Camelot CA Platform
Camelot CA Pipelines
Camelot CB Pipelines

Decommissioning Programmes

29 June 2012

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ABBREVIATIONS USED

Bcf	**Billion cubic feet**
CA	**Camelot Alpha**
CB	**Camelot Bravo**
CO2	**Carbon Dioxide**
cSAC	**candidate Special Area of Conservation**
DSV	**Dive Support Vessel**
EIA	**Environmental Impact Assessment**
EMS	**Environment Management System**
ERT	**Energy Resource Technology (UK) Limited**
ERRV	**Emergency Rescue and Response Vessel (stand by boat)**
ES	**Environmental Statement**
EU	**European Union**
ft	**Feet**
HLV	**Heavy Lift Vessel**
HSE	**Health and Safety Executive**
Km	**Kilometre**
KP	**Kilometre Point**
LAT	**Lowest Astronomical Tide**
lb/ft	**Pounds weight per Foot length**
LSA	**Low Specific Activity**
MEG	**Mono Ethylene Glycol**
MMO	**Marine Management Organisation**
MODU	**Mobile Offshore Drilling Unit**
NFFO	**National Federation of Fishermans Organisations**
NORM	**Naturally Occurring Radioactive Material**
NUI	**Normally Unmanned Installation**
OSPAR	**Oslo Paris convention for the protection of the marine environment**
PPM	**Parts Per Million**
psi	**Pounds per square inch pressure**
ROV	**Remote Operated Vehicle**
SAC	**Special Area of Conservation**
SNS	**Southern North Sea**
UKCS	**United Kingdom Continental Shelf**
US	**United States**
WROV	**Work-class ROV**

1. INTRODUCTION

This document contains the combined decommissioning programmes for the Camelot CA platform, the Camelot CA pipelines and Camelot CB pipelines. This document outlines the decommissioning options considered and the final recommended solution. These decommissioning programmes have been developed by 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). 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).

The Camelot CA platform and the Camelot CA and CB pipelines are owned 50% by Energy Resource Technology (UK) Limited and 50% by ERT Camelot Limited. Apache no longer has any ownership in any Camelot facilities but remain a section 29 notice holder. The three section 29 notices discussed in this document are described below.

The Camelot CA platform section 29 notice holders are ERT, ERT Camelot Limited and Apache.

The Camelot CA pipeline section 29 notice holders are ERT, ERT Camelot Limited and Apache.

The Camelot CB pipeline section 29 notice holders are ERT, ERT Camelot Limited and Apache.

The three decommissioning programmes included in this document are as follows. The first is the decommissioning programme for the Camelot CA platform. The second decommissioning programme is for the Camelot CA pipelines. The third decommissioning programme is for the Camelot CB pipelines. There are separate section 29 notices for the Camelot CA platform, the Camelot CA pipelines and the Camelot CB pipelines. These Camelot Decommissioning Programmes have been developed in accordance with the requirements of the Petroleum Act 1998 as amended by the Energy Act 2008. These final Camelot Decommissioning Programmes are now issued for formal consultation including a public consultation as required.

The combined programmes use the same section heading shown in table 1.0 below.

Table 1.0

SECTION	CA PLATFORM	CA PIPELINES	CB PIPELINES
1 Introduction	Combined	Combined	Combined
2 Executive summary	Combined	Combined	Combined
3 Background information	Separate	Separate	Separate
4 Descriptions	Separate	Separate	Separate
5 Inventory of materials	Separate	Separate	Separate
6 Decommissioning options	Separate	Separate	Separate
7 Selected options	Separate	Separate	Separate
8 Wells	Separate	N/A	N/A
9 Drill Cuttings	Separate	N/A	N/A
10 Environmental impact assessment	Combined	Combined	Combined

11 Interested party consultations	Combined	Combined	Combined
12 Costs	Separate	Separate	Separate
13 Schedule	Combined	Combined	Combined
14 Project management and verification	Combined	Combined	Combined
15 Debris clearance	Combined	Combined	Combined
16 Monitoring and maintenance	Combined	Combined	Combined
17 Supporting studies	Combined	Combined	Combined

Where the information required in a section is the same for all programmes then it is shown as combined. In this case the single section will apply in full for each of the decommissioning programmes.

Where the information required in a section is different for each of the programmes then that information is shown separately in that section but under the heading of relevant decommissioning programme.

As sections 8 Wells and section 9 Drill Cuttings do not apply to the pipeline decommissioning programmes they are only used for the platform decommissioning.

2. EXECUTIVE SUMMARY

The Camelot Fields are located in the Southern Basin of the United Kingdom Continental Shelf (UKCS) in Block 53/1a and the actual Camelot CA platform is located 80km from Great Yarmouth which is the nearest port. The Camelot fields consist of five gas reservoirs with condensate traces grouped into three fields. These three fields are Camelot Central South, Camelot North and Camelot North East. The fields were discovered in 1967 by Mobil and production commenced in 1989 from Camelot Central South and Camelot North through the Camelot CA platform using wells A1 to A5. In 1992 a second platform Camelot CB was installed over Camelot North East and in 1993 well A6 was drilled from the Camelot CA platform into the Cador accumulation and this was subsequently determined as part of the Camelot North field.

In 1998 the Camelot CB platform ceased production and in 2000 Mobil submitted a decommissioning programme for the Camelot CB platform. This programme was approved in 2001 and was then revised in 2002 to reflect the decision to re-use the platform. The Camelot CB platform was removed in 2002 and was later modified and re-used on another UK gas field. The Camelot CB pipelines were disconnected from the Camelot CB platform in 1999 and were not part of the Camelot CB decommissioning programme. For this reason the Camelot CB pipelines were placed into the DECC interim pipeline regime and have been inspected on a regular basis to ensure all decommissioning options remain available.

The last production from the Camelot CA platform was June 2009 and subsequent attempts to get the wells back on line were unsuccessful due to low well pressure, equipment failures and integrity problems with the surface process piping. Based on a cumulative production of 247Bcf it has been estimated that around 92% of the gas initially in place has been recovered. The formal Cessation of Production document has been approved by the licensing group of DECC.

In August 2010 the Joint Nature Conservation Committee and Natural England proposed a candidate Special Area of Conservation (cSAC) called Haisborough, Hammond and Winterton. This proposed cSAC includes the Camelot CA platform which exactly 1 km inside the North Eastern boundary on the crest of the Smiths Knoll sandbank. The cSAC also includes exactly 1.1km of the Camelot CA pipelines. The cSAC selection assessment document version 6 states 'The North East corner of the site …. contains very low diversity communities in gravelly and sandy sediment.' The assessment document also states 'The fauna of the sandbank crests is predominantly low diversity polychaete-amphipod communities which are typical of mobile sediment environments.'

Although the Camelot area contains no Annex I habitat or Annex II species the Holders have commission an independent Environmental Impact Assessment (EIA) of the decommissioning options to assess the overall impact on the environment from the various decommissioning activities. This EIA has included a Comparative Assessment (discussed in section 7.0) which looked at all the relevant alternatives and determined the impact in each case. These supporting documents are available directly from Energy Resource Technology (UK) Limited on request.

The Holders have commissioned a risk assessment of the decommissioning options identified to assess the overall risk to the personnel required to execute each work option. The results of the risk assessments have allowed a direct comparison to be made between the risks of each option. Where concerns were raised with the programmes then changes were made as

appropriate. This work also includes the preparation of a decommissioning safety case which has been approved by the HSE 9 June 2011 and a dismantling safety case that is currently being developed.

The Holders will consider and review all the comments and suggestions received through this consultation process. In the event that concerns are raised with the programmes then changes can be made as appropriate in discussion with DECC.

Regarding the Camelot CA platform decommissioning programme the Holders are aware that the jacket and topside will have to be removed and brought ashore to meet the requirements of the OSPAR Decision 98/3. There is no allowable option to abandon the platform in situ so for this reason removal is the only option being proposed.

The Holders have looked at the potential to reuse elements from the Camelot CA platform for Oil and Gas activity but feedback to date suggests that this is may not be possible to arrange. In the case of the process equipment the age of the facility and the changes in legislation and certification requirements make it difficult to re-use for production without extensive modifications. The jacket was only built for 11m of water so is too small to re-use anywhere else. The Holders continue to look at re-use options and any possible change to these decommissioning programmes will be discussed and agreed with DECC if appropriate.

In the current circumstances the Holders believe that the most effective solution for the recovered Camelot CA platform is to arrange for the recycling of as much of the material as is possible. Given the significant weight of metals it is expected that a high percentage of all recovered materials will be recycled.

The Camelot CA pipelines (PL624 and PL625) are currently trenched and buried with a cover of rock armour where the pipelines cross other third party pipelines. As the pipelines currently appear to be stable along most of the length the Holders believe that once flooded the loss of buoyancy will improve the stability. This makes it possible to leave the seabed undisturbed by leaving the flushed and cleaned pipelines buried in place. The ends are to be disconnected and cut back to the entrance of the rock armour following removal of the 7 concrete mats installed to protect the ends.

The Camelot CB pipelines (PL878 and PL879) were disconnected from the Camelot CB platform in 1999 and are trenched and buried along most of their length. If the pipelines appear to be stable on the seabed the Holders intend to leave the seabed undisturbed and leave the flushed and cleaned pipelines buried in place. 22 concrete mats have been used at various locations along the Camelot CB pipelines. These concrete mats were fitted with frond nets to encourage natural burial and this appears to have been effective. The intention is to inspect the location of the frond mats and all reasonable attempts will be made to locate and remove these mattresses.

To ensure that both sets of pipelines are stable the Holders have already undertaken a detailed pipeline baseline survey in March 2011. This survey measured the precise location of the pipelines along with the position of the seabed. This data was then used to calculate the depth of burial along the lines including the depth of burial where the concrete mats were positioned. The depth of burial information has been illustrated in graph 1 shown in the Appendix.

In the case of PL624 and PL625 the graph shown that along 97% of the pipeline length the top of the pipeline is either level with the seabed or buried below. The graph also shows that along

59% of the pipeline length the top of the pipeline is either 0.5 meters below the seabed or deeper. In the case of PL878 and PL879 the graph shown that along 93% of the pipeline length the top of the pipeline is either level with the seabed or buried below. The graph also shows that along 63% of the pipeline length the top of the pipeline is either 0.5 meters below the seabed or deeper. Further details of this survey are given in section 4 and section 6.

To ensure that the decommissioning programmes are executed effectively the Holders plan a number of different surveys. The first set of survey work consists of three different surveys which are made up as follows. The first survey is the baseline pipeline survey which was completed in March 2011 as mentioned above. This survey was the initial record of the location of all the pipelines. The second survey is the site 'as left' survey once the Camelot platform has been removed. This will include an ROV survey and a trawl sweep of the former platform location and the pipeline corridors. The third survey will be the first post-decommissioning environmental survey of the Camelot location to record the marine biology in the area following removal of the platform and jacket. This will be done once the platform is removed in the second half of 2012.

The next set surveys will take place two years after the decommissioning activity which should be around August 2014. The two surveys to be undertaken will be a repeat pipeline survey to record the location of all pipelines for comparison with the original baseline survey. This survey will also check that the cut piles of the CA platform remain sufficiently buried. The second survey is a repeat environmental survey to be done two years after the decommissioning and this will then be compared to the baseline environmental survey.

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

The Holders believe that the surveys mentioned above meet the requirements of DECC for two post removal pipeline and environmental surveys. The Holders intend to provide the survey results to DECC and these results and the need for further surveys will be discussed and agreed with DECC. Further details on the survey work planned can be found is section 16. The scope of work for the proposed surveys will be discussed and agreed with DECC.

The Holders currently intend to complete the decommissioning activity in 2012. The detailed schedule will depend on the availability of equipment and personnel but the high level schedule is to clean the pipelines, plug the platform wells, disconnect the pipelines, prepare the topsides, lift off the topsides, cut the piles, remove the jacket and then recycle all recovered material onshore.

The costs associated with the current decommissioning programmes are outlined later in this document in section 12.

The key feature of the proposed platform decommissioning programme is the fact that it is completely in line with OSPAR requirements so no derogations will be required.

3. BACKGROUND INFORMATION

Camelot CA facilities to be decommissioned.
The Camelot CA platform is a Normally Unmanned Installation (NUI) in 11m of water and located some 80km from the nearest port Great Yarmouth. Gas was exported to the nearby Leman complex. The installation consists of the following components which are illustrated in figure 1 in the appendix.

A single 700 ton jacket including weight of piles
A single 1,212 ton topsides including processing equipment
Six platform wells with 5-1/2 inch completions (not shown)

Pipelines to be decommissioned
Camelot CA
The Camelot CA pipelines connect the Camelot CA platform with the Leman 27A host facility. The pipeline infrastructure consists of the following components which are illustrated in figure 2 in the appendix.

One 12" concrete coated steel gas export pipeline (PL624) of length 14.424km
One 3.5" steel MEG pipeline (PL625) of length 14.424km strapped to the 12" line
One pipeline crossing over the live 30" Leman 27B to Bacton line
One pipeline crossing over the live 20" Leman C to Leman A line
One pipeline TEE where the CB lines join the CA lines
7 concrete mattresses located at the CA tie in spools at the Camelot CA platform end.

Camelot CB
The Camelot CB pipelines are connected to a TEE in the Camelot CA pipelines and run out to the former location of the Camelot CB platform which was already removed in 2002. The pipeline infrastructure consists of the following components which are illustrated in figure 2 in the appendix.

One 6" flexible gas export pipeline (PL878) of length 1.226km
One 3" flexible MEG pipeline (PL879) of length 1.244km
22 concrete mattresses located at points along the CB pipeline

Adjacent Facilities
The Camelot platform ties back to the Perenco Leman 27A platform which acted as the host for all Camelot production. The only other adjacent facilities are those related to the Leman field.

These are shown in figure 3 in the appendix and include the following: The live 30" Leman 27B to Bacton pipeline (PL24) which is crossed by the Camelot pipelines. The live 20" Leman 27C to Leman 27A pipeline (PL107) which is crossed by the Camelot pipelines. The adjacent platform are the Leman 27H platform which is located 4.2 nautical miles from Camelot, the Leman 27J platform which is 5.6 nautical miles from Camelot and the Leman 27C platform which is 6.1 nautical miles from Camelot.

Camelot Location

The Camelot field is located in block 53/01A some 80km from Great Yarmouth which is the closest port. This is illustrated in figure 4 in the appendix.

Prevailing Conditions

As an unmanned facility no regular records were kept of the prevailing conditions at Camelot so typical Southern North Sea conditions have been used. This typical data indicates that winds exceed force 7 just 7% of the year and significant wave heights exceed 3 meters less than 3% of the year. Tidal currents are up to 1.2 knots neap and 2.2 knots spring and the residual water current in the area is generally NNE to SSE following the overall water circulation pattern which is in and out of the English Channel. The platform and pipeline surveys from 2007, 2008 and 2011 show a sandy seabed with strong current evidence. The surface sea temperatures reach 15°C in summer and 5 °C in winter.

Marine Activity

As the Camelot platform is situated in just 11m of water on a sand bank it is away from the regular shipping lanes and as such sees little activity in the immediate area. Since the installation of the Camelot platform in 1989 there have been no reported near miss incidences from the Leman ERRV which provided radar cover for the area. There has also been very little fishing activity reported around the Camelot facility and ROV surveys of the seabed around the installation have detected no interaction with any other marine activity. The Marine Management Organisation (MMO) UK Sea Fisheries Statistics 2009 show a very low level of fishing activity in the IVc(6.2) sector off Lowestoft which includes the Camelot area. The total 2009 landings from the sector were 6,200 tons which is just about 1% of the UK total catch and is in fact the lowest reporting sector in the UK.

Marine Biology

A detailed review of the marine biology in the Camelot area has been included in the Environmental Impact Assessment. This review looks first at the plankton, phytoplankton and zooplankton which are abundant in the area and typical of what is found in the Southern North Sea. This marine life has no particular sensitivities to the proposed decommissioning activity. The review then looks at the Benthos and notes that the fauna of the sandbank crests around Camelot are predominantly low diversity polychaete-amphipod communities which are typical of mobile sediment environments. The review details the fish communities typically found in the Camelot area and these include Lemon Sole, Sprat, Sand Eels, Sole Mackerel and Plaice. The breeding and life cycle patterns of these fish vary from season to season over a wide area so although it is almost impossible to avoid coincident decommissioning operations however the fish have a low sensitivity to the activities proposed. The review also looks at marine mammals and although the concentrations are mostly low all cetacean species are listed in Annex IV of the EU Habitats Directive, which protects them from any deliberate disturbance. For this reason no explosives are to be used in this decommissioning programme. The review finally looks at seabirds in the area and notes that the seabird vulnerability to oil pollution in the Camelot area is mostly low to occasionally moderate. However as Camelot produces no oil the planned decommissioning operations should have no impact on the seabird population.

4. DESCRIPTIONS OF ITEMS TO BE DECOMMISSIONED

CAMELOT CA PLATFORM PROGRAMME

Jacket and Topsides
The Camelot jacket has four tubular steel legs of conventional construction. Each leg has an internal pile cut off at elevation + 9.00m. The total weight of the jacket is estimates at 700 tons. This is made up of the base at 410 tons, the leg extensions at 100 tons, the piles at 160 tons, the risers at 10 tons, anodes at 10 tons and marine growth estimated at 10 tons.

The jacket supports topsides weighing 1,212 tons. The Camelot topside structure comprises four levels. The lower level is the cellar deck with the metering skid and slops tanks. The mezzanine deck has the wellheads, process piping, hydraulic pressure equipment and generators. The main deck has a 20m by 15m free area directly above the wells and behind a blast wall is the control room and temporary accommodation facilities. There is also a pedestal crane and vent boom. The main deck is 32m above Lowest Astronomical Tide (LAT) sea level. The final upper level is the helideck.

Platform Wells
There are six platform wells drilled from Camelot into the four identified accumulations. The wells are all deviated to different degrees to reach the targets in the four reservoirs. The wells A1 to A5 were all completed with a single production string of 5-1/2 inch tubing with a weight of 23 lb/ft. Well A6 was also completed with 5-1/2 tubing but with the addition of a tail section of 4-1/2 tubing. Well A1 to A5 were all completed inside the 9-5/8 casing where the production packer is set. Well A6 includes a 7 inch liner where the production packer is set. The gas pressures in the wells are all now sub-hydrostatic so the decommissioning plugs are actually required to keep the seawater out rather than the gas in. The wells are as follows:

53/1a-A1, tubing length to packer 7,900ft, gas pressure 1461psi, seawater pressure 2874psi.
53/1a-A2, tubing length to packer 8,428ft, gas pressure 1135psi, seawater pressure 2811psi
53/1a-A3, tubing length to packer 8,459ft, gas pressure 1188psi, seawater pressure 2798psi
53/1a-A4, tubing length to packer 6,235ft, gas pressure 931psi, seawater pressure 2812psi
53/1a-A5, tubing length to packer 8,338ft, gas pressure 786psi, seawater pressure 2796psi
53/1a-A6, tubing length to packer 12,676ft, gas pressure 1629psi, seawater pressure 2882psi

CAMELOT CA AND CB PIPELINES PROGRAMMES

Pipelines
The pipelines included in the decommissioning programme for Camelot are as follows:-

Camelot CA pipelines
These run from Camelot CA to Leman 27A and consist of two pipelines.
The first is the
Camelot CA gas export line PL624
Which is a 12" diameter pipeline, 14.424km long made of X52 Grade Steel with a 70mm concrete weight coating.
The second line is the
Camelot CA MEG line PL625
Which is a 3.5" diameter pipeline, 14.424km long made of X52 Grade Steel with a 0.4mm Fusion Bonded Epoxy coating. This 3.5” line is strapped to the 12” for stability.

Camelot CB pipelines
These run from the former Camelot CB location to a TEE in the Camelot CA pipeline and consist of two pipelines.
The first is the
Camelot CB gas export line PL878
Which is a 6" diameter pipeline, 1.226km long made of flexible steel reinforced plastic
The second line is the
Camelot CB MEG line PL879
Which is a 3" diameter pipeline, 1.244km long also made of flexible steel reinforce plastic.

All the Camelot pipelines are no longer in use and the latest subsea survey in March 2011 found for the most part that the pipelines were buried under the natural seabed with no evidence of original trenching. In the case of the Camelot CA 12" gas export pipeline PL624 and the piggyback Camelot CA 3.5" MEG pipeline PL625 it was found that along 97% of the pipeline length the top of the pipeline was either level with the seabed or buried below. For the Camelot CB 6" gas export pipeline PL878 it was found that along 96% of the pipeline length the top of the pipeline was either level with the seabed or buried below. For the Camelot CB 3" MEG pipeline PL879 it was found that along 93% of the pipeline length the top of the pipeline was either level with the seabed or buried below.

The March 2011 survey has recorded the actual position of the pipeline along the route with a cross section of the seabed which shows the location of the pipe with respect to the adjacent seabed and mean seabed. This survey has also recorded the protective rock mounds that were placed during the original construction over the two pipeline crossings and the TEE connection. There is no evidence from the ROV surveys of any interaction or impact on the pipelines from fishing gear or other marine users. This suggests that the pipelines are not a risk to other marine users.

The Camelot CB pipelines have already been flushed and cleaned when they were disconnected in 1999. This flushing process reduced the hydrocarbon content to a level that allows the ends to be left open to the seabed. This is usually a level of less than 40 parts per million of hydrocarbon in water. The Camelot CA pipelines have been vented and de-pressured ready for flooding, flushing and cleaning. These operations were completed as part of the pre-decommissioning process.

Concrete Mats
Protective concrete mats have been used at two locations. There are 22 concrete mats along the 6 inch flexible Camelot CB pipeline which have been fitted with frond elements to encourage natural sand backfill and which currently appear to be buried. The March 2011 survey only found the frond elements sticking out from the seabed. The sonic seabed profiling devices were unable to detect the actual concrete mats as they are of a similar density to the seabed. There are also 7 concrete mats over the tie in spools at the Camelot platform which remain on the seabed surface. Further information on the location of the various concrete mats and the burial depth will be obtained in the next survey planned by the Holders.

Materials on the Seabed

Results from the March 2011 survey suggest that there are no oil related debris or drill cuttings at the Camelot platform location or along the pipelines. Should future survey detect any oil related debris then this will be removed to leave the seabed clear.

5. INVENTORY OF MATERIALS

CAMELOT CA TOPSIDE			
Item	Description	Tons	Material
1	Structural Steel	700	Carbon Steel
2	Piping	110	Carbon Steel
3	Vessels	50	Carbon Steel
4	Machinery	50	Carbon Steel
5	Floor Grating	120	Galvanised steel
6	Hand rails	30	Galvanised steel
7	Cables	10	Plastic coated copper
8	Cable trays	15	Stainless Steel
9	Electrical cabinets	10	Stainless Steel
10	Helideck	30	Aluminium
11	Firewall coating	20	Cement bond
12	Thermal insulation	15	Mineral fibre
13	Electrical equipment	10	Miscellaneous
14	Fuel	5	Marine diesel
15	Lube oil	1	Marine lubricant
16	Small bore piping	5	Stainless Steel
17	Lead acid batteries	1	Miscellaneous
18	Accommodation	30	Miscellaneous
Total		1212	

CAMELOT CA JACKET			
Item	Description	Tons	Material
1	Jacket	510	Carbon steel
2	Piles	160	Carbon steel
3	Risers	10	Carbon steel
4	Anodes	10	Aluminium alloy
5	Marine growth	10	Marine growth
Total		700	

CAMELOT CA PIPELINES			
Item	**Description**	**Tons**	**Material**
1	**12 inch gas export**	**1,811**	**Carbon Steel**
2	**3.5 inch MEG**	**229**	**Carbon Steel**
3	**Anodes**	**45**	**Aluminium alloy**
4	**12 inch concrete coat**	**2,359**	**Concrete**
	Total	**4,444**	

CAMELOT CB PIPELINES			
Item	**Description**	**Tons**	**Material**
1	**6 inch gas export**	**72**	**Flexible pipe**
2	**3 inch MEG**	**36**	**Flexible pipe**
3	**Concrete Mats**	**100**	**Concrete**
	Total	**208**	

The produced hydrocarbons from Camelot only consisted of natural gas and small quantities of associated condensate. Residual hydrocarbons are to be flushed with seawater into a filtration system where persistent hydrocarbons are separated into a holding tank for transport and disposal onshore. Following this cleaning the Holders do not expect to find any residual produced hydrocarbons. The Camelot diesel generators will remain in service to maintain the navigation lighting and other safety systems up until the final removal of the topside. For this reason a small stock of diesel and lubrication oil will be maintained on board as shown above. Other than the materials listed above the Holders are unaware of any hazardous or restricted items on Camelot.

A full onboard equipment inventory with a tag list has been used as part of the original maintenance system and this will be available to onshore contractors dealing with re-use/disposal processes. Give the age of the asset and topside equipment the Holders do not expect to be able to re-use any of the Camelot machinery and the current programmes is that all material will be broken down for recycling where appropriate facilities exist.

LSA and NORM.
There is no evidence of any scale deposits in the process equipment and no radioactive Low Specific Activity (LSA) material or Naturally Occurring Radioactive Material (NORM) has been detected. A radioactivity survey was done around the platform in January 2011 and found only background trace readings that are in line with the UK average.

Further radioactive surveys will be undertaken before any equipment is delivered for re-cycling. The Holders can confirm that all appropriate regulations and requirements will be adhered to should any LSA or NORM be encountered.

6. DECOMMISSIONING OPTIONS

To evaluate the most acceptable decommissioning option the Camelot field infrastructure has been divided into separate components as follows:

CAMELOT CA PLATFORM PROGRAMME

Jacket & Topsides Removal Options

The Holders are aware that the Camelot jacket and topside will have to be removed and brought ashore to meet the requirements of the OSPAR Decision 98/3. There is no allowable option to abandon the platform in situ so for this reason removal is the only option being proposed. For this reason there is no requirement for an environmental comparative assessment but the Holders have completed an Environment Impact Assessment (EIA) that reviews all the environmental impacts foreseen from the platform removal activities. A summary of the EIA results is included in section 10 and the summary Environmental Statement (ES) is available on request from the Holders. This section of the document will review the removal options considered which were as follows:

Heavy Lift Removal

This is the use of a suitable Heavy Lift Vessel (HLV) crane barge that can lift the various Camelot platform components as complete units. These are the 1212 ton Camelot topside and the 700 ton Camelot jacket which can be removed in the reverse manner of the original installation. This would be achieved by cutting the topside free of the jacket to allow the crane barge to lift off the topside package and place it on a waiting transport barge. An abrasive cutting jet is then lowered inside each of the four leg/piles to cut them 3m below the seabed. With the jacket cut free the crane barge would then lift the jacket off the seabed and place it on the waiting transport barge. The transport barge is towed to a suitable onshore facility where it is offloaded with a set of heavy lift self propelled trailers. This method has been successfully utilised on a number of occasions in the Southern North Sea (SNS) and is the reverse of installation. The removal of the topsides and jacket by HLV is now standard practice for marine contractors.

Piece Small Removal

This is the use of a smaller work boat which is rigged up right next to the Camelot platform from where equipment can be deployed to cut the topside and jacket into small pieces for removal to shore. As the topside is cut up the components are segregated offshore and loaded into conventional transport containers as appropriate. A supply boat then brings the containers to port where the containers can them be transported to the appropriate recycling facility. The jacket is also cut up into smaller pieces with the assistance of underwater equipment. This method has been used in Norway and the United States (US).

Jacket and Topside Recycling

In both removal options the entire jacket and topside are removed to shore for recycling. At the recycling facility conventional equipment is used pull the topside and jacket apart with the components being segregated as appropriate for recycling. Equipment which cannot be re-used together with dismantled components will be recycled. Material where no effective environmental recycling option exists will be sent to landfill. This will only be done where the incremental use of resources and energy to recycle exceed the impact of using landfill. The Holders will consider disposal sites throughout the North Sea area. The chosen shore facility must demonstrate a proven disposal track record, a proven waste stream management

throughout the deconstruction process and imaginative recycling options. Any marine growth recovered with the jacket will composted where possible.

The precise waste streams and respective quantities will be identified during a waste inventory. This survey will identify the existence and quantity of any hazardous, toxic or radioactive substances. No LSA or NORM has been reported although ongoing inspections will take place during the decommissioning process. Any authorisations required for the disposal of these substances will be obtained should these substances be found on site.

Any waste that arises from the deconstruction of Camelot would be treated in accordance with all relevant legislation and best practices. The wastes will be categorized and handled in such a manner so as to not present any threat to the local environment. Generally, special wastes will be transported from the site in sealed containers. Procedures for NORM, LSA scale and radioactive components will be handled in accordance with the approved procedures of specialist contractors should these materials be found on site.

In order to maximise the reuse, recovery and recycle rate for the platform wastes and to minimise the amount of materials destined for landfill or incineration, segregation of individual wastes as far as is reasonably practical is necessary. Segregating wastes will also reduce the energy used in transporting materials to recycling facilities as the material inventories may be moved in single movements. Each individual waste stream shall be assessed in order to develop the most favourable disposal option.

CAMELOT CA AND CB PIPELINES PROGRAMMES

Pipelines Options

Following a review of the pipeline system and components a number of options were identified. This section of the document will review the removal options considered which were as follows:

Complete Removal

The complete removal of the four pipelines could be achieved by excavating all the pipelines from below the seabed and then recovering them through a reverse lay process. In the case of the Camelot CB flexible lines this would be a reverse reeling process. For the Camelot CA lines this would have to be a reverse S-lay process. The biggest issue with the reverse S-lay however is the removal of the 12 inch gas export line which has a 70mm concrete weight coating. The reason this is an issue is because the concrete coating is very susceptible to bending which means that the if the pipe is to be recovered then large recovery tensions will be required to keep it as straight as possible and so avoid bending the concrete which otherwise would crack and could fall off in significant volumes. To achieve the required recovery tensions in the shallow water around Camelot it is necessary to use a conventional anchored pipe-lay barge. With a conventional barge the anchors have to be deployed and recovered in pairs every 500m or so which appears to create a significant seabed impact. The 2011 survey of the pipelines found that the cathodic protection systems had been successful in maintaining the integrity of the pipeline steel and where visible the concrete coating appeared intact. As the 3.5 inch MEG line is physically strapped to the 12 inch gas export line they must be considered together. On removal the pipelines would be transported to shore for recycling and disposal. The large volume of concrete coating will be a challenge for recycling. A key benefit of removal is the avoidance of any continuing future inspection burden or insurance / liability risk.

The Camelot CA pipeline system includes a single pipeline TEE where the Camelot CB pipelines connect into the Camelot CA pipelines. The Camelot CA pipeline system also includes two crossings where the pipelines cross over two other active pipelines. All three of these items are currently covered with a protective rock layer. To remove all three of these items the rock cover will have to be excavated using a combination of mechanical grabs and hydraulic jetting. This excavation process may be complex and difficult. It may also have to involve the use of divers to physically remove rock from inside and around the structures. With the rock cover removed from the structures the protective frames are then cut free and are pulled to surface. With the protective frame removed the other pipeline components can be removed. These lifts can be done by a number of vessels including Work-class ROV (WROV) vessels and Dive Support Vessels (DSV). Recovered material is to be transported to shore where it is cut up for deliver to an appropriate recycling facility.

During the excavation process the soil and rock cover would have to be disturbed and fluidised which could cause material to be dispersed over a distance of 50m on each side of the pipeline.

Partial Removal
This is the option to remove the four pipelines as described above but leaving the three structures covered in protective rock in place. In this partial removal option the single pipeline TEE where the Camelot CB pipelines connect into the Camelot CA pipelines would be left in place. The two Camelot CA pipeline crossings would also to be left in place where the pipelines cross over two other active pipelines. In the partial removal option the protective rock layers that currently cover the three structures are left in place. This eliminates the risk of having to excavate the rock cover and avoids the risk to dispersing the rock over the seabed.

Decommission in situ
The four pipelines are buried or rock covered along their length and have been in place for over 20 years so they appear to be have been no risk to other marine users and actual survey data has not detected any impact or interaction with the pipelines. On this basis leaving the buried pipelines in place should be an option. In this case the pipelines are first flushed to an optimum environmental level. Calculations done suggest that the 12" Camelot CA pipeline currently contains only 42.36kg of condensate residuals so the Holders believe that it is possible to flush the pipeline to a level where the hydrocarbon content in the pipeline is less than 30ppm. There are no other chemicals in any of the pipeline systems. When the pipelines are flooded with seawater they will lose any buoyancy and become heavier and more stable on the seabed. It is expected that the buried pipeline will remain stable and immobile during the period of degradation due to their relative density. Seabed surveys in 2000, 2001, 2002, 2007, 2008 and 2011 have found evidence of scouring where the pipeline has become exposed but comparison of the surveys year by year shows that a number of these exposed areas have become re-buried naturally. With the pipeline flooded it is expected that this natural re-burial will become more prevalent due to the loss of buoyancy allowing the pipelines to remain buried and so reducing the scouring effect. As the pipelines are known to re-bury year by year the Holders are unable to justify the impact of taking immediate remedial action on any exposed pipe until the effects of the pipeline flooding process can be measured. Degradation of pipelines will occur over a long period within the seabed sediment and is not expected to represent a hazard to other users of the sea. Precise corrosion rates are difficult to generate due to coatings and concrete encapsulation but once the anodes are dissipated then structural breakdown of the steel would probably occur in around 100 years.

Although the existing survey data from as far back as 1997 shows that most of the pipeline length is buried and stable the plan is to survey the pipelines two years after the pipeline

decommissioning process is complete and compare with the survey data taken in March 2011 which was done ahead of the decommissioning and flushing operations. By comparing the two sets of survey data it should be possible to determine how the buried pipeline is behaving.

The March 2011 survey found that the Camelot CA 12" gas export pipeline (PL624) along with the piggybacked 3.5" MEG line (PL625) had 28 free-spans of various lengths and heights. In terms of height 7 were less than 20cm high, 8 were between 20cm and 40cm high, 10 were between 40cm and 80cm high, 2 were between 80cm and 160cm high and one was 360cm high. In terms of length 5 were less than 4m long, 12 were between 4m and 13m long, 6 were between 13m and 20m long, 4 were between 20m and 30m long and one was 44m long. Of these spans only three were large enough to merit inclusion in the Fish Safe database. These are the spans 44m long by 360cm high, 25m long by 120cm high and 13m long by 80cm high. The Fish Safe database records all spans greater than 10m in length and 0.8m in height.

The March 2011 survey found that the Camelot CB 6" gas export flexible pipeline (PL878) had just 4 free-spans of height 4cm, 10cm, 18cm and 25cm. The lengths of these free-spans were 4m, 7m, 7m and 17m. The Camelot CB 3" MEG flexible pipeline had 14 free spans all of which were small. 8 were less than 5cm high and the remaining 6 were all less than 10cm high. In terms of length 8 were less than 2m long, 4 were between 2m and 6m long with one 12m long and one 22m long. None of these spans are big enough for inclusion in the Fish Safe database.

Section 16 includes a further discussion on the surveys planned for the decommissioning process.

Concrete Mats

Various mats made of conventional Portland cement have been used along the Camelot pipelines. There are 22 concrete mats along the Camelot CB 6 inch flexible pipeline which have been fitted with frond elements to encourage natural sand backfill and which currently appear to be buried. The Holders plan to survey the mats to confirm the depth of burial. This is to be done with sonic instruments to avoid unnecessary disturbance of the seabed. There are 7 concrete mats over the Camelot platform tie in spools which remain on the seabed surface. The Holders believe the current options are as follows:

Leave in situ

Survey the mats to confirm the absence of snagging hazards and ensure there will be no problem for other marine users. Considerations in this case are the minimal seabed disturbance, lower energy usage and reduced risk to personnel engaged in the activity. This will however depend on the need to move any pipe spools trapped underneath. This would appear to be a reasonable option if the concrete mats have become buried under the seabed. This could well be the case for the 22 mats fitted with front elements which were intended to encourage natural burial. The fishing industry has indicated that they may support leaving mats in situ where they have been undisturbed during the decommissioning process and are totally buried to 0.5 meters.

Recover.

This is the lifting of the mats from the seabed and transport to shore for disposal. As concrete materials are not currently recycled they will most probably have to go to land fill. From safety incidents in the past there are now doubts regarding the integrity of mattresses. This is because they have broken-up during removal and have had problems with the handling/lifting points.

The Holders are aware that recovery of all concrete mats buried or not is the option preferred by DECC.

Grout Bag Form Works

A number of large grout bags have been used as form works at various locations along the pipeline tie in spools for support. These grout bags are around 1 meter cubed and are filled with conventional Portland cement. There are 7 grout bags at the Camelot platform tie in spools and 12 grout bags at the Leman platform tie in spools. The current options appear as follows:

Leave in situ

Survey the grout bags to confirm the absence of snagging hazards and ensure there is no problem for other marine users. Considerations in this case are the minimal seabed disturbance, lower energy usage and reduced risk to personnel engaged in the activity.

Recover.

This is the lifting of the grout bags from the seabed and transport to shore for disposal. As the grout bags were pumped full of cement on the seabed they have little or no structural strength as they were not designed for lifting. There does not appear to be any other real option for recovery of the grout bags other than using a large mechanical scoop. These mechanical scoops are used regularly for dredging and appear to be effective. Jet dredging may also be possible if the structural integrity of the polypropylene grout bags has deteriorated to a level where the material can be torn and ripped easily. The Holders are aware that recovery is the option preferred by DECC.

Other Options

As far as the Holders are aware all the possible decommissioning options have been included in this document. There has been no short listing process to eliminate any option at this stage so there should be nothing missing from the options shown.

7. SELECTED REMOVAL AND DISPOSAL OPTIONS

This section will outline the options selected for the various decommissioning programmes:

CAMELOT CA PLATFORM PROGRAMME

Jacket & Topsides Removal Options

As indicated in section 6 above the Holders are aware that the Camelot jacket and topside will have to be removed and brought ashore to meet the requirements of the OSPAR Decision 98/3. There is no allowable option to abandon the platform in situ so for this reason removal is the option being proposed.

The platform and jacket removal options outlined in section 6 have been reviewed by the Holders and the decision is to go for a heavy lift removal. The key reason for this decision is safety. Through parent company support the Holders have access to extensive experience with heavy lift removal which allows the Holders to fulfil the legal obligations under the health and safety legislation to manage the decommissioning process in an effective manner. The problem with piece small removal is the lack of experience available to the Holders to manage this option to the satisfaction of the Holders HSE standards.

Once removed the platform and jacket will be delivered to shore and then recycled as described in section 6.

CAMELOT CA AND CB PIPELINES PROGRAMMES

Pipeline Options

To determine the best decommissioning option for the pipelines the Holders completed a detailed comparative assessment. This assessment was developed through a workshop discussion and the use of an independent third party facilitator. The desired outcome of the workshop was the identification of, and agreement on, the recommended option for decommissioning the CA and CB pipelines. As a result of the discussions and the ranking of the options by the group in each criterion, the Holders have reached a consensus on the recommended option.

Description of the Comparative Assessment Process

The meeting began with a review of the criteria and ranking system against which the options, and their advantages and disadvantages, would be consistently judged. The CA and CB pipelines were discussed separately because they are subject to separate Section 29 Notices and because of the differences in their characteristics and potential removal techniques. A brief background of the project and the lines themselves was presented to the Comparative Assessment Team, followed by a brief discussion of the possible removal options. Each option was then discussed and scored on the following five main criteria.

Technical. How easy are the options to execute.
Safety. Including the safety implications for both operational personnel and 3rd parties.
Environmental. These considered the 'Environmental operations' i.e. impacts during the operational phase or activities, such as the use of vessels to complete a program of work.

'Environmental end points' e.g. impacts associated with the final condition of the materials or components of the option, such as the material being recycled or left *in-situ*, and the final condition of the seabed; quantitative assessment *of* CO_2: which had been carried out for each option prior to the workshop.
Societal. What are the impacts on others outside the decommissioning project.
Costs. The financial impact of the options.

The discussions and scores given to each option, and the reasoning or justification for the scores, were summarised and recorded. Each aspect of a particular option was discussed against each of the criteria until a consensus was reached, a score assigned and the reasons behind the decision understood by all the members of the Comparative Assessment Team.

Description of the Comparative Assessment Criteria
Prior to the workshop, preparatory work was completed to aid the evaluation of the options. This included the listing of the potential environmental risks both offshore and onshore. It also included a review of the spread of vessels that would be used, the duration of operations, and the masses of material that would be recycled, reused, disposed of or left *in*-situ, the total and net energy use and the total and net gaseous emission associated with each option. The process also looked at the number of man days involved in each option.

The five main criteria shown above were split into sub-criteria, to facilitate a more accurate assessment of the performance of each option. For the purposes of this Comparative Assessment, each of the sub-criteria was judged to have an equal contribution to the final performance of each option; hence no 'weighting' factor was applied during the scoring of the options. However, since the main criteria comprise one or more sub-criteria, the main criteria were effectively weighted as follows:
Technical: 10%
Safety: 30%
Environmental: 30%
Societal: 20%
Cost: 10%

Description of Scoring
The options listed above were scored against each criterion using the definitions presented below as a guide. For each criterion, the most favourable score was 5, and the poorest score was 1. The Comparative Assessment Team scored the performance of each option in each criterion, assigning a score from 5 to 1. The Comparative Assessment Team discussed the performance of each option until a consensus was reached. On completion of the assessment, the individual scores in each criterion were summed, and the option with the highest total score was identified as the likely recommended option.

Scoring system and definitions.

Score	Definition	Criteria examples
5	Very good	Most favourable aspects of all criteria: minimal environmental impacts; known procedures and technical operations; minimal safety risks and most acceptable cost implications.
4	Good	Above average environmental performance; technical feasibility and

		safety considerations and more acceptable cost implications.
3	Adequate	Acceptable environmental performance, technical feasibility, manageable safety risk, medium cost.
2	Poor	Poor environmental performance, greater technical risk, high safety risk, high cost.
1	Very poor	Very poor environmental performance, high technical risk, high safety risk, high cost.

The conclusion of the assessment process was as follows:

Camelot CA Pipelines
During the discussions at the workshop and the subsequent scoring the complete removal option and partial removal option were agreed to have relatively similar advantages and disadvantages with respective scores of 32 and 36. The leave in situ option however, had a total score of 47 which was agreed to clearly indicate that it is the recommended option. This is a result of the technical complexity and uncertainty of removing the 12" concrete coated export pipeline and the need for an anchored pipe lay barge to remove any or all of the 12" pipeline which would have a significant impact on the seabed through physical impact of the anchors well as de-burying operations.

Results for the CA lines.

CRITERIA		**SCORE**		
		Option 1: Remove by reverse pipe lay	**Option 2:** Partial removal by reverse pipe lay	Option 3: Leave in situ
Technical	**Feasibility/Complexity of the operation**	3	2	5
Safety	**Risk to operational personnel**	3 5,314 man days	3 >5,314 man days	5 483 man days
	Risk to 3rd parties	5	5	4
	Risk to onshore personnel	4	4	5
Environmental	**From operations**	1	2	5
	From end points	3	5	5
	CO_2 emissions	4 Total: 7,785 tonnes Net: 7,785 tonnes	4 Total: 7,445 tonnes Net: 6,979 tonnes	5 Total 6,177 tonnes Net: 98 tonnes
Societal	**Societal effects offshore**	4	5	4
	Societal effects	4	4	5

	onshore			
Cost	**Overall expenditure (£ million)**	1 £8.5 million	2 £9 million	4 £0.7 million
Overall score		**32**	**36**	**47**

It should be noted that in Option 3 (leave in situ) the man hours, CO_2 emissions and cost include a number of future monitoring surveys and assumes no remedial action is required.

The potential for the CA lines to span is expected to decrease once they have been flushed of gas and flooded with seawater, increasing their stability within the sediment. Although there is a lack of data on sediment movement, both short and long term, along the route, this was taken into account during the discussions. The possible presence of *Sabellaria spinulosa* may support the option of leaving the line in-situ as this option would have the least potential to impact any community present. Leaving the lines in-situ would also minimise the risk of adversely affecting the currently live 3rd party lines that the 12" export pipeline crosses. The existing rock covers at the pipeline crossings and at the TEE piece are both stable and over-trawlable and the section of line most likely to span, i.e. the section nearest the Camelot NUI location, has already been protected by rock-cover. This, in combination with the expected increase in stability of the flooded line, is expected to mitigate against future spans occurring. Leaving the lines in-situ prevents significant disturbance to the seabed and although there is a potential for debris to occur as the line disintegrates in the future, this was expected to be less of a risk than debris created by concrete snapping off the 12" line as it is retrieved to the vessel.

This is subject to the proposed post decommissioning survey discussed further in section 16.

The full comparative assessment report is available on request.

Camelot CB Lines

As a result of the discussions and scoring the recommended option for the CB lines was identified as leave in-situ. The difference in overall scores between the two options (remove by reverse lay or leave in in situ) is relatively small indicating little differences in the overall advantages or disadvantages of the two options but one of the deciding factors was the fact that the lines were trenched and buried. In order to justify exposing personnel to risk in offshore operations, a strong driver, such as a clear reduction in safety risk to other users or in negative impacts to the environment, would be needed. The lower score for the environmental end-points criterion was a result of the „unknown" future risks such as the possibility of the lines disintegrating or becoming unburied and hence posing a risk to the Energy Resource Technology (U.K.) Ltd or other users of the sea. The lower score was also a result of the lack of data confirming conclusively the depth of burial. The most likely future interaction with the lines would be from fishing vessels and as the area is one of both low value and low effort, the risk is expected to be minimal.

Results for the CB lines.

CRITERIA		**SCORE**	
		Option 1: Remove by reverse reeling	**Option 2:** Leave in situ
Technical	**Feasibility/Complexity of the operation**	5	5
Safety	**Risk to operational personnel**	3 1,400 man days	5 200 man days
	Risk to 3rd parties	5	5
	Risk to onshore personnel	5	5
Environmental	**From operations**	2	5
	From end points	5	3
	CO_2 emissions	4 Total 1,064 tonnes Net: 1,064 tonnes	5 Total: 245 tonnes Net: 37 tonnes
Societal	**Societal effects offshore**	5	5
	Societal effects onshore	5	5
Cost	**Overall expenditure (£ million)**	4 £2 million	5 £0.3 million
Overall score		**43**	**48**

It should be noted that in Option 2 (leave in situ) the man hours, CO_2 emissions and costs include a provision for a number of future monitoring surveys, but assume that no remedial action would be required.

From the assessment and evaluation of the potential options for decommissioning both the Camelot CA and CB pipelines and the work completed by the Comparative Assessment Team, it has been decided that the CA and CB pipelines will be left in-situ. This is subject to the proposed post decommissioning survey discussed further in section 16.

The full comparative assessment report is available on request.

Concrete Mats and Grout Bag Formworks

The Holders are aware that DECC requires the removal of all concrete mats and grout bags including those buried under the seabed so for this reason the Holders have selected the option of complete removal. This is provided that the items can be found. During the offshore activity to remove the pipeline spools the Holders intend to survey the locations of all concrete material probing the seabed to a depth of 0.5 meters to try and locate the concrete mats and grout bags.

If this probing fails to detect any material then it is not the intention to disturb the seabed further to try and search for the items and this will be reported back to DECC. The preference is to complete the removal process using remote equipment but it may be necessary to consider the use divers on the seabed. Both DECC and the Holders recognise that safety is a key consideration in any diving operation so the removal work will only proceed once the diving teams are satisfied that the work can be done safely. The Holders intend to use the best available practice for the concrete removal and this will include the use of seabed cages to hold the material for the lift to surface.

In the event that it is not possible to arrange a safe lift then that particular item will be left in place and recorded for discussion with DECC. The Holders will fully record all diving operations done to remove the concrete materials and will discuss the results with DECC. If necessary the Holder will undertake a further comparative assessment of the options for the concrete materials that were not detected through probing to a depth of 0.5m.

8. WELLS

There are six platform gas production wells on the Camelot installation as listed in section 4. The work required on the wells as part of the decommissioning process can be done under the current licensing and consent regime so this work may well be complete by the time the formal decommissioning programmes is approved. The well decommissioning phase begins with the setting of mechanical plugs in the tailpipe of the well to isolate the reservoir. This is followed by punching the tubing to circulating seawater to kill the well finally the placement of cement plugs in the well to act as the permanent barriers to isolate the reservoir. All of this work will be done by specialist crews and equipment mobilized to the Camelot site.

Under current legislation the seabed has to be left clear so the well work continues with the final cutting of the tubing and casing 3 meters below the seabed. As each tubing and casing is cut it will be pulled to surface and cut as appropriate into sections for transport to shore for recycling. A well abandonment PON 5 along with the appropriate HSE notifications will be submitted to cover the well decommissioning activity.

All well decommissioning work will comply with the Offshore Installation and Wells (Design and Construction, etc) Regulations 1996. This is achieved through compliance with the ERT well examination scheme which is based around the Oil and Gas UK guidelines for the suspension and abandonment of wells. Compliance with the ERT well examination scheme is verified by an independent well examiner.

9. DRILL CUTTINGS

There are no visible mounds of drill cuttings anywhere in the Camelot area which is to be expected as only six wells were drilled. Site surveys over the years have not reported any sign of drill cuttings mounds so it is apparent that the cuttings have been distributed widely during the actual drilling process due to the strong local seabed currents and scouring effects around the jacket legs.

Following the OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings Piles detailed modelling was done by the UK Oil and Gas industry looking at the 174 UKCS installations where potentially significant cuttings piles may be present. The results of this modelling showed that all the largest cuttings piles were below the 10 t/yr OSPAR threshold value. The modelling also calculated the persistence values for the 174 UKCS installations and all were below the 500 km2/yr OSPAR threshold value.

On this basis the Holders believe that the Camelot area falls below the threshold values specified in Stage 1 of the OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings Piles.

Although there is no evidence of drill cuttings in the immediate vicinity of the wells the Holders will be carrying out sea bed sampling to verify the absence of cutting debris that may affect the environment. Should any evidence of drill cuttings be discovered then the Holders will contact DECC to review the findings and agree any necessary remedial actions.

10. ENVIRONMENTAL IMPACT ASSESSMENT

The Holders are confident that there will be an overall positive environmental impact from the decommissioning as the site is to be cleared to OSPAR requirements. To ensure no elements can detract from this positive environmental impact the Holders have commissioned an Environmental Impact Assessment (EIA) of the Camelot decommissioning programmes as outlined in this section. This EIA has been supported by a site specific environmental survey done in February 2012 and has also used existing base line environmental data to describe the biological activity in the area. The EIA has looked at all the possible impacts the proposed decommissioning activity may have in the local area and the wider Southern North Sea. The EIA has also looked at the emissions generated by the decommissioning activity to ensure they are managed efficiently. The EIA documents the environmental assessment applied to the Camelot decommissioning project and the consultation with the relevant environmental stakeholders. The object of the EIA has been to evaluate the environmental impact during the decommissioning of the Camelot infrastructure and to ensure that the long term environmental impacts from the decommissioning operations remain positive. A tabular summary of the discussion on the environmental impact of the selected option is shown in figure 5 in the appendix.

Conclusions from the EIA

Environmental Sensitivities

The Camelot decommissioning area includes the Camelot CA platform, the 15 km long 12" gas export line (PL624) and piggy-backed 3.5" MEG line (PL625) from the platform to the Leman complex and the two out-of-use pipelines previously associated with the decommissioned Camelot CB platform, the 1.2 km long 6" gas export line (PL878) and the 3" MEG line (PL879). The Camelot CA platform is located in 11 m water depth on Smiths Knoll, a sandbank which comprises part of the Haisborough, Hammond and Winterton cSAC. The export pipeline from the platform to the Leman complex in Block 49/27 also crosses into the North Norfolk Sandbank and Saturn Reef cSAC. The qualifying features for both cSACs are the sandbanks within the area and the presence of biogenic reefs, both of which are classed as Annex I habitats under the Habitats Directive.

Six wells were drilled from the Camelot CA platform; however, no evidence of drill cuttings piles has been found. It is most likely that the strong hydrodynamic regime in the area has eroded and dispersed any drill cuttings piles. From the recent site specific survey data and other data gathered for nearby developments, the seabed sediments around the platform and along the export pipeline route were found to comprise of gravel and sand, likely to support a benthic community dominated by polychaetes and amphipods. A benthic survey was conducted in 2009 along the proposed pipeline route for the Baird Gas Project: this route passes through the same blocks as the Camelot CA pipeline and identified *Sabellaria spinulosa* at a number of sites. The closest of these sites to the Camelot decommissioning area is approximately 2 km east of the Camelot CA platform. The findings of these surveys have been confirmed by the Camelot pre-decommissioning site specific environmental survey completed February 2012.

The Camelot decommissioning area is a spawning area for lemon sole, sprat, sandeel, sole, mackerel, plaice and whiting as well as a nursery ground for lemon sole, sandeels, mackerel and whiting. Fishing effort in the area is very low and consists of mainly demersal fishing, resulting in landings primarily of plaice and sole. The Camelot decommissioning area lies within

ICES rectangle 34F2 and 35F2 which records both relative effort and relative value of the commercial fishing as “very low”.

Seven cetacean species have been recorded in the vicinity of the Camelot area in densities ranging from low to very high. These include the bottlenose and white-sided dolphin, the long-finned pilot whale and minke whale. Common and white-beaked dolphin and harbour porpoise have been recorded within the Camelot area, the latter in high to very high numbers in August and September. Although the harbour porpoise is an Annex II species under the Habitats Directive, it is not currently classed as a qualifying feature for either the North Norfolk or Haisborough cSAC.

Seabird vulnerability to surface oil pollution within the Camelot area ranges from low to moderate throughout the year except December. As the offshore work will not take place in December the vulnerability in Block 53/1 during the offshore decommissioning activity is either “moderate” or “low”. As the Camelot platform only produced gas the oil pollution risk from the decommissioning activities is minimal.

The Camelot facilities are situated in an area of “high” shipping intensity though removed from regular shipping lanes. Vessels are unlikely to be in close proximity to the CA platform due to the shallow water depth over Smiths Knoll. Decommissioning activities at Camelot are unlikely to impact on subsea cables, wrecks or dredging activities or with any military activity. With the exception of the tie-in to the Leman complex and the CB pipelines remaining on the seabed, the Camelot facilities do not interact with any other oil and gas developments.

The potential for decommissioning activities to impact upon the qualifying feature of either of the two cSACs is therefore the main sensitivity for the Camelot decommissioning project.

Environmental Impacts of Decommissioning Operations
Through the EIA process, the following activities were identified as having the potential to impact negatively on the environment, and as such, were assessed in more detail:
Underwater noise arising from the Camelot decommissioning activities
Accidental worst case hydrocarbon spill from a vessel collision
The pipelines or sections of the pipelines do not remain fully buried
The pipelines break up and pipeline material or sections appear on the seabed
The disintegration of concrete coating on the CA pipeline results in concrete material appearing on the seabed

Decommissioning of the Camelot facilities will involve a DSV, heavy lift vessel with associated tugs and transport barges. The DSV will be used to decommission the CA and CB pipelines and to transport the recovered mattresses and pipeline ends currently on the seabed surface to shore for recycling or disposal. The heavy lift vessel, tugs and transport barges will remove the Camelot CA platform in two sections, the topsides and jacket, and return the materials to land for shore processing. The decommissioning of the pipelines and removal of the platform will not occur at the same time. Modelling of the potential underwater noise created by these activities and an assessment of noise propagation and mammal densities throughout the year indicates that neither activity will result in injury to marine mammals. Further, although some disturbance to marine mammals in the vicinity may occur, the predicted density of the animals and the small area in which this impact may occur is small, suggesting very few to extremely few animals are likely to be affected. Future monitoring of the area, such as the planned pipeline depth of burial survey expected to take place two years after decommissioning is predicted to have the same

source noise level as the DSV used for pipeline decommissioning and hence is expected to have the same low level of potential impact on marine mammals.

Potential environmental impacts from accidental events are most likely to arise from the loss of conventional marine diesel fuel from one of the vessels or a collision between vessels, involved in the decommissioning activities. Oil spill modelling suggests that a spill would not persist for any more than 8 hours and would not reach either the UK/Netherlands trans-boundary line or the UK coastline. Although seabirds are vulnerable to surface oil spills, their densities in the Camelot area are predominantly low to moderate. Such a hazard is present in many other offshore oil and gas activities and the industry has a well-developed system of controls in place to reduce the likelihood of an event and to minimise any impact to the marine environment if such an event were to occur.

The CA pipeline previously exported gas to the Leman complex. A depth of burial survey conducted in March 2011, indicates that the pipeline is currently buried along most of its length. As part of the decommissioning operations to leave the line *in situ*, the pipeline will be flushed and left flooded with seawater, which will increase the weight of the pipeline and is expected to increase the stability of the line within the sediment, decreasing the possibility that sections of the pipeline would be uncovered and hence the risk that remedial rock cover operations would be needed in the future. Should any sections of the pipeline become uncovered, the monitoring programme, to be agreed with DECC, would allow any such sections of the pipeline to be identified and possible mitigation operations to take place.

As the concrete and steel pipeline disintegrates it would be expected that the material would remain buried in the pipeline trench. The local sediment characteristic might be altered and may attract different fauna into the area. However, the area that might be affected will be small in comparison to the Camelot decommissioning area. In addition, the trenched material would pose minimal risk to the local demersal fishing industry. In the unlikely event that sections of the degrading pipeline or the disintegrated concrete coating became uncovered appeared on the seabed, where it might deter demersal fishing, it is expected that any impact would be minimal given the low fishing effort and low catch value in the Camelot decommissioning area.

The planned programme of work involves techniques and procedures routinely used in the oil and gas industry and will employ the accepted mitigation procedures to minimise environmental impact.

Duration and Management of Activities

Decommissioning of the Camelot field and infrastructure is expected to occur during 2012. The preliminary work will begin with the removal of the pipeline spools at Camelot. The removal of the platform by the heavy lift vessel is expected to take two weeks, beginning some time from July 2012 but this may be delayed to suit operational and safety requirements. The pipeline decommissioning will be completed once the platform has been removed and this is expected to take around 3 weeks to complete

The programme of work is to be managed by ERT. On completion of the offshore work, ERT will confirm that the seabed is clear of debris and free from obstructions and within four months, ERT will submit the required completion report to DECC. A post-decommissioning environmental survey will be conducted following the decommissioning work. ERT have proposed that in two years, a further pipeline depth of burial survey and a second post-decommissioning environmental survey be conducted. These two surveys will be compared

with the surveys done earlier to confirm the status of the buried pipelines and the status of the benthic fauna in the area.

A second post-decommissioning pipeline survey will be done four years after the decommissioning activity and this will be compared with both the 2011 and 2014 surveys to check the status of the pipelines. The expectation is that replacing the gas with seawater has increased the stability of the lines within the sediment. Further surveys will be discussed and agreed with DECC if necessary.

EIA Conclusions

The potential impacts of the planned and possible accidental events relating to the Camelot decommissioning project have been the subject of a full EIA process. The likelihood of their occurrence and subsequent potential impacts has been assessed. It is concluded that the planned programme of work is unlikely to have a significant negative impact upon the marine environment.

It is also important to note that the Holders currently operate an Environmental Management System (EMS) which has been independently verified to British Standard BS EN ISO 14001:2004 in accordance with OSPAR recommendation 2003/5. The application of the EMS during the Camelot decommissioning project ensures that the Holders Environmental Policy is followed and that the Holders responsibilities under all relevant regulations are met. Other key facets of the EMS include effective contractor management, emergency preparedness and response, measuring monitoring and reporting, and audit and review. The Holders EMS will be interfaced with the management systems of the main contracting parties participating in the Camelot decommissioning project.

The Holders have noted that the Camelot location is now inside the newly designated Haisborough, Hammond and Winterton candidate Special Area of Conservation (cSAC) since 20 August 2010. The Holders have also noted that the cSAC selection assessment document version 6 states 'The North East corner of the site (where the Camelot CA platform is located) contains very low diversity communities in gravelly and sandy sediment.' The assessment document also states 'The fauna of the sandbank crests is predominantly low diversity polychaete-amphipod communities which are typical of mobile sediment environments. With this in mind the Holders do not believe that this cSAC will have any impact on the decommissioning programmes as the platform and jacket have to be removed under OSPAR rules regardless of the colonisation of the site by protected species. On this basis the recent designation of the cSAC can have no impact on the decision to remove the topside and jacket. It is also true that because the topside and jacket must be removed there is no need for the comparative assessment that usually requires further studies of the cSAC ahead of operations offshore.

The full EIA is available on request from the Holders at the address shown on the cover.

11. INTERESTED PARTY CONSULTATIONS

The three decommissioning programmes were issued for public consultation 14 March 2012. A notice was placed in the London Gazette, the Eastern Daily Press, and the Guardian advising the public of the consultation process, how to obtain copies of the documents and how to comment on the contents. The document was made available as a download from the Holders parent company website HelixESG.com. The document was also available as a hard copy from the offices of ERT at Helix House, Kirkton Drive, Dyce, Aberdeen.

No members of the public requested any data and no comments were received from the general public during this consultation process. Five commercial enquiries were received following the publication of the notices. Two enquiries came from the press and three from companies and all five were enquiring about commercial opportunities. As no comments were received no changes were required to the decommissioning programmes presented here.

The three decommissioning programmes were also sent direct to DECC and the four statutory consultees who are the National Federation of Fisherman's Organisations (NFFO), the Scottish Fishermans Federation (SFF), the Anglo-North Irish Fish Producers Association (ANIFPO) and Global Marine Systems Limited.

The NFFO responded with their standard policy paper on offshore oil and gas decommissioning dated October 2010. The Holders can confirm that all aspects of the NFFO policy paper have already been incorporated into the three decommissioning programmes so no changes were required. The policy paper is available on requests from either ERT or the NFFO.

The SFF and the ANIFPO both responded to confirm that they would leave any comments to the NFFO as Camelot was not in their area of the sea. Global Marine Systems Limited did not provide a response despite follow up requests.

On this basis the Holders believe that the three decommissioning programmes fully reflect the outcome of the statutory consultation process.

12. COSTS

The Holders have prepared an initial estimate of the total cost of the decommissioning programmes based on the assumption that all work would be carried out and completed by the end of 2012. The final cost of the whole programmes will be heavily dependent on the specific contracts awarded and the synergies that might be available with similar offshore programmes that coincide with the timetable for Camelot. As such a precise breakdown to element level at this stage may not be accurate. Estimates are in accordance with UK Oil and Gas Guidelines on Decommissioning Cost Estimation document. Totals below may not compute exactly due to rounding differences.

Estimated Cost Range
Camelot CA platform
Platform and Jacket Preparation and Removal £5 million to £6 million
Six Platform Wells and One Suspended Well Abandonments £6.9 million to £7.5 million
Engineering and Studies £0.5 million to £1 million
Platform total £12.4 million to £14.5 million

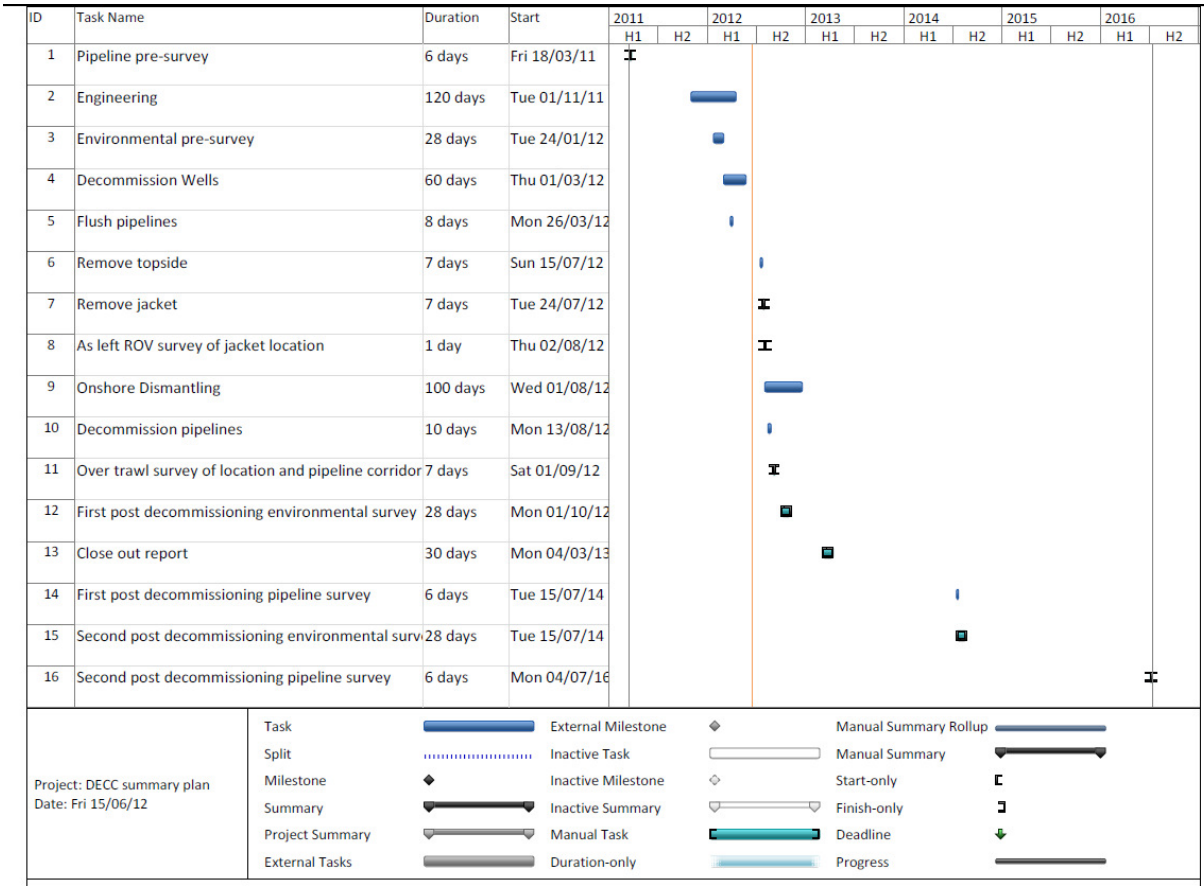
Camelot CA and CB pipelines
Pipeline Infrastructure Decommissioning in situ £2 million to £5.5 million
Engineering and Studies £0.5 million to £1.0 million
Pipeline total £2.5 million to £6.5 million

Overall Total £14.9 million to £21 million

13. SCHEDULE

The Holders hope to be in a position to remove the platform and jacket in 2012. The final date for removal will be dependent on the availability of suitable equipment. The high level programmes are shown as figure 6 (included in the appendix).

The onshore dismantling and recycling phase will commence once the transport barge has delivered and offloaded the topside and jacket to the selected shore base. The duration of this phase is not yet defined as it will depend on the most efficient way in which the dismantling and segregation process can be complete. It is expected that this will take around three to four months but may be longer depending on how the use of resources is optimised.



14. PROJECT MANAGEMENT AND VERIFICATION

As the Camelot platform in no longer producing the existing Camelot management team will now focus on the decommissioning process to ensure it is managed and delivered in a safe and effective manner. When it is found necessary additional project management resources will be used to support the Camelot team. It is expected however that the key contractors for the various phases of the decommissioning work will assist with the management and delivery process. Where possible the work will be coordinated with other decommissioning operations in the SNS. A record will be maintained to monitor and track the process of consents and the consultations required as part of this process.

Once the final decommissioning programmes have been approved then any changes will be discussed with DECC to ensure that appropriate steps are taken to evaluate the impact of any changes required. The Holders intend to submit a close out report to DECC detailing how the programmes was carried out within a target of four months from completion of the offshore decommissioning work. This includes completion of any debris clearance and the results of post-decommissioning surveys and future monitoring survey programmes.

15. DEBRIS CLEARANCE

On completion of the platform removal a ROV survey will be conducted around the site and any oil related seabed debris logged will be recovered for onshore disposal or recycling in line with existing platform disposal methods.

In order to demonstrate a clear seabed following decommissioning works the Holders will complete an over-trawl of the relevant areas including an area of 500m around the former Camelot location and a corridor 100 metres wide either side of each pipeline. The Holders plan to have an independent organisation complete the over-trawl and provide a seabed clearance certificate.

16. POST-DECOMMISSIONING MONITORING AND MAINTENANCE

The Holders intend to remove the platform completely and the jacket piles and wells will be removed to 3 meters below the existing seabed. The first post decommissioning survey will be an ROV survey of the location centred on the site of the former Camelot installation. This will take place immediately after the heavy lift operations have been carried out. Following this all pipeline routes and structure sites will be the subject of an over-trawl survey when decommissioning activity has concluded.

As soon as practical after the platform removal the environmental baseline survey of the Camelot location will be completed to record the marine biology in the area following removal of the platform and jacket. This will be done in the second half of 2012. The results of these surveys will be included in the decommissioning close out report.

Two years after the decommissioning is complete the Holders will undertake a 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 environmental survey done immediately following decommissioning and this should allow the Holders and DECC to evaluate the site remediation process.

Two years after the decommissioning is complete the Holders will undertake a 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 should be around August 2016. Once again this survey will record the location of all pipelines for comparison with both the original baseline survey and the two year post decommissioning survey. 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

17. SUPPORTING STUDIES

These Camelot Decommissioning Programmes have included information from the following documents and studies:

Guidance Notes on the Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998. DECC January 2010.

Camelot Field Decommissioning Project, Pipeline Options Comparative Assessment Report, March 2011.

Camelot Field Decommissioning Project, Environmental Impact Assessment Report, March 2011.

Camelot Tracerco survey 13 January 2011.

Evidence base for designation of Haisborough, Hammond and Winterton Special Area of Conservation, Natural England and JNCC, 20 July 2010.

Special Area of Conservation (SAC) Haisborough, Hammond and Winterton SAC Selection Assessment Version 6.0 20 August 2010.

Camelot pipelines survey, Canyon Offshore Ltd, COT-013-CYNUK ERT-IP, March 2011.

APPENDICES

Graph 1:	Pipeline burial
Figure 1:	Camelot platform
Figure 1A:	Camelot platform comparative scale
Figure 2:	Camelot pipelines
Figure 3:	Adjacent facilities
Figure 4:	Camelot Location
Figure 5:	Environmental Impacts
Figure 6:	Decommissioning schedule
Attachment 7:	NFFO response
Attachment 8:	SFF response
Attachment 9:	ANIFPO response
Attachment 10:	GMS enquiry