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# Camelot CA Platform Camelot CA Pipelines Camelot CB Pipelines

## Decommissioning Programmes Close Out Report

**14 AUGUST 2013**

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## ABBREVIATIONS USED

<b>BoD</b>	<b>Basis of Design</b>
<b>CA</b>	<b>Camelot Alpha</b>
<b>CB</b>	<b>Camelot Bravo</b>
<b>DECC</b>	<b>Department of Energy and Climate Change</b>
<b>DP</b>	<b>Dynamically Positioned</b>
<b>DSV</b>	<b>Dive Support Vessel</b>
<b>EA</b>	<b>Environment Agency</b>
<b>EIA</b>	<b>Environmental Impact Assessment</b>
<b>EMT</b>	<b>Environment Management Team</b>
<b>ERT</b>	<b>Energy Resource Technology (UK) Limited</b>
<b>ES</b>	<b>Environmental Statement</b>
<b>HLV</b>	<b>Heavy Lift Vessel</b>
<b>HSE</b>	<b>Health and Safety Executive</b>
<b>M</b>	<b>meter</b>
<b>MCAA</b>	<b>Marine and Coastal Access Act</b>
<b>NFFO</b>	<b>National Federation of Fishermen's Organisations</b>
<b>NORM</b>	<b>Naturally Occurring Radioactive Material</b>
<b>OBM</b>	<b>Oil Based Mud</b>
<b>PPM</b>	<b>Parts Per Million</b>
<b>ROV</b>	<b>Remote Operated Vehicle</b>
<b>RPS</b>	<b>Radiation Protection Supervisor</b>

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## 1.0 INTRODUCTION

The last gas production from the Camelot CA platform was June 2009. Following a review of all the options it was decided to decommission the field and the formal cessation of production was approved by DECC in February 2011.

This document contains the close-out report for the combined decommissioning programmes as approved by the Secretary of State on 13 July 2012 for the Camelot CA platform, the Camelot CA pipelines and Camelot CB pipelines.

Energy Resource Technology (UK) Limited on behalf of the holders of the relevant section 29 notices issued by the Department of Energy and Climate Change (DECC) are pleased to confirm that the three Camelot decommissioning programmes have been completed as approved by the Secretary of State. The three section 29 holders are Energy Resource Technology (UK) Limited (ERT), ERT Camelot Limited and Apache Beryl I Limited (Apache) (all herein after referred to as the Holders). Apache were formerly known as Mobil North Sea LLC (Mobil).

This close out report is issued in line with the DECC decommissioning guidance notes and is intended to satisfy DECC and the relevant stakeholders that the approved programmes have been carried out. There were three main elements to the overall decommissioning plan;

- Abandonment of the CA Installation
  - Removal to shore of the topsides and jacket, with all wells decommissioned and conductors and piles cut to 3m below seabed.
- Abandonment of the CA Pipelines
  - Survey of the pipelines to be left *in situ*, cleaning, seawater flooding and disconnection, removal of spool pieces, grout bags and mattresses
- Abandonment of the CB Pipelines
  - Survey of the pipelines to be left *in situ*, removal of grout bags and mattresses

The acceptance of this close-out report by DECC as evidenced by inclusion on the DECC website marks the completion of the project.

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## 2.0 DECOMMISSIONING PROGRAMME OUTCOME

### Pipelines

In January 2011 notification was made to the HSE under the Pipeline Safety Regulations 1996 that decommissioning of the pipelines was to commence over the summer 2011.

In March 2011 the four pipelines were surveyed using a pipe tracker and seabed profiler mounted on an ROV. This survey recorded the position of the pipelines and the seabed as well as checking for debris. During this survey no debris was recorded.

In March 2012 the Camelot gas export pipeline was flooded with seawater from the Camelot platform in preparation for the pipeline pigging and flushing. With the pipeline flooded a Dynamically Positioned (DP) workboat was mobilised to the Camelot location with a filtration spread rigged up on the workboat deck. A flexible hose was connected between the DP workboat and the platform allowing the Camelot gas export pipeline to be pigged and flushed from the host platform using un-treated seawater. Flushing continued until the level of oil in the water being flushed out of the pipeline dropped to 24 Parts Per Million (ppm). All the fluids flushed from the pipeline were filtered on the workboat to reduce the level of oil in the flushing water discharged to sea to below 30ppm. Due to the efficiency of the filtration system and flushing programme the total weigh of hydrocarbon discharged was only a fraction of that allowed in the approved permit conditions. This also avoided the use of any chemical treatments in the pipeline which was left filled with raw seawater. With this flushing complete the pipelines were then ready to be disconnected.

### Well Abandonment

In April 2011 equipment was mobilised to the platform to allow for the preliminary suspension of the six gas production wells. This was to allow any gas to be vented and the wells killed. This was to reduce the risk for the subsequent platform operations required for the final well plugging and topside decommissioning preparation.

In January 2012 the well decommissioning Basis of Design (BoD) was agreed with our independent well examiner and the HSE. Also in January a survey vessel was mobilised to survey the Camelot location to confirm it was suitable for a jack up work boat and to complete the pre-decommissioning environmental survey of the actual Camelot area. The environmental survey was to inform the EIA, the Environmental Statement (ES) and the MCAA licence application.

In February 2012 a jack up work boat was mobilised to the Camelot location and bridge linked to the Camelot platform. This was to support both the well decommissioning operations and the preliminary preparatory work on safety critical elements. As mentioned in the decommissioning programmes well decommissioning is regulated under a separate field licencing and consent regime and so could commence ahead of the formal approval of the actual decommissioning programmes.

At the end of April 2012 the jack-up unit departed the Camelot location having assisted the Camelot platform successfully plug the six gas production wells to the requirements outlined in the Oil and Gas UK guidelines. This included removing all cables from the permanent cement plugs and flushing and recovery of the Oil Based Mud (OBM) from behind the original casings. This work was carried out in accordance with the ERT well examination scheme and verified by our independent well examiner who issued the final certification for each well without reservation. The

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HSE were provided with a weekly well operations report during the work and copies of the final well status and the examination certification which they received without comment.

### **Platform Removal**

In June 2011 the Camelot export pipeline was blown down and isolated at the host platform to reduce the risk to personnel working on the platform.

In June 2011 the HSE confirmed that they were satisfied with the case for health and safety submitted for the decommissioning phase of the Camelot operations by ERT as the Camelot platform duty holder. This decommissioning safety case updated the Camelot operations safety case which was in place until that time.

During the second half of 2011 engineering work was undertaken to establish the decommissioning options and the well plugging strategy. This was done through a comparative assessment process which reviewed all the options identified. Work was also started on the Environmental Impact Assessment (EIA) for the decommissioning operations. At this stage consultation was carried out with various parties including DECC on the development of the decommission plans for the platform and four pipelines.

In November 2011 an application was submitted to DECC for a Marine and Coastal Access Act (MCAA) permit for the platform removal and associated activities.

The February 2012 environmental survey found no evidence of any drill cuttings in any of the sample locations in the Camelot area. This confirms that the cuttings were distributed widely during the original drilling by the strong local current. With no cutting pile detected at the Camelot area the provisions of OSPAR Recommendation 2006/5 on the Management Regime for Offshore Cuttings Piles do not apply. No sighting of marine mammals was reported during the survey work.

During the well decommissioning in March 2012 some low level Naturally Occurring Radioactive Material (NORM) was detected inside one of the production control chokes when it was removed from one of the wells. The onsite ERT Radiation Protection Supervisor (RPS) secured this NORM material as required by the ERT local rules for control of radioactive materials. At this time a formal application was made to the Environment Agency (EA) for the permit required to manage this NORM under the Environmental Permitting (England & Wales) Regulations 2010.

With the jack-up alongside Camelot it was possible to take the Camelot helideck out of service temporarily to allow the first two sets of lifting pad-eyes to be re-instated under the helideck and this was completed in April 2012. These pad-eyes were inspected and certified for the full topside weight using the same design and materials as were used for the original installation lifts.

In April 2012 the public consultation on the decommissioning plans closed with no comments received from either the public or the designated parties consulted.

In May 2012 an application was made to the Environment Agency (EA) in both the UK and the Netherlands for the trans-frontier shipment of waste permit required to deliver the topside and jacket to the Netherlands for dismantling, recycling and disposal. This was in line with the EU and OECD regulations on waste shipments.

In May 2012 the Environment Agency (EA) approved the ERT permit required to manage the NORM under the Environmental Permitting (England & Wales) Regulations 2010. The low level NORM had been deposited by the reservoir water brought to surface with the produced gas.

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In June 2012 an abrasive cutting system was mobilised to the Camelot platform to cut the six plugged wells 3m below the seabed. Due to local tidal scouring around the base of the jacket it was considered prudent to make a deeper cut so all the wells were actually cut 5m below the natural seabed. With the wells cut a test lift was carried out on each to make sure that they were all free of the seabed for final lift out by the Heavy Lift Vessel (HLV). The successful abrasive cutting operations achieved the objective of avoiding the use explosives.

In June 2012 the HSE confirmed that they were satisfied with the case for health and safety submitted by ERT as duty holder for the dismantling operations required to remove the Camelot platform. This dismantling safety case then replaced the decommissioning safety case which had been approved earlier.

With the abrasive cutting system demobilised a welding team began work on the platform to re-instate the final two sets of lifting pad-eyes. This work was complete in July 2012 when the pad-eyes were inspected and certified for use.

In July 2012 the trans-frontier shipment of waste permit was approved by both the EA in the UK and the environment agency of the Netherlands. This was to allow the shipment of the topside and jacket to the Netherlands for dismantling, recycling and disposal.

In July 2012 the Environmental Management Team (EMT) at DECC issued a licence under the Marine and Coastal Access Act 2009 (MCAA) for the platform removal and associated activities. This licence also met the needs of the Marine Works (Environmental Impact Assessment) Regulations 2007 (As Amended).

In July 2012 DECC issued the approval from the Secretary of State for the three Camelot decommissioning programmes. These were the decommissioning programmes for the Camelot CA platform, the Camelot CA pipelines and the Camelot CB pipelines.

In July 2012 the HLV mobilised to the Camelot location and commenced the final removal operations. The first items removed were the six well conductors previously cut 5m below the natural seabed. Also removed were the seawater intake caisson and the produced water discharge caisson. During the conductor removal activities work platforms were built around the top of the jacket legs allowing the topside to be cut free of the jacket. With the heavy lift rigging connected to the re-instated pad-eyes the topside was lifted clear. The total load including rigging was found to be 1,220 tons which was well within the maximum estimated load of 1,492 tons used for the lifting design calculations. The topside was placed immediately onto a transport barge and sea-fastened along with the conductors and caissons. With the sea-fastening complete the transport barge departed for the Netherlands.



With the topside removed work platforms were established on the jacket to allow for the cutting and removal of the leg extensions and placement of the abrasive cutting tool into each of the legs for cutting. Each leg was cut at least 3m below the natural seabed. As each leg was cut a rigging arrangement was attached to the top of the jacket allowing the HLV to lift the jacket clear of the seabed immediately

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after the final cut. The total jacket load including rigging was found to be 600 tons which was well within the maximum estimated load of 914 tons used for the lifting design calculations. The HLV lifted the jacket up until the bottom of the cut legs was level with the bottom of the HLV hull. The jacket was then sea-fastened to the fixation points on the HLV hull so it could be transported to shore on the HLV hook.



While the jacket was being sea fastened an ROV survey was done of the seabed. The ROV survey found that the area around the jacket location has been scoured out to a depth of around 5m below the natural seabed but even at this depth there was only one hole visible where a leg had been cut. As this hole was below the scour level it was filling naturally with sand moving on the seabed. The ROV survey also found no trace of the well conductors confirming that they were cut below the scour depth other than the 30" conductor of well A1. As the A1 conductor was not tied back to surface the abrasive cutting jet was unable to penetrate

the conductor wall so it was not cut and remained in place. The A1 conductor was sitting about 2m above the natural seabed so did not present an immediate hazard to marine activities ahead of the final removal.

Having completed operations at the former Camelot location the HLV sailed to the Netherlands and placed the jacket structure onto the quayside of the dismantling facility. The HLV then picked up the topside from the transport barge and place this on the quayside next to the jacket. The use of the HLV in port allowed the unloading to be done without the assistance of any heavy lift self-propelled trailers.



During all the offshore operations required for the decommissioning programmes there were no spills or accidental releases of any hydrocarbons into the environment.

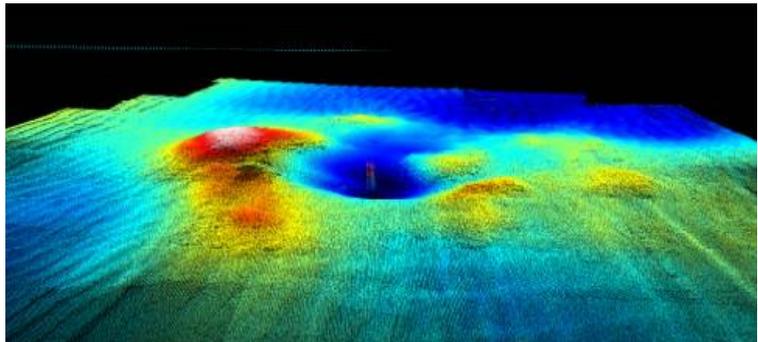
In August 2012 the UK Hydro-graphic office, the Marine and Coastguard Agency, Trinity House and the HSE were all informed of the removal of the Camelot platform and the associated navigation aids displayed from the platform. This was to allow the navigation charts to be update as required. CDA Deal was also informed of the platform removal so that the Kingfisher FishSAFE Information Service could be updated to show the A1 conductor as a suspended well ahead of the final removal.

In October 2012 the survey vessel that was used in January 2012 was re-mobilised to complete the first post-decommissioning environmental survey of the actual Camelot area. This environmental survey is intended to be a base line which can then be used for comparison with next environmental survey currently planned for October 2014.

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The Environmental survey showed there to be no areas of environmental significance or value to nature conservation in the transect areas. The data showed that the seabed almost entirely consists of uninterrupted features that are consistent with fine sediments such as slightly gravelly sands or sands. The only area where there are any features that show there to be materials other than sand is in and around the previous platform location where there are man made rock dump features.

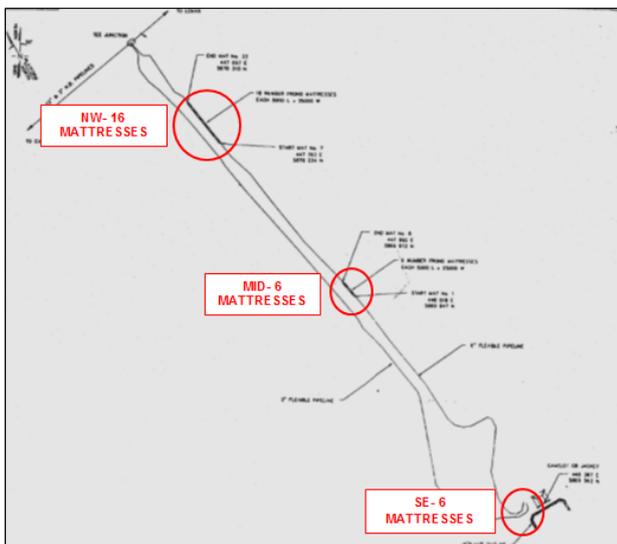
In March 2013 a DSV was mobilised to the Camelot location to cut and remove the A1 Conductor that remained in place. At the same time the divers swept the area and removed the few small items of debris found. With the remaining conductor cut the Camelot platform location and the Camelot pipeline routes were then ready for the final trawl sweep.



### Mattress removal

As preparation for the CA jacket removal and pipeline flushing operations a DSV was mobilised to conduct spool removal in April 2012. Following the as found survey it was identified that there were only 5 no. mattresses at the tie-in location as opposed to the expected 7 no. Of these, 2 no. mattresses (and a grout bag) were recovered, with 3 no. mattresses left in situ, buried to a depth in excess 0.5m within the rock dump area.

During the same DSV campaign in April 2012 a survey was taken of the old Camelot B location to verify pipeline burial. During this survey 4 no. of the reported original 10 no. mattresses present were recovered. The remaining 6 no. (if present) had been buried to a depth well in excess of the 0.5m probe investigation. At the same time, a survey of the tie in area at the host platform identified 4 no. concrete mattresses which were recovered.



Following the A1 conductor removal and further surveys it was identified that from the original field installation that there could still have been up to 22 no. frond mattresses along the PL878/879 routes. Following consultation with DECC, in June 2013 it was decided to mobilise an ROV Support vessel c/w hydraulic grapple spread to locate and recover these mattresses, along with a further attempt to locate and recover the buried 6 no. concrete mattresses left in-situ at the CB location.

The locations and pipelines were all positively identified but despite several attempts with the grapple, no concrete mattresses were found, despite an investigation depth of c.1m into the seabed.

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- 9 Grabs at NW location - Fronds only recovered
- 3 Grabs at Mid location - Fronds only recovered
- 8 Grabs at SE location - nothing recovered

The full June 2013 mattress recovery report is included in Appendix 2.

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### 3.0 DEBRIS CLEARANCE

Following discussions with the National Federation of Fishermen's Organisations (NFFO) a fishing vessel was mobilised in April 2013 to the Camelot location to conduct trawl sweeping operations within the 500m zone that was established around the Camelot platform. In June 2013 another vessel was mobilised to conduct 100m pipeline corridor sweeps along the lengths of the buried lines. Having completed the trawl sweeps to the satisfaction of the skippers the NFFO have provided Certificate of Clean Seabed (appendix 1) confirming that the area at time of the sweeps was found to be clear of any obstruction or debris that could be attributed to the Camelot development.

In April 2013 CDA Deal were informed of the removal of the A1 conductor at the Camelot location and the successful trawl sweep confirming that the former location was free of hazard. This will allow the Camelot location to be removed from the Kingfisher FishSAFE Information Service.

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#### 4.0 POST DECOMMISSIONING SURVEYS

In 2014 which is two years after the decommissioning was completed the Holders will undertake a second post-decommissioning environmental seabed sampling survey to verify the levels of any contamination and assess the level of biological activity in the area. The results of this survey will be compared with the first post-decommissioning environmental survey which was done in October 2012. Comparing the results of the two surveys should allow the Holders and DECC to evaluate the site remediation process.

Also in 2014 the Holders will undertake the first post-decommissioning pipeline burial survey to verify the location of the pipelines relative to the seabed. The results of this survey will be compared with pipeline survey done in March 2011 and this should allow the Holders and DECC to evaluate the stability of the pipelines and the effectiveness of the self-burial process. This survey will also include the cut piles.

The final post decommissioning survey will be a further repeat pipeline survey four years after the decommissioning activity which will be 2016. Once again this survey will record the location of all pipelines for comparison with both the original baseline survey from 2011 and first post-decommissioning pipeline survey in 2014. This survey will also check that the cut piles of the CA platform remain sufficiently buried.

All survey results will be discussed and agreed with DECC and further studies or pipeline surveys may be carried out if considered appropriate by the Holders and DECC.

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## 5.0 VARIATIONS

The Holders can confirm that the decommissioning programme was executed as approved by the Secretary of State without any significant variations.

During the decommissioning activity the filtration system captured a total of 108kg of hydrocarbons from the export pipeline and 32kg of hydrocarbons from the topside piping. As a dry gas field this small level of hydrocarbons is to be expected.

During the jacket dismantling onshore almost 10 tons of anodes were recovered and recycled.

The NORM contamination found in the topside piping was sent for laboratory testing and this determined that the activity level was low enough to allow for disposal directly to conventional land fill. Although the land fill option was available it was agreed that the best option was to send the materials to Germany where they could be smelted down and re-cycled. As the scale inside the piping was very thin it has been estimated that the total weight of NORM material is less than 1 ton.

With the platform unloaded the dismantling contractor made the area safe and first began the process of cleaning and removing the NORM contaminated pipe and process equipment. Of the fourteen areas found to be contaminated laboratory test measurements confirmed that the actual contamination was so low that twelve were exempt from all legislation and notification. The remaining two results were slightly higher and so required notification but were still low enough to be exempt from any licencing requirement. The NORM level was also low enough to be exempt from the need to measure the exact quantities recovered. Although the NORM contamination was shown to be low enough for disposal directly to land fill it was agreed that the best option was to send the materials to Germany where they could be smelted down and re-cycled.

With the NORM contamination removed the dismantling contractor then completed the dismantling, re-cycling and disposal operations all in accordance with the approved trans-frontier shipment of waste permit. As part of this re-cycling process a detailed inventory of materials was developed and a rigorous segregation system was put in place to maximise the recovery of materials. Based on the detailed inventory listing the dismantling contractor expects to re-cycle in excess of 95% of the total weight of the topside and jacket combined.

Following the removal of the platform, there was a time based variation to the agreed plan, with an eight month delay before the A1 conductor stump was recovered. This in turn led to the delay in completing mattress recovery works (refer to Appendix 2) and the final seabed clearance trawl sweep.

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## 6.0 COSTS

This section reviews the decommissioning costs to date and compares them with the original estimates included in the decommissioning programme. This comparison excludes any potential future costs.

### *Camelot CA platform*

Platform and Jacket Preparation and Removal.

Original estimate £5 million to £6 million. Actual cost £6.3 million.

Platform and Jacket Recycling.

Original estimate £0 million (scrap value). Actual cost £1.5 million.

Six Platform Well Abandonments.

Original estimate £6.9 million to £7.5 million. Actual cost £7.5 million.

Engineering and Studies.

Original estimate £0.5 million to £1 million. Actual cost £1.0 million.

Platform total.

Original estimate £12.4 million to £14.5 million. Actual cost £16.3 million.

### *Camelot CA and CB pipelines*

Pipeline Infrastructure Decommissioning in situ.

Original estimate £2 million to £5.5 million. Actual cost £3.9 million.

Engineering and Studies.

Original estimate £0.5 million to £1.0 million. Actual cost £0.8 million.

Pipeline total.

Original estimate £2.5 million to £6.5 million. Actual cost £4.7 million.

Overall Total

Original estimate £14.9 million to £21 million. Actual cost £21 million.

The key difference between the original estimate and actual costs was the impact of the NORM processing on the platform re-cycling cost. Originally it was estimated that the scrap value of the various steel components would cover the full dismantling cost. Unfortunately the NORM contamination in the pipework and process equipment made this re-cycling more complex and impacted on the cost. Even though subsequent testing showed that the NORM contamination was below the allowable limits and not hazardous the handling procedures and management of site operations had to be reorganised on the basis that the contamination was a hazard risk.

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**Appendix 1 - Clean Seabed Certificate – Camelot A Location**

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29<sup>th</sup> July 2013.

To whom it may concern

### **Decommissioned Camelot Platform & Infrastructure pipe lines TRAWL SWEEP Confirmation letter**

The Grimsby based Trawler **Fruitful Harvest GY 991** operating under NFFO membership conducted the following activities at the Decommissioned **Camelot Platform** Well location commencing 19<sup>th</sup> April 2013.

1. 20<sup>th</sup> April a series of intense bi-directional sweeps over known **Camelot** 500 metre Zone with the objective of clearing seabed debris or identifying seabed snags within that zone. ( see plotter tracks)
2. 21<sup>st</sup> April 2013 a secondary series of bidirectional sweeps over the **Camelot** 500 metre zone location with the objective of demonstrating the area to be free of debris or hazard following the decommissioning programme was conducted.
3. 8<sup>th</sup> June 2013 – 12<sup>th</sup> June 2013 a series of intense bi-directional sweeps over known **Camelot** pipelines was conducted ( see plotter tracks) with the objective of ensuring no seabed snags along the said pipeline rout.

A significant number of passes were made across the area. (see attached plotter data) with Standard Southern North Sea Anchor Seine trawl equipment was used to conduct the sweeps.

The method used was to ensure continuous contact with the seabed to determine whether there were any major obstructions which might present a major snag for future fishing activities. The trawl net was seen as a means of gathering any items of debris located in the area.

Following completion of the sweep programme the skipper of **Fuitful Harvest GY991** has reported to NFFO the following:

- a) No debris was recovered on either operation (500mtr zone & pipeline).
- b) One minor snag was experienced during the Camelot 500mtr zone sweeps.
- c) The snag was encountered while towing gear in a NE direction at 12.00hrs on 20/04/13 at position 52-56.5750N 002-09.091E. No damage to the trawl was caused but shredding of ropes was encountered ( see pictures). No object could be marked on sounder but black marks along damaged rope may indicate a cutting pile (see pictures)

Based upon feedback provided by the skipper, the Federation accepts that the decommissioned **Camelot** site 500m safety zone was found to be clear of debris and any major obstruction. The Camelot associated pipeline was also clear of any significant seabed obstruction.

Signed

*Alan Piggott*

A Piggott  
General Manager

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**Appendix 2 - Camelot Wellhead and Mattress Removal report (Ref. 11937/001/PJR)**

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**REVISION RECORD:**

Revision No.	Comment	Author	Date	Approved
A	Issued for review & comments	RHA	20/06/13	-
0	Issued for implementation	RHA	24/06/13	OWI



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	<b>CAMELOT MATTRESS AND WELLHEAD REMOVAL</b>	
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## 1.0 INTRODUCTION

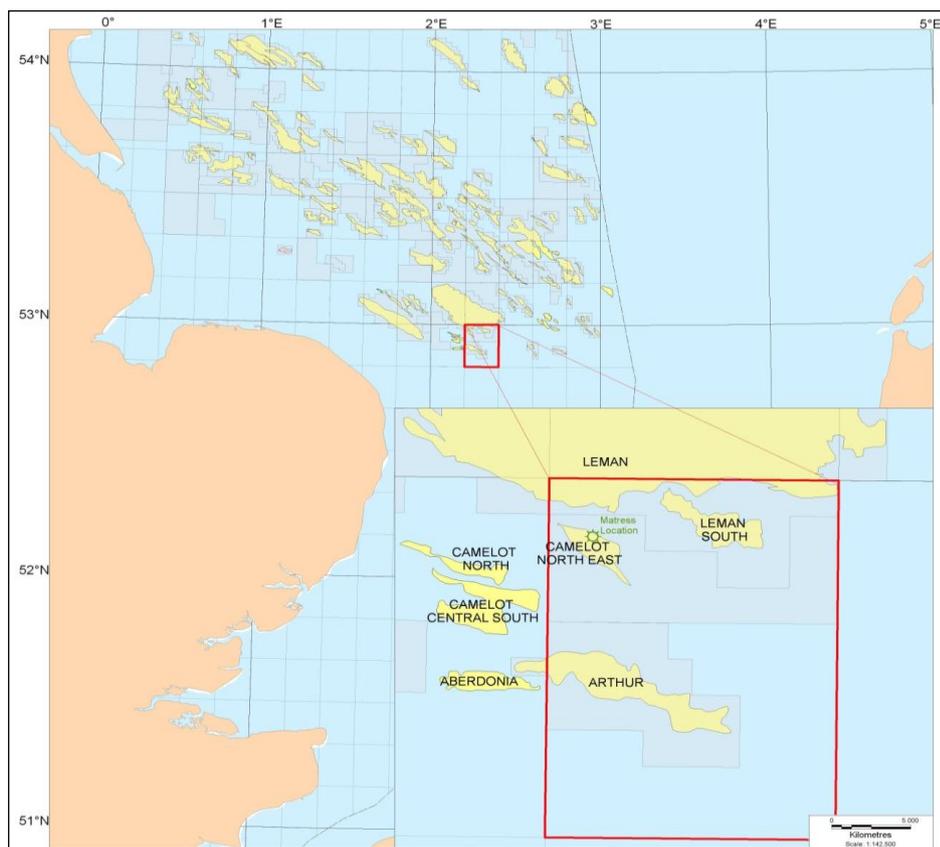
### 1.1 FIELD LAYOUT

The Camelot field was discovered in 1967 and all production wells completed in 1989 by ExxonMobil. In 1992, the Camelot Bravo (CB) platform was installed in Block 53/2 to produce from a single well: this platform ceased to produce in 1998 and was decommissioned in 2002. In December 2006 Helix ERT acquired the Camelot field and facilities which included the Camelot CA Platform with 6 producing wells and a gas export line to the Leman platform (49/27A). In June 2009 gas production from Camelot CA was ceased.

In April 2011 well abandonment operations at Camelot CA began and decommissioning plans were approved. In 2012, Camelot gas export pipeline was flooded and the Camelot CA topsides and jacket removed. As part of the Camelot decommissioning works a DSV was hired to assist with seabed clearance at the CB 6" and 3" flowlines, however not all the mattresses were removed and the Department of Energy and Climate Change (DECC) have now requested that a further attempt to remove them is made.

In June 1987 the gas well 53/1-5 was drilled and abandoned by the Ocean Benarmin rig. The wellhead remains in place with 30", 20" and 13-38" casings. In Sep 2012 the Well Enhancer relocated to field and attempted to survey the 53/1a-5 wellhead, however it was not positively identified due to insufficient survey equipment available for the drifting sands.

HELIX ERT has contracted HELIX WOUK to carry out the seabed clearance and wellhead recovery operations in the Camelot field.

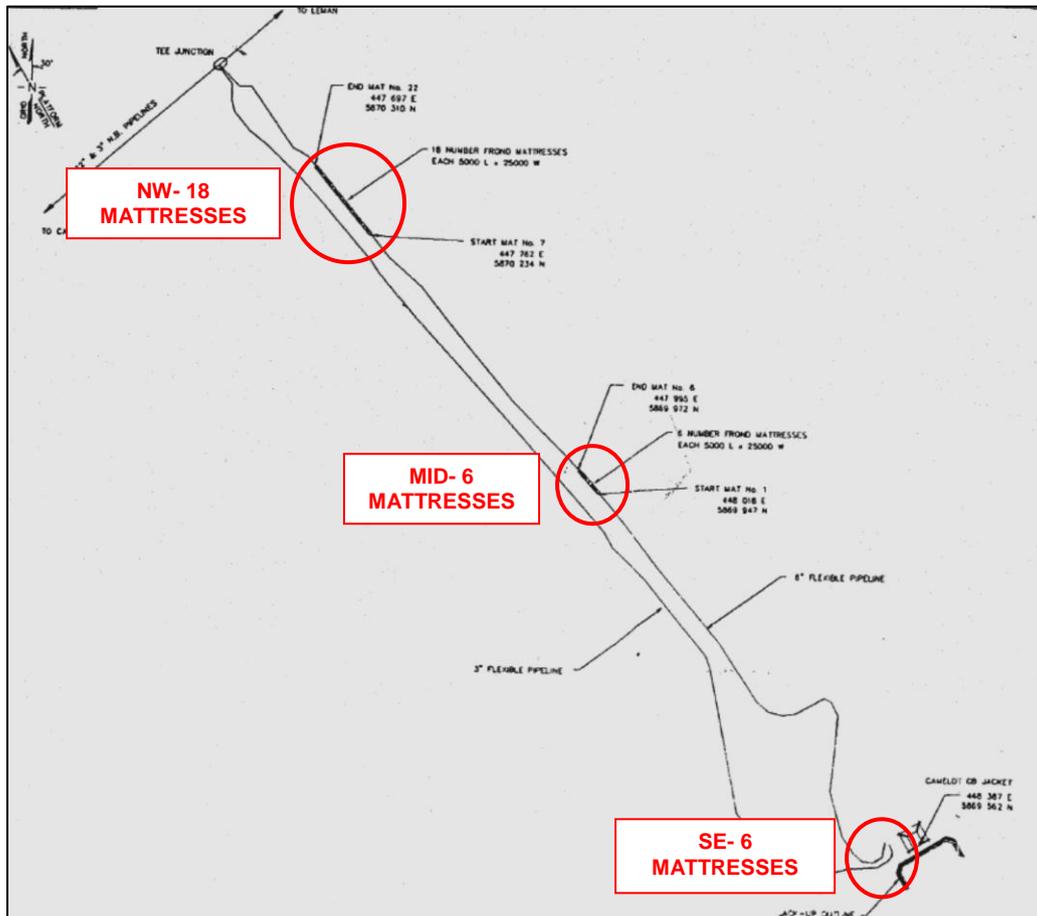


**Fig 1- Camelot Field Layout**

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- 1.2 SCOPE OF WORK
- 1.2.1 Mattress Recovery

There are three locations where mattresses were expected to be located on the PL 878 / PL879 pipelines:



**Fig 2- Mattress Locations**

As part of this workscope, the mattresses were to be located and recovered where possible.

- 1.2.2 Wellhead Recovery

The wellhead from suspended well 53/1a-5 will be recovered as part of this workscope.

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### 1.3 EQUIPMENT

#### 1.3.1 Hydraulic Grapple

A Hydraulic Grapple was utilised for the mattress recovery operations on the PL878 Pipeline. The Grapple c/w hydraulic hose bundle was deployed subsea on the main crane, and operated via a surface control panel under the direction of the GSI technicians. The Grapple has a SWL of 15Te.

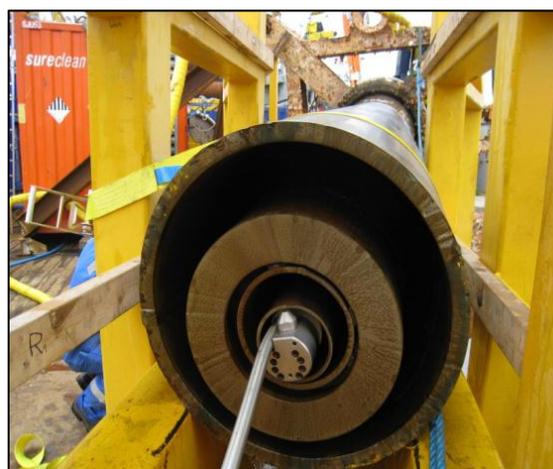


**Fig 3- Hydraulic Grapple**

#### 1.3.2 NCA Internal Multi-String Cutting Tool

The NCA Internal Multi-String Cutting Tool (IMSCCT) was mobilised for the 53/1a-5 Wellhead recovery operations. The IMCT is based on NCA's Abrasive Water Jet Cutting (AWJC) system and is capable up to five layers of casings from the inside of a well in one run.

The AWJC method uses a high-energy jet of water-borne abrasive particles with enough kinetic energy to cut even the hardest steel alloys quickly and safely. The IMCT produces a clean and even cut, which makes conductor recovery easy. The cut conductor segments are safe to handle as they are returned to shore.



**Fig 4- Internal Multi String Cutting Tool**

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### 1.3.3 ROV TSS440 Pipe Tracker

Due to the fact that the PL878 & PL879 pipelines were previously trenched and buried, a TS440 Pipe and Cable Survey System was mobilised to assist in locating the pipeline and associated areas of interest. The TSS440 system was mobilised and integrated with the XLS work class ROV.

The TSS440 system measures, displays and records the position of the target relative to the ROV, and its depth of cover beneath the seabed. The technology used by the System gives it the flexibility to detect any conductive target, whether the material is exposed or buried.

### 1.3.4 ROV Blueview 2D Imaging Sonar

As the visibility in the Camelot area is known to be poor, a Blueview Imaging Sonar was mobilised and integrated with the XLS Work Class ROV to assist in identifying and locating targets. The BlueView 2D imaging sonar provides streaming sonar imagery, making it easy to search and navigate in low and zero visibility water.

## 2.0 MATTRESS RECOVERY OPERATIONS

### 2.1 AS FOUND SURVEY

The ROV was fitted with a TS440 pipetracker and Blueview Sonar to assist in locating and surveying the Pipelines and mattress locations.

Upon vessel arrival in the field, each mattress location was surveyed in turn and the ROV footage was reviewed for any visual confirmation of mats. Due to the poor visibility, visual confirmation was not possible.

### 2.2 SE MATTRESS LOCATION

Upon completion of the ROV As Found survey, the vessel relocated to the SE mattress location on PL 878 and set up for mattress recovery operations. Coordinates from drawing no **DE345007** were plotted on the NAV screen to assist in locating the mattresses:

Mattress no.	Location
1	448369.0E, 5869521.4N*
2	448364.2E, 5869522.6N*
3	448359.4E, 5869524.0N*
4	448354.5E, 5869525.7N*
5	448349.9E, 5869527.8N
6	448345.6E, 5869530.5N
7	448341.9E, 5869533.7N
8	448338.3E, 5869537.4N
9	448333.1E, 5869539.2N
10	448335.7E, 5869533.6N

\* Previously Recovered

Using the TSS440, the Pipelines PL878 / PL879 were positively identified and the grapple was deployed to commence mattress recovery operations. The Grapple achieved a depth of investigation of approximately 1m below seabed.

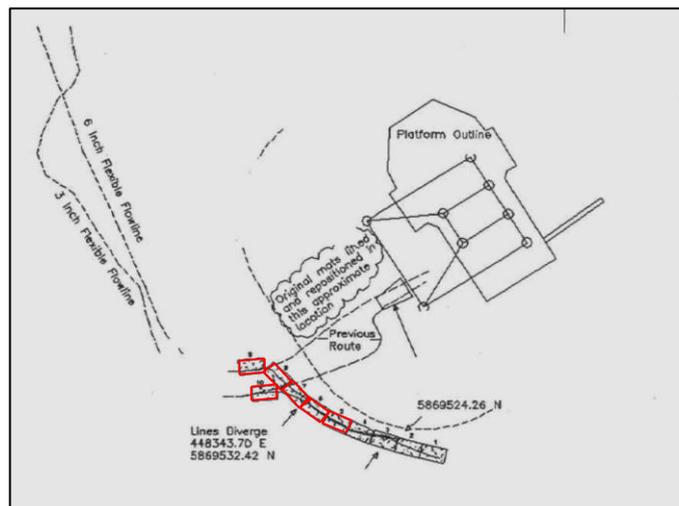
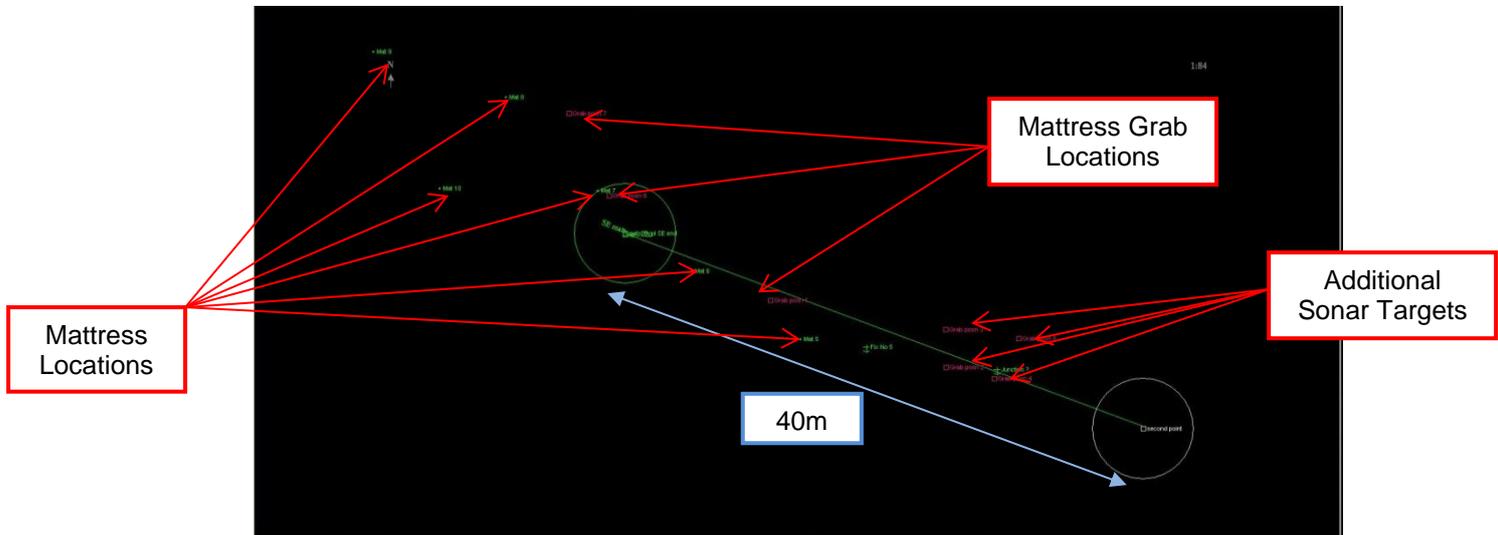


Fig 5- SE Mattress Location

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At the SE mattress location, seven attempts were made to locate and recover the mats using the hydraulic grapple, but no evidence of any mats was found. The grab locations can be seen in Figure 6. In addition, a sonar target was also investigated although nothing of interest was located:



**Fig 6- SE Mattress Location NAV Screen Grab**

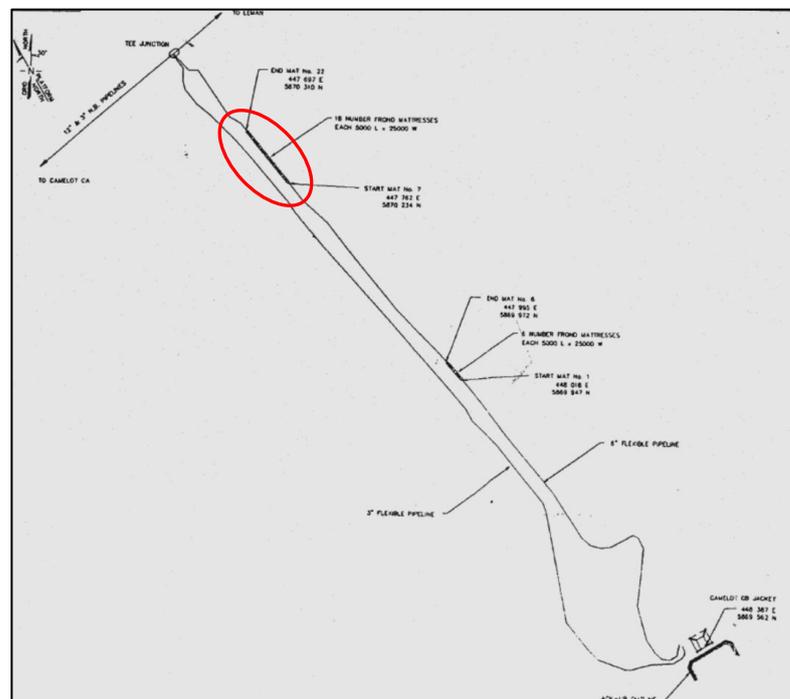
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### 2.3 NW MATTRESS LOCATION

Following operations at the SE mattress location, the vessel relocated to the NW mattress location and set up for mattress recovery operations. The pipeline was surveyed from KP 0.941 to KP 1.096. Mats were expected to be located from KP 0.989 to KP 1.088 as indicated in drawing no **AB6746-DR-20-044**. ROV footage identified the following areas as possible mattress locations:

- KP 0.984
- KP 0.996
- KP 1.042
- KP 1.079

Using the TSS440, the Pipeline PL878 was positively identified and the grapple was deployed to commence mattress recovery operations. The Grapple achieved a depth of investigation of approximately 1m below seabed.



**Fig 7- NW Mattress Location**

At the NW mattress location, nine attempts were made to locate and recover the mats using the hydraulic grapple. Two Grapples of Fronds were recovered to the vessel, the locations of these grabs can be seen in Figure 8. No evidence of any concrete mats was seen.

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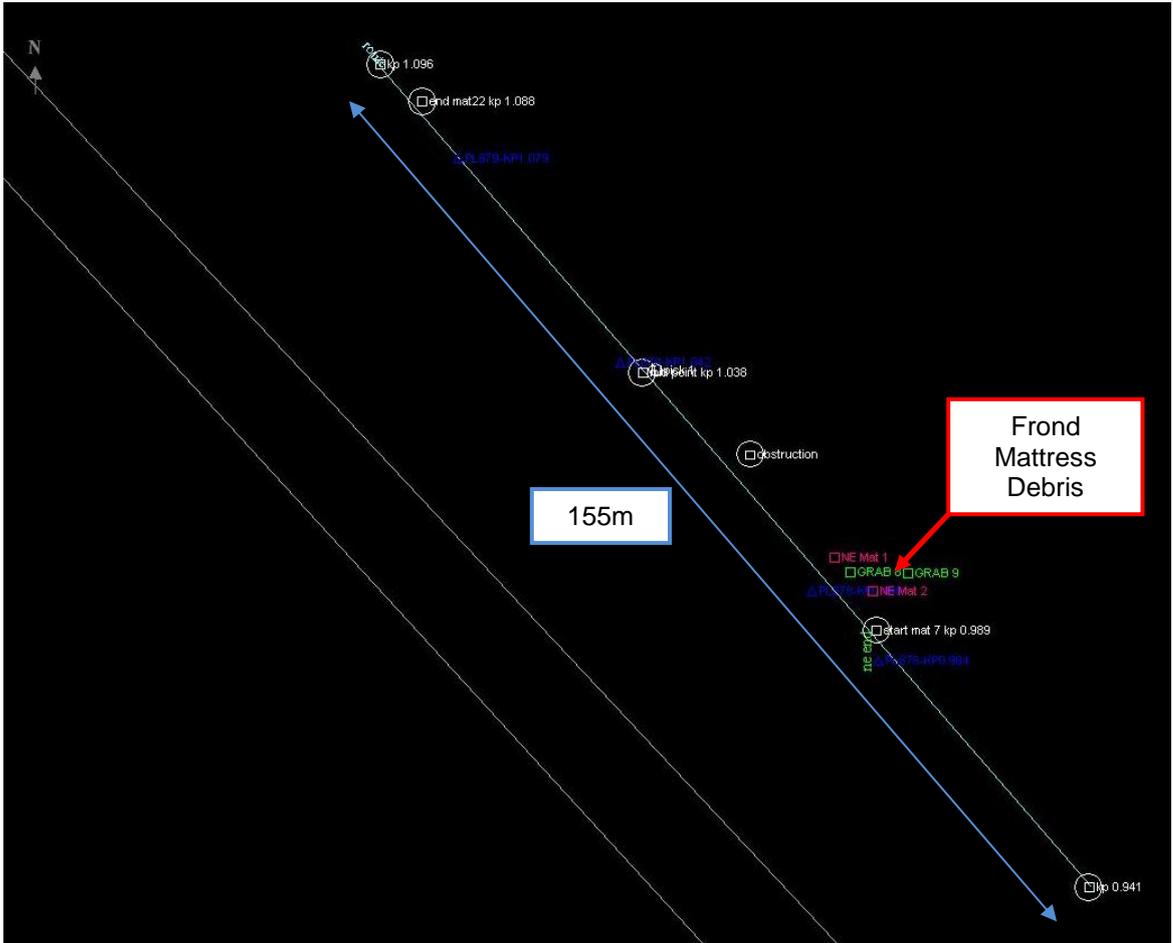


Fig 8- NW Mattress Location NAV Screen Grab

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Figure 9 shows ROV footage of the Hydraulic Grapple at the SW location with a load of Fronds prior to recovery to the vessel, with Fig 10 showing the Fronds in storage on deck.



**Fig 9- NW Mattress Location Grapple of Fronds**



**Fig 10- Recovered Fronds in storage on deck**

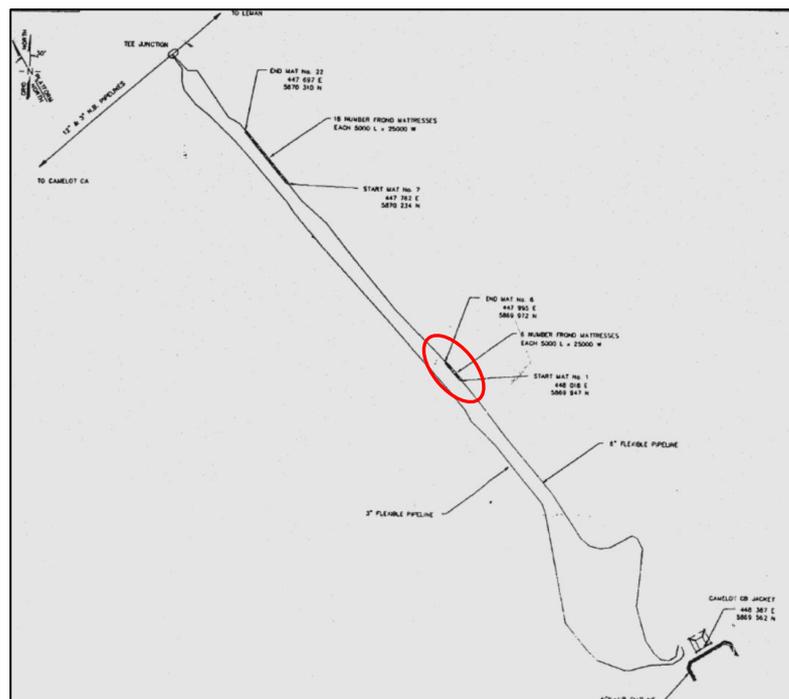
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## 2.4 MID MATTRESS LOCATION

Following operations at the NW mattress location, the vessel relocated to the MID mattress location and set up for mattress recovery operations. The pipeline was surveyed from KP 0.605 to KP 0.640 where mats were expected to be located as indicated in drawing no **AB6746-DR-20-044**. Historic ROV footage identified the following areas as possible mattress locations:

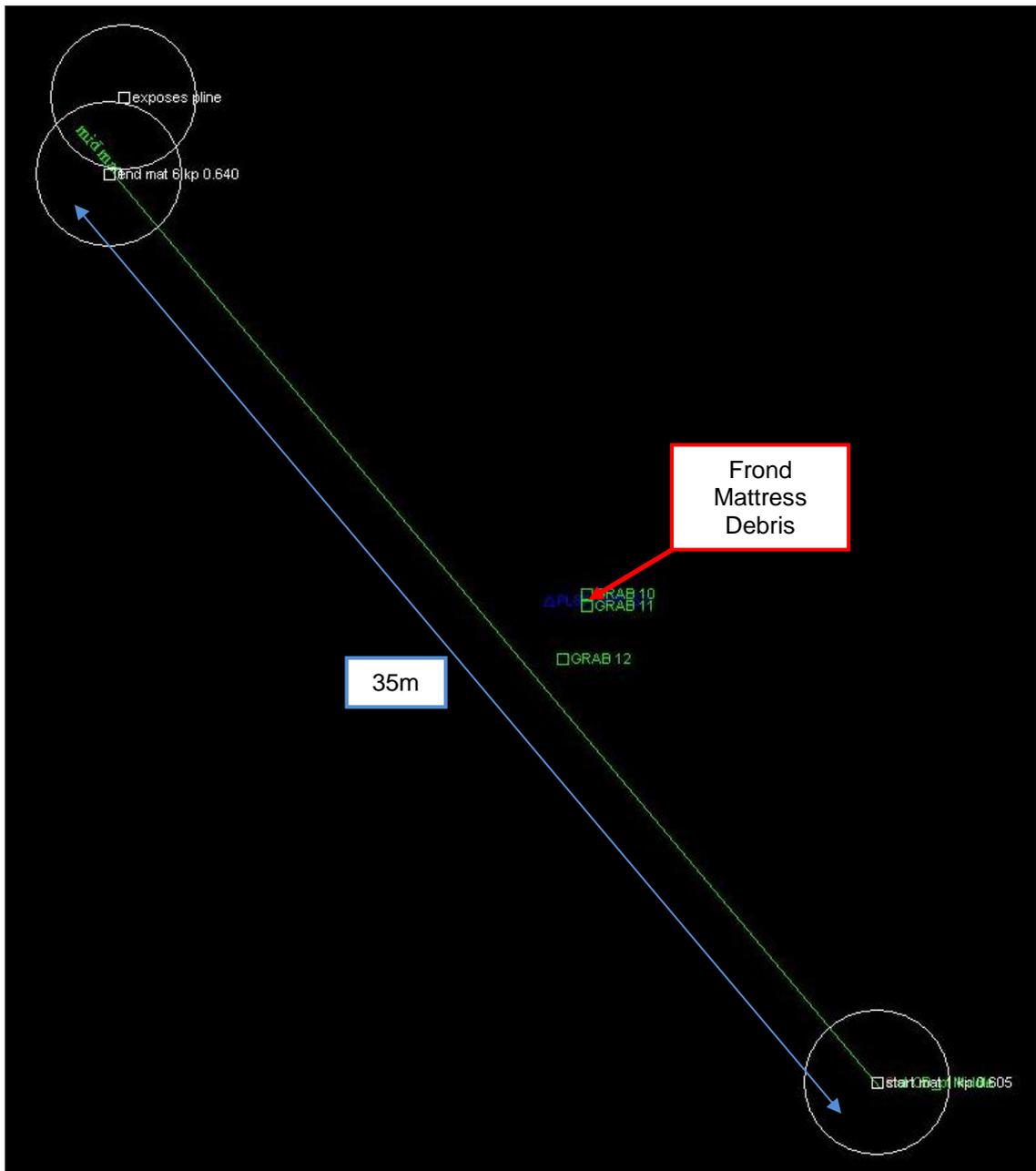
- KP 0.620

Using the TSS440, the Pipeline PL878 was positively identified and the grapple was deployed to commence mattress recovery operations. The Grapple achieved a depth of investigation of approximately 1m below seabed.



**Fig 11- MID Mattress Location**

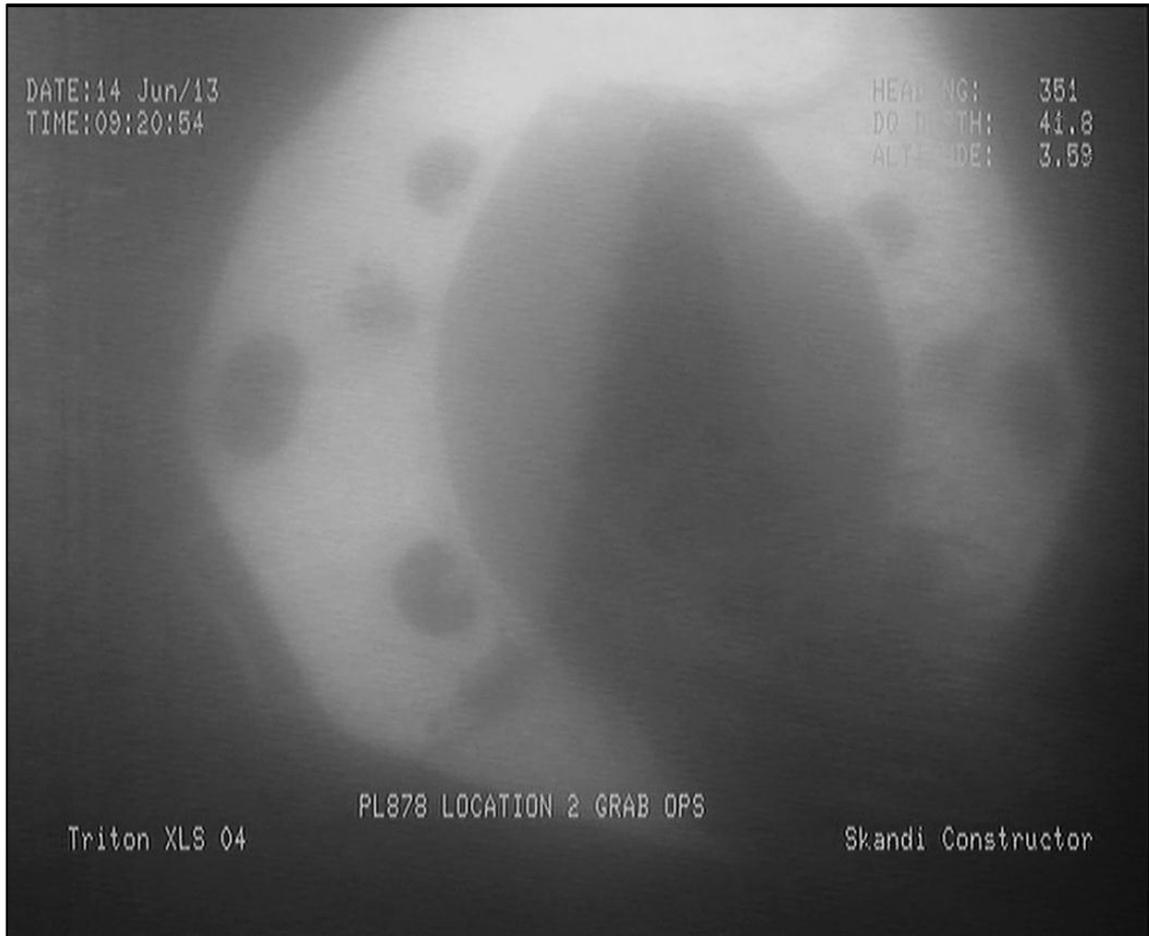
At the MID mattress location, three attempts were made to locate and recover the mats using the hydraulic grapple. Three Grapples of Fronds were recovered to the vessel, the locations of these grabs can be seen in Figure 12. No evidence of any concrete mats was seen.



**Fig 12- MID Mattress Location NAV Screen Grab**

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Figure 13 shows ROV footage of the Hydraulic Grapple at the MID location with a load of Fronds prior to recovery to the vessel.



**Fig 13- MID Mattress Location Grapple of Fronds**

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### 3.0 WELLHEAD RECOVERY OPERATIONS

The vessel set up over the Camelot 53/1a-5 wellhead (see **Appendix 4.1- Seabed Clearance Certificate** for geodetics and coordinates) and performed an As Found survey of the wellhead and surrounding area. Fishing net was found wrapped around the base of the wellhead however no other debris was found. The wellhead was initially drifted using a 13 3/8" Drift Tool and HUD was approximately 2' (Figure 14).



**Fig 14- 13 3/8" Drift Tool, 2' HUD**

Swarf and dense sludge were recovered with the drift tool. A sample of the swarf recovered to the vessel can be seen in Fig 14.



**Fig 15- Swarf sample recovered to the vessel**

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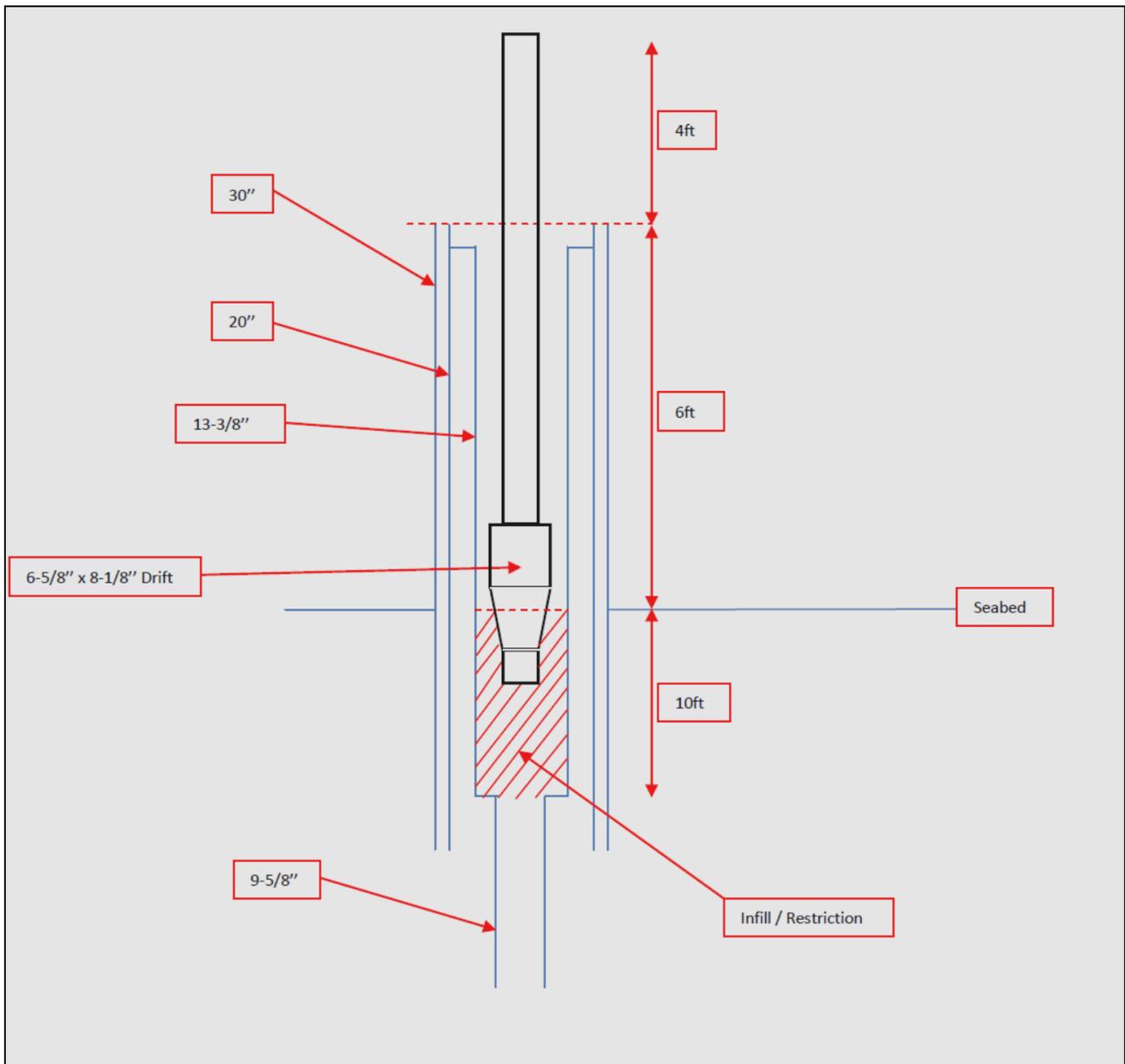
A Twin Air Compressor c/w high pressure airline and drift tool stem was rigged up and deployed subsea for stage 1 cleaning operations. A High Pressure Pump c/w high pressure water jet line was rigged up with the high pressure airline and deployed subsea for stage 2 cleaning operations (Figure 16).



**Fig 16- Stage 2 Cleaning Ops**

Stage 2 cleaning operations and 13 3/8" drifts were cyclically carried out. Drifts with a 6 5/8" x 8 1/8" Tool were also carried out. The HUD was approximately 6' indicating the possibility of an obstruction, as can be seen in Fig 17.

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**Fig 17- Wellhead Drift Operations**

The wellhead was rigged up for recovery and the Oceaneering-NCA Internal Multistring Cutting Tool was rigged up and deployed subsea for wellhead severance. The wellhead was cut and recovered to surface in approximately 6 hours (Figure 18). The severed wellhead recovered to surface measured approximately 1.8m in length and can be seen in Fig 19.

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**Fig 18- Severed Wellhead**



**Fig 19- Recovered Wellhead on deck**

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An ROV As Left Survey indicated an obstruction in the 13 3/8" Casing (Figure 20), which would prevent any additional internal cutting tool being used until cleared. The estimated stickup above the current seabed level is approximately 3ft. A 360° Sonar Sweep was also performed and a Seabed Clearance Certificate completed.



**Fig 20- Obstruction in 13 3/8" Casing**



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**4.0 APPENDICES**

**4.1 SEABED CLEARANCE CERTIFICATE**

### Seabed Clearance Certificate

LOCATION / WELL: CAMELOT FT-PLO, 53/1A-5 DATE: 15/06/13

COORDINATES Lat: 52°56'37"N Long: 2°1'52"E Geodetic Datum: EGSO/UTM31

METHOD OF SURVEY: ROV/SOVIAR

TYPE OF EQUIP. USED: ROV/BLUELETU CONTRACTOR: HELIX CAVALRY/SEATRONAUTICS

RANGE OF COVERAGE: 75m No. OF SCANS: 2

VESSEL HEADING (Indicate on Diagram): 180°

POSITIONS OF VESSEL RELATIVE TO WELL DURING SCANS: \_\_\_\_\_

HEIGHT OF SPANNING UNIT DURING SCANS: ROUTE : 1.5m (General/Survey ON WELL)

NATURE OF SEABED: FLAT TYPE OF WELLHEAD: 30"

TYPE OF RECORDS MADE: VISRO

VESSEL HEADING

SPECIFY SCALE OF DIAGRAM: 4m

Produced By Well Ops (UK) Ltd. Drawing Office Date: 31.05.13 Drawn: NGE Dwg No: MSC-009

LIST OF TARGETS				
POSITION (Lat. & Long)	APPROX. DIMENSIONS (M)	DESCRIPTION	Means of Identification	Y/N Recovered
1	N/A	N/A	NONE	A/C N/A
2				
3				
4				
5				
6				
7				
8				
9				
10				

MEANS OF IDENTIFICATION		REASONS FOR NOT REMOVING REMAINING DEBRIS	
A. SONAR SCAN	D. VESSEL RECORDS	SONAR STOWS CREW STABED	
B. DIVING INSPEC.			
C. ROV.			

**SIGNATURES (1)**

NAME: Robert Hamilton POSITION: Client COMPANY: HELIX ERT

**(2)**

NAME: Daniel Stuart POSITION: Project Engineer COMPANY: HELIX WELL OPS

**GUIDANCE NOTES**

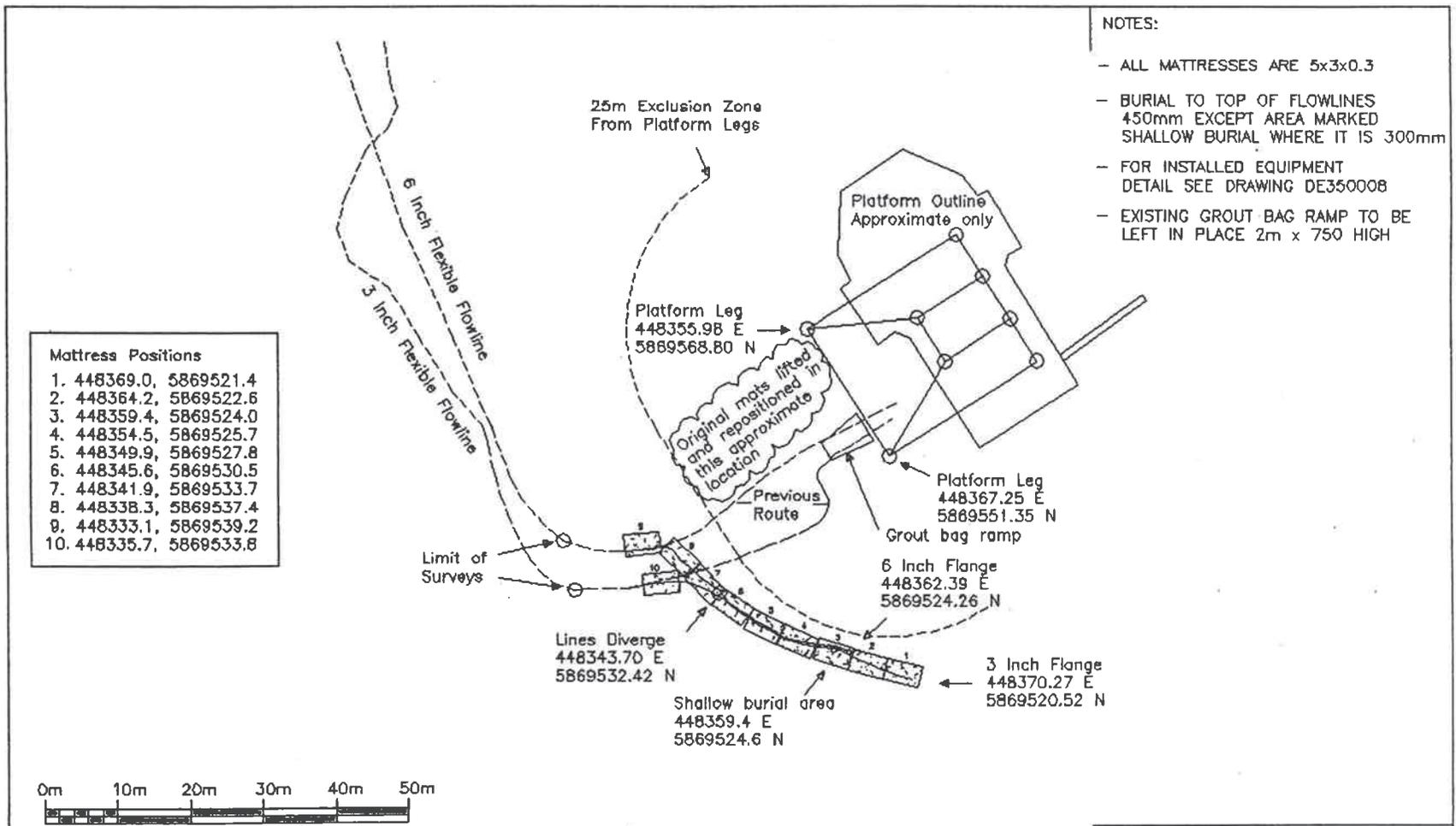
(1) Survey should extend to at least 70m from the wellhead.

(2) The first signatory should be the person responsible for the client or his representative. Second signatory should be the person supervising the seabed survey, i.e. the sonar operator, R.O.V. Supervisor.

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## 5.0 DRAWINGS

Item	Drawing No.	Description
1.	DE345007	BP AMOCO Camelot As Left Camelot B Platform Location
2.	AB6746-DR-20-044	3" & 6" Pipeline As-Laid Positions



- NOTES:
- ALL MATTRESSES ARE 5x3x0.3
  - BURIAL TO TOP OF FLOWLINES 450mm EXCEPT AREA MARKED SHALLOW BURIAL WHERE IT IS 300mm
  - FOR INSTALLED EQUIPMENT DETAIL SEE DRAWING DE350008
  - EXISTING GROUT BAG RAMP TO BE LEFT IN PLACE 2m x 750 HIGH

DO NOT SCALE		Sheet Size	A3		Lead Engineer			Project Manager			Client Approval		
					C. BLAHE								
					Date			Date			Date		
					02.08.99								
THIS IS A CAD PRODUCED DRAWING AND IS NOT TO BE CHANGED MANUALLY		Z1	04.08.99	AS LEFT	CT		Draughtman	Checker	Offshore Engineer				
		A1	30.07.99	ISSUED FOR COMMENT	AP		A. PROCTOR	CHRS TILLEY	J. RIXON				
IF IN DOUBT ASK		Rev	Date	Revision	Rev	By	Exp.	Project	Date	Date	Date		
									30.07.99	02.08.99	02.08.99		

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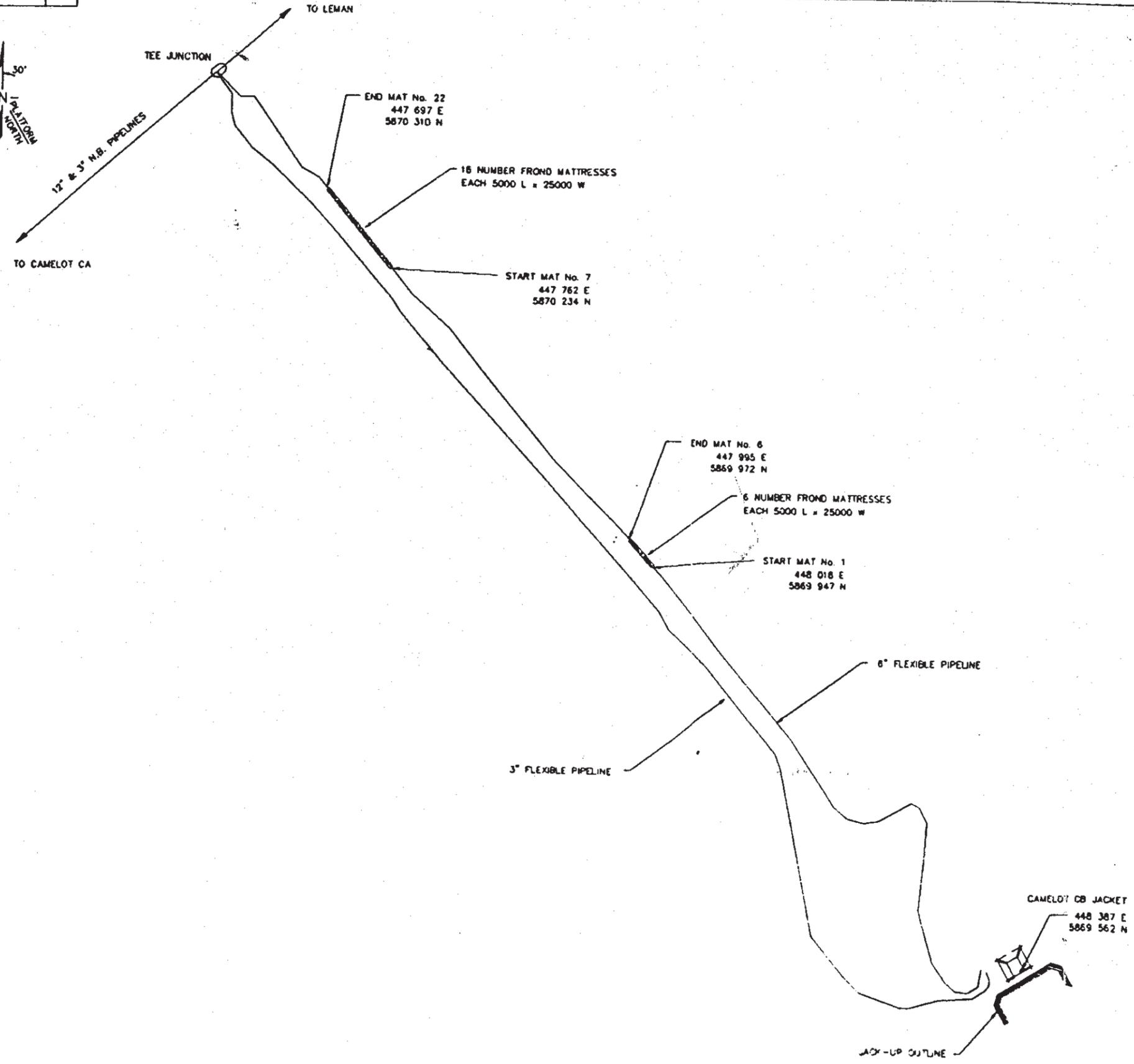
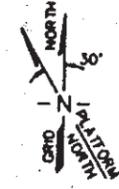
Project  
**CAMELOT DEVELOPMENT PROJECT**

BP AMOCO CAMELOT  
AS-LEFT CAMELOT B  
PLATFORM LOCATION

Like drawing Scale & Plotting Scale

Driving Number & CAD File Number

**NTS**      **DE345007**      **Z1**



REV	DATE	DESCRIPTION	BY	CHK	APP
1	13-11-92	ISSUED FOR CLIENT COMMENT / APPROVAL	LMC		
1	13-11-92	ISSUED FOR INTERNAL COMMENT	LMC		

**S** Seaway (UK) Ltd.

PROJECT: CAMELOT DEVELOPMENT PROJECT

CLIENT: MOBIL NORTH SEA LTD.

TITLE: 3" & 6" PIPELINE AS-LAID POSITIONS

SCALE: 1:2000

DATE: 13-11-92

BY: LMC

CHK: [Signature]

APP: [Signature]

PROJECT NO: ABB746-DR-20-044

FILE NO: B746-044

REV: 1A

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