SILVERSTONE ENERGY LIMITED

Tristan NW Field

Decommissioning Programmes

SEL/TNW/REP/002

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Glossary

Abandon	To cease work on a well which is non-productive, to plug the well with cement plugs and salvage all recoverable equipment.
Benthic fauna	Organisms that live on, near, or in the bottom sediments of the seabed.
Block	A North Sea acreage sub-division measuring approximately 10km x 20km forming part of a quadrant, e.g. Block 15/5 is the 5th block of Quadrant 15.
Copepods	Small crustaceans whose adult stage usually includes a single eye in the centre of the head. The free living marine species form a vital part of many marine food webs.
Decommissioning	Preferred term (rather than Abandonment) for the re-use, recycling and disposal of redundant oil and gas facilities.
Diatoms	A group of eukaryotic algae that secrete characteristic cell walls consisting of two separate halves with an overlap between them. Diatoms reproduce by binary fission and often exist as single cells, but some species form colonies of chains.
Dinoflagellates	A diverse group of eukaryotic algae that often have two protruding flagellae used for propelling and directing the cell.
DTI	Historically the regulatory authority for the offshore oil and gas industry, this agency has been dissolved and its energy-related responsibilities now fall to DECC.
Dynamic Positioning	A system of sensors and thrusters on a vessel which allows it to maintain position using satellite telemetry to adjust thrusters' direction and power.
End-point	End-points describe the final condition of the materials or components covered in the option.
Environmental Impact Assessment	A process to identify and assess the impacts associated with a particular activity, plan or project.
Environmental Statement	A report setting out the findings of an assessment of a project's environmental impacts.
Fauna	Animal life.
Infauna	Fauna that lives within sediments.
Manifold	The branch pipe arrangement which connects the valve parts of a multiple pipes
Median Line	The boundary between the offshore mineral extraction jurisdictions of two states, by convention drawn equidistant from the nearest point of land on each side.
Notice to Mariners	Admiralty Notice to Mariners contain all the corrections, alterations and amendments for the UK Hydrographic Office worldwide series of Admiralty Charts and Publications and are published weekly as booklets, which are despatched directly from the UKHO.
Operations	Operations are the activities or procedures that are undertaken offshore or onshore to complete the selected programme of work.
Phytoplankton	Planktonic organisms that obtain energy through photosynthesis.

Residual risk	The risk that remain in an unmanaged form, even when effective risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.
Risk	The combination of the probability of an event and a measure of the consequence.
Salinity	The salt content, in this case of a body of water.
Sandbank	A submerged bank of sand that may or may not be exposed at low tide.
Sand wave	A ridge-like sand structure on the seabed caused by suspension and deposition of material by water currents.
Special Area of Conservation	Special Areas of Conservation (SACs) are strictly protected sites designated under the EC Habitats Directive
UKCS	United Kingdom Continental shelf. Waters in which the UK Government has jurisdiction over oil and gas activity
Umbilical	Subsea pipe or cable connecting structures such as wellheads and subsea distribution units. Can be used to carry chemicals, hydraulic fluids and electricity supply.
Xmas Tree	A structure fixed to the seabed which comprises a system of valves to control flow from a well into production flowlines.
Zooplankton	Broadly defined as heterotrophic (deriving energy from organic matter) planktonic organisms, although some protozoan zooplankton species can derive energy both from sunlight and by feeding on organic matter.

Acronyms and Abbreviations

“	Feet
ALARP	As Low As Reasonably Practicable
BMS	Business Management System
CAPEX	Capital Expenditure
CO	Carbon monoxide
CO_2	Carbon dioxide
Cu	Copper
dB	Decibel
DECC	Department of Environmental and Climate Change
DP	Dynamic Positioning
DSV	Dive Support Vessel
DTI	Department of Trade and Industry
DWR	Deep Water Route
DWT	Deadweight Tonnage
EIA	Environmental Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
FFS	Fishing Friendly Structure
ft	Feet
GJ	Gigajoules
HSE	Health and Safety Executive
HSEQ	Health, Safety, Environmental and Quality
ICES	International Council for the Exploration of the Sea
ISO	International Standard Organisation
kHz	Kilohertz
km	Kilometre
LAT	Lowest Astronomical Tide
LSA	Low Specific Activity
m	Metre
m/s	Metres per second
MCA	Maritime and Coastguard Agency
MEG	Monoethylene glycol
mm	Millimetre
N_2O	Nitrous Oxide
NFFO	National Federation of Fishermen's Organisations
nm	Nautical Mile
NUI	Normally Unmanned Installation

NW	North West
OPEP	Oil Pollution Emergency Plan
OPEX	Operating Expense
OPPC	Oil Pollution Prevention and Control
PON	Petroleum Operations Notice
pSAC	Possible Special Area of Conservation
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SAHFOS	Sir Alister Hardy Foundation for Ocean Science
SDU	Subsea Drilling Unit
SUTU	Subsea Umbilical Termination Unit
t	tonne
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
UKDMAP	United Kingdom Digital Map
UKOOA	United Kingdom Offshore Operators Association
UTA	Umbilical Termination Assembly

Section 29 Notice Holders

In December 2009 and in accordance with the requirements of the **Petroleum Act 1998**, the Department of Energy and Climate Change (DECC) issued Section 29 Notices for the submarine pipelines and offshore installations associated with the Tristan NW facilities. These Notices were issued to:

- Granby (Tristan) Limited
- Granby Oil and Gas plc
- MCX Exploration (UK) Limited
- Mitsubishi Corporation
- Silverstone Energy Limited

Equity of the Tristan NW field is owned by Granby (Tristan) Limited (64.3 %) and the MCX Exploration (UK) Limited (35.7 %) and the field is operated on their behalf by Silverstone Energy Limited.

The Section 29 Notice Holders for the Tristan NW Field each confirm that they authorise Silverstone Energy Limited, as operator of the Tristan NW Field, to submit Decommissioning Programmes relating to the Tristan NW facilities, as directed by the UK Secretary of State. Each Notice Holder confirms that they support the proposals detailed in these Decommissioning Programmes, submitted by Silverstone Energy Limited.

Letters from the Section 29 Notice Holders confirming this agreement are included in Appendix I.

On 26th March 2010, Bridge Energy AS and Silverstone Energy Limited combined to form Bridge Energy UK Limited. Following this, the Tristan NW asset was transferred to Bridge Energy UK Limited on 1st June 2010.

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1 INTRODUCTION

1.1 Scope of Document

This document presents the Decommissioning Programmes for the infrastructure and pipeline in the Tristan NW Field in Blocks 49/29b and 49/30d of the United Kingdom Continental Shelf (UKCS). Tristan NW is approximately 76 km from the east coast of England and 29 km from the median line with the Netherlands (**Figure 1**). Granby (Tristan) Limited and the MCX Exploration (UK) Limited are the equity owners of the field and Silverstone Energy Limited (Silverstone) is the operator.

Since production began in 2008, the performance of the single Tristan NW well has been poor, and Silverstone estimates that the field will become sub-economical in the second or third quarter of 2010. All the studies that the operator has carried out to date indicate it is very unlikely that there are any affordable measures that could be taken to extend the economic life of the field. Accordingly, Silverstone proposes to cease production at this location and decommission the field, and has prepared these Decommissioning Programmes in accordance with the requirements of the **Petroleum Act 1998**.

The facilities at Tristan NW comprise a suspended exploration well, a single production well and subsea terminal unit, a production pipeline with piggy-backed control umbilical, and a valve assembly linking the pipeline to the subsea production manifold of the adjacent host platform, the Davy platform operated by Perenco UK Ltd (Perenco).

1.2 Structure of Document

The Tristan NW infrastructure is covered by two Section 29 notices, one for the well and subsea infrastructure, and one for the pipeline, umbilical and jumpers. Two decommissioning programmes are therefore presented in this document, and the sections of the document that relate to these respective notices are shown in **Table 1**.

Table 1: The two Decommissioning Programmes presented in this document.

No.	Section Heading	Programme 1: well, subsea infrastructure	Programme 2: production pipeline & umbilical
1	Introduction	Combined	
2	Executive summary	Combined	
3	Background information	Combined	
4	Facilities to be decommissioned	Combined	
5	Inventory of materials	Section 5 (Table 8)	Section 5 (Table 9)
6	Removal and disposal options	N/A	Section 6
7	Selected removal and disposal option	Section 7	Section 7.4.6 and 7.4.7
8	Wells	Section 8	N/A
9	Debris clearance	Combined	
10	Interested party consultations	Combined	
11	Environmental Impact Assessment	Combined	
12	Costs	Combined	
13	Schedule	Combined	
14	Project management and verification	Combined	
15	Pre- and post-decommissioning monitoring and maintenance	Combined	
16	Supporting material	Combined	

2 EXECUTIVE SUMMARY

2.1 Status of the Field and Need for Decommissioning

Tristan NW is a small gas field in Block 49/29b of the UKCS, 76 km from the coast of Norfolk and 29 km from the median line with the Netherlands. The field is operated by Silverstone Energy Limited (Silverstone) on behalf of the owners Granby (Tristan) Limited (64.3 %) and MCX Exploration (UK) Limited (35.7 %). Silverstone has determined that the field is nearing the end of its economic life, and since there are no viable alternative uses for the facilities in their present location has concluded that the field should be decommissioned. These Decommissioning Programmes have therefore been prepared in accordance with the requirements of the **Petroleum Act 1998** and the DECC Decommissioning Guidelines. The assessments and recommendations in them have been informed by technical studies and informal consultation with stakeholders, including fishermen's organisations.

The Tristan NW Field comprises a suspended exploration well, and a single production well tied-back to the Davy host platform in Block 49/30d. The link to Davy comprises sections of separate 6" pipeline and 4" umbilical on the seabed at the production well, a 14.8 km length of trenched and buried pipeline with piggy-backed umbilical, and a small valve assembly linking the pipeline to the Davy subsea production manifold. The pipeline is 15.5 km long in total and the piggy-backed umbilical 15.3 km long.

2.2 Proposed Decommissioning Programmes

The production well, umbilical and production pipeline will be flushed and cleaned, with all production fluids disposed of via the Davy Normally Unmanned Installation (NUI), or, for the umbilical, to sea. The production well will then be plugged and abandoned using the jack-up drilling rig *ENSCO 92*. The Xmas tree and fishing-friendly protective cover will be retrieved by cutting the casing approximately 3 m below the seabed. A similar cut will be made at the suspended well to retrieve its casing.

In the Tristan NW Field all the jumpers, spool-pieces and sections of exposed umbilical and pipeline lying on the seabed will be retrieved and taken ashore for recycling, along with all the protective mattresses and grout bags. The loop of umbilical near the production well will be retrieved through the protective rock-dump, and the rock-dump left in place.

Within the 500 m safety exclusion zone around the Davy NUI, the exposed sections of pipeline and umbilical on the seabed, the small valve assembly, and the jumpers linking it to the Davy manifold, will be retrieved along with all their protective mattresses and grout bags. The subsea manifold, which is part of the Davy infrastructure, will be left in place.

As required under the **Petroleum Act 1998**, a detailed Comparative Assessment has been carried out to identify the best option for decommissioning the 14.8 km length of trenched and buried production pipeline with piggy-backed umbilical. Options were comprehensively assessed and compared on the basis of their safety risk, environmental impacts, CO_2 emissions, technical feasibility and cost. This assessment indicated that the best option is to remove the sections of pipeline and umbilical lying on the seabed at either end of the line, and leave the combined pipeline and umbilical in its present trench, buried by natural sediment and areas of spot rock-dump.

2.3 Environmental Sensitivities

There are no particular ecological environmental sensitivities in the Tristan NW Field. The wells are located in a water depth of 35.5 m and the pipeline to Davy runs across one small and one larger sandbank, where the minimum water depth is 25 m. These sandbanks are outliers to the extensive complex of sandbanks off the coast of Norfolk, but the Tristan NW Field itself is located approximately 15 km outside the boundary of the North Norfolk Sandbanks possible Special Area of Conservation. Seabed sediments in the field and along the pipeline route comprise medium-coarse sands, and are likely to support a seabed community of polychaete worms, gastropods, brittlestars, sea urchins and amphipods. None of these species is rare or protected, and there is no evidence that the reef-forming worm *Sabellaria spinulosa* or the reef-forming coral *Lophelia pertusa* are present in the area. For both the Tristan wells, cuttings from the top-hole sections (which were drilled with water-based mud) were discharged to sea, whereas cuttings from the other sections (drilled with low toxicity oil-based muds) were contained on the rig and shipped to shore for treatment and disposal. There is therefore no drill cuttings pile at either well.

Seabird vulnerability to surface oil pollution is high to very high in February, March and December, but moderate or low in August and September when the proposed offshore programme of work would take place. Seven species of marine mammal have been sighted in the area. Harbour porpoises and white-beaked dolphins occur regularly in very high to low densities, whereas minke and pilot whale, bottlenose, common and white-sided dolphin occur more sporadically and in low densities. The area of the field is a nursery ground for *Nephrops*, cod, lemon sole and whiting, and spawning area for mackerel, plaice, lemon sole, sprat and *Nephrops*. Commercial fishing in the area is dominated by beam trawling for the demersal fish species such as plaice and sole, and for the ICES rectangle 35F2 in which Tristan NW is located, both the relative fishing effort and the overall relative fishing value are assessed as “very low”.

The Tristan wells are located in a recognised shipping lane used by approximately 8,602 vessels each year (about 24 vessels each day). Most of this traffic comprises cargo and passenger vessels travelling between the UK and the Netherlands, and the majority of vessels are in the size category 1,500 to >=40,000 tonnes. With the exception of the Davy host platform, the Tristan NW Field does not interact in any way with other oil or gas developments (the nearest producing field is 5 km away) or with any other type of offshore commercial or defence activity or site.

2.4 Environmental Impact of Operations

There are no particular ecological environmental sensitivities in the area of the Tristan NW Field, and no Annex I habitats in the field or close to it.

The main sensitivity for the proposed programme of work is the fact that the Tristan NW production well is located in a busy shipping lane.

No aspect of the proposed programme of work would be likely to give rise to any significant planned ecological environmental impacts. All of the techniques and procedures that would be employed are routinely used in oil and gas development or decommissioning projects.

There is a risk that an accident between vessels in the shipping lane could result in a spill of bunker fuel. It is concluded that the various generic and project-specific mitigation measures that would be put in place, and the inclusion of the Tristan NW Field and planned decommissioning activities in the Perenco Davy NUI Oil Pollution Emergency Plan (OPEP), have reduced this risk to an ALARP level and it does not represent a significant environmental risk for the decommissioning programmes. Silverstone and CSL are in close communication with Perenco and will confirm that the variation to the OPEP sufficiently covers all potential decommissioning activities.

2.5 Long-term Environmental Impacts

The proposed programme of work would result in the removal of all facilities and infrastructure from the field, with the exception of the 14.8 km length of trenched and buried 6” pipeline with piggy-backed 4” umbilical. This line would remain buried to the full depth of the existing trench and covered with at least 0.6m of natural sediment and existing spot rock-dump.

The long-term presence of the trenched and buried pipeline with umbilical, and the possibility that its depth of burial may change un-noticed or over a short period of time, or as a result of interactions with bottom-towed gears or other users of the sea, may be regarded as a source of interference for commercial fishing activities in the area. The relative value of the total commercial fishing in the area is very low, however, and the avoidance by fishermen of the small area of ground in which the pipeline is trenched would have a very small economic impact.

Given the location of the line in the southern North Sea, the relatively shallow water in the Tristan NW Field, and the presence of sandbanks and sand waves along the pipeline route, it is possible that the sediment cover over the trenched and buried line might in time be reduced by natural erosion. The monitoring programme that Silverstone will discuss and agree with DECC should provide valuable information with which to monitor and assess the natural movements of sediments at this specific location, and give early warning of the need for possible remedial action.

2.6 Duration and Management of Activities

The proposed decommissioning programmes will be managed by Silverstone and will be carried out during August and September 2010. As currently planned, the DSV and jack-up will be operating in the field for a total of approximately 41 days, in two phases of work. Progress will be reported to DECC and Silverstone will issue a completion report to DECC within four months of completion of all offshore work.

2.7 Monitoring and Maintenance of Remains

Subject to further discussions with DECC, it is likely that within a year of completion Silverstone will carry out a full environmental and seabed survey of the former sites of the exploration and production wells, the valve assembly near Davy, all the seabed infrastructure, and the route of the trenched and buried pipeline with piggy-backed umbilical. Future survey requirements will be discussed and agreed with DECC.

3 BACKGROUND INFORMATION

3.1 Introduction

A more detailed description of the environmental conditions experienced at the Tristan NW Field can be found in the separate Tristan NW Field Decommissioning Environmental Statement (BMT Cordah, 2010).

The Tristan NW Field is located in Block 49/29b, approximately 76 km northeast of the nearest UK coastline (Norfolk), 29 km west of the UK/Netherlands median line, and approximately 15 km southeast of the boundary of the North Norfolk Sandbanks possible Special Area of Conservation (pSAC) (**Figure 1**). The Tristan NW Field comprises a single development well (49/29b-11) tied-back via a 15.5 km subsea pipeline to the Davy NUI in Block 49/30d (**Figure 1**).

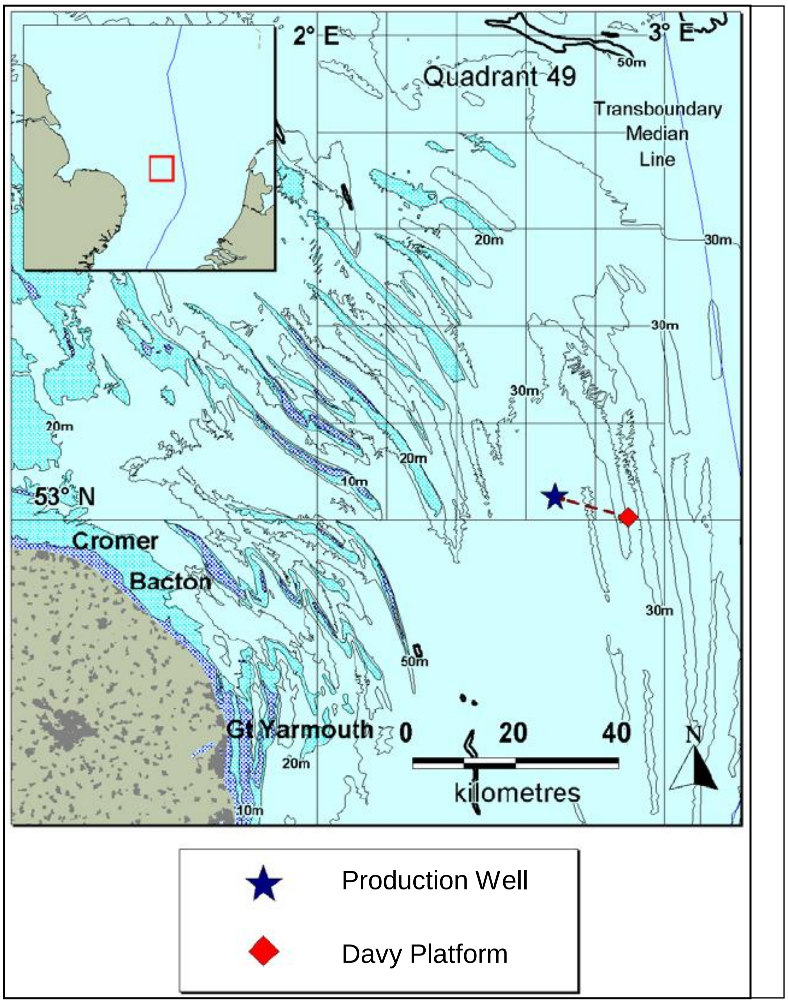

Figure 1: Location of the Tristan NW Field in Blocks 49/29b and 49/30d.

Source: Tristan NW Development Environmental Statement, Granby (2007), (amended)

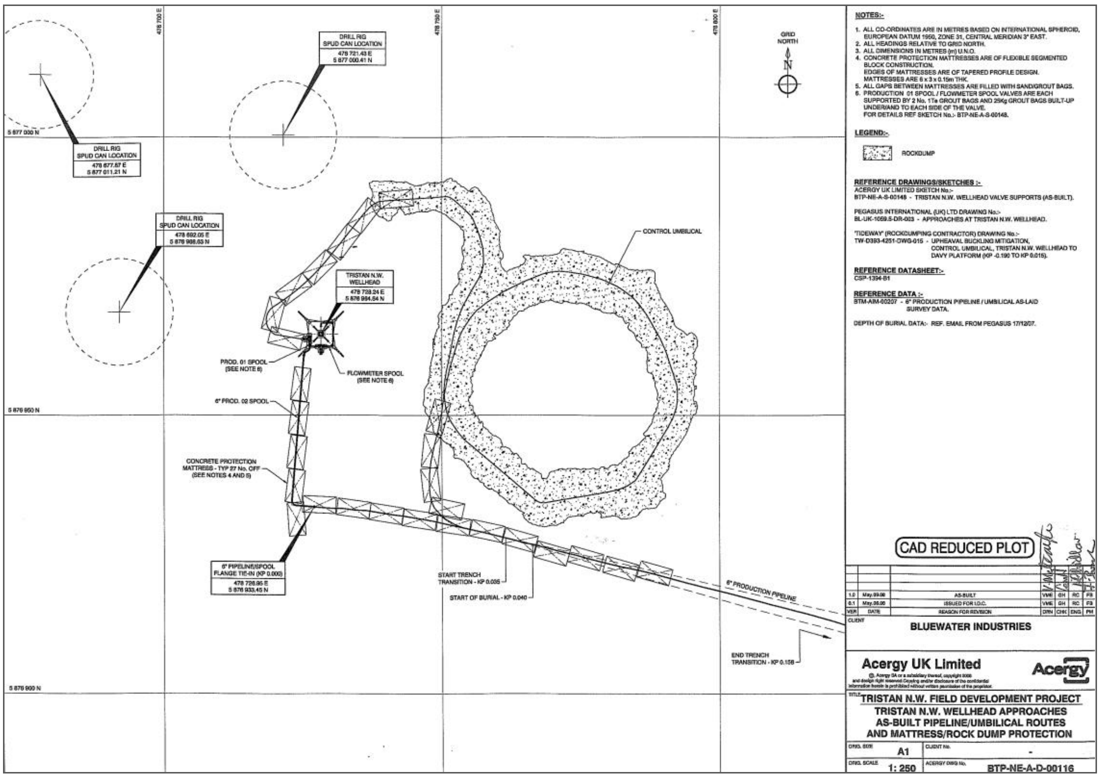

Figure 2: Facilities at the west end of the Tristan NW infrastructure.

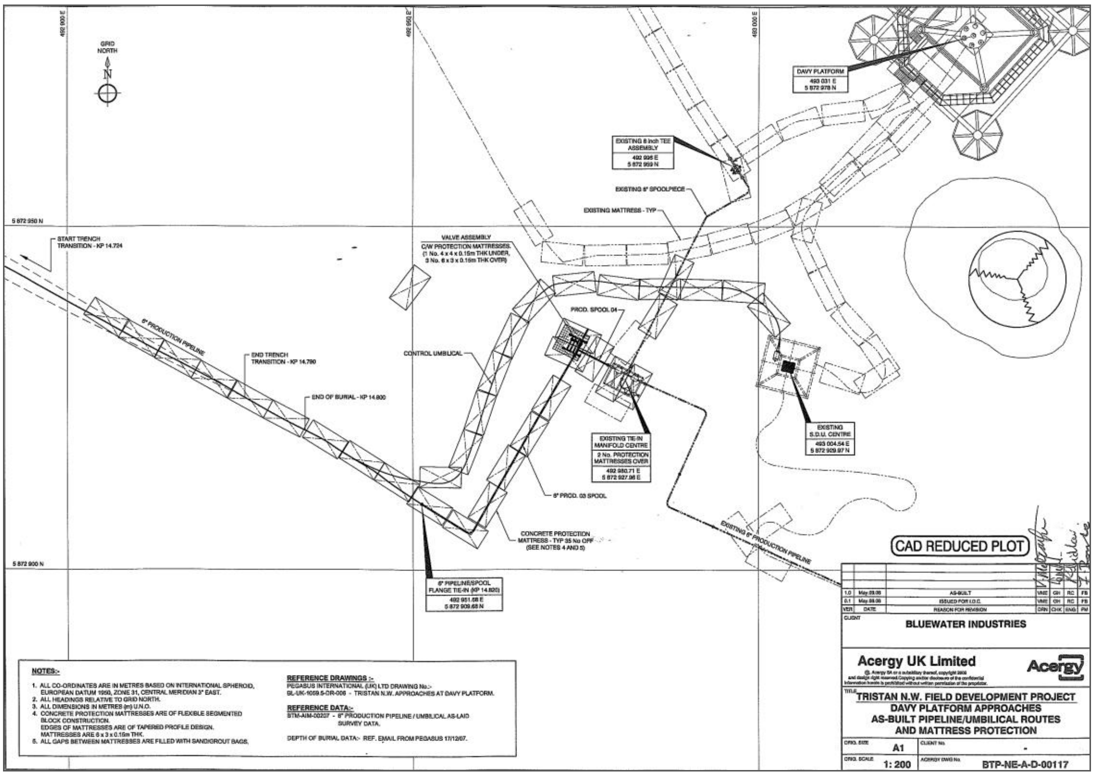

Figure 3: Facilities at the east end of the Tristan NW infrastructure (at Davy NUI).

3.2 Metocean Conditions

Tidal streams in the Tristan NW Field flood southwards and ebb northwards. Maximum tidal currents are 0.82 m/s for spring tides and 0.46 m/s for neap tides (Hydrographer of the Navy, 2000). Significant wave heights in the Tristan NW Field typically exceed 2 m for approximately 10 % of the year (Smith, 1998).

Water temperatures at the sea surface and seabed are similar, and there is little seasonal variation in either the surface or bottom salinity (**Table 2**).

Table 2: Sea temperature and salinity at the Tristan NW Field.

Location	Temperature (°C)		Salinity (ppt)	
	Sea surface	Seabed	Sea surface	Seabed
Summer	16	16	34.25	34.5
Winter	5	5	34.75	34.6

Source: UKDMAP (1998)

Winds in the Tristan NW Field are predominately south-westerly, with seasonal variations. Strong winds (winds exceeding 28 knots) occur most frequently between September and March (ConocoPhillips, 2003).

3.3 Seabed Conditions

The Tristan NW pipeline crosses two sandbanks and water depths in the field range from 25 m to 36 m (Gardline, 2006).

Seabed sediments consist predominantly of fine to medium sand interspersed with areas of shell fragments and gravel (Gardline, 2006). The seabed comprises undisturbed megarippled sand with ripples having an average wavelength of 6-7 m and heights of 0.5-0.6 m. The asymmetry of the ripples suggests the prevailing current and direction of sediment transport at the seabed is north-northwest (Gardline, 2006).

3.4 Biological Environment

3.4.1 Benthic communities

The results of a survey undertaken in Blocks 53/3 and 53/4 (Horne and Wren), immediately south of the Tristan NW Field indicate that species diversity and abundance in the area are expected to be low (Granby, 2007), which is consistent with observations of seabed communities under moderately harsh current regimes. The survey results suggested that infauna in the vicinity of the Tristan NW Field would be expected to be dominated by polychaetes. The most abundant infauna species observed during the Horne and Wren survey were the polychaetes *Ophelia borealis* and *Nephtys cirrosa*, the gastropod *Polinices pulchellus*, the brittlestar *Ophiura albida*, the sea urchin *Echinocyamus pusillus* and the amphipod *Urothoe brevicornis*, as well as juvenile brittlestars of indeterminate species (Granby, 2007).

3.4.2 Plankton

The Tristan NW Field is located within the 'South British Coastal' sub-division of the North Sea (Adams, 1987). Plankton in this area are typical of the Continental Shelf although southern intermediate species are also present.

The phytoplankton community in the Tristan NW Field is dominated by the dinoflagellate genera *Ceratia* and high numbers of diatoms of the genus *Chaetoceros* (SAHFOS, 2001). The copepod *Calanus* dominates the zooplankton communities in the field (SAHFOS, 2001). The larger zooplankton (or megaplankton) in the field includes the euphausiids (krill), thaliacea (salps and doloids), siphonophores and medusae (jellyfish).

3.4.3 Fish

The Tristan NW Field lies within potential spawning grounds for mackerel, plaice, lemon sole, sprat and *Nephrops*. In addition to spawning grounds, the waters surrounding the Tristan NW Field also act as a nursery area for *Nephrops*, cod, lemon sole and whiting (**Table 3**).

Table 3: Spawning and nursery areas in the Tristan NW Field area.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mackerel					S*	S*	S*	S				
Plaice	S*	S*	S									S
Lemon sole	N	N	N	S/N	S/N	S/N	S/N	S/N	S/N	N	N	N
Sprat					S*	S*	S	S				
Nephrops	S/N	S/N	S/N	S/N*	S/N*	S/N*	S/N	S/N	S/N	S/N	S/N	S/N
Cod	N	N	N	N	N	N	N	N	N	N	N	N
Whiting	N	N	N	N	N	N	N	N	N	N	N	N

Key:

S	Spawning
S*	Peak Spawning
N	Nursery

Source: Coull *et al*. (1998)

3.4.4 Marine mammals

Seven species of marine mammal have been observed in the vicinity of the Tristan NW Field. Harbour porpoises and white-beaked dolphins occur regularly in the area, whereas minke whale, pilot whale, bottlenose dolphin, common dolphin and white-sided dolphin have been sighted more sporadically (Reid *et al.*, 2003, UKDMAP, 1998; **Table 4**). The Tristan NW Field is approximately 76 km from the UK coastline, and grey and common seals could be found in the vicinity of the field.

3.4.5 Seabirds

Fulmar, gannet, guillemot, razorbill, kittiwake, herring and the great black-backed and lesser black-backed gulls are commonly found in the vicinity of the Tristan NW Field (DTI, 2001). Peak numbers of seabirds occur in the offshore waters of the Tristan NW Field area following the breeding season and through winter, with birds tending to forage closer to coastal breeding colonies in spring and early summer (DTI, 2001).

The most sensitive times of year at the Tristan NW Field are during February, March and December, when vulnerability to oil pollution is "high" to "very high". Seabird vulnerability to oil pollution ranges from "moderate" to "low" for the remainder of the year and, overall, seabird vulnerability to surface pollution in the Tristan NW Field area is "low" to "moderate".

Table 4: Marine mammal sightings in Quadrant 49 and surrounding quadrants.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harbour porpoise		4	2	4	2	2	4	1	2	4	3	4
Minke whale							4	4				
Pilot whale								4				
Bottlenose dolphin											4	
Common dolphin		4										
White-beaked dolphin	3		3	1	4	4	4			4	4	4
White-sided dolphin								4				

Key:

Low (1)	0.01-0.09 animals/km
Mod (2)	0.10-0.19 animals/km
High (3)	0.20-0.49 animals/km
Very High (4)	>=0.50 animals/km

Source: Reid *et al.* (2003); UKDMAP (1998)

3.5 Conservation interests

There are no ‘sandbanks’, ‘submerged sea caves’, ‘reefs’ or ‘submarine structures made by leaking gas’ which are designated as an Annex I habitat under the Habitats Directive, in the area of the Tristan NW Field. The closest Annex I habitat is the North Norfolk Sandbanks, a series of ten main sandbanks and associated fragmented smaller banks formed as a result of tidal processes. The North Norfolk Sandbanks extend from approximately 41 km to approximately 111 km from the north-east coast of Norfolk. The Tristan NW Field is located approximately 15 km east from the boundary of the possible Special Area of Conservation for the North Norfolk sandbanks.

No potential Annex I habitats such as *Sabellaria spinulosa* reefs, reefs of *Lophelia pertusa* or pockmarks have been identified in the field area (**Section 3.3**; Gardline, 2006). The only Annex II species recorded within the vicinity of the Tristan NW Field is the harbour porpoise, which is present throughout most of the North Sea throughout the year (**Section 3.4.4**). The Annex II species grey and common seals may occur in the vicinity of the Tristan NW Field (**Section 3.4.4**).

3.6 Commercial Fishing

The Tristan NW Field lies within ICES rectangle 35F2. The demersal fishing method beam trawling, dominates the fishing effort in this rectangle, with demersal species such as plaice, sole, sprat, and the shellfish species Norway lobster (*Nephrops norvegicus*) and crab dominating the landings.

In comparison to other areas of the North Sea, the relative UK fishing effort in the area of the Tristan NW Field in 2008 was “very low” (Marine Scotland, 2009). The ‘relative value’ for the Tristan NW Field area in 2008, in comparison to other areas of the North Sea, was “very low” (Marine Scotland, 2009).

3.7 Shipping

The Tristan NW Field is located in an area of high shipping intensity, with 23 shipping routes passing within 10 nautical miles (19 km) of the Tristan NW production well (Anatec, 2007; **Figure 4**).

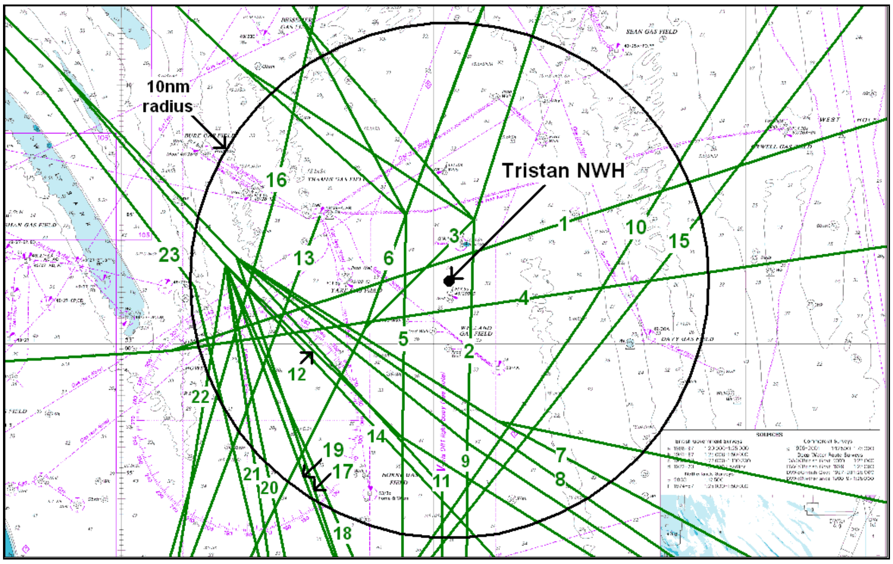

Figure 4: Location of the 23 shipping routes within 10 nm of the Tristan NW production well.

Source: Anatec (2007)

The 23 shipping routes are used by an estimated 8,602 vessels each year, which equates to approximately 24 vessels each day. Cargo ships (48 %) and tankers (45 %) dominate this traffic, with the remaining 7 % of vessels comprising ferries and offshore vessels. Vessels passing through the field area vary in size from 0-1,500 DWT to >=40,000 DWT (**Figure 5**).

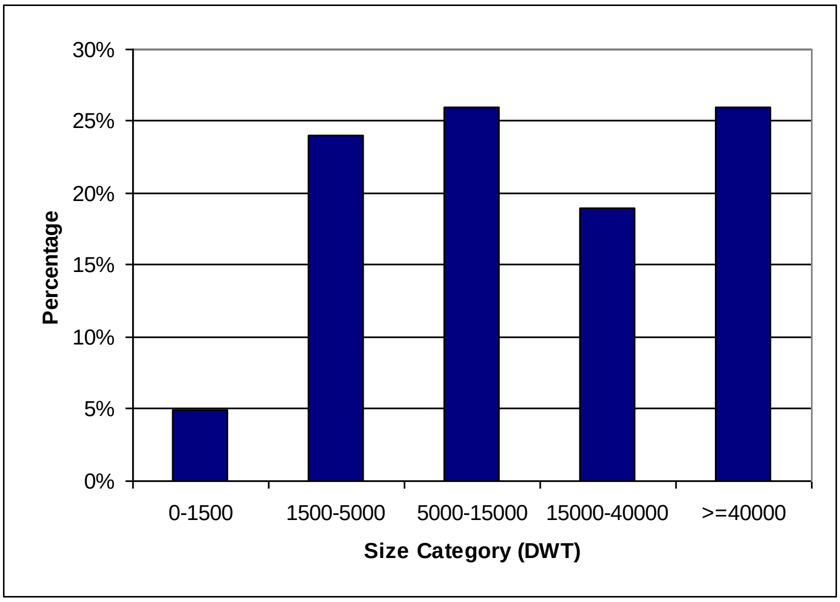

Figure 5: Vessel size distribution within 10 nm of the Tristan NW production well.

Source: Anatec (2007)

3.8 Adjacent Facilities

The Tristan NW Field is located within 5 km of the Welland fields (Welland Northwest and Welland South). The North Davy Field lies approximately 7 km north of the Tristan NW to Davy pipeline, and the Thames, Wensum, Yare, Thurne and Deben fields are located 10 to 15 km west of the Tristan NW Field. The Tristan NW umbilical crosses the existing Davy 8" spool piece on its approach to the Davy Subsea Drilling Unit (SDU).

A total of 14 wells have been drilled in Block 49/29. The Tristan NW development well (49/29b-11) was completed in March 2008, one other well was drilled in 2003, and the remaining wells were drilled during the 1980s and 1990s. The latest Kingfisher chart indicates that the Tristan NW pipeline lies in the vicinity of three submarine communication cables, the Norsea Comms cable, the UK-Netherlands-14 cable, and the out-of-service UK-Germany-5 cable. However, information from Kingfisher (pers. comm.) suggests that disused cables that have been out of use for more than two years may not appear on the Kingfisher charts. It is believed that two additional cables, not appearing on the Kingfisher charts, may pass close to the production well. Identification of these cables has not been possible, and it is not known if they are still in place, but they have been included here as a worst case. The closest operational cable to the Tristan NW Development pipeline is the Norsea Comms cable, approximately 18 km to the west; the closest disused cable (assuming it is still in place) lies approximately 1 km northwest from the Tristan production well (**Figure 6**).

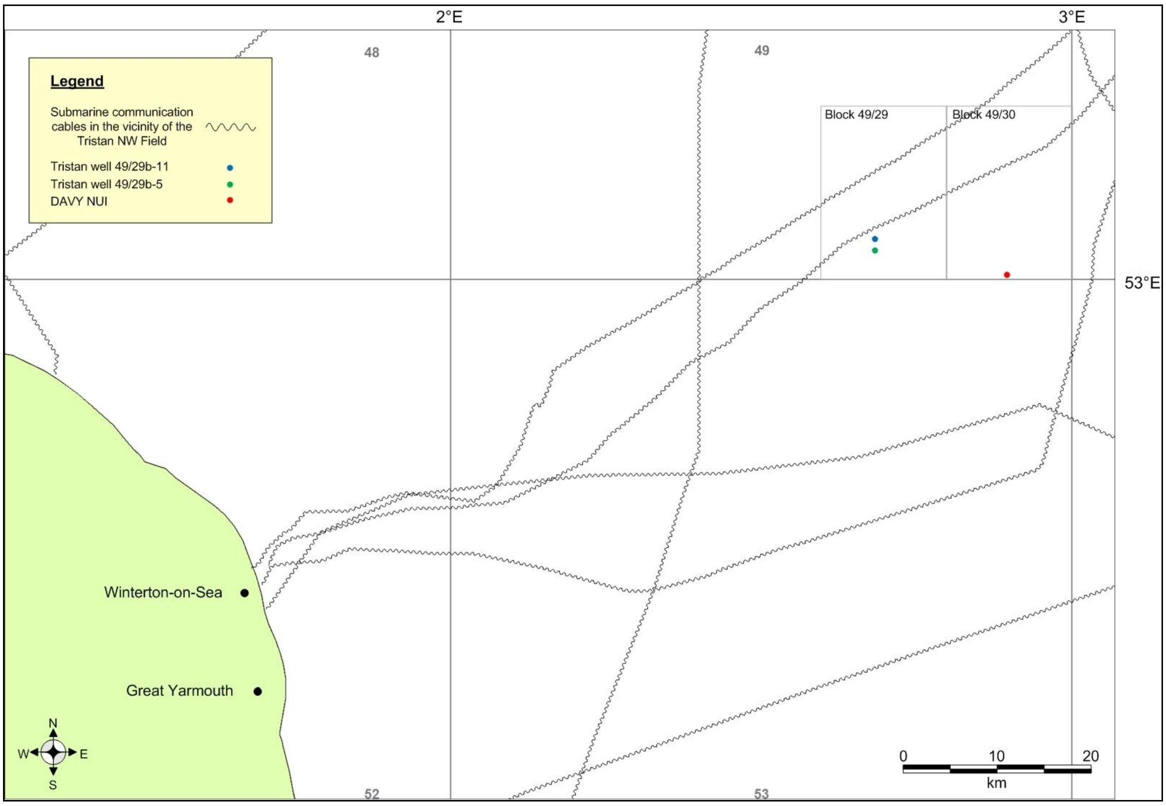

Figure 6: Submarine communication cables in the vicinity of the Tristan NW Field.

Source: Kingfisher (2010)

3.9 Commercial Activity

Apart from fishing and the transit of shipping, no other commercial or industrial activities take place within the Tristan NW Field area.

3.10 Wrecks

No charted wrecks were identified during the site surveys for the development of the Tristan NW Field (Granby, 2007).

3.11 MOD Activity

There are no recorded historic military disposal sites within or close to the Tristan NW Field area. No Air Force or Naval Practice and Exercise Areas are located in the Tristan NW Field area (DECC, 2009).

3.12 References

The environmental references cited in this section are detailed in the Tristan NW Field Decommissioning Environmental Statement (BMT Cordah, 2010).

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4 FACILITIES TO BE DECOMMISSIONED

4.1 Overview

Figure 7 and Figure 8 illustrate the facilities and existing infrastructure at the Tristan NW Field. These comprise:

Decommissioning Programme 1

- Tristan NW production well and Xmas tree with integrated Fishing-Friendly Structure (FFS)
- Second, suspended Tristan exploration well
- Umbilical Termination Assembly (within the Xmas tree)
- Two 32 m long 6” spool pieces connecting the wellhead to the 6” production pipeline
- Flowmeter spool piece including two double block and bleed valves and two manual valves
- Subsea Umbilical Termination Unit (SUTU) within the existing Subsea Drilling Unit Centre (SDU)
- 35 m long 6” spool piece connecting the pipeline to the valve assembly
- Valve assembly
- 6” tie-in spool piece connecting the valve assembly to the Davy subsea manifold

Decommissioning Programme 2

- 15.5 km long 6” production pipeline (PL2441)
- 15.3 km long control umbilical, the majority of which is “piggy-backed” onto the production pipeline (PLU2442)
- Two flexible jumpers from the production well to the Umbilical Termination Assembly (UTA)(PLU2442JTNW)
- Two flexible jumpers from the SUTU to the SDU (PLU2442JDSDU)

With the exception of the trenched and buried pipeline and piggy-backed umbilical, the entire infrastructure at the Tristan NW Field is contained within either the 500 m exclusion zone at the Davy NUI or the exclusion zone at the Tristan NW production well.

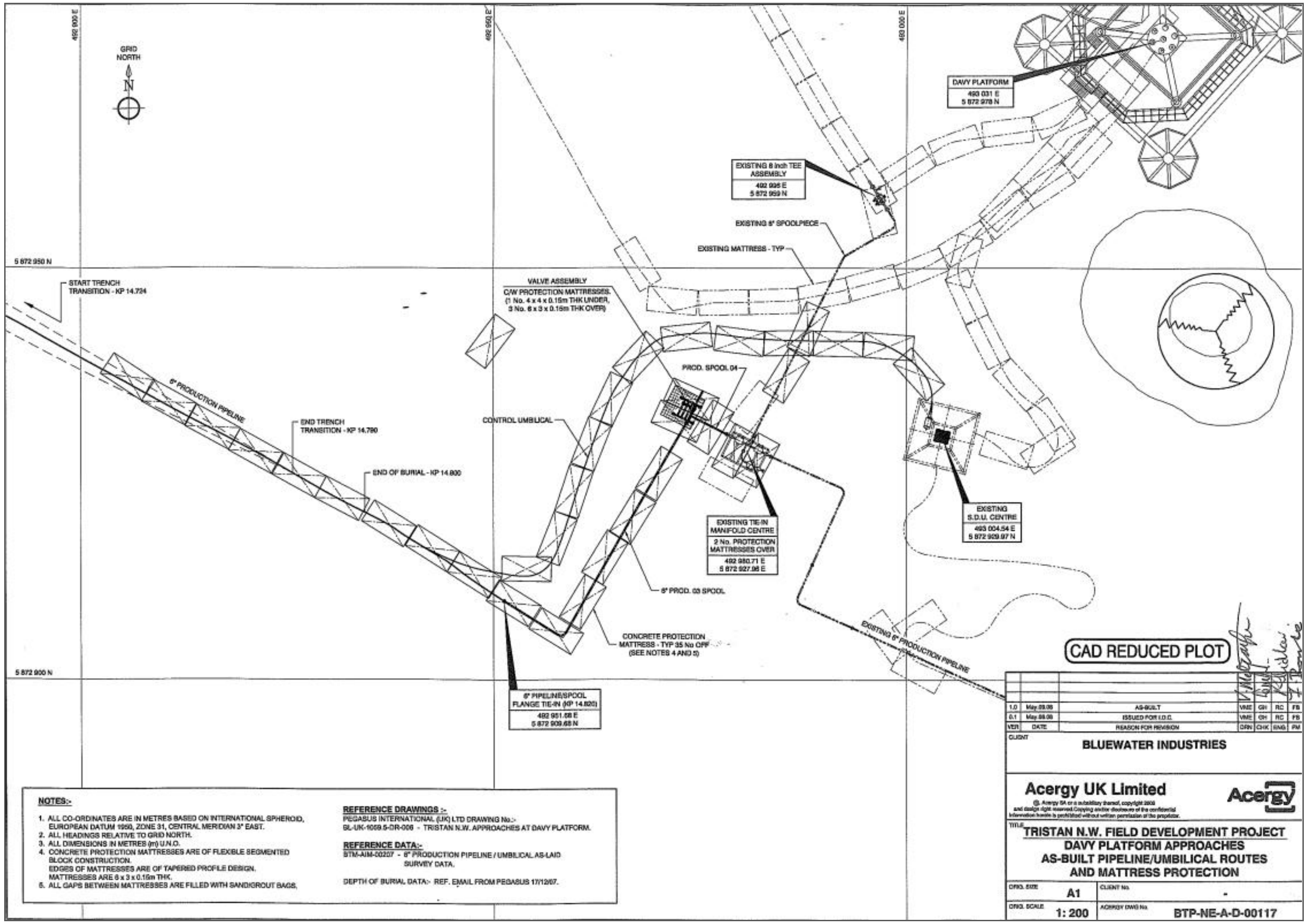


Figure 7: Tristan NW Field seabed infrastructure at the Davy NUI.

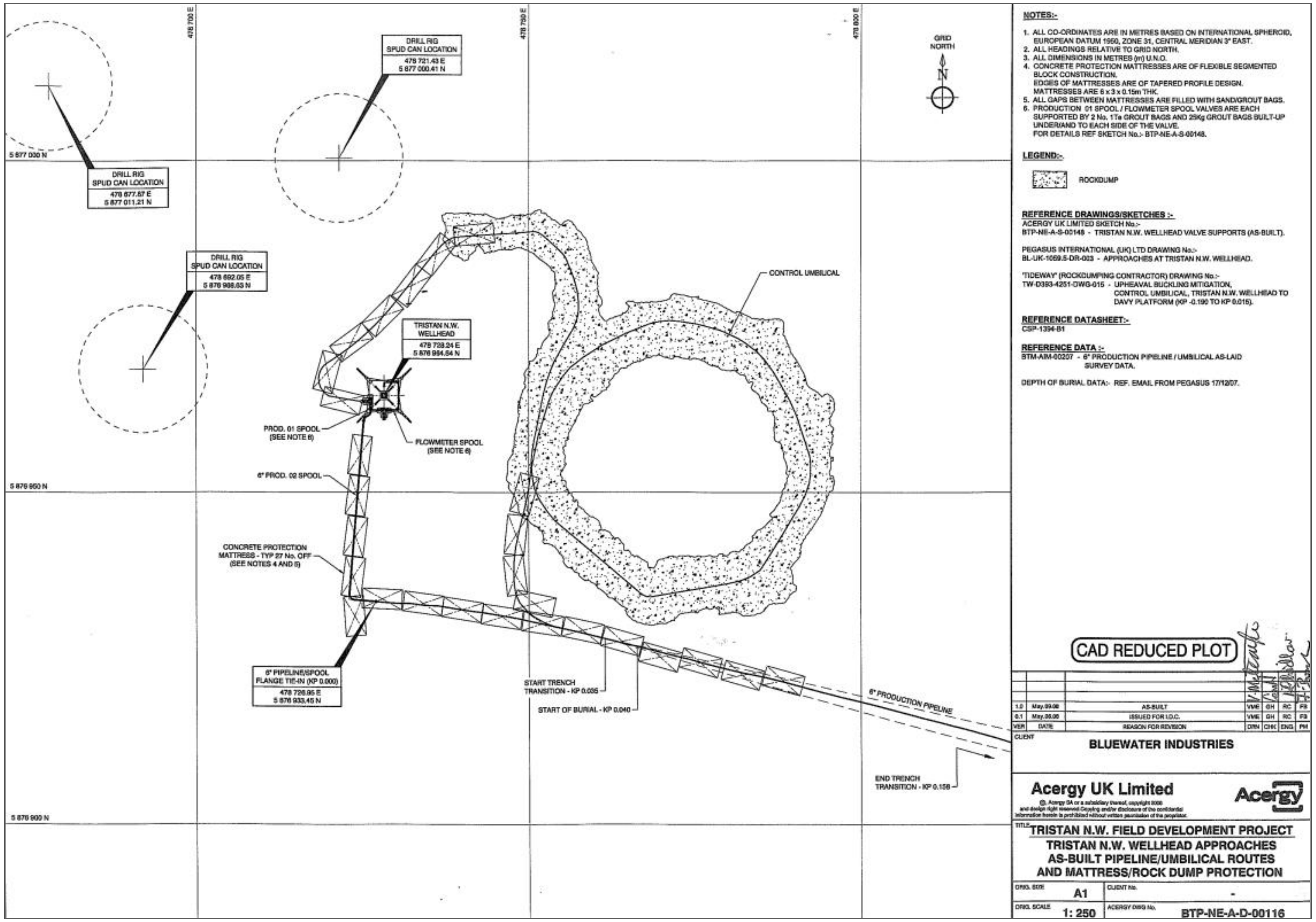


Figure 8: Tristan NW Field seabed infrastructure at Tristan NW production well.

Table 5 lists the coordinates of the main facilities at the field. The pipeline and umbilical run in a slightly deviated straight line from the Tristan well to the Davy subsea manifold.

Table 5: The coordinates of the facilities in the Tristan NW Field.

Infrastructure item	Easting	Northing	Latitude	Longitude
Tristan well 49/29b-11	478 728.24	5 876 974.64	53° 02’ 26.69” N	2° 40’ 57.90” E
Tristan well 49/29b-5	478 840	5 875 667	53° 01’ 44.39” N	2° 41’ 04.21” E
Valve assembly	492 973.65	5 872 933.08	53° 00’ 17.26” N	2° 53’ 43.06” E
Davy Manifold	492 980.71	5 872 927.96	53° 00’ 17.10” N	2° 53’ 43.44” E
Davy SDU	493 004.54	5 872 929.97	53° 00’ 17.16” N	2° 53’ 44.72” E

4.2 Tristan NW Production Well

Details of the Tristan NW production well and the second suspended well are presented in **Section 8.**

4.3 Tristan NW Production Wellhead

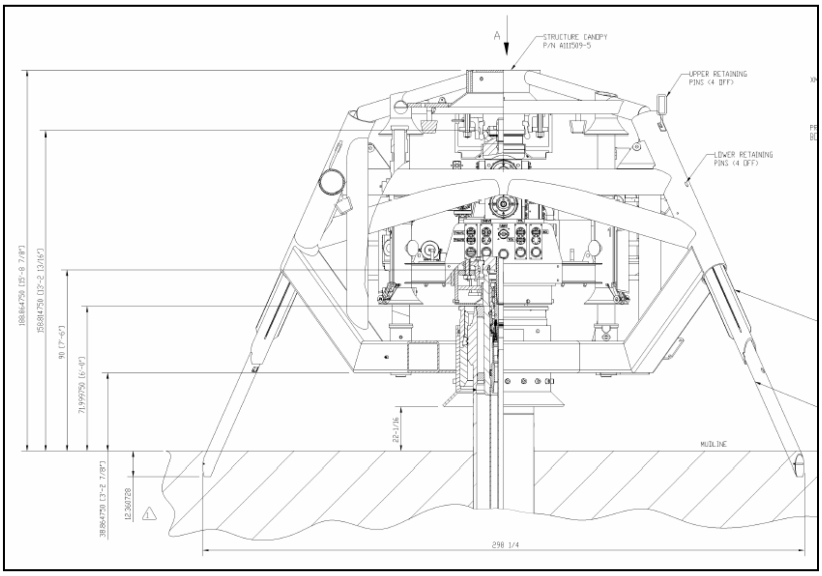


Figure 9: Diagram of Xmas tree structure.

Source: Tristan NW Development Environmental Statement, Granby (2007)

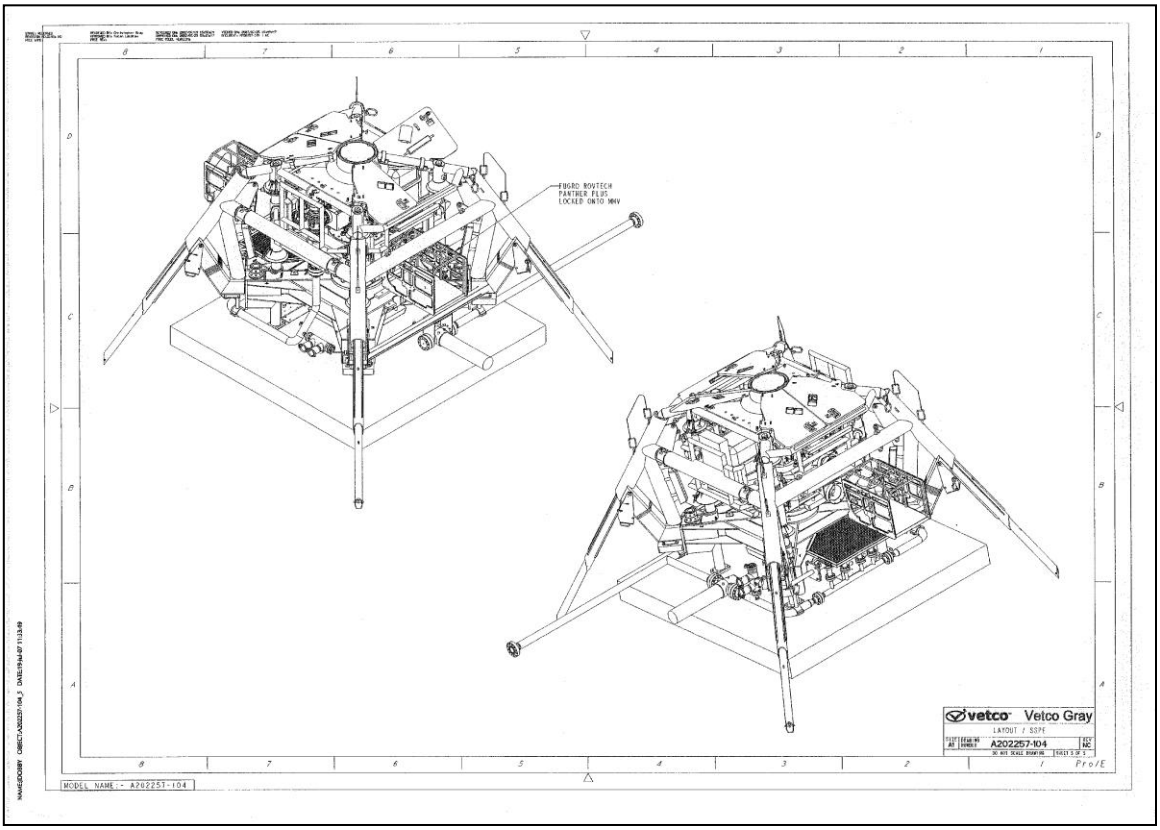


Figure 10: Schematic of the Tristan NW production well FFS and Xmas tree.

The Tristan NW Vetco production tree (**Figure 9**) is made of Duplex (stainless steel) and weighs 17 t. The tree is contained within a Fishing-Friendly Structure (FFS) also made of steel and weighing 5 t (**Figure 10**). The FFS has integral ballast weights and extendable legs to provide stability on the seabed, and is capable of withstanding 65 t of over-trawling impact.

The flowmeter spool piece is attached to the underside of the tree and connects to two further spool pieces which lead to the 6” production pipeline (**Figure 11** and **Figure 12**). Jumpers from the control umbilical are attached to the tree at a control panel (**Figure 13**).

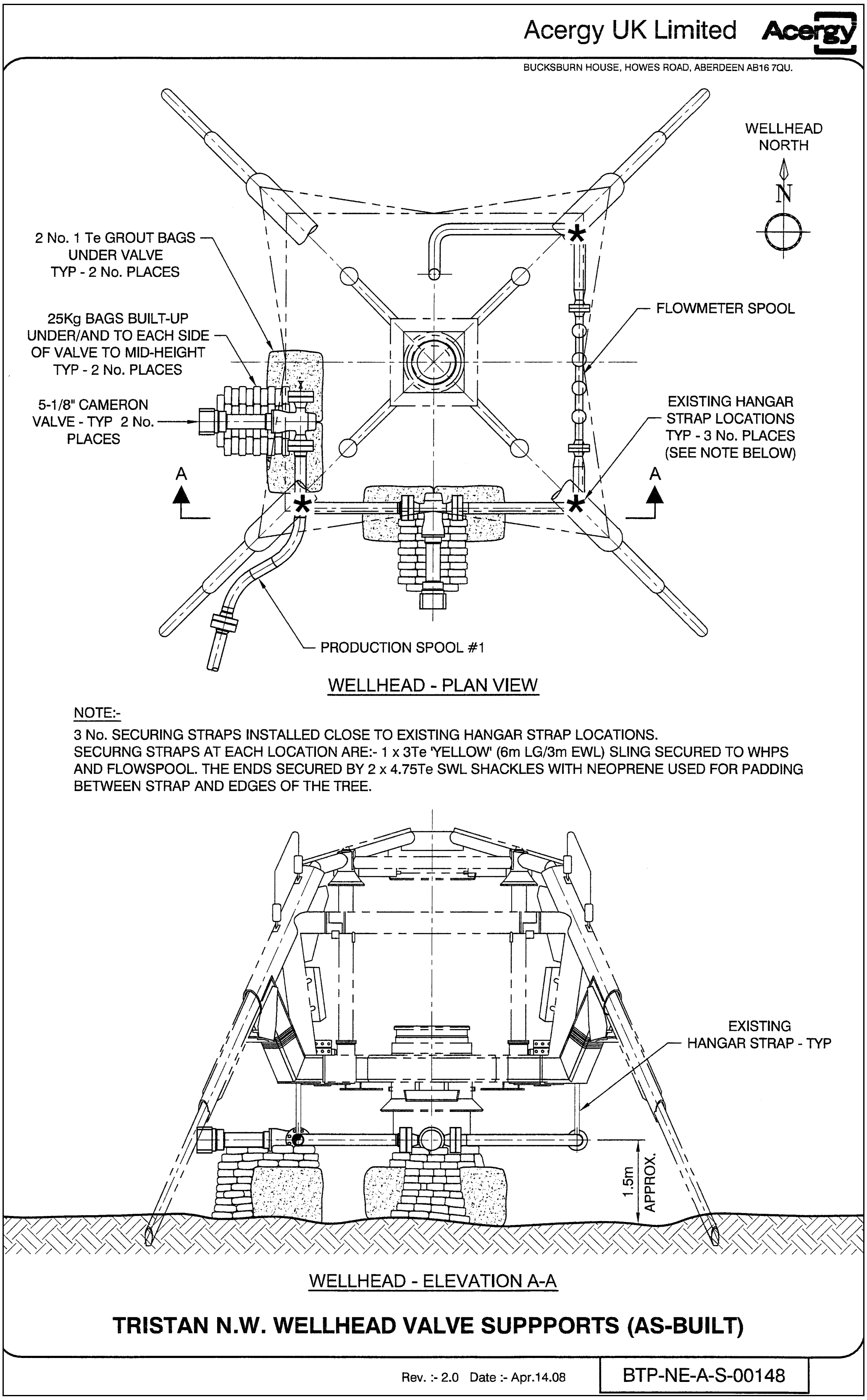


Figure 11: Schematic of the Tristan NW wellhead and flowmeter spool piece.

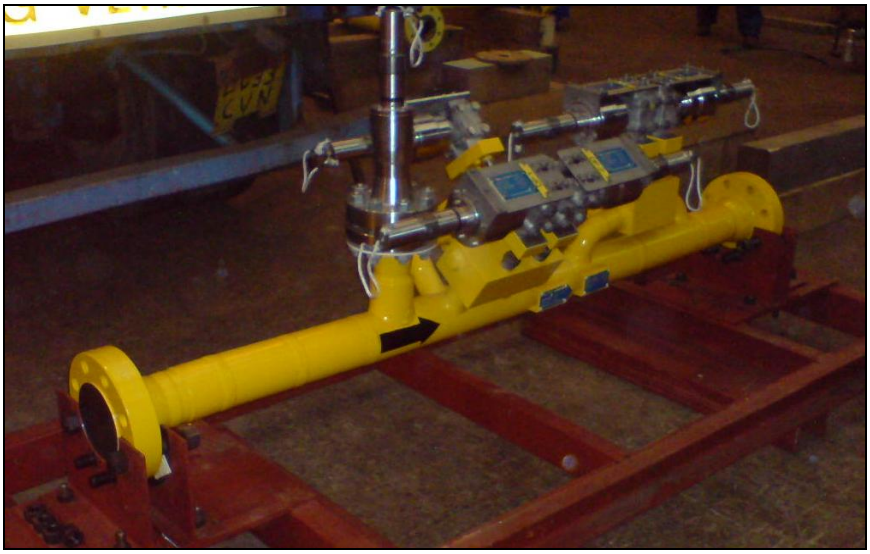


Figure 12: The Tristan NW flowmeter.

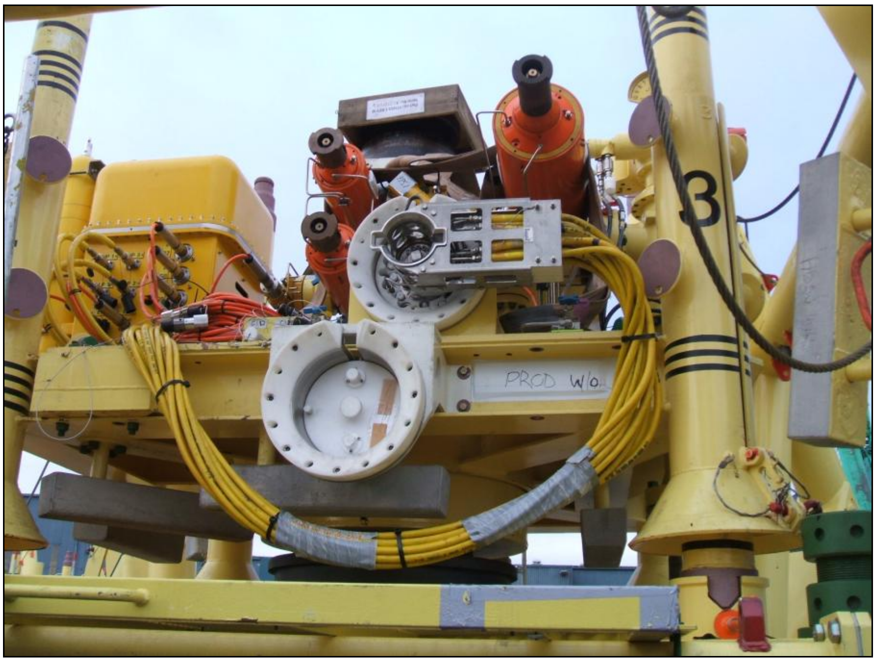


Figure 13: Onshore mock-up of the Tristan NW umbilical control panel and jumpers.

Figure 14: Photograph showing the lid of the Tristan NW FFS.

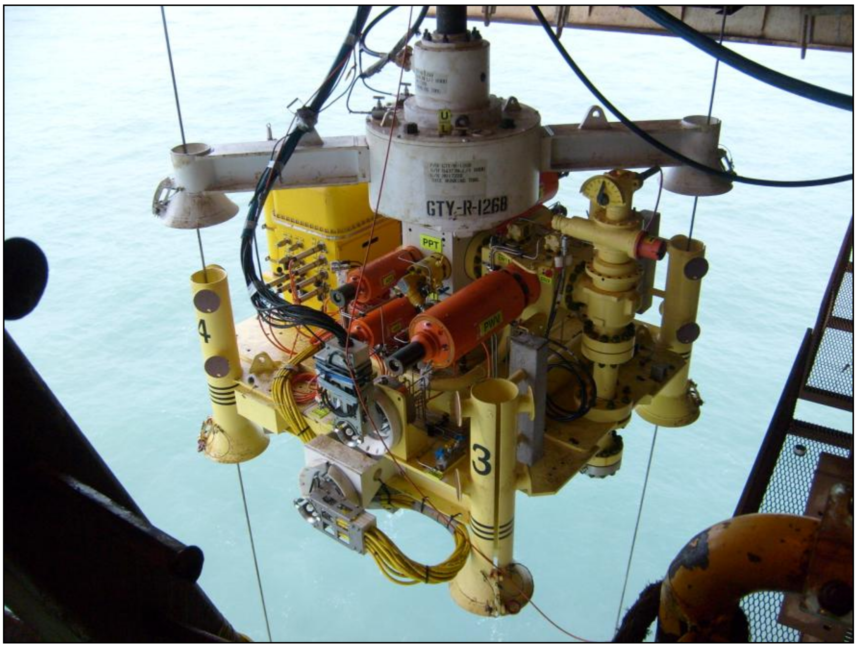


Figure 15: The Tristan NW Xmas tree being deployed offshore.

4.4 Flexible Jumpers (PLU2442JTNW & PLU2442JDSDU)

Four 30 kg synflex flexible jumpers are used at the Tristan NW Field (**Figure 16**); two connect the wellhead to the Umbilical Termination Assembly (UTA) and two connect the Subsea Umbilical Termination Unit (SUTU) to the Davy Subsea Drilling Centre (SDU). The two wellhead jumpers lie protected within the frame of the FFS and the two at the SUTU lie unprotected on the seabed.

Figure 16: Control jumpers.

4.5 6" Spool Pieces

In total, five X65 steel spool pieces are in use at the Tristan NW Field (**Figure 7** and **Figure 8**):

- the flowmeter spool piece and valves (**Figure 17**) which connect to;
- two further spool pieces covering the 32 m distance to the production pipeline;
- a spool piece at the Davy end of the pipeline;
- a 35 m long spool piece which connects the pipeline to the valve assembly at the Davy NUI; and
- the final spool piece which connects the valve assembly to the existing Davy subsea valve assembly and is protected by a single mattress.

The 32 m and 35 m spool pieces are protected by 5 and 9 concrete mattresses respectively.

Figure 17: Photograph of the flowmeter spool piece.

4.6 Umbilical Termination Assembly (UTA) and Subsea Umbilical Termination Unit (SUTU)

The Umbilical Termination Assembly (UTA) and the Subsea Umbilical Termination Unit (SUTU) are identical stainless steel components of the control umbilical. When referring to the component at the wellhead the term UTA is used, and when referring to the component at the Davy NUI end of the umbilical the term SUTU is used. These structures connect the electrical and hydraulic control conduits to the jumpers, and are attached to the wellhead and SDU by steel straps.

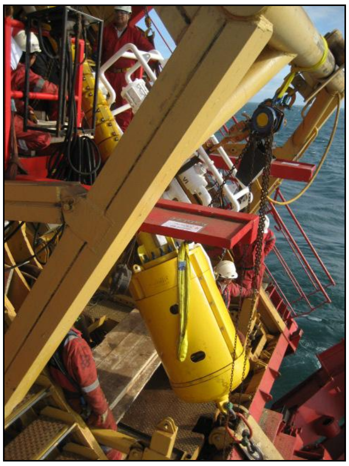


Figure 18: Deployment of UTA/SUTU.

4.7 Control Umbilical (PLU2442)

4.7.1 Description

The Tristan NW production well is controlled by a single 15.3 km long 4” diameter continuous umbilical, with a 5 mm high density polyethylene outer sheath. Most of the umbilical is piggy-backed onto the production pipeline and is therefore trenched and buried (**Section 4.8**). Where the umbilical is not buried in the trench, at both the Tristan well head (100 m) and Davy subsea manifold (126 m), it is protected by 11 and 12 6 m x 3 m x 0.15 m concrete mattresses respectively. As the umbilical approaches the Davy SDU, it crosses an 8” spool piece, which is part of the Davy infrastructure and will remain in place. Approximately 250 m of umbilical is looped on the seabed close to the Xmas tree, and is protected by 2,215 t of rock-dump (**Table 6**).

4.7.2 Function

The control umbilical comprises a number of component lines containing power cables and hydraulic fluid. Before preparatory flushing begins, the umbilical will contain 48 m^3 of Transaqua HT2 hydraulic fluid and 48 m^3 of MEG in the chemical lines. A cross section of the umbilical is presented in **Figure 19**.

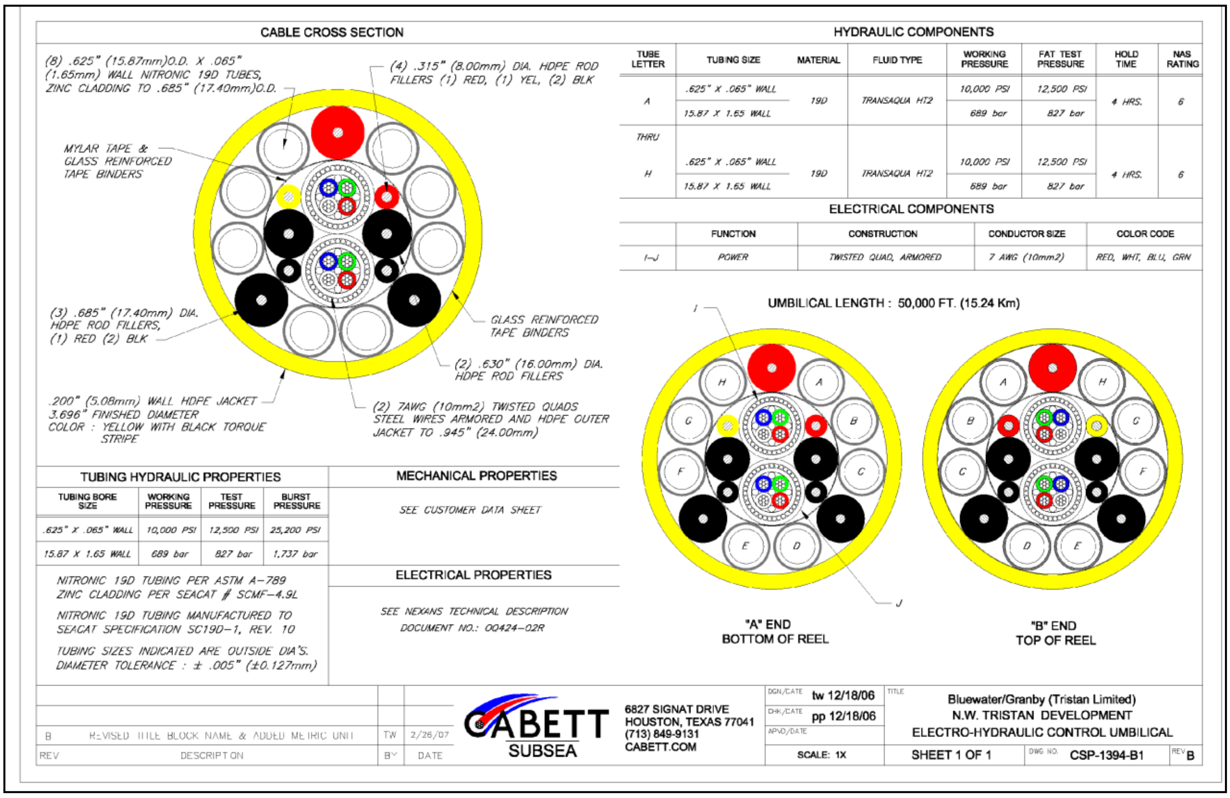


Figure 19: Cross sections of the Tristan NW control umbilical.

4.8 6" Production Pipeline (PL2441)

4.8.1 Description

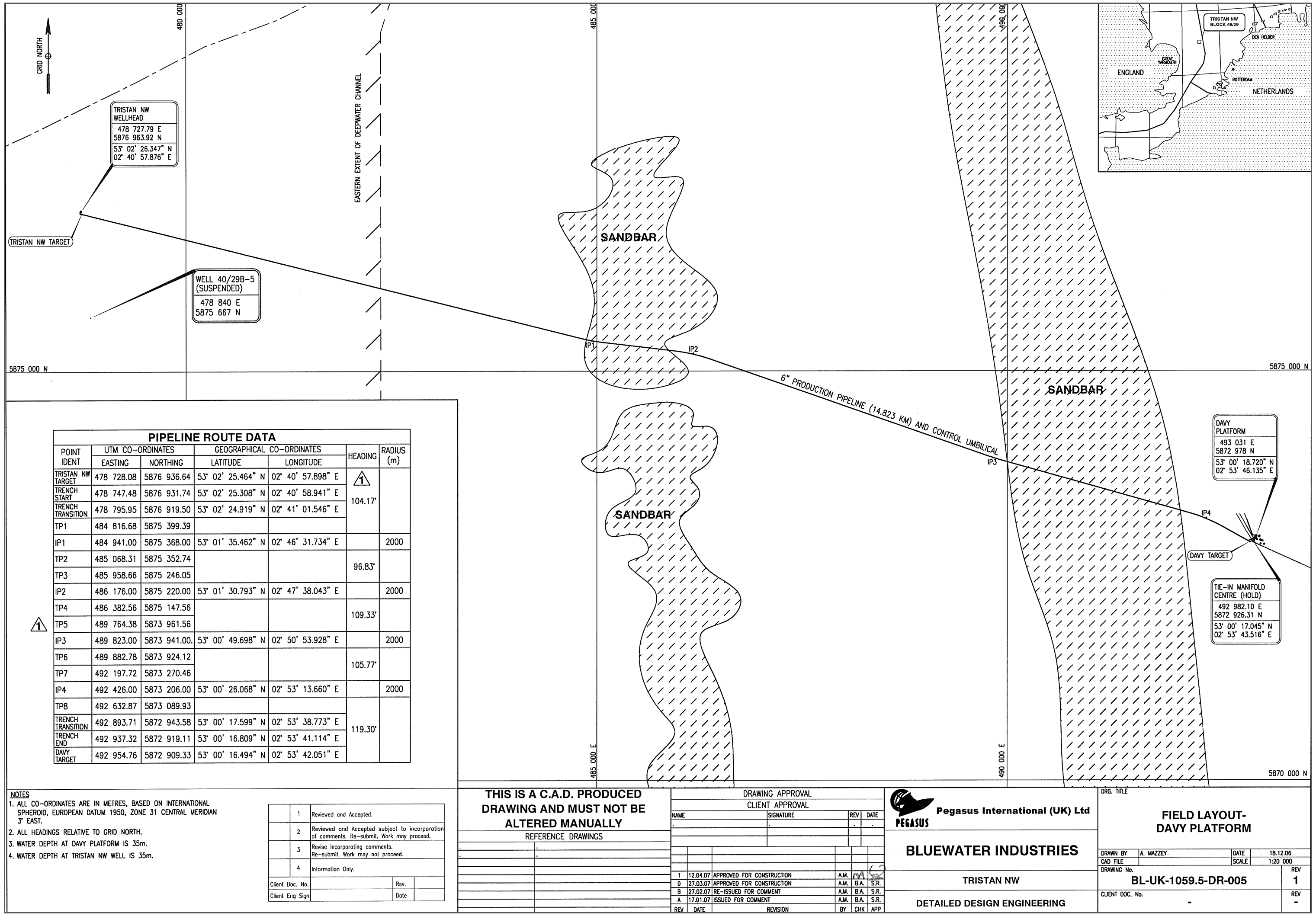
The Tristan NW production well is connected to the Davy NUI via a 15.5 km long 6" production pipeline. The pipeline is constructed of carbon steel, protected by a 2 mm thick 3-layer polypropylene anti-corrosion coating. A total of 74 aluminium-zinc sacrificial anodes are spaced evenly along the length of the pipeline.

4.8.2 Seabed bathymetry along the pipeline route

The Tristan NW to Davy pipeline crosses two sandbanks (**Figure 20**), as shown in the bathymetry diagram (**Figure 21**) and the depth profile (**Figure 22** and **Figure 23**). The seabed around the production well 49/29b-11 is relatively flat and the first (smaller) sandbank is encountered at KP 5.0 (**Figure 21**). Water depth above this sandbank is approximately 32 m and there are sandwave formations on the lee (northeast) side of the bank. This sandbank forms the western side of a channel which has a maximum depth of 38.1 m and a relatively flat bottom. The seabed then rises again as the second, larger sandbank is encountered at KP 11.8. The water depth over this sandbank decreases to approximately 25 m, before increasing to 33 m towards the Davy NUI. A sandwave feature can also be seen on the top of this second sandbank.

4.8.3 Depth of burial

The Tristan NW control umbilical is piggy-backed along the majority of the pipeline. Approximately 14.8 km (95 %) of the pipeline and piggy-backed umbilical is buried in a trench approximately 0.8 m deep, following the natural bathymetry of the area. Since the pipeline has a diameter of 168 mm, the top of the pipeline is at least 0.6 m below the seabed. When the pipeline was laid, the trench was back-filled with natural sediment. Spot rock-dumping of 1-5" graded rock is also present at various points along the pipeline to ensure stability (**Table 6**).



PIPELINE ROUTE DATA

POINT IDENT	UTM CO-ORDINATES EASTING	UTM CO-ORDINATES NORTHING	GEOGRAPHICAL CO-ORDINATES LATITUDE	GEOGRAPHICAL CO-ORDINATES LONGITUDE	HEADING	RADIUS (m)
TRISTAN NW TARGET	478 728.08	5876 936.64	53° 02' 25.464" N	02° 40' 57.898" E	104.17°	
TRENCH START	478 747.48	5876 931.74	53° 02' 25.308" N	02° 40' 58.941" E		
TRENCH TRANSITION	478 795.95	5876 919.50	53° 02' 24.919" N	02° 41' 01.546" E		
TP1	484 816.68	5875 399.39				
IP1	484 941.00	5875 368.00	53° 01' 35.462" N	02° 46' 31.734" E		2000
TP2	485 068.31	5875 352.74			96.83°	
TP3	485 958.66	5875 246.05				
IP2	486 176.00	5875 220.00	53° 01' 30.793" N	02° 47' 38.043" E		2000
TP4	486 382.56	5875 147.56			109.33°	
TP5	489 764.38	5873 961.56				
IP3	489 823.00	5873 941.00.	53° 00' 49.698" N	02° 50' 53.928" E		2000
TP6	489 882.78	5873 924.12			105.77°	
TP7	492 197.72	5873 270.46				
IP4	492 426.00	5873 206.00	53° 00' 26.068" N	02° 53' 13.660" E		2000
TP8	492 632.87	5873 089.93			119.30°	
TRENCH TRANSITION	492 893.71	5872 943.58	53° 00' 17.599" N	02° 53' 38.773" E		
TRENCH END	492 937.32	5872 919.11	53° 00' 16.809" N	02° 53' 41.114" E		
DAVY TARGET	492 954.76	5872 909.33	53° 00' 16.494" N	02° 53' 42.051" E		

Figure 20: The route of the Tristan NW pipeline to the Davy NUI.

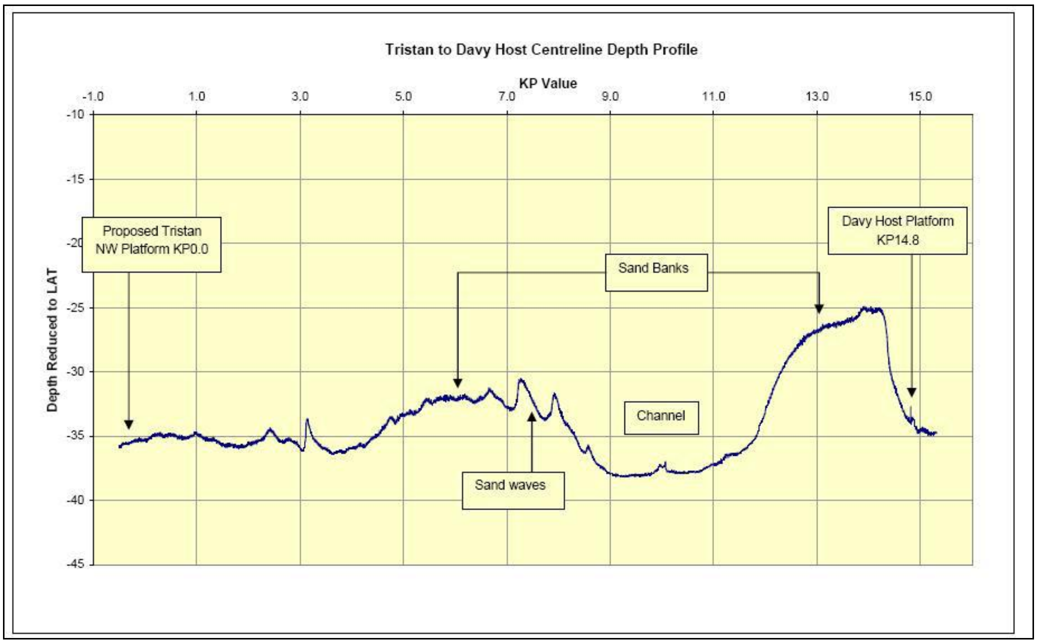


Figure 21: Tristan NW to Davy host centreline depth profile.

Source: Gardline, 2007. Note: The variation in seabed depth is exaggerated in this graph because the scale of the vertical axis (water depth) is approximately 1,000 times greater than that on the horizontal axis (kilometres along the route).

Table 6: Rock-dump totals for Tristan NW pipeline and umbilical.

Start Location	Weight (t)
Umbilical loop	2,215
Pipeline	16,195
Total	**18,410**

At either end of the pipeline, sections lie on the seabed rather than in the trench. Approximately 60 m is exposed at the wellhead end and 54 m at the Davy platform end. These sections, and the spool pieces which connect them to the other facilities, are protected by a total of 26 mattresses each measuring 6 m x 3 m x 0.15 m and weighing 6 t. Approximately 100 m of umbilical and the loop of umbilical overage of approximately 250 m lie on the seabed near the wellhead. 126 m of umbilical lies on the seabed at the Davy end of the infrastructure. The 100 m and 126 m lengths of umbilical are protected by mattresses, as is the pipeline, and the overage loop is covered with rock-dump (**Table 6**). Following the installation of the pipeline in August, 2007, an "as-built" survey was completed during which the depth of the pipeline in the trench was surveyed at 5 m intervals. **Figure 22** and **Figure 23** show the profile of the seabed and the pipeline in its trench, along the whole length of the pipeline; the red line is the seabed and the green line is the pipeline. This figure also illustrates the bathymetry along the whole route, and shows the two sandbanks and some of the sand ripples present along the route.

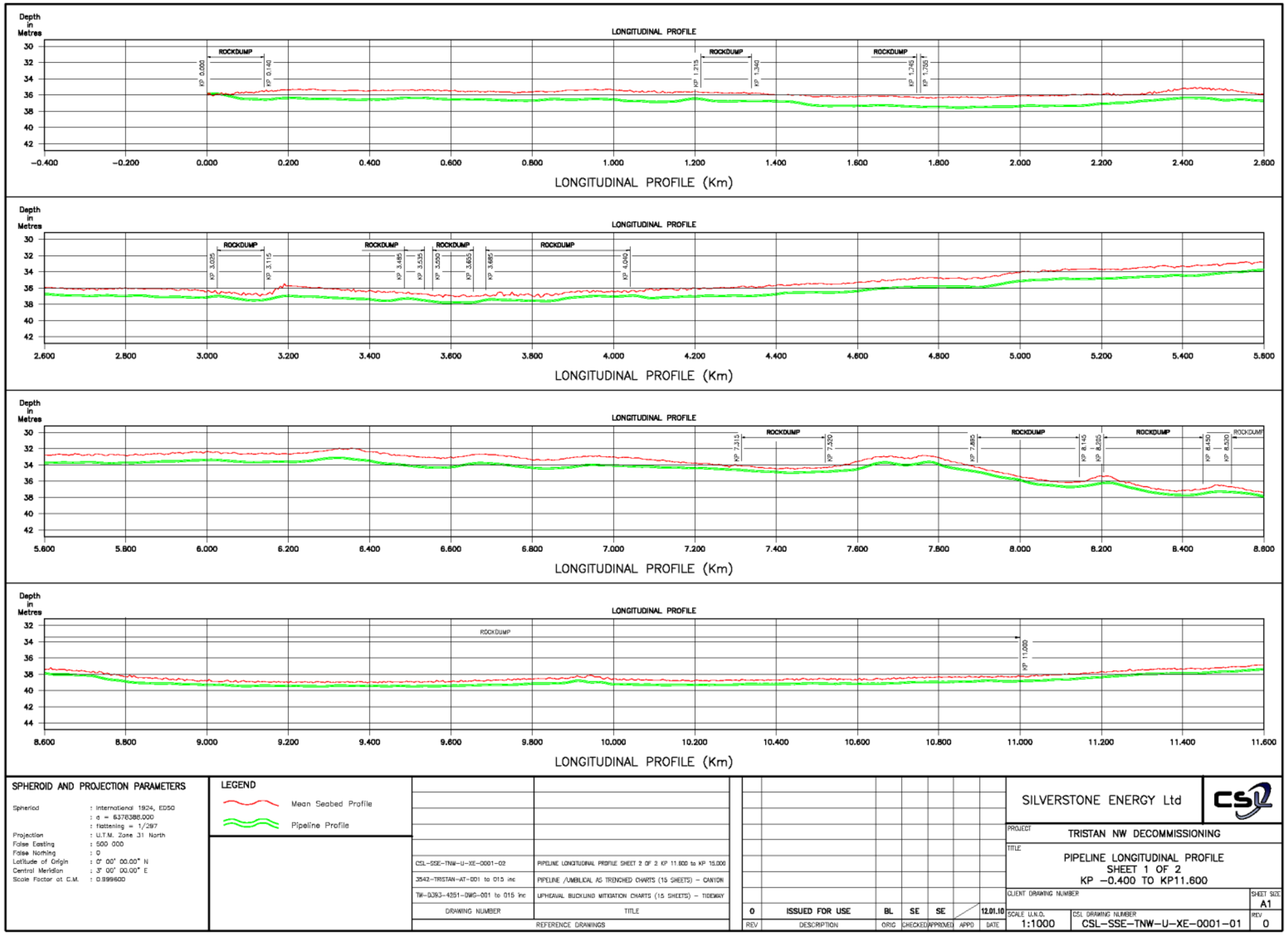


Figure 22: The as-built depth profile of the Tristan NW production pipeline.

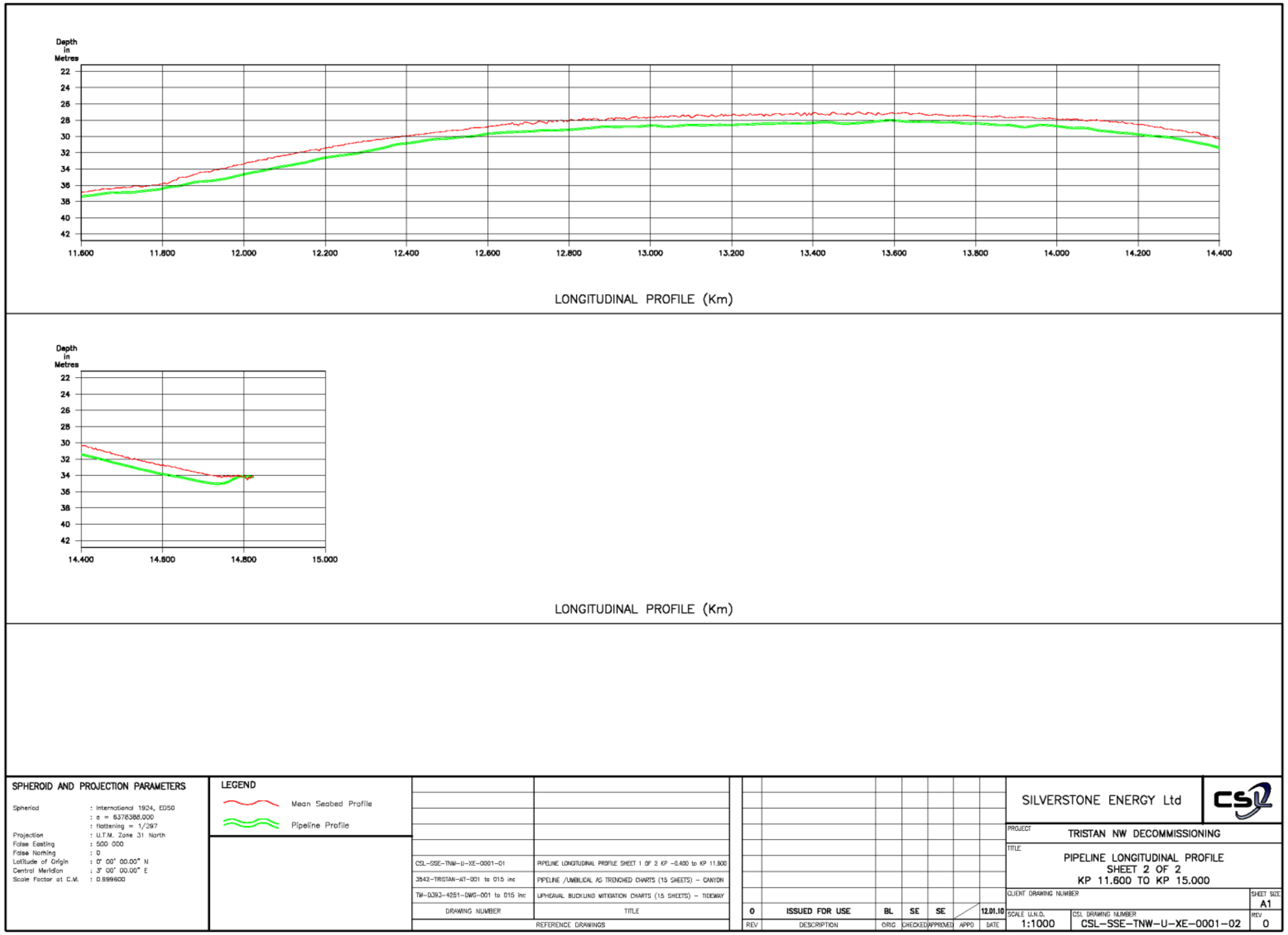


Figure 23: The as-built depth profile of the Tristan NW production pipeline, concluded.

4.9 Valve Assembly

The 0.7 m high valve assembly routes the produced dry gas from the production pipeline to the Davy manifold and on to the platform processing facilities. Constructed of X65 steel, it is contained with the assembly frame and supported on a 4 m x 4 m x 0.15 m concrete mattress (**Figure 24**).

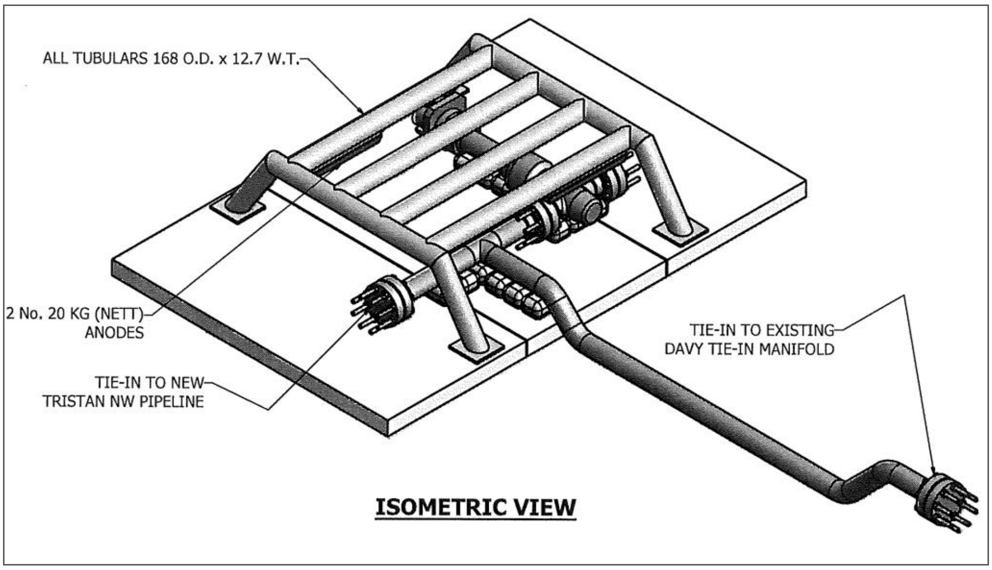


Figure 24: Tristan NW valve assembly.

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5 INVENTORY OF MATERIALS

5.1 Introduction

Table 7 details the contents of the pipeline and umbilical at the beginning of decommissioning operation. **Table 8** and **Table 9** present the estimates of the mass of different types of materials in the various structures covered by the two Decommissioning Programmes presented in this document.

Table 7: Contents of the production pipeline and control umbilical before flushing.

Structure	Contents	Volume (m^3)
6" production pipeline (after venting to atmospheric ambient pressure)	Dry gas	971
4" control umbilical	Transaqua HT2 (hydraulic fluid)	48
	MEG (hydrate preventer)	48

5.2 NORM (Naturally Occurring Radioactive Material)

There has been no previous evidence of LSA scale at the Tristan NW location and it is not expected to be encountered during decommissioning operations.

Table 8: The items included in Decommissioning Programme 1 (DP1); the Tristan NW Field infrastructure.

Item	Mass (t)						
	Concrete	Steel	Aluminium	Zinc	Copper	Plastic	Rock
2 well casings		14					
Tristan NW well head inc. FFS		22					
2 6" spool pieces		1.408					
Flowmeter spool piece		0.537					
6" spool piece to valve assembly		1.54					
Valve assembly		2.7					
6" spool piece to manifold		1.6					
Mattresses (68)	408						
Grout bags	5						
TOTAL	**413**	**43.785**	**0**	**0**	**0**	**0**	**0**

Table 9: The items included in Decommissioning Programme 2 (DP2); pipeline, umbilical and jumpers.

Item	Mass (t)						
	Concrete	Steel	Aluminium	Zinc	Copper	Plastic	Rock
15.5 km 6" production pipeline		682					
15.3 km control umbilical		30			54	115	
UTA and SUTU		0.7					
Jumpers (4)		0.12					
Sacrificial anodes			0.254	0.153			
Rock-dump							18,410
TOTAL		**714.8**	**0.254**	**0.153**	**57**	**112**	**18,410**

6 REMOVAL AND DISPOSAL OPTIONS FOR THE PIPELINE AND UMBILICAL

6.1 Introduction

Under the DECC decommissioning guidelines, all the facilities in the Tristan NW Field, with the exception of the pipeline and piggy-backed umbilical, must be removed from the seabed. Accordingly, the Tristan NW infrastructure, including the wellhead and FFS, the protective mattresses, control units (SUTU and UTA) and jumpers, will be recovered and returned to shore for recycling or reuse as appropriate. The general methods that will be employed to undertake this programme of offshore and onshore work are described in **Section 7**.

There are no prescribed options for decommissioning pipelines and umbilicals; all lines must be assessed individually (DECC, 2009). This section therefore:

- describes the procedure that Silverstone used to identify and select options for decommissioning the 6" production pipeline and piggy-backed umbilical; and
- describes the results of the Comparative Assessment of the options for decommissioning that line.

6.2 Identification of Feasible Options

6.2.1 Introduction

Feasible options for the decommissioning of the production pipeline and piggy-backed umbilical ("the line") were identified and described in a detailed technical study undertaken on behalf of Silverstone by CSL Limited (CSL).

Silverstone has no further use for the line in its present location, and has not been able to identify any third party that would wish to acquire this asset for further use in its present location. The line must therefore be decommissioned.

Within the framework of the DECC guidelines, the following 4 main options were identified for the decommissioning of the line:

1. Leave the line trenched and buried *in situ*
2. Remove the line by reverse reeling
3. Remove the line by reverse pipe-lay

4. Bury the line more deeply in its present trench

For options 2 and 3, it may be necessary to expose ("debury") the line before extracting it from the trench, and for option 4 there are two possible techniques that could be used to lower the line in its trench. In total, 7 options were therefore examined in the Comparative Assessment process.

6.2.2 Description of options

6.2.2.1 Option 1: Leave *in situ*

After flushing both the production pipeline and the umbilical, the exposed separate lengths of pipeline and umbilical lying on the seabed at both the Tristan NW and Davy ends of the line would be cut from the line by cold cutting. The severed sections, approximately 75 m in length, would be removed to shore for recycling. The cut ends of the line would be buried to the full depth of the existing trench using an air-lift tool to remove seabed sediment and the trench allowed to back-fill naturally with sediment from the adjacent seabed. This option would take about 3.5 days of offshore work.

After completion of this option a 14.8 km length of pipeline with piggy-backed umbilical would be left *in situ* it its present trench, buried by natural sediment and the existing rock-dump to a depth of at least 0.6 m from the top of the line to the seabed.

6.2.2.2 Option 2A: Remove by reverse reeling without deburial

After flushing both the production pipeline and the umbilical, the spool pieces would be disconnected from the pipeline ends and the spool pieces sections removed to shore for recycling. The pipeline end flange at Tristan NW would be fitted with a recovery head prior to the arrival of the reel vessel. The reel vessel would then be used to pick up and retrieve the whole 15.5 km length of production pipeline and piggy-backed umbilical by reverse reeling. The line would be pulled bodily through the backfill of natural sediment and the areas of spot rock-dumping in the trench. On the reel vessel, the two lines would be separated and put on different reels. After retrieval, the vessel with the reels would return to shore and the lines unspooled, and the pipeline and umbilical progressively cut into short sections for onward transportation to a recycling site. This option would take about 6 days of offshore work and 4 days of onshore work.

After completion of this option, the former routes of the pipeline and umbilical would be clear of all items. The trench would probably contain much of the original backfill of natural sediment and most of the rock-dump, although some rock-dump material may have been displaced onto the immediately adjacent seabed.

6.2.2.3 Option 2B: Remove by reverse reeling with deburial

After flushing both the production pipeline and the umbilical, the spool pieces would be removed from the pipeline at Tristan NW and Davy ends of the pipeline. A pipeline recovery head would be fitted to the Tristan NW end of the pipeline for recovery by reel vessel. The spool piece sections would be removed to shore for recycling. A dredging tool would then be deployed from a DSV to debury the line by displacing all the sediment and all the rock-dump from the trench onto the adjacent seabed. After exposing the whole line, a reel vessel would then be used to pick up and retrieve the whole 15.5 km length of production pipeline and piggy-backed umbilical by reverse reeling. After retrieval, the reels would be returned to shore and the lines unspooled, and the pipeline and umbilical progressively cut into short sections for onward transportation to a recycling site. This option would take about 10 days of offshore work and 4 days of onshore work.

After completion of this option, the former routes of the pipeline and umbilical would be clear of all items. The 1 m deep trench would contain little sediment or rock-dump, but might be expected to begin to backfill as a result of the natural movement of seabed sediments in these shallow waters. Most of the rock-dump would be scattered over the adjacent seabed.

6.2.2.4 Option 3A: Remove by reverse lay without deburial

After flushing both the production pipeline and the umbilical, the spool pieces at both ends of the pipeline would be removed and a pipeline recovery head fitted to the Tristan NW end of the pipeline. The spool piece sections would be removed to shore for recycling. A pipe-lay vessel would then be used to pick up and retrieve the whole 15.5 km length of production pipeline and piggy-backed umbilical by reverse pipe-lay. The line would be pulled bodily through the backfill of natural sediment and the areas of spot rock-dumping in the trench. On the pipe-lay vessel the two lines would be separated and cut into short (24 m) lengths, and then back-loaded onto cargo vessels for transportation to the shore for recycling. This option would take about 8 days of offshore work and 2 days of onshore work.

After completion of this option, the former routes of the pipeline and umbilical would be clear of all items. The trench would probably contain much of the original backfill of natural sediment and most of the rock-dump, although some rock-dump material may have been displaced onto the immediately adjacent seabed.

6.2.2.5 Option 3B: Remove by reverse lay with deburial

After flushing both the production pipeline and the umbilical, the spool pieces at both ends of the pipeline would be removed and a pipeline recovery head fitted to the Tristan NW end of the pipeline. The spool piece sections would be removed to shore for recycling. A dredging tool would then be deployed from a DSV to debury the line by displacing all the sediment and all the rock-dump from the trench onto the adjacent seabed. After exposing the whole line a pipe-lay vessel would then be used to pick up and retrieve the whole

15.5 km length of production pipeline and piggy-backed umbilical by reverse pipe-lay. On the pipe-lay vessel the two lines would be separated and cut into short (24 m) lengths, and then back-loaded onto cargo vessels for transportation to the shore for recycling. This option would take about 12 days of offshore work and 2 days of onshore work.

After completion of this option, the former routes of the pipeline and umbilical would be clear of all items. The 1 m deep trench would contain little sediment or rock-dump, but might be expected to begin to backfill as a result of the natural movement of seabed sediments in these shallow waters. Most of the rock-dump would be scattered over the adjacent seabed.

6.2.2.6 Option 4A: Lower in trench by subsea plough

After flushing both the production pipeline and the umbilical, and removing the exposed sections as described in **Section 7.4**, a large subsea plough would be deployed by a DSV and located over one end of the pipeline and piggy-backed umbilical. The plough would be slowly drawn along the line, deepening the trench to about 1 m and allowing the line to settle into the deeper trench. This option would take about 10 days of offshore work, although it is possible that 2 passes along the line might be required to achieve the desired depth of burial.

After completion of this option, no exposed section of pipeline or umbilical would remain on the seabed. The pipeline and piggy-backed umbilical would be buried in its existing trench to a depth of about 0.8 m over the top of the pipe, and the existing natural backfill and spot rock-dump would remain more or less in place.

6.2.2.7 Option 4B: Lower in trench by water-jetting

After flushing both the production pipeline and the umbilical and removing the exposed sections as described in **Section 7.4**, an underwater jetting tool would be deployed by a DSV and located over one end of the pipeline and piggy-backed umbilical. The jetting tool would be slowly drawn along the line, deepening the trench to about 1 m and relocating the line into the deeper trench, which would then be allowed to naturally back-fill. This option would take about 10 days of offshore work, although it is possible that the water-jetting equipment would not be able to pass through the spot rock-dump, and would therefore require more time for offshore operations.

After completion of this option, no exposed section of pipeline or umbilical would remain on the seabed. The pipeline and piggy-backed umbilical would be buried in its existing trench to a depth of about 0.8 m over the top of the pipe, and the existing natural backfill and spot rock-dump would remain more or less in place.

6.3 Method Used to Compare and Select Options

6.3.1 Selection criteria

As required by the **Petroleum Act 1998**, Silverstone carried out a Comparative Assessment of the available options for decommissioning the pipeline and umbilical to determine which option was most suitable in view of the status, condition and environmental setting of the line. Silverstone used the selection criteria recommended by DECC to compare different options. Some of these criteria were assessed quantitatively and some qualitatively, and the specific criteria used were as follows:

6.3.1.1 Safety risk

Definition:

A qualitative assessment of the potential safety risk to people directly or indirectly involved in the programme of work offshore and onshore, or who may be exposed to risk as a result of the successful completion of the option.

Criteria:

- The safety risk for project personnel who would be engaged in carrying out the decommissioning programmes offshore.
- The risk of interactions with vessels in the shipping lane.
- The safety risk for project personnel engaged in decommissioning activities onshore.
- The residual safety risk to fishermen on successful completion of the option.

6.3.1.2 Environmental impacts

Definition:

An assessment of the significance of the risks to any environmental compartment as a result of operations (the activities that would be undertaken to complete the option) or the end-points (the final state of the facilities, material or environment as a result of successfully completing the option).

Criteria:

- The number of “moderate” environmental risks to the marine and terrestrial environments from offshore and onshore operations.

- The number of “high” environmental risks to the marine and terrestrial environments from offshore and onshore operations.
- The number of “moderate” environmental risks to the marine and terrestrial environments from offshore and onshore end-points.
- The number of “high” environmental risks to the marine and terrestrial environments from offshore and onshore end-points.

6.3.1.3 CO_2 emissions

Definition:

The total emission of CO_2 from the proposed activities offshore and onshore associated with the complete programme of work for each option, including the transportation, treatment, recycling and disposal of any recovered materials or wastes. This estimation includes the emissions that would arise during the new manufacture of material to replace otherwise recyclable materials that were deliberately not recovered or recycled.

Criterion:

- The estimated total emissions of CO_2.

6.3.1.4 Societal impacts

Definition:

The effects of any of the operations or end-points on the standard of living or commercial activity of individuals, organisations or companies.

Criteria:

- The number of “medium” risks for fisheries and other users of the sea (but excluding specifically the safety risk to fishermen which was assessed under “safety risk”, above), and to onshore communities or the infrastructure or amenities of those communities.
- The number of “high” risks for fisheries and other users of the sea (but excluding specifically the safety risk to fishermen which was assessed under “safety risk”, above), and to onshore communities or the infrastructure or amenities of those communities.

6.3.1.5 Technical feasibility

Definition:

The feasibility of completing the planned programme of work successfully using the facilities, equipment, and procedures which are currently being used by the offshore oil and gas industry, or could reasonably be expected to be available in time for the Tristan NW decommissioning operations.

Criterion:

- An assessment of the feasibility and complexity of the option, including the risk of encountering unrecoverable failure such that the whole option could not be completed as planned.

6.3.1.6 Cost

Definition:

The total net cost specifically attributable to the execution of the proposed decommissioning programmes (including CAPEX and OPEX) and allowing for the proper recycling, treatment and disposal of wastes.

Criterion:

- The estimated total cost of the complete programme of work, including offshore and onshore operations, waste treatment and disposal, and future monitoring.

A total of 13 criteria in 5 categories were therefore selected to assess the performance of the options. **Table 10** lists the criteria and their categories. The 13 individual criteria were treated as having an equal effect or contribution (approximately 7.7 %) to the final performance of each option, but since there were more criteria in some categories than others, the overall result was to “weight” or emphasise the influence of some categories over others. **Table 10** therefore shows that “environment” was most influential, contributing approximately 39 % of the final result, followed by “safety” (31%), “societal impact” (15%), “technical feasibility” (8 %) and “cost” (7 %).

Table 10: Selected criteria for assessing pipeline options, and resulting weighting of each category.

Criterion	Category	Influence of category on final assessment
Risk to project personnel	**Safety**	**31 %**
Shipping lane risk		
Risk to onshore personnel		
Residual risk to fishermen		
Operational risks - medium	**Environment**	**39 %**
Operational risks - high		
End-point risks - medium		
End-point risks - high		
Total CO_2 emissions		
Societal risks - medium	**Societal impact**	**15 %**
Societal risks - high		
Technical feasibility	**Technical feasibility**	**8 %**
Execution costs	**Cost**	**7 %**

6.3.2 Options selection workshop

An options selection workshop was held to assess the relative “performance” of each option, in order to identify the recommended option for the decommissioning of the production pipeline and piggy-backed umbilical.

During the workshop, a team of engineers, subsea specialist and environmental specialists reviewed the findings of a number of individual technical studies and provided expert judgement of the absolute and relative performance of the options in each criterion.

6.3.3 Ranking the options

Ranking was used to gain an initial view of the overall performance of each option, which was then tested by discussion and an iterative process of sensitivity analysis.

The 7 options assessed fell into 4 distinct categories (**Section 6.2**). After examining the raw data for the performance of options, the workshop team concluded that ranking all the criteria on a scale of 1-7 would unduly exaggerate the difference in the performance of some options. Therefore in most criteria, the option that had the best performance was ranked 1 and the worst was ranked 3. Options with approximately equivalent performance were given equal rankings, and in some criteria where there was a very marked difference in the actual performance of all the options, the worst option(s) was ranked 4.

The rankings in the individual criteria were then summed, and the option with the lowest overall score was identified as the presumed recommended option.

6.4 Comparison of Options for the Combined Production Pipeline and Piggy-backed Umbilical

6.4.1 Introduction

This section presents the result of the Comparative Assessment workshop of options for the trenched and buried pipeline and piggy-backed umbilical. It begins by describing the performance of the options in each of the criteria separately, and then collates these assessments, with the aid of the ranking table, to identify a recommended option.

6.4.2 Safety of personnel

In all options, the safety risk to project personnel both offshore and onshore would be very low, and within the limits that are widely accepted as tolerable by the offshore oil and gas industry. Option 1 “Leave *in situ*” and Option 4 “Lower in trench” would both have a smaller safety risk than either Option 2 or 3 because, overall, fewer people would be exposed to risk, and for shorter periods of time. Option 3 “Reverse pipe-lay” was judged to have, relatively, the highest safety risk for project personnel. This was because both variants of this option would involve the offshore cutting (approximately 1,000 cuts) of the pipeline and umbilical into short sections for transportation to the recycling site. Although each cut would be a relatively standard operation, the risk increases because of the number of cuts and the numbers of people exposed to risk.

Option 1 performed best with respect to shipping lane risks because of the shorter period of activity. Option 2A was next because reverse reeling without deburial would require only one vessel and would be a relatively quick operation. All other options performed relatively poorly because they either required two vessels (for deburial) or would take longer.

For onshore personnel Option 1 again performed well because of the small amounts of pipeline material that would be handled. Option 2 performed poorly because of the need to cut the pipeline and umbilical into short (24m) sections onshore; although each cut would be a relatively standard operation, the risk increases because of the number of cuts and the numbers of people exposed to risk.

The residual risk to fishermen is clearly best in Options 2 and 3, where the whole line is removed to shore. Option 4 is next, because if the line is successfully lowered in its existing trench the risk of snagging, and the risk of exposure or spanning of the line due to the natural movement of seabed sediment, is reduced. Option 1 was therefore judged to perform relatively poorly in this respect. All of the line is presently buried to a depth of at least 0.6 m below the seabed, but given the relatively shallow water along the route and the known dynamic and mobile nature of the surficial sediments on sandbanks in this part of the southern North Sea, it is possible that the sediment cover on the line could decrease over time, thus increasing the snagging risk.

6.4.3 Environmental impacts

No option was found to have any operational or end-point impacts that could be classified as presenting a "high" environmental risk. The options were therefore differentiated only on the basis of their "medium" environmental risks.

With respect to the environmental risks posed by the proposed operations and end-points, Option 4, "Deepen by trenching" had more risks than the other options, which all performed equally well. This was because the trenching operations had the potential to grossly disturb the backfilled trench and rock-dump, with effects on the adjacent seabed sediments and benthic community, or to accidentally displace or partially expose parts of the line, with consequent effects on other users of the sea.

6.4.4 CO_2 emissions

The estimates of CO_2 emissions show that the options fall into two groups characterised by similar levels of emissions. Options 1 and 4 had similar, relatively high total CO_2 emissions because, if the steel pipeline were not recovered and recycled, then in theory an equivalent amount of steel (approximately 650 tonnes) would have to be manufactured from raw materials to replace it. This approach to calculating CO_2 emissions (and energy use) is necessary in order to properly demonstrate the savings that may be made in some decommissioning options when recyclable materials are retrieved from the sea rather than being left there.

Options 2 and 3 had similar, lower levels of emissions because although there would be more offshore activity, all the material in the line would be retrieved and available for recycling. The differences between Options 2A, 2B, 3A and 3B are small and within the generally accepted margin of error for such calculations. The levels of emissions from these options can therefore be considered to be essentially the same.

The estimated total amount of CO_2 that might be emitted in the two groups of options is significantly different. The smallest difference between these two groups (between Option 3B and Option 1, an increase of approximately 1,000 t or 150 %) is much greater than the generally accepted margin of error for such calculations and could be considered to be a real difference.

6.4.5 Societal impacts

The most likely and important societal impacts in all the options were the safety risk to fishermen and other users of the sea, and these were captured under the heading "Safety risks" above.

In those options where material would be returned to shore for recycling, there might be both negative and positive risks to communities, businesses or infrastructure, associated with the transportation, recycling and disposal of material. All of these risks were, however, assessed as being low and do not serve to differentiate the performance of the options.

6.4.6 Technical feasibility

All of the options were judged to be technically feasible, using equipment that was readily available to the industry and techniques and procedures that are routinely employed offshore. A review of the possible programmes of work, and an assessment of the possible hazards and accidental events associated with each option, revealed that there were nonetheless differences in the feasibility and complexity of the options. These differences were judged to be marked, such that it was considered justifiable to rank the 4 groups of options on a scale of 1 to 4.

Option 1 performed best, because it involved fewer, simpler offshore activities and therefore had a higher likelihood of success. Option 2 was next, because reverse reeling is a well-established technique that can be completed quickly with the relatively more risky and complex task of cutting up being undertaken in more controlled and controllable conditions onshore. Option 3 was judged to be more complex than Option 2 because of the need to cut, lift and backload many individual sections of pipeline and umbilical offshore. Finally, Option 4, “Deepen by trenching” was judged to be relatively the most complex and prone to unplanned activities and unforeseen events. This is because this option requires the use of a plough or water-jetting system to deepen the trench. It is possible that neither system would achieve the desired burial depth, since the original pipeline installation procedure encountered a layer of stiff clay in some areas which prevented the plough from creating a deep enough trench. Both options, but in particular Option 4A “Trenching with a plough”, may cause damage or disturbance to either the line or its cover of rock-dump. The pipeline or the umbilical, or both, could be snagged and pulled from the trench, or the plough could become clogged and dislodged by the rock-dump. Additional, unplanned activities, with consequences for cost and schedule, as well as additional impacts on other users of the sea, may result from these situations.

6.4.7 Costs

It was possible to prepare fairly detailed budget costs for each option, based on the considerable experience that the industry has of the operations and activities involved in each option. The estimates showed that there were real differences in the costs and these differences were judged to be marked, such that it was considered justifiable to rank the 4 groups of options on a scale of 1 to 4.

Option 1 was assessed as being the least expensive by virtue of the smaller amount of offshore and onshore work involved. Options 2A and 3A were next but were estimated to be approximately 4 times the cost of Option 1. Options 2B, 3B, and 4 were more expensive still (due to the number of vessels involved and durations of offshore activities) and were estimated to be approximately 6 times the cost of Option 1.

6.5 Recommended Option for the Production Pipeline and Piggy-backed Umbilical

Table 11 presents a summary of the performance of each option in each of the criteria.

The Comparative Assessment indicated that, overall, the recommended option for decommissioning the trenched and buried pipeline with piggy-backed umbilical was Option 1, "Leave *in situ*", which has the best performance in 10 of the 13 assessment criteria. After flushing and cleaning the pipeline and umbilical, the exposed ends of the production pipeline and umbilical, presently lying on the seabed protected by mattresses, would be cut off and the sections, approximately 75 m in length, returned to shore for recycling. The cut ends of the pipeline with umbilical would be buried to the full depth of the existing trench by airlifting the seabed material from beneath the cut ends in the trench, and then allowing the trench to backfill naturally with sediment from the adjacent seabed.

On completion of these operations, the whole length of the production pipeline and piggy-backed umbilical would be located in its present trench, buried to a depth of at least 0.6 m to the top of the line by a layer of natural sediment and spot rock-dump. The trenched and buried line would then be subject to an agreed programme of survey and monitoring, as described in **Section 15.**

Table 11: Comparison of 7 options for decommissioning the Tristan NW production pipeline and piggy-backed umbilical.

Criteria	Rank of Options in each criterion						
	1	2A	2B	3A	3B	4A	4B
Safety risk to project personnel	1	2	2	3	3	1	1
Shipping lane risk	1	2	3	3	3	3	3
Risk to onshore personnel	1	3	3	2	2	2	2
Residual risks to fishermen	3	1	1	1	1	2	2
Operational risks – medium	1	1	1	1	1	2	2
Operational risks –high	1	1	1	1	1	1	1
End-point risk – medium	2	1	1	1	1	2	2
End-point risks – high	1	1	1	1	1	1	1
Total CO_2 emissions	2	1	1	1	1	2	2
Societal operational risks - medium	1	1	1	1	1	1	1
Societal operational risks – high	1	1	1	1	1	2	1
Technical feasibility	1	2	2	3	3	4	4
Execution costs	1	3	4	3	4	4	4
Sum of ranks	**17**	**20**	**22**	**22**	**23**	**27**	**26**
Final ranking	**1**	**2**	**3=**	**3=**	**5**	**7**	**6**

Key to options:

1	Leave *in situ*
2A	Remove by reverse reeling without deburial
2B	Remove by reverse reeling with deburial
3A	Remove by reverse lay without deburial
3B	Remove by reverse lay with deburial
4A	Deepen by ploughing
4B	Deepen by water-jetting

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7 PROPOSED PROGRAMME OF WORK

This section describes the offshore programme of work that will be carried out to decommission the seabed infrastructure, jumpers and mattresses at the Tristan NW Field. The programme of work for the plugging and abandonment of the wells is described in **Section 8**.

The proposed programmes have been developed following the guidance given by DECC, Silverstone Energy's HSE policies and the initial views and concerns of stakeholders.

7.1 Phases of Work

It is proposed that the entire programme of work will be carried out in two phases during the summer of 2010. An outline schedule showing the timing and duration of the proposed decommissioning operations is presented in **Section 13**.

The work will be conducted using the DSV *Bibby Topaz* and the jack-up rig *ENSCO 92*. The DSV will enter the Tristan NW area and complete the infrastructure flushing operations and disconnect the infrastructure. It will then decommission the trenched pipeline and piggy-backed umbilical and retrieve the infrastructure from the production well and complete an as-left survey before relocating to the Davy location to disconnect and retrieve the infrastructure there, finishing with the as-left survey. The rig will then complete the well suspension and abandonment of both wells and will remove the wellhead structure.

7.2 Shutting-in the Well

Before decommissioning operations begin, the production well 49/29b-11 will be shut-in and isolated at the platform. This programme of work is described in **Section 8**.

7.3 Subsea Flushing

7.3.1 Introduction

This section describes the procedures that would be completed to remove the inventory from the pipeline and wellhead, and the chemicals and other fluids from the umbilical, before they are decommissioned. Before work on the wells can commence, the lid of the FFS will be removed. It will be recovered and recycled onshore with the rest of the Tristan NW infrastructure.

The DSV operations to flush, disconnect and clear the items on the seabed will take approximately 16 days.

7.3.2 Flushing the pipeline

The Tristan NW pipeline carries the produced dry gas and some condensate for processing at the Davy NUI. Due to low reservoir pressure, well 49/29b-11 has only been achieving enough pressure to produce through a cycle of shut-in and release for some time. Assuming that ambient pressure is reached within the pipeline decommissioning activities will begin with a seawater flush of the remaining inventory in the pipeline: The well will be shut-in by divers and isolated at the platform. The divers will install a pig launcher and a solid pig and a $2m^3$ slug of MEG will be propelled from the well through the pipeline to Davy NUI using seawater, in order to remove the remaining inventory. The MEG volume will prevent any seawater from entering the Davy NUI riser and adversely affecting the topside process. The pig will be collected from the spool piece when disconnected and returned to the DSV. The pipeline will then be left filled with untreated seawater.

The use and discharge of all chemicals will be risk-assessed through a PON15C permit application as required under the **Offshore Chemicals Regulations 2002**.

7.3.3 Flushing the umbilical

Investigations have determined that the umbilical contents cannot be flushed downhole, nor does Davy NUI have the space to store the umbilical fluids or the capacity to lift storage containers onto the structure; therefore the umbilical will be cut and left open to the sea and allowed to naturally fill with seawater, with the sections on the seabed collected by the DSV..

The use and discharge of all chemicals will be risk-assessed through a PON15C permit application as required under the **Offshore Chemicals Regulations 2002**.

7.4 Decommissioning the Seabed Infrastructure

It is planned that the programme will comprise the following activities:

- Cut the untrenched pipeline, remove the sections lying on the seabed and dredge down the ends.
- Cut the untrenched umbilical and rock-protected overage, remove the sections and dredge down the ends.
- Retrieve the items lying on the seabed.

- Complete the as-left survey.
- Relocate to the Davy platform.
- Disconnect the manifold jumpers.
- Remove and wet store all spool and pipeline mattresses at the Davy location.
- Remove the valve assembly, associated spool pieces and the base valve assembly mattress.
- Install a blind on the manifold.
- Remove the UTA from the Davy SDU and close all SDU hatches.
- Cut the umbilical running from the UTA to the trench at point of burial and leave on seabed.
- Cut the pipeline from the spool tie-in to the point of burial and leave on seabed.
- Re-install the manifold protective mattresses.
- Recover all items on the seabed at Davy.
- Complete the as-left survey.

It is expected that this phase of work will take approximately 16 days to complete. Before deploying any divers, ROV surveys will be used to confirm the seabed conditions. There are no plans to use explosives for any part of this programme of work. In the unlikely event that explosives are needed, the project would follow the JNCC guidelines on minimising the risk of disturbance and injury to marine mammals (https://www.og.decc.gov.uk/environment/jncc_ex_guide.pdf) as part of activities to manage the environmental impacts of operations.

7.4.1 Flexible jumpers

Once the well has been flushed the jumpers at the wellhead will be depressurised and allowed to fill with untreated seawater. They will then be disconnected from the UTA and wellhead, at which point they will self-seal, and, deck-space allowing, retrieved to the vessel for recycling on shore. The same process will apply to the two jumpers at the Davy NUI between the valve assembly and the Davy manifold.

7.4.2 Umbilical Termination Assembly (UTA) and Subsea Umbilical Termination Unit (SUTU)

The UTA and SUTU are connected to the wellhead and SDU by steel straps. As both steel units form part of the umbilical, they will be retrieved during the recovery of the umbilical sections and recycled.

7.4.3 Spool Pieces

There are five 6” spool pieces in the field (**Section 4.5**). Once the pipeline has been depressurized, flushed and made safe, divers will disconnect the spool pieces from the infrastructure using cold cutting techniques such as a band saw or diamond wire cutting. Before attempting to lift the spool pieces, they will be cut into manageable sections on the seabed.

7.4.4 Valve Assembly

Divers will inspect the structure for any damage or loose items on the assembly, particularly those that might be removed to make recovery easier. The structure will be disconnected from the spool piece to the Davy subsea manifold and left open to fill with seawater. Divers will then connect the lifting rigging and the valve assembly will be retrieved onto the *Bibby Topaz.* Since Tristan NW produced dry gas, the assembly is not expected to be contaminated but once it is secured on deck it will be examined for LSA scale. All associated equipment will be recovered to the DSV with the assembly. The Davy manifold will have a blind flange installed to replace the spool piece from the valve assembly.

It may be possible to sell the valves for re-use elsewhere. The remaining steel in the valve assembly would then be recycled.

7.4.5 Mattresses

The concrete mattresses covering the infrastructure will be removed as required to allow access to the items to be decommissioned. They will be wet-stored on the seabed, and since the wellhead is situated in the shipping lane the mattresses will stacked so that the minimum 27 m clearance depth required in this channel by the Maritime and Coastguard Agency (MCA) is always maintained. The mattresses used to protect much of the Tristan NW infrastructure have been in place for over two years. Consequently, the lifting points cannot be certified and the mattresses will have to be recovered using converted 20 ft debris baskets. As with the other recovery operations, an ROV will be deployed to locate and survey the mattresses before the diver operations begin. Using mattress handling frames, the divers will lift the mattresses 1.5 m above the seabed into the debris basket. The mattresses will be transported back to shore for reuse onshore or disposed of to landfill.

7.4.6 Decommissioning the pipeline

Once the pipeline has been flushed and cleaned (**Section 7.3.2**) and the protective mattresses removed, divers will be deployed to decommission the exposed sections of the pipeline. Following an ROV survey of the spools and surrounding area, a 75 m length of pipeline from the spool tie-in point to the burial point at each end of the pipeline will be cut into sections by divers using a band saw or diamond wire cutting tool. The exposed pipeline ends will be dredged down to a depth matching the present bottom-of-trench level of 0.8 m. This will be achieved using an airlift tool. The cut pipeline sections will be temporarily left as wet store on the seabed until the divers return to attach the recovery rigging and lift the pipeline sections to the DSV.

7.4.7 Decommissioning the umbilical

7.4.7.1 Mattress-covered umbilical

Once all the flushing and cleaning operations have been completed, the ends of the umbilical will be detached from the Xmas tree and the SDU by divers. The divers will then proceed to the burial point of the umbilical at either end of the trench as identified by the ROV. Using either a saw or a hydraulic cutter, divers will sever the umbilical. Again, the complete section of the umbilical may be temporarily left as wet-store before being lifted to the DSV. The umbilical end will be recovered over the bend restrictor on the *Bibby Topaz* and placed into a tensioner to pull it through the deck guillotine. It will then be cut into 12 m lengths on the *Bibby Topaz*, bundled and stored. When both surface-laid sections of the umbilical have been recovered, the umbilical will be capped, the air lift deployed to the divers and the ends of the trenched umbilical dredged to match the bottom-of-trench depth of 0.8 m.

7.4.7.2 Rock-dumped umbilical

The whole of the 250 m rock-dumped umbilical near the production well will be recovered as above. Provided that stress analysis proves that the umbilical could withstand the strain, the rock-dump will not be cleared prior to removal. Minimal disturbance to the seabed is expected from this operation.

7.5 Final Operations

Before leaving the Davy area, the protective mattresses will be replaced over the Davy manifold and the umbilical crossing. Any debris associated with the Tristan NW Field will be collected in order to leave a clear seabed, and as-left surveys of the pipeline and wells will be completed.

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8 WELLS

8.1 Introduction

Before the decommissioning of the facilities begins, the well will be shut-in and isolated, prior to being plugged and abandoned. The well abandonment programme will comply with **Oil and Gas UK guidelines Issue 3, January 2009**.

8.2 Status of the Wells

The Tristan NW well 49/29b-11 is currently producing dry gas and a small amount of condensate at an average rate of 44,000 m^3 per day and 0.03 m^3 per day respectively. This well is currently listed as category 3 under the guidelines produced by Oil & Gas UK (Oil & Gas UK, 2009) and requires intervention for full abandonment. The exploration well 49/29b-5, was drilled in 1987 and suspended for future re-entry using mudline suspension equipment but not subsequently re-entered. The 30” conductor with debris cap currently stands approximately 5 ft clear of the seabed. Well 49/29b-5 also has to be regarded as a category 3 well, as secure barrier testing between the reservoir and the environment cannot be confirmed.

8.3 Plugging and Abandonment

Following clearance of the area of any debris and disconnection, removal of Tristan NW items by the DSV and isolation of the well, all well work will be conducted from the jack-up drilling rig. The wellhead will be flushed and well 49/29b-11 killed using untreated seawater. The rig is required to facilitate re-entry of well 49/29b-5 and the setting of the deep cement plugs required for permanent abandonment. The well tubing will be mechanically cut at a depth of approximately 30 ft below the seabed.

There are no plans to use underwater explosives at any stage of the offshore decommissioning programme of work. The rig will use a rotating cutter operated by the drilling derrick such as the “Quickcut” system, to cut the caissons. This is an industry standard method of cutting and has a proven track record. It is therefore still not expected that any explosives will be used in the severing of the caissons: Should anything unforeseen happen to the chosen cutting tool, there a number of tools that could be used instead as the drilling derrick provides a method of rotation to cut the caisson. The use of explosives therefore represents a last resort for the decommissioning team and would only be considered when all other reasonable options have been exhausted. In these circumstances, the project would follow the normal, required application for permitting the use the explosives and take all necessary steps to ensure minimal environmental impact: This would include adhering to the JNCC guidance for minimising risk of disturbance and injury to marine mammals (https://www.og.decc.gov.uk/environment/jncc_ex_guide.pdf).

8.3.1 Production Well 49/29b-11

The wellhead will be flushed with seawater from the jack-up rig: This seawater flush will effectively kill the production well by bullheading any contents of structure and production tubing into the formation. Any hydrocarbon residue will therefore be bullheaded into the formation and not released to sea.

The drilling rig will tie-back the subsea tree production and annulus bores to surface. The well will be plugged below the production packer, with tubing and "A" annulus circulated above to kill-weight sodium chloride brine or seawater. Approximately 9000 ft of 5.1/2" production tubing will be recovered, together with the tubing hanger. The subsea Xmas tree will then be recovered. Abandonment cement plugs will be spotted and all casings recovered from approximately 10 ft below mudline. The overtrawlable structure will likewise be recovered and the seabed verified clear by ROV sonar. The casing, FFS and tree will all be returned to shore for recycling.

8.3.2 Well 49/29b-5

The previous exploration and appraisal well has been suspended and therefore requires final cementing operations and the severance of the casing. Having tied back the casings to surface, the well will be re-entered and the existing inadequate cement plug will be drilled out. New abandonment plugs will be set in the well to effect a permanent abandonment to current standards. The 9.5/8" x 13.3/8" annulus is understood to contain oil-based mud from the original drilling of the well in 1987, while other annuli contain water-based muds. In order to isolate from surface the non-reservoir overburden it would be necessary to cut the 9.5/8" and circulate the oil-based mud from the well. The relative risks of performing this oil-based mud recovery versus leaving the outer annuli un-cemented are currently under review. Having established and tested cement plugs as necessary, all remaining casings will be cut and recovered from ca 10 ft below the seabed and removed to shore for recycling. A sonar sweep of the seabed will be undertaken to confirm clear.

8.4 Preparation of PON5

All well abandonment activities that require the use or discharge of chemicals will be subject to a separate PON5. An OPPC permit is not required as there will be no release of reservoir hydrocarbons.

9 DRILL CUTTINGS

No drill cutting piles are present at either the exploration or production Tristan NW wells.

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10 DEBRIS CLEARANCE

10.1 Introduction

All infrastructure at the Tristan NW Field will be completely removed to shore, with the exception of the 14.8 km trenched section of the pipeline and piggy-backed umbilical, its existing cover of spot rock-dump, and the rock-dump previously protecting the 250 m coil of umbilical at the Tristan NW wellhead. The locations of all items are well known and it is planned that each will be found and retrieved during the offshore programme of work. Any large piece of equipment or material that is accidentally lost overboard during this programme will be located and retrieved.

10.2 Seabed Clearance Survey

On completion of the planned offshore programme of work, the seabed will be surveyed using side scan sonar and ROV to ensure that it is clear of items or obstructions that might pose a safety risk to fishermen or other users of the sea. The areas that will be surveyed are as follows:

- The areas within the 500 m zone of the Davy NUI where Tristan NW decommissioning operations were undertaken.
- A corridor 100 m either side of the production pipeline running from the Davy manifold to the Tristan NW production well to confirm that the remaining, trenched pipeline and piggy-backed umbilical are not exposed.
- A 500 m radius circle centred on the production well 49/29b-11 and a 500 m radius circle covering the previously suspended well 49/29b-5.
- The remaining rock-dump previously located over the umbilical loop at the production well.

If any significant hydrocarbon production debris associated with the Tristan NW Field is found it will be retrieved and taken ashore for recycling, re-use or disposal as appropriate.

10.3 Final Condition of the Offshore Site

At the former location of the Tristan NW wells, the surface of the seabed will be clear of items, with the exception of the coil of rock-dump. The severed ends of the well casings will be located at a depth of about 3 m below the natural level of the seabed.

Along the route of the trenched production pipeline and piggy-backed umbilical, the existing rock-dump will remain in place. At no point along the route or at the ends of the pipeline would any pipeline be exposed. The seabed will be free of debris.

At the Davy NUI end of the infrastructure, all protective materials and items of Tristan NW-specific equipment will be removed, leaving the seabed clear of Tristan NW items.

11 CONSULTATIONS

11.1 Introduction

This section describes the consultations that Silverstone has undertaken with stakeholders, statutory consultees and other interested parties regarding the proposed decommissioning programmes.

11.2 Consultation Process

Silverstone began its programme of consultation in April 2009, when it became clear that a decision regarding the cessation of production of Tristan NW would be required in the near future. Silverstone met with DECC for an initial discussion regarding the decommissioning options for the field. DECC advised which statutory consultees should be contacted.

Informal consultation has taken place with the organisations listed in **Table 12**, prior to the formal submission of the decommissioning programmes. An email was sent to all consultees describing the intended decommissioning activities and included diagrams of the Tristan NW facilities. Only one written response was received, from the NFFO (Appendix II). As a result, the other consultees were contacted and they verbally confirmed that they had nothing further to add to the NFFO response.

Table 12: Summary of initial views of consultees and Silverstone's response.

Organisation	Comment	Silverstone Response
National Federation of Fishermen's Organisations	The detail of the initial decommissioning proposal complies with most of the NFFO decommissioning policy. A copy of the NFFO Policy Paper was provided. NFFO requests that the over-trawlability study is carried out when decommissioning is complete.	Silverstone notes and appreciates all comments. A post-decommissioning monitoring programme will be discussed and agreed with DECC to ensure that the pipeline remains buried.
Scottish Fishermen`s Federation	Informal comments similar to those of NFFO. No further formal comments received.	As above.
Northern Ireland Fishermen’s Federation	Informal comments similar to those of NFFO. No further formal comments received.	As above.
Global Marine Systems	No comments received during informal or formal consultation.	Not applicable.

Following the publication of the Consultation Draft of these Decommissioning Programmes, Silverstone has formally consulted with the following statutory consultees, as specified by DECC:

- National Federation of Fishermen's Organisation
- Scottish Fisherman's Federation
- Northern Ireland Fishermen's Federation
- Global Marine Systems

An example of the letter that accompanied the Consultation Draft to these consultees is presented in Appendix II. No formal responses were received from the statutory consultees; each consultee was therefore contacted by telephone to ensure they had received the Consultation Draft. Each confirmed they had.

During the period of public consultation, no comments were received from members of the public.

Consultation with statutory consultees and relevant stakeholders, such as those included below, will continue as necessary during the execution of the Decommissioning Programmes.

- Health and Safety Executive (Offshore Division)
- Maritime and Coastguard Agency
- Joint Nature Conservation Committee
- Department of Energy and Climate Change

11.3 Publication and Advertisement of the Decommissioning Programme

The combined Decommissioning Programmes have been advertised by means of a Public Notice printed in selected appropriate national and local newspapers. CD-ROM copies of the full document have been sent to every statutory consultee. A PDF version of the full document was made available during this notice period for download from the Silverstone website www.silverstoneenergy.co.uk and a copy of the document containing the two Consultation Draft Programmes is currently available on the DECC website.

12 ENVIRONMENTAL IMPACT ASSESSMENT

12.1 Introduction

Silverstone have conducted an Environmental Impact Assessment (EIA) of the proposed programme of work, including a Comparative Assessment of the environmental impacts of different decommissioning options for the pipeline and umbilical (BMT Cordah, 2010; CSL, 2010). This section summarises the results of the EIA. In particular it:

- identifies the main environmental impacts associated with the proposed programme of work;
- highlights the potential environmental and societal impacts that were of concern to consultees;
- describes how significant potential impacts would be mitigated in the proposed programme of work; and
- quantifies the total energy use and the total gaseous emissions that would be associated with the proposed programme.

The full ES contains much information that is summarised in this Decommissioning Programme. Unless such information is essential for a proper understanding of potential environmental impacts, it is not repeated here.

12.2 Summary of Method Used for EIA

12.2.1 Introduction

The EIA was carried out in accordance with the Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 as amended by the Offshore Petroleum Production and Pipelines (Assessment of Environmental Impacts) (Amendment) Regulations 2007. An environmental impact assessment is a procedure that is used to:

- identify all the environmental risks associated with a proposed project;
- selectively identify those risks that are likely to cause significant impact to the environment;
- describe the measures that the project owner proposes to employ to eliminate or reduce (mitigate) these impacts;

- ensure that the knowledge, views and concerns of stakeholders are taken into considerations when evaluating environmental risks and their mitigation; and
- present a summary of the environmental management plan that the project owner will enact in order to mitigate risks.

12.2.2 Types and sources of environmental risk in decommissioning projects

The options in decommissioning projects comprise the *operations* undertaken offshore and onshore, and the *end-points* that are achieved by the successful completion of those operations. Both the operations and the end-points can cause environmental impact; operational impacts may generally be short-term and possibly localised, whereas end-point impacts may be less acute but of longer duration.

The environmental risks associated with the proposed Tristan NW Decommissioning Programmes were therefore assessed and described in terms of operations and end-points.

12.2.3 Method

The EIA was completed by undertaking the following tasks:

- Preparing a description of the environmental setting and sensitivities in the Tristan NW Field.
- Preparing a description of the operations and end-points, and the potential accidental events, associated with the proposed decommissioning programmes.
- Completing a scoping study to identify significant potential environmental risks associated with the programme, taking into account the views and concerns of stakeholders.
- Describing and if possible quantifying the residual environmental risks of the significant impacts after the application of generic or project-specific mitigation measures.

12.3 The Environmental Setting of the Tristan NW Field

The environmental setting and sensitivities of the area of the Tristan NW Field were summarised in **Section 3**, and are described more fully in the ES (BMT Cordah, 2010).

12.4 Environmental Impacts of the Decommissioning Programmes

12.4.1 Impacts from planned operations

12.4.1.1 Introduction

The EIA identified 3 planned operations that were assessed as "moderate" risks, namely:

- The risk to shipping from the physical presence vessels
- The effects of underwater noise from DP vessels
- The flushing and cleaning of the pipeline and umbilical

12.4.1.2 Physical presence of vessels

Risk: The *ENSCO 92* will spend approximately 30 days on site completing the decommissioning operations. For approximately 95 % of this time the vessel will be located in or close to the busy shipping lane the Deep Water Route (DWR) that runs S-N across the Tristan NW production well. Approximately 15 vessels per day pass within 2 nm of the Tristan NW location. In particular, while working to plug and abandon the production well, the *ENSCO 92* will be stationary jacked up on its legs. It will thus represent a potential source of interference to shipping and other users of the sea. A survey vessel will pass through the DWR during the post-decommissioning surveys.

Mitigation: Other users of the sea will be informed about the planned programme of work before it starts through formal "Notices to mariners" issued by the Hydrographer to the Navy. Silverstone will ensure that the main operators of ships passing near the site are given advanced notice of the decommissioning operations. Fishermen will be aware of the proposed operations through these notices and also through the formal consultation process that would be completed during consideration of the two Decommissioning Programmes presented in this document. The additional mitigation measures recommended for the original drilling programme at Tristan NW (Anatec, 2007) will be considered during a specific safety assessment that Silverstone will conduct with the well intervention contractors. It is expected that all vessels in the area will in any case be applying normal good seamanship and navigation practice to ensure the safety of their own and other vessels.

Conclusion: Operations in the Tristan NW Field are planned to take place during August or September, when visibility, weather and sea state are likely to be reasonably benign. For most of the time the *ENSCO 92* will be stationary; its position will be well-advertised, and will not change suddenly. The vessel is expected to spend less time on decommissioning operations than was spent in 2008 by the rig drilling the Tristan NW production well. Although there may be an increased risk to commercial shipping and other users of the sea, this risk would be reduced through the application of the mitigation measures noted above. The risks to other users of the sea from the planned programme of work to decommission the Tristan NW Field are therefore assessed as not significant.

12.4.1.3 Effects of underwater noise

Risk: The DSV *Bibby Topaz* is the most likely source of underwater noise, as it will conduct the majority of its operations while operating on dynamic positioning (DP). The source noise level from such a vessel is estimated to be approximately 180 dB re 1μ Pa with most energy in a frequency range below 1 kHz. Noises of this frequency can be detected by marine mammals, and if the received noise level is greater than approximately 120 dB re 1μ Pa (i.e. about 75 dB above the species' hearing threshold), this may cause temporary changes in behaviour or temporary changes in hearing ability.

Seven species of marine mammal have been sighted in the area of the Tristan NW Field, and the observed numbers are greatest in the period July to September, which coincides with the proposed decommissioning operations. The available published data (on the hearing ability of 3 of these species) shows that their threshold hearing level is in the range 34 dB to 91 dB re 1 μPa. Standard calculations for the attenuation of noise in water show that the received noise level would fall below 120 dB at a distance of approximately 300 m from the vessel. Marine mammals within this zone may thus encounter noises that disturb their normal behaviour and could temporarily affect their hearing. Marine mammals in the area of the Tristan NW production well are also exposed to the underwater noise from the traffic in the shipping lane.

Mitigation: The programme of work will be completed as efficiently as possible, making best use of the summer "weather window". Engines and machinery will be well-maintained and vessel noise would not start suddenly, thus giving any marine mammals an opportunity to move away from the area. It is planned that both the DSV *Bibby Topaz* and *ENSCO 92* will spend as short a time as possible undertaking the decommissioning programme of work, commensurate with safe operations and good seamanship.

Conclusion: It is conservatively estimated that marine mammals within a radius of approximately 0.3 km of the DSV *Bibby Topaz* (i.e. an area of approximately 0.28 km^2) might be exposed to a received noise level of >120dB re 1μ PA. At the time of the proposed operations there may be very high numbers of harbour porpoise in the area but low numbers of other marine mammals such as minke whale, pilot whale, white-sided dolphin and bottlenose dolphin. A small number of individual marine mammals may therefore be exposed to noise levels that have been observed to cause behavioural changes, but it is unlikely that any marine mammal would be exposed to a noise level that would cause a temporary deterioration in hearing ability. The noise levels in the field would not suddenly change, but would be expected to increase and decrease gradually as the DSV *Bibby Topaz* and *ENSCO 92* took station over the well or worked slowly over parts of the pipeline, umbilical and valve assembly. The risk to marine mammals from the underwater noise of vessels involved in the planned programme of work to decommission the Tristan NW Field is therefore assessed as not significant.

12.4.1.4 Flushing and cleaning of the pipeline and umbilical

Risk: As the pipeline carries mainly dry gas with some condensate, few chemicals are required for production. The inventory of the pipeline would therefore pose minimal risk to the environment when it is flushed to the Davy NUI as there would be minimal chemicals and minimal produced water.

The umbilical contains MEG (monoethylene glycol) and hydraulic fluid. MEG is considered by the regulators to pose little or no risk to the environment. The hydraulic fluid is a water-based compound, which is soluble and readily biodegradable and is unlikely to bioaccumulate. One component has a toxicity of 4.6 mg/L to organisms, but due to the physical properties of the formulation, any impact that might be caused by this component is likely to be short-lived.

Once the umbilical has been severed and the contents are left to circulate out naturally, it is unlikely that all of the MEG and hydraulic fluid will be discharged subsea. The contents are likely to be discharged when the cut, un-trenched sections of the umbilical are recovered to the DSV. This will increase the volume through which the liquids are discharged and reduce any potential impact to the environment.

Mitigation: The pipeline inventory will be flushed to the Davy NUI. Any chemicals required during this operation, such as the pig, will be recorded on and subject to, a PON15C permit.

Conclusion: Since the pipeline inventory is to be flushed to the Davy NUI no increase in the potential impacts beyond operating levels are expected. When the umbilical is severed it is unlikely that any sensitive receptor or designated site will be affected by the flushing and cleaning operations described above, due to the fast currents in the area, the small volumes contained within the umbilical, the properties of the fluids and the location of discharge. The umbilical contents in the trenched section of the umbilical are even less likely to cause an impact as the exchange of these fluids with the seawater is less likely to occur.

12.4.2 Impacts from unplanned operations or accidental events

12.4.2.1 Introduction

The EIA identified 1 accidental event that was assessed as a “moderate” risk, namely:

- Accidental oil spill from a vessel collision

12.4.2.2 Accidental oil spill from a vessel collision

Risk: The *ENSCO 92* will spend approximately 30 days on site completing the decommissioning operations. During this time the rig will be located in the DWR that runs S-N across the Tristan NW production well. Approximately 15 vessels per day pass within 2 nm of the Tristan NW location. In particular, while working to plug and abandon the production well, the *ENSCO 92* will be stationary with legs jacked down onto the seabed It will thus represent a potential navigation risk to shipping, and a collision between the *ENSCO 92* and another vessel could result in a spill of bunker fuel from one or both of the vessels. A surface slick of 630 t of diesel moving under the influence of a steady 30 knot wind could disperse after approximately 7 hours and would not reach the coast. In the area of the Tristan NW Field, seabird vulnerability to surface oil pollution is "low" to "moderate" at the time proposed for the offshore programme.

Mitigation: The heightened risk of a vessel collision during offshore operations in the area of the Tristan NW Field was recognised in the Environmental Statement for the field development (Granby, 2007). In view of the relatively large numbers of vessels using the DWR shipping lane, specialist consultants recommended additional mitigation measures to increase the awareness of other users of the sea to proposed operations in the field and minimise the likelihood that a collision would occur (Anatec, 2007). These included giving advanced notice of the operations to the main operators of ships passing in proximity to the site, in particular northbound traffic following the DWR, and ensuring that emergency response vessels carrying specialist equipment. Silverstone will consider the adoption of similar mitigation measures during the decommissioning programme of work and will conduct a safety assessment with the contractors to determine which measures will be appropriate and necessary. The present operations in the Tristan NW Field are covered by the Davy Oil Pollution Emergency Plan (OPEP), and it is proposed that the whole of the offshore decommissioning programme of work would similarly be covered by this plan.

Conclusion: Significant effort will be taken before and during the proposed offshore operations to reduce the likelihood that a vessel in the shipping lane would collide with the *ENSCO 92*. Appropriate mitigation measures applied during the original drilling and installation programme may be applied during the decommissioning programme of work. Modelling carried out for the development Environmental Impact Assessment showed that a 630 tonne spill of diesel (a realistic worst-case scenario caused by an accidental release of the whole inventory in a vessel's bunker fuel) would tend to travel in a north-easterly direction under the influence of winds and currents. The fuel would evaporate steadily while being dispersed. Modelling indicated that there was a 0 % chance that fuel would reach either the UK or Dutch coastlines.

It is therefore concluded that the risks to the environment and other users of the sea from an accidental spill of oil following a vessel collision have been reduced to a level that is as low as reasonably practicable (ALARP). The *likelihood* that the accidental event would occur would be reduced by the preparatory work that Silverstone would undertake before offshore operations begin, and the procedures that Silverstone would have in place to manage and monitor operations once they had started. The *effects* of an accidental spill would be reduced by the swift implementation of the existing OPEP.

12.4.3 Impacts from planned end-points

12.4.3.1 Introduction

The EIA identified 1 planned end-point that was assessed as a "moderate" risk, namely:

- The interference to commercial fishing from the presence of the trenched and buried line

The EIA identified 2 planned end-points that were assessed as likely to be beneficial, namely:

- The restoration of the natural seabed after removal of subsea infrastructure; and
- The onshore recycling of retrieved materials

12.4.3.2 Interference to commercial fishing from the presence of the trenched and buried line

Risk: On completion of the proposed decommissioning programmes, a 14.8 km section of 6" pipeline with piggy-backed 4" umbilical will be left *in situ* in its present trench, covered by natural backfill and spot rock-dumping. The steel pipeline will gradually corrode and break up over a period estimated to be at least 60 years, but the umbilical is expected to deteriorate slowly and may last longer. At present, the top of the pipeline/umbilical combination is buried to a depth of at least 0.6m below the surface of the seabed, but it is possible that natural movements of the sandy sediment, in particular on the shallow water sections on the tops of the sandbanks, might erode the sediment and reduce the thickness of this cover. The bottom-towed trawling gear predominantly used in the area (Beam trawling) typically ploughs to a depth of 8-10cm through sandy sediment. If the depth of burial decreases or the pipeline breaks up and moves from its present location at the bottom of its trench, there is a risk that bottom-towed gear could interact with the decommissioned line. Consequently, fishermen in the area may view the decommissioned line as an increasing safety risk, and modify their activities and fishing patterns to ensure that the remains were avoided, with associated negative effects on the commercial success of their operations.

Mitigation: All other material in the Tristan NW field will be retrieved and returned to shore for recycling or disposal. The cut ends of the pipeline/umbilical combination will be dredged to the full depth of the existing trench, and completely covered with natural sediment. On completion of the decommissioning programme of work, it is expected that the top of the pipeline/umbilical will be covered by at least 60 cm of sediment or rock-dump. Silverstone will conduct an "as-left" post-decommissioning survey to confirm that the line is adequately buried, and report the results to DECC. In agreement with DECC, Silverstone intend to conduct seabed surveys along the entire route of the trenched and buried line one and five years after decommissioning to confirm that it is still adequately buried, and to gain more information about the movement of sediments in the area. If erosion, exposure or spanning has occurred, Silverstone will discuss and agree appropriate mitigation measures with DECC.

Conclusion: The trenched and buried line is presently buried to a depth that ensures it is well beyond the reach of the main types of bottom-towed fishing gear used in the area of the Tristan NW Field. The best available evidence suggests that the sandbanks that the pipeline crosses are stable and are not migrating. Some erosion and transportation of surficial sediments probably does occur in the area but this is generally a slow process, involving both erosion and deposition, which would be unlikely to expose the line to an extent that physical interaction between bottom-towed gears and the line would be possible. The line and the area of seabed 100 m either side of it represent less than 0.1 % of the seabed in ICES rectangle 35F2. The relative value of fishing in the area of the Tristan NW Field in 2008 was "very low" (£0 to 1 million) so on a *pro rata* basis the value of area of the pipeline route is very small.

The residual effects on commercial fishing operations of the presence of the trenched and buried line are therefore assessed as not significant.

12.4.3.3 Restoration of clear seabed after removal of subsea infrastructure

Benefit: The proposed operations will ensure that with the exception of the trenched and buried pipeline and piggy-backed umbilical, all the seabed infrastructure of the Tristan NW Field is completely removed. On completion of the decommissioning operations and verification that the seabed is clear of debris, the area of seabed around the production well and between the well and the beginning of the pipeline trench will be available for commercial fishing.

12.4.3.4 Recycling onshore of retrieved materials

Benefit: All the equipment and materials returned to shore in the UK will be reused, recycled or disposed of responsibly, as appropriate.

Table 13 presents an assessment of the planned fates of the materials presently in the Tristan NW Field. **Table 14** presents the fate of recyclable and reusable materials that will be returned to shore. It is expected that 100 % of recyclable material returned to shore will be reused or recycled and that the project HSEQ target relating to these items will be met (**Section 16**, **Table 17**).

Table 13: Summary of the planned fate of different materials presently in the Tristan NW Field.

Material	Existing mass (t)	Re-used		Re-cycled		Disposed of		Left *in situ*	
		t	%	t	%	t	%	t	%
Concrete	353	0	0	0	0	341	96.6	12	3.4
Steel	733	24.7	3	24.1	3	0	0	680.8	93
Aluminium	0.254	0	0	0	0	0	0	0.254	100
Zinc	0.153	0	0	0	0	0	0	0.153	100
Copper	53.5	0	0	1.66	3	0	0	51.8	97
Plastic	14.8	0	0	3.58	24	0	0	11.2	76
Rock	18,410	0	0	0	0	0	0	18,410	100

Table 14: Fate of recyclable materials returned to shore.

Material	Mass returned to shore (t)	Re-used		Re-cycled	
		t	%	t	%
Steel	52.1	24.7	47	27.4	53
Copper	1.66	0	0	1.66	100
Plastic	3.58	0	0	3.58	100
Total	**54**	**24.7**	**46**	**29.3**	**54**

12.4.4 Impacts from unplanned end-points

12.4.4.1 Introduction

The EIA identified 3 unplanned end-points that were assessed as a "moderate" risk, namely:

- The pipeline and umbilical combination does not remain fully buried
- The pipeline and/or the umbilical breaks up or is broken up by natural or anthropogenic forces and sections appear on the seabed as litter
- Significant additional rock-dumping is required after decommissioning to mitigate observed exposure or spanning of the line

12.4.4.2 Interference to commercial fishing and other users of the sea from the exposure of the trenched and buried pipeline and umbilical

Risk: Natural wave and tidal action could erode the cover of seabed sediment presently lying over the trenched and buried pipeline and piggy-backed umbilical, leading to the exposure and possibly spanning of sections of the line. Over the many years of slow disintegration of the line, fishermen begin to experience interactions between the line and bottom-towed fishing gear. Fishermen notice increased pulling forces on gear, and ultimately potential snagging events. As a result, the route of the line is given a wide berth by commercial fishermen, with a consequent impact on the profitability of their operations in this ICES rectangle.

Mitigation: In agreement with DECC, Silverstone intend to conduct seabed surveys along the entire route of the trenched and buried line one and five years after decommissioning to confirm that it is still adequately buried, and to gain more information about the movement of sediments in the area. If erosion, exposure or spanning has occurred, Silverstone will discuss and agree appropriate mitigation measures with DECC.

The surveys will also inform discussions between Silverstone and DECC with respect to the need, frequency and type of monitoring programme that may be required for the rest of the pipeline's existence in the seabed.

Conclusion: The best available evidence suggests that the sandbanks that the pipeline crosses are stable and are not migrating. Some erosion and transportation of surficial sediments probably does occur in the area but this is generally a slow process, involving both erosion and deposition, which would be unlikely to expose the line to an extent that physical interaction between bottom-towed gears and the line would be possible. If the surveys scheduled for the first 5 years of post-decommissioning life show that marked erosion of sediment is occurring, remedial action can be taken before exposure of the line poses a significant risk to commercial fishing activity, and the frequency of subsequent surveys can be adjusted accordingly. Even if the perceived risk to commercial operations resulted in a lack of fishing within 500 m of the line, the unfished area would represent less than 0.5 % of the seabed area in ICES rectangle 35F2, with a *pro rata* value of fish landed of approximately £5,000 in 2008.

The risk of economic effects on commercial fishing operations from the possible unnoticed and unmitigated exposure or spanning of sections of the ageing trenched and buried line is therefore assessed as not significant.

12.4.4.3 Interference to commercial fishing and other users of the sea from the break-up of the trenched and buried pipeline and umbilical and subsequent appearance as litter on the seabed

Risk: As the pipeline ages it will lose its strength and, as described above, may become partially or fully exposed and spanning as a result of the natural movement of sediments. Under these circumstances there is an increased possibility that bottom-towed fishing gear or the anchors from other vessels may snag the line. This may displace part of the line from the trench, or break the pipeline or the umbilical, or rip a section of piggy-backed umbilical from the pipeline. Left unnoticed and exposed to natural forces, it is conceivable that sections of the line could appear on the seabed as litter and potential snagging hazards to bottom-towed gears. As a result, the route of the line is given a wide berth by commercial fishermen, with a consequent impact on the profitability of their operations in this ICES rectangle.

Mitigation: In agreement with DECC, Silverstone intend to conduct seabed surveys along the entire route of the trenched and buried line one and five years after decommissioning to confirm that it is still adequately buried, and to gain more information about the movement of sediments in the area. If erosion, exposure or spanning has occurred, Silverstone will discuss and agree appropriate mitigation measures with DECC.

The surveys will also inform discussions between Silverstone and DECC with respect to the need, frequency and type of monitoring programme that may be required for the rest of the pipeline's existence in the seabed.

The route of the trenched and buried line will be clearly marked on navigation charts and notices to mariners. Commercial fishermen operating in the area will know of the presence of the line. If interactions with the line are observed or snagging events occur, it is very likely that these will be reported promptly to Silverstone who would then be able to consider appropriate mitigation measures.

Conclusion: The likelihood that broken sections of line would appear as litter on the seabed was judged to be very low. The two proposed monitoring surveys would also greatly inform Silverstone's understanding and assessment of the residual risk from the long-term presence and break-up of the line, allowing appropriate remedial action to be taken before snagging events occurred or litter appeared on the seabed. The risk of economic effects on commercial fishing operations from the possible unnoticed and unmitigated appearance of broken sections of the pipeline or umbilical as litter on the seabed is therefore assessed as not significant.

12.4.4.4 Impacts to the benthos and interference to commercial fishing caused by rock-dumping to protect the pipeline and umbilical and mitigate erosion or spanning

Risk: Natural wave and tidal action could erode the cover of seabed sediment presently lying over the trenched and buried pipeline and piggy-backed umbilical, leading to the exposure and possibly spanning of sections of the line. The most efficient remedial action that Silverstone could take would be spot rock-dumping over these shallow or partially exposed sections. This would (i) hold them in place and prevent further deburial and, (ii) create a low profile over-trawlable "berm" that would eliminate or significantly reduce the snagging risk for fishermen. Rock-dumping would require the deposition of perhaps several thousands of tonnes of graded (1"-5") rock on specific sections of the line. The rock-dump material would smother the natural sediments and benthos on the seabed along and adjacent to the line, and forever change the character of the seabed sediments. Since the rock-dump would not be being placed in a trench, it might settle over a slightly wider area.

Mitigation: In agreement with DECC, Silverstone intend to conduct seabed surveys along the entire route of the trenched and buried line one and five years after decommissioning to confirm that it is still adequately buried, and to gain more information about the movement of sediments in the area. If erosion, exposure or spanning has occurred, Silverstone will discuss and agree appropriate mitigation measures with DECC.

If rock-dump were required, the exact volumes of material needed would be carefully calculated so that only the minimum amount of rock-dump is put in place. Rock-dumping operations can be carefully controlled from the rock-dump vessel through the use of steerable fall pipes and underwater monitoring of the operation by ROV. This ensures that the material is placed exactly where required on the seabed, and that the size, shape and contours of the rock-dump conform to the pre-determined plan.

Conclusion: Rock-dump may be required over sections of the line, which already has some areas of rock-dump. The sediments along the line are silty sands, and new rock-dump would alter their character. Similarly, the deposition of rock-dump would impact the immediate benthos and the fauna typical of sandy sediments would not flourish in areas of rock-dump. However, there are no rare or protected habitats or benthic fauna along the route of the line, and the area that might be covered by carefully located rock-dump would be very small in relation to the area of undisturbed sandy sediments and benthic communities on the seabed adjacent to the line. The risk of environmental impact to the seabed sediments and associated benthic communities from the placement of rock-dump on the present route of the line to mitigate erosion or exposure of the ageing trenched and buried line is therefore assessed as not significant.

12.4.5 Energy use and gaseous emissions

The proposed decommissioning programme of work would use energy and produce emissions of CO_2 and other gases. Because some recyclable material would be left in the sea (the trenched and buried pipeline and piggy-backed umbilical) some of the energy and emissions attributable to this programme are "theoretical", to account for the replacement of "lost" recyclable material. **Table 15** shows the total energy use and total CO_2 emissions of the proposed programme of work. It is estimated that the proposed programme of work would result in a total energy use of approximately 121,520 GJ and total CO_2 emissions of approximately 9,254 tonnes.

Table 15: The total use of energy and the total CO_2 emissions for the Tristan NW decommissioning programme of work.

Vessel/Activity	Energy Use GJ	CO_2 emission tonnes
Vessel use	98,639	7,255
Recycling materials	263	26
New manufacture of materials	22,618	1,973
Total energy and emissions	**121,520**	**9,254**

The total CO_2 emissions from the proposed programme of work to decommission the Tristan NW Field, including the emissions that would theoretically be attributable to the project from the new manufacture of steel and other material, to replace recycle materials that would be left in the sea, are very small in comparison with the emissions attributable to oil and gas operations on the UKCS. When compared with the emissions attributable to oil and gas operations on the UKCS in 2007, which were 16,890,408 tonnes, the total CO_2 emissions from the revised Tristan programme represent approximately 0.05%. It should also be noted that these data were calculated using a greater number of days work than is planned for the operations, in order to represent a worst case scenario..

12.5 Conclusions

There are no particular ecological environmental sensitivities in the area of the Tristan NW Field, and no Annex I habitats in the field or close to it.

The main sensitivity for the proposed programme of work is the fact that the Tristan NW production well is located in a busy (24 vessels per day) shipping lane.

No planned aspect of the proposed programme of work would be likely to give rise to any significant ecological environmental impacts. All of the techniques and procedures that would be employed are routinely used in oil and gas development or decommissioning projects.

There is a risk that an accident between vessels in the shipping lane could result in a spill of bunker fuel. It is concluded that the various generic and project-specific mitigation measures that would be put in place, and the existence of the present Davy NUI OPEP, have reduced this risk to an ALARP level and that it does not represent a significant environmental risk for the decommissioning programme of work.

The proposed programme of work would result in the removal of all the facilities and infrastructure from the field, with the exception of the 14.8 km length of trenched and buried 6" pipeline with piggy-backed 4" umbilical. This line would remain buried to the full depth of the existing trench and covered with at least 0.6m of natural sediment and spot rock-dump.

Given the location of the line in the southern North Sea, the relatively shallow water in the Tristan NW field, and the presence of sandbanks and sand waves along the pipeline route, it is possible that the sediment cover over the trenched and buried line might in time be reduced by natural erosion. The monitoring programme that Silverstone will discuss and agree with DECC should provide valuable information with which to monitor and assess the natural movements of sediments at this specific location, and give early warning of the need for possible remedial action.

The long-term presence of the trenched and buried pipeline with umbilical, and the possibility that its depth of burial may change un-noticed or over a short period of time, or as a result of interactions with bottom-towed gears or other users of the sea, may be regarded as a source of interference for commercial fishing activities in the area. The relative value of the total commercial fishing in the area is very low, however, and the avoidance by fishermen of the small area of ground in which the pipeline is trenched would have a very small economic impact.

13 SCHEDULE

13.1 Introduction

This section presents the schedule for the proposed programme of work, giving information on the likely timing and duration of the main phases of work that were described in **Section 7**. The schedule has been developed with reference to the following important aspects:

- the agreed COP for the field;
- the time required to prepare and obtain approval for the necessary licences and consents;
- the requirement to plug and abandon the well in a safe and efficient manner; and
- the desire to complete a safe offshore programme of work by an agreed date, using best possible use of the light well intervention vessel.

There are no licence conditions or environmental sensitivities (**Section 3**) that suggest that there are particular times of year when certain offshore activities should not be undertaken. Silverstone plan to complete all the offshore operations, and submit the verification and close-out reports (**Section 16.7**), by the start of Q4 2010.

13.2 Proposed programme of work

Figure 25 outlines the main decommissioning phases of work and their approximate duration, excluding transit to and from shore. Activities are due to commence with the arrival of the DSV at the beginning of August 2010. The jack-up rig will arrive on station after the 20th August. Work is planned to be completed by 30th September 2010.

Decommissioning Activity	Timing			
	Week 1	Week 2	Week 3	Week 4
Flushing of umbilical and pipeline				
Decommissioning of pipeline and umbilical				
Retrieval of seabed infrastructure				
As-left survey (DSV)				
Well abandonment				
As-left survey (Rig)				

Figure 25: Proposed schedule of work.

14 COSTS

Silverstone has prepared an estimate of the total cost of the Tristan NW Decommissioning Programmes (**Table 16**). These costs are based on the assumption that all work would be carried out and completed in the summer of 2010.

The final cost of this programme of work will be dependent on the specific contracts awarded and the synergies that might be available with similar offshore programmes that coincide with the timetable for Tristan NW.

Table 16: Summary of the total estimated cost of the Tristan NW Decommissioning Programmes.

Item	Estimated Cost (£m)
Programme to flush pipeline, umbilical and plug and abandon wells	3.1
Programme to remove subsea infrastructure	2.8
OPEX and other charges post-COP	2.0
Decommissioning survey, Year 1 Decommissioning survey, Year 5	0.150 0.225
Total	**8.275**

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15 PRE- AND POST-DECOMMISSIONING MONITORING AND MAINTENANCE

15.1 Pre-decommissioning surveys

When vessels associated with the Tristan NW Field decommissioning programme arrive on station, the precise location and status of all items to be dealt with will be confirmed. In addition, ROVs will be used to confirm the seabed conditions before divers are deployed.

15.2 Post-decommissioning surveys

The former site of the well head, the rock-dump used to protect the exposed section of umbilical near the well, the whole length of the pipeline and umbilical, and the former site of the valve assembly, will be surveyed when all the offshore operations have been completed. The areas that will be surveyed and the types of data that will be acquired will be discussed and agreed with DECC. It is likely, however, that the survey will:

- map the seabed and any items left in place, to confirm that they are in the planned and agreed locations and condition; and
- acquire samples to determine the extent and magnitude of any perturbation or chemical contaminations that may have been caused by the decommissioning operations.

The results of the survey will be submitted to DECC. If the status of the trenched and buried pipeline and umbilical does not conform to that proposed in the Decommissioning Programme, Silverstone will discuss the need for possible remedial action with DECC.

The need for further environmental surveys will be discussed with DECC in the light of the findings of the first post-decommissioning survey. Existing survey data show that there is no measurable chemical contamination in any part of the Tristan NW Field; oil-based drill cuttings were not discharged at the well site.

15.3 Monitoring of remains

The trenched and buried pipeline and umbilical will remain the licensees' responsibility.

The post-decommissioning survey will provide a detailed assessment of the location of the trenched and buried pipeline and umbilical, and the depth of burial. Based on the results of the survey, an appropriate monitoring programme will be discussed and agreed with DECC. It is likely that this will comprise one or more offshore surveys that would employ remote techniques to assess the depth of burial of the line. The findings of every survey will be reported to DECC. The timing and aims of further surveys will be discussed and agreed with DECC.

16 PROJECT MANAGEMENT AND VERIFICATION

16.1 Introduction

This section describes how Silverstone Energy will manage the proposed decommissioning programmes and report progress to DECC. It also confirms Silverstone's undertaking to provide the required verification and close-out reports to DECC.

16.2 Project Management

As operator of the Tristan NW Field, Silverstone will be solely responsible for the management of the decommissioning programme of work, which comprises:

- Setting the health, safety and environmental standards for the programme
- Approving the final detailed programme of work and schedule of operations
- Appointing and managing contractors
- Monitoring progress and reporting to DECC
- Exercising a legal "duty of care" with respect to all items and materials taken ashore for re-use, recycling or disposal
- Ensuring that the offshore sites, and any items permitted to remain offshore, are left in the planned conditions described in the Decommissioning Programmes

A number of proven management tools will be used in managing this project, including a project-specific Permits Licences Actions Notices and Consents (PLANC) register to assign and monitor project-related activities, deadlines and responsibilities.

16.3 Controlling documents

The whole programme of work for decommissioning will be performed and managed under the auspices of relevant Silverstone policies, procedures and goals and targets including the following:

- Silverstone's Corporate Health, Safety and Environmental Policy
- Silverstone's Health, Safety and Environmental Business Management System (BMS)
- Tristan NW Decommissioning Project HSEQ Goals and Targets

The Tristan NW Decommissioning Project HSEQ Goals and Targets presented in **Table 17**.

Table 17: Tristan NW Decommissioning Project HSEQ Goals and Targets

Tristan NW Decommissioning Project HSEQ GOALS and TARGETS			
	Performance Indicator	**Target**	**Aspects**
1	Lost Time Injuries	Zero	No harm to personnel during operations.
2	Oil Spills	Zero	No marine impact due to operations
3	Unauthorized Chemical Discharge	Zero	No marine impact other than pipeline authorised discharges
4	Dangerous Occurrences (DO/OIR9)	Zero	No unwanted incidents - due to effective management
5	Regulatory Non- Conformances	Zero	All regulatory requirements identified and satisfied
6	Recycling	>95 %	Of retrieved recyclable metals to be recycled or reused
7	Perform HSEQ Audit	Undertaken	Undertake all planned HSEQ audits
8	Effective consultations	100 %	All DECC-notified consultees to be consulted with
9	Schedule	30-09-10	All offshore activities to be completed by 30th September 2010

16.4 Notifying other users of the sea

At least 6 weeks before offshore decommissioning work begins, Silverstone will notify the UK Hydrographic Office so that appropriate Notices to Mariners can be distributed. At the same time, an advisory notice about the planned programme of work will be placed on the Sea Fish Industry Authority's Kingfisher Bulletin.

16.5 Reporting Progress

Silverstone will report the progress of the decommissioning programmes to DECC according to a reporting schedule that will be agreed with DECC before operations begin.

16.6 Duty of care for waste materials

Silverstone and the project managers CSL are in the initial stages of engaging the services of contractors for the waste handling and/or recycling of the materials from the decommissioning project. The contractors under consideration are well established in the industry with both experience and reputation in these operations. The successful contractor will be required to provide HS&E policy statements, ISO Registration Certificates, Waste Management Licences and Registered Waste Carriers Certificate. It is not planned to ship any waste across frontiers, and as such no transfrontier shipment licences will be required.

All equipment and materials retrieved during the programme of work will be returned to the UK for re-use, recycling or treatment and disposal, as appropriate. The project has set a target to recycle and reuse >95 % of the equipment and materials retrieved. Silverstone will ensure compliance with their legal "Duty of Care" with respect to the management, treatment and disposal of all waste equipment and materials retrieved during the programme. This will include keeping copies of all waste transfer notes for at least two years and special (hazardous) waste consignment notes for at least three years. In addition, Silverstone will ensure that waste carriers are appropriately registered and waste managers are appropriately authorised for the activities and types of waste being treated or disposed of.

16.7 Verification

The outcome of the well abandonment programme will be specifically examined under Regulation 18 of the **Offshore Installation and Well Design and Construction Regulation**s (DCR, 1996).

An over-trawl survey by an independent fishing vessel is planned for the location of the Tristan NW area and pipelines overage. This is the only area outside the Davy exclusion zone that is the site of decommissioning work. As described above, it is not expected that the condition of the buried pipeline will have changed enough to cause an impediment to trawling or other activities and no such reports have been received.

Hence, no provision has been made for an independent contractor to survey the whole area of the Tristan NW infrastructure.

Within four months of the completion of the decommissioning work, Silverstone will provide DECC with:

- the post-decommissioning survey report (**Section 15.2**);
- the debris clearance survey report (**Section 10**);
- confirmation of the independent over-trawl survey of the wells and pipeline; and
- the project close-out report.

17 SUPPORTING MATERIAL

Anatec (2007). Consent to Locate – Tristan NW (Technical Note) Ref A1864 – RBA-CR-1

BMT Cordah (2010). Environmental Statement for the Tristan NW Field Decommissioning Programme. (SEL-TNW-REP-003), February 2010.

CSL, (2010). Tristan NW Decommissioning Comparative Assessment Report (CSL-SSE-TNW-U-REP-0001), February 2010.

Granby (2007). Tristan NW Field Development Environmental Statement (DECC Ref: D/3579/2007), prepared by Rudall Blanchard Associates.

Oil & Gas UK (2009). Suppression and Abandonment of Wells / North Sea Abandonment study 2009 WEL03.

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APPENDIX I: Section 29 Notice Holders

Granby
Oil & Gas plc

Offshore Decommissioning Unit
3rd Floor
Atholl House
86-88 Guild Street
Aberdeen
Ab11 6AR

Granby (Tristan) plc
3 Queens Gardens
Aberdeen
AB15 4YD

Tel: +44 1224 659120
Fax: +44 1224 659130

www.bridge-energy.com

10 August 2010

Dear Sir or Madam

TRISTAN NW DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 10th August 2010.

We, Granby (Tristan) Limited, hereby confirm that we authorise Bridge Energy UK Ltd. to submit on our behalf an abandonment programme relating to the Tristan NW facilities as directed by the Secretary of State on 10th August.

We confirm that we support the proposals detailed in the Tristan NW Decommissioning Programme dated 10th August 2010, which is to be submitted by Bridge Energy UK Ltd. in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully
Granby (Tristan) Limited

James Brunton

Jim Brunton
Managing Director

Granby
Oil & Gas plc

Offshore Decommissioning Unit
3rd Floor
Atholl House
86-88 Guild Street
Aberdeen
Ab11 6AR

3 Queens Gardens
Aberdeen
AB15 4YD

Tel: +44 1224 659120
Fax: +44 1224 659130

www.bridge-energy.com

10 August 2010

Dear Sir or Madam

TRISTAN NW DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 10th August 2010.

We, Granby Oil & Gas plc, hereby confirm that we authorise Bridge Energy UK Ltd. to submit on our behalf an abandonment programme relating to the Tristan NW facilities as directed by the Secretary of State on 10th August.

We confirm that we support the proposals detailed in the Tristan NW Decommissioning Programme dated 10th August 2010, which is to be submitted by Bridge Energy UK Ltd. in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully
Granby Oil & Gas plc

James Brunton

Jim Brunton
Managing Director

MCX EXPLORATION (UK) LTD.
Mid City Place, 71 High Holborn
London, WC1V 6BA, United Kingdom

10th August 2010

Offshore Decommissioning Unit
3rd Floor
Atholl House
86-88 Guild Street
Aberdeen
Ab11 6AR

Dear Sir or Madam

TRISTAN NW DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 10th August 2010.

We, MCX Exploration (UK) Ltd, hereby confirm that we authorise Bridge Energy UK Ltd. to submit on our behalf an abandonment programme relating to the Tristan NW facilities as directed by the Secretary of State on 10th August.

We confirm that we support the proposals detailed in the Tristan NW Decommissioning Programme dated 10th August 2010, which is to be submitted by Bridge Energy UK Ltd. in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully

Jiro Mukai
Managing Director
MCX Exploration (UK) Ltd.

Mitsubishi Corporation

3-1, MARUNOUCHI 2-CHOME, CHIYODA-KU, TOKYO 100-8086, JAPAN

10th August 2010

Offshore Decommissioning Unit
3rd Floor
Atholl House
86-88 Guild Street
Aberdeen, AB11 6AR

Dear Sir or Madam,

TRISTAN NW FIELD DECOMMISSIONING PROGRAMME
PETROLEUM ACT 1998

We acknowledge receipt of your letter dated 10th August 2010.

We, Mitsubishi Corporation, hereby confirm that we authorise Bridge Energy UK Ltd. to submit on our behalf an abandonment programme relating to the Tristan NW facilities, as directed by the Secretary of State on 10th August 2010.

We confirm that we support the proposals detailed in the Tristan NW Decommissioning Programme dated 10th August 2010, which is to be submitted by Bridge Energy UK Ltd. in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Yours faithfully,

Makoto Tsurusaki
General Manager
Exploration & Production Unit
Mitsubishi Corporation

APPENDIX II: Correspondence with Statutory Consultees

Informal consultation with Statutory Consultees

Dear Sirs,

Further to your telephone conversation with Mr Richard Strachan of Silverstone Energy Limited, please find attached a brief over-view of the proposed Tristan NW decommissioning programme.

CSL is in the process of preparing a Decommissioning Programme for submission to DECC, at which time a formal period of consultation will be initiated.

However, it would be very helpful if you were able to supply some initial feedback prior to submission, to inform our preparation of the programme. With a view to our enthusiasm to progress through the initial administration as quickly as possible, it would be very much appreciated if you would be able to respond by the end of this week (22nd January 2010).

Please send any comments or views to the undersigned, or contact the undersigned if you have any questions.

Thank you for considering this request.

Regards,

Tristan NW Decommissioning

Silverstone Energy Limited are in the process of assessing options for the decommissioning of the subsea infrastructure in the Tristan NW gas field, in Block 49/29 of the UKCS, prior to submitting a Decommissioning Programme to DECC under the Petroleum Act 1998.

The Tristan NW facilities are located in ICES rectangle 35F2 in a water depth of 35m, about 76km NE of Bacton on the coast of Norfolk, and comprise:

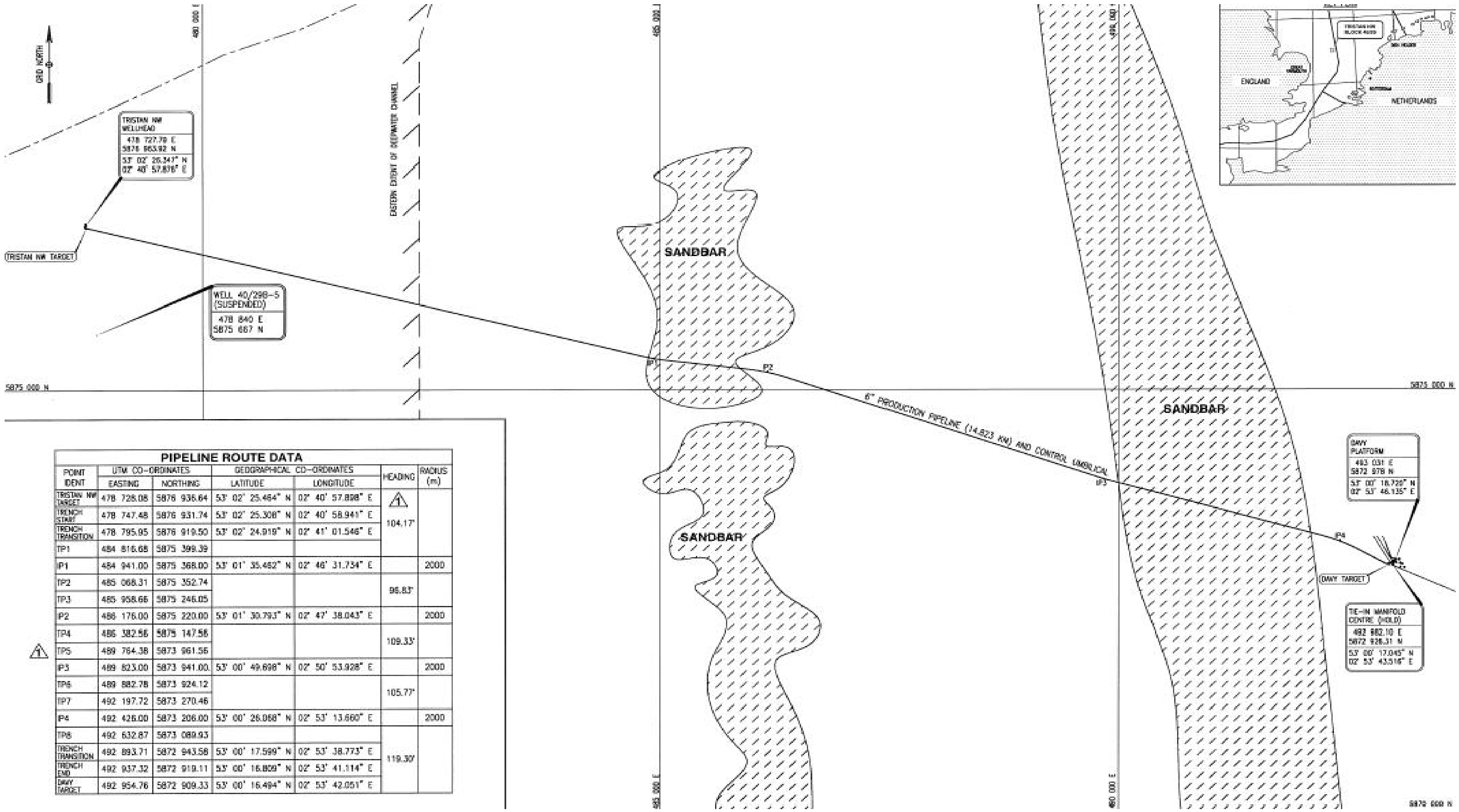
- 1 production well and 1 nearby suspended well;
- a 15km long trenched and buried 6” pipeline with piggy-backed 2” umbilical;
- 1 subsea valve assembly; and
- a short connection to the Davy subsea production manifold.

Figure 1 shows the overall layout of the facilities and Figures 2 & 3 the infrastructure layout at each end of the pipeline. The field produces dry gas with a very low proportion of condensate. Gas is exported to the Davy platform, which is not part of the proposed decommissioning programme.

Our initial proposal is to:

- Plug and abandon the production well and the suspended well, and remove the well head and casings, cutting them at least 3m below the level of the seabed.
- Remove all jumpers, and all parts of the pipeline and umbilical lying on the seabed protected by mattresses or rock-dump. All the mattresses would be removed and the rock-dump left in place.
- Remove the valve assembly
- Disconnect the pipeline from the Davy manifold, which is needed for other operations at the host platform and will stay in place until that platform is decommissioned.
- Bury the cut ends of the pipeline and umbilical to the full depth of the existing trench, and leave the flushed pipeline and umbilical trenched and buried in its existing trench.

It is planned that decommissioning and P&A operations would be carried out and completed in 2010, with offshore operations probably taking place in August or September



PIPELINE ROUTE DATA

POINT IDENT	UTM CO-ORDINATES EASTING	NORTHING	GEOGRAPHICAL CO-ORDINATES LATITUDE	LONGITUDE	HEADING	RADIUS (m)
TRISTAN NW TARGET	478 728.08	5876 936.64	53° 02' 25.464" N	02° 40' 57.898" E	1	
TRENCH START	478 747.48	5876 931.74	53° 02' 25.308" N	02° 40' 58.941" E	104.17°	
TRENCH TRANSITION	478 795.95	5876 919.50	53° 02' 24.919" N	02° 41' 01.546" E		
TP1	484 816.68	5875 399.39				
IP1	484 941.00	5875 368.00	53° 01' 35.462" N	02° 46' 31.734" E		2000
TP2	485 068.31	5875 352.74			96.83°	
TP3	485 958.66	5875 246.05				
IP2	486 176.00	5875 220.00	53° 01' 30.793" N	02° 47' 38.043" E		2000
TP4	486 382.56	5875 147.56			109.33°	
1 TP5	489 764.38	5873 961.56				
IP3	489 823.00	5873 941.00	53° 00' 49.698" N	02° 50' 53.928" E		2000
TP6	489 882.78	5873 924.12			105.77°	
TP7	492 197.72	5873 270.46				
IP4	492 426.00	5873 206.00	53° 00' 26.068" N	02° 53' 13.660" E		2000
TP8	492 632.87	5873 089.93				
TRENCH TRANSITION	492 893.71	5872 943.58	53° 00' 17.599" N	02° 53' 38.773" E	119.30°	
TRENCH END	492 937.32	5872 919.11	53° 00' 16.809" N	02° 53' 41.114" E		
DAVY TARGET	492 954.76	5872 909.33	53° 00' 16.494" N	02° 53' 42.051" E		

Figure 1: Overall Layout – Davy Platform and Tristan NW Field

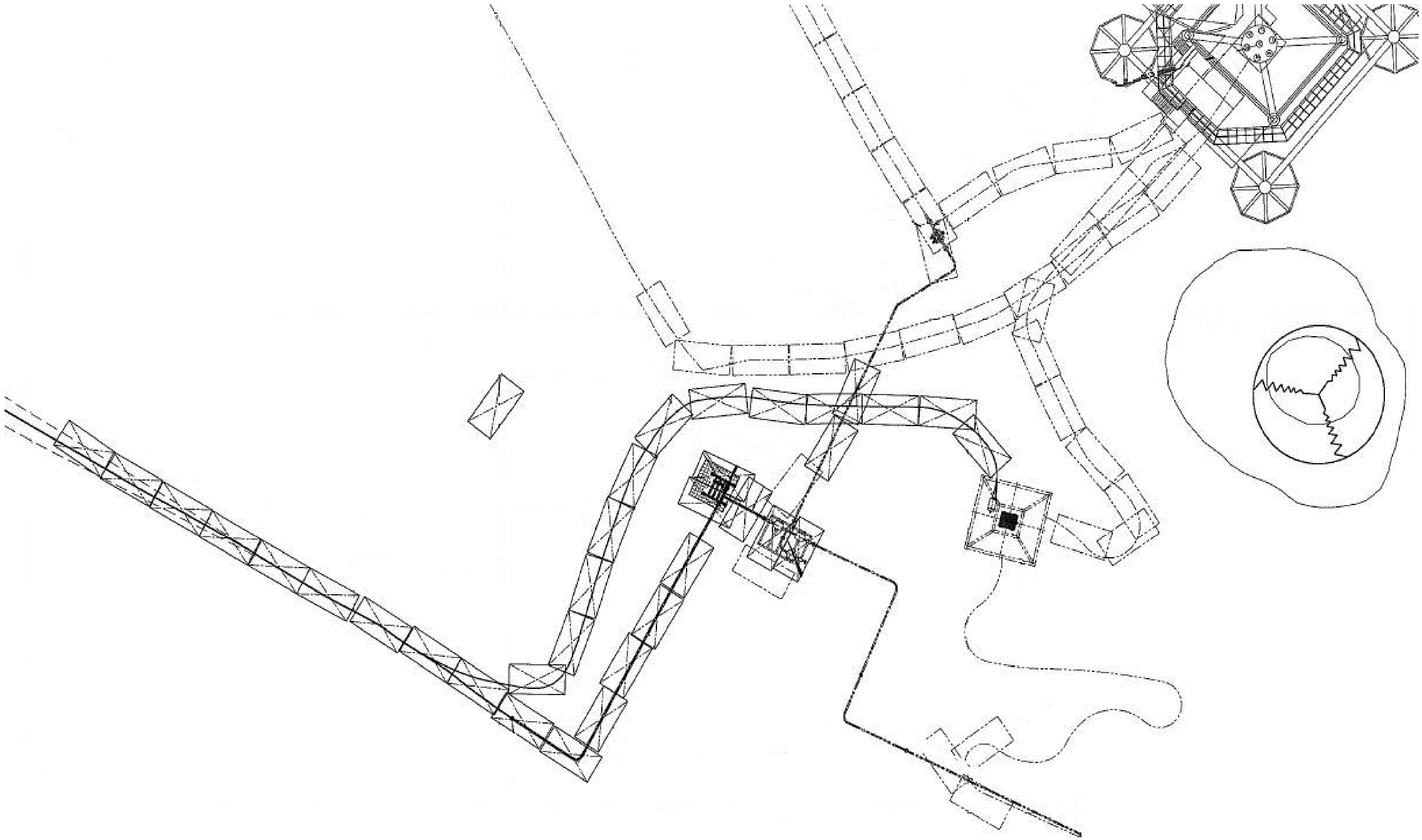


Figure 2 – Subsea Infrastructure at Davy Platform end of pipeline

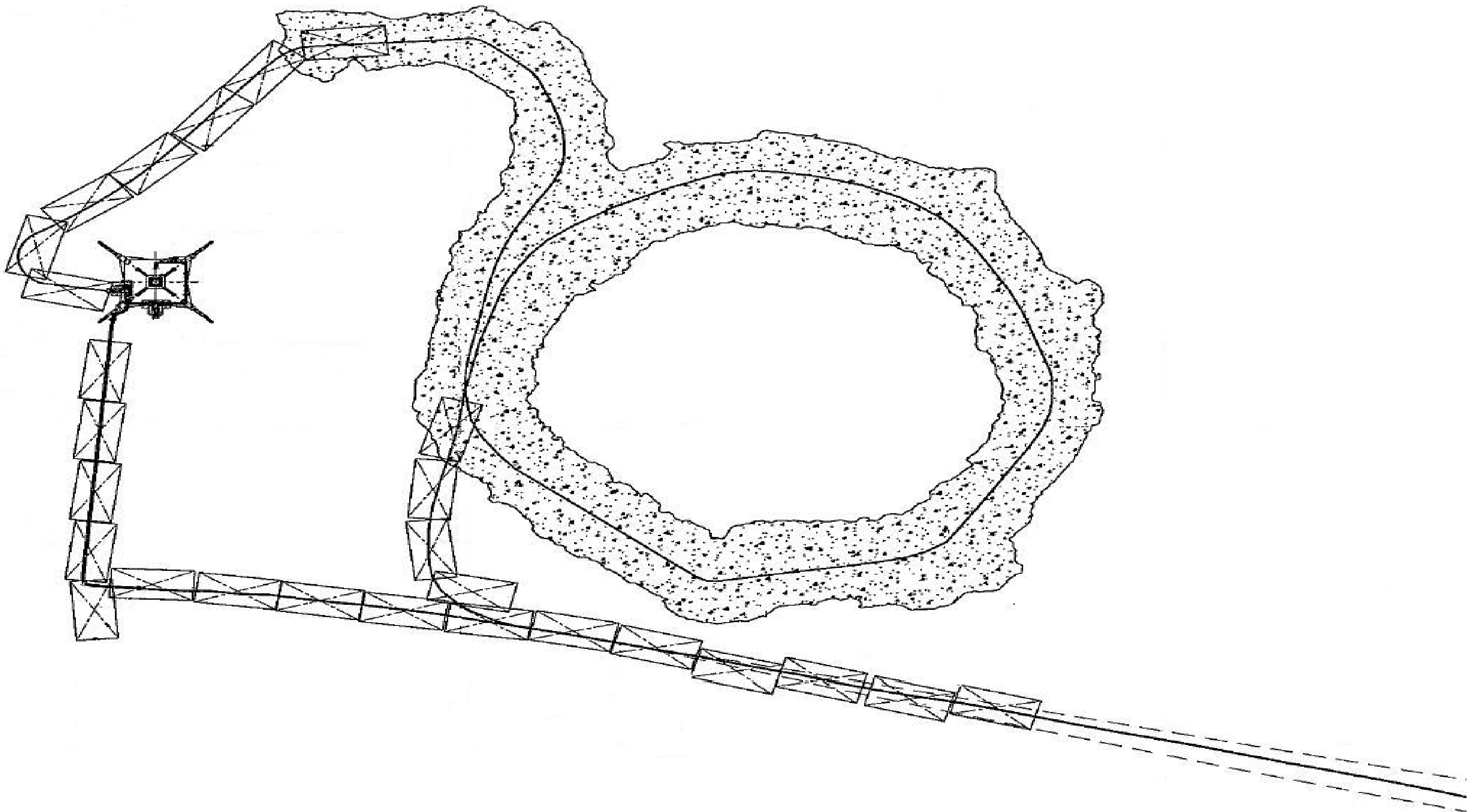


Figure 3 – Subsea Infrastructure at Tristan NW end of pipeline

Informal consultation response from NFFO

Crawford
Thank you for the email relating to Tristan NW Decommissioning program.

On face value the detail of your initial proposal complies with most of the NFFO decommssioning policy. However, I have attached a copy of our Policy Paper as guidance on the NFFO position on all aspects of decommissioning.

We would hope that it is the intention of Silverstone to contribute towards the Fisheries Legacy Trust based upon the pipeline which will be left in situ. We also request that the overtrawlability study is carried out when decommissioning is complete.

In making any response please reply to dbevan@nffo.org.uk Tel 01904 635 432

Please feel free to contact me at any time if you need to discuss any points the policy paper raises

Dave Bevan

Example of formal letter sent to Statutory Consultees

08 March 2010

The National Federation of Fishermen's Organisations
30 Monkgate
York
YO31 7PF

Attention: Mr. D. Bevan

Dear Mr. Bevan

PETROLEUM ACT 1998: Tristan NW Field Decommissioning Programme

Silverstone Energy Limited has submitted a draft of the Tristan NW Field Decommissioning Programme for the consideration of the Secretary of State for Energy and Climate Change, in accordance with the provisions of the Petroleum Act 1998.

Further to this and our correspondence in January of this year, please find enclosed a CD copy of the draft Tristan NW Field Decommissioning Programme, for your review.

Comments on the decommissioning programme should be made, in writing, to our nominated contact, by close of business 6th April 2010:

Kate Black
BMT Cordah Limited
Scotstown Road
Bridge of Don
Aberdeen
AB23 8HG

In the event that you have no comments on the draft programme, it would be greatly appreciated if you would confirm this in writing to the above address. Should you have any questions, or require anything more, please contact the above.

I would like to take this opportunity to thank you for your attention in this matter.

Yours sincerely,

Richard Strachan
Developments Manager