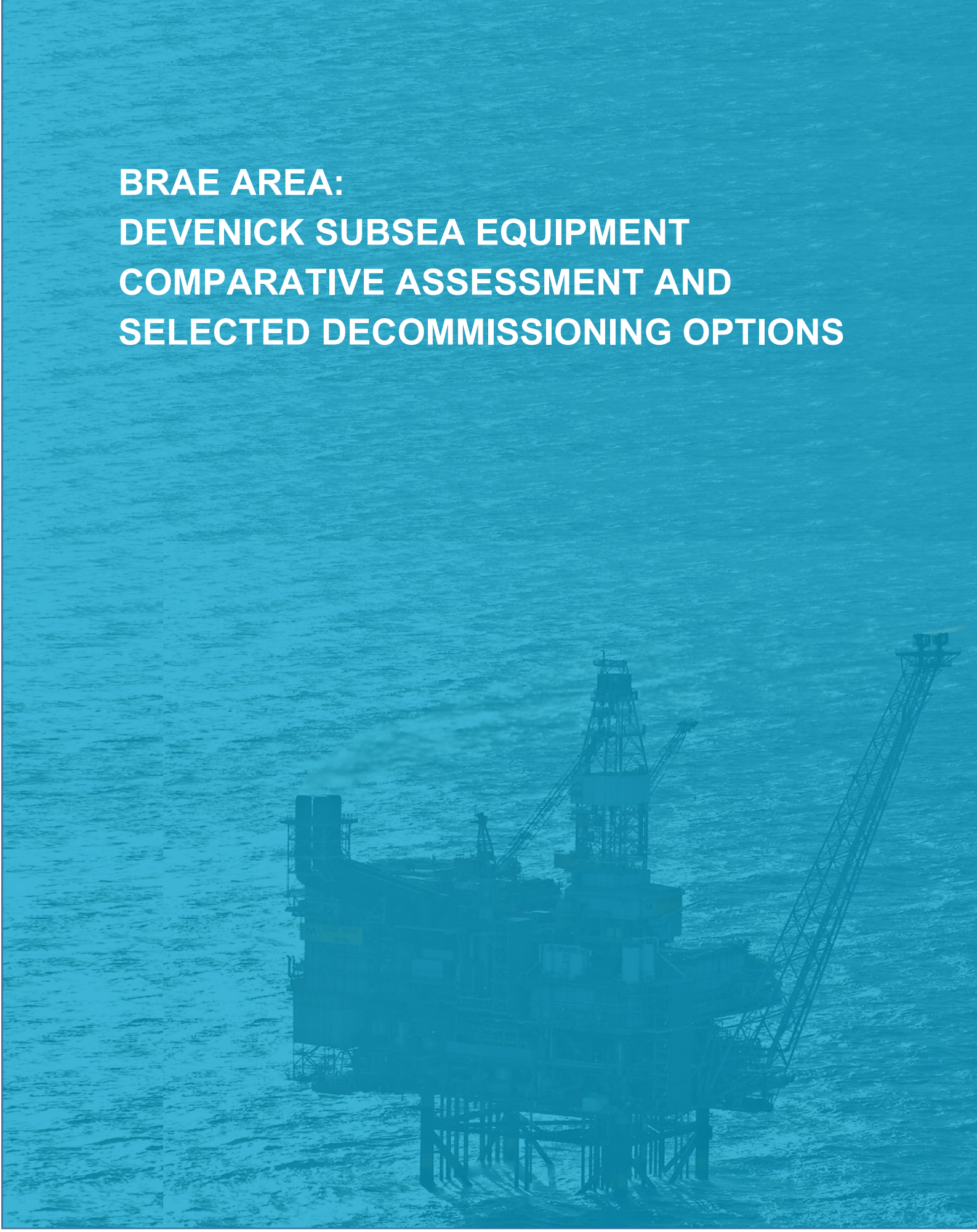
BRAE AREA:
DEVENICK SUBSEA EQUIPMENT COMPARATIVE ASSESSMENT AND SELECTED DECOMMISSIONING OPTIONS



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Terms and Abbreviations

Abbreviation	Explanation
BEIS	Department for Business Energy and Industrial Strategy
CA	Comparative Assessment
E & A	Exploration and Appraisal
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
PiP	Pipe in Pipe
PL ###	Pipeline number
PLU ###	Umbilical number
SAGE	Scottish Area Gas Evacuation
SSIV	Sub Sea Isolation Valve
TAQA	TAQA Bratani Limited
UHB	Upheaval Buckling
WHPS	Wellhead Protection Structure

EXECUTIVE SUMMARY

Overview

TAQA Bratani Limited (TAQA) operates the Devenick Field, which is approaching the end of its productive life. Therefore, TAQA is planning to decommission the Devenick facilities.

The Devenick facilities tie back to the East Brae platform. TAQA took over from RockRose as operator of the Brae Area facilities, including East Brae, in 2020. The Brae facilities are also coming to the end of their productive life, and RockRose had been planning to decommission the Brae facilities for some time. These plans included decommissioning the East Brae platform and associated Braemar Field subsea tie back, and the Brae Alpha and Brae Bravo platforms and connected subsea infrastructure.

The Devenick field started production in 2012 from well S1, which was originally drilled as an appraisal well, but was later recompleted as a development production well. The S2 well was not commissioned due to higher than anticipated levels of H_2S in the reservoir fluids and there has been no production from this well. Consequently, the pipelines and umbilical between S2 and the Devenick manifold have not been used.

Devenick cannot produce after East Brae Cessation of Production, as Devenick depends on East Brae as its control point and export route. The OGA accepted a proposed CoP date for East Brae of no earlier than the beginning of 2022, and the same CoP date for Devenick. East Brae CoP will be driven by the performance of the installation and reservoir conditions, including Devenick, and market conditions. The Devenick facilities were installed to service the Devenick field. Once Devenick and East Brae cease production, there are no sensible reuse opportunities for the Devenick facilities. There are no other hydrocarbon accumulations in the area local to Devenick, and the subsea facilities are of no use for renewable energy projects, etc.

TAQA had prepared a decommissioning programme for Devenick prior to becoming operator of East Brae [1]. Therefore the TAQA Devenick decommissioning programme was originally prepared in isolation from decommissioning plans for East Brae. Since TAQA took over Brae Area operatorship, the Devenick decommissioning programme [2] has been fully integrated into the wider Brae area decommissioning plans.

TAQA will implement the decommissioning programmes for the Brae Area including the Devenick subsea facilities. The purpose of the current document is to describe the Comparative Assessment (CA) process used to determine the preferred decommissioning options for the Devenick Facilities, and list those options. The CA process used to determine the Devenick facilities preferred decommissioning options aligns with the process previously developed for the wider Brae Area. The Brae Area process started from a default position of a clear seabed.

The Devenick CA process concluded that;

- All equipment above the seabed, e.g. wellheads, piping protection frames, surface laid pipelines and umbilicals and valve structures should be removed to shore for reuse recycling or disposal. The possible exceptions to this are surface pipelines and umbilicals in close proximity to the East Brae platform if derogation is granted to leave the platform jacket footings in place.
- All parts of buried pipelines and umbilicals with a burial depth of **more** than 0.6 m should be left in place.
- All parts of buried pipelines and umbilicals with a burial depth of **less** than 0.6 m should be assessed and appropriately remediated. Survey results show that only short lengths of pipelines and umbilicals, e.g. are buried at depths less than 0.6 m. Remediation measures for these short lengths of pipelines and umbilicals will be discussed and agreed with OPRED prior to implementation.

Devenick Facilities

Figure 2 shows the arrangement of the Devenick facilities including the connections to the East Brae platform.

The Devenick facilities comprise;

- the S1 subsea wellhead, Xmas tree and Wellhead Protection Structure. (The S2 Xmas tree and Wellhead were removed in 2015 and 2017 respectively).
- the Devenick Manifold
- pipelines and umbilicals connecting the S1 well and S2 well location to the Devenick Manifold
- cooling spool protection structures at the S1 well and the S2 well location
- pipelines and an umbilical connecting the Devenick Manifold and the East Brae platform
- the Devenick SSIV (Subsea Isolation Valve) structure at the East Brae platform
- the Devenick Risers at the East Brae platform
- associated pipeline stabilisation materials.

CA Process

The overall Devenick facilities CA process is shown in Figure 1. The main steps in this overall process were;

1. Review the Devenick facilities' overall configuration to identify the types of equipment present and identify generic "Segment Types". That is, break the overall Devenick equipment inventory into categories such as; "Fabricated steel structures", "Buried Pipelines", "Surface Laid Pipelines", "Wells", etc.

2. Confirm that Brae Area CAs for each generic Segment Type are appropriate for Devenick and whether the Devenick facilities have any additional Segment Types not previously accounted for.

3. Classify the Devenick facilities into generic Segment Types and identify the preferred decommissioning option for each segment of each facility.

4. Report the results of the CA process.

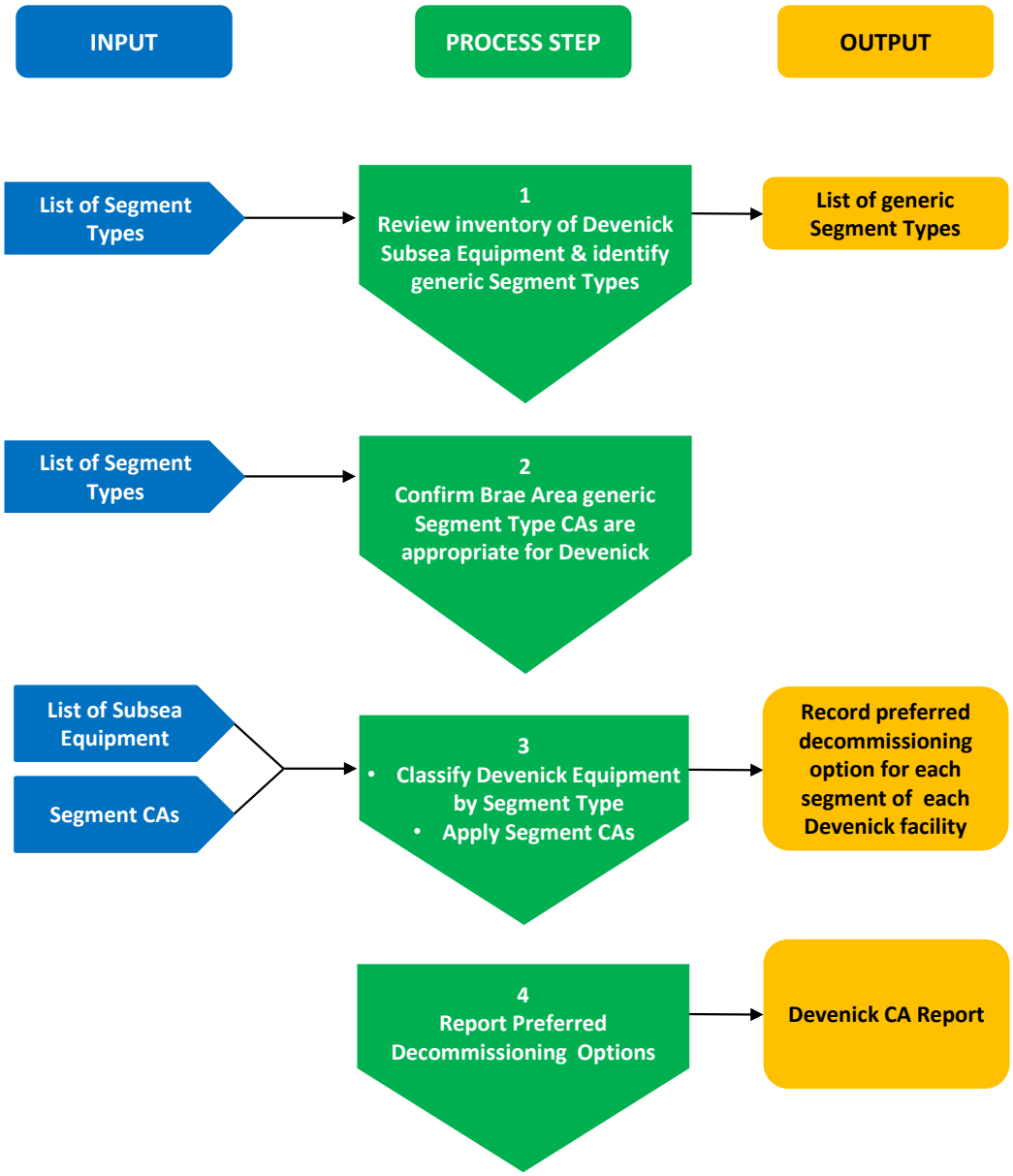

Figure 1: Devenick CA Process

This approach was used to avoid duplication of effort when conducting detailed CA. The process classified each of the Devenick facilities into the appropriate segments and identified the preferred decommissioning solutions for those segments, rather than conducting an exhaustive CA of each facility from scratch.

The Brae Area CAs were conducted in a workshop format where suitably competent personnel assessed relevant decommissioning options for each segment type against five criteria, Safety, Environmental Impact, Technical Feasibility, Socio Economic Impact and Cost. These criteria are presented in Appendix 1. The decommissioning option for the segment with the lowest overall impact on the criteria taken in aggregate was identified as the preferred decommissioning option for that segment. Within this approach some criteria, e.g., safety and environmental impact were considered more important than others. Cost was not used as a determining criterion. In comparing pairs of options, a simple 0 to 1 scoring scheme was used for each option against each criterion where a score of 0 indicated the least preferable option and 1 the most preferable. These scores were used by the CA team as an aid to rank options against a single criterion. The scores were not used to compare across criteria and the identification of the preferred option was primarily a qualitative decision. This approach corresponds to a modified Oil and Gas UK methodology A [4].

CA Conclusions

The CA results for the generic segment types are presented in Appendix 1. These results were then applied to the specific Devenick equipment to arrive at the Devenick subsea facilities decommissioning options CA.

The overall conclusion of the Devenick subsea facilities CA is that all of the subsea equipment will be removed to shore for recycling or disposal.

There are two exceptions to this overall conclusion:

1. **Buried pipelines.** In accordance with guidance [3], pipelines, including umbilicals, that are buried to a depth of > 0.6 m will be left in situ as removal is impracticable, entailing disproportionate risk, seabed disturbance and use of resources and in comparison to the benefits that would accrue from recovery of the material in these pipelines. Pipelines, or parts of pipelines that are buried to a depth of < 0.6 m will be assessed and remediated with rock cover as necessary or removed. Remediation measures will be agreed with OPRED prior to implementation. Leaving these buried pipelines in place does not obstruct the seabed for fishing.

2. **Equipment in close proximity to the derogated East Brae platform footings.** The East Brae platform footings are a candidate for derogation from OSPAR decision 98/3. If derogation is granted, equipment that is in close proximity to derogated footings may be left in situ. The basis for taking this option is that the effort and risk to personnel involved in removing this equipment is disproportionate to the benefit gained in terms of reduction of risk to fishing vessel crews, given that the East Brae platform derogated footings will present a much larger potential obstruction in the same location as the Devenick subsea equipment. The risks to personnel associated with removing the equipment arise from the additional work involved, the congestion and confinement in the working area, and the potential requirement to use divers for these works.

   If any pipelines or umbilicals are left in place adjacent to derogated footings, the lines will be removed up to a logical limit or break point, such as a flange or a crossing with another pipeline, umbilical or cable. The final break points will be determined by TAQA in consultation with the selected decommissioning contractor but will be no further than 75 m from the footings and are likely to be crossings with the Braemar pipelines and umbilicals which are some 30 m to 50 m from the platform footings. TAQA will agree the break points with OPRED on a line by line basis prior to work commencing. Any equipment left in place will be cleaned of oil or chemical contamination before dismantling operations take place.

   If TAQA is not granted derogation to leave the East Brae sub-structure footings in place, then the equipment on the seabed adjacent to the East Brae footings will be removed to shore for reuse, recycling, or appropriate disposal, leaving a clear seabed.

The conclusions of the CA are that the Devenick subsea equipment should be treated as follows:

1. **S1 Wellhead, Xmas tree and wellhead protection structure**

   Remove to shore for reuse, recycling, or appropriate disposal.

   Remediate any depressions in the seabed to remove any snagging hazard.

2. **S1 & S2 Rock covered cooling spool protection structures and cooling spools**

   Move the rock cover, and where appropriate and practicable reuse the rock for remediation of cut pipeline ends and seabed depressions resulting from removing Devenick facilities.

Remove the cooling spool protection structures, and cooling spools, to shore for reuse, recycling, or appropriate disposal.

3. **Manifold structure**

   Remove to shore for reuse, recycling, or appropriate disposal.

4. **SSIV structure**

   Remove to shore for reuse, recycling, or appropriate disposal.

5. **Trenched buried and rock covered sections of pipelines and umbilicals**

   Leave in place. Assess any areas where burial depth is less than 0.6 m and rectify these areas as necessary with rock cover or remedial trenching and burial. Make safe any exposed pipeline cut ends, by placing rock cover, etc.

   The Devenick pipelines are crossed by one third party pipeline and one third party telecommunications cable, and cross three third party telecommunications cables. These crossings are all in trenched buried or rock covered areas of the Devenick pipelines and umbilicals. All the crossings will be left in place undisturbed.

6. **Surface laid sections of pipelines and umbilicals, and protection and stabilisation features NOT in close proximity to East Brae derogated footings**

   Remove to shore for reuse, recycling, or appropriate disposal.

   If practical difficulties prevent protection and stabilisation features such as mattresses, grout bags, etc. being safely recovered for removal to shore, TAQA will discuss and agree alternative solutions with OPRED.

7. **Surface laid sections pipelines and umbilicals and protection and stabilisation features in close proximity to East Brae derogated footings**

   Remove up to a logical break point. For Devenick pipelines and umbilicals, the logical break point is likely to be crossings with Braemar pipelines and umbilicals, approximately 30 m to 50 m from the base of the East Brae sub-structure.

   Leave the remainder of pipelines, umbilicals and protection and stabilisation features in close proximity to the derogated sub-structure footings in place. Make safe any exposed ends by burial, placing rock cover, etc.

1 Devenick Facilities

The Devenick facilities are listed in Table 1 and illustrated in Figure 2. The facilities consist of the Devenick Manifold, the S1 well, and the flowlines and umbilical that connect them. The Devenick S2 well was plugged and abandoned, and the Xmas tree was recovered, in 2015. The pipelines and umbilical that connected the S2 well and the Devenick Manifold are still in place. However, the tie in spools at the well and manifold ends of the flowlines were removed in 2015. The S2 wellhead was severed and recovered in 2017.There are production flowline cooling spools at both the S1 well and S2 well location. The cooling spools are shielded by protection structures that are stabilised by rock cover.

The Devenick facilities also include a production flowline, a methanol pipeline, and a control umbilical that connect the Devenick Manifold and the East Brae platform. The production flowline is fitted with an SSIV and associated protection structure at the East Brae platform. The SSIV is connected to the East Brae platform by an umbilical.

The pipelines and umbilical connecting the Devenick Manifold and the East Brae platform are crossed by the gas export pipeline from Utsira High to the SAGE system and the Havfrue / AEC-2 telecommunications cable. The Utsira pipeline and Havfrue / AEC-2 cable cross the trenched and buried portion of the Devenick pipelines and umbilical.

The pipelines and umbilical from the Devenick Manifold to the East Brae Platform cross three telecommunications cables; AC1, which is operational, and TAT10 and TAT14, which are redundant. All the crossings are extensively rock dumped and will be left in situ.

The Devenick pipelines and umbilicals also cross the Braemar pipelines and umbilicals inside the East Brae platform 500 m zone. These crossings are in close proximity to the East Brae jacket footings. These crossings are protected by concrete mattresses. If derogation for the East Brae footings is obtained, these crossings will be left in situ, otherwise the crossings will be dismantled, and the various components removed to shore.

Table 2 lists the pipeline and umbilical protection and stabilisation features that are in place on the Devenick facilities. These include concrete mattresses, grout bags and rock cover.

The Devenick development previously included an Exploration and Appraisal (E & A) well; 9/29A-1. This consisted of a wellhead, guide base and guideposts. This well was successfully plugged, abandoned, and removed in 2017 in accordance with relevant guidance and legislation.

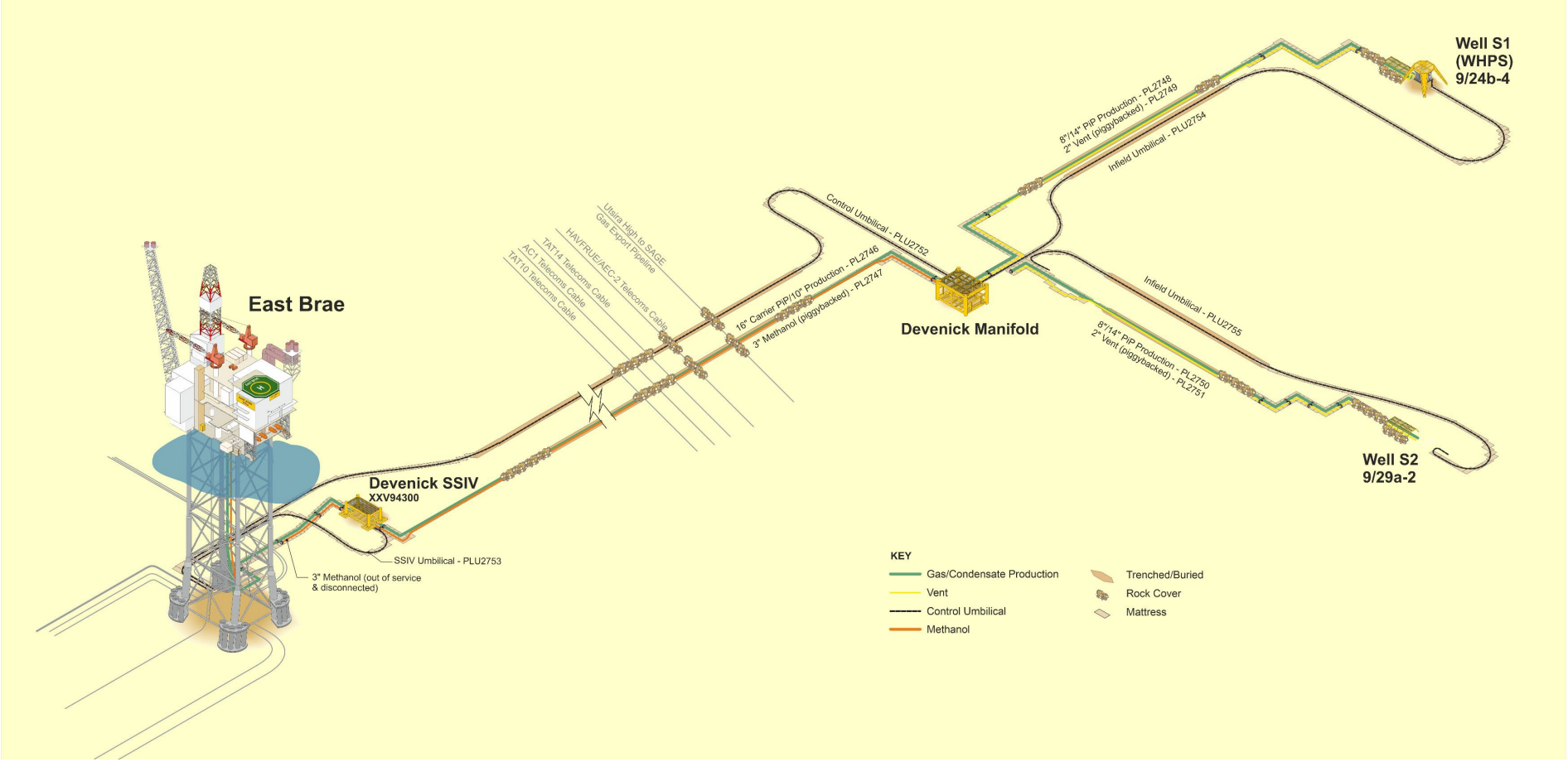

Figure 2: Devenick Facilities

Table 1: Devenick Facilities		
Equipment	**Description**	**Notes**
S1 Wellhead / Xmas Tree	This equipment includes the wellhead, guide base, guideposts, and Xmas tree.	Weight = 76 te
S1 WHPS (Wellhead Protection Structure)	S1 WHPS is secured to the seabed by four foundation piles.	Weight = 120 te
S1 Protection Frame Type A	Part of 4 Section S1 Cooling Spool Protection Frame.	Weight = 40 te Length = 15 m
S1 Protection Frame Type B	Part of 4 Section S1 Cooling Spool Protection Frame.	Weight = 35 te Length = 15 m
S1 Protection Frame Type C	Part of 4 Section S1 Cooling Spool Protection Frame.	Weight = 32.5 te Length = 15 m
S1 Protection Frame Type D	Part of 4 Section S1 Cooling Spool Protection Frame.	Weight = 28 te Length = 18 m
S1 Protection Frame Rock Cover	Rock cover distributed over 63m total length of S1 protection frames	Weight = 1600 te
S2 Xmas Tree / Wellhead	The Xmas tree and Wellhead were Removed in 2015 / 2017 respectively. The removal of the S2 wellhead broke up the concrete that formed the cemented connection between the wellhead and the seabed. This resulted in several concrete “boulders” on the seabed at the S2 well location. The largest of these is 2 m x 2 m x 2 m, with a mass of approximately 20 te.	
S2 Protection Frame Type A	Part of 4 Section S2 Cooling Spool Protection Frame.	Weight = 40 te Length = 15 m
S2 Protection Frame Type B	Part of 4 Section S2 Cooling Spool Protection Frame.	Weight = 35 te Length = 15 m
S2 Protection Frame Type C	Part of 4 Section S2 Cooling Spool Protection Frame.	Weight = 32.5 te Length = 15 m
S2 Protection Frame Type D	Part of 4 Section S2 Cooling Spool Protection Frame.	Weight = 28 te Length = 18 m
S2 Protection Frame Rock Cover	Rock cover distributed over 63m total length of S2 protection frames	Weight = 1700 te
E & A Wellhead / Xmas Tree	Removed in 2015 / 2017	
Devenick Manifold Structure	Devenick Manifold Structure, which includes various equipment, e.g., valves, subsea control modules, multi-phase flowmeter, distribution units and control jumpers. The manifold comingles the production from the S1 and S2 flowlines into the production pipeline PL 746, and distributes control signals, methanol etc. to the wells. The Manifold Structure is secured to the seabed by four foundation piles.	Weight = 242 te

Table 1: Devenick Facilities		
Equipment	**Description**	**Notes**
PL 2746 Production Pipeline	10” / 16” PiP, 33.817 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from the Devenick Manifold to the East Brae platform. Short lengths of the pipeline adjacent to the East Brae platform and the Devenick manifold are surface laid. The pipeline crosses the AC1, TAT10 and TAT14 telecommunications cables, and is crossed by the Utsira High gas pipeline. All these crossings are extensively rock dumped.	
PL 2747 Methanol Pipeline	3” Pipeline piggybacked on PL 2746, 33.804 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from the East Brae platform to the Devenick Manifold. Short lengths of the pipeline adjacent to the East Brae platform and the Devenick manifold are surface laid. The pipeline crosses the AC1, TAT10 and TAT14 telecommunications cables, and is crossed by the Utsira High gas pipeline. All these crossings are extensively rock dumped.	This pipeline is out of service. Methanol is conveyed in PLU 2752 cores.
PL 2748 S1 Production Pipeline	8” / 14” Pip, 1.49 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from Well S1 to the Devenick Manifold. Short lengths of the pipeline adjacent to the S1 wellhead and the Devenick manifold are surface laid.	
PL 2749 S1 2” Service Line	2” Pipeline piggybacked on PL 2748, 1.49 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from Well S1 to the Devenick Manifold. Short lengths of the pipeline adjacent to the S1 wellhead and the Devenick manifold are surface laid.	
PL 2750 S2 Production Pipeline	8” / 14” Pip, 1.279 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from the site of Well S2 to the Devenick Manifold. A short length of the pipeline adjacent to the Devenick manifold is surface laid.	
PL 2751 S2 2” Service Line	2” Pipeline piggybacked on PL 2750, 1.277 km long. The pipeline is mainly trenched and back filled with spot rock cover. The pipeline runs from the site of Well S2 to the Devenick Manifold. A short length of the pipeline adjacent to the Devenick manifold is surface laid.	

Table 1: Devenick Facilities		
Equipment	**Description**	**Notes**
PLU 2752 Control Umbilical	105 mm composite flexible umbilical, 33.78 km long. The umbilical is mainly trenched and back filled with spot rock cover. The umbilical runs from the East Brae platform to the Devenick Manifold. Short lengths of the umbilical adjacent to the East Brae platform and the Devenick manifold are surface laid. The umbilical crosses the AC1, TAT10 and TAT14 telecommunications cables, and is crossed by the Utsira High gas pipeline. All these crossings are extensively rock dumped.	
PLU 2754 S1 Infield Control Umbilical	98.6 mm composite flexible umbilical, 1.51 km long. The umbilical is mainly trenched and back filled with spot rock cover. The umbilical runs from the Devenick Manifold to Well S1 umbilical termination. Short lengths of the umbilical adjacent to the S1 well and the Devenick manifold are surface laid.	
PLU 2755 S2 Infield Control Umbilical	115 mm composite flexible umbilical, 1.39 km long. The umbilical is mainly trenched and back filled with spot rock cover. The umbilical runs from the Devenick Manifold to the site of the Well S2 umbilical termination assembly. Short lengths of the umbilical adjacent to the S2 well site and the Devenick manifold are surface laid.	
SSIV Structure	The SSIV structure is in the East Brae platform 500m zone to the northeast of the sub-structure footprint. The SSIV structure measures 10.75 m x 6.5 m x 4.25 m (L x W x H). The structure is not piled.	Weight = 72.5 te
PL U2753 SSIV Control Umbilical	71.3 mm composite flexible umbilical, 0.5 km long. The umbilical is surface laid on the seabed. The umbilical runs from the East Brae platform to the Devenick SSIV.	

Table 2: Pipeline Protection and Stabilisation Features				
Protection / Stabilisation Feature	**Total Number**	**Weight (te)**	**Locations**	**Exposed/Buried/Condition**
Concrete mattresses	67	4.7 te each Total 314.9 te	Over PL 2746 & Piggybacked PL 2747 at East Brae Platform	Exposed on seabed
Salt Sack/Grout Gabion	2	2 x Sack/gabion each containing 40 Grout Bags Total 80 x 25 kg Grout Bags = 2.0 te	Over PL 2746 at East Brae Platform	Exposed on seabed
Grout Bags	30	25kg each Total 0.75 te	Over PL 2746 at East Brae Platform	Exposed on seabed
Grout Bags	10	25kg each Total 0.25 te	Over PL 2747 at East Brae Platform	Exposed on seabed
Concrete mattresses	29	4.7 te each Total 136.3 te	Over PL 2746 & Piggybacked PL 2747 at Manifold	Exposed on seabed
Salt Sack/Grout Gabion	3	3 x Sack/gabion each containing 40 Grout Bags Total 120 x 25 kg Grout Bags = 3.0 te	Over PL 2746 at Manifold	Exposed on seabed
Rock	Spot Rock Cover	UHB = 33,000 te, Telecommunications cable crossings (x 3) 16,300 te Total 49,300 te	Over PL 2746 and Piggybacked PL 2747	Exposed on seabed
Concrete mattresses	43	4.7 te each Total 202.1 te	Over Control Umbilical PLU 2752 at East Brae Platform	Exposed on seabed
Rock	Spot Rock Cover	Telecommunications cable crossings (x 3) Total 4,800 te	Over Control Umbilical PLU 2752	Exposed on seabed

Table 2: Pipeline Protection and Stabilisation Features				
Protection / Stabilisation Feature	**Total Number**	**Weight (te)**	**Locations**	**Exposed/Buried/Condition**
Concrete mattresses	59	4.7 te each Total 277.3 te	Over Control Umbilical PLU 2752 at Devenick Manifold	Exposed on seabed
Concrete mattresses	16	4.7 te each Total 75.2 te	Over SSIV Control Umbilical PLU 2753 at East Brae Platform to SSIV structure	Exposed on seabed
Concrete mattresses	31	4.7 te each Total 145.7 te	PL 2748 & piggybacked PL 2749 at Manifold	Exposed on seabed
Rock	Spot Rock Cover	UHB Total 7,600 te	PL 2748 & piggybacked PL 2749	Exposed on seabed
Concrete mattresses	33	4.7 te each Total = 155.1 te	PL 2748 & piggybacked PL 2749 at Well S1	Exposed on seabed
Concrete mattresses	17	4.7 te each Total 79.9 te	S1 Well Control Umbilical PLU2754 at Manifold	Exposed on seabed
Concrete mattresses	48	4.7 te each Total 225.6 te	S1 Well Control Umbilical PLU 2754 at Well S1	Exposed on seabed
Concrete mattresses	24	4.7 te each Total 112.8 te	PL 2750 & piggybacked PL 2751 at Manifold	Exposed on seabed
Rock	Spot Rock Cover	UHB Total 7,600 te	PL 2750 & piggybacked PL 2751	Exposed on seabed
Concrete mattresses	30	4.7 te each Total 141.0 te	PL 2750 & piggybacked PL 2751 at S2 Well site	Exposed on seabed
Grout Bags	60	25kg each Total 1.5 te	PL 2750 & piggybacked PL 2751 at Manifold	Exposed on seabed
Grout Bags	480	25kg each Total 12.0 te	PL 2750 & piggybacked PL 2751 at S2 Well site	Exposed on seabed

Table 2: Pipeline Protection and Stabilisation Features				
Protection / Stabilisation Feature	**Total Number**	**Weight (te)**	**Locations**	**Exposed/Buried/Condition**
Concrete mattresses	20	4.7 te each Total 94.0 te	S2 Well Control Umbilical PLU 2755 at Manifold	Exposed on seabed
Concrete mattresses	58	4.7 te each Total 272.6 te	S2 Well Control Umbilical PLU 2755 at S2 Well site	Exposed on seabed

2 CA Process

The overall methodology used for the Devenick Facilities CA was to review the process previously used for the other subsea facilities in the Brae Area to confirm that it was suitable for use for the Devenick facilities and then to apply it. TAQA found the Brae Area approach to be suitable, and therefore adopted it for the Devenick Facilities.

The approach classifies the equipment inventory into generic Segment Types and uses CA to identify the preferred decommissioning option for each segment type. For example, a Segment Type might be "Buried Pipeline", and the preferred decommissioning option would be removal to shore. This approach was used to avoid duplication of effort when considering multiple facilities that are heterogeneous in nature, i.e., an individual pipeline might consist of buried segments, surface laid segments, structures, etc. It is more efficient to identify how to treat each segment of each facility by comparison with generic Segment Types and their preferred decommissioning options, than to perform a detailed CA for each facility from scratch. Figure 3 demonstrates this approach for a typical pipeline that runs from a pipeline structure on the left of the image to a production platform on the right of the image. The pipeline breaks down into the following segments: 1) a pipeline structure; 2) & 6) two unprotected surface laid pipeline segments; 3) & 5) two segments of rock covered surface laid pipeline, and; 4) & 7) two crossings. The selected decommissioning options for this pipeline would then be determined by identifying the relevant generic Segment Types and corresponding preferred decommissioning options.

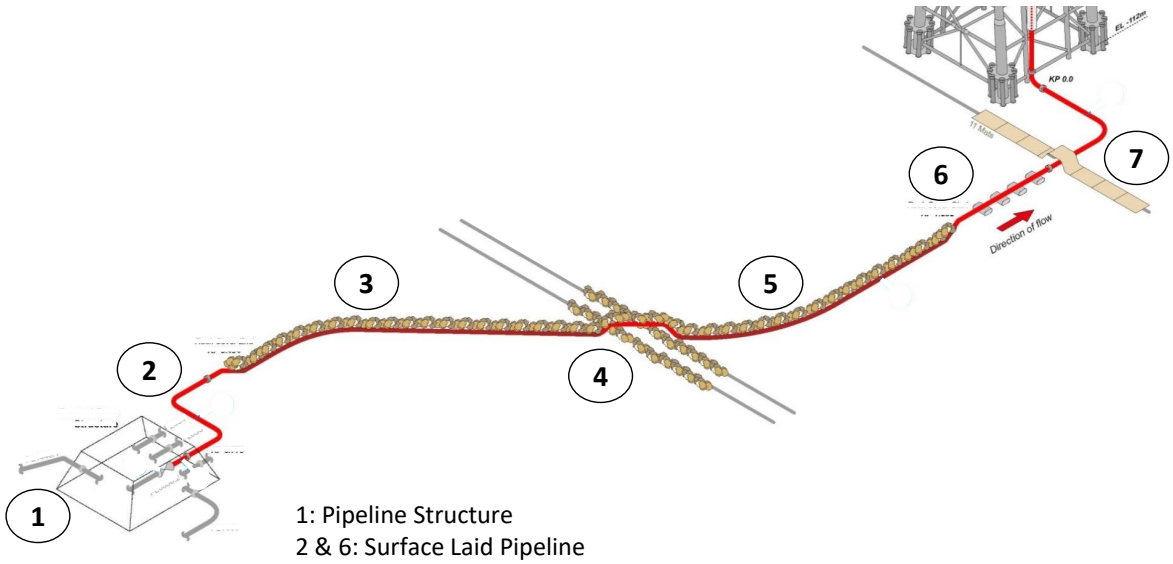

Figure 3: Example Segment Classification

Appendix 1 presents the assessment criteria used to assess the Brae Area Generic Segment types and the respective preferences for decommissioning options. Table 3 lists the generic Segment Types used in the Brae Area CA, the preferred decommissioning option for each of those generic Segment Types at Devenick, and the reasoning for the selection of the option.

Section 3 presents the specific decommissioning options determined for the Devenick facilities by applying the approach set out in Table 3.

Table 3: Devenick Generic Segment Types Selected Decommissioning Options			
Segment Type	**Description / Notes**	**Selected Preferred Decommissioning Option**	**Reasoning for Option Selection**
A.1: Fabricated Steel Structures (forming part of pipelines)	Fabricated steel structures are used to provide support to subsea equipment, including valves, manifolds, and subsea well templates, and to provide protection from dropped objects and damage from impact by fishing gear. The Devenick CA methodology classes some structures as installations and others as parts of pipelines, depending on their use.	Remove to shore for reuse, recycling, or disposal.	Fabricated structures pose a risk to fishing vessels and should therefore be removed.
A.2: Fabricated Steel Structures (forming, or part of installations)			Fabricated structures pose a risk to fishing vessels. Guidance requires complete removal of subsea installations. Therefore these structures should be removed
B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 0.6 m below seabed)	A trenched pipeline is laid into a trench in the seabed, which may then be backfilled with seabed material or left open. If a trench is left open, it may naturally backfill over time due to the action of tides and currents. Rock cover may also be used to prevent upheaval buckling or to protect a trenched pipeline from damage due to fishing gear or dropped objects. Trenching may also be used to stop a pipeline from moving laterally on the seabed. In this instance, rock cover or other means are likely to be required to keep the pipeline in the seabed trench.	Leave in place (make safe any exposed cut pipeline ends)	Pipeline segments that are buried to a depth greater than 0.6 m do not pose a risk to fishing vessels. Recovering trenched and buried pipeline segments disturbs the seabed, uses resources, and imposes risk on the personnel recovering the line.
B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 0.6 m below seabed)		Leave in place (make safe any exposed cut pipeline ends) provided a specific assessment confirms that it is safe to do so, following remediation measures if necessary. If specific assessment demonstrates that leave in place is not safe for other sea users, without impracticable mitigation measures, remove to shore for reuse recycling or disposal.	Pipeline segments that are buried to a depth less than 0.6 m may pose a risk to fishing vessels if they migrate to the seabed. A specific assessment will determine if this is the case for a particular pipeline segment and if practicable measures can mitigate the situation. Recovering trenched and buried pipeline segments disturbs the seabed, uses resources, and imposes risk on the personnel recovering the line segment.

Table 3: Devenick Generic Segment Types Selected Decommissioning Options			
Segment Type	**Description / Notes**	**Selected Preferred Decommissioning Option**	**Reasoning for Option Selection**
B.2.1.1: Surface Laid Pipeline (Mattress/Grout Bag Protection)	A surface laid pipeline is laid onto the seabed; it is not trenched or buried. The Devenick surface laid pipelines are short segments of flowlines from the wells to the manifold, and short sections of the lines from the manifold to the East Brae platform. These portions may be protected by mattresses or rock cover.	Remove the mattresses and grout bags and remove the pipeline segment to shore for reuse recycling or disposal. (See G.1 and G.2 below for treatment of mattresses and grout bags).	Surface laid mattress / grout bag protected pipeline segments pose a snagging hazard to fishing vessels. Therefore these pipeline segments should be recovered. (There is also potential for fishing vessels to "fish up" mattresses or parts of mattresses which pose hazards to fishing vessel crews that handle them See G.1 and G.2 below).
		If the mattress / grout bag protected pipeline segment is in close proximity to derogated platform footings, leave in place.	The snagging hazard posed by surface laid mattress / grout bag protected pipeline segments in close proximity to platform footings is negligible in comparison to the hazard from the footings. Therefore, any benefit accrued from removing these pipeline segments is not worth the risk and use of resources required to recover them.
B.2.1.2: Surface Laid Pipeline (Rock Cover Protection)		Leave rock protected surface laid pipelines in place.	Rock protected pipeline segments do not pose a significant hazard to fishing vessels. The risk to personnel, disturbance of the environment and use of resources associated with recovering rock protected pipeline segments outweigh the small reduction in risk to fishing vessels that would result from removing these pipeline segments.
B.2.2: Surface Laid Pipeline (No protection)		Remove to shore for reuse, recycling, or disposal.	Any segments of unprotected pipeline at Devenick are short and removal is straight forward. There is therefore no merit in adopting other solutions.

Table 3: Devenick Generic Segment Types Selected Decommissioning Options			
Segment Type	**Description / Notes**	**Selected Preferred Decommissioning Option**	**Reasoning for Option Selection**
C.1: Fishing Critical Span (Pipeline or umbilical)	A span is a length of pipeline or umbilical that is not directly in contact with the seabed. Spans can occur if the seabed is scoured away by the action of currents, or if the pipeline or umbilical buckles because of thermal effects or other causes. A fishing-critical span is a span that is large enough to trap fishing gear. This can be a significant hazard to fishing vessels and their crews.	For short spans, rock cover the full span in place. For long spans, cut out the span and make safe the resulting cut ends of pipe, with rock cover. Remove the cut out length of pipeline to shore for reuse, recycling, or appropriate disposal.	Fishing critical spans present a snagging hazard to fishing vessels and their crews. The rock required to cover the full length of a short span may be less than that required to cover the cut ends that would result if the short span were cut out. Rock covering the full length of the span may also result in less disturbance to the seabed, and less use of resources than cutting out the span and rock covering the resulting cut ends.
C.2: Integrity Critical Span (Pipeline or umbilical)	An integrity-critical span is a span that does not present a hazard to fishing vessel crews but can cause failure of the pipeline or umbilical. If such a failure occurs, the failed pipeline can present a hazard to fishing vessel crews. (A span can be fishing-critical and integrity-critical).		Integrity critical spans may develop into fishing critical spans. Integrity critical spans may also cause the pipeline or umbilical to break producing to pipe ends that are a potential snagging hazard. Therefore, proactively eliminating the span is preferred.
C.3: Non-critical Span (Pipeline or umbilical l)	A non-critical span is one that is neither fishing-critical, nor integrity-critical. Non-critical spans may develop over time into integrity or fishing critical spans.		A non-critical span may develop into an integrity or fishing critical span. Therefore, proactively eliminating the span is preferred.
D - Cables	Not Relevant to Devenick Facilities		

Table 3: Devenick Generic Segment Types Selected Decommissioning Options			
Segment Type	**Description / Notes**	**Selected Preferred Decommissioning Option**	**Reasoning for Option Selection**
E.1: Buried/Trenched Umbilical (Top of Umbilical below seabed level)	Typically, umbilicals are trenched and buried between the East Brae platform safety zone and the Devenick Manifold and between the manifold and the S1 well and S2 well site.	Leave in place.	Buried umbilical segments do not pose a significant risk to fishing vessels. (TAQA will review umbilical segments that are buried to a depth shallower than 0.6 m to confirm that they do not pose a risk to fishing vessels., following remediation measures if necessary). Recovering trenched and buried umbilical segments disturbs the seabed, uses resources, and imposes risk on the personnel recovering the line.
E.2.1: Surface Laid Umbilical (Mattress / Grout bag protection/stabilisation)	Short lengths of umbilicals may be surface laid at the approaches to the East Brae platform, the Devenick Manifold, the S1 well and the S2 well site. The Devenick SSIV umbilical in the East Brae platform 500 m safety zone is entirely surface laid.	Recover to shore for reuse recycling or disposal.	Surface laid umbilical segments and associated mattress protection potentially pose risks to fishing vessels and their crews. The first is the risk of "fishing up" a mattress or part of a mattress and the hazard this presents to the crew who will have to handle it on the vessel deck. The second risk is a snagging risk.
E.2.2: Surface Laid Umbilical (Rock cover protection/stabilisation)		Leave in place.	Rock protected umbilical segments do not pose a significant hazard to fishing vessels. The risk to personnel, disturbance of the environment and use of resources associated with recovering the rock protected umbilical segments outweigh the small reduction in risk to fishing vessels that would result from removing these segments.
F.1: Live Crossing (Devenick lines crossing a live third-party line)	A live crossing is a crossing where a Devenick pipeline or umbilical crosses, or is crossed by, a third-party pipeline or cable that is still in use.	Leave until the third-party facility is decommissioned and then decommission as a dead crossing.	There is no reason to incur the technical and business risks associated with dismantling a live crossing.

Table 3: Devenick Generic Segment Types Selected Decommissioning Options			
Segment Type	**Description / Notes**	**Selected Preferred Decommissioning Option**	**Reasoning for Option Selection**
F.2: Dead Crossing (All lines in crossing are dead)	A dead crossing occurs where a Devenick pipeline or umbilical crosses, or is crossed by, another TAQA facility or a third-party pipeline, umbilical or cable that is no longer in use.	Treat crossing components as per the preferred options for the individual components of the crossing, e.g., treat surface laid pipeline segments as surface laid pipeline segments, etc.	Once a crossing is dead, it may be treated as an assembly of other generic Segment Types. There is no reason to treat the components of a dead crossing differently to how they would be treated if they occurred in isolation.
G.1: Unburied Concrete Mattress	Concrete mattresses are used to stabilise and protect subsea pipelines and umbilicals.	Remove to shore for reuse, recycling, or disposal. (If removal is not safe or practicable TAQA will consult OPRED regarding alternative solutions).	Mattresses and grout bags pose risks to fishing vessels' crews if they are "fished up" and must be handled on the deck of the vessel. Guidance [3] indicates that the preferred solution for unburied mattresses and grout bags is removal.
G.2: Unburied Grout Bag	Grout bags are effectively sandbags that are dry filled with cement grout. Grout bags are also used for pipeline and umbilical protection and isolation.		

3 Devenick Facilities Selected Decommissioning Options

Table 4 lists Devenick facilities segment classifications and the corresponding decommissioning options selected by identifying the relevant generic Segment Type.

The default decommissioning option for the Devenick facilities is a clear seabed. However, at East Brae, if a derogation is obtained to leave the platform sub-structure footings in place, the selected decommissioning option for equipment in close proximity to the footings may be to leave it in place. Figure 4 shows the extent of the area around the East Brae sub-structure footings that constitutes "close proximity". This area extends approximately 75m beyond the sub-structure footings. There is surface laid Devenick equipment outside this area. The selected decommissioning option for equipment outside the close proximity area is removal, unless it is buried, or rock covered. Surface laid equipment within the "close proximity" area may be left in place or may be removed up to a logical limit or break point. The limit of removal for the Devenick pipelines and umbilicals is likely to be the crossings with the Braemar pipelines and umbilicals, which are approximately 50 m from the footings.

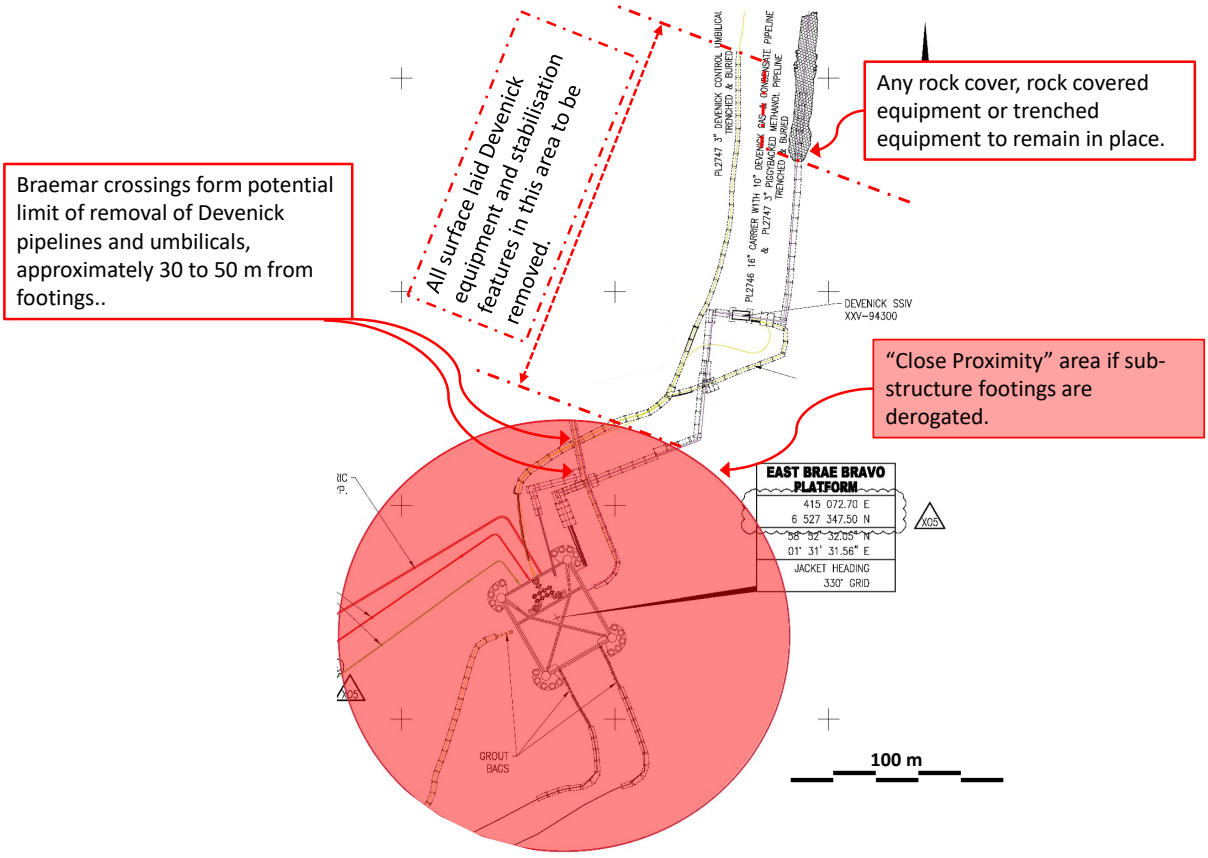

Figure 4: East Brae "Close Proximity" Area

3.1 Devenick Subsea Facilities Selected Decommissioning Options

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
S1 Wellhead / Xmas Tree	This equipment includes the wellhead, guide-base, guideposts, and Xmas tree.	**Segment type: Well** Plug and abandon in accordance with Oil and Gas UK and BEIS guidance. Remove equipment to shore for reuse, recycling, or appropriate disposal. Remediate any seabed depression as required.	Regulation requires the removal of Wellheads and Xmas Trees.
S1 WHPS	S1 WHPS is secured to the seabed by four foundation piles.	**Segment type: A.2 Fabricated Steel Structure (forming, or part of installation)** Remove to shore for reuse, recycling, or appropriate disposal. Remediate any seabed depression as required.	Refer to Table 3: Segment Type A.2. These structures pose a risk to fishing vessels, and regulation requires their removal.
S1 Protection Frame Type A	Part of 4 Section S1 Cooling Spool Protection Frame.	**Segment type: Treat as A.1 Fabricated Steel Structure (forming part of pipeline) and B2.2 Surface Laid Pipeline (No Protection**) Move rock. Recover cooling spool protection structures and spools forming parts of PL 2748 and PL 2749, to shore for reuse, recycling, or appropriate disposal. Some of the rock cover from the cooling spool protection frames may be reused locally to remediate any holes in the seabed resulting from S1 wellhead removal.	Refer to Table 3: Segment Types A.1 and B2.2. These structures pose a risk to fishing vessels, and regulation requires their removal. Once the structures are removed, removal of the cooling spools is straightforward, therefore there is no merit in considering other options.
S1 Protection Frame Type B	Part of 4 Section S1 Cooling Spool Protection Frame.		
S1 Protection Frame Type C	Part of 4 Section S1 Cooling Spool Protection Frame.		
S1 Protection Frame Type D	Part of 4 Section S1 Cooling Spool Protection Frame.		
S1 Protection Frame Rock Cover	Rock cover distributed over 63m total length of S1 protection frames		

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
S2 Wellhead / Xmas Tree	The Xmas tree and Wellhead were removed in 2015 / 2017 respectively. The equipment was taken onshore for recycling or disposal. The S2 wellhead removal operation generated several concrete "boulders" resulting from the breakup of the cement around the wellhead. The largest of these boulders is 2 m x 2 m x 2 m. The mass of this boulder may be up to 20 te. The total mass of the boulders will be determined as they are handled during decommissioning. There are several potential remediation measures for these boulders irrespective of their aggregate mass. These measures include; • Using the boulder(s) to partly fill the void in the seabed resulting from the removal of the wellhead. It may be necessary to break up the boulders to do this. • Recovering the boulders to a vessel and thence to shore for recycling or disposal. It may be necessary to break up the boulders prior to recovery because of their shape or mass. The remediation measure adopted will be determined during detailed engineering. TAQA will consult with OPRED to agree the selected remediation measure adopted.		Regulation requires the removal of Wellheads and Xmas Trees.
S2 Protection Frame Type A	Part of 4 Section S2 Cooling Spool Protection Frame.	**Segment type: Treat as A.1 Fabricated Steel Structure (forming part of pipeline) and B2.2 Surface Laid Pipeline (No Protection)** Move rock. Recover cooling spool protection structures and spools forming parts of PL 2750 and PL 2751, to shore for reuse, recycling, or appropriate disposal. Some of the rock cover from the cooling spool protection frames may be reused locally to remediate any holes in the seabed resulting from S2 wellhead removal.	Refer to Table 3: Segment Types A.1 and B2.2. These structures pose a risk to fishing vessels, and regulation requires their removal. Once the structures are removed, removal of the cooling spools is straightforward, therefore there is no merit in considering other options.
S2 Protection Frame Type B	Part of 4 Section S2 Cooling Spool Protection Frame.		
S2 Protection Frame Type C	Part of 4 Section S2 Cooling Spool Protection Frame.		
S2 Protection Frame Type D	Part of 4 Section S2 Cooling Spool Protection Frame.		
S2 Protection Frame Rock Cover	Rock cover distributed over 63m total length of S2 protection frames		
E & A Wellhead / Xmas Tree	Removed in 2017. Equipment taken onshore for recycling or disposal.		Regulation requires the removal of Wellheads and Xmas Trees.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
Devenick Manifold	Manifold structure, which includes various equipment, e.g., valves, subsea control modules, multi-phase flowmeter, distribution units and control jumpers. The manifold comingles the production from the S1 and S2 flowlines into the production pipeline PL 2746, and distributes control signals, methanol etc. to the wells. The Manifold Structure is secured to the seabed by four foundation piles.	**Segment type: A.2 Fabricated Steel Structure (forming, or part of installation)** Cut foundation piles 3 m below the seabed and remove the manifold to shore for reuse, recycling, or appropriate disposal. Remediate any seabed depression as required.	Refer to Table 3: Segment Type A.2. This structure poses a risk to fishing vessels, and regulation requires its removal.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2746 Production Pipeline	10” / 16” PiP, 33.8 km long. The pipeline runs from the East Brae platform to the Devenick Manifold. The pipeline is trenched and back filled over most of its length with spot rock cover. The initial ≈ 340 m of the pipeline at the East Brae platform and final ≈ 150 m at the Devenick manifold are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted, and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2746 Production Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal. Pipeline in close proximity to derogated sub-structure footings: Leave in situ.	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2747 Methanol Pipeline	3" Pipeline piggybacked on PL 2746, 33.8 km long. The pipeline runs from the East Brae platform to the Devenick Manifold. The pipeline is trenched and back filled over most of its length with spot rock cover. The initial ≈ 340 m of the pipeline at the East Brae platform and final ≈ 150 m at the Devenick manifold are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2747 Methanol Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal. Pipeline in close proximity to derogated sub-structure footings: Leave in situ.	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2748 S1 Production Pipeline	8” / 14” PiP, 1.49 km long. The pipeline runs from the Devenick Manifold to the S1 well. The pipeline is trenched and back filled over most of its length with spot rock cover. The initial ≈ 110 m of the pipeline at the manifold and the ≈ 170 m of the pipeline between the trench transition and cooling spool protection structures at the S1 well are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted, and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2748 S1 Production Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal.	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2749 S1 Methanol Pipeline	2" Pipeline piggybacked on PL 2748, 1.49 km long. The pipeline runs from the Devenick Manifold to the S1 well. The pipeline is trenched and back filled for most of its length with spot rock cover. The initial ≈ 110 m of the pipeline at the manifold and the ≈ 170 m of the pipeline between the trench transition and cooling spool protection structures at the S1 well are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted, and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2749 S1 Methanol Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal.	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2750 S2 Production Pipeline	8" / 14" Pip, 1.28 km long. The pipeline runs from the Devenick Manifold to the S2 Well site. The pipeline is trenched and back filled over most of its length with spot rock cover. The initial ≈ 130 m of the pipeline at the manifold and the ≈ 175 m of the pipeline between the trench transition and cooling spool protection structures at the S2 well site are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2750 S2 Production Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2751 S2 Vent Pipeline	2" Pipeline piggybacked on PL 2750, 1.28 km long. The pipeline runs from the Devenick Manifold to the S2 Well site. The pipeline is trenched and back filled over most of its length with spot rock cover. The initial ≈ 130 m of the pipeline at the manifold and the ≈ 175 m of the pipeline between the trench transition and cooling spool protection structures at the S2 well site are surface laid and mattress protected.	**Segment type: B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)** Leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type B.1.1. Pipelines buried to this depth pose no significant risk to fishing vessels. Removal would disturb the seabed, consumes resources and exposes personnel to risk.
		Segment type: B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed) The lengths of the Devenick pipelines that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline that retrenching them. However other appropriate remediation measures may be adopted, and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.	Refer to Table 3: Segment Type B.1.2. There are limited lengths of Devenick buried pipelines that are shallower than 0.6 m. Assessing and remediating these on a case by case basis will ensure a balanced solution considering safety, environmental, technical, social, and economic factors.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PL 2751 S2 Vent Pipeline / Cont.		**Segment type: B.2.1.1: Surface Laid Pipeline (Mattress / Grout Bag Protection)** Pipeline not in close proximity to derogated sub-structure footings: Remove protection and pipeline to shore for reuse, recycling, or appropriate disposal	Refer to Table 3: Segment Type B.2.1.1. Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PLU 2752 Control Umbilical	105 mm composite flexible umbilical, 33.78 km long. The umbilical runs from the East Brae platform to the Devenick Manifold. The umbilical is trenched and back filled over most of its length with spot rock cover. Depth of burial is generally greater than 0.6 m. Any lengths of PLU 2752 that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths (generally a few tens of metres or less) of shallow buried umbilical that retrenching them. However other appropriate remediation measures may be adopted. Remediation measures will be discussed and agreed with OPRED before implementation. The initial ≈ 225 m of the umbilical at the East Brae platform and final ≈ 170 m at the Devenick manifold are surface laid and mattress protected.	**Segment type: E.1: Buried/Trenched Umbilical (Top of umbilical below seabed)** Lengths of umbilical buried to a depth > 0.6 m, leave in place (make safe any exposed ends).	Refer to Table 3: Segment Type E.1
		Segment type: E.2.1: Surface Laid Umbilical (Mattress / Grout Bag Protection) Umbilical not in close proximity to derogated sub-structure footings: Remove protection and umbilical to shore for reuse, recycling, or appropriate disposal. Umbilical in close proximity to derogated sub-structure footings: Leave in situ.	Refer to Table 3: Segment Type E.2.1

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PLU 2754 S1 Infield Control Umbilical	98.6 mm composite flexible umbilical, 1.51 km long. The umbilical runs from the Devenick Manifold to the S1 Well site. The umbilical is trenched and back filled over most of its length with spot rock cover. Depth of burial is generally greater than 0.6 m. Any lengths of PLU 2754 that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths (generally a few tens of metres or less) of shallow buried umbilical that retrenching them. However other appropriate remediation measures may be adopted. Remediation measures will be discussed and agreed with OPRED before implementation. The initial ≈ 170 m length of the umbilical at the manifold and the final ≈ 260 m length of the umbilical at the S1 wellsite are surface laid and mattress protected.	**Segment type: E.1: Buried/Trenched Umbilical (Top of umbilical below seabed)** Leave in place (make safe any exposed ends). The buried trenched and buried portion that forms the bulk of the length of PLU 2754 will be left in place.	Refer to Table 3: Segment Type E.1
		Segment type: E.2.1: Surface Laid Umbilical (Mattress / Grout Bag Protection) Umbilical not in close proximity to derogated sub-structure footings: Remove protection and umbilical to shore for reuse, recycling, or appropriate disposal.	Refer to Table 3: Segment Type E.2.1

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PLU 2755 S2 Infield Control Umbilical	115 mm composite flexible umbilical, 1.39 km long. The umbilical runs from the Devenick Manifold to the S2 Well site. The umbilical is trenched and back filled over most of its length with spot rock cover. Depth of burial is generally greater than 0.6 m. Any lengths of PLU 2755 that are buried at a shallower depth than 600mm will be assessed following survey and remediated as required. Any remediation required will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths (generally a few tens of metres or less) of shallow buried umbilical that retrenching them. However other appropriate remediation measures may be adopted. Remediation measures will be discussed and agreed with OPRED before implementation. The initial ≈ 180 m length of the umbilical at the manifold and the final ≈ 235 m length of the umbilical at the S2 wellsite are surface laid and mattress protected. The umbilical jumpers at the well were disconnected in 2015.	**Segment type: E.1: Buried/Trenched Umbilical (Top of umbilical below seabed)** Leave in place (make safe any exposed ends). Note 2 The buried trenched and buried portion that forms the bulk of the length of PLU 2755 will be left in place. Note 2	Refer to Table 3: Segment Type E.1
		Segment type: E.2.1: Surface Laid Umbilical (Mattress / Grout Bag Protection) Umbilical not in close proximity to derogated sub-structure footings: Remove protection and umbilical to shore for reuse, recycling, or appropriate disposal. The mattress protected portions of PLU 2755 at the manifold and S2 wellsite will be recovered and returned to shore for reuse, recycling, or disposal. The mattresses will also be recovered and returned to shore.	Refer to Table 3: Segment Type E.2.1

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
Live Crossings PL 2746, PL 2747 and PLU 2752 crossings with AC1 and Havfrue / AEC-2 telecommunications cables, and Utsira High Gas Pipeline	The Devenick lines PL 2746, PL 2747 and PLU 2752 cross over the live AC1 telecommunications cable, approximately 17.5 km south of the Devenick Manifold, and are crossed by the Utsira High gas pipeline and Havfrue / AEC-2 telecommunications cable approximately 3.6 km and 4.5 km south of the manifold respectively. At the AC1 crossing the Devenick lines are surface laid, and rock covered. At the Utsira High pipeline and Havfrue / AEC-2 telecommunications cable crossings, the Devenick lines are trenched and buried, and rock covered.	**Segment type: F.1: Live Crossing.** Leave until the third-party facility is decommissioned and then decommission as a dead crossing. In this instance PL 2746, PL 2747, and PLU 2752 will remain in situ.	Refer to Table 3: Segment Type F.1 Crossings should not be disturbed while any of their elements remain live. Once all crossing elements are dead, the crossing can be decommissioned in accordance with the segment types that make it up.
Live Crossings PL 2746, PL 2747 and PLU 2752 crossings with Devenick pipelines and umbilicals.	The Devenick lines PL 2746, PL 2747 and PLU 2752 cross the Braemar pipelines PL 1969 and PLU 1970 inside the East Brae 500m zone in close proximity to the jacket footings.	**Segment type: F.1: Live Crossing.** Leave until the third-party facility is decommissioned and then decommission as a dead crossing. At the time of Devenick Decommissioning the Braemar facilities will also be decommissioned. This will then be considered a Dead Crossing. If derogation is obtained to leave the East Brae footings in place, then these crossings, which are in close proximity to the footings will also be left in situ.	Refer to Table 3: Segment Type F.1 Crossings should not be disturbed while any of their elements remain live. Once all crossing elements are dead, the crossing can be decommissioned in accordance with segment types that make it up.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
Dead Crossings PL 2746, PL 2747 and PLU 2752 crossings with AT10 and AT14 telecommunications cables.	The Devenick lines PL 2746, PL 2747 and PLU 2752 cross the TAT10 and TAT14 telecommunications cables, which are no longer in use, approximately 22 km and 11.5 km south of the Devenick manifold respectively. These crossings are rock covered.	**Segment type: F.2: Dead Crossing.** Treat crossing components as per the preferred options for the individual components of the crossing, e.g., treat surface laid pipeline as surface laid pipeline, etc. In this instance PL 2746, PL 2747, and PLU 2752 will remain in situ.	Refer to Table 3: Segment Type F.2 Once all crossing elements are dead, the crossing can be decommissioned in accordance with segment types that make it up.
Spans in Devenick pipelines and umbilicals	There are short spans on some Devenick pipelines. These are monitored by survey.	**Segment Type: C.1: Fishing Critical Span (Pipeline, cable, or umbilical)** **Segment Type: C.2: Integrity Critical Span (Pipeline, cable, or umbilical)** **Segment Type: C.3: Non-critical Span (Pipeline, cable, or umbilical)** All spans will either be removed as part of the surface laid pipelines or umbilicals in which they occur, or rock covered, in the case where they occur in trenched and buried lines.	Refer to Table 3: Segment Types C.1, C.2, C.3 Spans pose a risk to fishing vessel crews.
Devenick SSIV Structure	The Devenick SSIV structure is in the East Brae platform 500m zone. The structure measures 10.75 m x 6.5 m x 4.25 m. The structure is not piled.	**Segment type: A.1: Fabricated Steel Structures (forming part of pipelines)** Remove to shore for appropriate reuse, recycling, or appropriate disposal.	Refer to Table 3: Segment Type A.1 This structure poses a risk to fishing vessels, and regulation requires their removal.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
PLU 2753 SSIV Control Umbilical	71.3 mm composite flexible umbilical, 0.5 km long. The umbilical is surface laid on the seabed and mattress protected for the great majority of its length. The umbilical runs from the East Brae platform to the Devenick SSIV.	**Segment type: E.2.1: Surface Laid Umbilical (Mattress / Grout Bag Protection)** Umbilical not in close proximity to derogated sub-structure footings: Remove protection and umbilical to shore for reuse, recycling, or appropriate disposal. Umbilical in close proximity to derogated sub-structure footings: Leave in situ.	Refer to Table 3: Segment Type E.2.1 Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4: Devenick Subsea Facilities Segments & Selected Decommissioning Options			
Equipment	**Description / Notes**	**Segment Type / Selected Decommissioning Option**	**Reasons For Selecting Decommissioning Option**
		Segment type: E.2.3: Surface Laid Umbilical (No protection) Umbilical not in close proximity to derogated sub-structure footings: Remove to shore for reuse, recycling, or appropriate disposal. Umbilical in close proximity to derogated sub-structure footings: Leave in situ.	Refer to Table 3: Segment Type E.2.3 Facilities that are not in close proximity to derogated footings represent a risk to fishing vessel crews. Facilities that are in close proximity to derogated footings present negligible incremental risk to fishing vessel crews. The use of resources, disturbance to the seabed and risk to personnel that would accrue from removal are therefore not warranted.

Table 4 Notes:

1 Any unprotected surface laid segments of PL 2750, PL 2751, and PLU 2755 were removed with the S2 Xmas tree in 2015. The surface laid segments of PL 2750 & PL 2751 under the cooling spool protection structures at the S2 wellsite are still in place. The cooling spool protection structures and these lines will be removed. Similarly, the mattress protected surface laid portion of PLU 2755 at the S2 well site is still in place. This portion of PLU 2755 will also be removed.

2 The depth of burial of PLU 2755 is subject to confirmation. If necessary, any points on this line where the depth of burial is insufficient, will be mitigated with rock cover or by retrenching subject to consultation and agreement with OPRED.

3 Remediation will probably be rock cover, as a rock cover vessel will be present for decommissioning and rock cover is a more efficient means of mitigating these short lengths of shallow buried pipeline than retrenching them. However, other appropriate remediation measures may be adopted, and if this is the case remediation measures will be discussed and agreed with OPRED before implementation.

3.2 Rock Covered Cooling Spool Protection Structures

The Devenick subsea facilities include production pipeline cooling spool protection structures at the S1 and S2 well locations. These structures are rock covered. This type of structure does not correspond to a specific generic Segment Type. However, the structures may be considered analogous to both pipeline structures and surface laid rock covered pipelines. The selected decommissioning option for the pipeline structures generic Segment Type is removal and for rock covered surface laid pipelines is leave in place. However, if a rock covered pipeline poses an unacceptable risk to other sea users (for example, fishing vessel crews), then the rock cover should be moved, and the pipeline trenched in place or removed to shore. The cooling spool protection structures are substantial; 2.5 m high, up to 5.2 m wide, and around 15 m long. There are four structures at each well site, laid end to end. The total length of the protection structures at each well site is 63 m. Given the size of the structures, it is considered that leaving them in place would pose an unacceptable risk to other sea users. Following the logic in the CA methodology, if the structures were rock covered pipelines that posed an unacceptable risk, the decommissioning option would be to move the rock cover and trench or remove the pipelines. Once the rock cover is moved from the Devenick cooling spool protection structures, they are effectively pipeline structures, in which case the selected decommissioning option is removal to shore. Hence, the selected decommissioning option for the Devenick cooling spool protection structures is to move the rock cover and remove the protection structures and cooling spools to shore. The rock cover may then be used to remediate cut pipeline ends, or depressions in the seabed resulting from the Devenick decommissioning operations, if this is practicable. Any excess rock, not required for seabed remediation, will be profiled to ensure that it does not represent a snagging hazard to fishing vessels.

3.3 Devenick Pipeline Risers and Topsides Equipment

There are four Devenick lines that terminate at the East Brae platform;

- PL 2746 – 10” Production Pipeline
- PL 2747 – 3” Methanol Pipeline
- PLU 2752 – Main Umbilical
- PLU 2753 – SSIV Umbilical

The pipelines run up the side of the East Brae jacket as “risers” in a riser caisson and terminate on the platform topsides. Similarly, the Devenick umbilicals run up the jacket in a caisson and terminate on the platform topsides.

The risers and topsides equipment that form part of the Devenick pipelines and umbilicals have not been subject to CA. The topsides equipment will be removed to shore for reuse, recycling, or disposal in conjunction with the platform topsides. The lengths of riser and umbilical attached to the platform upper jacket will be removed to shore for reuse, recycling, or disposal in conjunction with the upper jacket. The lengths of riser and umbilical attached to the platform footings will be removed with the footings or left in place with the footings, dependent on whether derogation is obtained to leave the footings in place.

4 Summary of Decommissioning Options

In summary, the selected decommissioning options for the Devenick subsea facilities are:

- **S1 Wellhead / Xmas Tree and Wellhead Protection Structure**
    - Remove to shore for reuse, recycling, or appropriate disposal.
- **S1 & S2 Rock covered Cooling Spool Protection Frames comprising Protection Frames Type A, Type B, Type C and Type D and Cooling Spools**
    - Move rock cover and where appropriate reuse rock for remediation of cut pipeline ends at trench transitions and other seabed depressions resulting from removing Devenick facilities.
    - Remove cooling spool protection structures, and cooling spools forming parts of PL 2748, PL 2749, PL 2750, and PL 2751, to shore for reuse, recycling, or appropriate disposal.
- **Devenick Manifold structure**
    - Remove to shore for reuse, recycling, or appropriate disposal.
- **SSIV structure**
    - Remove to shore for reuse, recycling, or appropriate disposal.
- **Trenched buried and rock covered pipeline and umbilical segments, forming parts of PL2746, PL 2747, PL 2748, PL 2749, PL 2750, PL 2751, PLU 2752, PLU 2754**
    - Leave in place. Make safe any exposed ends or other exposed portions by placing rock cover, burial, etc.
- **Surface laid pipelines and umbilicals forming parts of PL 2746, PL 2747, PL 2748, PL 2749, PL 2750, PL 2751, PLU 2752, PLU 2754 and protection and mattresses and grout bags NOT in close proximity to East Brae derogated sub-structure footings, i.e., at the S1 and S2 well sites and the Manifold**
    - Remove to shore for reuse, recycling, or appropriate disposal. If protection and stabilisation features such as mattresses, grout bags, etc. cannot be safely recovered for removal to shore, then the fallback option is to rock cover / bury in place, following consultation with OPRED.
- **Surface laid pipelines and umbilicals forming parts of PL 2746, PL 2747, PL 2748, PL 2749, PL 2750, PL 2751, PLU 2752, PLU 2754 and mattresses and grout bags in close proximity to East Brae derogated sub-structure footings**
    - Remove up to a logical break point. For Devenick pipelines and umbilicals, the logical break point is likely to be crossings with Braemar pipelines and umbilicals, approximately 30 m to 50 m from the base of the East Brae sub-structure footings.
    - Leave the remainder of pipelines, umbilicals and protection and stabilisation features in close proximity to the derogated sub-structure footings in place. Make safe any exposed ends by placing rock cover, burial, etc.

5 References

[1] Devenick Field Decommissioning Programmes, TAQA, DEV-01298-DEC-PM-ADP-0001-TAQ, Revision 3, January 2016

[2] Brae Area Devenick Subsea Facilities Decommissioning Programmes, TAQA, TB-DEV-DEC01-AD-0001-000, Revision 02, March 2022

[3] Guidance Notes: Decommissioning of Offshore Oil and Gas Installations and Pipelines, BEIS, November 2018.

[4] Guidelines for Comparative Assessment in Decommissioning Programmes, Issue 1, Oil and Gas UK, October 2015.

Appendix 1 CA Criteria and Segment CA Results

CA Criteria

Table 5: CA Criteria		
CRITERIA	**SUB CRITERIA**	**DESCRIPTION**
Safety	Risk to personnel	Safety risk to project personnel on and offshore during or as a result of the implementation of the Option
	Risk to other users	Safety risk to other users of the sea such as fishing and other commercial vessels during or as a result of the Option
Environmental	Energy Consumption/ Emissions	Total energy used and emissions arising from each Option (includes implementation and embodied energy in materials)
	Impacts of Option	Impacts to the environment during or as a result of the Option
Technical	Technical Feasibility / Challenge	Is the Option technically feasible, to what extent does the Option make use of proven technology is it likely to fail?

Table 5: CA Criteria		
CRITERIA	**SUB CRITERIA**	**DESCRIPTION**
Socio-Economic	Commercial Impact on Fisheries	Impacts both during the implementation and as a result of the Option on commercial fisheries
	Wider Community Impact	Impacts on the health, well-being, standard of living, structure, or coherence of communities both during the implementation and as a result of the Option
Economic	Total Project Cost	Total costs incurred during the implementation and as a result of the Option

Segment CA Results

Table 6: Generic Segment CA Results

	1st PREFERENCE		2nd PREFERENCE		3rd PREFERENCE		4th PREFERENCE
A.1: Fabricated Steel Structures (forming part of pipelines)	If a structure is in close proximity to sub-structure footings, and risk assessment shows risks of leaving in place are ALARP, leave in place	If structure is not a candidate to remain in place, then...	Remove to shore	If structure cannot be removed to shore, then...	Profile with rock cover or bury	-	-
A.2: Fabricated Steel Structures (forming, or part of installations)	Remove. If it is technically challenging, or poses significant safety risk to remove a structure, complete an asset specific comparative assessment to determine most appropriate, balanced decommissioning option.						
B.1.1: Buried/Trenched Pipeline (Top of Pipe more than 600mm below seabed)	Leave in place (make safe any exposed ends)	If the pipeline is deemed to pose an intolerable risk to other sea users, then...	Retrench in place	If the risk to other sea users cannot be addressed by trenching, then...	Rock cover in place	If the risk to other sea users cannot be addressed by rock cover, then...	Remove to shore
B.1.2: Buried/Trenched Pipeline (Top of Pipe less than 600mm below seabed)							
B.2.1.1: Surface Laid Pipeline (Mattress/Grout Bag Stabilisation)	If pipeline is in close proximity to sub-structure footings, and risk assessment shows risks of leaving in place are ALARP, leave in place	If pipeline is not a candidate to remain in place, then...	Remove mattresses/grout bags and remove pipeline to shore (See G.1 & G.2 for treatment of Mattresses and Grout bags)	If it is not practicable to move or remove mattresses/grout bags and remove pipeline to shore, then...	Rock cover or trench pipeline in place	-	-

Table 6: Generic Segment CA Results							
	1st PREFERENCE		**2nd PREFERENCE**		**3rd PREFERENCE**		**4th PREFERENCE**
B.2.1.2: Surface Laid Pipeline (Rock Cover Stabilisation/Protection)	Leave in place (make safe any exposed ends)	If rock covered pipeline presents an intolerable risk to other sea users, then...	Move or remove rock cover and trench pipeline in place	If it is not possible to trench pipeline in place, then...	Move or remove rock cover and remove pipeline to shore	-	-
B.2.2: Surface Laid Pipeline (No rock cover Stabilisation /Protection)	Trench in place	If trench in place is not possible, then...	Leave pipeline in place	If leaving pipeline in place presents an intolerable risk to fishing vessel crews, then...	Rock cover in place	If line length is short, for example a tie in spool, then...	Recover to shore
	BEIS guidance recognises “Trunk” lines as candidates for decommissioning in place on the seabed. The definition of a trunk line is taken to be that given by Oil and Gas UK. Depending on the length of the surface laid pipeline it may be possible to clear “gates” through it for fishing access by either trenching or rock covering short lengths of the pipeline.						
C.1: Fishing Critical Span (Pipeline, cable or umbilical)	Cut out span and remove to shore (make safe any exposed ends)	If the span is short and less material is required to cover the entire span than to cover the exposed cut ends, then...	Rock cover full span in place	-	-	-	-

Table 6: Generic Segment CA Results							
	1st PREFERENCE		**2nd PREFERENCE**		**3rd PREFERENCE**		**4th PREFERENCE**
C.2: Integrity Critical Span (Pipeline, cable or umbilical)	Cut out span and remove to shore (make safe any exposed ends)	If the span is short and less material is required to cover the entire span than to cover the exposed cut ends, then...	Rock cover full span in place	-	-	-	-
C.3: Non-critical Span (Pipeline, cable or umbilical)	Leave in place and monitor	If monitoring demonstrates the span is growing to the point where it will become fishing or integrity critical, then...	If the span is short and less material is required to cover the entire span than to cover the exposed cut ends, then...	Rock cover full span in place		-	-
D.1: Buried/Trenched Cable (Top of Cable below seabed level)	Leave in place (make safe any exposed ends)	If the cable is deemed to pose an intolerable risk to other sea users, then...	Remove to shore	-	-	-	-
D.2: Surface Laid Cable (Mattress/grout bag stabilisation)	If cable is in close proximity to sub-structure footings, and risk assessment shows risks of leaving in place are ALARP, leave in place	If cable is not a candidate to remain in place, then...	Remove mattresses/grout bags & remove cable to shore (See G.1 & G.2 for treatment of mattresses and grout bags)	If it is not practicable to remove mattresses/grout bags and remove cable to shore, then...	Rock cover or trench cable in place	-	-

Table 6: Generic Segment CA Results							
	1st PREFERENCE		**2nd PREFERENCE**		**3rd PREFERENCE**		**4th PREFERENCE**
E.1: Buried/Trenched Umbilical (Top of Umbilical below seabed level)	Leave in place (make safe any exposed ends)	If the umbilical is deemed to pose an intolerable risk to other sea users, then...	Remove to shore	-	-	-	-
E.2.1: Surface Laid Umbilical (Mattress/Grout bag Impact Protection/Stabilisation)	If umbilical is in close proximity to sub-structure footings, and risk assessment shows risks of leaving in place are ALARP, leave in place	If umbilical is not a candidate to remain in place, then...	Remove mattresses/grout bags & remove umbilical to shore (See G.1 & G.2 for treatment of mattresses and grout bags)	If it is not practical to remove mattresses/grout bags and remove umbilical to shore, then...	Rock cover or trench umbilical in place	-	-
E.2.2: Surface Laid Umbilical (Rock Cover Impact Protection/Stabilisation)	Leave in place (make safe any exposed ends)	If rock covered umbilical presents an intolerable risk to other sea users, then...	Remove rock cover and trench umbilical in place	If it is not feasible or reasonable to trench umbilical in place, then...	Remove rock cover and remove umbilical to shore	-	-
F.1: Live Crossing (Marathon Asset Crossing a Live Third Party Asset)	Leave until the third party facility is decommissioned and then decommission as a dead crossing.						
F.2: Dead Crossing (All Lines in Crossing are Dead)	Treat crossing components as per the preferred options for the individual crossing components.						

Table 6: Generic Segment CA Results							
	1st PREFERENCE		**2nd PREFERENCE**		**3rd PREFERENCE**		**4th PREFERENCE**
G.1: Unburied Concrete Mattress Note 1	Reuse mattress offshore	If the concrete mattress cannot be reused offshore...	Recycle mattress to remediate seabed depressions following removal of structures or remediate pipeline spans	If mattress cannot be reused or recycled offshore, then…	Remove to shore for recycling or disposal	If mattress cannot be removed, then…	Bury in place
G.2: Unburied Grout Bag Note 1	Reuse grout bag offshore	If the grout bag cannot be reused offshore...	Recycle grout bag to remediate seabed depressions following removal of structures or remediate pipeline spans	If grout bag cannot be reused or recycled offshore, then…	Remove to shore for recycling or disposal	If grout bag cannot be removed, then…	Bury in place

Note 1: Discussions with OPRED indicated that offshore reuse and recycling options are not acceptable, therefore unburied mattresses and grout bags will be removed to shore for disposal.

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