APPENDIX B - Maureen Drilling Template – Options

This section is superseded by Addendum 1.

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B.1 Summary of Decommissioning Options Considered

Three main options were considered for decommissioning the template:

Option 1 – Retrieve intact, cut into manageable sections on the transport barge, and transport section to shore for recycling;

Option 2 – Retrieve and transport it to shore intact for reuse or recycling;

Option 3 – Cut into sections on seabed, retrieve and transport sections to shore for recycling.

B.1.1 Option 1 - Retrieve Intact, Cut into Manageable Sections on the Transport Barge, and Transport Sections to Shore for Recycling

Option 1 involves removing spoil from within the foundation piles and subsequently cutting them internally with a hydro-abrasive cutter. The template can then be recovered from the seabed using a Heavy Lift Vessel (HLV). The lifting rigging will be designed to accommodate any deterioration in the original lifting points and supplementary slings may be utilised. The template installation weight was about 490 te in air. This weight will be factored for removal calculations to take into account pile remnants, grout within sleeves and drill cuttings residing upon structure members.

The Option 1 methodology is fully described in Section 7.

Following retrieval of the template to the surface, the template will be washed and cleaned prior to disposal. The template may be washed/cleaned onboard the transportation barge or once it arrives onshore. These alternatives are considered as subsections to Option 1.

B.1.1.1 Method 1.1 - Wash the template offshore prior to cutting and transporting to shore for recycling

The template, on retrieval to the surface, would be transferred onto a barge where it would be placed in a sealed, leak proof containment on deck and washed prior to cutting into manageable pieces. The wash water and mud residues would be collected and transported to shore, along with the template, for disposal.

This method provides more options for transporting the template sections to the ultimate disposal site because the sections will be able to be lifted with conventional craneage and can therefore be offloaded at a number of shallow water ports without special facilities.

B.1.1.2 Method 1.2 - Wash the template onshore prior to recycling

This method involves cutting the template into manageable pieces in a sealed, leak proof area and transporting them to shore where they will need to be washed prior to disposal. This would limit the onshore locations to which the template could be taken as it would probably be contaminated with drill cuttings, which would necessitate additional onshore controls and procedures.

The Option 1 costs are shown in Table B-1.

Table B-1 Option 1 Costs

Summary Tasks	Option 1
Recover template with HLV, wash (onshore or offshore) and cut into sections on barge and dispose of onshore.	£2,750,000

B.1.2 Option 2 - Retrieve and Transport it to Shore Intact for Reuse or Recycling

This Option is essentially the same as Option 1, except that instead of cutting the template into sections, the template is transported to shore intact. Preservation of the structure intact enables it to be reused should the opportunity arise.

The Option 2 methodology is as described for Option 1, in Section 7, except that the template is not cut into sections.

This option also has two alternative methods of washing and removing drill cuttings from the template. These alternatives are considered as subsections to Option 2.

B.1.2.1 Method 2.1 - Wash the template offshore prior to transporting to shore for reuse or recycling:

In this case the template would be secured in a sealed, leak proof containment on the barge and washed off, with all recovered liquids and solids collected for onshore disposal. This would be a difficult task considering the dimensions of the template as an intact structure.

B.1.2.2 Method 2.2 - Wash the template onshore prior to reuse or recycling

The problems encountered in cleaning the structure onshore would be similar to those encountered offshore. In addition, further restrictions would be presented in locating a site which could handle the structure and the washed off materials.

Despite Option 2 providing potential for reuse, there is no known opportunity for such a large template, which was purpose built for Maureen. Consequently, this option would also lead to disposal of the template and the same environmental considerations as per Option 1 apply to Option 2.

Option 2 requires the availability of heavy-lift/winching equipment onshore and a large storage area which limits the number of ultimate disposal sites available.

The costs for this option are given in Table B-2.

Table B-2 Option 2 Costs

Summary Tasks	Option 2
Recover template with HLV, wash (onshore or offshore) and dispose of or put into storage onshore.	£2,850,000

B.1.3 Option 3 - Cut into Sections on Seabed, Retrieve and Transport Sections to Shore for Recycling

Option 3 differs from Option 1 in that the template would be cut into small enough sections, subsea, to enable recovery with a typical DSV crane.

The Option 3 methodology is similar to that described for Option 1, in Section 7, except as depicted in Figure B-1 and Figure B-2.

Figure B-1 Divers Cutting and Optionally Washing the Template *in situ*

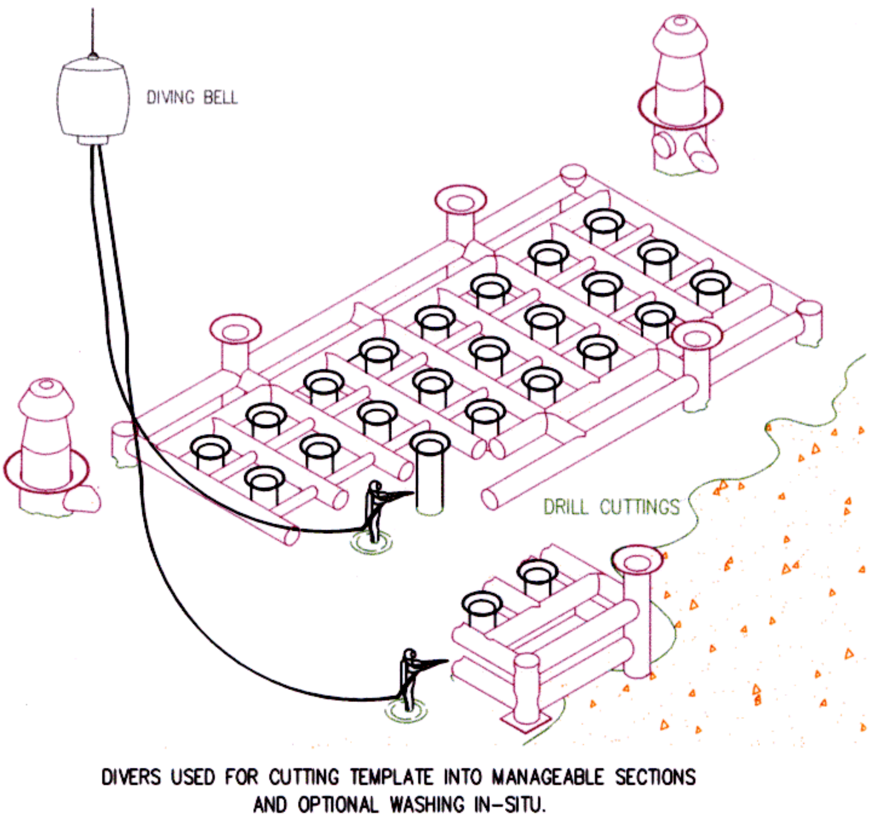
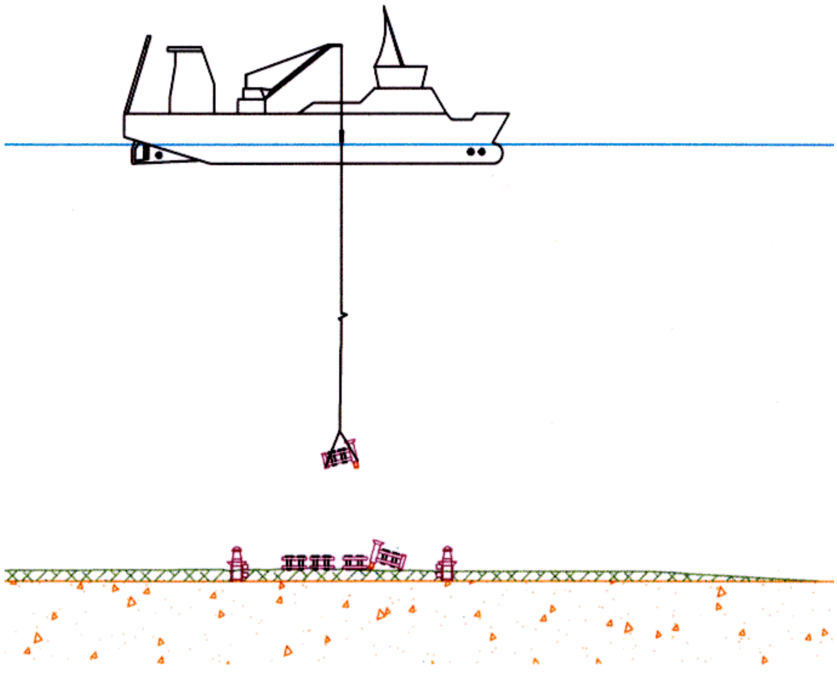


Figure B-2 Recovery of Sections of the Template



Completing this operation is a very diver intensive option and necessitates use of oxy-arc, hydro-abrasive and diamond wire cutting techniques or explosives to cut the template into manageable pieces. The option presents a number of hazards to diver intervention that would need to be addressed. The major advantage is that the expensive HLV is not required for the operation. This gives significant cost and scheduling advantages over Option 1.

Two sub-methods regarding washing and removal of drill cuttings exist for this option, namely:

B.1.3.1 Method 3.1 - Wash the template pieces subsea prior to recovering them and transporting to shore for recycling

As with subsea diver and cutting activities involved with this Option, the subsea cleaning operations will also lead to disturbance and resuspension of the drill cuttings. The divers will need to move the cut pieces of the template, therein possibly disturbing a larger area of the seabed. Cleaning the template in this manner would also be a diver intensive activity. The benefit would be that drill cuttings are not recovered to surface thereby obviating the requirement for onshore disposal. This method also requires similar considerations to Option 1 for the ultimate disposal site, and also negates the requirement for onshore heavy-lift equipment.

B.1.3.2 Method 3.2 - Wash the template pieces on the vessel offshore prior to transporting to shore for disposal

This method involves retrieving the cut template pieces from the seabed, placing them in a in a sealed, leakproof containment on the supply vessel and washing them prior to disposal. The wash water and debris would be collected and transported to shore along with the template for disposal.

Although this option does away with a requirement for a heavy-lift vessel, it demands the most extensive subsea work and necessitates the greatest vessel deployment time whilst the template is being cut subsea.

The costs for this option are given in Table B-3.

Table B-3 Option 3 Costs

Task	Method 3.1	Method 3.2
Cut template subsea into manageable pieces, retrieve the cut sections and transport them to shore for disposal	£2,400,000	£3,000,000

B.2 Comparative Assessment of Options

This subsection describes the findings of the qualitative assessment of the options available for decommissioning of the drilling template. The options have been examined for their safety and environmental significances as well as technical and cost implications. The results are summarised in Table B-4, Table B-5, Table B-6 and Table B-7.

The evaluation methodology applied, was to compare each option relative to each other and rank them in order of 1 to 3 on each of the relevant selection criteria (1 being most and 3 being least desirable).

The following potential hazards are common to both the options and methods:

- Contamination with drilling mud and hazards associated with cutting equipment (e.g. use of explosives); these will be addressed in a structured safety review prior to commencing the decommissioning activity;
- General diving hazards and those associated with cutting and heavy lift operations; these hazards will be addressed in specific Diving Hazid(s);
- Marine hazards owing to the number of vessels involved during various stages of the field abandonment; these will be subject to specific assessment and activities scheduled to minimise risks;
- General manual handling, COSHH and other hazards will be assessed prior to carrying out the activities.

The management systems within the Maureen Abandonment Safety Case and operating procedures will ensure these assessments are carried out.

B.2.1 Option 1 – Retrieve Intact, Cut into Manageable Sections on the Transport Barge, and Transport Section to Shore for Recycling

Complexity and associated technical risk

The most complex activity connected with this option would be to lift the template off the seabed and onto the support vessel, and requires a heavy lift vessel (HLV). Method 1.2, onshore washing, limits the choice of sites and necessitates additional procedures and controls to limit contamination and environmental impact. (See Table B-4.)

Risks to personnel

The requirement for divers operating at 96 m depth for connecting lifting tackle to the wellheads and the template requires use of a diving bell. Disposable over-suits will need to be worn to prevent diver and bell contamination. This option would require the same number of divers as Option 2. (See Table B-5.)

Environmental impacts

The environmental impact from this option is least of all the options. (See Table B-6.)

Figures for emissions to air from vessel movements during the proposed operations are, by qualitative assessment, likely to be the same as those for Option 2.

Other environmental impacts would be emissions to air from the combustion of diesel from vessels used during recovery and subsequent transport to shore and onto the ultimate disposal site. Figures for these emissions are likely to be the same for all the options.

The wellheads, template and pile remnants would be disposed of using standard steel recovery techniques.

Effect on safety of navigation and other sea users

Once the template and the docking piles have been removed, there would be a debris survey to ensure that no snagging hazards are left and to confirm overtrawlability. There would be no impact on the safety of navigation and other sea users resulting from this option.

Costs

Estimated costs for decommissioning the template are given in Section B.1, Table B-1 and summarised in Table B-7. This method of decommissioning is the second most expensive of the three options.

B.2.2 Option 2 – Retrieve and Transport it to Shore Intact for Reuse or Recycling

Complexity and associated technical risks

In addition to the complexity for Option 1, issues arise here once the template reaches onshore. There would be a limit to the number of onshore facilities able to handle the whole template, and a need for heavy lift equipment or winching facilities. Method 2.2, onshore washing, further limits the choice of sites and necessitates additional procedures and controls to limit contamination and environmental impact.

Risks to personnel

The requirement for divers operating at 96 m depth for connecting lifting tackle to the wellheads and the template requires use of a diving bell. Disposable over-suits will need to be worn to prevent diver and bell contamination. This option would require the same number of divers as Option 1 and the same exposure duration. (See Table B-5.)

Environmental impacts

Theoretically, this is the best environmental option however, no use for the template is likely. With this outcome, the template will need to be scrapped and melted-down to recover the steel.

Figures for emissions to air from vessel movements during the proposed operations are, by qualitative assessment, likely to be the same as those for Option 1. (See Table B-6.)

Other environmental impacts would be emissions to air from the combustion of diesel from vessels used during recovery and subsequent transport to shore and onto the ultimate disposal site. Figures for these emissions are likely to be same for all three options

Costs

Estimated costs for decommissioning the template and the docking piles are given in Table B-2 and summarised in Table B-7. This method of decommissioning is the most expensive of the three options.

The Option Ranking Summary in Table B-8 concludes that Option 2 – to retrieve the whole template for reuse or recycling as the second most favourable option.

B.2.3 Option 3 - Cut into Sections on Seabed, Retrieve and Transport Sections to Shore for Recycling

Complexity and associated technical risk

The most complex activity connected with this option would be to cut the template subsea. This is a very diver intensive option and necessitates use of oxy-arc, hydro-abrasive, diamond wire or explosives to cut the template into manageable pieces. The option poses a number of diver related hazards which would need to be addressed prior to carrying out the activity.

Risks to personnel

The requirement for divers operating at 96 m depth for template cutting and connecting lifting tackle to the wellheads and the template requires use of a diving bell. Disposable over-suits will need to be worn to prevent diver and bell contamination. This option would require an immense amount of diving compared with Options 1 or 2. In addition, the mode and extent of cutting and total number of lifts, increases the diver exposure to risk. (See Table B-5.)

Environmental impacts

Environmentally, this option is likely to cause the most disturbance to the subsea environment. Divers will need to move the cut pieces of the template to gain access/clean, thus disturbing a larger area of the seabed.

Figures for emissions to air from vessel movements during the proposed operations are, by qualitative assessment, likely to be the greatest of the three options given the extended DSV deployment period (see Table B-6).

Other environmental impacts would be emissions to air from the combustion of diesel from vessels used during recovery and subsequent transport to shore and onto the ultimate disposal site. Figures for these emissions are likely to be same for all three options.

There would be minimal impact on land-based disposal sites. The wellheads, template and pile remnants would be scrapped and melted down to recover the steel.

Effect on safety of navigation and other sea users

Once the template and the docking piles have been removed, there would be a debris survey to ensure that no snagging hazards are left and to confirm overtrawlability. There would be no impact on the safety of navigation and other sea users resulting from this option.

Costs

Estimated costs for decommissioning the template and the docking piles are given in Table B-3 and summarised in Table B-7. This method of decommissioning is the least expensive of all the options.

Table B-4 Option Selection Summary Table – Technical Considerations

(Rankings as well as comments on particular issues considered)

Option/Method	Technical		
	Lifting	Cutting	Disposal
Option 1 Method 1.1 Recover the template using HLV, clean & cut into manageable pieces, load onto a supply vessel and transport to shore for disposal.	HLV required for the template lift (~500 te in air) and approx 12 smaller lifts. Total 1 heavy lift	Onboard cutting into manageable pieces (~ 50 te pieces)	Recover steel More options for disposal site Offshore wash waste to be recovered and disposed
Ranking	**1**	**2**	**2**
Option 1 Method 1.2 Recover the template using HLV, cut into manageable pieces, load onto a supply vessel and transport to shore for cleaning & disposal.	HLV required for the template lift (~500 te in air) and approx 12 smaller lifts. Total 1 heavy lift	Onboard cutting into manageable pieces (~ 50 te pieces)	Recover steel Disposal of Wash effluent containing mud, oil and drill cuttings. Onshore cleaning limits sites.
Ranking	**1**	**2**	**2**
Option 2 Method 2.1 Recover the template using HLV, clean and load whole template onto a supply vessel for transport to shore for reuse or recycling.	HLV required for the template (~500 te in air). Total 2 heavy lifts	Onshore cutting if the template cannot be reused and has to be disposed. Onshore cuts into manageable lengths.	Template deconstruction if it cannot be reused. (large laydown area required). Recovery and disposal of Wash effluent containing mud, oil and drill cuttings.
Ranking	**2**	**1**	**3**
Option 2 Method 2.2 . Recover the template using HLV and load the whole template onto a supply vessel for transport to shore for cleaning and reuse or recycling.	HLV required for the template (~500 te in air). Total 2 heavy lifts	Onshore cutting if the template cannot be reused and has to be disposed. Onshore cuts into manageable lengths.	Template deconstruction if it cannot be reused (large laydown area required). Recovery and disposal of Wash effluent containing mud, oil and drill cuttings.
Ranking	**2**	**1**	**3**
Option 3 Method 3.1 Cut template into manageable sections and clean them *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for transport to shore for disposal.	DSV required for recovering the template pieces. Approx 12 smaller lifts. Subsea lifts	Subsea cutting into manageable pieces using one of following methods (Broco, Hydro Abrasive, Diamond Wire, Explosives)	Recover steel as per other options.
Ranking	**3**	**3**	**1**
Option 3 Method 3.2 Cut template into manageable sections *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for cleaning on the vessel and transport to shore for disposal.	DSV required for recovering the template pieces. Approx 12 smaller lifts. Subsea lifts	Subsea cutting into manageable pieces using one of following methods (Broco, Hydro Abrasive, Diamond Wire, Explosives)	Recover steel Disposal of Wash effluent containing mud, oil and drill cuttings.
Ranking	**3**	**3**	**2**

Table B-5 Option Selection Summary Table – Safety Considerations

(Rankings as well as comments on particular issues considered)

Option/Method	Safety			
	Divers	**Surface work**	**Marine**	**Onshore**
Option 1 Method 1.1 Recover the template using HLV, clean & cut into manageable pieces, load onto a supply vessel and transport to shore for disposal.	12 @ 4 days Connect hydro-abrasive cutting equipt to sever template piles, connect lifting gear for recovery of the template Potential for diver contamination	Recovery of template, transferring onto barge/supply vessel, cleaning in bunded area and collecting the effluent for onshore disposal, cutting template into manageable pieces.	DSV - 1 @ 4 days HLV – 1 @ x 2 days Barge/Supply Vessels – 1each @ 7 days = 20 vessel days	Handling of clean template pieces. Handling and disposal of offshore wash waste containing mud, oil and drill cuttings.
Ranking	**1**	**1**	**1**	**1**
Option 1 Method 1.2 Recover the template using HLV, cut into manageable pieces, load onto a supply vessel and transport to shore for cleaning & disposal.	12 @ 4 days Connect hydro-abrasive cutting equipt to sever template piles, connect lifting gear for recovery of the template Potential for diver contamination	Recovery of template, transferring onto barge/supply vessel, cutting template into manageable pieces and transferring onto supply vessel	DSV - 1 @ 4 days HLV – 1 @ x 2 days Barge/Supply Vessels – 1each @ 7 days = 20 vessel days	Handling of dirty template pieces. Onshore cleaning of template pieces and disposal of effluent containing mud, oil and drill cuttings.
Ranking	**1**	**1**	**1**	**2**
Option 2 Method 2.1 Recover the template using HLV, clean and load whole template onto a supply vessel for transport to shore for reuse or recycling.	12 @ 4 days Connect hydro-abrasive cutting equipt to sever template piles, connect lifting gear for recovery of the template Potential for diver contamination	Recovery of template, transferring whole onto barge/supply vessel, cleaning in bunded area and collecting the effluent for onshore disposal.	DSV - 1 @ 4 days HLV – 1 @ x 2 days Barge/Supply Vessel – 1each @ 7 days = 20 vessel days	Handling whole clean template. Heavy lift and/or winching facilities required onshore. Onshore disposal of wash effluent containing mud, oil and drill cuttings.
Ranking	**1**	**2**	**1**	**3**
Option 2 **Method 2.2** Recover the template using HLV and load the whole template onto a supply vessel for transport to shore for cleaning and reuse **or recycling**.	12 @ 4 days Connect hydro-abrasive cutting equipt to sever template piles, connect lifting gear for recovery of the template Potential for diver contamination	Recovery of template and transferring whole onto barge/supply vessel for transport to shore.	DSV - 1 @ 4 days HLV – 1 @ x 2 days Barge/Supply Vessel – 1each @ 7 days = 20 vessel days	Handling whole template. Heavy lift and/or winching facilities required onshore. Onshore cleaning of template and disposal of effluent containing mud, oil and drill cuttings.
Ranking	**1**	**2**	**1**	**3**
Option 3 **Method 3.1** Cut template into manageable sections and clean them *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for transport to shore for disposal.	12 @ 30 days Connect hydro-abrasive cutting equipt to sever template piles. Cut template into manageable pieces, clean the pieces *in situ* and connect lifting gear for recovery of the pieces. Potential diver safety hazards during cutting and lifting operations, and contamination	Recovery of template pieces using DSV, transferring onto supply vessel, and transport to shore for disposal.	DSV - 1 @ 30 days Supply Vessel – 1 @ 10 days = 40 vessel days	Handling of clean template pieces.
Ranking	**3**	**1**	**3**	**1**
Option 3 **Method 3.2** Cut template into manageable sections *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for cleaning on the vessel and transport to shore for disposal.	12 @ 21 days Connect hydro-abrasive cutting equipt to sever template piles. Cut template into manageable pieces, connect lifting gear for recovery of the pieces and clean the pieces in a bunded area. Potential diver safety hazards during cutting and lifting operations, and contamination	Recovery of template pieces using DSV, transferring onto supply vessel, cleaning in a bunded area and transport to shore for disposal.	DSV - 1 @ 21 days Supply Vessel – 1 @ 10 days = 31 vessel days	Handling of clean template pieces. Onshore disposal of effluent containing mud, oil and drill cuttings.
Ranking	**3**	**1**	**3**	**2**

Table B-6 Option Selection Summary Table – Environmental Considerations

(Rankings as well as comments on particular issues considered)

Option/Method	Environmental		
	Marine	Atmospheric	Onshore
Option 1 Method 1.1 Recover the template using HLV, clean & cut into manageable pieces, load onto a supply vessel and transport to shore for disposal.	Disturbance to ~ 50 m x 26 m area of seabed (~780 m^3 assuming 0.6 m thickness of drill cuttings) Vessel effluent x 13 vessel days (barge not powered)	Exhaust emissions x 13 vessel days. Road transport.	Disposal of template & Pile sections Offshore washed drill cuttings to be disposed onshore
Ranking	**1**	**1**	**1**
Option 1 Method 1.2 Recover the template using HLV, cut into manageable pieces, load onto a supply vessel and transport to shore for cleaning & disposal.	Disturbance to ~ 50 m x 26 m area of seabed (~780 m^3 assuming 0.6 m thickness of drill cuttings) Vessel effluent x 13 vessel days (barge not powered)	Exhaust emissions x 13 vessel days. Road transport	Disposal of template & Pile sections Onshore cleaning and disposal of drill cuttings effluent
Ranking	**1**	**1**	**2**
Option 2 Method 2.1 Recover the template using HLV, clean and load whole template onto a supply vessel for transport to shore for reuse or recycling.	Disturbance to ~ 50 m x 26 m area of seabed (~780 m^3 assuming 0.6 m thickness of drill cuttings) Vessel effluent x 13 vessel days (barge not powered)	Exhaust emissions x 13 vessel days. Road transport.	Reuse or recycling of whole template. Disposal of Pile sections Onshore cleaning and disposal of drill cuttings effluent
Ranking	**1**	**1**	**1**
Option 2 Method 2.2 Recover the template using HLV and load the whole template onto a supply vessel for transport to shore for cleaning and reuse or recycling.	Disturbance to ~ 50 m x 26 m area of seabed (~780 m^3 assuming 0.6 m thickness of drill cuttings) Vessel effluent x 13 vessel days (barge not powered)	Exhaust emissions x 13 vessel days. Road transport.	Reuse or recycling of whole template. Disposal of Pile sections Onshore cleaning and disposal of drill cuttings effluent
Ranking	**1**	**1**	**2**
Option 3 Method 3.1 Cut template into manageable sections and clean them *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for transport to shore for disposal.	Disturbance to ~ 100 m x 60 m area of seabed (~3600 m^3 assuming 0.6 m thickness of drill cuttings). Jetting will cause disturbance and resuspension of cuttings. Vessel effluent x 40 vessel days	Exhaust emissions x 40 vessel days. Road transport.	Disposal of template pieces & Pile sections.
Ranking	**3**	**3**	**1**
Option 3 Method 3.2 Cut template into manageable sections *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for cleaning on the vessel and transport to shore for disposal.	Disturbance to ~ 100 m x 60 m area of seabed (~3600 m^3 assuming 0.6 m thickness of drill cuttings). Diver activity subsea will cause disturbance and resuspension of cuttings. Vessel effluent x 31 vessel days	Exhaust emissions x 31 vessel days. Road transport	Disposal of template pieces & Pile sections Onshore cleaning and disposal of mud, oil and drill cuttings effluent
Ranking	**3**	**2**	**2**

Table B-7 Option Selection Summary Table – Cost Considerations

Option/Method	Costs (£)
Option 1 Method 1.1 Recover the template using HLV, clean & cut into manageable pieces, load onto a supply vessel and transport to shore for disposal.	£2.75 million
Ranking	**2**
Option 1 Method 1.2 Recover the template using HLV, cut into manageable pieces, load onto a supply vessel and transport to shore for cleaning & disposal.	£2.75 million
Ranking	**2**
Option 2 Method 2.1 Recover the template using HLV, clean and load whole template onto a supply vessel for transport to shore for reuse or recycling.	£2.85 million
Ranking	**2**
Option 2 Method 2.2 Recover the template using HLV and load the whole template onto a supply vessel for transport to shore for cleaning and reuse or recycling.	£2.85 million
Ranking	**2**
Option 3 Method 3.1 Cut template into manageable sections and clean them *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for transport to shore for disposal.	£2.4 million
Ranking	**1**
Option 3 Method 3.2 Cut template into manageable sections *in situ* using divers, recover the pieces using DSV and load them onto a supply vessel for cleaning on the vessel and transport to shore for disposal.	£3.0 million
Ranking	**3**

B.3 Selection of Preferred Option

On the basis of the comparative assessment presented in subsection B.2 and the cost evaluations presented in subsections B.1.1, 0 and B.1.3, Option 1, Method 1.1 – Removal and recovery of template, cleaning and cutting it offshore and transporting for onshore disposal has been selected as the preferred option.

A qualitative assessment of the safety and environmental hazards, technical challenges and costs for all options and methods is contained in subsections B.2.1, B.2.2 and B.2.3.

The evaluation methodology applied, was to compare each option relative to each other and rank them in order of 1 to 3 on each of the relevant selection criteria (1 being most and 3 being least desirable).

The overall score and ranking was generated by summation – applying a general weighting of 2 to the safety and environmental rankings to account for their greater importance. These rankings are presented in Table B-8 and they lead to the preferred option being Option 1, Method 1.1.

The overall ranking shows that the safety and environmental impacts through activities associated with Option 3 are greater than Options 1 and 2 though this is the least cost option. Hazards specific to Option 3 include diving and other hazards associated with subsea cutting activities, which would add to the overall diving risk. Marine hazards for Option 3 are greater than for Options 1 and 2 owing to the extended diving period.

A sensitivity analysis on the model has been conducted by applying different weightings, but it still draws to the same recommendation, i.e. Option 1. Method 1.1. Accordingly, further detailed and/or quantitative assessment is not deemed necessary for justification of the option selection.

Table B-8 Option Ranking Table

Option/Method	Safety				Environmental			Technical			Cost	Overall		
	Divers	Surface work	Marine	Onshore	Marine	Atmospheric	Onshore	Lifting	Cutting	Disposal		Score	Ranking	
Option 1 – Method 1.1	1	1	1	1	1	1	1	1	2	2	2	21	1	1
Option 1 – Method 1.2	1	1	1	2	1	1	2	1	2	2	2	25	2	
Option 2 – Method 2.1	1	2	1	3	1	1	1	2	1	3	3	29	3	2
Option 2 – Method 2.2	1	2	1	3	1	1	2	2	1	3	3	31	4	
Option 3 – Method 3.1	3	1	3	1	3	3	1	3	3	1	1	38	5	3
Option 3 – Method 3.2	3	1	3	2	3	2	2	3	3	2	3	43	6	

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