

Topaz Decommissioning Project

Comparative Assessment



RD-TOP-ZPL005
Rev 07 (JAN 2021)

FINAL

INEOS UK SNS Limited

CONTROLLED DOCUMENT

Title:

Topaz Decommissioning Project

Comparative Assessment Report

FINAL

Notes:

This is a report of the Comparative Assessment (CA) undertaken as part of the Topaz Decommissioning Project. The CA evaluates and compares potential decommissioning options for the 6.6” Gas Export Pipeline and 3.6” umbilical that lie between the Topaz subsea well and the Schooner platform, and will be the subject of decommissioning activities (along with the Topaz wellhead), as part of the decommissioning project.

Revision Record:							
Rev.	Date Prepared	Author	Chk'd	Name	Title	Signed	Date App'd
7	22-01-21	P Jones	NH	D Scott	CEO	<i>D Scott</i>	22-01-21
6	19-11-20	P Jones	-	-	-	-	-
5	19-03-20	P Jones	-	-	-	-	-
4	25-02-20	P Jones	-	-	-	-	-
3	26-11-19	P Jones	-	-	-	-	-
2	02-10-19	P Jones	-	-	-	-	-
1	26-07-19	P Jones	-	-	-	-	-
0	06-11-18	P Jones	-	-	-	-	-
Document Origination			Check	Document Approval for use by INEOS Oil & Gas UK			
The master original of this document is held by:				QHSE			

EXECUTIVE SUMMARY

The Topaz subsea wellhead is located in the southern basin of the UKCS in Block 49/02, approximately 15.5km to the south-east of the DNO North Sea (ROGB) Limited owned Schooner platform. The Topaz well is tied back to the Schooner platform via a 6.6" gas export pipeline. There is also an umbilical between Schooner and Topaz providing control and chemical injection (i.e. hydraulic control hoses, methanol, electrical power and control communications).

A Comparative Assessment of potential decommissioning options has been completed for the export pipeline and umbilical between the Topaz subsea wellhead and the Schooner platform.

A Comparative Assessment study is required to support the final decision for the decommissioning of the Topaz pipeline and umbilical. This report presents a description of the potential decommissioning options considered, the method used to complete the Comparative Assessment and the findings of the work undertaken.

Following a screening exercise, the Comparative Assessment considered the following two main options for the Topaz pipeline and umbilical:

- Complete Removal; and
- Partial Removal.

The options were assessed using the OPRED Decommissioning Guidance Notes (Ref 1) and evaluations made on the basis of qualitative evaluation for each of the main areas of assessment, namely:

- Safety
- Environmental
- Technical
- Societal

The study concluded that the best option would be to undertake partial removal of the pipeline and umbilical, whereby the surface laid sections at either end of the line (i.e. the subsea wellhead and the Schooner platform ends) would be recovered and removed to shore for recycling/disposal, leaving only the buried sections *in situ*.

Mattress and grout bag removal at the platform ends was not considered within this comparative assessment as it forms part of the base case plan for the Topaz decommissioning programme whereby all surface laid mattresses and grout bags will be removed where possible.

Table of Contents

1	Introduction	5
1.1	Overview	5
1.2	Purpose and Scope	5
1.3	Environmental Setting	5
1.4	Pipeline Burial Status	5
1.5	Deposited Rock/Mattresses	6
1.6	Assumptions, Limitations and Gaps in Knowledge	7
2	The Comparative Assessment Process	8
2.1	Comparative Assessment Process	8
2.2	Screening Assessment	8
2.3	Comparative Assessment Criteria	8
2.3.1	Safety	8
2.3.2	Environmental	8
2.3.3	Technical	9
2.3.4	Societal	9
2.3.5	Commercial	9
3	Results of the Comparative Assessment	10
3.1	Option Screening	10
3.2	Comparative Assessment	10
3.2.1	Safety – Comparative Assessment	10
3.2.2	Environmental – Comparative Assessment	11
3.2.3	Technical	12
3.2.4	Societal	12
3.2.5	Commercial	13
4	Conclusions	14
5	References	15

Tables

Table 3-1	Summary of Options Screening Assessment	10
Table 3-2	Summary of Comparative Assessment - Safety	11
Table 3-3	Summary of Comparative Assessment – Environmental	12
Table 3-4	Summary of Comparative Assessment – Technical	12
Table 3-5	Summary of Comparative Assessment – Societal	13

Figures

Figure 1-1	Depth of Cover along the Topaz Pipeline Route (2015)	6
------------	--	---

1 Introduction

1.1 Overview

The Topaz subsea wellhead is located in the southern basin of the UKCS in Block 49/02, approximately 15.5km to the south-east of the DNO North Sea (ROGB) Limited owned Schooner platform. The Topaz well is tied back to the Schooner platform via a 6.6" gas export pipeline. There is also a 3.6" umbilical between Schooner and Topaz providing control and chemical injection (i.e. hydraulic control hoses, methanol, electrical power and control communications).

The nearest coastline is 130km south west (Norfolk, UK) and the UK/Netherlands median line lies 42km east. Topaz lies in approximately 34m of water (to Lowest Astronomical Tide).

Topaz ceased production in October 2017.

The pipeline/umbilical does not cross any other lines. Similarly, there are no other lines crossing over the Topaz pipeline/umbilical.

1.2 Purpose and Scope

As per the OPRED Guidance notes [Ref 1], pipeline decommissioning options require to be comparatively assessed.

The purpose of this Comparative Assessment is to provide an assessment of potential decommissioning options available for the Topaz export gas pipeline and umbilical against a set of assessment criteria derived from OPRED guidance documents. The output of this Comparative Assessment will assist in identifying the preferred decommissioning options and methods, and supports the submission of the decommissioning programme to OPRED.

1.3 Environmental Setting

Topaz is located within an area of sand with some areas of gravel and cobbles and undergoes high energy wave action. This physical environment impacts the species that are dominant in the area. Benthic species are used to natural seabed disturbance and are dominated by polychaetes, crustaceans and molluscs. The area is used as a nursing ground for twelve fish species and a spawning ground for ten species including cod, whiting, sandeel and mackerel. Seabirds are particularly sensitive to oil on the surface of the water between June and September and in December. Species common in this part of the Southern North Sea include Common guillemot, Northern fulmars and Black-legged kittiwake. There is the potential that up to three marine mammal species (harbour porpoise, minke whale and white-beaked dolphin) may be present in the area of Topaz, with June and July seeing the highest densities. Topaz is situated at the outermost reach of the most common excursions of harbour and grey seals coming from Donna Nook and the Wash areas. Topaz is also located approximately 28km from the Southern North Sea SAC for harbour porpoise, 28km south of the North Norfolk and Saturn Reef SAC and 33km from the Dogger Bank SAC.

1.4 Pipeline Burial Status

Pipeline inspection surveys have been undertaken on the Topaz pipelines in 2012, 2015 and 2019.

In surveys undertaken in 2012, it was reported that the average depth of cover over the pipeline was 1.29m and 1.22m for the umbilical.

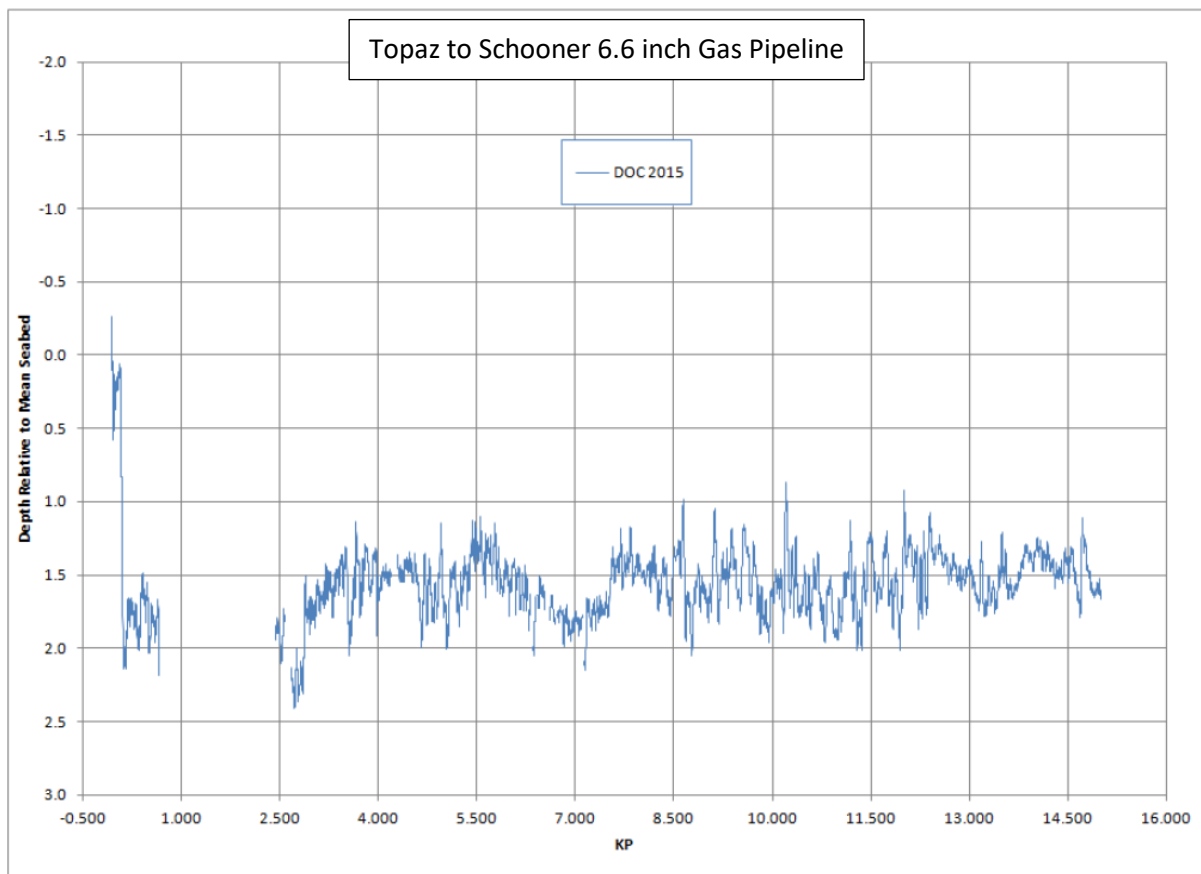
In the surveys undertaken in 2015, the pipeline was reported to be buried through the entire length up to the Schooner 500m boundary with an average depth of cover reported at 1.56m and was reported to show an increased cover of approximately 0.3m from the 2012 survey.

The latest, interim, surveys conducted in 2019 identified that no freespans or exposures were present along the route, confirming the stable, buried status of the line.

The mean seabed profile and top of pipe along the route is shown in Figure 1-1 below.

The umbilical was reported to have an average depth of cover of 1.19m in the 2015 survey and was found to be buried along the entire route. Comparison with the 2012 data showed the depth of cover to remain relatively similar, indicating the umbilical burial is stable. The interim survey conducted in 2019 confirmed no freespans or exposures along the umbilical route.

Figure 1-1 Depth of Cover along the Topaz Pipeline Route (2015)



In both the 2012 and 2015 surveys, the pipeline and umbilical were reported to be well buried. This was confirmed in 2019 with no identified freespans or exposures on the route.

1.5 Deposited Rock/Mattresses

There are 14 locations along the Topaz pipeline/umbilical route where rock dump has been used to protect the line. These are proposed to remain *in situ* for the decommissioning

programme and no consideration of options for these has been made within the comparative assessment.

Mattress and grout bag use is restricted to the wellhead and platform ends of the lines and the base case assumption is that these items will be removed from the seabed as far as possible during the offshore decommissioning works. Only in the event of difficulties will INEOS approach OPRED regarding an alternative approach.

1.6 Assumptions, Limitations and Gaps in Knowledge

The comparative assessment has been undertaken on the following basis.

- There is no assessment of mattress or grout removal options as it is base case for all surface laid mattresses and grout bags to be removed where possible. If difficulties are experienced during offshore works INEOS will approach OPRED for advice in such circumstances.
- Gravel/rock dumped areas will not be removed and will remain *in situ*.
- The assessment approach was qualitative. As such, judgement has been required throughout parts of the assessment relating to the relative differences between options considered.
- For the comparative assessment, it was assumed that complete removal of the pipeline would be undertaken by reverse reeling. It is recognised, however, that there is limited experience of reverse reeling of trenched and buried lines [Ref 2], so estimates of the safety risk and technical challenge implications carry some uncertainty.
- There are no known reportable freespans on the route.
- Sections of pipeline left *in situ* would be the subject of a survey frequency as agreed with OPRED.

2 The Comparative Assessment Process

2.1 Comparative Assessment Process

The Comparative Assessment process has been accomplished by internal review by the decommissioning experts within INEOS.

2.2 Screening Assessment

As per OPRED guidelines, a screening assessment was undertaken in order to identify the feasible decommissioning options for the Topaz pipeline and umbilical. Following this, the selected options were taken forward for the Comparative Assessment.

2.3 Comparative Assessment Criteria

In order to evaluate each potential decommissioning option identified following the screening assessment, a series of criteria were defined in line with the OPRED guidance notes. The criteria were grouped into four main sections to include Safety, Environment, Technical, and Societal. Commercial criteria would only be considered in the event that a preferred strategy could not be identified using the main four evaluation criteria. In the case of the Topaz Comparative Assessment, a commercial evaluation was not necessary.

A description of each of the criteria assessed is presented within the sections below.

2.3.1 Safety

- Risk to personnel - Assesses the risk that each decommissioning option poses to those personnel working offshore during the operations, including vessel personnel;
- Risk to other users of the sea - Assesses the risk that each decommissioning option poses to 3rd party assets and vessels both during operations and after operations.
- Risk to those on land – for people involved in the handling, recycling and/or disposal of the recovered items when returned onshore.

2.3.2 Environmental

- Marine Impacts – this includes chemical discharges, hydrocarbon discharges, seabed disturbance.
- Energy Use and Atmospheric Emissions – comparison of energy and emissions for each option.
- Resource Consumption – resource use for the options.
- Other environmental consequences – including noise and vibration, accidental spills and cumulative effects.

2.3.3 Technical

- Risk of Major Project Failure - Assesses the risk of major project failure for each decommissioning option.

2.3.4 Societal

- Fisheries and Shipping Access (post ops) - Assesses the risk that each decommissioning option poses to access for fisheries and shipping (exclusion zone or non-trawling areas);
- Community (onshore) disturbance - Assesses the risk that each decommissioning option poses to onshore communities, when materials are brought ashore for disposal or processing (i.e. communities situated near the sites);
- Local Employment - Assesses the risk or the opportunity that each decommissioning option poses/offers to local employment, such as those working in local shipping yards.

2.3.5 Commercial

- Economic - Assesses the magnitude of the cost of each decommissioning option – only to be undertaken in the event that a clear strategy cannot be determined by evaluation of the above four categories.

3 Results of the Comparative Assessment

3.1 Option Screening

The initial options screening assessment considered a range of decommissioning approaches for the Topaz pipeline and umbilical. Table 3-1 below provides a summary of the options considered and those taken forward for the full Comparative Assessment. A number of options were considered for the Topaz project, summarised in below.

Table 3-1 Summary of Options Screening Assessment

Option	Status	Rationale
Leave the pipeline as is	Discounted	Whilst the majority of the pipeline is well buried and could potentially be left, it was identified that to leave the shallow and unburied sections of line at the two ends of the line to be an unrealistic scenario.
Trench the unburied sections at the two platform ends	Discounted	Considered easier to remove the unburied sections rather than try to bury them considering the effort and time required to achieve sufficient burial depth.
Rock Dump to bury the existing shallow/unburied sections of line	Discounted	Base case is to achieve decommissioning without rock dumping where possible and to only use rock dumping where absolutely necessary.
Complete Removal	Taken forward for Comparative Assessment	Whilst the specific method of removal was not considered in detail, the concept of complete removal was taken forward into the Comparative Assessment and the advantages/disadvantages considered.
Partial Removal	Taken forward for Comparative Assessment	Partial removal would result in a clean seabed but with the majority of the pipeline buried below 600mm and was therefore taken forward for Comparative Assessment.

On the basis of the above, the full Comparative Assessment was undertaken on two options:

- Partial Removal; and
- Complete Removal.

3.2 Comparative Assessment

A summary of the findings of the Comparative Assessment are provided within the sections below and are presented within the four categories of assessment in the OPRED guidance – Safety, Environmental, Technical and Societal.

3.2.1 Safety – Comparative Assessment

Some of the key highlights of the safety assessment are as follows:

- The complete removal of the pipeline eliminates any snagging hazards.
- Main risks under both options related to the potential for dropped objects during onshore and offshore operations.
- Under a complete removal option, it is possible that diving intervention may be required which poses a higher risk by use of divers in the water. It is preferable to avoid the use of divers where reasonably possible.

- There was considered to be a low risk to 3rd party assets and vessels during operations due to the potential for breakdown of trenches which could damage the trenching equipment.
- Although the assessment undertaken was qualitative, it was readily apparent that complete removal would involve a greater degree of offshore working risk due to the larger workscope. With this in mind, mitigations can be put in place and, therefore, although complete removal represents a higher risk option it was not considered unacceptable on the basis of the assumed mitigations.
- Under a partial removal option, there is a residual potential snagging hazard that exists by leaving the pipeline, however, this is mitigated by the correct burial of exposed areas and ends.

A summary of the safety assessment is provided below.

Table 3-2 Summary of Comparative Assessment - Safety

	Option 1- Complete Removal	Option 2 – Partial Removal
Risk to personnel	More offshore work. Limited experience of reverse reeling. Recovered pipeline/umbilical to be handled offshore introducing a greater risk to personnel. May require use of divers.	Lower degree of offshore works compared to full removal which lessens the risk to those offshore. Workscope can be completed without the use of divers. As the works would be within the 500m zones for the most part, the risk to 3 rd parties would be limited.
Risk to other users of the sea (post ops)	Marginally lower risk as potential snag risks would have been completely removed, noting that the pipeline is buried for the vast majority of the route. Seabed disturbance in the form of mounds, etc. could be created when excavating the buried sections of line and present a snagging hazard.	The buried pipeline/umbilical will degrade over time within the surrounding sediments and are not expected to present a hazard to other users of the sea due to being buried and stable. The pipelines will not be preserved, which will assist in expediting the degradation.
Risk to those onshore (during Ops)	Significantly more onshore activity (lifting, cutting, handling, etc.) prior to recycling/disposal of the recovered sections of pipelines.	Limited onshore handling as only the unburied sections of pipeline would need to be recovered to shore.

3.2.2 Environmental – Comparative Assessment

Some of the key highlights of the assessment are as follows:

- The environmental appraisal of the two options determined there to be a low risk for chemical and hydrocarbon discharges in both cases due to the pipeline/umbilical having been cleaned prior to decommissioning works.
- Removal of the complete length of lines would create a greater disturbance to the seabed compared to the partial removal option. Although such impacts would likely be relatively short-lived, there is nonetheless a difference between the two options.
- Energy usage and atmospheric emissions were also estimated to be higher in the complete removal option, due to the larger amount of equipment required for complete removal.
- There is risk of accidental spills from operation vessels. Longer duration campaigns therefore carry a higher potential risk of spills.
- A complete removal option would require higher energy use onshore for handling and processing of the recovered pipeline/umbilical sections.

A summary of the environmental assessment is provided below.

Table 3-3 Summary of Comparative Assessment – Environmental

Category	Option 1- Complete Removal	Option 2 – Partial Removal
Marine Impacts	The pipeline/umbilical has already been flushed/cleaned. However, complete removal will place a higher degree of seabed disturbance due to need to disturb the seabed in order to gain access to the two lines.	The pipeline/umbilical has already been flushed/cleaned. Relatively short duration vessel use. Seabed disturbance will be limited to the areas where pipeline sections are unburied, which will be restricted to the 500m zones.
Energy Use and Atmospheric Emissions	Longer duration offshore works will result in higher energy use and emissions to air. Further, there will be greater energy and emissions requirement to process the recovered pipeline once onshore.	Relatively short lived offshore works resulting in lower energy use and emissions to air. With less material recovered to shore, there will be lower energy and emissions associated with processing the recovered materials.
Resource Consumption	Higher resource consumption will be necessary to recover from the seabed and return to shore.	Relatively low resource consumption based on short lived nature of offshore works.
Other consequences - Accidental Spills	Longer offshore campaign would increase the risk of accidental spills, however, robust mitigation measures should make this a relatively unlikely event.	Always a potential for accidental spills, however, the relatively short duration works will limit the risk. Robust mitigation measures should make this a relatively unlikely event.

3.2.3 Technical

Some of the key highlights of the assessment are as follows.

- There are a large number of activities required for the complete removal option, which increases the likelihood of technical challenges.
- The requirement of a crane for lifting means activities have both wind and wave restrictions, making both options weather sensitive. In the case of partial removal, however, a shorter workscope reduces the weather risk.
- A partial removal options represents a relatively low risk technical option.

Table 3-4 Summary of Comparative Assessment – Technical

Category	Option 1- Complete Removal	Option 2 – Partial Removal
Technical Feasibility	Relatively limited experience of reverse reeling of trenched and buried pipelines.	Cut and lift is well established method for retrieval of short sections of line.

3.2.4 Societal

Some of the key highlights of the assessment are as follows:

- In both options, risks to stakeholders were considered low for fisheries and shipping access due to the pipeline being completely removed or buried.
- In the complete removal case there is the potential for short-term benefits to local employment at ship and disposal yards.
- However, there will be an increase of activity around the local ports and yards which could disrupt the onshore community. Additionally, the positive benefits of such work would only be relatively short-lived.

Table 3-5 Summary of Comparative Assessment – Societal

Category	Option 1- Complete Removal	Option 2 – Partial Removal
Fisheries and Shipping Access	There would be a short-term effect on fisheries whilst the offshore works are being undertaken, but there would be no legacy surveys over the pipeline required.	No impact during the offshore works as everything would be within the respective 500m zones of platforms. Limited potential future impact associated with pipelines surveys.
Community (Onshore) Disturbance & Employment	Much more handling of pipeline sections onshore which would improve short term employment prospects. However, long term prospects cannot be guaranteed.	Limited onshore disturbance. Lower requirement for short term employment due to less material being brought to shore.

3.2.5 Commercial

No commercial evaluation was undertaken for this comparative assessment on the basis that there are some notable differences between the two considered options, rendering a commercial assessment unnecessary.

4 Conclusions

The Topaz pipeline and umbilical decommissioning options were subjected to a Comparative Assessment in line with OPRED guidance. The Comparative Assessment comprised a screening level appraisal followed by a full Comparative Assessment of viable options in which consideration was given to Safety, Environmental, Technical and Societal aspects.

It was determined in the screening level assessment that the most viable options were complete removal of the pipeline/umbilical or partial removal of both whereby the shallow and unburied sections of the lines (i.e. at the Topaz wellhead and Schooner platform ends) would be recovered to shore for recycling/disposal. As such, these two options were considered in greater detail within the qualitative Comparative Assessment.

Following completion of the assessment, the preferred option was Partial Removal, based on the following key factors.

- The pipeline and umbilical are, on the main route section, well buried and stable, as evidenced by pipeline inspections surveys. Both lines have substantially more cover than the minimum 600mm.
- Given the relatively well buried nature of the lines, it was evident that a complete removal option would require substantially greater input in terms of offshore scope and would result in a much greater degree of seabed disturbance compared to the partial removal option, for only incremental benefit.
- The Partial Removal option was considered technically achievable and relatively efficient to complete with the increasing sphere of experience in the UKCS of decommissioning projects. With the removal of the unburied/shallow buried sections of line at the Topaz wellhead end and the Schooner platform end, the majority of the line would remain well buried and stable and would be very unlikely to result in any long term snagging risk.
- Under a partial removal option, the reduced duration and scope of offshore works reduces the safety risk, environmental impact and technical risk to the project.

5 References

1. OPRED (2018) Guidance Notes, Decommissioning of Oil and Gas Installations and Pipelines (May 2018).
2. Jee (2015) Mattress Solutions, DNS-01-r01c. A report produced by Jee Limited for Decommissioning North Sea Ltd and Zero Waste Scotland, publication date 27 May 2015.
3. OSPAR (2006) Recommendation 2006/5 on a Management Regime for Offshore Cuttings.
4. OGUK (2013) Decommissioning of Pipelines in the North Sea Region 2013, Oil & Gas UK.