ENI UK LIVERPOOL BAY

METHOD STATEMENT

INSTALLATION OF NEW SPOOLS

Client: **ENI UK**

Document Number: **52967-MET-009**

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1.0 OVERVIEW

1.1 PROJECT OVERVIEW

Company's Liverpool Bay CCS Transport & Storage Project (LBA CCS T&S Project) is being developed in parallel with and as a key part of the HyNet Northwest full-chain hydrogen and CCS industrial decarbonisation project which is designed to transform a region of the UK into the world's first low carbon industrial cluster by 2030.

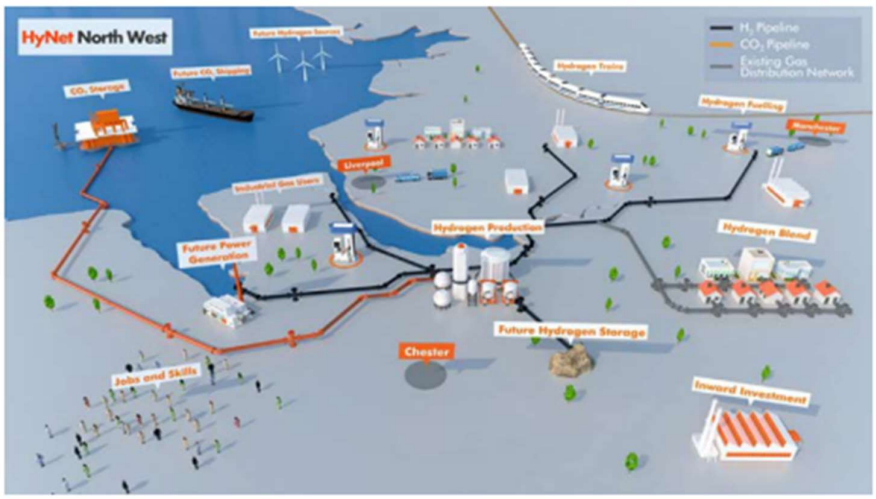


Figure 1-1 Hynet Project North West Project Overview

The HyNet Project is being developed on a phased approach based on CO_2 emissions capture from existing industrial facilities, alongside capture from new-build hydrogen generation facilities.

While industrial decarbonisation is the anchor, the HyNet Project builds the infrastructure backbone for a full regional hydrogen economy and leverages the opportunity to repurpose for future CCS service the existing oil and gas facilities at Point of Ayr and offshore in Liverpool Bay. CO_2 storage is provided in depleted and well-known hydrocarbon fields that are owned and operated by ENI UK.

1.2 SCOPE OF WORK

The Tenderer's scope of work is to prepare Douglas, Hamilton Main, Hamilton North, Hamilton East and Lennox Facilities for CCS repurposing as follows:

Douglas Platform

- Remove and recover protection from pipelines, spools and umbilicals (mattresses and grout bags)
- Locate buried pipelines and umbilicals down to depth of 0.6m DoC and excavate.
- Cut and remove spool, pipeline sections and umbilicals to required demolition and repurpose extents
- Remove and recover SSBV structure
- Plug redundant pipelines (11 off) and supply, install and test mechanical connectors on designated repurposed pipelines (5 off)
- Conduct metrology from mechanical connectors to new Douglas Platform Tie-ins.
- Construct, install and leak test spools between repurposed pipelines and new Douglas Platform
- Repurposed onshore/offshore pipelines post spools tie-in precommissioning works (POA to Douglas platform)
- Repurposed offshore pipelines post spools tie-in precommissioning works (Douglas to Satellite platforms)
- Spool protection installation (6x3x0.3m mattresses)

Hamilton Main Platform

- Remove and recover protection from pipelines and umbilicals (mattresses and grout bags)
- Locate buried pipelines and umbilicals down to a depth of 0.6m DoC and excavate
- Cut and remove pipeline and umbilicals to required demolition and repurpose extents
- Cut and remove caisson, riser and J-tube sections from platform

Hamilton North Platform

- Remove and recover protection from pipelines and umbilicals (mattresses and grout bags)
- Locate buried pipelines and umbilicals down to a depth of 0.6m DoC and excavate
- Cut and remove pipeline and umbilicals to required demolition and repurpose extents
- Cut and remove caisson, riser and J-tube sections from platform

Hamilton East XT

- Remove and recover protection from flowline and umbilical (mattresses and grout bags)
- Locate buried flowline and umbilical down to a depth of 0.6m DoC and excavate
- Cut and remove flowline and umbilical to required demolition extents

Lennox Platform

- Remove and recover protection from pipelines and umbilicals (mattresses and grout bags)
- Locate buried pipelines and umbilicals down to a depth of 0.6m DoC and excavate
- Cut and remove pipeline and umbilicals to required demolition and repurpose extents
- Remove and recover SSBV structure
- Cut and remove caisson, riser and J-tube sections from platform

The scope of work covered in this method statement is the installation of New Spools at the Douglas worksite location.

2.0 METHOD STATEMENT

The below offers a high-level workflow of the preparatory and operational tasks that will be carried out to execute the works. Detailed procedures will be written for the tasks during the project engineering phase and issued to Company for approval.

2.1 ONSHORE PREPARATION

The following onshore operations will be carried out in advance of the offshore phase, and the results will be incorporated into the offshore working procedures:

- New Spool Design, fabrication, coating & testing
- Design of any sea-fastening required
- Lift plans and rigging design (if required)
- Development of Deck Plans and Mobilisation methodologies
- Development of detailed Operational Procedures ·
- Hazard Identification and Risk Assessment (HIRA)
- 3rd Party selection, equipment and procedures
- Procurement of materials, consumables, rigging, etc.;
- Logistics planning
- Liaison with 3rd party operators – through Company (if any)

2.2 OVERVIEW

As part of the demolition and repurposing of the Liverpool Bay Area platform infrastructures for CCS, the following preparation work will be required at the Douglas worksite:

- ROV Surveys of New Spool routes
- Removal of Pipeline coating for installation of MC / Smart Flange
- MC / Smart Flange installation on the repurposed pipelines
- Over boarding and wet storing of New Fixed Spools from CSV along spool lay routes
- Installation of New Fixed Spools
- Metrology for closing spools (5 off)
- Installation of New Metrology Spools

2.2.1 Douglas Platform

At the Douglas Platform location (LAT 26m), it is anticipated that the following repurposed pipelines will have mechanical connectors and spools installed as follows:

Pipeline	Size	MC Qty	Fixed Spool Qty	Metrology Spool Qty
SP-01: PL 1041	14”	1	3	1
SP-02: PL 1035	16”	1	4	1
SP-03: PL 1039	20”	1	5	1
SP-04: PL 1036A	12”	1	6	1
SP-05: PL 1030	20”	1	11	1

Table 2-1 Douglas Platform Worksite Summary

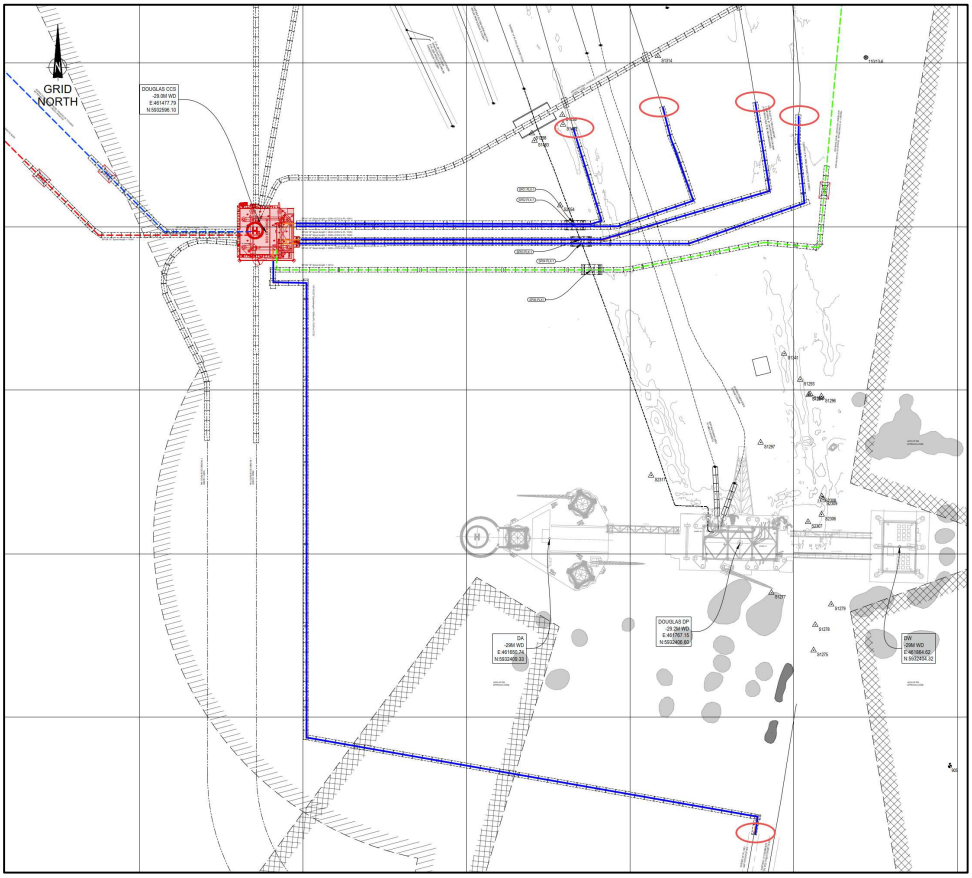


Figure 2-1 Subsea Removals Around Douglas Complex
Note: New spool routes shown in blue and MC positions in red.

2.3 KEY EQUIPMENT

The following outlines the key equipment required to carry out the required tasks outlined in this Method Statement.

2.3.1 Diver Dredge

For flange and pipe excavation, an 8” electrically powered Diver dredge will be required.

Figure 2-2 Diver Dredge

2.3.2 Diamond Wire Saw (DWS)

The DWS is a hydraulically powered saw, which uses a continuous diamond wire to cleanly and squarely cut through a variety of pipe, flexibles and umbilicals.

Cutting capacity	50-1067mm / 2-42in
Hydraulic requirements	80-90lpm @ 210bar / 17-19gal @ 3045psi
Hydraulic oil type	ISO VG32 or equivalent
Maximum carriage speed	60mm/min / 2.3in/min
Typical cutting speed	4-50mm/min / 0.157-1.968in/min
Mass in air	410kg / 903lbs
Mass in water	320kg / 706lbs (buoyancy optional)
Jaw width open	1108mm / 43in
Dimensions	2250mm / 88.6in x 1579mm / 62.1in x 747mm / 29.4in

Figure 2-3 DWS

2.3.3 Coating Removal Tool (CRT)

The CRT is a Diver installed, high pressure water jetting unit which removes pipeline coatings to an SA2.5 finish in preparation for MC / Smart Flange installation.

Figure 2-4 CRT

2.3.4 Mechanical Connector / Smart Flange (MC)

The mechanical connector (or smart flange), is a proven method for which a pipeline can be cut and a new flange can be installed, allowing for future tie-in and re-routing. The MC is installed on to the prepared pipe end and locked in place via bolt tensioning / bolt interfacing. A seal is formed around the pipe via compression seals and the connector is tested in situ via a test port and downline.

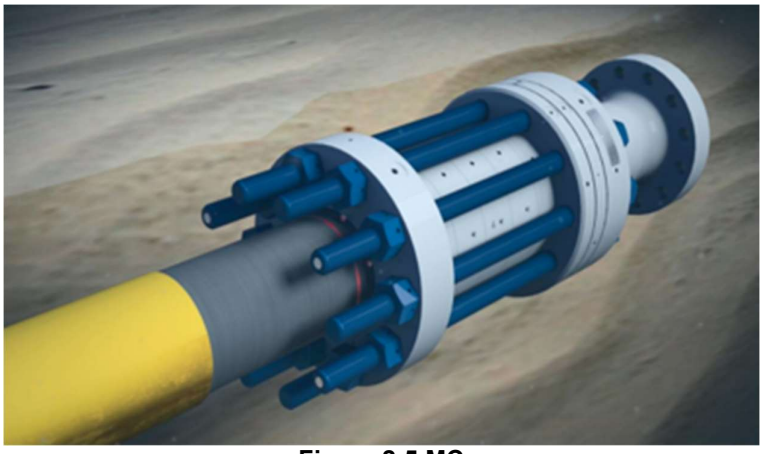
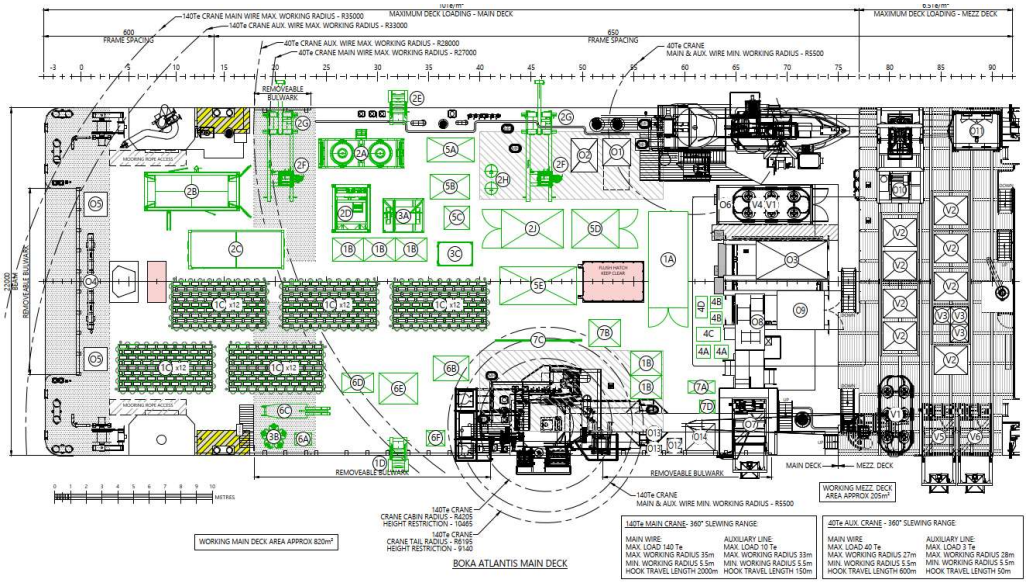
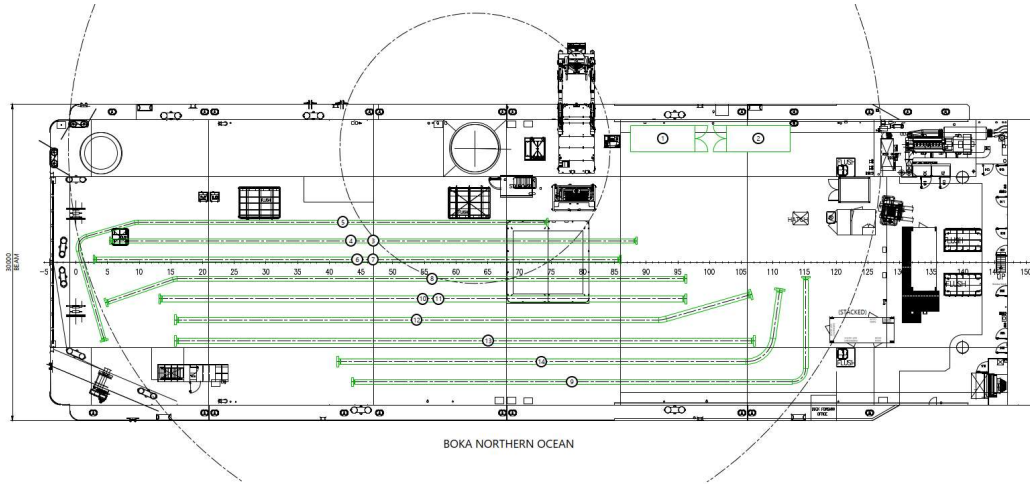
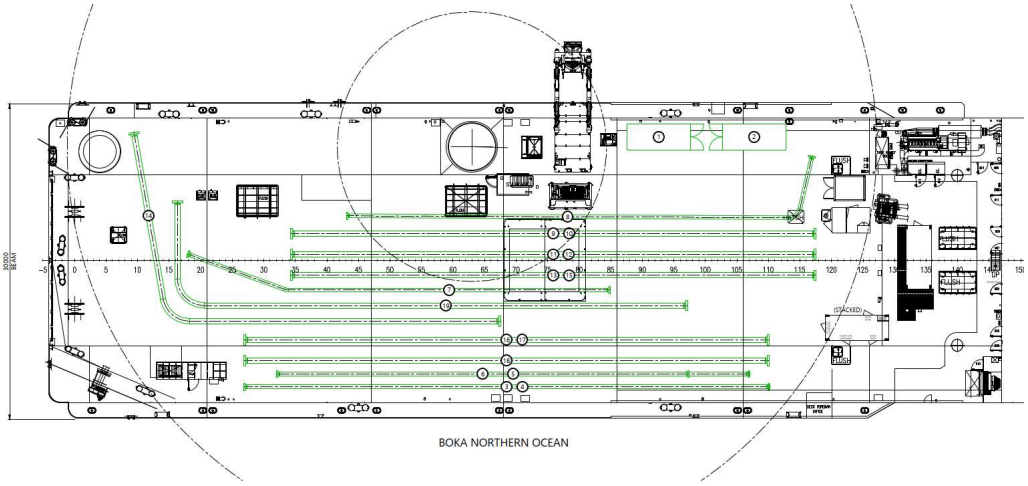


Figure 2-5 MC

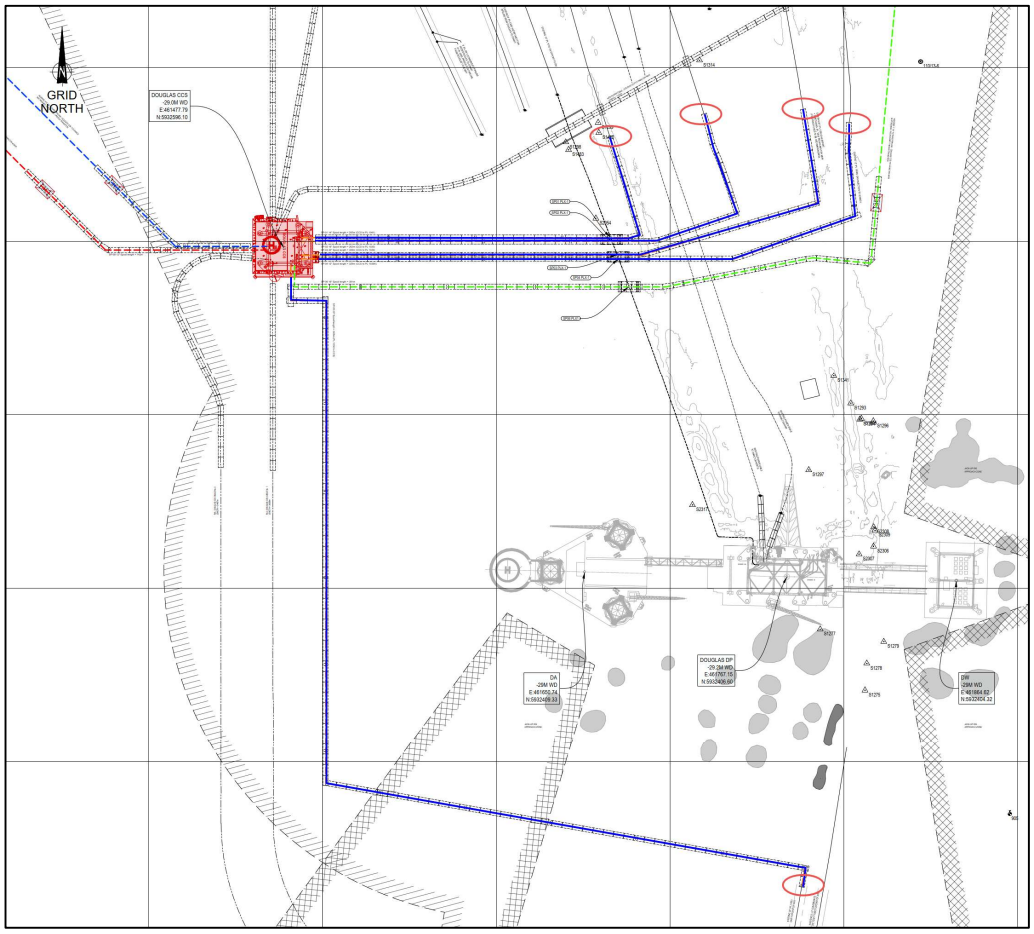
2.4 NEW SPOOL INSTALLATION

The following steps outline the operations to prepare the 5 off identified pipelines for repurpose with new mechanical connectors and the installation of new spools to New Douglas Platform riser tie-ins.

Step	Task
	Load Out / Mobilisation of DSV
1.	The DSV will mobilise the following equipment and personnel at local port: • 5 off Mechanical Connectors / Smart Flanges • DWS • CRT • Diver Dredge  **Ref: Fig 1 in Section 3.0**
2.	A mobilisation procedure will be developed to cover the following areas, typically: Quayside support & loadout, vessel deck layout, security, seafastenings, subcontractor, equipment and mobilisation checklists. Demobilisation will also cover support vessel clean up and return of sub-contractor equipment.

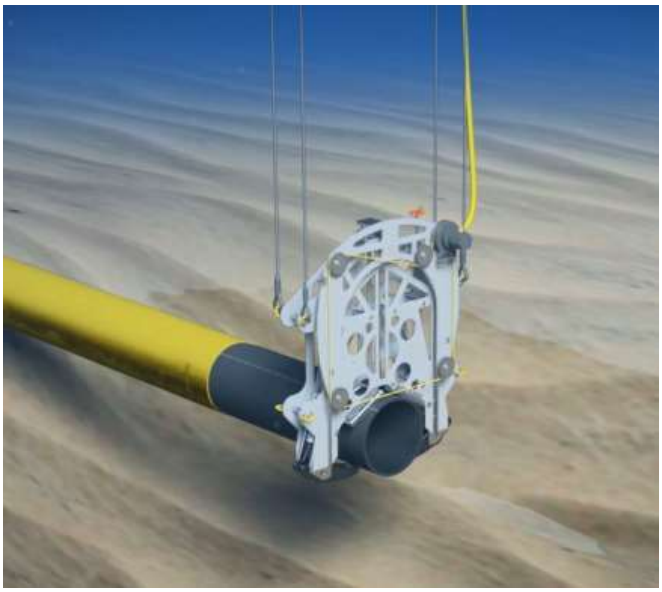
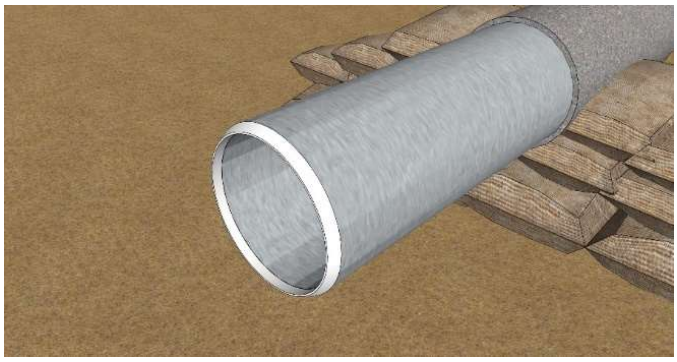
Step	Task
	Load Out / Mobilisation of CSV
3.	Over two trips the CSV will mobilise the following equipment and personnel at local port: • Fixed and Metrology Spools   **Ref: Fig 2 & 3 in Section 3.0**
4.	A mobilisation procedure will be developed to cover the following areas, typically: Quayside support & loadout, vessel deck layout, security, seafastenings, subcontractor, equipment and mobilisation checklists. Demobilisation will also cover vessel clean up and return of sub-contractor equipment.
	Preparatory Works for Vessel
5.	Vessel will arrive on site and complete field entry and DP trials outside the 500m zone.

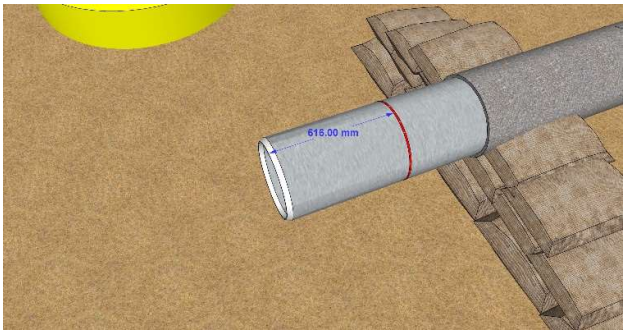
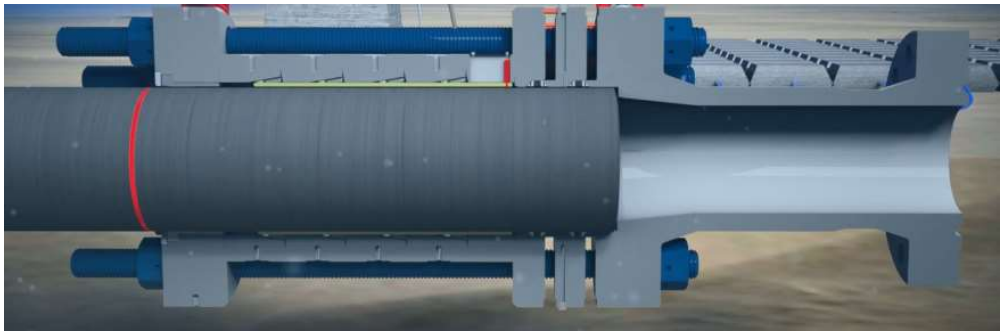
Step	Task
6.	Vessel will then set up at the given location to complete an ROV as-found survey around each worksite, in addition ROV will conduct a thorough survey of each of the five new spool routes. • 14" CCS to PL1041 • 16" CCS to PL1035 • 20" CCS to PL1039 • 12" CCS to PL1036A • 20" CCS to PL1030
7.	Upon completion of the as-found and route surveys the Vessel will set-up for Diving Operations.
Mechanical Connector / Smart Flange Installation	
8.	Carry out toolbox talk to review: • Over boarding and deployment equipment in line with approved Lift Plan • Assess current and forecasted weather conditions. • Review HIRA actions. • Ensure everyone is aware of their responsibilities and the upcoming operations methodology is fully understood and all operational instructions are clear.
9.	Perform a full radio communications check with all parties involved in the operation.
10.	Deck Crew, Project Engineer and Sub-Contractors to prepare required tools and equipment for deployment.

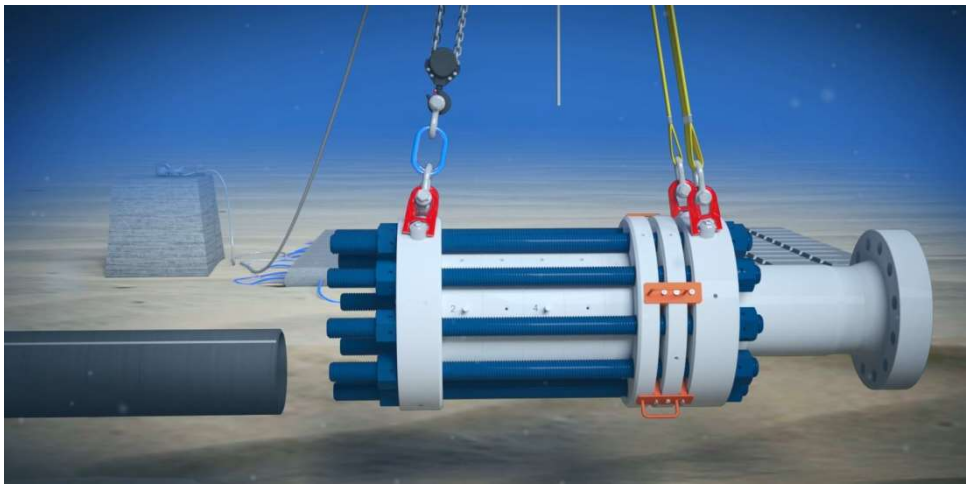
Step	Task
11.	Deploy Divers to pipeline final cut / MC location(s) and determine if any dredging is required at cut location for the fitting of the CRT or DWS. 
12.	If required, Deck to overboard Dredger and dredge at cut location.
13.	Once Divers are located at Pipeline. Divers are to measure and mark out the section of coating to be removed from Pipeline cut location ~ Circa 1.5m.
14.	Overboard and deploy CRT to the worksite.

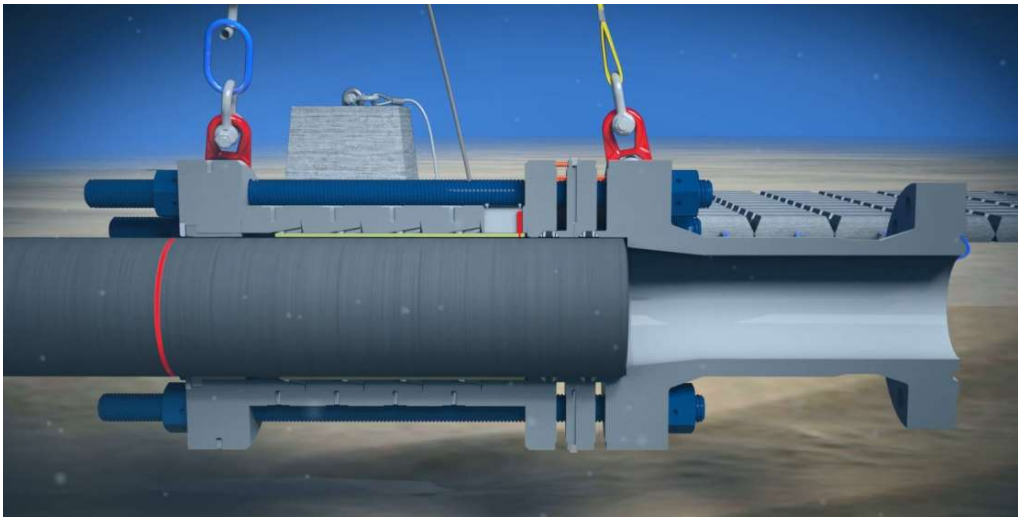
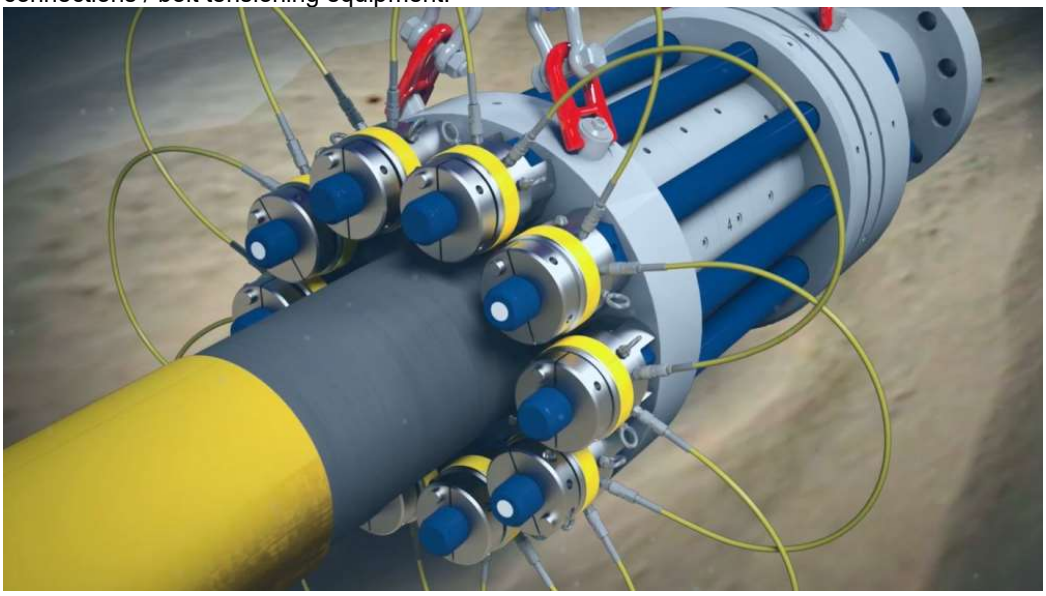
Step	Task
15.	Divers to fit CRT onto section of pipeline that will be cut. Divers to standby whilst coating removal tool is in operation. 
16.	On completion of concrete coating removal ops, Divers to locate back to pipe and remove any steel rebar left in place with manual or powered hand tools. 

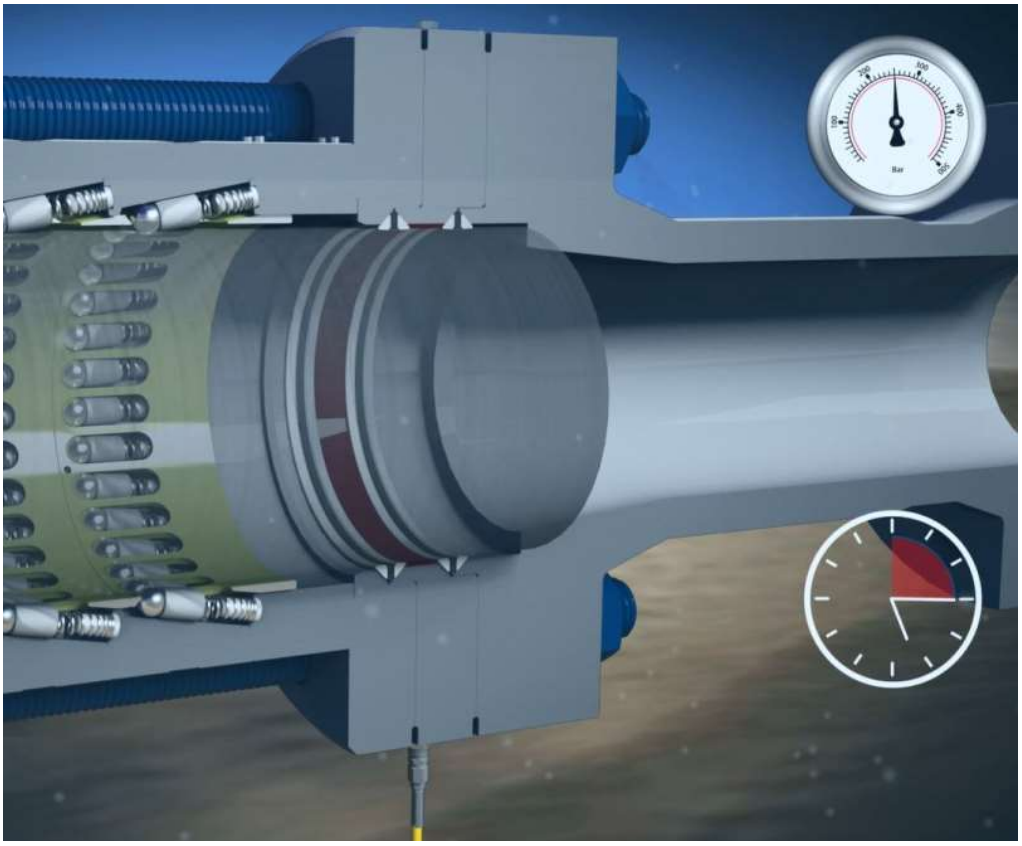
Step	Task
17.	A final pass with CRT is to be conducted to remove the coal tar enamel leaving an SA-2.5 finish. 
18.	Once pipeline coating has been removed, CRT is to be removed and recovered to deck.
19.	On instruction from the Dive Supervisor, Deck Foreman to overboard the DWS by means of the vessel crane.
20.	Under the instruction of the Dive Supervisor, Deck Foreman to lower the DWS to the work location, monitored by the ROV.
21.	Diver to guide the DWS onto the **cut** location.  Position the DWS in such a way that it clamps onto the MC / Smart Flange section of the Pipeline, preventing a topple/roll post cut.

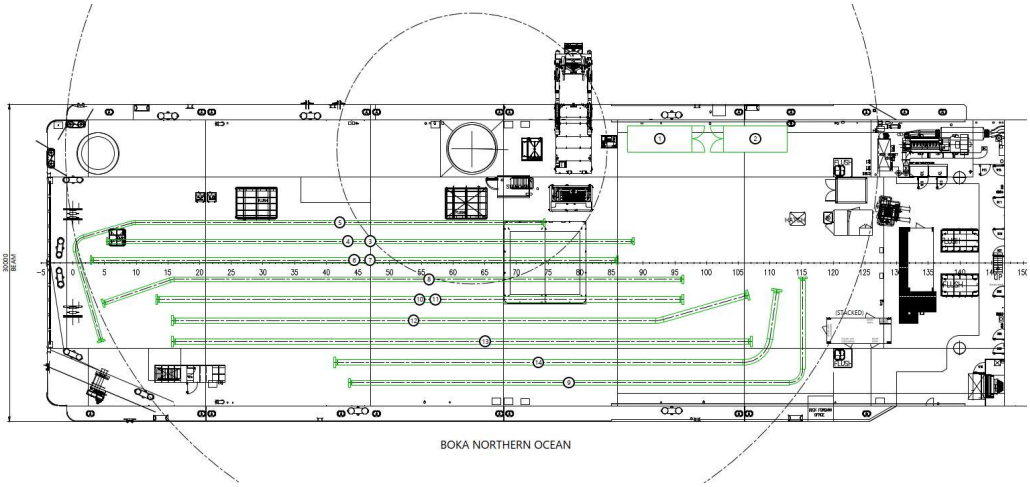
Step	Task
22.	Under the instruction of the Dive Supervisor, DWS Tech/Operator to start the HPU and close the DWS hydraulic jaws around the pipeline. Divers to keep clear of the hydraulic jaws and watch-out for pinch-points.
23.	Once the DWS jaws are seated correctly and secure, Diver to disconnect the crane. Keep the Crane close to the Worksite, if possible.
24.	Cutting Team to commence cutting. Cutting Team to control the process from surface. ROV to monitor the cutting.
25.	On completion of the cut, the DWS Tech/Operator is to stop the HPU, depressurize system and disconnect Drive Motor hoses from the Control Panel.
26.	Under the instruction of the Dive Supervisor, Diver to approach cut location, inspect and confirm the cut is complete, clean and square. 
27.	Using a GR29 Hydraulic Grinder fitted with a Wire Cup Brush, ensure the pipeline end is cleaned to a minimum of bright shiny metal SA-2.5. If Required, Diver to grind, using a GR29 Hydraulic Grinder fitted with an abrasive rotary flapper disc, any seam welds encountered down to parent metal of the pipe at the cutting locations. Grind these flat for a distance of at least 750mm away from the cut.
28.	Using a GR29 Hydraulic Grinder fitted with a Grinding Disc, diver to remove all sharp edges from the cut end of the pipeline and add a slight chamfer to ensure that the MC / smart flange can be installed without damaging the sealing faces. 

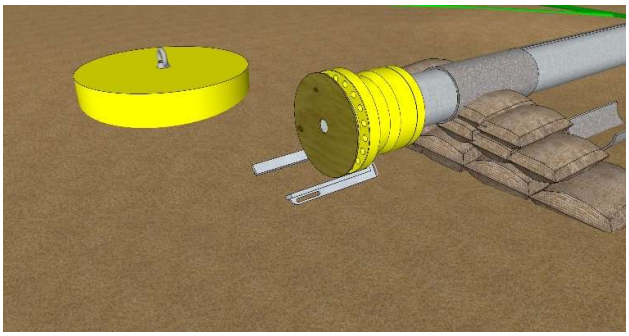
Step	Task
29.	Diver to perform GVI on pipe internal for any signs of pitting corrosion or any other anomalies and WT checks on the pipeline using a Cygnus Dive UT meter as directed by inspection co-ordinator/ Project Engineer. Confirm that Pipeline WT tolerances are within limits for fitting of the MC / Smart Flange. 
30.	Divers to confirm Pipeline end at cut location is supported either by temporary sand bag supports or on the seabed and there is enough clearance below the 6 o'clock position for purposes of the MC / Smart Flange Installation.
31.	Diver to mark the pipeline prior to installing the Smart Flange.  This mark will line up with the back of the MC / Smart Flange nuts, when the pipe is fully seated at the shoulder, thus confirming correct position. 

Step	Task
32.	Deck to rig up MC / smart flange and under the instruction of the Dive Supervisor, Crane Operator to deploy the MC / smart flange to the work location. 
33.	Diver to guide the MC / smart flange into position on the cut location of the pipe. 

Step	Task
34.	Slide the MC / smart flange onto the pipe until the end of the pipe meets the inside piston shoulder. The back of the flange should be in line with the mark made earlier. 
35.	Make use of lever hoists and appropriate rigging to hold the smart flange in place at the end of the pipeline to prevent it from sliding forward.
36.	In line with manufactures procedure, MC / Smart Flange to be installed on pipe via use of bolted connections / bolt tensioning equipment. 

Step	Task
37.	On completion of MC / Smart Flange installation, connection to pipe via dual seal arrangement will be conducted via downline from vessel or diver hand pump. 
38.	Divers to de-rig worksite of all tooling and equipment.

Step	Task
	Over Boarding and Wet Storing Spools
39.	Carry out toolbox talk to review: • Over boarding and deployment of spools in line with approved Lift Plan • Assess current and forecasted weather conditions. • Review HIRA actions. • Ensure everyone is aware of their responsibilities and the upcoming operations methodology is fully understood and all operational instructions are clear.  **Ref: Fig 2 & 3 in Section 3.0**
40.	Perform a full radio communications check with all parties involved in the operation.
41.	Prior to spool deployment, perform a GVI and take photos of the Spool Piece flange faces to confirm no corrosion, damage or pitting is present.
42.	Deck crew to apply wooden flange protection plates on to the flange faces.
43.	Deck Crew to ensure all restraints / seafastening are removed and load is free for lifting.
44.	Deck Crew to install tag lines as required and conduct a sweep of the load for any loose objects. Confirm all shackles are installed correctly and that rigging is free from potential twists and snags.
45.	Crane Operator to lower crane hook c/w pennant, Deck Crew to attach crane pennant to the load.
46.	Under instruction of the Deck Foreman, Crane Operator to raise the hook to tension the rigging. Deck Crew to check rigging is sitting correctly and not twisted.
47.	Crane Operator to lift Spool clear of deck, overboard and deploy through splash zone.
48.	Continue to deploy Spool subsea and lower to seabed clear of assets until approx. 5m above seabed. ROV to monitor as required.
49.	ROV to assist positioning the Spool in location as per the survey screen. Monitor for the remaining 5m until seabed touchdown is achieved.
50.	Survey to take fixes of Spool location.
51.	Once Spool is confirmed on seabed, in correct location and with fixes completed, ROV to disconnect rigging from crane, recovery of crane to deck clear of subsea assets.

Step	Task
	Fixed Spool Installation
52.	Carry out toolbox talk to review: • Over boarding and deployment of equipment in line with approved Lift Plan • Assess current and forecasted weather conditions. • Review HIRA actions. • Ensure everyone is aware of their responsibilities and the upcoming operations methodology is fully understood and all operational instructions are clear.
53.	Perform a full radio communications check with all parties involved in the operation.
54.	Deck Crew, Project Engineer and Sub-Contractors to prepare required tools and equipment for deployment.
55.	Deploy Divers to worksite and locate to wet stored Spool.
56.	Divers / Dive Supervisor to assess Spool positioning and rig up Spool using DMA(s), static rigging and air lift bags.
57.	Diver to install Flange Catchers on spool ends as required. 
58.	With a combination of DMA(s), Static Rigging & Lift Bags(s), take the weight of **New Spool**. Once neutrally buoyant, Diver to manoeuvre the Spool into its final position, and land it on the Flange Catchers.
59.	Once the Spool Piece is in position for installation, Diver to remove the wooden protection plates on the flange faces of both the Spool Piece and the adjacent flange / MC (Smart Flange) location.
60.	Diver to use podgers and installation aids to align the Spool flange with the adjacent flange
61.	Diver to insert lower half of the stud bolts and nuts in flange location and loosely tighten nuts by hand/spanner (Keeping in mind gasket installation).
62.	Diver to close the gap to keeping sufficient space for the installation of the gasket.
63.	Divers to perform a CVI on the gasket and flange ring grooves prior to installation, paying specific attention to deformities, damages or any other anomalies.

Step	Task
64.	Ensure Gasket Insertion Tool is fitted to the gasket and used for installation of the gasket, as per example below. 
65.	Diver to guide and install gasket into the flange ring groove.
66.	Fully close the flange connections either by flogging bolts and/or drawing in with lever hoists as required.
67.	Starting from 12 o'clock number all stud bolts starting from 1, 2, 3, etc.
68.	Ensure the flange is square and the gasket is evenly compressed and captured, Diver to dress the bolts for 100% tensioning coverage.
69.	Using a vernier calliper diver to take radial measurements to ensure gasket is central and sits in the flange groove. To be recorded on Data sheets.
70.	Diver to take flange gap measurements at the cardinal clock positions and record in bolt tensioning data sheet.
71.	Remove the Gasket Insertion Tool prior to fully closing the flange 

Step	Task
72.	Diver to remain at flange and install Bolt Tensioning equipment for a 100% Hydraulic Bolt Tensioning sequence. By fitting tensioning jacks over the bolts, screw down the reaction nuts and tighten. Use a Vernier calliper to measure flange gaps at the cardinal positions in order to monitor flange alignment.
73.	Complete Bolt Tensioning and Take final completion measurements on flange gaps and record.
74.	Divers to de-rig worksite of all tooling and equipment.
Metrology Spool Installation	
75.	On completion of all fixed spool tie-ins, metrology will be conducted for closing spool fabrication. Metrology operations are covered in **Metrology Method Statement: 52967-MET-010**.
76.	Metrology spools will be brought out via CSV / DSV and installed in position in line with previous steps.
77.	Spool flanges will be leaked tested as per **Pre-Commissioning & Mechanical Completion Assistance Method Statement: 52967-MET-013**.
78.	On successful testing of spool flanges, mattress protection will be installed as per **Spool Protection & Mattress Installation Method Statement: 52967-MET-011**.
Task Complete	

3.0 DRAWINGS AND SKETCHES

Please see the following attachments:

Title	Attachment
Boka Atlantis Deck Layout	Technical 10.1.26 - 52967-SK-03-006-1
Boka Northern Ocean Deck Layout – Trip 1	Technical 8.1.8 - 52967-SK-03-002-1
Boka Northern Ocean Deck Layout – Trip 2	Technical 8.1.9 - 52967-SK-03-002 2