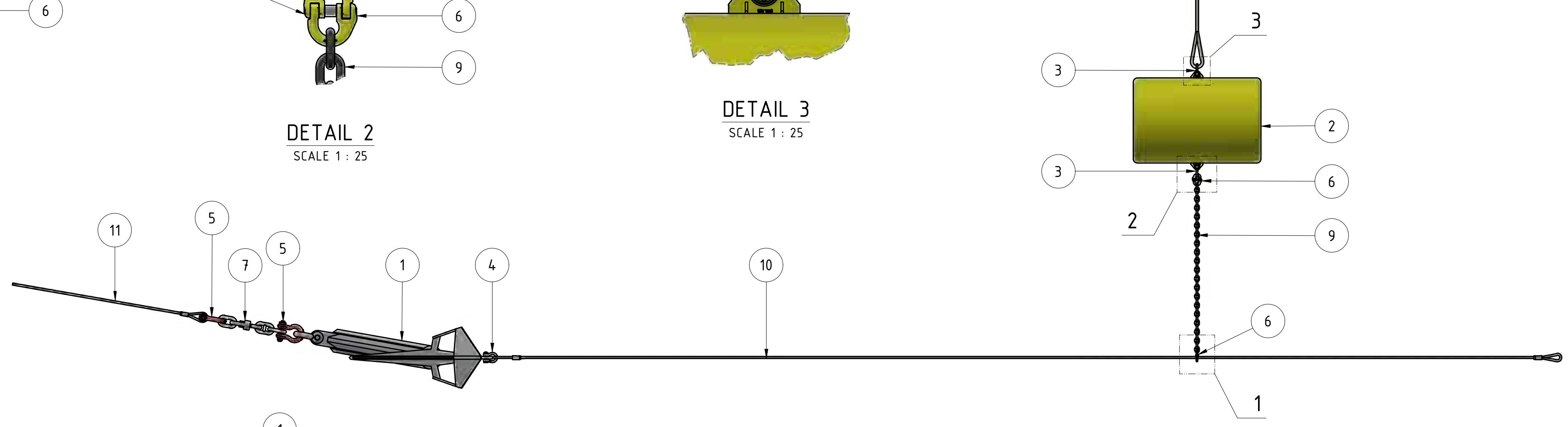
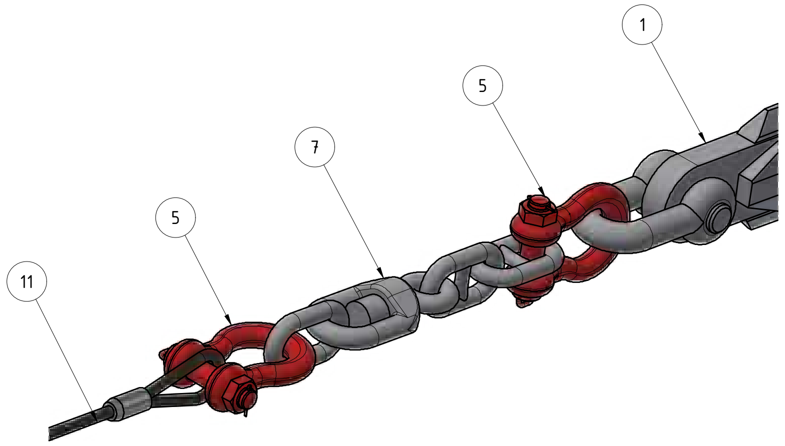
SCALE 1 : 25



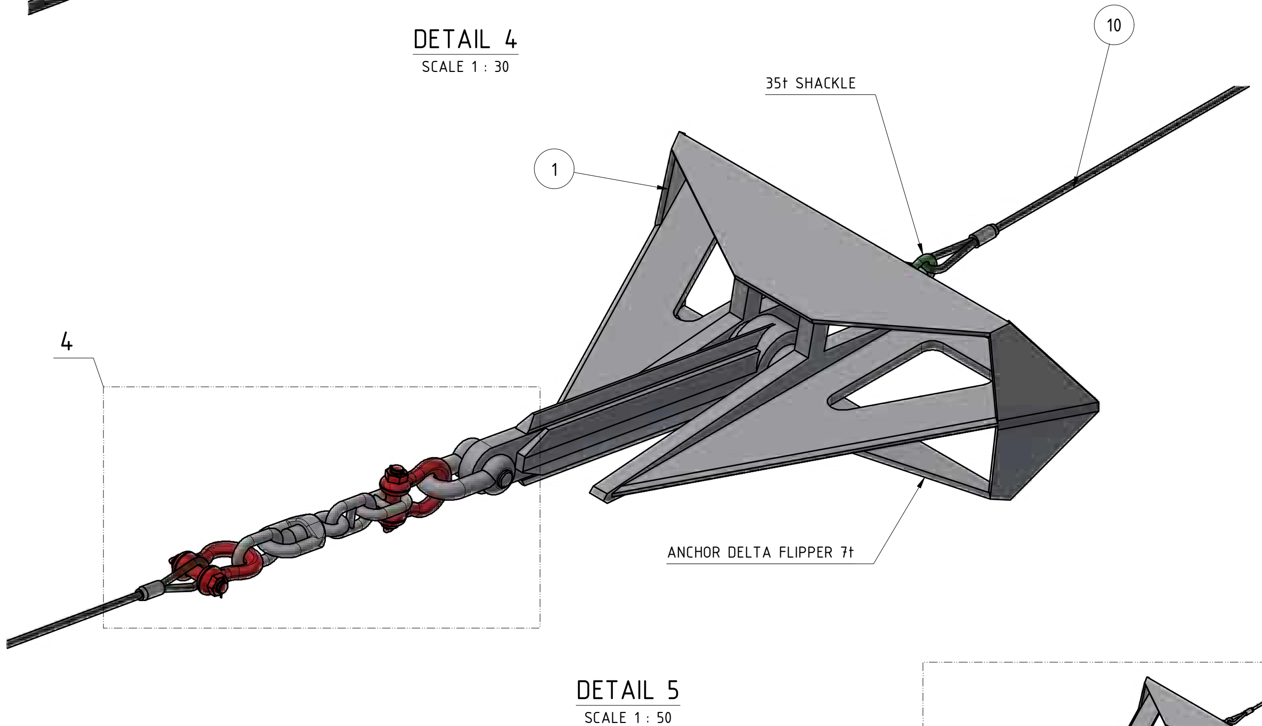
DETAIL 3
SCALE 1 : 25



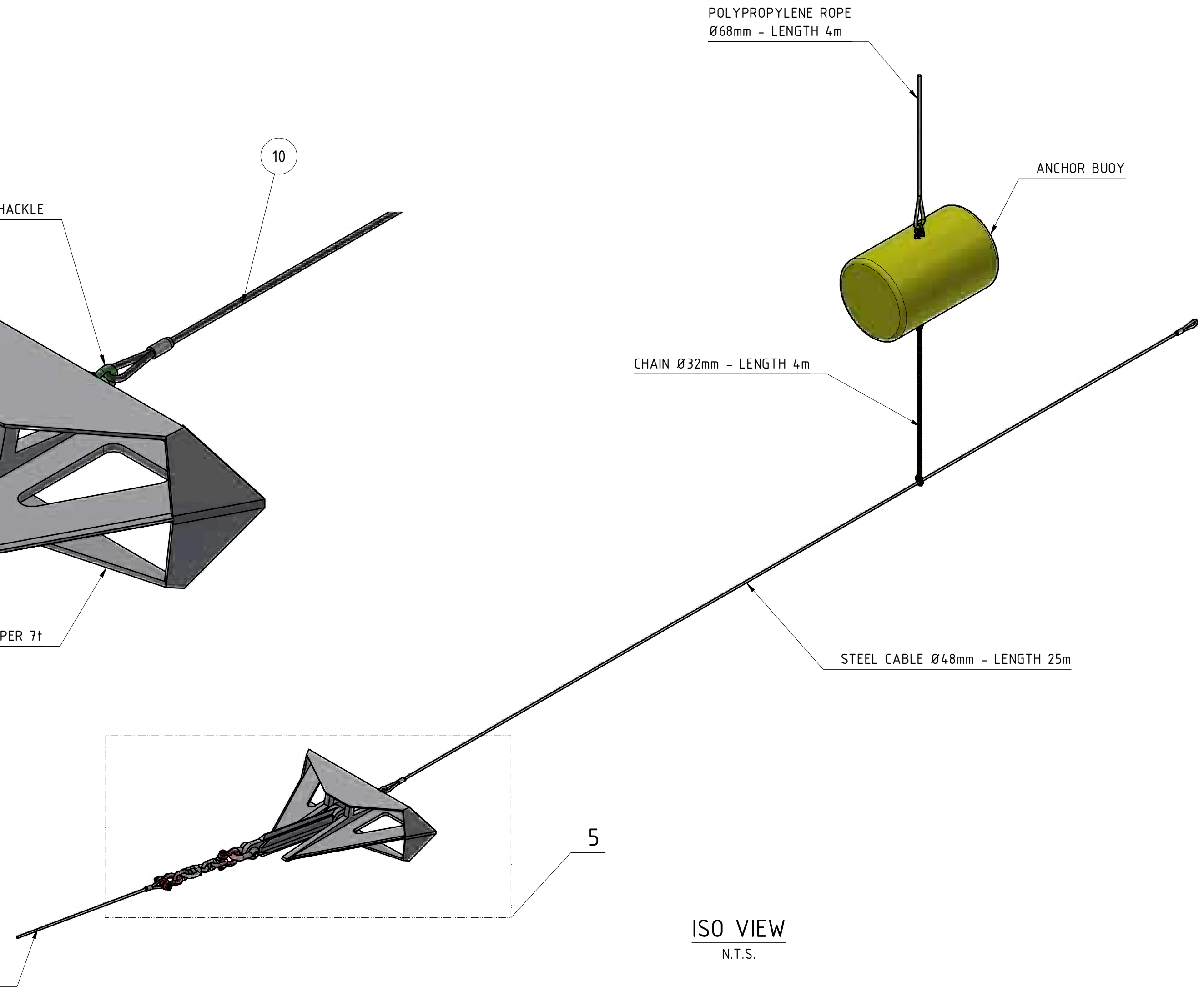
FRONT VIEW



DETAIL 4
SCALE 1 : 30



DETAIL 5
SCALE 1 : 50



ISO VIEW
N.T.S.

RIGGING LIST

POS	QTY	DESCRIPTION	TYPE	MBL [t]	WLL [t]	LENGTH [m]	DIAMETER [mm]
1	1	ANCHOR DELTA FLIPPER					
2	1						
3	2	GP BOW SHACKLE BN	G-4163		25		
4	1	GP BOW SHACKLE BN	G-4163		35		
5	2	ANCHOR SHACKLE CROSBY	G-2130		85		
6	2	COUPLING LINK	G-32-8		32		
7	1						
8	1	POLYPROPYLENE ROPE				4	68
9	1	CHAIN			31.5	4	32
10	1	STEEL CABLE				25	48
11	1	ANCHOR WIRE					48

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm U.N.O.
2. ALL MATERIALS AND FABRICATION SHALL BE ACCORDING TO OE-GE-ENG-SPE-0001, FABRICATION SPECIFICATIONS: STEEL STRUCTURES.

A	16/12/2025	ISSUED FOR REVIEW	SHAS	MLPZ	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT
LIVERPOOL BAY CCS PROJECT

SUBJECT
OVERVIEW ANCHOR BUOY CONNECTION
DELTA FLIPPER ANCHOR

CLIENT
Liverpool Bay CCS

BOSKALIS SUBSEA CABLES
P.O.BOX 43, 3350 AA PAPENDRECHT - EMAIL: ROYAL@BOSKALIS.COM

FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3			

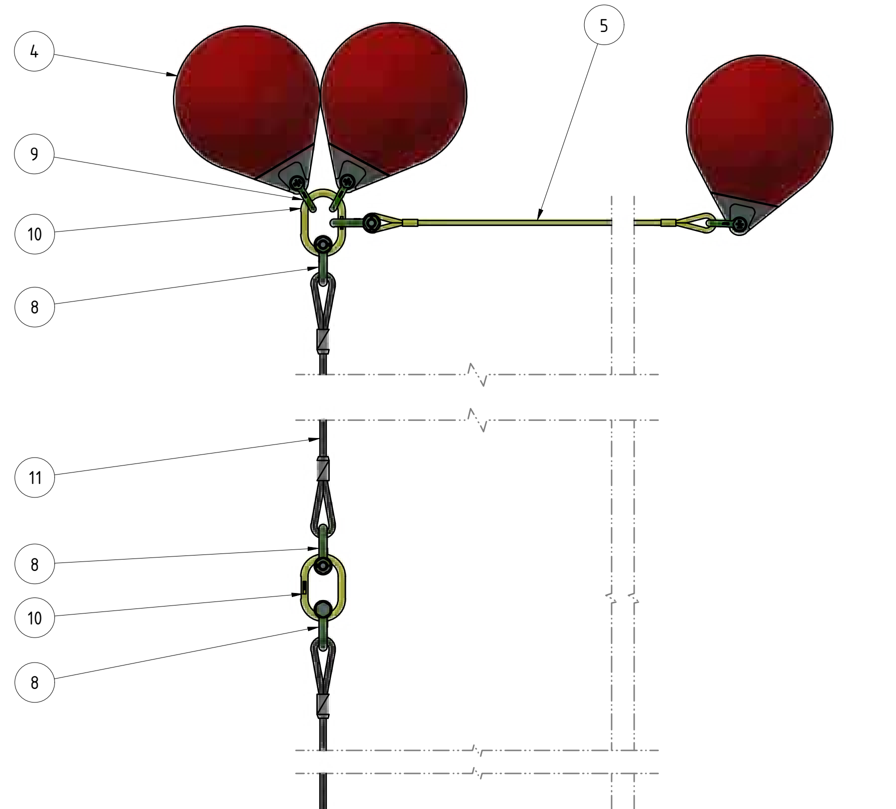
SCALE	BOSKALIS DRAWING NO. SH NO.	SHEET	REV.
1 : 150	0059359-BOS-CAD-DRW-4001	1 of 1	A

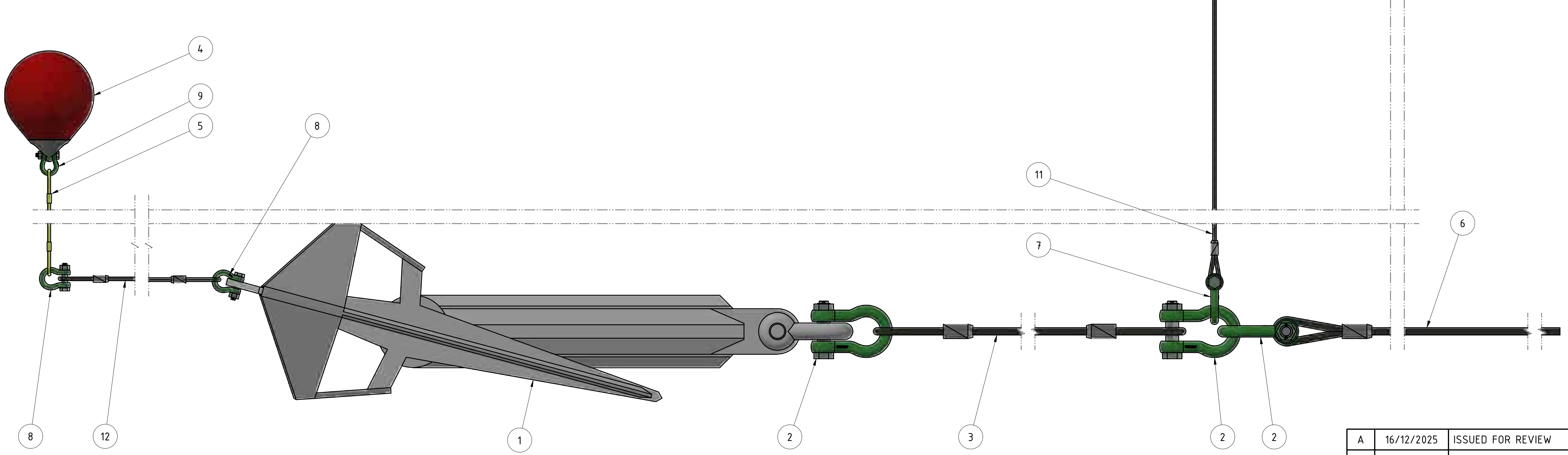
Appendix F Rigging Beach anchor and recovery [HOLD03]

PART LIST								
POS	QTY	DESCRIPTION	TYPE	MATERIAL	LENGTH [m]	DIA [mm]	WLL [t]	TOTAL WEIGHT [kg]
1	1	Flipper-Delta Anchor						5000
2	3	GP BOW SHACKLE BN	G-4163	Steel			85	
3	1	Steel Wire Forerunner with Flemish Eye		Steel	TBC	48		
4	4	A4 Norweigen Buoy	A4	Generic				
5	2	Polpropylene rope		Polypropylene	6	20		
6	1	Anchor Wire		Steel		48		
7	1	GP BOW SHACKLE BN	G-4163	Steel			35	
8	6	GP BOW SHACKLE BN	G-4163	Generic			12	
9	4	GP BOW SHACKLE BN	G-4163	Steel			8.5	
10	2	MASTER LINK	MS-28mm-WLL 12.8T	Steel			12.8	
11	2	Steel Wire Forerunner with Flemish Eye		Steel	10	24		
12	1	Steel Wire Forerunner with Flemish Eye		Steel	100	24		

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm U.N.O.





A	16/12/2025	ISSUED FOR REVIEW	HASA	MLPZ	WALR	N/A	TIPL
REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: BEACH ANCHOR AND RECOVERY RIGGING

CLIENT: LIVERPOOL BAY CCS

liverpool bay ccs

BOSKALIS SUBSEA CABLES

P.O.BOX 43, 3350 AA PAPENDRECHT - EMAIL: ROYAL@BOSKALIS.COM

FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3			
SCALE		BOSKALIS DRAWING NO. SH NO.	SHEET	REV.
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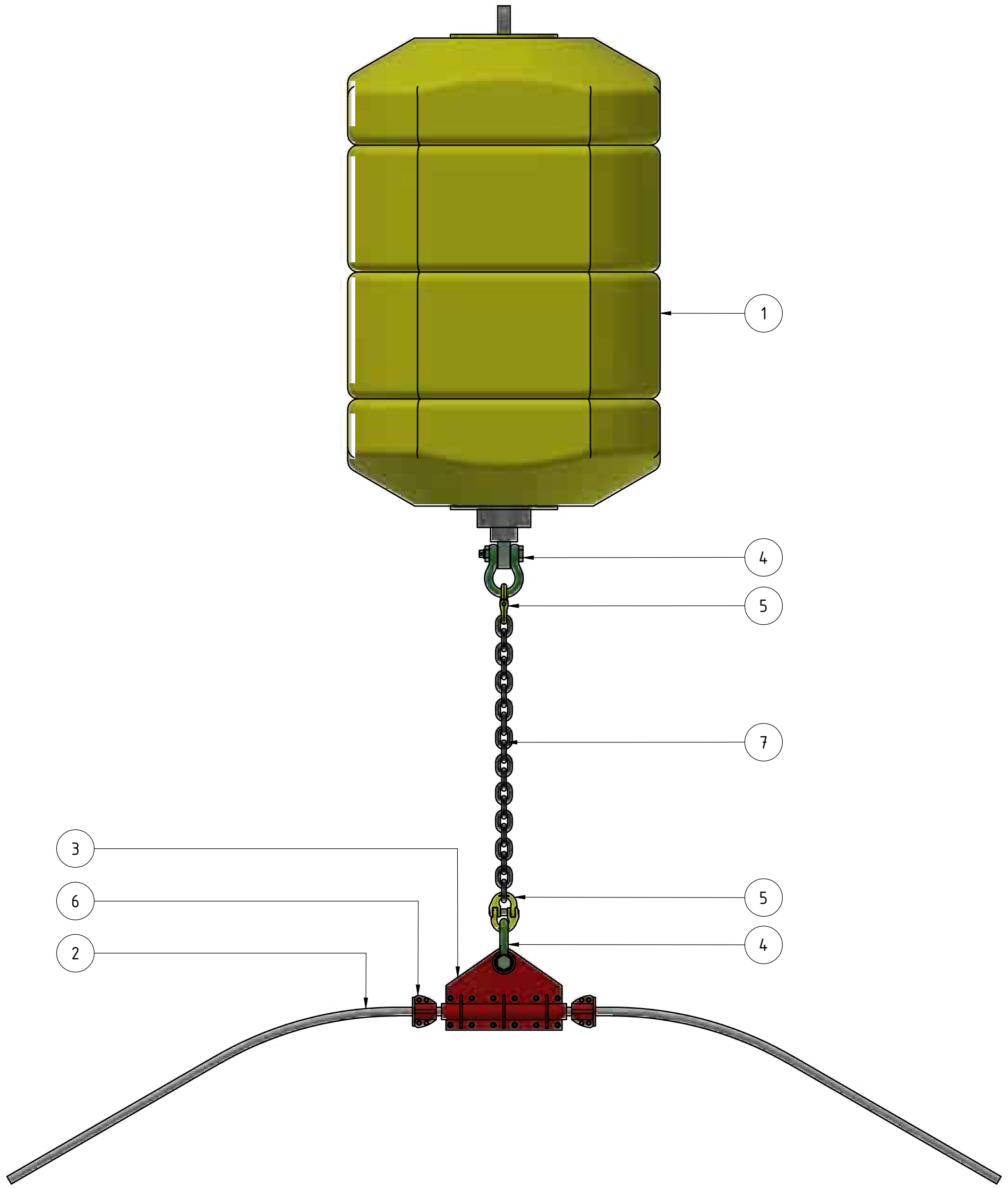
Appendix G Rigging midline buoy arrangement

RIGGING LIST

POS	QTY	DESCRIPTION	TYPE	MBL [t]	WLL [t]	LENGTH [m]	DIAMETER [m]
1	1	MIDLINE BUOY				3.2	2
2	1	ANCHOR WIRE					
3	1	CABLE SUSPENSION BRACKET			4		
4	2	BOW SHACKLE	G-4163		25		
5	2	COUPLING LINK	G-26-8		21.6		
6	2	CABLE CLAMP					
7	1	CHAIN	26-8		21.2	1.6	

GENERAL NOTES

1. ALL DIMENSIONS ARE IN mm U.N.O.
2. ALL MATERIALS AND FABRICATION SHALL BE ACCORDING TO OE-GE-ENG-SPE-0001, FABRICATION SPECIFICATIONS: STEEL STRUCTURES.



FRONT VIEW

ISO VIEW
N.T.S.

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	09/12/2025	ISSUED FOR REVIEW	SHAS	MLPZ	WALR	N/A	TIPL

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: MID-LINE BUOY ARRANGEMENT

CLIENT: Liverpool Bay CCS

liverpool bay ccs

BOSKALIS SUBSEA CABLES
P.O.BOX 43, 3350 AA PAPENDRECHT - EMAIL: ROYAL@BOSKALIS.COM

FORMAT	PROJECTION	CLIENT DRAWING NO.	REV.
A3			
SCALE		BOSKALIS DRAWING NO. SH NO. / SHEET	REV.
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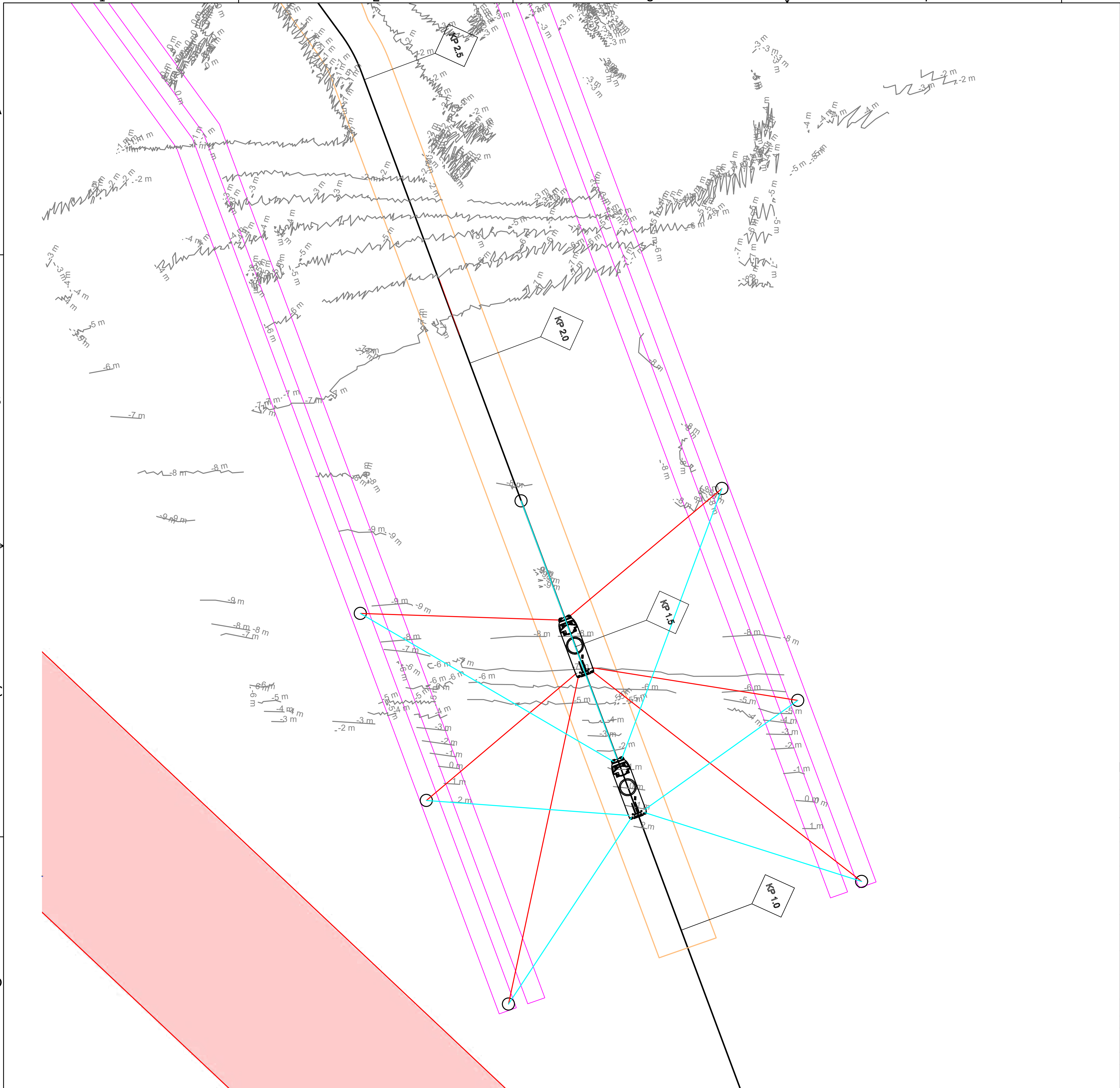
Appendix H Indicative anchor patterns – Nearshore, Standard, Crossing with buoys (Survival)



LEGEND

	ANCHOR CORRIDOR
	EXCLUSION ZONE
	RPL

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	07/11/2025						

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: NEARSHORE ANCHOR PATTERN

CLIENT: liverpool bay ccs

BOSKALIS SUBSEA CABLES
P.O.BOX 43, 3350 AA PAPENDRECHT

FORMAT	PROJECTION		REV.
A3			

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
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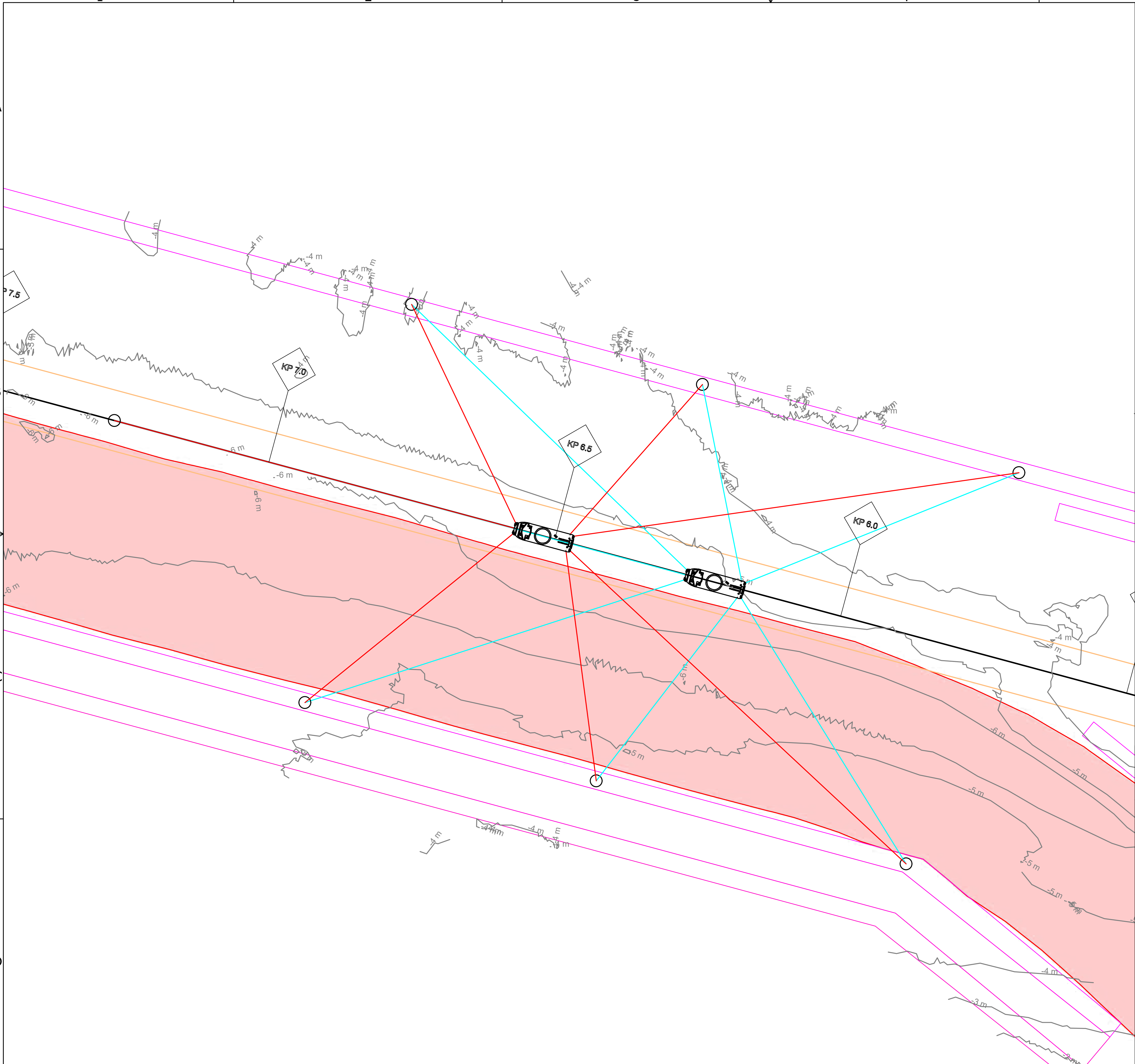


LEGEND	
	ANCHOR CORRIDOR
	EXCLUSION ZONE
	RPL

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	07/11/2025						

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

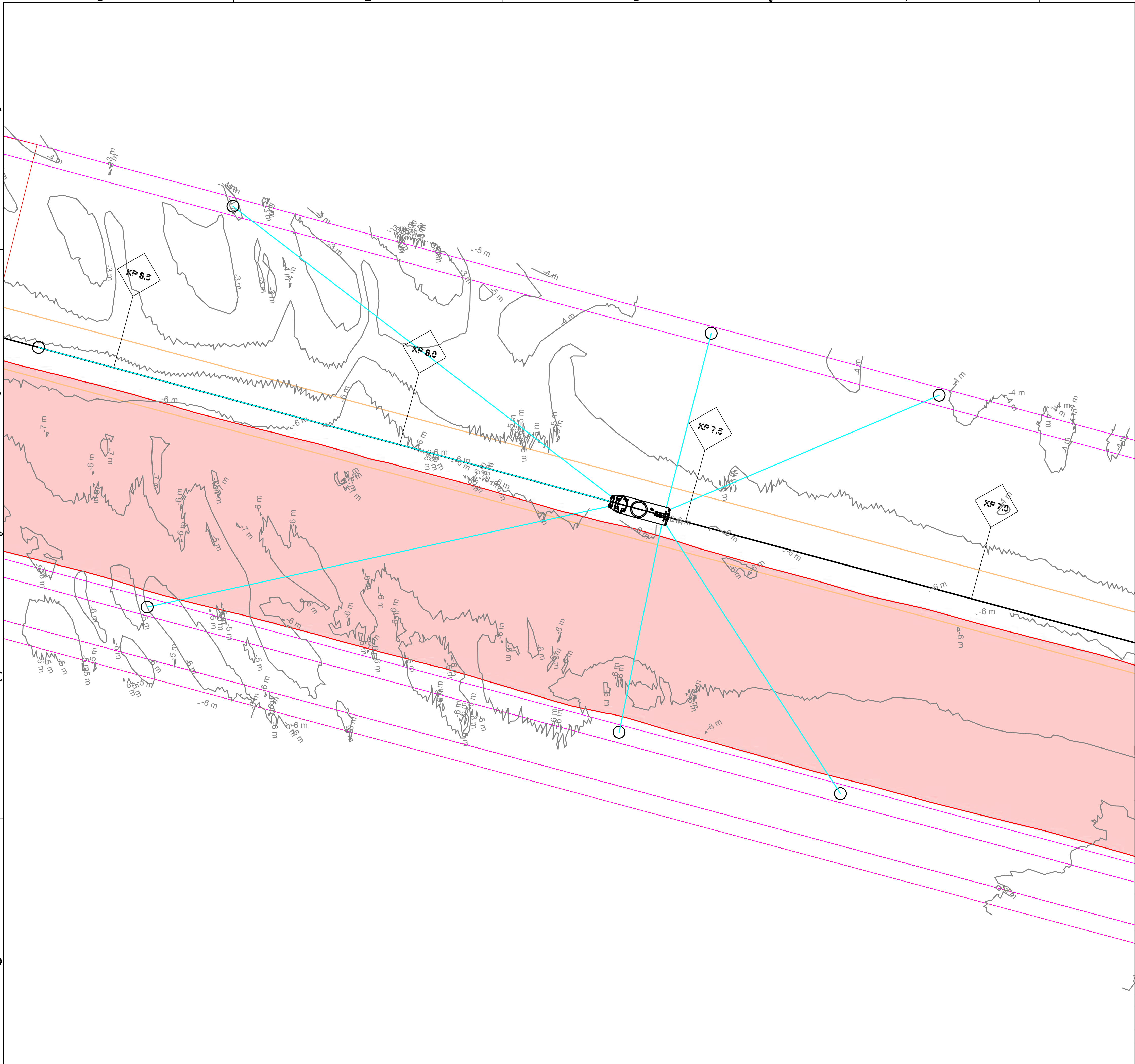
SUBJECT: STANDARD ANCHOR PATTERN

CLIENT: liverpool bay ccs

BOSKALIS SUBSEA CABLES
P.O.BOX 43, 3350 AA PAPENDRECHT

FORMAT	PROJECTION		REV.
A3			

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
	0059359-ANCHOR PATTERN DRAWINGS	01 of 03	A



LEGEND

	ANCHOR CORRIDOR
	EXCLUSION ZONE
	RPL

REV.	DD/MM/YYYY	REVISION REASON	CKD. ORG.	CKD. DISP.	CKD. INT.	APP. OPS.	APP. PM.
A	07/11/2025						

DEVELOPMENT

PROJECT: LIVERPOOL BAY CCS PROJECT

SUBJECT: CROSSING ANCHOR PATTERN WITH MID-LINE BUOYS (SURVIVAL)

CLIENT: liverpool bay ccs

BOSKALIS SUBSEA CABLES
P.O.BOX 43, 3350 AA PAPENDRECHT

FORMAT	PROJECTION		REV.
A3			

SCALE	BOSKALIS DRAWING NO.	SHEET	REV.
	0059359-ANCHOR PATTERN DRAWINGS	02 of 03	A

Survival pattern Welsh Channel – [HOLD03]

Appendix I Specification sheet CLV Ndurance

EQUIPMENT SHEET

NDURANCE
CABLE LAYING VESSEL

CONSTRUCTION/CLASSIFICATION

Built by	Samsung C&T corporation ZPMC - Shanghai Zhenhua Heavy Industries Co.Ltd
Year of construction	2013
Classification	Bureau Veritas, offshore multifunctional accommodation barge, bottom strengthened for loading and unloading aground

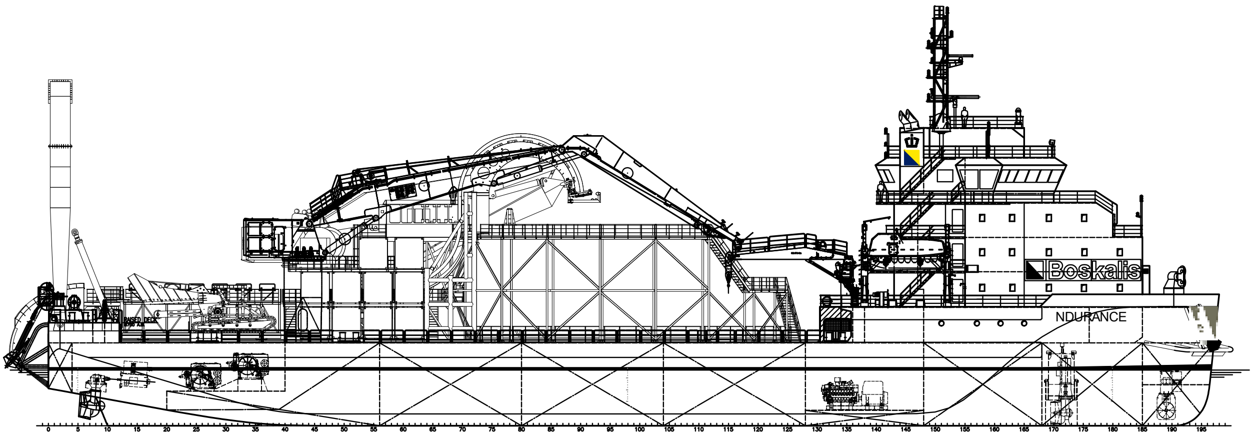
FEATURES

- Completely new ship and turntable design.
- Diesel electric propulsion system.
- Accommodation on fore ship, total for 98 persons
- Two engine rooms.
- Beaching capability.
- Corridor under accommodation to handle projects at the bow.
- 7 point mooring system due to Ploughing modus (bow 7th anchor wire).
- Launch & recovery trencher with A-frame is used for: Trenchformer, SMD HD3 Plough, joint repair, Quadrant MBR 5 m
- Wheelpair Tensioner in Gooseneck
- Suited for Workclass Schilling ROV
- Pull anchor winch + clamp
- Friction 7th anchor winch

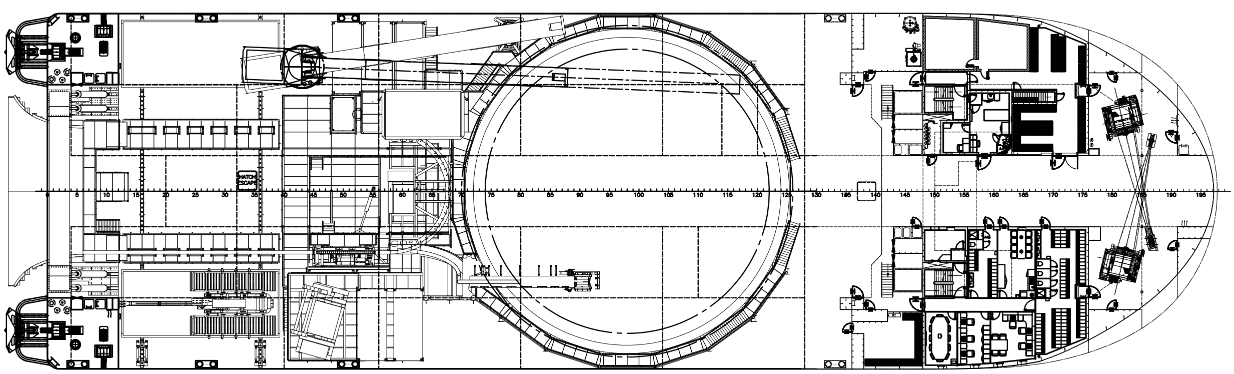
MAIN DATA

Dynamic positioning system	DP-2
Length overall	99.00 m
Breadth	30.00 m
Moulded depth	7.00 m
Design draught	4.8 m
Displacement	12,285 t
Turntable capacity	4,300 t
Outer diameter	26 m
Inner diameter	3-6 m (adjustable)
Product cable size	50-300 mm
Cable speed range	0-1000 m/h
MBR cable highway	5.00 m
Cable tensioners	15 t
Crane	25 t SWL at 25 m
Cable handling area	35 m x 30 m
Max. sailing speed	11.5 kn
Total installed power	7,500 kW
Main engines	7,280 kW
Azimuth thrusters	2 x 1,250 kW + 2 x 1,000 kW
Bow thruster	1 x 550 kW

NDURANCE
CABLE LAYING VESSEL



SIDE VIEW



TOP VIEW DECK LEVEL

Boskalis
PO Box 43
3350 AA Papendrecht
The Netherlands
T +31 78 69 69 000
offshore.energy@boskalis.com
www.boskalis.com/offshore

Appendix J Specification sheet typical AHT Lingestroom

LINGESTROOM

ANCHOR HANDLING TUG SUPPLY VESSEL

IMO nr.	9819404
Call sign	PICW
Flag	Dutch
Type	Shoalbuster 3512
Constructed	2017
Bollard Pull	61.8 tons
Speed	11.5 knots
Free deck space	145 m²
Deckload	15.0 - 3.0 ton/m²

Basic functions: Towing, Mooring, Pushing, Anchor Handling, Supplying, Surveying, Ploughing, Crew Transfer

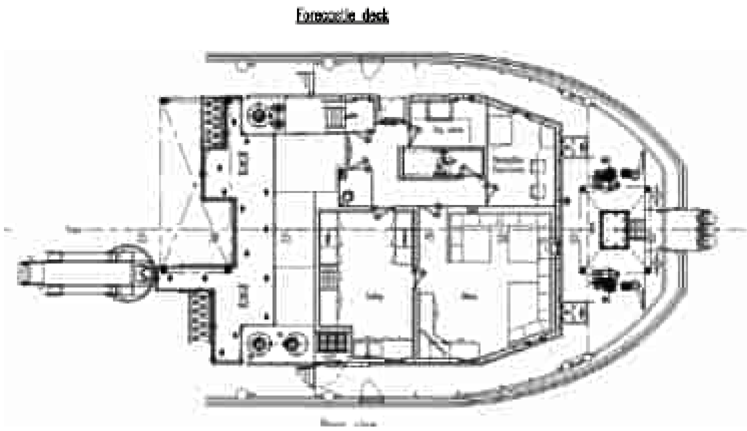
GRT / NT	476 / 142
Dimensions	34.80 x 12.00 x 4.30 mtr.
Draft (min. / max.)	2.90 / 3.40 mtr.
Air draft (min. / max.)	10.86 / 17.88 mtr.
Displacement	597 tons
Engines	3x Caterpillar, type C32-TTA SCAC, each 970 kW / 1.319 HP @ 1800 rpm
Gear Boxes	3x Reintjes, type WAF 675L reduction 7.07:1
Generator Sets	2x Caterpillar, type C7.1, each 187.5 kVA, voltage 230/400 VAC - 50 Hz
E-Power Generator	Combined with center C32 main engine, 600 ekW @ 1800 rpm - 440 VAC
Hydro Set	Electric drive with 3x E-motor, 2x 110 kW / 1x 52 kW
Propulsion	3x Fixed pitch propeller in Van der Giessen Optima Nozzle (Ø 2250 mm)
Bow Thruster	Electrical driven FPP, 243 kW / 320 HP (Ø 960 mm)

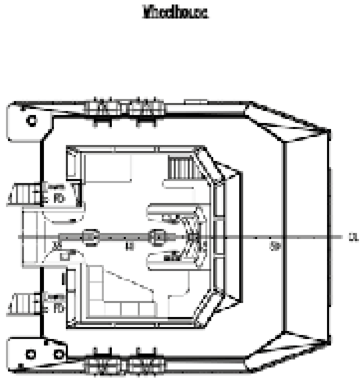
Tank capacities	Fuel oil	255.0 m³	Lub oil	3.7 m³	Hydr. Oil	2.0 m³
	Gear oil	3.3 m³	Dirty oil	4.5 m³	Sludge	2.0 m³
	Fresh water	67.0 m³	Sewage	5.8 m³	Bilge water	5.0 m³

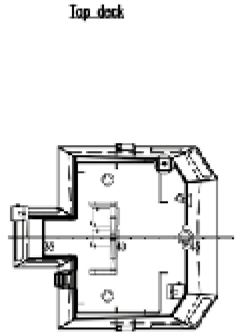
Transfer pumps	Fuel / Fresh water, type SIHI - 50 m³/hr. @ 4.8 bar
Nautical equipment	2x Radar (sea/river) - Magnetic compass - Gyro compass - Auto pilot - GPS / Satellite navigation system ECDIS - AIS - 2x Echosounder - Speedlog - Windindicator 2x VHF + DSC - 1x VHF - SSB Radio + DSC - Navtex - VSAT system - 2x Inmarsat-C - EPIRB - SART 2x HH VHF - Satcom + GSM
Deck equipment	Hydr. crane, HS Marine, type AKC290-LHE3, 11.3T - 16.5 mtr. / 24.4T - 7.89 mtr. Towing winch, Kraaijeveld, WF - 1000 mtr., Ø 48 mm steel wire, 59.1 / 115 tons + incl. AH winch, 600 mtr., Ø 48 mm steel wire, 101.7 / 150 tons Tugger winch, power 12 tons - Hydr. Towing pins + Chain stopper, SWL 100T Stern roller, L. 5.00 mtr., Ø 1180 mm, SWL 165T - Towing hook & Gob eye, SWL 55T Container locks (7x 20 ft. / 3x 10 ft.) - Push bow
Special equipment	HV/AC installation - Sewage treatment plant - (fresh) Watermaker - Fuel oil separator Moonpool (Netto: 700 x 600 mm)
Optional	A-frame (with plough) / 4p-Mooring system Waterinjection Dredging system / ROV - Diving Ops. platform
Accommodation	11 persons (conform 'ILO 2006 rules')
Classification	BV - I ✠ HULL • MACH / Tug, Special service - multi purpose ship / Unrestricted navigation • AUT-UMS - Notation: Anchor Handling / Notation: Clean ship NSI - Unrestricted navigation # IMO - Inventory of Hazardous Materials (Green Passport)

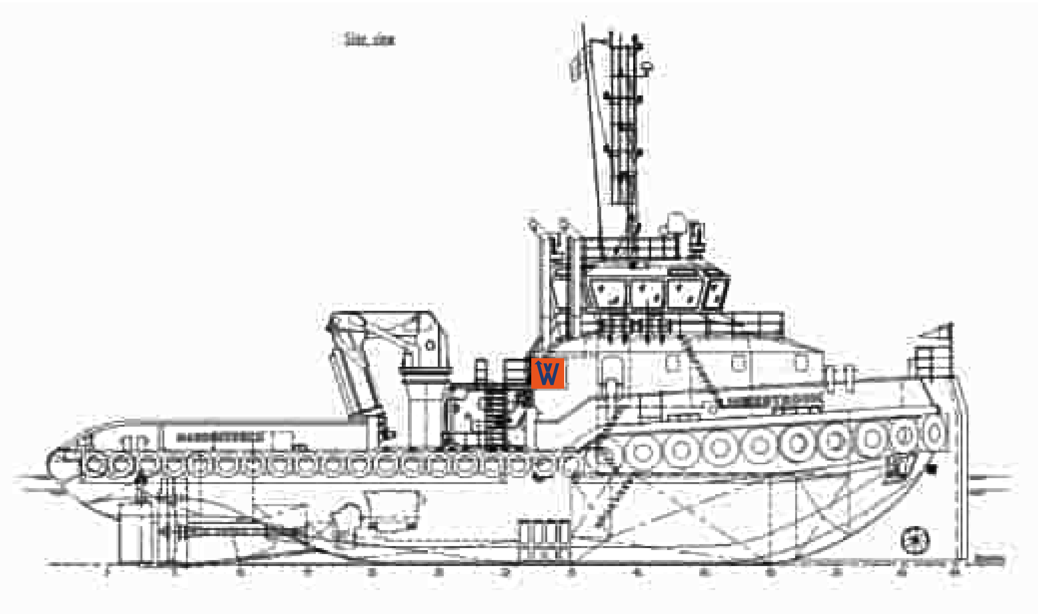
VAN WIJNGAARDEN MARINE SERVICES B.V.

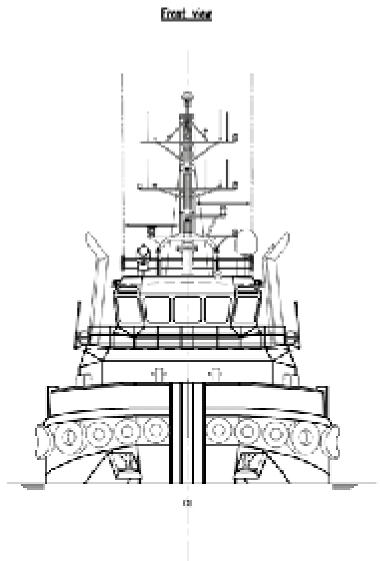
Buitenweistraat 15 • 3372 BC Hardinxveld-Giessendam • The Netherlands • T: +31 (0)184 490 244
F: +31 (0)184 490 265 • E: info@wijngaarden.com • I: www.wijngaarden.com

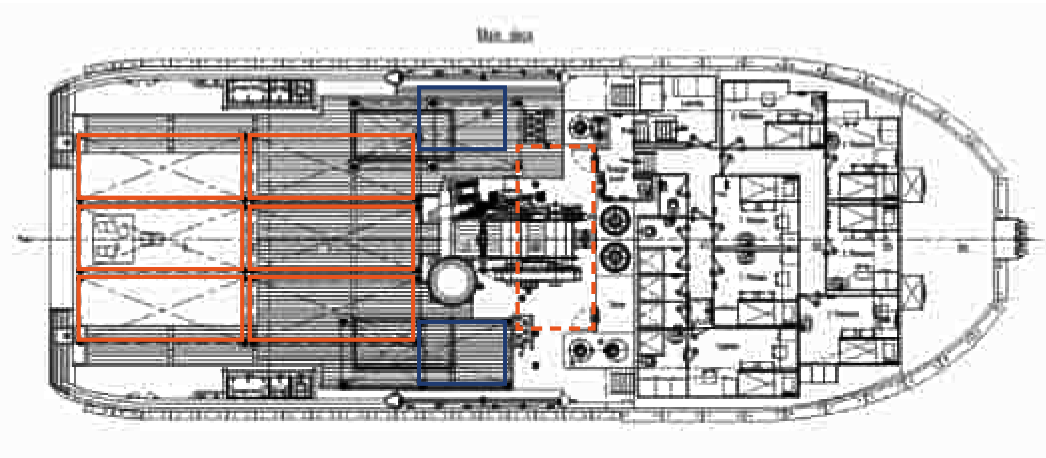


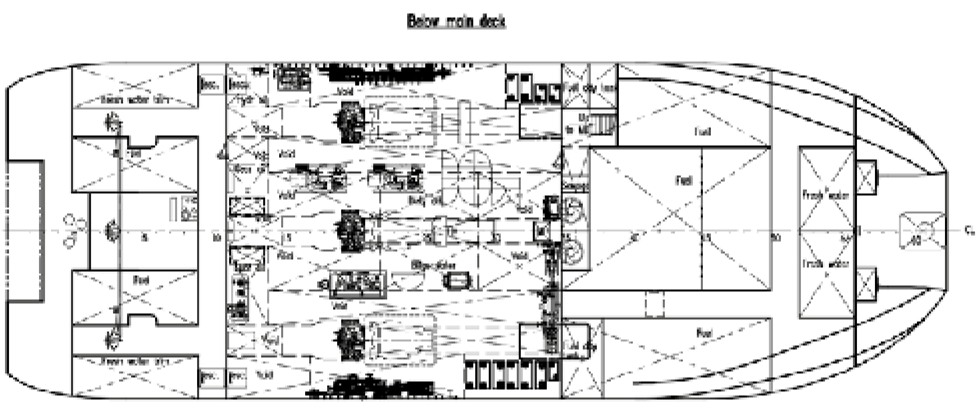


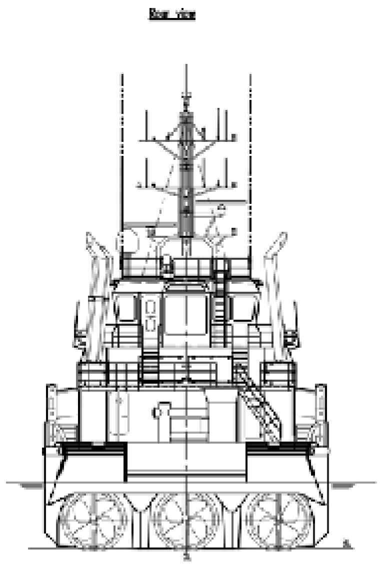












Note: Similar to "NOORDSTROOM"

Appendix K Specification sheet typical AHT Coastal Crown

Acta Marine

Coastal Crown

DP-2 hybrid triple drive shallow draft Multi Cat

- *The world's first commercial workboat with both Tier-3 engines and hybrid/ battery power.*
- *An operating draft of less than 2,0 m in DP-1 or DP-2 mode.*
- *The most sustainable and fuel efficient workboat in the market, resulting in;*
  - *73% savings on NOx emissions,*
  - *20% savings on Fuel and CO_2 emissions.*
- *Accommodation available for up to 19 persons.*

Coastal Crown

CLASSIFICATION / FLAG

Flag	Dutch
Trading area	World wide
Call sign	PDVW
IMO	9920356
Classification society	Bureau Veritas
Class ship type	Anchor handling Tug, Special Service Multi purpose ship, Unrestricted Navigation
Class notation	1 ✠ Hull ● Mach ✠ AUT-UMS Dynapos AM/AT-R
Safety equipment	Max. 19 persons
Dynamic Position Installation	DP-2 class certified (5 Thrusters)

MAIN DIMENSIONS

Length o.a.	37,00 m
Breadth o.a.	11,84 m
Draft	min. draft 1,73 m max. draft 2,12 m
Airdraft	max. 18,50 m
GRT	427
NRT	128
Max. deck load	5 ton/m^2
Free deck space	207 m^2

ACCOMMODATION

Accommodation	Fully airconditioned 17/19 persons 1x single berth cabins 9x double berth cabins

NAVIGATION AND COMMUNICATION SYSTEMS

GMDSS	A1,A2,A3
V-SAT	available

MACHINERY & PROPULSION

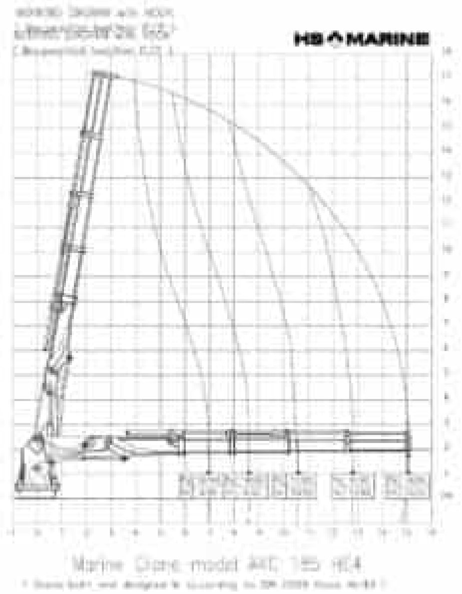
Maximum speed	11 knots
Bollard pull	30 ton
Power output	2988 kW
Propulsion	Twin fixed pitch propellers in nozzles
Main engines	2x Caterpillar C32 Acert SCAC 895 kW
Auxiliary engines	2x Caterpillar C18 Acert SCAC 599 kW; 1x Caterpillar C4.4 65 ekW
Bow thruster	2x 360 azimuth Compact-Jet thruster 249 kW
Stern thruster	1x 360 azimuth thruster 470 kW
DP-2system:	Navis
Batteryset	300 kWh

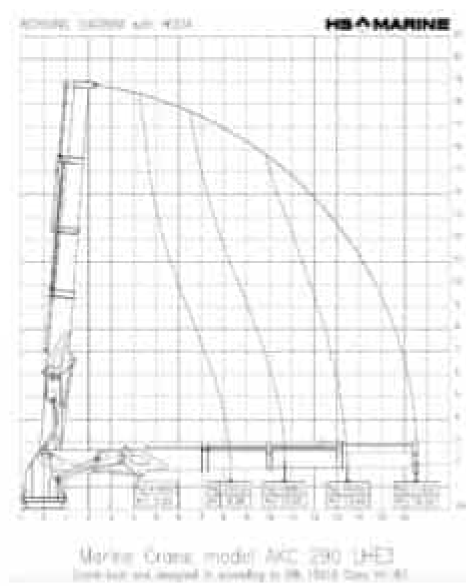
DECK EQUIPMENT

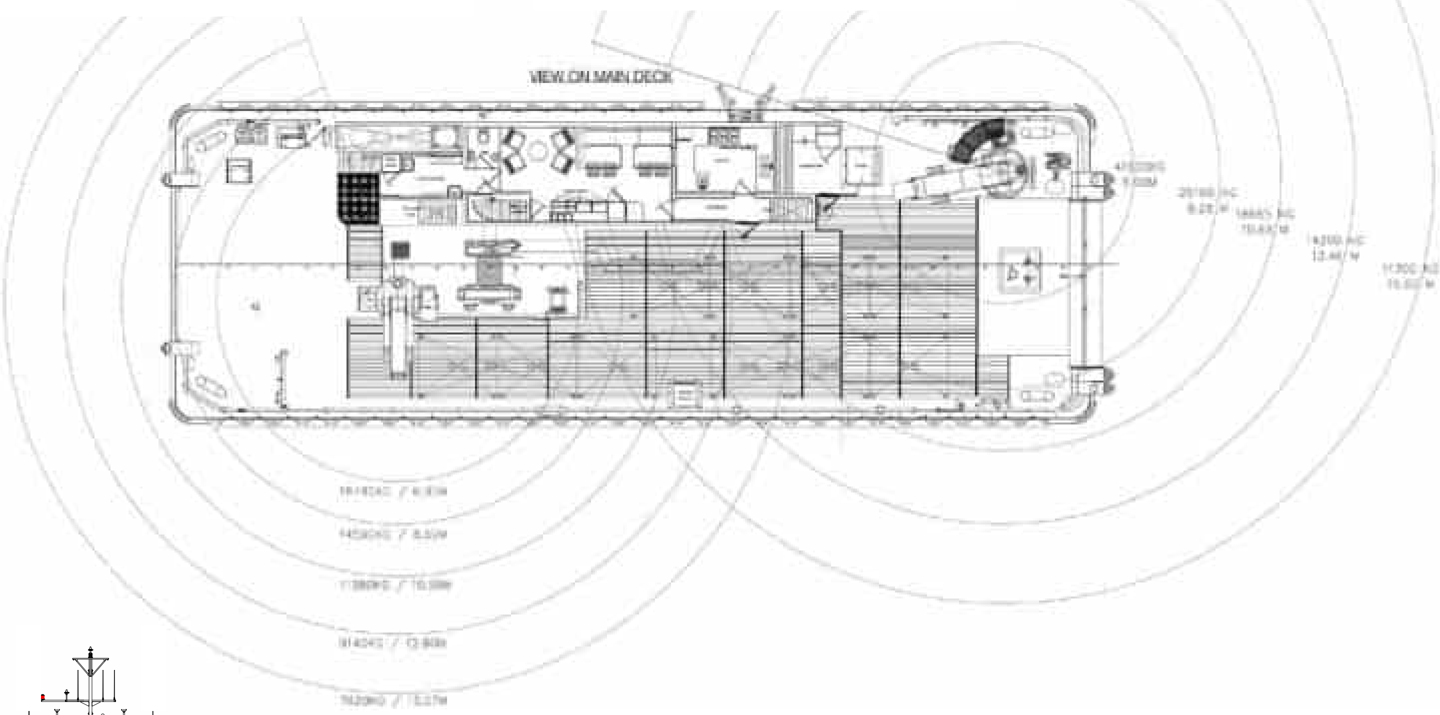
AH winch	100 ton - 9 m/min., 50 ton - 18 m/min., 25 ton - 36 m/min.
Tugger winch	10 ton 0-20 m/min.
Hydr.deck crane FS	HS Marine AKC290 LH3 Fixed hook SWL 11,3 ton at 16,50 m - 25,1 ton at 8,28 m Wire winch SWL 10 ton
Hydr.deck crane AS	HS Marine AKC185 HE4 Fixed hook SWL 7,6 ton at 15,07 m - 18,7 ton at 6,95 m
Towing Pins foredeck	Tugpins towing pins 70 ton
Chain/wire Stopper foredeck	Tugpins Karm fork 70 ton

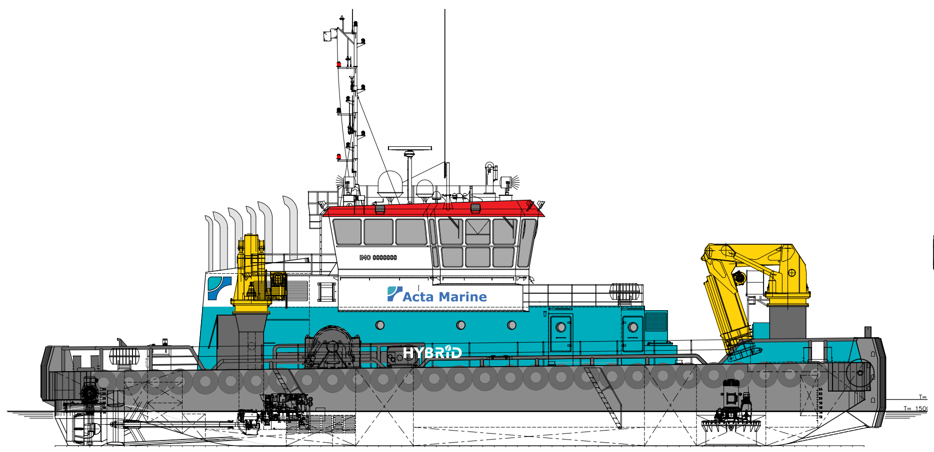
TANK CAPACITIES

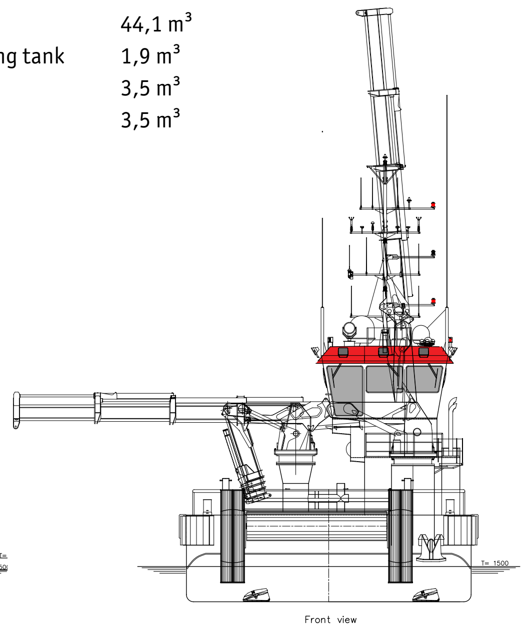
Fresh water	91 m^3
Fuel	110 m^3
Sewage	44,1 m^3
TLQ sewage holding tank	1,9 m^3
Dirty oil	3,5 m^3
Bilge water	3,5 m^3

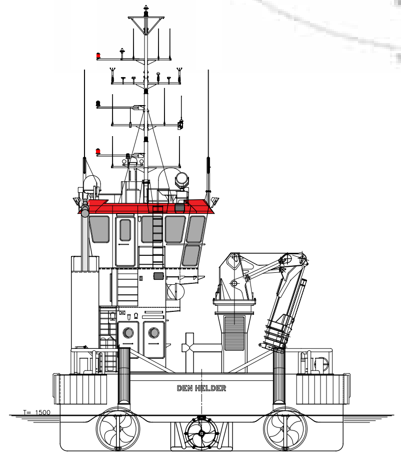


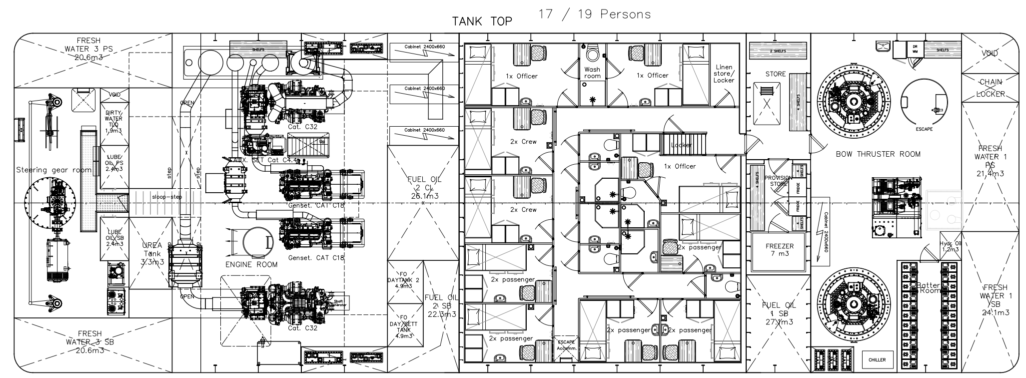












Coastal Crown

HYBRID

CARE FOR SUSTAINABLE SUPPLY CHAIN

TRIPLE DRIVE HYBRID CONFIGURATION

Typical works scope of (DP)Workboats in a project contains a variety of activities with various idle/waiting intervals per day. A smart configuration and use of power and propulsion systems will result in considerable savings of fuel and emissions.

Direct Drive mode: 2 direct drive engines on fixed props. Mainly used during transits and when strong power required like during anchor-/barge handling.

Diesel-electric Drive mode: 2 generators with diesel-electrical drive for azimuth stern and 2 bow thrusters. Mainly used during DP-operations and manoeuvring at the project site.

Battery-Electric Drive mode: 300Kwh Battery pack for DP back-up power and ship's accommodation supply. Mainly used during idle/ waiting intervals between activities. Battery capacity can be upgraded when needed.

PROJECTS

Acta Marine DP Multicats have a long track record of various coastal projects. This vessel can effectively perform the work scope ie:

- Ultra shallow draft anchor-handling or as towing tug
- Cable and/or pipelay support
- Pre-lay grapple runs
- Beach pull operations in ultra shallow waters
- Survey/ROV support in DP1 or DP2 modus
- Mass flow excavation support
- UXO support/monitoring/removal from the seabed
- Spray/Jet pontoon for shallow water dredging projects
- CPT/Vibrocore operations
- Dredging support for large Hopper & Cutter dredgers
- General supply vessel, not limited to Fuel supply.

Acta Marine

+31 (0)88 03 20 900 info@actamarine.com www.actamarine.com

Offices:
Het Nieuwe Diep 39D, 1781 AE, Den Helder (NL)
Rivium Promenade 74, 2909 LM, Capelle a/d IJssel (NL)

END OF DOCUMENT

APPENDIX E: SEABED PREPARATION METHOD STATEMENT.

SEABED PREPARATION METHOD STATEMENT

Project Name	**Liverpool Bay CCS Project**
Project Document Reference	**0059359-BOS-ENG-WMS-015**
COMPANY Document Reference	**NA**
COMPANY Revision Code	**NA**

Rev.	Issue Purpose	Date	Initiated	Checked	Verified	Approved
01	Issued for Information	29-Apr-26	E. Burns	M. Wennekes	T. Plant	P. Gibson

Revision History		
Revision	**Section**	**Change**
01	N/A	First Issue

HOLD point register			
Nr.	Description / Ref of HOLD point	Responsible Party	Status
01			
02			

Table of contents

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

Reference is made to Project Introduction [201]

1.1 Purpose of document

The purpose of this document is to describe:

- The methodology for seabed preparation works that include slope reduction and mega ripple levelling on the Liverpool Bay CCS project.
- Describe the working method for permit/ licensing purposes.

For a general overview of all available project documentation reference is made to the Project Master Document Register [202].

2. ABBREVIATIONS & DEFINITIONS

2.1 Abbreviations

Each abbreviation is introduced the first time it is encountered in the document. After which only the abbreviation will be used. See the table below for an overview of the abbreviations used in this document.

Table 1 – Document and project specific abbreviations

Abbreviation	Definition	Abbreviation	Definition
TSHD	Trailer Suction Hopper Dredger	WID	Water Injection Dredger
CD	Chart Datum	LAT	Lowest Astronomical Tide – sea water reference level
ALARP	As Low As Reasonably Practicable	MBES	MultiBeam EchoSounder – acoustic survey method
CCS	Carbon Capture and Storage	DPR	Daily Progress Report
CLV	Cable Lay Vessel	RPL	Route Position List
CTV	Crew Transfer Vessel	SHE-Q	Safety, Health, Environment & Quality
DV	Dredge View	UXO	Unexploded Ordnance
CTV	Crew transfer vessel	BHD	Backhoe Dredger
LB CCS	Liverpool Bay Carbon Capture and Storage		

2.2 Units

The following table provides a definition of non- SI units used throughout this document.

Table 2 – Non-SI Units

Symbol	Non-SI Unit	Expressed in SI Units
t	Ton	1000 kg
NM	Nautical Mile	1.852 m
kn	knots	1 NM/h
N	Newton	m·kg·s-2

2.3 Definitions

Table 3 – Definitions

Term	Definition
Employer	Liverpool Bay CCS
Contractor	Boskalis Subsea Cables B.V.
LBA CCS	Liverpool Bay Carbon Capture and Storage
Subcontractor	N/A

3. REFERENCES

3.1 Boskalis Project Documents

Table 4 - BSC Project Documents

Ref.	Document Title	BOS Document Number	External Document Number
[201]	Project Introduction	0059359-BOS-PMT-REP-1002	0562701DGQY0102N
[202]	Master Document Register	0055383-BOS-DCC-REG-1001	LUD-INF-REPL-BOS-04910
[203]	Project Organigram	0059359-BOS-PMT-CHA-1005	10562701DGFD0105N
[204]	Project Schedule	0059359-BOS-PLA-SCH-1006	10562701DGPR0106N
[205]	As-built Documentation Procedure	0059359-BOS-ENG-PRO-1007	105627-01-D-G-PT-0107N
[206]	Emergency Response Plan	0059359-BOS-SHE-PLA-1010	10562701DFPA0501N
[207]	Emergency Notification Chart	0059359-BOS-SHE-CHA-1011	105627-01-D-B-QV-0050N
[208]	Project Health Safety Plan	0059359-BOS-SHE-PLA-1014	10562701DFQW0503N
[209]	Beaching Procedure Ndurance	0059359-BOS-ENG-PRO-5108	105627-01-D-N-PK-6084N
[210]	Beaching Analysis NDurance	0059359-BOS-ENG-REP-2104	105627-01-D-N-CZ-6012N

3.2 Third Party and Employer Supplied Documents

Table 5 – Third Party and Employer Supplied Documents

Ref.	Document Title	BOS Document Number	External Document Number
[211]	Liverpool Bay CCS Ltd, Hynet Carbon Dioxide Transportation and Storage Project – Offshore Environmental Statement (ES), Appendix H: Physical Processes Technical Report	N/A	N/A

4. APPENDICES

Appendix A Vessel specifications

5. SCOPE OF WORK

On the Liverpool Bay Carbon Capture and Storage (LB CCS) project, the seabed preparation scope comprises pre-sweeping and bed levelling of slopes and mega ripples to ensure that the seabed is prepared in accordance with the safe beaching requirements of the Cable Lay Vessel (CLV) [209].

This document outlines the method by which we propose to execute the works using a BHD (Backhoe Dredger), TSHD[1] (Trailing Suction Hopper Dredger), and WID (Water Injection Dredger).

[1]Operated in a non-standard configuration, with material handled via suction pipe and immediately discharged back into the water column, without storage.

The execution area is shown in Figure 1.

Figure 1 - Execution area of the seabed preparation works based on pre-engineering survey between KP2.000 and KP 5.700

Table 6 – Slope reduction volumes for the BHD and TSHD[1]

Scope of Work	Scope location	Expected volume [m3] *
BHD/ TSHD[1] Slope reduction	KP 2.900 – KP 3.500	46,000
BHD/ TSHD[1] Slope reduction	KP 4.180 – KP 5.700	82,000
Total		**128,000**

Table 7 – Mega ripple levelling area for the WID

Scope of Work	Levelling location	Area [m2] *
WID mega ripple levelling	KP 2.350 – KP 2.900	32,000
WID mega ripple levelling	KP 3.500 - KP 4.000	26,000
Total		**58,000**

** These volumes and areas are based on pre-engineering surveys from 2025; the exact volumes and areas are determined based on the pre-surveys prior to commencement of the works.*

5.1 BHD/ TSHD[1] Slope reduction

The BHD is scheduled to perform the bulk of the scope by means of side casting. The TSHD[1] will arrive later on site to perform the final pre-sweeping, since the vertical accuracy of this vessel is higher than the BHD. The last 0.5m of material above design will be pre-swept by the TSHD to make sure the design is suitable for the Cable Lay Vessel to be beached during cable installation works.

[1]Operated in a non-standard configuration, with material handled via suction pipe and immediately discharged back into the water column, without storage.

5.2 WID Mega ripple levelling

The WID will level the seabed preparation area by means of water injection. The material in the top of the ripples will be levelled to the deeper parts of the ripples.

6. EQUIPMENT

The following equipment is in principle foreseen for the execution of the works:
- BHD Magnor or similar
- BHD assisting tugboat Union Onyx or similar
- TSHD Shoalway or similar
- WID Norma II or similar
- Survey vessel Porthos or similar
- CTV (crew transfer vessel)

6.1 Backhoe Dredger

A BHD is basically a hydraulic excavator installed on a pontoon. Side casting is executed by the excavator which is mounted on a turntable at the front of the pontoon. The BHD is mainly used for side casting in shallow or confined waters. An impression of a BHD is given in Figure 2.

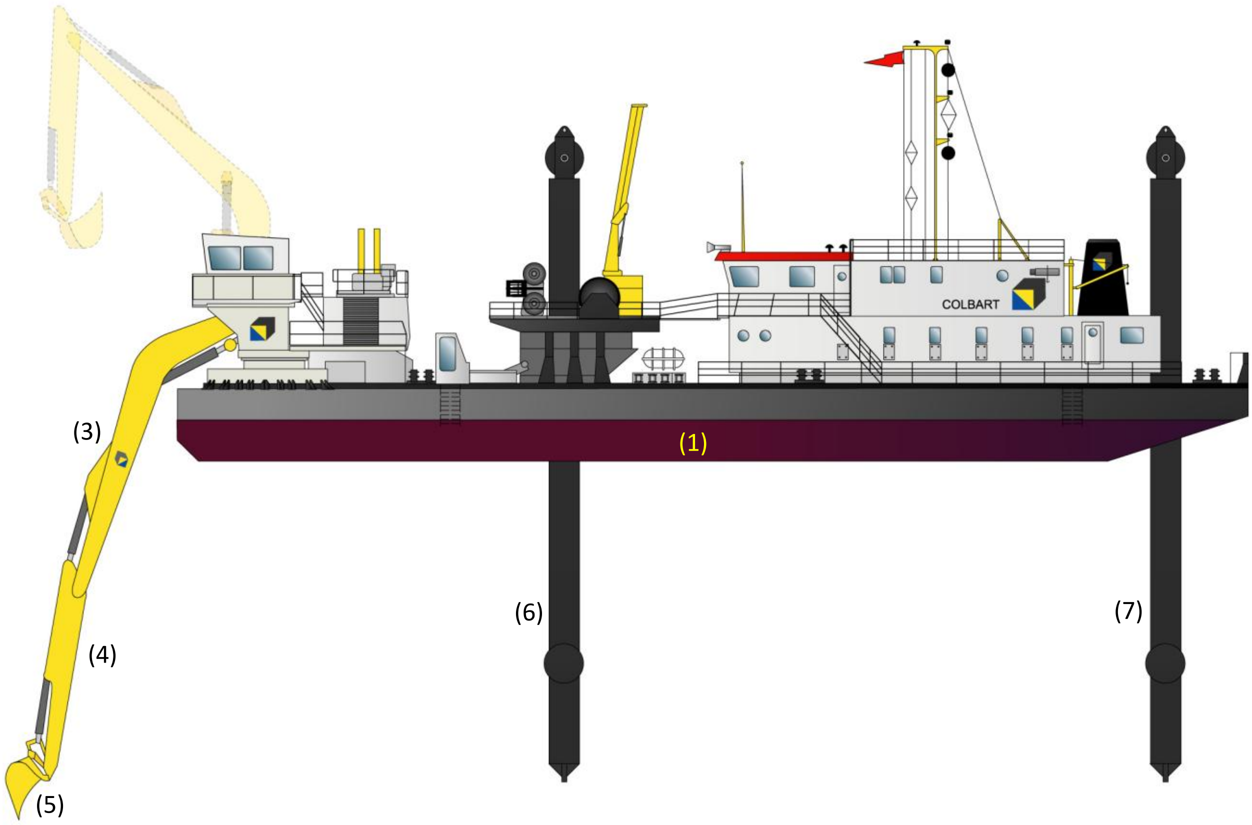


Figure 2 - General layout BHD

The main components of a BHD, as depicted in Figure 2, are:

- The pontoon (1);
- The hydraulic excavator, consisting of an excavator body (2), boom (3), stick (4) and bucket (5);
- The spud poles (6) and spud carrier, or tilting spud (7).

The spuds are able to elevate the pontoon to some extent which provides stability to the pontoon during side casting. The spud carrier or tilting spud enables the pontoon to move forwards and backwards when the auxiliary spuds are lifted.

6.1.1 Working method when side casting material with a BHD

To start side casting operations, the BHD is towed to the project location. The BHD positions its spuds on the seabed. Side casting with a BHD is a cycle operated process, the bucket mounted at the end of the stick will excavate the soil from the seabed and will deposit the material adjacent to the area of excavation.

These operations can be divided in the following consecutive steps:

- Excavating;
- Lifting bucket;
- Swinging full bucket;
- Unloading bucket;

- Swinging empty bucket;
- Lowering and positioning bucket;

Material side casted by the BHD is placed (side casted) underwater parallel to the working area at a distance within the reach of the BHD for later possible re-use as backfill material as is shown in Figure 3.

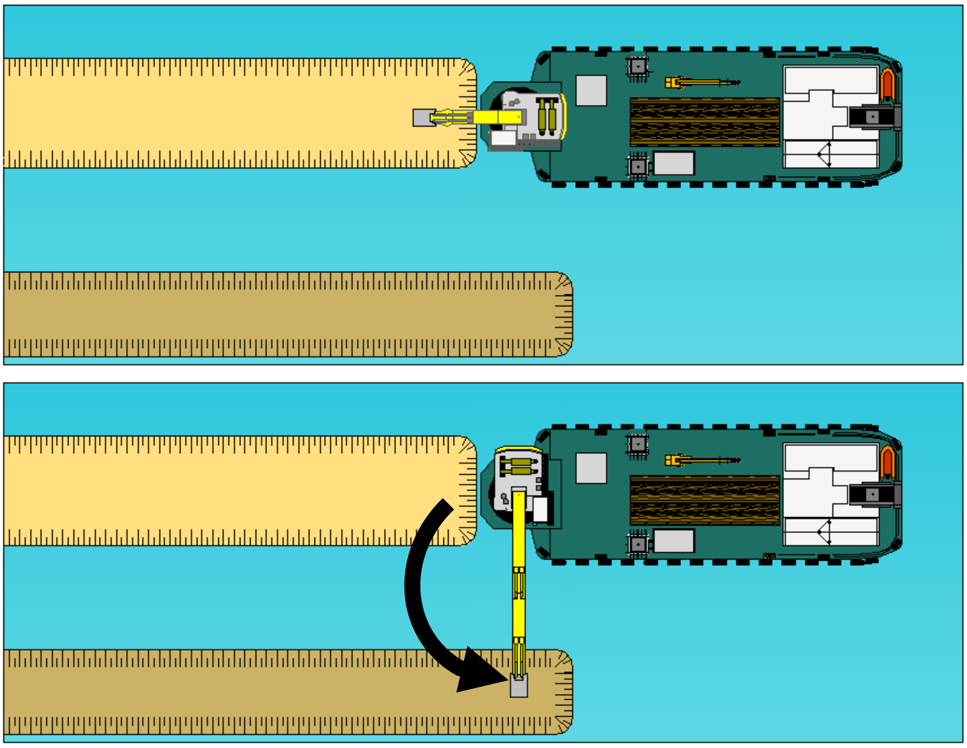


Figure 3 - BHD side casting material parallel to the working area

Figure 4 - BHD Magnor side casting configuration

6.2 Trailer suction hopper dredger

A TSHD is a self-propelled, seagoing vessel that dredges material and redistributes it through controlled discharge.

Pre-sweeping takes place by means of one suction pipe, installed alongside the vessel. The material is loosened and collected by means of the draghead, which is located at the lower end of the suction pipe. Dredge pump in the vessel lift the mixture of soil and water through the pipeline. The material is then placed back on the seabed by means of side casting. A typical TSHD is shown below, in Figure 5.

For this project, in order to perform the pre-sweeping operations, the TSHD will be operated in a non-standard configuration, with material handled via suction pipe and immediately discharged back into the water column, without storage (side casting).

Side casting is achieved by continually releasing the material at the same time it is recovered. This continuous release can be achieved either by rainbowing the material via the hydraulic discharge pipe (5), or by sailing with the hopper doors open and allowing the material to disperse in the water. Further details of which are provided later in this section.

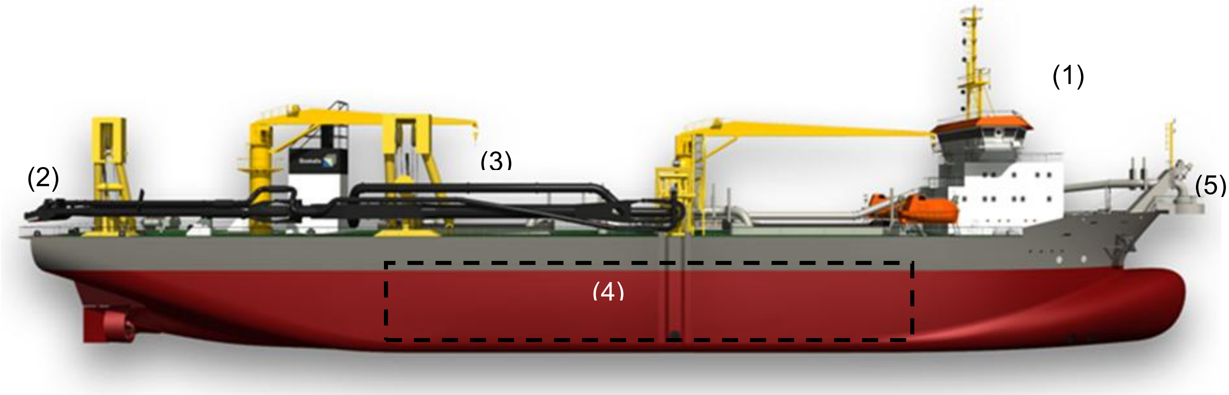


Figure 5 - Trailing Suction Hopper Dredger (TSHD)

In principle the main elements of the TSHD, as depicted in Figure 5 - Trailing Suction Hopper Dredger (TSHD), are:

- Standard ship's installation (1) for the engines, the crew' quarters, the bridge with navigational controls, etc;
- The draghead (2), connected at the lower end of the suction pipe. This gently interacts with the seabed surface using adjustable features such as guiding elements or low-impact water flows. Different types of configurations can be fitted, depending on the soil conditions.
- The suction pipe (3) and deck pipelines through which the mixture is transported.
- The hopper (4) is the ship's cargo hold. ***The hopper will not be used in this configuration and will be fully isolated during the pre-sweeping operations***.
- The hydraulic discharge pipe exit (5)

6.2.1 *Working method when pre-sweeping with a TSHD*

Prior to the start of the pre-sweeping operations, a hydrographic survey of the pre sweeping route will be executed. The results of the survey campaign and the required route dimensions will be loaded in the DV (Dredge View) - Monitoring System on board the TSHD. The TSHD will sail to the area where the pre-sweeping is required. Once in the vicinity of the pre-sweeping area, the TSHD will position itself along the theoretical centre line of the project area and lowers the draghead onto the seabed, see Figure 6 during this process, the position of the draghead will be controlled both horizontally and vertically.

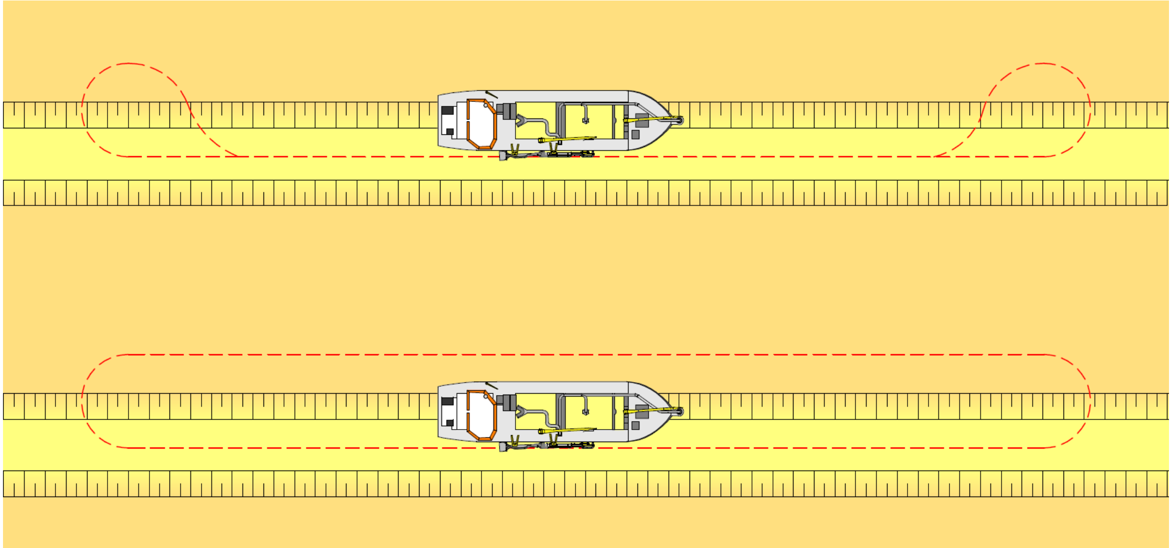


Figure 6 - TSHD Sailing tracks during pre-sweeping operations

The TSHD will sail tracks in one or two directions, depending on the area depth, width to be realised and local conditions (currents, wind, waves, etc.). To minimise the number of turns of the TSHD for each trip, the length of each track will be optimised along the process.
There are two methods in which a TSHD can isolate the hopper and place the material back on the seabed:

- Figure 7 below illustrates a TSHD side-casting material via a hydraulic discharge pipe, this method is expected to ensure that the material reaches a greater side casting distance, meaning it is an optimal and preferred working method.
- An alternative approach involves sailing and pre-sweeping while simultaneously releasing the material through the vessel’s bottom doors back onto the seabed, as shown in Figure 8.

Both methods prevent material from entering the hopper hold and ensure it remains in continuous motion throughout the pre-sweeping process.

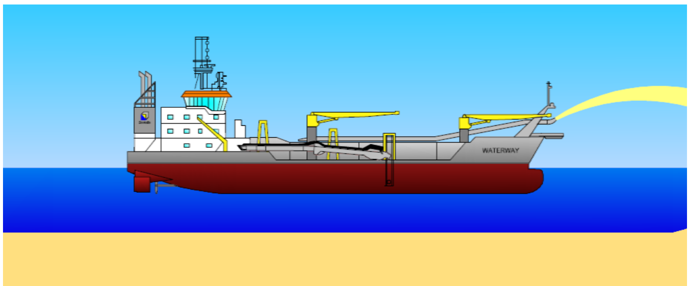


Figure 7 - TSHD side casting the material adjacent to the seabed preparation area

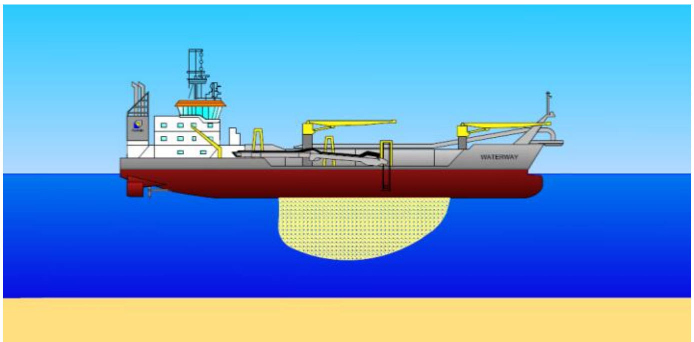


Figure 8 - TSHD side casting the material via bottom doors

6.3 Water injection dredger

A Water Injection Dredger (WID) consists of a self-propelled vessel with a submerged nozzle beam and a water pumping installation. The nozzle beam can be lowered to a required and controlled distance from the seabed. Setup of a WID is illustrated in Figure 9.

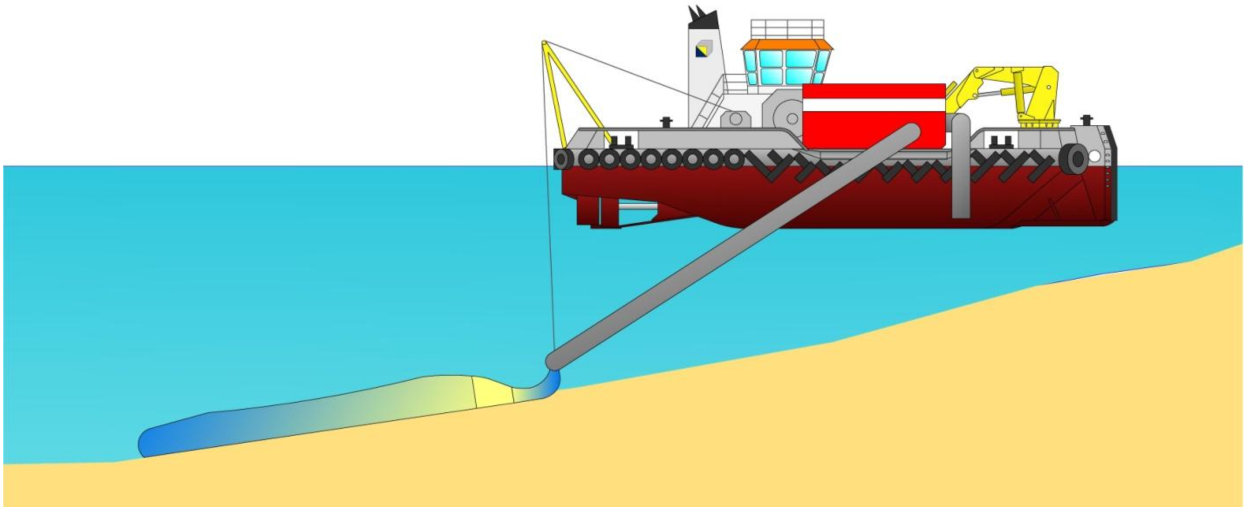


Figure 9 – Boskalis Multicat equipped as Water Injection Dredger

6.3.1 *Water Injection Dredger Working Method*

The working principle of a WID is to use fluidisation to move seabed material. Fluidising is achieved by injecting water with low pressure in the seabed via WID's nozzle beam, see Figure 10. By fluidising the material, a gravity driven density flow will transport the material to adjacent areas.

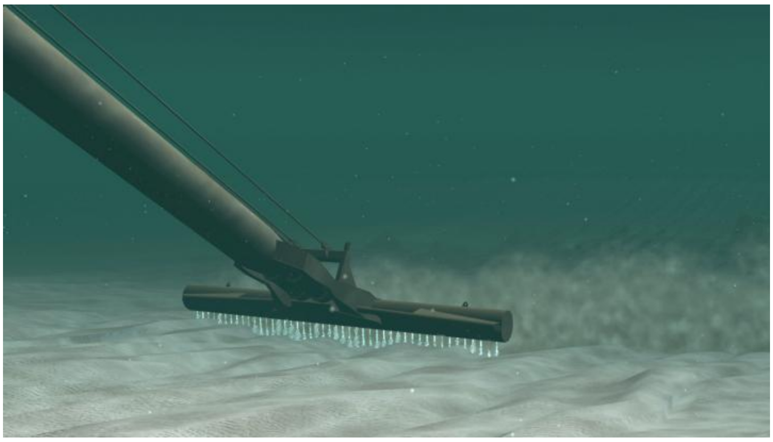


Figure 10 – WID nozzle beam

The process of WID can be divided into three phases:

1. Water injection: mobilisation of seabed material
2. Transition: supercritical flow and hydraulic jump of suspended material
3. Transport: stable density flow which transports the suspended material

The presence of a gradient (i.e. a natural slope or trench) and/or currents may substantially improve the transport capacity of the density flow. The three phases and natural gradient are illustrated in Figure 11.

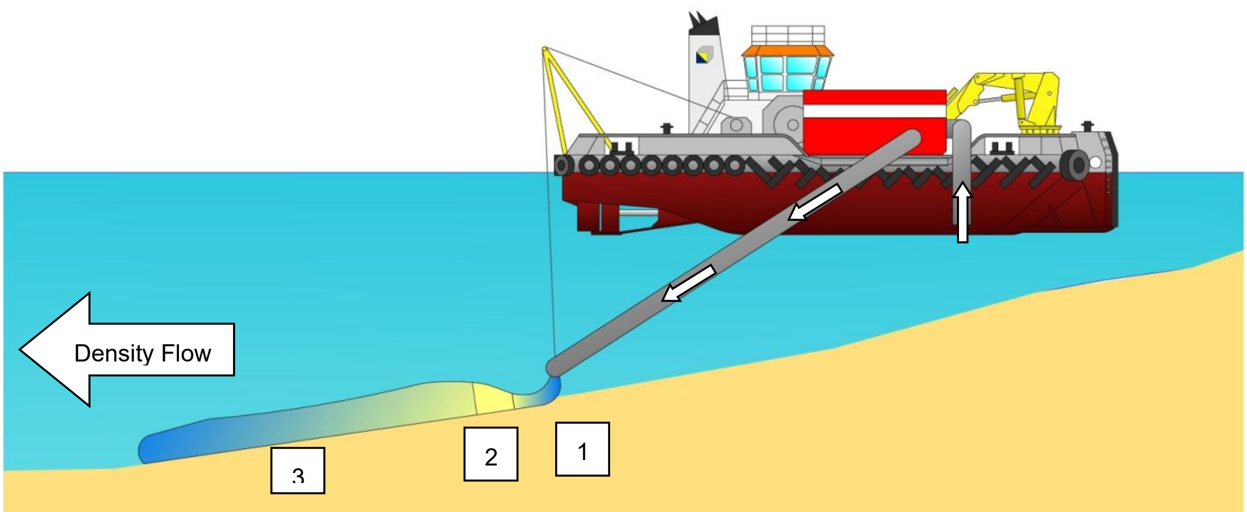


Figure 11 - WID phases

Jetting of water is performed with a relatively low pressure, this to limit turbulence and facilitate entrainment of water and material in a high-density volume flow. The penetration depth of the jet water and the quantity of the obtained suspended material depend on the soil parameters (grain size, permeability, density and plasticity), jet pressure, jet flow, stand-off distance, nozzle angle and sailing speed of the WID.

The thickness of the density flow varies between one and several meters, with a distinct separation level between the fluidised layer and surrounding water. The density flow is mainly directed in the opposite direction of the WID's heading. The suspended soil particles will eventually settle under the influence of gravity, which determines the maximum transport distance. Production rates and distances are larger in small grained material than in coarser materials. Furthermore the direction of the density flow can be controlled by setting out a specific sailing pattern of the WID, for example see Figure 12.

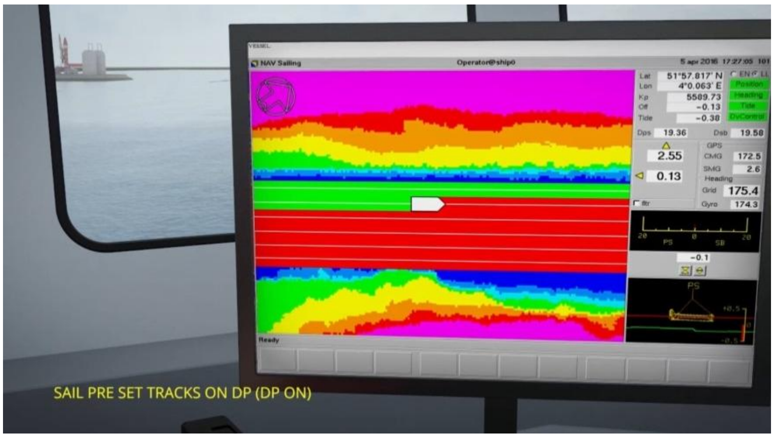


Figure 12 – WID sailing pattern

6.4 Seabed preparations - sediment release rates

The industry practice of calculating sediment release rates is described in the book Dredging for Sustainable Infrastructure by IADC. The expected sediment release rates for the above described working method is provided in Table 8.

Table 8 - Sediment release rates

Scope of Work	**Sediment release rate per cycle [kg/s]**
BHD Side Casting	1.7
TSHD[1] releasing material through a hydraulic discharge pipe	8.2
TSHD[1] releasing material through the bottom doors	4.4

[1]Operated in a non-standard configuration, with material handled via suction pipe and immediately discharged back into the water column, without storage.

The above sedimentation release rates are within the mentioned rate (295 kg/s) that was adopted for the modelling in the Physical Processes Technical Report [211].

7. SITE CONDITIONS

7.1 Site conditions – depths

The existing seabed in the nearshore area varies between 0m CD (Chart Datum) to 9m CD. The area of the mega-rippling levelling is between 1.0m CD and 4.30m CD and the slope reduction area is between 0m CD and 4.5m CD.

7.2 Site conditions – tidal circumstances

The region is characterised by having large intertidal regions consisting of beaches and sandbanks. The Highest Astronomical Tide (HAT) is 9.8m and the Lowest Astronomical Tide (LAT) is at 0.2m, with the Mean Sea Level (MSL) at 4.89m.
All the seabed preparation areas will be restricted to the tidal conditions of the area. In preparation and during execution the tide will be monitored in order to optimize the workability of the BHD, TSHD[1] and WID in the tidal restricted areas.
It's expected that vessels will go on standby during the execution period because of low tide.

Table 9 - Tidal data from Mostyn Dock (reference Chart Datum)

HAT	9.8 m
MHWS	8.9 m
MHWN	7.0 m
MSL	4.89 m
MLWN	2.9 m
MLWS	1.1 m
LAT	0.2 m

8. SURVEY AND MONITORING

The following survey works are required to provide the necessary information to prepare, execute monitor and complete the works:

- Pre-sweep survey
- Progress surveys
- Post-sweep survey

9. PROPOSED EQUIPMENT

The proposed equipment is indicative only and subject to availability at the time of execution of the project.

Table 10 - BHD Magnor general particulars

Boskalis BHD MAGNOR		
Length overall	72.0m	
Breadth	20.4m	
Max draught	3.39m	
Buckets	Up to 40m^3	
From	Western EU	
Transport	Under tow by tug	

Table 11 - BHD Odin general particulars

Boskalis BHD ODIN		
Length overall	60.0m	
Breadth	18.0m	
Max draught	2.66m	
Buckets	6 – 22 m^3	
From	Western EU	
Transport	Under tow by tug	

Table 12 – Assistance tug Union Onyx general particulars

Boskalis tug Union Onyx		
Length overall	33.0m	
Breadth	11.0m	
Max draught	4.4m	
Propulsion	2 x fixed pitch ASD propeller	
Max speed	13 kn	
From	Western EU	
Transport	Own keel	

Table 13 - TSHD Shoalway general particulars

Boskalis TSHD SHOALWAY		
Hopper capacity	4,500m^3	
Length overall	90.0m	
Breadth	19m	
Max draught	6.8m	
Propulsion	2 x 1,491 kW	
Max speed	11 kn	
From	Western EU	
Transport	Own keel	

Table 14 - TSHD Strandway general particulars

Boskalis TSHD STRANDWAY		
Hopper capacity	4,500m^3	
Length overall	92.1m	
Breadth	19m	
Max draught	6.8m	
Propulsion	2 x 1,491 kW	
Max speed	11 kn	
From	Western EU	
Transport	Own keel	

Table 15 - TSHD Freeway general particulars

Boskalis TSHD FREEWAY		
Hopper capacity	4,500m^3	
Length overall	92.1m	
Breadth	19m	
Max draught	6.6m	
Propulsion	2 x 1,491 kW	
Max speed	11 kn	
From	Western EU	
Transport	Own keel	

Table 16 - TSHD Causeway general particulars

Boskalis TSHD CAUSEWAY		
Hopper capacity	4,500m^3	
Length overall	92.1m	
Breadth	19m	
Max draught	6.8m	
Propulsion	2 x 1,491 kW	
Max speed	11 kn	
From	Western EU	
Transport	Own keel	

Table 17 - WID Norma II general particulars

Boskalis WID Norma II		
Length overall	24.9m	
Breadth	9.5m	
Max draught	1.96 m	
Propulsion	Twin screw, 4-blade fixed pitch props ø1,380 mm	
Max speed	10 kn	
From	United Kingdom	
Transport	Own keel	

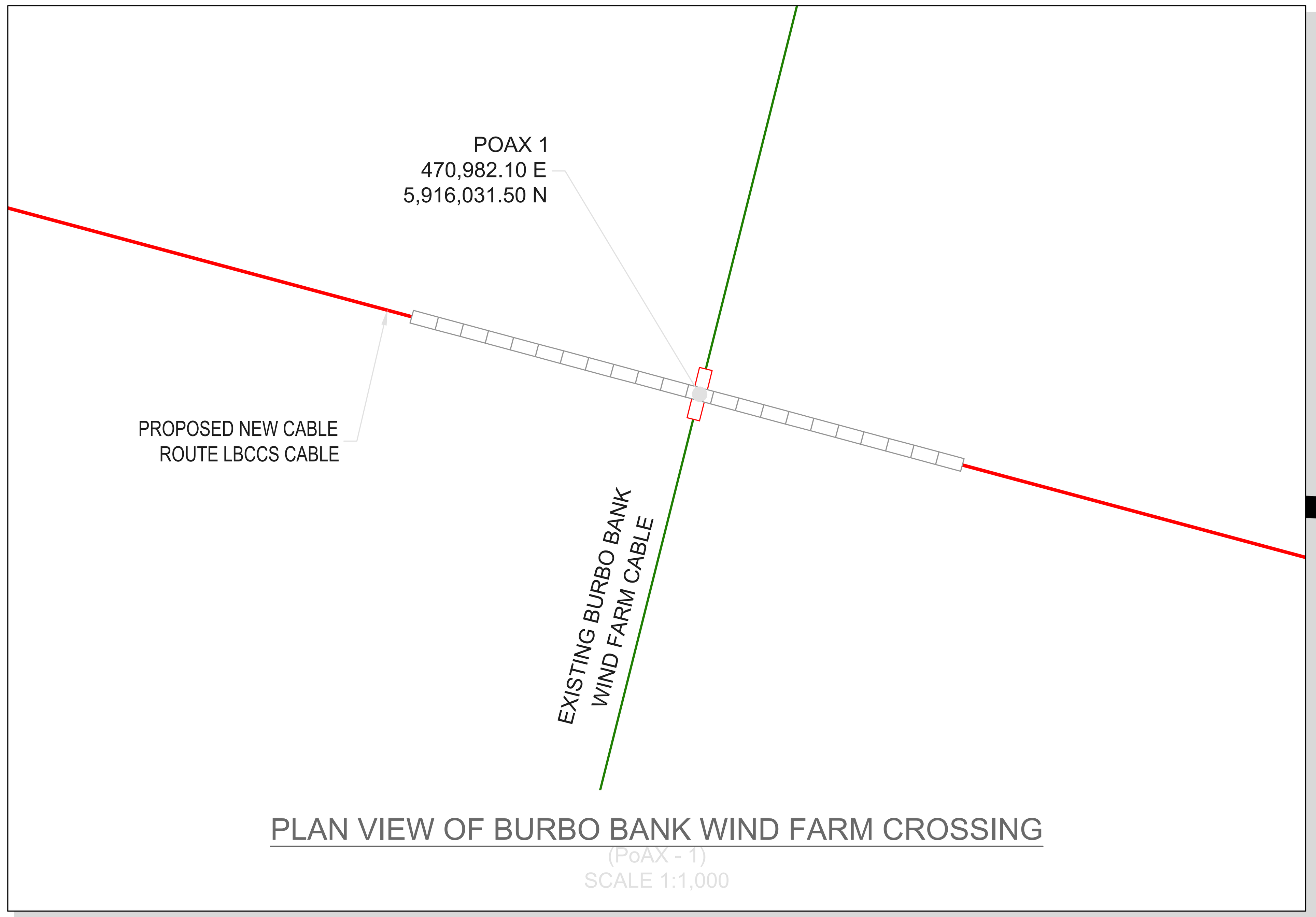
Table 18 – Survey vessel Porthos general particulars

Boskalis survey vessel Porthos		
Length overall	11.4m	
Breadth	3.5m	
Max draught	0.95 m	
Propulsion	2 x Volvo Duoprop outdrives	
Max speed	20 kn	
From	United Kingdom	
Transport	Road transportable	

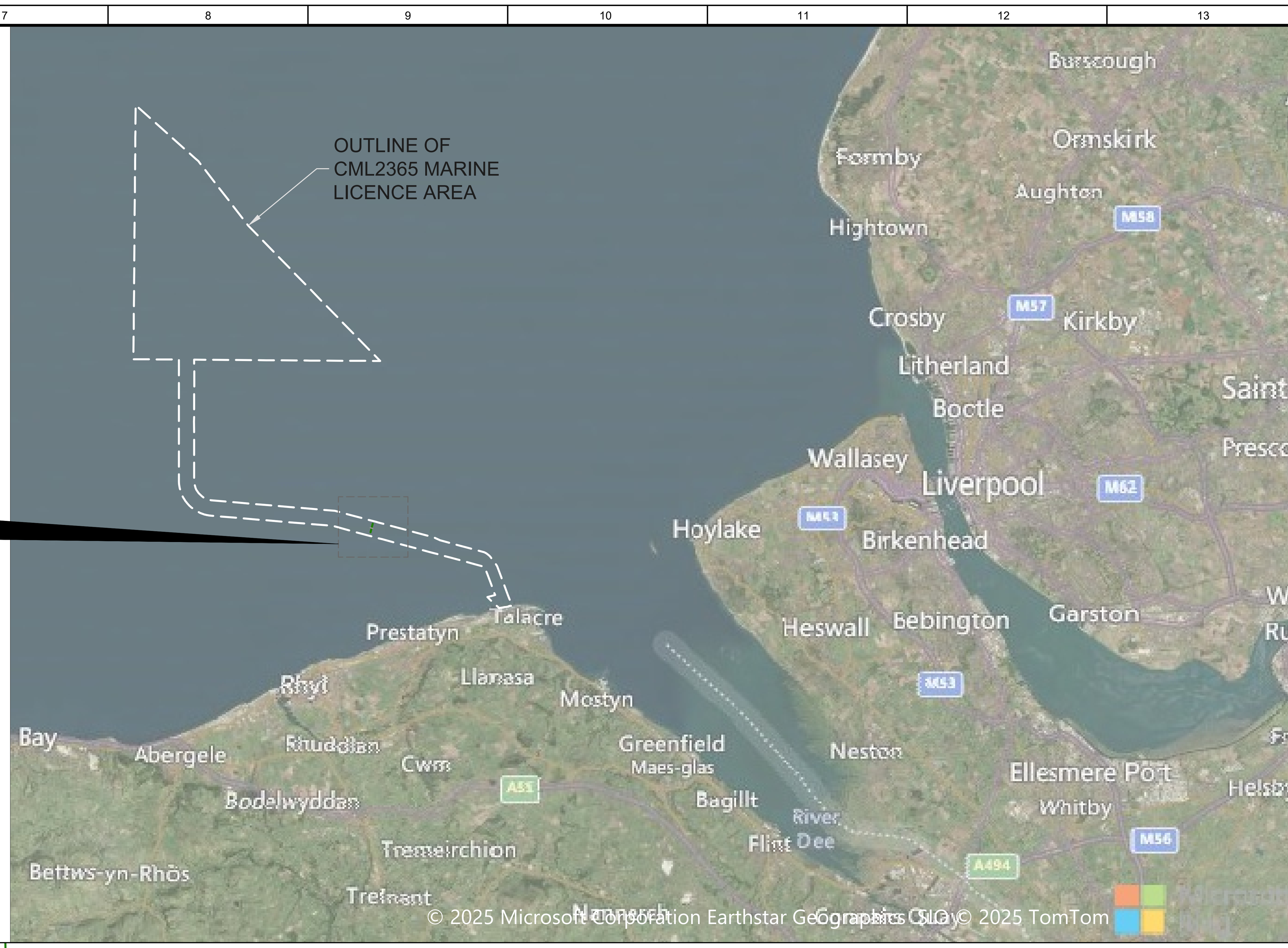
Table 19 - CTV MCS Zephyr general particulars

CTV General Particulars		
Length overall	19.2m	
Breadth	7.3m	
Max draught	1.2 m	
Max speed	15 kn	
From	United Kingdom	
Transport	Own keel	

APPENDIX F: CROSSING DESIGN DRAWINGS FOR POA TO DOUGLAS CCS CABLE (POAX-1 TO POAX-10).



PLAN VIEW OF BURBO BANK WIND FARM CROSSING
(PoAX - 1)
SCALE 1:1,000

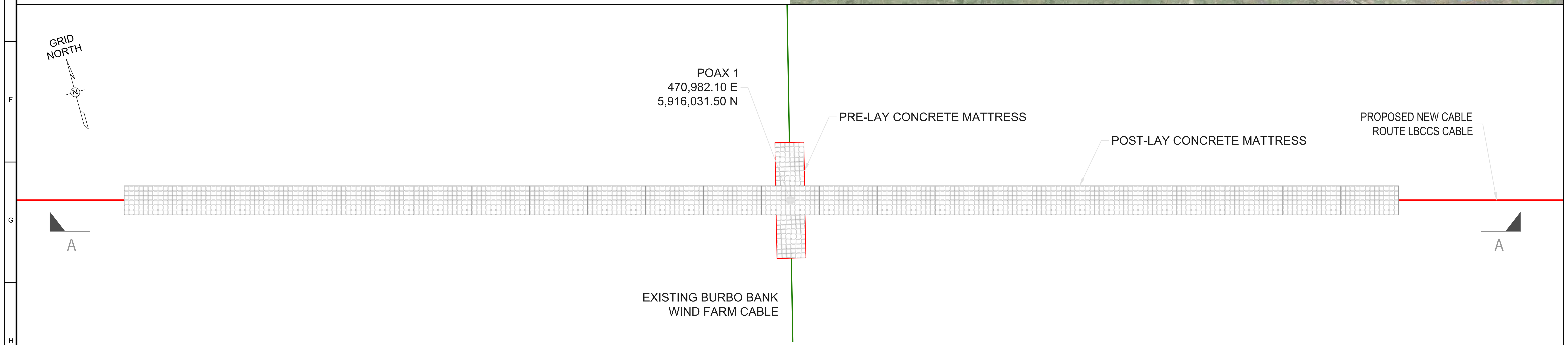


REFERENCE DOCUMENTS

NUMBER	TITLE

NOTES:

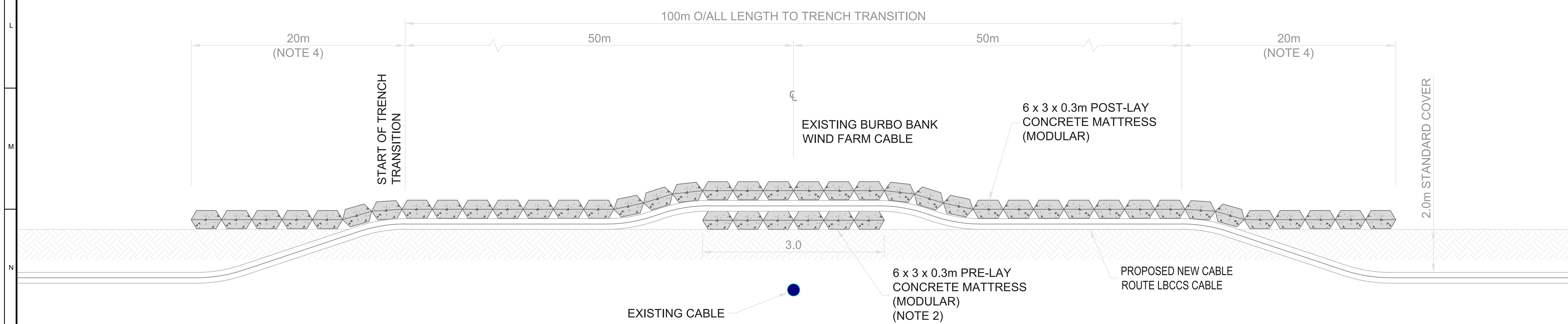
1. THE CABLE MINIMUM BENDING RADIUS IS ASSUMED TO BE 2.4m DURING INSTALLATION AND OPERATION.
2. MODULAR MATTRESS PROPERTIES FOR THE PROPOSED PRE-LAY AND POST-LAY MATTRESSES SHALL BE AS PER10562701DSRH1039W, CABLE CROSSING DESIGN REPORT - POINT OF AYR TO DOUGLAS CCS.
3. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
4. EXTENT OF MATTRESS PROTECTION SHALL BE CONFIRMED BASED ON SITE-SPECIFIC GROUND SLOPE CONDITIONS.



PLAN VIEW ON BURBO BANK WIND FARM CABLE CROSING (PoAX-1)
SCALE 1:250

ABBREVIATIONS:

GYM	GWYNT-Y-MOR
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH



SECTION A-A
NOT TO SCALE

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	00	13.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC

Revision index

Company logo and business name: liverpool bay ccs

LCI Activity Code GB20250014
Contract Code 000593

Company Document ID: 10562701DSDN1049W
Job. N. JA1351

Contractor logo and business name: wood.

Contractor Document ID: OP271234-GN-GAS-0012
Contractor N.

Vendor logo and business name: NOT APPLICABLE

Vendor Document ID: NOT APPLICABLE
Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES

Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying

Scale: AS SHOWN
Sheet of Sheets: 1 of 1

Document Title:

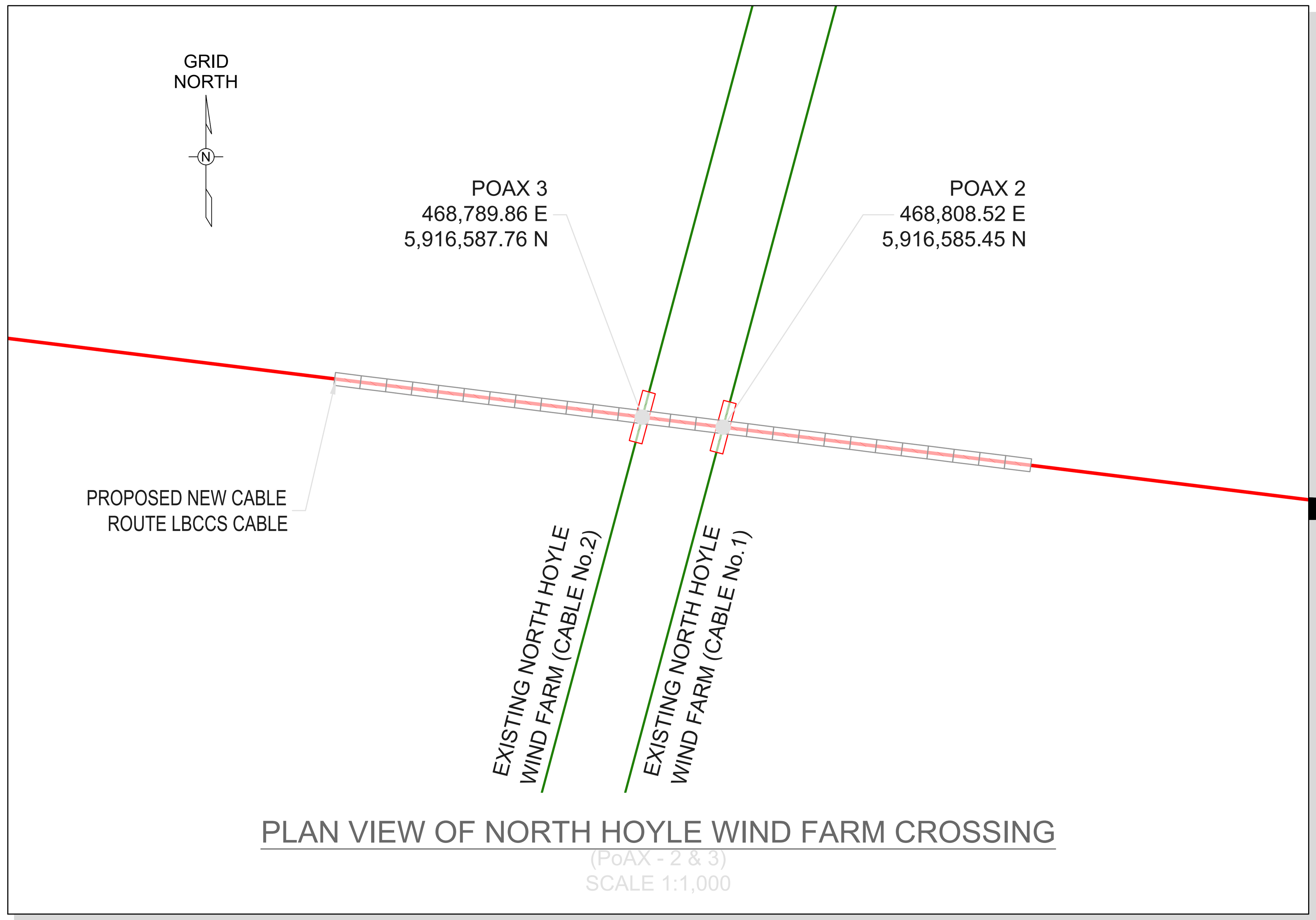
PROPOSED BURBO BANK CROSSING SKETCH

Supersedes N. NOT APPLICABLE
Superseded by N.

Plant Area: 1
Functional Unit: 0

Software: Autocad

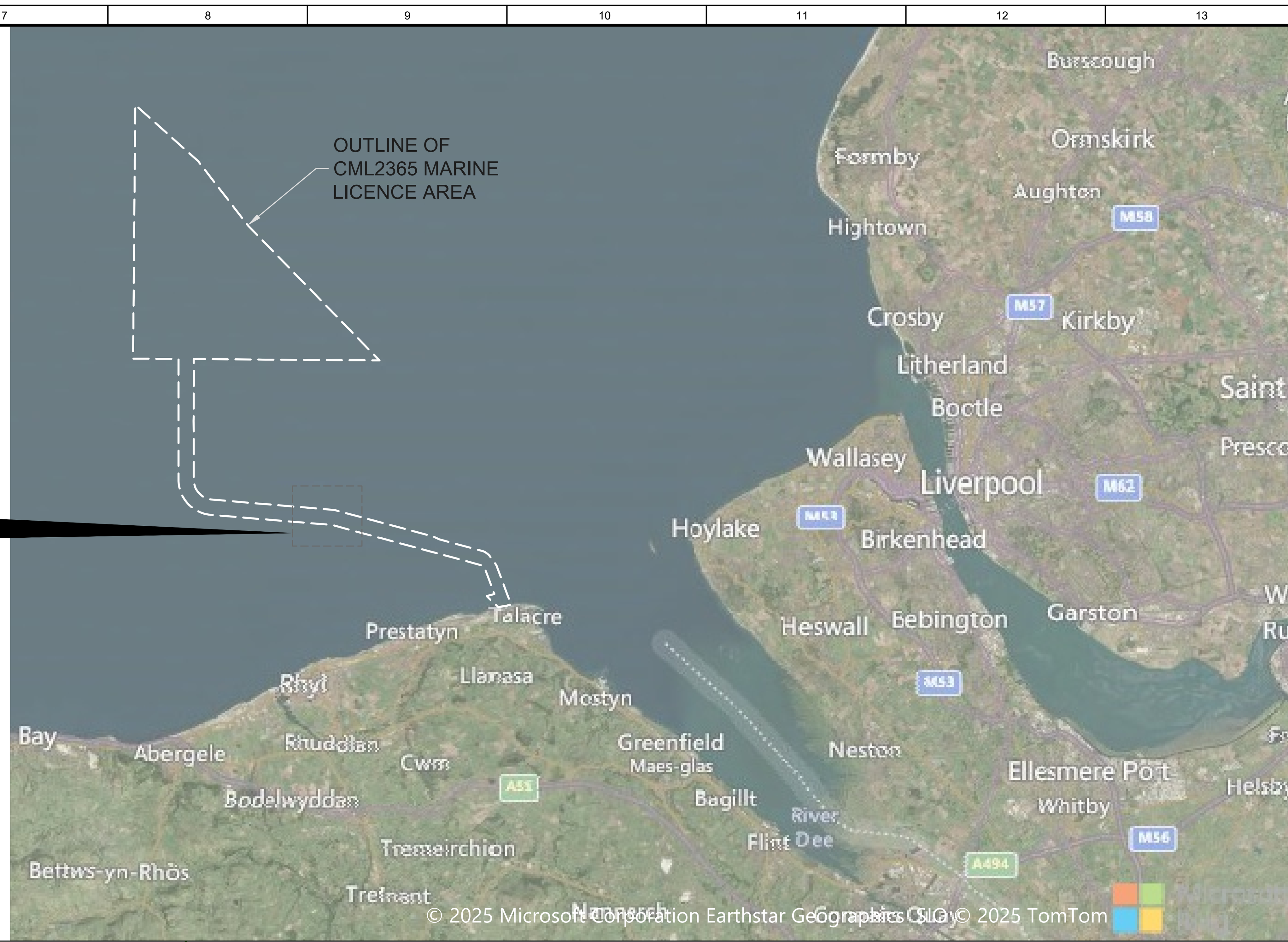
File Name OP271234-GN-GAS-0012.DWG

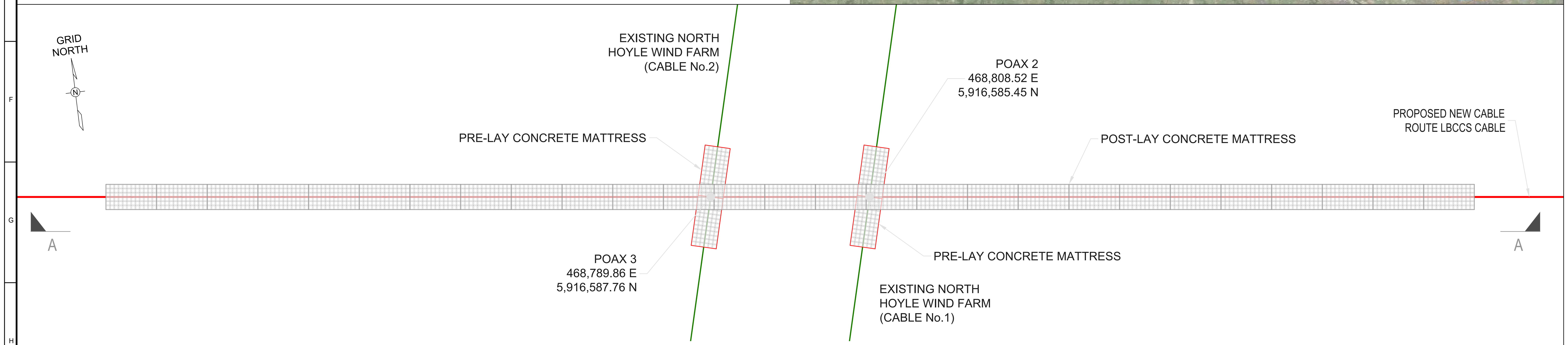


PLAN VIEW OF NORTH HOYLE WIND FARM CROSSING

(PoAX - 2 & 3)

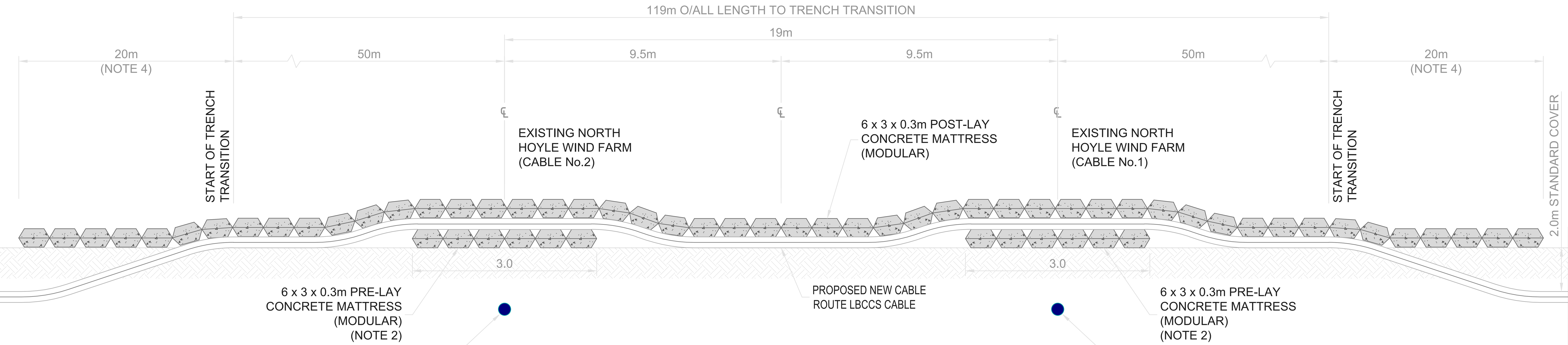
SCALE 1:1,000





PLAN VIEW ON NORTH HOYLE WIND FARM CABLE CROSSING (PoAX-2 & PoAX-3)

NOT TO SCALE



SECTION A-A

NOT TO SCALE

REFERENCE DOCUMENTS

NUMBER	TITLE

NOTES:

1. THE CABLE MINIMUM BENDING RADIUS IS ASSUMED TO BE 2.4m DURING INSTALLATION AND OPERATION.
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3. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
4. EXTENT OF MATTRESS PROTECTION SHALL BE CONFIRMED BASED ON SITE-SPECIFIC GROUND SLOPE CONDITIONS.

ABBREVIATIONS:

GYM	GWYNT-Y-MOR
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	00	13.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC

Revision index

Company logo and business name: liverpool bay ccs

EX-DE

LCI Activity Code GB20250014

Contract Code 000593

Company Document ID: 10562701DSDN1050W

Job. N. JA1351

Contractor logo and business name: wood.

Contractor Document ID: OP271234-GN-GAS-0013

Contractor N.

Vendor logo and business name: NOT APPLICABLE

Vendor Document ID: NOT APPLICABLE

Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES

Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying

Scale: AS SHOWN

Sheet of Sheets: 1 of 1

Document Title: PROPOSED NORTH HOYLE CROSSING SKETCH

Supersedes N. NOT APPLICABLE

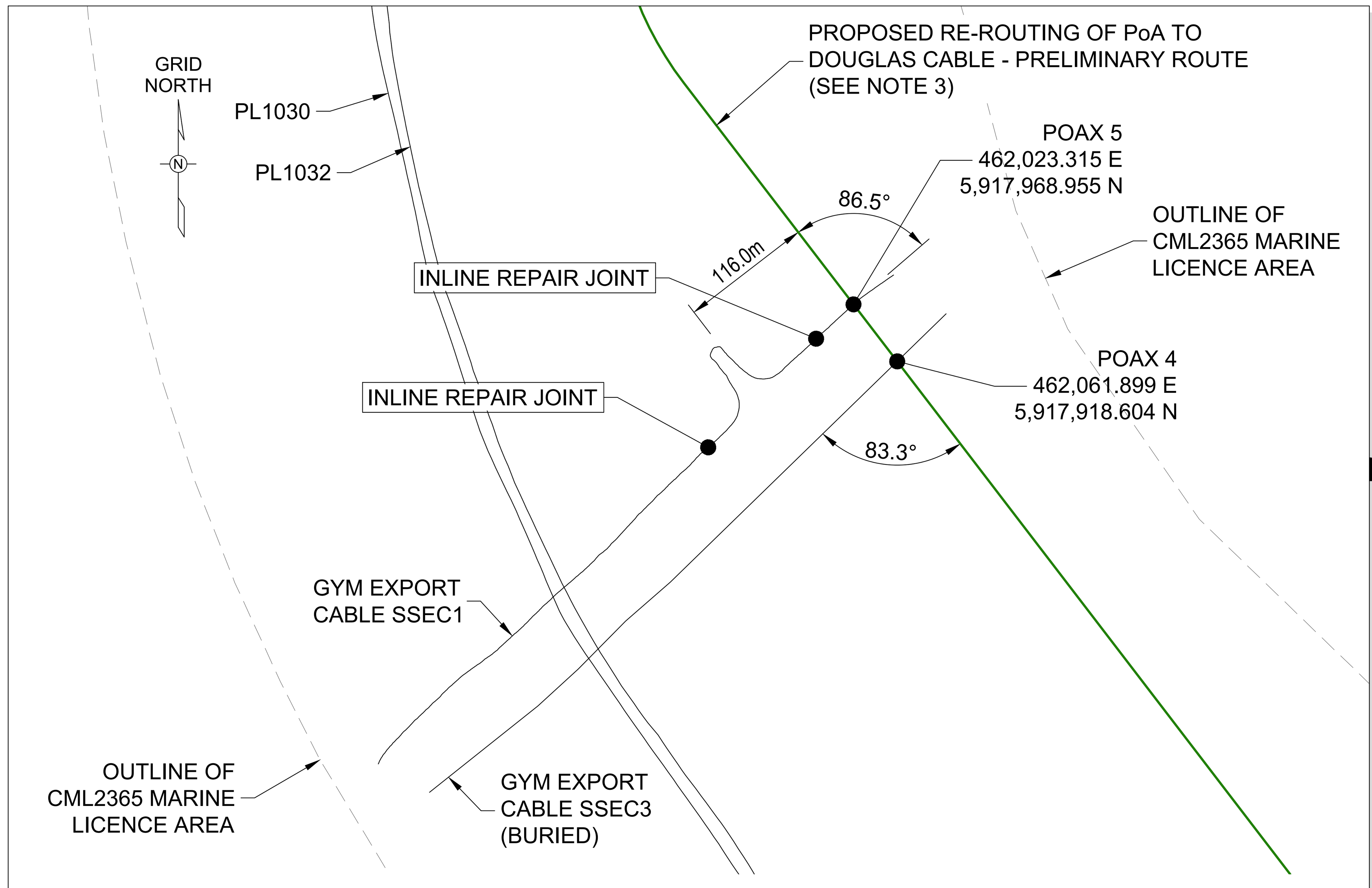
Superseded by N.

Plant Area: 1

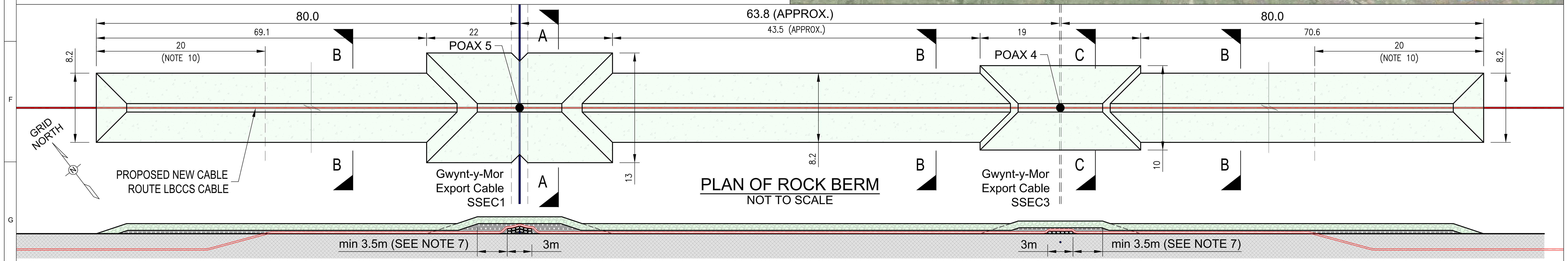
Functional Unit: 0

Software: Autocad

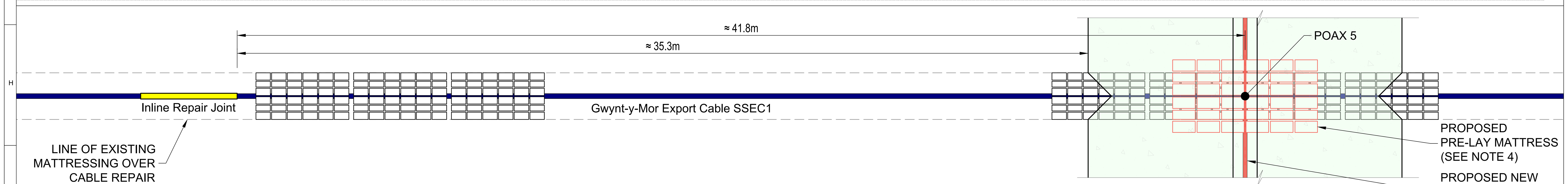
File Name OP271234-GN-GAS-0013.DWG



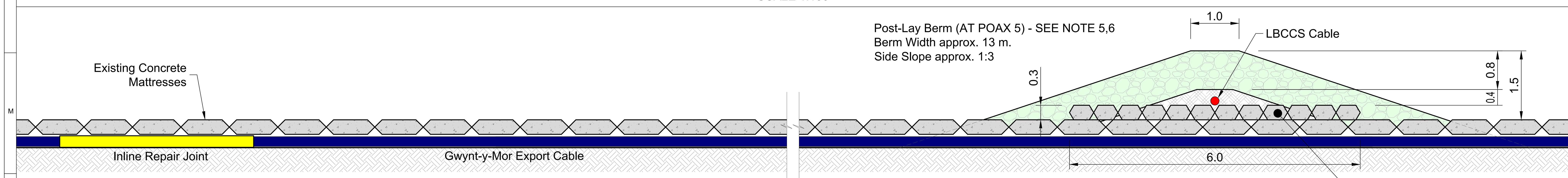
PROPOSED RE-ROUTING OF PoA TO DOUGLAS CABLE
SCALE 1:4,000



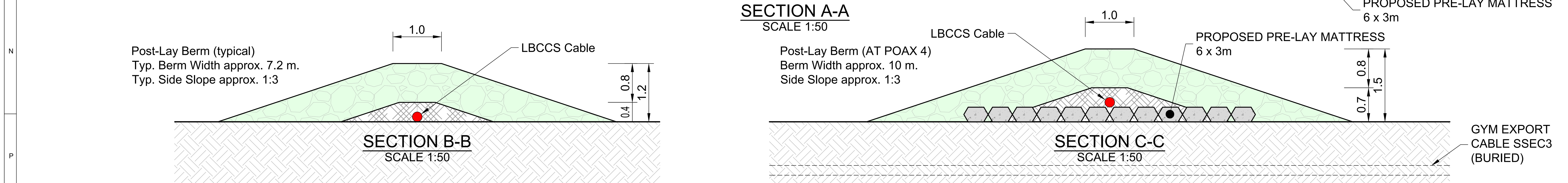
PLAN OF ROCK BERM
NOT TO SCALE



PLAN OF CROSSING OF GWYNT-Y-MOR EXPORT CABLE SSEC1 AND PoA TO DOUGLAS CABLE
SCALE 1:100



SECTION A-A
SCALE 1:50



SECTION B-B
SCALE 1:50

SECTION C-C
SCALE 1:50

REFERENCE DOCUMENTS

NUMBER	TITLE

NOTES:

1. THE ORIGINAL ROUTING FOR THE LBCCS CABLE PASSES BETWEEN THE WESTERN INLINE REPAIR JOINT AND THE CABLE REPAIR BIGHT ON GYM EXPORT CABLE SSEC1.
2. THE PROPOSED RE-ROUTING OF THE LBCCS CABLE IS TO 3 x WD FROM THE EASTERN REPAIR JOINT ON GYM EXPORT CABLE SSEC1. THIS ALSO MAINTAINS >50m CLEARANCE WITH PARALLEL CABLE IN THE BIGHT.
3. PRELIMINARY ROUTE. THE PROPOSED RE-ROUTING OF THE POA TO DOUGLAS CABLE MAY BE REFINED TO IMPROVE INSTALLABILITY.
4. PROPERTIES OF THE PROPOSED PRE-LAY MATTRESS AND THE POST-LAY ROCK BERM SHALL BE AS PER 10562701DSRH1039W CABLE CROSSING DESIGN REPORT-POINT OF AYR TO DOUGLAS CCS.
5. THE DETAILS OF THE PROPOSED ROCK BERM ARE SHOWN FROM THE BOTTOM OF THE PROPOSED PRE-LAY MATTRESS AT THE CROSSING LOCATIONS POAX 4 AND 5.
6. AT CROSSING POAX 5, IT IS ASSUMED THAT THE EXISTING PIPELINE AND MATRESS ARE EXPOSED ON THE SEA-BED. THIS MUST BE CONFIRMED BASED ON INSPECTION OF SITE-SPECIFIC CONDITIONS. THE FOOTPRINT OF THE ROCK BERM SHOWN IS CONTINGENT ON THIS ASSUMPTION.
7. THE PROPOSED INCREASE IN HEIGHT OF THE ROCK BERM AT THE CROSSINGS SHOULD START AND EXTEND UPTO A MINIMUM OF 3.5m BEFORE AND AFTER THE EDGE OF THE PROPOSED PRE-LAY MATTRESS.
8. ALL DIMENSIONS ARE MINIMUM AND THE ROCK BERM MAY EXTEND BEYOND THE STATED DIMENSIONS.
9. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
10. ROCK BERM PROTECTION EXTENTS TO BE CONFIRMED BASED ON EXISTING GROUND SLOPE. PROTECTION SHOULD BE EXTENDED UNTIL CABLE REACHES A BURIAL DEPTH OF 2.0m.

ABBREVIATIONS:

GYM	GWYNT-Y-MOR
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH

Crossing ID	Pre-Lay Protection		Post-Lay Protection			Total Quantity / Volume (Nos. / m³)
	Type	Quantity	Type	Total Length (m)	Quantity	
PoAX-4 & PoAX-5	Concrete Mattress (high density edge blocks)	2 Nos.	Rock Berm	224.000	275 m3 (Underlayer), 1150 m3 (Armour Layer)	2 Nos., 1515 m3

Note: 10% design/placing tolerance has been assumed for rock volume estimation.

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	02	05.03.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	01	06.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	00	09.12.25	ISSUED FOR DESIGN	BCA	LSU	CKI	BOK	GC

Revision index

Company logo and business name: liverpool bay ccs
LCI Activity Code GB20250014
Contract Code 000593
Company Document ID: 10562701DSDN1047W
Job. N. JA1351

Contractor logo and business name: wood.
Contractor Document ID: OP271234-GN-GAS-0010
Contractor N.

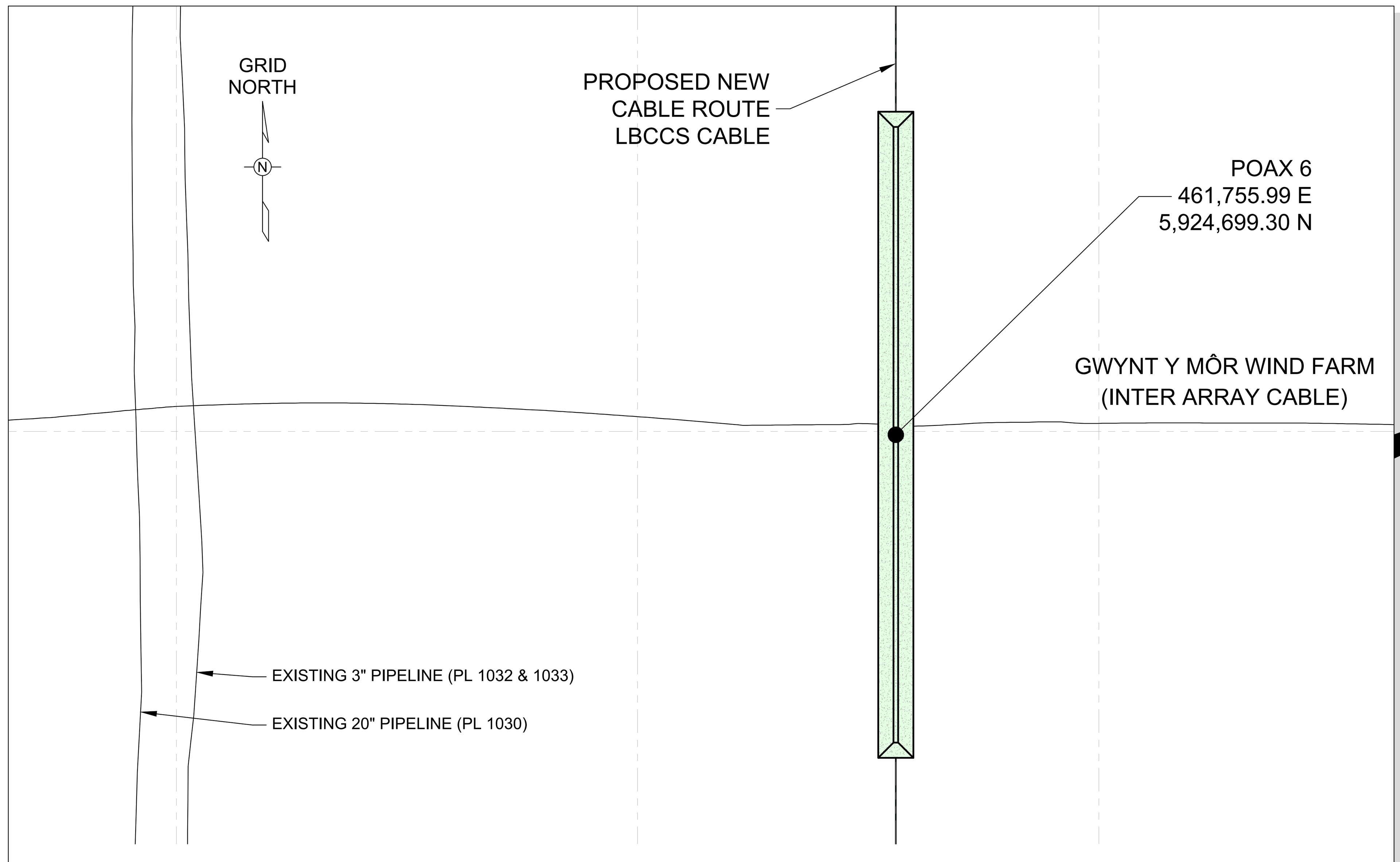
Vendor logo and business name: NOT APPLICABLE
Vendor Document ID: NOT APPLICABLE
Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES
Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying
Scale: AS SHOWN
Sheet of Sheets: 1 of 1

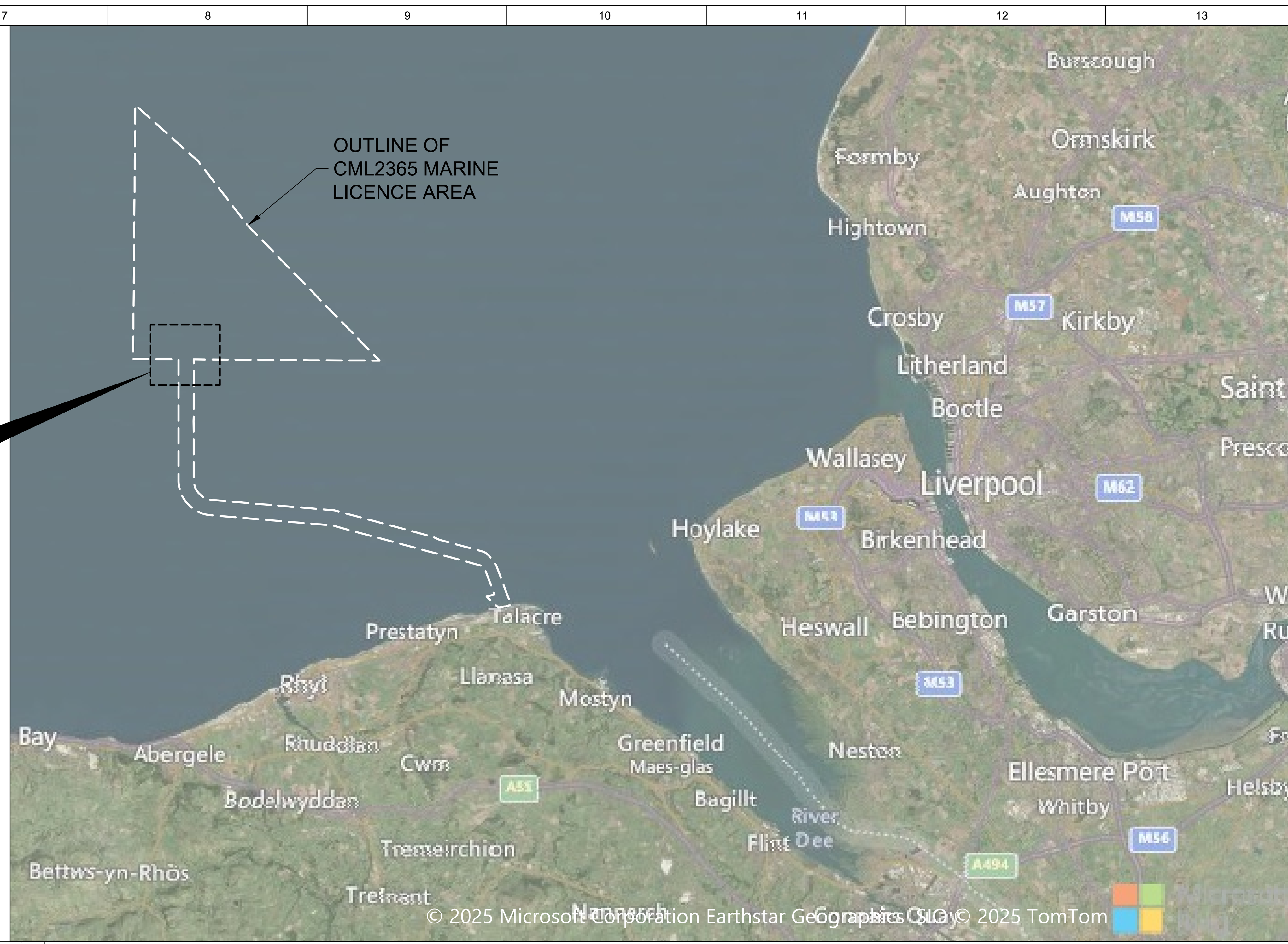
Document Title: Proposed Gwynt-y-Mor Crossing Sketch
Supersedes N. NOT APPLICABLE
Superseded by N.
Plant Area: 1
Functional Unit: 0

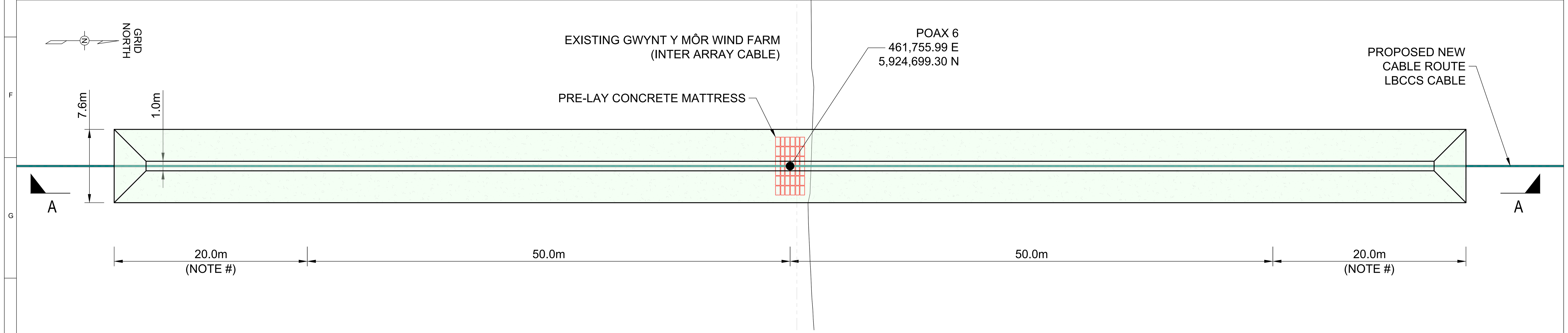
Software: Autocad

File Name OP271234-GN-GAS-0010.DWG

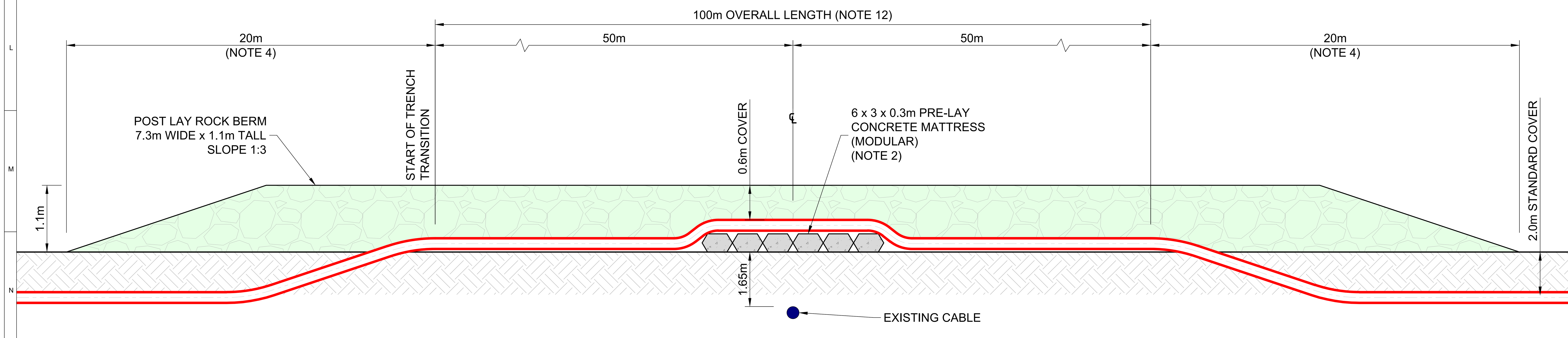


PLAN VIEW OF GWYNT Y MÔR WIND FARM (INTER ARRAY CABLE)
(PoAX - 6)
SCALE 1:1,000





PLAN VIEW OF GWYNT Y MÔR WIND FARM (INTER ARRAY CABLE)
(PoAX - 6)
SCALE 1:1,000



SECTION A-A
NOT TO SCALE

REFERENCE DOCUMENTS

NUMBER	TITLE

NOTES:

1. ALL DIMENSIONS AND COORDINATES ARE IN METRES UNLESS NOTED OTHERWISE.
2. THE CABLE MINIMUM BENDING RADIUS IS ASSUMED TO BE 2.4m DURING INSTALLATION AND OPERATION.
3. MODULAR MATTRESS PROPERTIES FOR THE PROPOSED PRE-LAY AND ROCK PROPERTIES FOR THE POST-LAY ROCK BERM SHALL BE AS PER10562701DSRH1039W, CABLE CROSSING DESIGN REPORT -POINT OF AYR TO DOUGLAS CCS.
4. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
5. EXTENT OF ROCK-BERM PROTECTION SHALL BE CONFIRMED BASED ON SITE-SPECIFIC GROUND SLOPE CONDITIONS. ROCK DUMP PROTECTION TO BE EXTENDED UNTIL CABLE REACHES 2m BURIAL DEPTH OF COVER.
6. EXISTING CABLES CROSSED ASSUMED BURIED TO A DEPTH OF 1.65m, TO BE CONFIRMED BY EPC CONTRACTOR.
7. THE POSITIONING OF THE CONCRETE MATTRESS WILL BE BASED ON THE ACTUAL SITE CONDITION DURING INSTALLATION. THE EPC CONTRACTOR SHALL ESTABLISH EXACT LOCATION OF CROSSINGS AND REPORT FINDINGS.
8. ALL DIMENSIONS ARE MINIMUM AND THE ROCK BERM MAY EXTEND BEYOND THE STATED DIMENSIONS.

ABBREVIATIONS:

GYM	GWYNT-Y-MOR
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH

Crossing ID	Pre-Lay Protection		Post-Lay Protection			Total Quantity / Volume (Nos. / m³)
	Type	Quantity	Type	Total Length (m)	Quantity	
PoAX-6	Standard Concrete Mattress	1 No.	Rock Berm	140.00	675 m3	1 No., 675 m3

Note: 10% design/placing tolerance has been assumed for rock volume estimation.

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	03	15.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	02	07.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	01	05.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	00	19.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC

Revision index

Company logo and business name: liverpool bay ccs EX-DE

LCI Activity Code GB20250014
Contract Code 000593

Company Document ID: 10562701DSDN1052W
Job. N. JA1351

Contractor logo and business name: wood.

Contractor Document ID: OP271234-GN-GAS-0014
Contractor N.

Vendor logo and business name: NOT APPLICABLE

Vendor Document ID: NOT APPLICABLE
Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES

Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying

Scale: AS SHOWN
Sheet of Sheets: 1 of 1

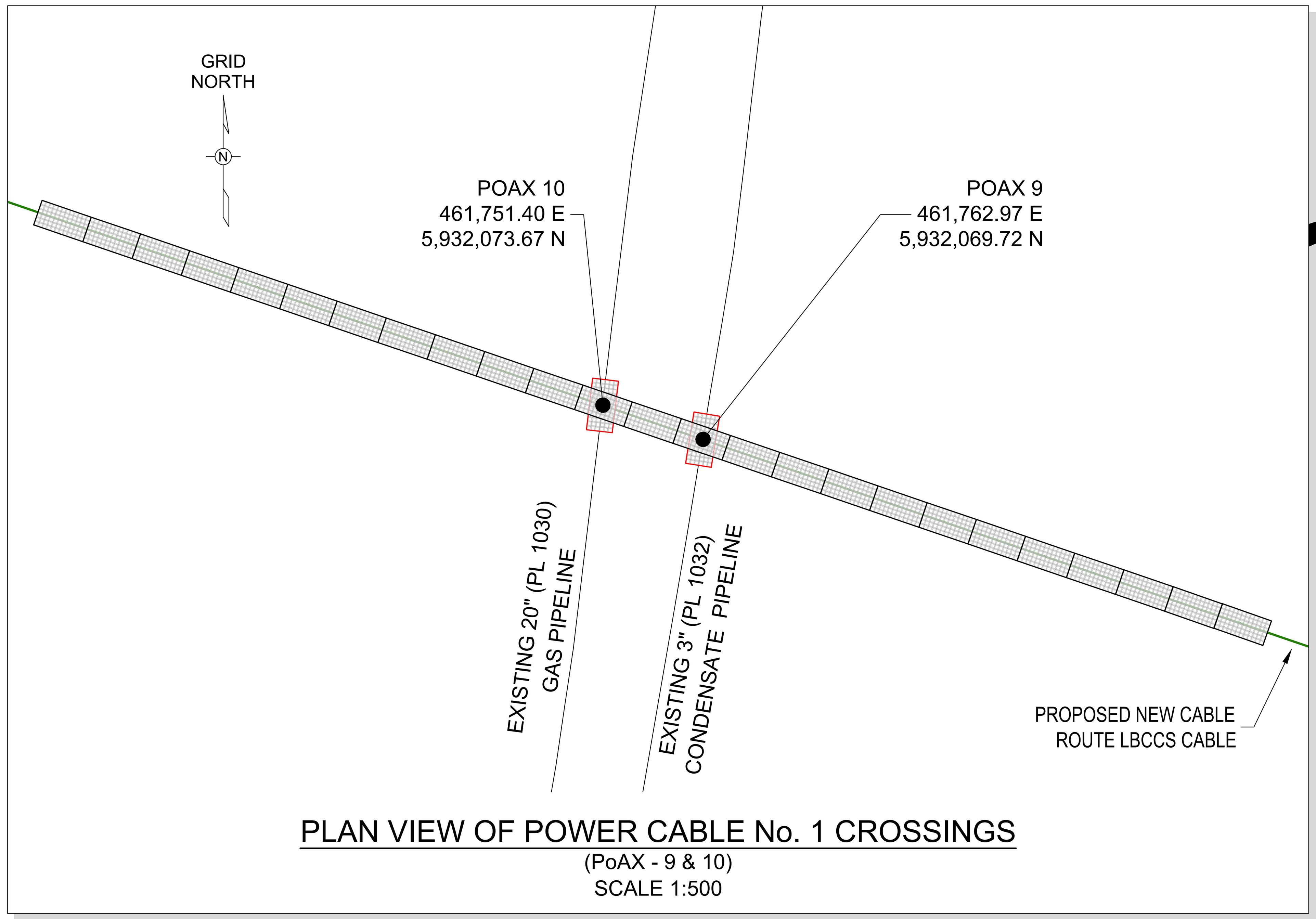
Document Title: PROPOSED GWYNT-V-MOR INTERLINK CROSSING SKETCH

Supersedes N. NOT APPLICABLE
Superseded by N.

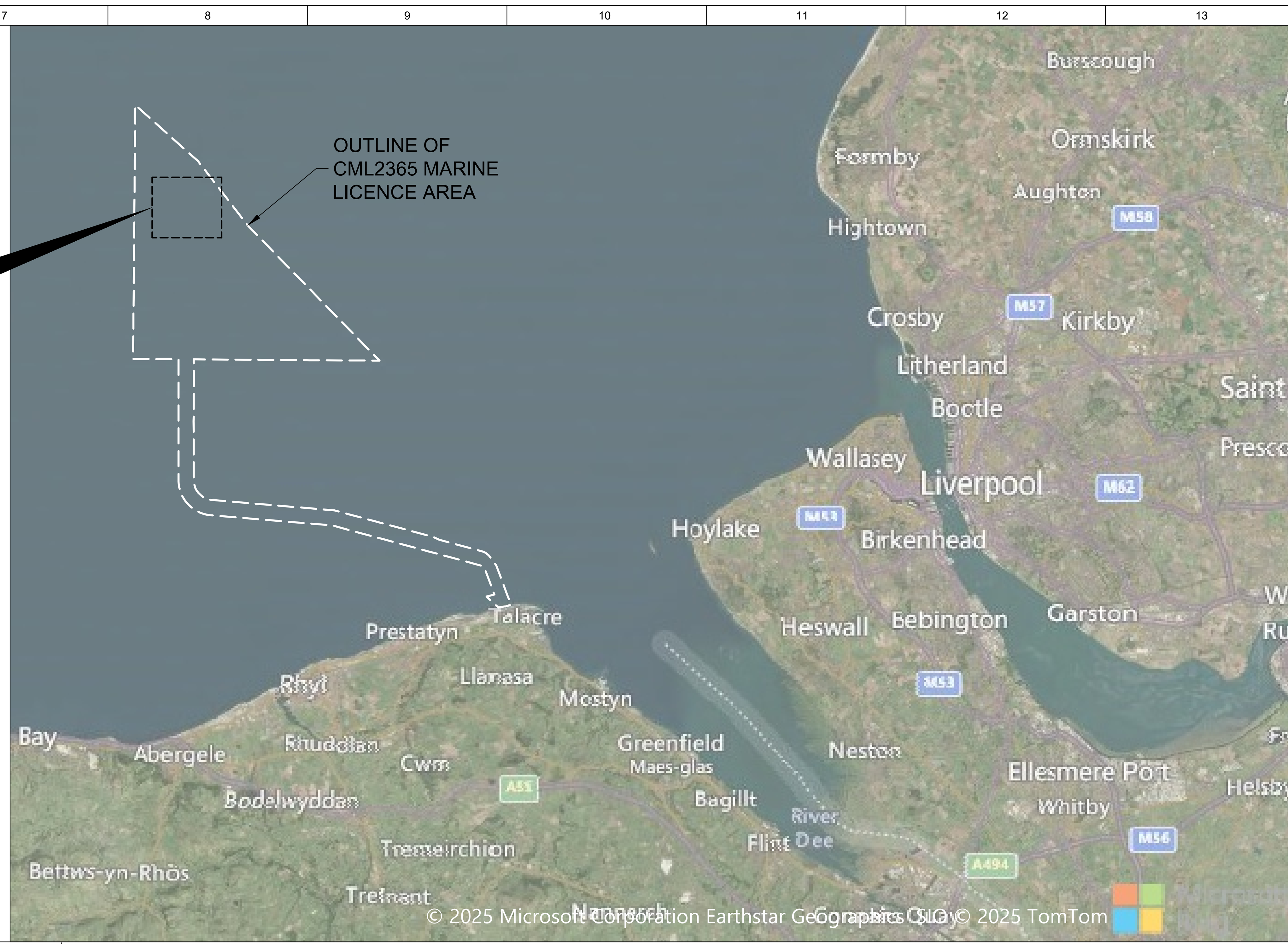
Plant Area: 1
Functional Unit: 0

Software: Autocad

File Name OP271234-GN-GAS-0014.DWG



PLAN VIEW OF POWER CABLE No. 1 CROSSINGS
(PoAX - 9 & 10)
SCALE 1:500

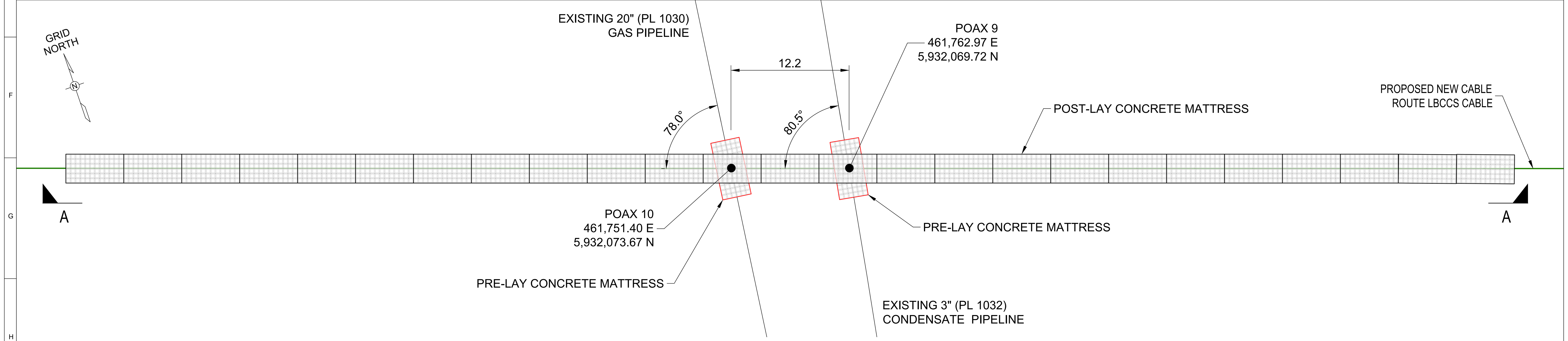


REFERENCE DOCUMENTS

NUMBER	TITLE

NOTES:

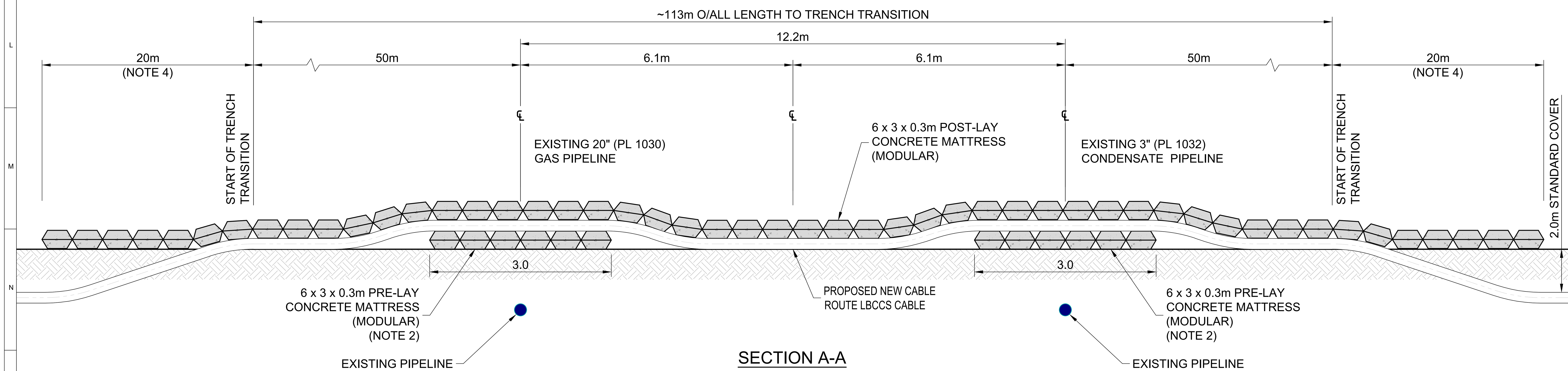
1. THE CABLE MINIMUM BENDING RADIUS IS ASSUMED TO BE 2.4m DURING INSTALLATION AND OPERATION.
2. MODULAR MATTRESS PROPERTIES FOR THE PROPOSED PRE-LAY AND POST-LAY MATTRESSES SHALL BE AS PER10562701DSRH1039W, CABLE CROSSING DESIGN REPORT - POINT OF AYR TO DOUGLAS CCS.
3. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
4. ROCK BERM PROTECTION EXTENTS TO BE CONFIRMED BASED ON EXISTING GROUND SLOPE. PROTECTION SHOULD BE EXTENDED UNTIL CABLE REACHES A BURIAL DEPTH OF 2.0m.



PLAN VIEW OF POWER CABLE No. 1 CROSSINGS (PoAX-9 & PoAX-10)
SCALE 1:250

ABBREVIATIONS:

GYM	GWYNT-Y-MOR
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH



SECTION A-A
NOT TO SCALE

Crossing ID	Pre-Lay Protection		Post-Lay Protection			Total Quantity / Volume (Nos. / m³)
	Type	Quantity	Type	Total Length (m)	Quantity	
PaAX-9 & PoAX-10	Standard Concrete Mattress	2 Nos.	Standard Concrete Mattress	153	25 Nos.	27 Nos.

Note: 10% design/placing tolerance has been assumed for rock volume estimation.

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	02	28.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	01	07.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	00	24.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC

Revision index

Company logo and business name: liverpool bay ccs

LCI Activity Code GB20250014

Contract Code 000593

Company Document ID: 10562701DSDN1051W

Job. N. JA1351

Contractor logo and business name: wood.

Contractor Document ID: OP271234-GN-GAS-0015

Contractor N.

Vendor logo and business name: NOT APPLICABLE

Vendor Document ID: NOT APPLICABLE

Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES

Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying

Scale: AS SHOWN

Sheet of Sheets: 1 of 1

Document Title: PROPOSED CROSSING SKETCH OF PIPELINES PL1032 AND PL1030

Supersedes N. NOT APPLICABLE

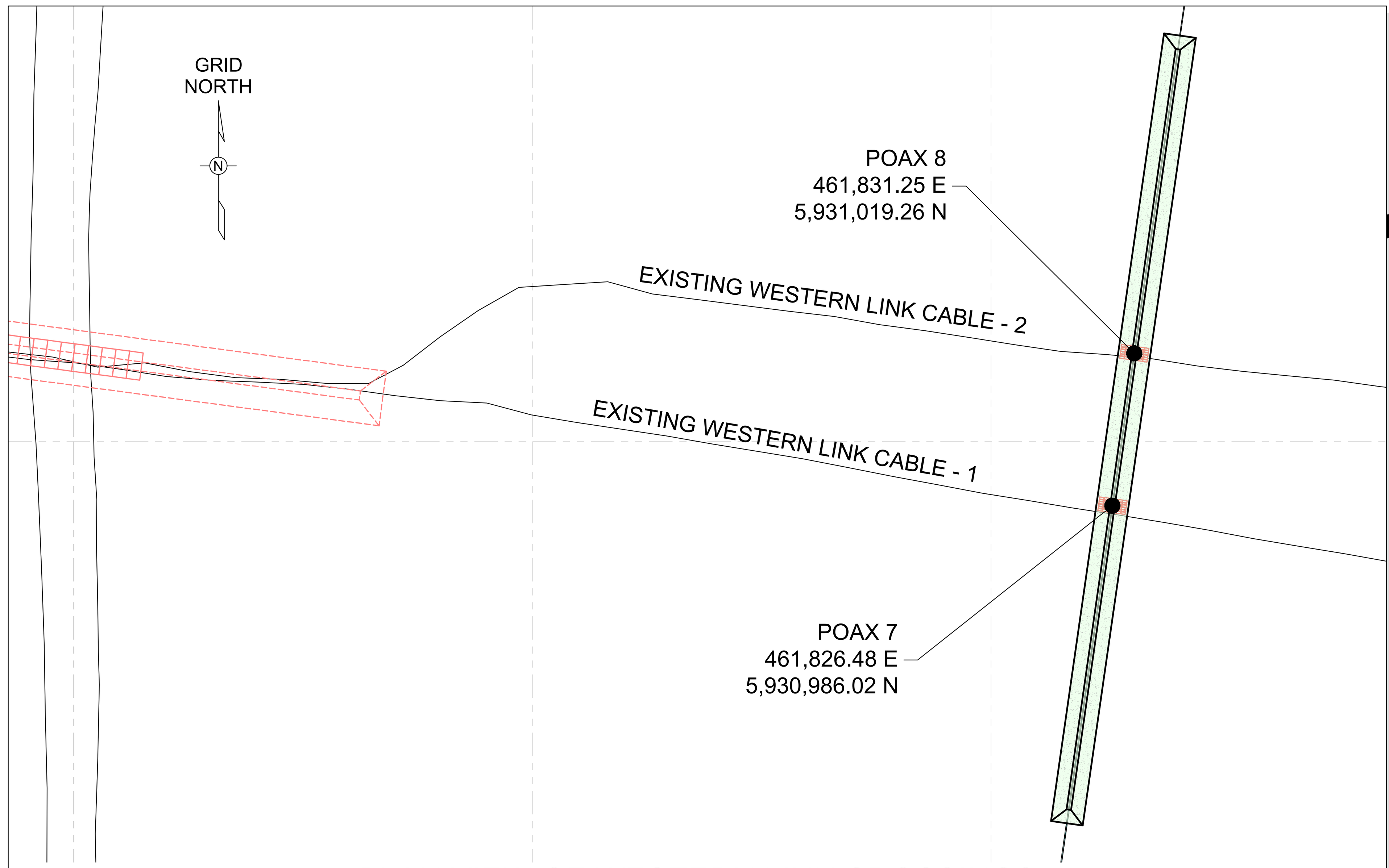
Superseded by N.

Plant Area: 1

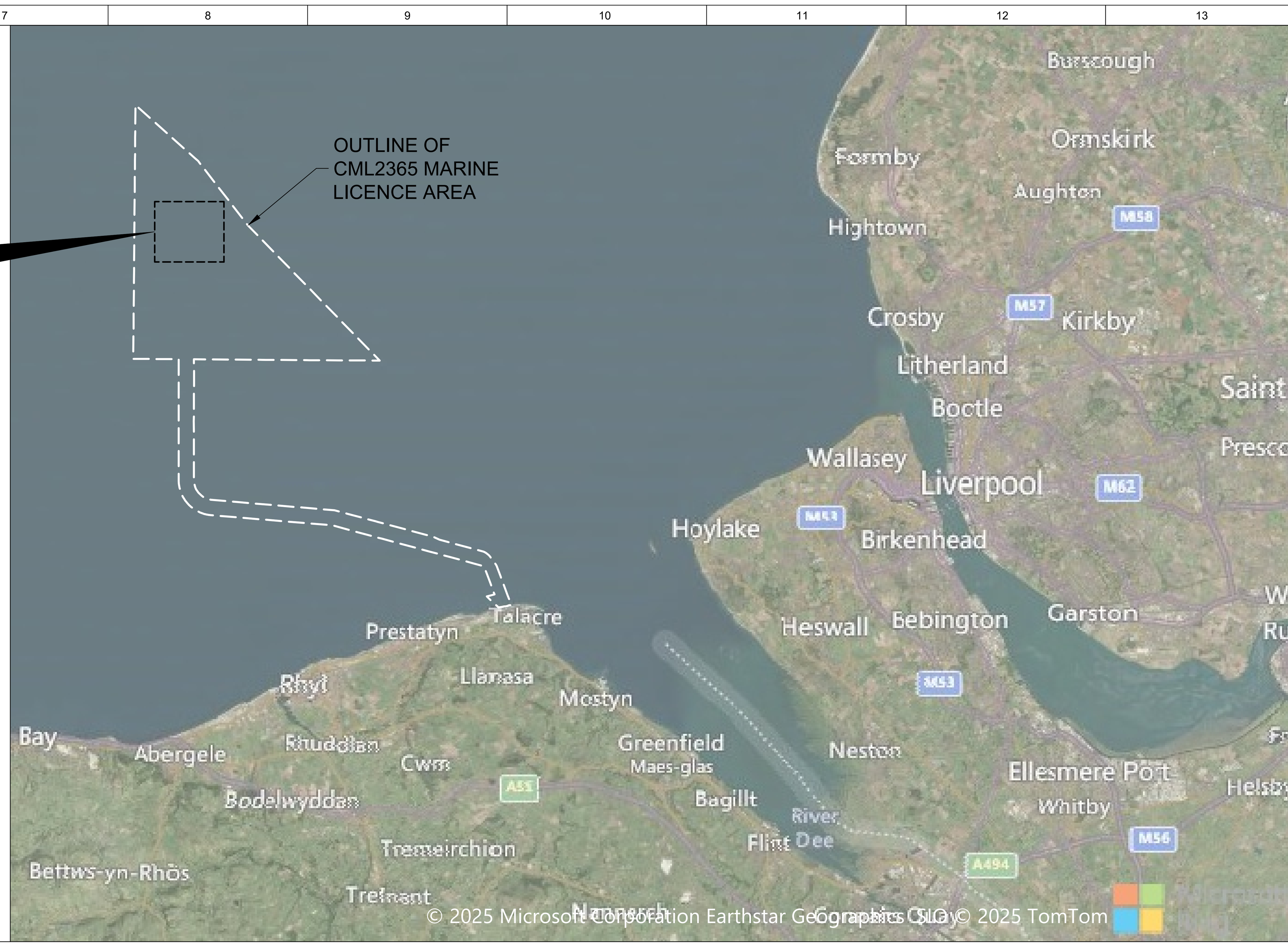
Functional Unit: 0

Software: Autocad

File Name OP271234-GN-GAS-0015.DWG



PLAN VIEW OF WESTERN LINK CROSSINGS
(PoAX - 7 & PoAX - 8)
SCALE 1:1,000



REFERENCE DOCUMENTS

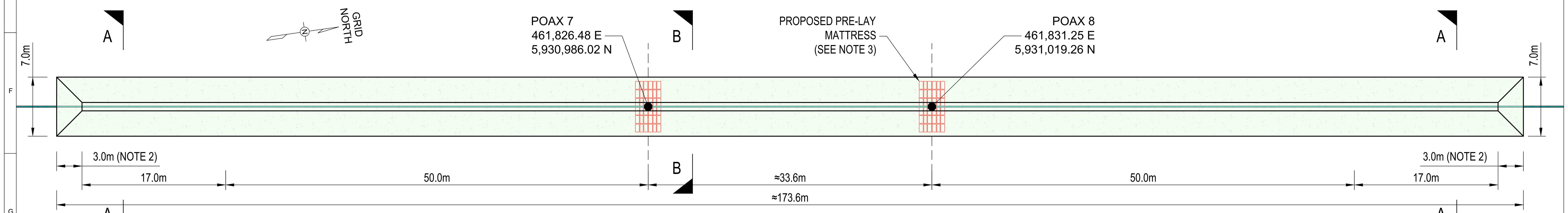
NUMBER	TITLE

NOTES:

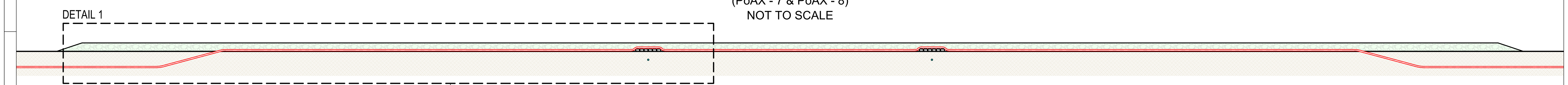
1. THE CABLE MINIMUM BENDING RADIUS IS ASSUMED TO BE 2.4m DURING INSTALLATION AND OPERATION.
2. ROCK BERM PROTECTION EXTENTS TO BE CONFIRMED BASED ON EXISTING GROUND SLOPE. PROTECTION SHOULD BE EXTENDED UNTIL CABLE REACHES A BURIAL DEPTH OF 2.0m.
3. PROPERTIES OF PRE-LAY MATTRESSES AND POST LAY ROCK BERM SHALL BE AS PER CABLE CROSSING DESIGN REPORT - POINT OF AYR TO DOUGLAS CCS 10562701DSRH1039W.
4. ALL COORDINATES ARE IN EUROPEAN DATUM 1950 UTM ZONE 30N.
5. ALL DIMENSIONS ARE MINIMUM AND THE ROCK BERM MAY EXTEND BEYOND THE STATED DIMENSIONS.

ABBREVIATIONS:

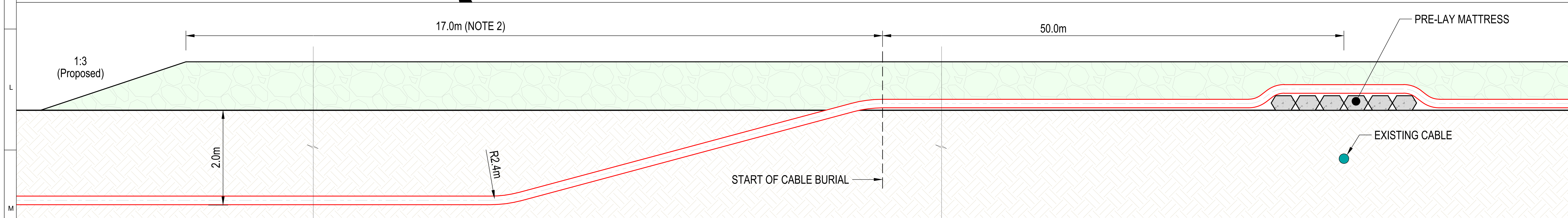
LBCCS	LIVERPOOL BAY CARBON CAPTURE & STORAGE PROJECT
POA	POINT OF AYR
TYP.	TYPICAL
WD	WATER DEPTH



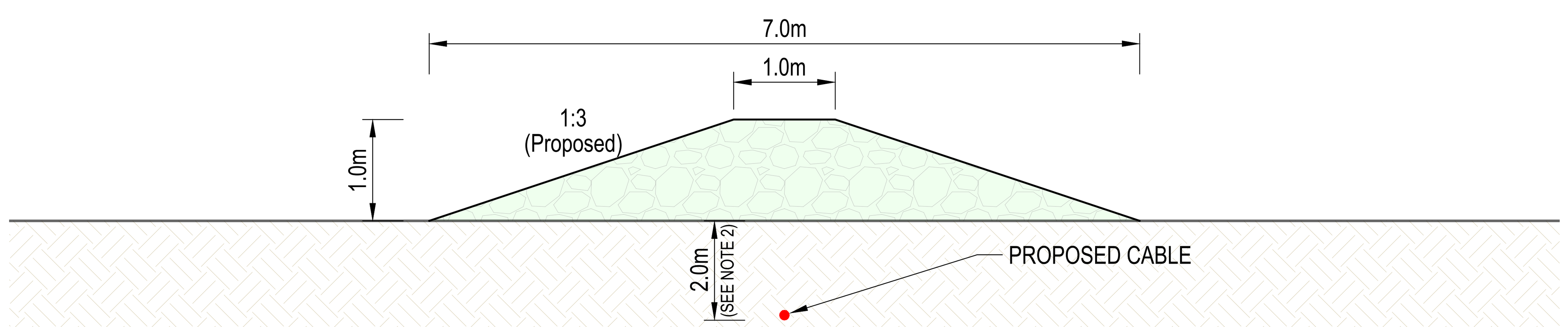
PLAN VIEW OF WESTERN LINK CROSSINGS
(PoAX - 7 & PoAX - 8)
NOT TO SCALE



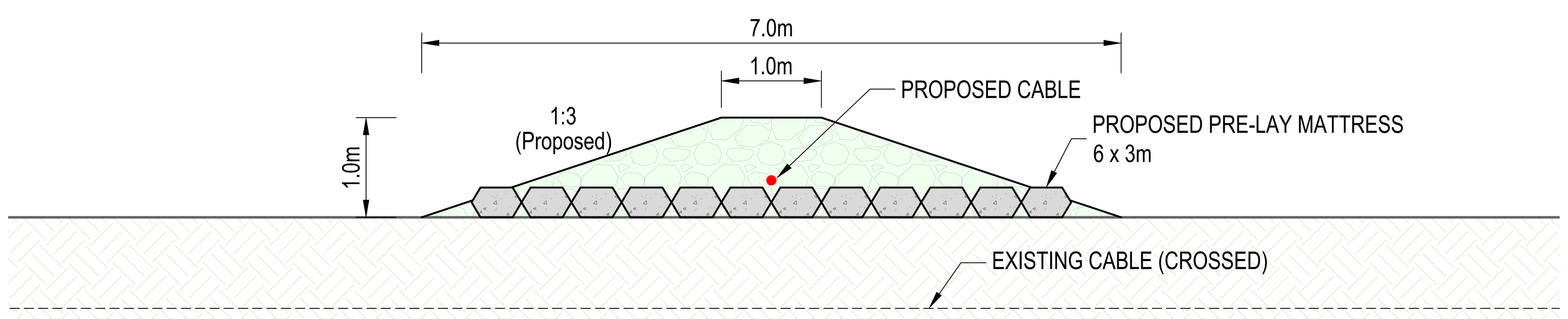
SECTION VIEW OF WESTERN LINK CROSSINGS
NOT TO SCALE



DETAIL 1
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE

Crossing ID	Pre-Lay Protection		Post-Lay Protection			Total Quantity / Volume (Nos. / m³)
	Type	Quantity	Type	Total Length (m)	Quantity	
PoAX-7 & PoAX-8	Standard Concrete Mattress	2 Nos.	Rock Berm	171	735 m3	735 m3

Note: 10% design/placing tolerance has been assumed for rock volume estimation.

Validity Status	Revision Number	Date	Description	Prepared by	Checked by	Approved by	Contractor Approval	Company Approval
EX-DE	05	17.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	04	07.04.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	03	05.03.26	APPROVED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	02	12.02.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	01	28.01.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
EX-DE	00	20.01.26	ISSUED FOR DESIGN	BCA	LSU	BOK	BOK	GC
Revision index								

Company logo and business name: liverpool bay ccs

LCI Activity Code GB20250014

Contract Code 000593

Company Document ID: 10562701DSDN1048W

Job. N. JA1351

Contractor logo and business name: wood.

Contractor Document ID: OP271234-GN-GAS-0011

Contractor N.

Vendor logo and business name: NOT APPLICABLE

Vendor Document ID: NOT APPLICABLE

Purchase Order N.

Facility and Sub Facility Description: SEALINE DOUGLAS CCS - POINT OF AYR GAS PLANT OFFSHORE CABLES

Project and SoW Description: LBA CCS PROJECT Engineering for Cable Laying

Scale: AS SHOWN

Sheet of Sheets: 1 of 1

Document Title: CABLE CROSSING GENERAL ARRANGEMENT WESTERN LINK CROSSING

Supersedes N. NOT APPLICABLE

Superseded by N.

Plant Area: 1

Functional Unit: 0

Software: Autocad

File Name OP271234-GN-GAS-0011.DWG

APPENDIX G: SUMMARY OF ENHANCEMENT, MITIGATION AND MONITORING COMMITMENTS

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
MM1	x	x		Scour protection (e.g. rock berms) will only be used at third-party cable crossings and monitored as per MM3.	To reduce the potential for scouring of seabed sediments to occur.	To reduce interactions between metocean regime (wave, sand and currents) and seabed structures.		x				x						P
MM2	x	x	x	Suitable implementation and monitoring of Cable Protection	Suitable implementation and monitoring of cable protection informed by a Cable Burial Risk Assessment (CBRA). Cables will be buried to a target depth of 2-3m and only be protected using external protection (e.g. rock berms) at third-party crossings.	Minimises the risk of underwater allision with cable protection, anchor or fishing gear interaction with subsea cables and interference with magnetic position fixing equipment.						x	x					T
MM3		✓		Development and adherence to a Cable Specification and Installation Plan (CSIP) post consent which will include cable burial where possible (in accordance with the specific policies set out	The CSIP will set out appropriate cable burial depth in accordance with industry good practice, minimising the risk of cable exposure. The CSIP will also ensure that cable crossings are appropriately designed	There is a potential for cable exposure to occur due to interactions between Metocean regime (wave, sand and currents). The sediment transport can lead to exposure of cables and infrastructure, the use of		✓	✓			✓	✓		✓		The CSIP will be conditioned in the Marine Licence.	P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				in the North West Inshore and North West Offshore Coast Marine Plans (HM Government, 2021)) and cable protection, as necessary.	to mitigate environmental effects, these crossings will be agreed with relevant parties in advance of CSIP submission. The CSIP will include a detailed CBRA to enable informed judgements regarding burial depth to maximise the chance of cables remaining buried whilst limiting the amount of sediment disturbance to that which is necessary. Measures will seek to reduce the amount of EMF which benthic and fish and shellfish receptors are exposed to during the operations and maintenance phase by increasing the distance between the seabed surface and the surface of the cables.	a cable burial depth alongside the cable installation strategy should provide sufficient depth to avoid exposure.												

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
MM4		✓		Cable protection to have a profiled cross section and height mitigated to < 1 m	To minimise changes to physical processes such as tidal current, wave regime and sediment transport pathways, particularly if located in shallow water.			✓										P
MM5	✓	✓	✓	No external cable protection in the intertidal area.	To minimise potential impacts on intertidal habitats within the Dee Estuary Special Area of Conservation (SAC) and Special Protection Areas (SPA).	Trenchless techniques (e.g. Horizontal Directional Drilling (HDD)) will be used for cable installation which will not result in any direct habitat disturbance or scour to intertidal habitats		✓	✓									P
MM6	✓	✓	✓	The HDD exit pit will be 3 m below seafloor.	Embedded mitigation to ensure no materials are placed on the seafloor of the intertidal zone.			✓	✓									P
MM7	✓	✓	✓	Development of and adherence to an Environmental Management Plan (EMP)	Measures will be adopted to ensure that the potential for release of pollutants from	Provides a means to ensure the efficient management and communication of	Outline EMP, with INNSMP	✓	✓			✓					Secured within a Marine Licence condition.	P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				that will be prepared and implemented during the construction, operational and maintenance and decommissioning phases of the Proposed Development. The EMP will include appendices detailing actions to minimise INNS (the INNSMP), and a MPCP will be developed which will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details	construction, operational and maintenance and decommissioning plant is minimised. These will likely include: designated areas for refuelling where spillages can be easily contained, storage of chemicals in secure designated areas in line with appropriate regulations and guidelines, double skinning of pipes and takes containing hazardous substances, and storage of these substances in impenetrable bunds. All vessels will be required to comply with the standards set out in the International Convention for the Prevention of Pollution from Ships (MARPOL).	commitments made for the management of the potential environmental impacts.												

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
MM8	✓	✓	✓	Actions to minimise INNS, including a biosecurity plan to limit spread and introduction of INNS.	These measures will aim to manage and reduce the risk of potential introduction and spread of INNS so far as reasonably practicable to best protect the biological integrity of the local natural environment and communities.	Provides a means to ensure the efficient management and communication of commitments made for the management of the potential environmental impacts with respect to the potential introduction and spread of INNS.			✓								Secured within a Marine Licence condition.	T
MM9	✓			Material arising from drilling and/or sandwave clearance will be deposited in close proximity to the works.	To retain material within sediment cell and maintain sediment transport regimes.			✓									Secured within a Marine Licence condition.	T
MM12	✓	✓	✓	Development of, and adherence to, an EMP, which will be issued to all vessel operators, requiring them to not deliberately approach marine mammals, marine turtles, and basking sharks; keep vessel speed to a	To minimise the potential for collision risk, or potential injury to, marine mammals and megafauna this code of conduct outlines in the EMP will be adhered to at all times.				✓			✓					An EMP will be issued to all Project vessel operators. Proposed to be secured through a condition in the marine licence(s).	T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Physical processes	Topics of Relevance: Marine Biodiversity	Topics of Relevance: Underwater noise	Topics of Relevance: Offshore ornithology	Topics of Relevance: Shipping and navigation	Topics of Relevance: Commercial fisheries	Topics of Relevance: Marine archaeology	Topics of Relevance: Infrastructure and Other	Topics of Relevance: Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				minimum; and avoid abrupt changes in course or speed should marine mammals approach the vessel to bow-ride.														
MM13	✓			Implementation of piling initiation, soft-start, and ramp-up measures within the Marine Mammal Mitigation Protocol (MMMP). An initiation stage and soft starts will be used during the installation of pin piles. This involves the implementation of an initial low hammer energy with a low number of strikes, followed by lower hammer energies at a higher strike rate at the beginning of the piling sequence before energy input is 'ramped up'	This measure will minimise the risk of injury to some fish, marine mammal, and marine turtle species in the immediate vicinity of piling activities, allowing individuals to move away from the area before noise levels reach a level at which injury may occur.	The MMMP will set out the designed-in measures to apply in advance of and during piling activities. The implementation of an approved MMMP will mitigate for the risk of physical or permanent auditory injury to marine mammals.	Outline MMMP		✓								Proposed to be secured as a condition of the marine licence(s).	P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				(increased) over time to required higher levels.														
MM14	✓			Inclusion of low order techniques as an unexploded ordnance (UXO) clearance option noting, however, that it is not possible to fully commit to this measure at this stage. Low order techniques are not always possible and are dependent upon the individual situations surrounding each UXO. Given that high order detonation may be required, the MMMP will also include mitigation to reduce the risk of injury from UXO clearance.	Low order techniques generate less underwater noise than high order techniques and therefore present a lower risk to sound-sensitive receptors such as fish, marine mammals, and marine turtles during UXO clearance.	To mitigate injury and disturbance from underwater noise generated from UXO clearance.			✓									P
MM15				Development of and adherence to a MMMP,	**Piling:** for the purpose of developing the	The MMMP will present appropriate mitigation			✓	✓								T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Topics of Relevance: Marine Biodiversity	Topics of Relevance: Underwater noise	Topics of Relevance: Offshore ornithology	Topics of Relevance: Shipping and navigation	Topics of Relevance: Commercial fisheries	Topics of Relevance: Marine archaeology	Topics of Relevance: Infrastructure and Other	Topics of Relevance: Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				based on a draft MMMP submitted alongside the ES. The MMMP will present measures for Piling UXO clearance and some types of geophysical activities. The MMMP will be developed on the basis of the most recent published statutory guidance and in consultation with key stakeholders.	MMMP, a mitigation zone of 500 m will be applied, following the JNCC (2010a) guidance. The Draft MMMP will set out the measures to apply in advance of and during piling activity including the use of Marine Mammal Observers (MMObs), Passive Acoustic Monitoring (PAM), and Acoustic Deterrent Devices (ADD), thereby following the latest JNCC guidance (JNCC, 2010a).	for activities that could potentially lead to injurious effects on marine mammals.												
MM16	✓	✓		Where practicable, any requirements for cable protection will be compliant with Maritime and Coastguard Agency (MCA)'s methodology (Annex 1 of Marine Guidance Note (MGN) 654) (MCA, 2021).	• Following further survey and detailed engineering, if areas are identified where external protection is required and the MCA condition of no more than 5% reduction in water depth is not achievable, a location	Ensures the final array layout is suitable for Search and Rescue (SAR) operations and that reductions in under keel clearance are acceptable.						✓						T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
					specific review of impacts to shipping and consultation with the MCA will be carried out and additional mitigations agreed as required.													
MM17	✓	✓	✓	The Applicant is committed to marking and lighting the project in accordance with relevant industry guidance and as advised by relevant stakeholders including the MCA, Civil Aviation Authority (CAA) and Trinity House. This will include appropriate lighting and marking of Offshore Platforms (OPs). The Applicant will also ensure the project is adequately marked on nautical charts. A lighting and marking plan will be secured.	The new Carbon Capture Storage (CCS) platform will exhibit lights, marks, sounds, signals and other aids to navigation as required by the Standard Marking Schedule, and in consultation with Trinity House. The platform and cables will be suitably marked on Admiralty Charts, with associated note.	Maximises awareness of the Proposed Development in both day and night conditions including in restricted visibility and assists with SAR operations. Measure will ensure other marine users are aware of operations and infrastructure associated with the Proposed Development.						✓			✓		Secured within a Marine Licence condition.	T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
MM18	✓	✓	✓	Lighting and marking of project vessels.	Cable Lay Vessels (CLVs) and other vessels involved in cable installation will display appropriate marks and lights, and broadcast their status on AIS at all times, to indicate the nature of the work in progress, and highlight their restricted manoeuvrability.	Maximises awareness of the Proposed Development allowing vessels to passage plan in advance.						✓					Secured within a Marine Licence condition.	T
MM19	✓	✓	✓	Promulgation of information advising on the nature, timing and location of activities, Safety Zones and advisory safe passing distances, including through Notices to Mariners.	Timely circulation of information via Notices to Mariners (NtM), Kingfisher/KIS-ORCA notifications, Radio Navigational Warnings, Navigational Telex (NAVTEX), and/or other navigational broadcast warnings as soon as reasonably practicable in advance of and during the works.	To ensure other marine users are aware of operations associated with the Proposed Development.						✓	✓		✓		Secured within a Marine Licence condition.	T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
MM20	✓	✓	✓	Advisory safe passing distances and safety zones.	Passing vessels will be requested to maintain an advisory safe passing distance around project vessels (e.g. cable installation vessels) restricted in manoeuvrability. It is assumed that a 500 m Safety Zone for the new Douglas CCS platform will be applied for post-consent.	To minimise the likelihood of involvement in incidents.						✓					Secured within a Marine Licence condition.	T
MM21	✓	✓	✓	A Vessel Management Plan (VMP) will be developed which will determine vessel routing to and from construction areas and ports to avoid areas of high risk to marine mammals.	The VMP will be issued to all vessel operators, requiring them to: • not deliberately approach marine mammals, marine turtles, and basking sharks; • keep vessel speed to a minimum; and avoid abrupt changes in course or speed should marine mammals	Ensures project vessels are suitably managed to minimise the likelihood of involvement in incidents and maximise the ability to assist in the event of a third-party incident.			✓			✓					Secured in the VMP	T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
					approach the vessel to bow-ride.													
MM22	✓	✓	✓	Compliance of all project vessels with international marine regulations as adopted by the Flag State, notably the International Regulations for Preventing Collisions at Sea (COLREGs) (IMO, 1972/78) and the International Convention for the Safety of Life at Sea (SOLAS) (IMO, 1974).	Compliance of project vessels with international marine regulations as adopted by the Flag State, including the COLREGs (International Maritime Organization (IMO), 1972/77) and SOLAS (IMO, 1974).	To minimise the risk introduced due to the presence of project vessels.						✓						T
MM23	✓	✓	✓	Where required, based on risk assessment, guard vessels and/or temporary Aids to Navigation (AtoNs) may be deployed to guide vessels around any areas of construction activity.	Where cable exposures exist that would result in significant risk (e.g. if cable burial is carried out post cable lay), guard vessels will be used where appropriate until the risk has been mitigated by burial	To maximise awareness of temporary hazards.						✓						T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
					and/or other protection methods.													
MM24	✓	✓	✓	Use of guard vessels at cable exposures	Where cable exposures exist that would result in significant risk (e.g. if cable burial is carried out post cable lay), guard vessels will be used where appropriate until the risk has been mitigated by burial and/or other protection methods.													
MM25	✓		✓	Liaison with local ports and harbours, particularly the Port of Mostyn, during the construction phase.	Maximises awareness of the Proposed Development through consultation and ensures project vessels are suitably managed.	Minimises the risk introduced due to the presence of project vessels.						✓						T
MM26	✓	✓	✓	Ongoing liaison with fishing fleets will be maintained via an appointed Fisheries Liaison Officer (FLO) and Fishing Industry	To maintain effective communications between the project and fishermen and appropriate liaison with relevant fishing interests	The Applicant is committed to ongoing liaison with fishermen throughout all stages of the project.						✓	✓					P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				Representative (FIR). Prior to construction, a Fisheries Liaison and Coexistence Plan (FLCP) will be developed, setting out in detail the planned approach to fisheries liaison and means of delivering any other relevant mitigation measures.	to ensure that they are fully informed of development planning and any offshore activities and works. To provide warnings to the fishing community and advance warning of project activities and associated Safety Zones and advisory safety distances.	To provide a point of contact to liaise and engage with the fishing industry												
MM27	✓	✓	✓	A dropped objects plan will be developed for reporting and recovery of dropped objects where they pose a potential hazard to other marine users.	For the reporting and recovery of dropped objects.	Dropped objects could pose a potential hazard to other marine users.							✓				To be secured within a Marine Licence condition	P
MM28	✓	✓	✓	The identification and implementation of Archaeological Exclusion Zones (AEZs) around those sites identified as having high and medium archaeological potential	AEZs will ensure offshore infrastructure avoids any known wrecks. The size of the AEZ will be evidence based and established using the precautionary	To avoid direct impacts on sites of identified archaeological significance.	Outline Written Scheme of Investigation (WSI)							✓			To be secured within a Marine Licence condition	P

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				as identified in Table 11.14 of volume 2, chapter 11.	principle to ensure that it is of sufficient size to protect the site from the nature of impact.													
MM29	✓			Final cable routing, well drilling and platform construction to avoid any known archaeological constraints identified in pre-construction site investigation surveys through micro siting.		To avoid direct impacts on sites of identified archaeological significance.	Outline WSI							✓			To be secured within a Marine Licence condition	P
MM30	✓	✓		The identification and implementation of Temporary Archaeological Exclusion Zones (TAEZs) based on all available information including the stated positional accuracy, the recorded size of the target and the potential archaeological significance around those records for	TAEZs are recommended in Table 11.15 of volume 2, chapter 11. Further details provided in the Outline WSI.	To avoid direct impacts on sites of identified archaeological significance.	Outline WSI							✓			To be secured within a Marine Licence condition	P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				wrecks, obstructions, debris and other sites of archaeological potential outside of the survey data coverage but within the Project boundary.														
MM31	✓			Archaeological input into specifications for, and archaeological analysis of, any further pre-construction geophysical and geotechnical surveys.	To identify any sites of archaeological importance that may require further investigation, avoidance or engagement with the archaeological curators.	To offset the impacts of the Project on sediments of geoarchaeological / palaeoenvironmental importance and enhance knowledge of the offshore marine archaeological resource.	WSI and Protocol for Archaeological Discoveries (PAD)							✓			To be secured within a Marine Licence condition	P
MM32	✓			Project archaeologists to be consulted in the preparation of any pre-construction Remotely Operated Vehicle (ROV)/diver surveys and, if appropriate, in monitoring/ checking of data. Further details provided in the Outline WSI.	To identify any sites of archaeological importance that may require further investigation, avoidance or engagement with the archaeological curators.	To prevent damage occurring to unidentified archaeological finds. To record archaeological remains that may be affected by pre-construction clearance operation.	WSI and PAD							✓			To be secured within a Marine Licence condition.	P

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
MM33		✓		Operational awareness of the location of those archaeological anomalies identified as having a low potential. Reporting through the agreed protocol (PAD) will be undertaken should material of potential archaeological interest be encountered. Further details provided in the Outline WSI.	To identify any sites of archaeological importance that may require further investigation, avoidance or engagement with the archaeological curators.		WSI and PAD							✓			To be secured within a Marine Licence condition	P
MM34	✓	✓	✓	Implementation of a protocol for recording finds of archaeological interest, following the guidance for the PAD.	To identify any currently unknown sites of archaeological importance that may require further investigation, avoidance or engagement with the archaeological curators.		WSI and PAD							✓			To be secured within a Marine Licence condition	P
MM35	✓			Archaeologists to be consulted in the preparation of pre-construction cable route clearance or other pre-	To record archaeological remains that may be affected by pre-		WSI and PAD							✓			To be secured within a Marine Licence condition	P

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				construction operations and, if appropriate, to carry out archaeological monitoring of such work. Further details provided in the Outline WSI.	construction clearance operation.													
MM36	✓	✓	✓	Mitigation of unavoidable direct impacts on known sites of archaeological significance: Options include i) preservation by record; ii) stabilisation; iii) detailed analysis and safeguarding of otherwise comparable sites elsewhere. Options include preservation by record; stabilisation; and detailed analysis and safeguarding of otherwise comparable sites elsewhere.	Further details provided in the Outline WSI.	To mitigate direct impacts on sites of identified archaeological significance.	WSI and PAD							✓			To be secured within a Marine Licence condition.	P

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
MM37	✓	✓	✓	Development and adherence to a WSI and PAD. Commitment to implementation of the Offshore WSI which is submitted with this application, prior to any post-consent works within the Eni Development Area and Area of Physical Project Works.	The Outline WSI is submitted alongside the application and contains a method statement for pre-construction surveys and details of monitoring requirements.	To ensure the protection and, if necessary, recording of previously unknown sites/objects of archaeological significance affected by the development.	WSI and PAD							✓			To be secured within a Marine Licence condition.	T
MM38	✓	✓		Where the Proposed Development cables/ pipelines will be required to cross an active cable, it is intended that a commercial ‘crossing agreement’ will be entered into with the cable operator. A crossing agreement based upon the International Cable Protection Committee (ICPC) Recommendation	This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely.	To reduce potential conflict at cable crossing locations. This is a formal arrangement that establishes the responsibilities and obligations of both parties and allows operations to be managed safely.									✓		In line with standard industry practice crossing agreements would be negotiated and agreed with operators as required.	T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Topics of Relevance: Marine Biodiversity	Topics of Relevance: Underwater noise	Topics of Relevance: Offshore ornithology	Topics of Relevance: Shipping and navigation	Topics of Relevance: Commercial fisheries	Topics of Relevance: Marine archaeology	Topics of Relevance: Infrastructure and Other	Topics of Relevance: Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				3-10C ‘Telecommunications Cable and Oil Pipeline/Power Cables Crossing Criteria’ (ICPC, 2014) will be used for any cable crossings. Where a cable is inactive, the Applicant will consult with the cable operator to ascertain if such a crossing agreement is required.														
MM39	✓	✓	✓	Development of and adherence to a Navigational Safety Plan (NSP). The NSP will describe measures put in place by the Project related to navigational safety, including information on Safety Zones, charting, construction buoyage, temporary lighting and marking, and means of	To ensure other marine users are aware of operations and infrastructure associated with the Proposed Development.										✓		Proposed to be secured within the marine licence.	T

Reference	Proposed Development Phase: Construction	Proposed Development Phase: Operation and maintenance	Proposed Development Phase: Decommissioning	Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance: Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change	Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
				notification of Project activity to other sea users (e.g., via Notice to Mariners).														
MM40	✓	✓	✓	Consultation with oil and gas operators and other energy infrastructure operators to promote and maximise cooperation between parties and minimise both spatial and temporal interactions between conflicting activities.	Licence blocks will be relinquished and acquired by different operators over the duration of the project life, and oil and gas operations will change according to the project phase. By continued consultation with the oil and gas operators both parties will keep informed of planned activities in order to minimise disruption to either party's operations and to maximise coexistence.	To promote and maximise cooperation between parties and minimise spatial and temporal interactions between conflicting activities.									✓		Secured in the Marine Licence	T
MM41		✓		Development and adherence to a Pipeline Specification and Installation Plan which	To ensure that the pipeline remains secure, is not a hazard to other sea users.	To manage risk that the pipeline becomes exposed and damaged by tidal currents.									✓		In line with standard industry practice.	T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				will include pipeline burial where possible and pipeline protection as necessary.														
MM42	✓			Installation of infrastructure over or adjacent to existing cables or pipelines will be subject to crossing or proximity agreements between the two parties, prior to the start of the construction phase.	To reduce potential conflict at crossing locations. Cable and pipeline crossing/ proximity agreements will be based on previously referenced guidance from the ICPC and Oil and Gas UK.										✓		In line with standard industry practice crossing/proximity agreements would be negotiated and agreed with operators as required.	T
MM45	✓	✓		During the construction and operational phases vessel fuel consumption will be minimised by optimising vessel scheduling, with consideration given to the co-ordination of activities and material delivery. Activities will be limited on the speed of vessels, and fuel used	During the construction and operational phase emissions resultant from fuel consumption by vessel movements will be minimised by ensuring the use of lower sulphur content fuel, providing an efficient and optimised vessel schedule to reduce the number of											✓		T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment		Topics of Relevance								Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
				will have a low sulphur component (0.1%). Vessels older than 20 years will not be used.	journeys, and avoiding the use of older vessels.													
MM47	✓			Where operationally practical, nearshore works will be undertaken outside of the Bathing Season (15th May to 30th September) to reduce risks to bathers associated with contaminant releases.	To reduce the risk to bathers from contaminant release.										✓			S
MM48	✓			Development and adherence to a Waste Management Plan (WMP).	A WMP is required by all Contractors and Subcontractors setting out details of all waste management procedures for their activities, details of expected waste arisings and procedures for waste management. The following aspects are expected to be a				✓			✓			✓			T

Reference	Proposed Development Phase			Mitigation and monitoring commitment	Justification (specific)	Justification (Generic)	Management plan commitment	Topics of Relevance									Means of implementation	Mitigation category (primary (P), secondary (S) or tertiary (T))
	Construction	Operation and maintenance	Decommissioning					Physical processes	Marine Biodiversity	Underwater noise	Offshore ornithology	Shipping and navigation	Commercial fisheries	Marine archaeology	Infrastructure and Other	Climate change		
					minimum requirement for the WMP: • analysis of the waste arisings/material surpluses; • specific waste management objectives for the Proposed Development; • methods proposed for prevention, reuse and recycling of wastes; • material handling procedures; and proposals for education of workforce and plan dissemination programme.													

APPENDIX H: DROPPED OBJECTS REPORTING FORM

Boskalis

DROPPED OBJECTS REPORTING FORM

Project document number	Enter document number	**Issue date**	Pick date
Project number	Enter project number	**Location**	Enter location
Project name	Enter project name	**Reporter**	Enter reporter
Vessel object was dropped from	Enter vessel	**Signature**	
Date and time	Enter date and time		

The Dropped Object Reporting Form is to be completed for any objects dropped into the sea that have NOT been recovered and either:

- Pose a threat to the environment, or
- Pose a threat to marine traffic (e.g. anchoring or fishing operations), or
- Have a (cumulative) size larger than 0.5 m^3

Any spillage of any liquid into the sea has to be handled as an environmental incident.

Object floating or semi-buoyant?	☐ Yes ☐ No		
Geographical location of object		**Grid**	☐ Lat/Long dd°mm',m ☐ Lat/Long dd°mm'ss" ☐ UTM Zone
		Chart datum	☐ WGS84 ☐ Other:
Approx. size of dropped object			
Description of dropped object (include details of hazardous substances if applicable)			
Cause of object being dropped			
State reason why object has not been recovered:			

Close out by Vessel's Master	
Name:	
Date:	
Signature:	

APPENDIX I: SPILL NOTIFICATION FORM

Part 1: Identity of Observer / Reporter	
Full Name:	Organisation / Company:
Contact Telephone No:	Contact E-Mail:
Marine Licence / Permit Ref:	Contact Fax:

Part 2: Incident Details		
Operator / Organisation / Company Responsible for Incident:		
Date of Incident:	Time of Incident:	
Other (e.g. name of witness):	Fixed / Mobile (delete as applicable)	Field Name:
Installation / Facility / Vessel: (*if vessel include type, size, IMO number, cargo*):		
Latitude (WGS84 DDD MM.MMM):		
Longitude (WGS84 DDD MM.MMM):		
Distance from coast:	Parties informed:	

Oil Release / Chemical Release or Permitted Discharge Notification (tick below and complete column details as applicable)		
Oil Release Notification: Yes / No	Chemical Release Notification: Yes / No	Permitted Discharge Notification: Yes / No
Max Released (tonnes):	Quantity Released (kg):	Max oil discharged (tonnes):
Min Released (tonnes):	Chemical Name:	Min oil discharged (tonnes):
Type of Oil: NA	Chemical Use:	Type of Oil:
Tier of Response (1,2 or 3): (As per Marine Pollution Contingency Plan)	% oil if OBM or base oil: Warning label:	Oil Conc. in discharge: Discharge rate m^3/hr:
Appearance:	Appearance:	Appearance:
Approx. release area on sea surface (m^2 or km^2):	Approx. release area on sea surface (m^2or km^2):	Approx. sheen area on sea surface (m^2or km^2):
Is Release Ongoing? Yes / No (must be updated & reported each 24-hr period unless otherwise directed USCG) Release since last report (tonnes): Total volume released to date (tonnes): Responders on site? Yes / No Volume remaining on vessel:		
Source of pollution:		
Cause of pollution:		
Steps taken to prevent re-occurrence/respond to incident (e.g. booming, closing dock gates):		
Release likely to reach Median line Yes / No: Shore Yes / No If YES approx. location / time:		
Photographs taken: Yes / No	Samples taken for Analysis: Yes / No	

Part 3: Weather Conditions	
Wind Speed (knots):	Wind Direction (0-360^{0}):
Beaufort Scale (1-12):	Wave Height (metres):
Weather Conditions:	
Tide: Ebb / Flood:	Sea State:
High Tide Time:	Swell:

Part 4: Spill Treatment Request	
Request to use oil spill treatment product. Yes / No (if Yes fill in remainder of Part 4)	Name and Type:
Volume:	(If dispersant) last tested for efficacy when?
Regulatory Contacts Natural Resources Wales (NRW) Coastguard CGOC	
Send completed form to:	