GAUPE
Decommissioning Programme

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Final Decommissioning Programmes

Approvals

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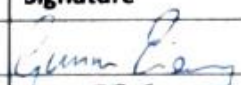
Prepared by:	Gunnar Einang		26/4/2021
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A02	Internal Review		01/10/19
A03	Internal Assurance Review		31/10/19
A04	Pre-draft to OPRED		06/11/19
A05	Consultation draft		04/06/20
A06	Post-consultation draft		07/01/21
A07	Final decommissioning programme		05/02/21

Distribution List for Statutory and Public Consultation

Name	Company/Organisation	No of hard copies
Stewart Welsh	Department of Business, Energy and Industrial Strategy	1
Linda Hanken	Lundin Energy Norway A/S	1
Steven Alexander	Scottish Fishermen's Federation	1
Ian Rowe	The National Federation of Fishermen's Organisations	1
Harry Wick	Northern Irish Fish Producers Organisation	1
Alex Riddell	Global Marine Systems Limited	1
Thomas Aarrestad	Ministry of Petroleum and Energy	1

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Terms and Abbreviations

Term	Explanation
ALARP	As low as reasonably practicable
Armada Complex	Armada installations operated and 100% owned by Chrysaor. Located approx. 250km East of Aberdeen in the Central North Sea part of UKCS
Armada Safety Zone	Safety zone extending 500m out from any part of Armada installations which projects above the sea.
BEIS	Department for Business, Energy and Industrial Strategy
CA	Comparative Assessment
CATS	Central Area Transmission System
CNS	Central North Sea
COP	Cessation of Production
Cr	Chromium
CS	Carbon Steel
DP	Decommissioning Programme
EA	Environmental Appraisal
EIA	Environmental Impact Assessment
EHC	Electro-Hydraulic control and Chemical injection
ES	Environmental Statement
FPS	Forties Pipeline System
HSSE & SP	Health, Safety, Security, Environment and Social Performance
IRM	Integrity Repair and Maintenance
JNCC	Joint Nature Conservation Committee
LSA	Low Specific Activity
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (Marine Pollution)
MCZ	Marine Conservation Zone
MPA	Marine Protected Area
NCS	Norwegian Continental Shelf
NCMPA	Nature Conservation Marine Protected Area
NORM	Naturally Occurring Radioactive Material

OGA	Oil and Gas Authority
OPEP	Oil Pollution Emergency Plan
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo and Paris Convention (for the Protection of the Marine Environment of the North-East Atlantic)
P&A	Plug and Abandonment
PL	Pipeline
PLU	Pipeline Umbilical
PP	Polypropylene
PWA	Pipeline Works Authorisation
RBI	Risk Based Inspection
ROV	Remotely Operated Vessel
SAC	Special Area of Conservation
SEPA	Scottish Environmental Protection Agency
SPA	Special Protection Area
SSIV	Subsea Isolation Valve
Te	Metric Tonne
UKCS	United Kingdom Continental Shelf

1 EXECUTIVE SUMMARY

1.1 Decommissioning Programme

This document contains the decommissioning programme for the UK Continental Shelf (UKCS) infrastructure associated with the Gaupe field subsea tieback.

This Decommissioning Programme is submitted by the co-venturers [A/S Norske Shell and Lundin Energy Norway AS] all being recipients of the Section 29 Notice, and throughout this document the terms 'owners', 'we' and 'our' refer to all the co-ventures.

1.2 Requirement for Decommissioning Programme

Pipelines
In accordance with the Petroleum Act 1998, the Section 29 notice holders of the Gaupe pipelines (see Table 1.2) are applying to OPRED to obtain approval for decommissioning the pipelines detailed in Section 2.3 of this programme (see also Section 8 – Partner Letters of Support), as described in the Section 29 notice as follows:

GAUPE FIELD (UK) PIPELINES:

- PL2781, PL2782, PL2783 up to the UK-Norway median line, and any associated apparatus
- PLU2784, PLU2785, PLU2786 up to the UK-Norway median line, and any associated apparatus
- Gaupe SSIV manifold and all associated apparatus

It should be noted that because the Gaupe field is located on the Norwegian Continental Shelf (NCS) a separate decommissioning plan has been submitted to the Norwegian authorities for approval.

1.3 Introduction

The Gaupe field comprises two production wells in the Norwegian sector, Gaupe North and Gaupe South. Fluids from the two drill centres are commingled at the Gaupe SSIV manifold, located close to the Armada Complex located in the Central North Sea 250 km East of Aberdeen in the UKCS. The Gaupe wells are tied back to the Armada Complex via two 8" / 12" pipe-in-pipe systems and a flexible riser which has been installed within a platform conductor caisson. Controls for the field are provided by the Armada Facilities via two electro-hydraulic control and chemical supply umbilicals, one to each drill centre.

The Armada Complex is located approximately 250 kilometres east of Aberdeen, in a water depth of about 89 metres. Gas and condensate are sent towards the North Everest platform, with gas entering CATS at the CATS Riser Platform which is bridge linked to the North Everest platform. The condensate enters the North Everest owned Everest Lomond System pipeline before joining the FPS pipeline at Forties Charlie. The Armada Facilities, CATS Riser and facilities beyond are outwith the scope of the decommissioning programme presented here.

The Gaupe wells were tied back through the Gaupe field pipelines (including the pipelines set out in Clause 1.2 – 'Pipelines') above to the Armada Complex and came on stream in Q1 2012.

The Gaupe field assets were originally included within draft decommissioning proposals for the Armada Hub developed by BG Group plc. In February 2016, the entire issued and to be issued share capital of BG

Group plc was acquired by Royal Dutch Shell plc with no effect on the scope of the project as Shell planned to proceed with Armada Complex decommissioning. Approval-in-principle from the OGA for cessation of production (CoP) of the Armada Hub and associated tiebacks was granted in August 2016.

In November 2017, the Armada Complex was divested to Chrysaor Holdings Limited with the intent of extending field life and CoP was deferred. The Gaupe wells and associated subsea infrastructure were not part of the divestment and remained within the Shell portfolio.

Production was temporarily suspended in August 2018, and after clarifications regarding future use the owners declared CoP for the Gaupe field on 17th December 2019. This programme presents the decommissioning proposals for the subsea infrastructure in the UKCS associated with the Gaupe Field.

1.4 Summary of Recommendations

The Gaupe SSIV Co-mingling manifold along with production riser PL 2783 and umbilical riser PLU 2786 will be fully removed during decommissioning, in line with the requirements of OSPAR Decision 98/3. The SSIV and riser sections are fully within the Armada Safety Zone and are planned to be removed while the Armada Safety Zone remains in place or mitigating actions are put in place and within 3 years of Armada Complex Decommissioning Programme approval. Removal after Armada Complex cessation of production will enable efficient and safe operations and facilitate synergies with Armada Complex decommissioning operation. Re-use options for the SSIV Manifold and associated risers are being investigated and the infrastructure will be preserved if any credible re-use opportunities arise. If CoP of the Armada Complex is delayed beyond 2028 or Armada Complex decommissioning operations are planned later than 3 years after Armada Complex DP approval, Shell will contact OPRED and a revised schedule will be agreed by both parties in consultation with Armada owners.

The proposals for decommissioning the subsea pipelines and umbilicals, meanwhile, have been prepared in line with the OPRED Guidance Notes following a comparative assessment of credible options and are as follows:

- Trenched and buried pipelines will be decommissioned in situ with the pipeline ends removed and returned to shore for recycling or disposal. This recommendation applies to the Gaupe North production line (PL2781) and Gaupe South production line (PL2782).

- The Gaupe umbilicals (PLU2784 & PLU2785), trenched and naturally backfilling, will be decommissioned in situ with the ends removed and returned to shore for recycling or disposal.

- The Gaupe risers (PL2783 and PLU2786), full removal.

As the Gaupe subsea infrastructure decommissioning scope is limited, Shell will seek synergies with other projects to be able to perform the operations in a cost-efficient manner.

There is no sea water injection to the Gaupe system to introduce a risk of sulphate reducing bacteria which might produce microbiological corrosion or H_2S risks.

All pipelines will be cleaned of hydrocarbons and chemicals to a level of cleanliness demonstrating ALARP and filled with filtered seawater. The base case is to flush the Gaupe pipelines from a vessel to Armada in a campaign with another operator. If the campaign option is delayed or fails to materialise, Shell will revert to a fallback option to flush the pipelines from vessel to vessel in a standalone execution campaign. Flushing by either option will be executed by 2023 at the latest.

In the interim, the pipeline system, including ESDVs, will be maintained in an efficient state, in efficient working order and in good repair. This will be done by continuing to consider maintenance, inspection and monitoring requirements and implementing these under the existing service agreement with Chrysaor until the time that decommissioning activities are completed.

The affected area is classed as a low fishing activity area and the pipelines outside Armada Safety Zone are buried and rock covered.

1.5 Overview of Installations/Pipelines Being Decommissioned

1.5.1 Installations

The Gaupe SSIV manifold and Gaupe J-tube is included within the pipelines sections of this document.

1.5.2 Pipelines

Table 1.1: Pipelines being Decommissioned	
Number of Pipelines (see Table 2.1 for full details)	6
Gaupe Field (UK):	
Pipelines	3
Umbilicals	3

Table 1.2: Pipelines Section 29 Notice Holders Details		
Section 29 Notice Holders	**Registration Number**	**Equity Interest (%)**
Gaupe Field: [s29 notice only applies to UK Sector]		
A/S Norske Shell	914807077 (non-UK registration)	60%
Lundin Energy Norway AS	986209409 (non-UK registration)	40%

1.6 Summary of Proposed Decommissioning Programmes

Table 1.3: Summary of Decommissioning Programmes		
Selected Option	**Reason for Selection**	**Proposed Decommissioning Solution**
1. Pipelines, Flowlines & Umbilicals		
SSIV manifold will be removed	Leaves a clean seabed, removes a potential obstruction to fishing operations and maximises recycling of materials	Gravity based manifold will be removed in conjunction with Armada Hub decommissioning activities. This will enable efficient and safe operations and facilitate synergies with Armada Complex decommissioning operation.
Full removal of Gaupe riser PL2783 including Gaupe J-tube and Caisson.	To remove all seabed structures and leave a clean seabed	To be removed with the Armada jacket, pending Armada Complex Decommissioning Programme approval. This will enable efficient and safe operations and facilitate synergies with Armada Complex decommissioning operation.
Partial removal of Gaupe pipelines PL2781 and PL2782	Determined by CA process due to having lowest legacy risk to other users of the sea, lowest legacy environmental impact and lowest technical risk of project failure. [3]	Leave in situ with ends cut and removed.
Full removal of Gaupe umbilical riser PLU2786	To remove all seabed structures and leave a clean seabed	To be removed with the Armada jacket, pending Armada Complex Decommissioning Programme approval. This will enable efficient and safe operations and facilitate synergies with Armada Complex decommissioning operation.
Partial removal of Gaupe umbilicals PLU2784 and PLU2785	Determined by CA process due to posing lowest safety risk to offshore personnel, lowest legacy risk to other users of the sea, and lowest technical risk of project failure [3]	Leave in situ with ends cut and removed.
2. Interdependencies		
Risers planned removed with the Armada jacket. Removal together with Armada jacket will enable efficient and safe operations and facilitate synergies with Armada jacket decommissioning operation.		

1.7 Field Location Including Field Layout and Adjacent Facilities

Figure 1.1a: Field Location in UKCS

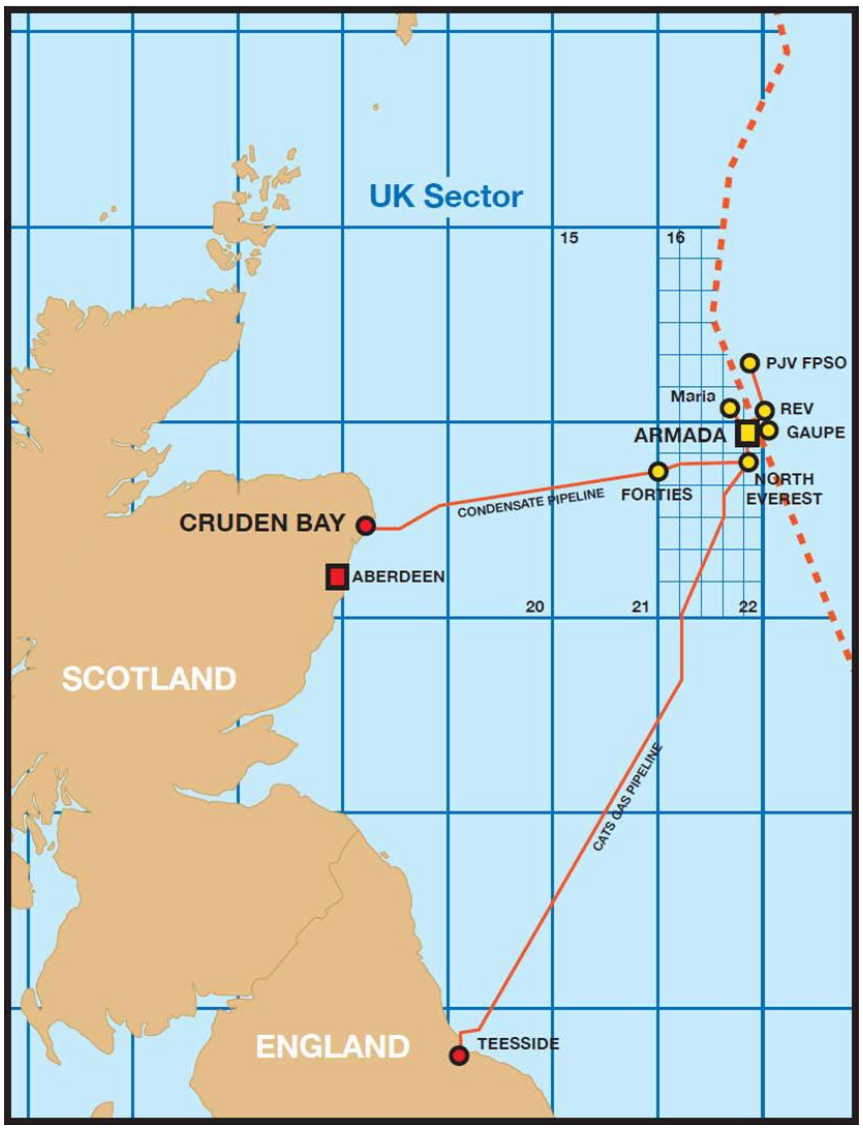


Figure 1.1b: Location of Gaupe Field

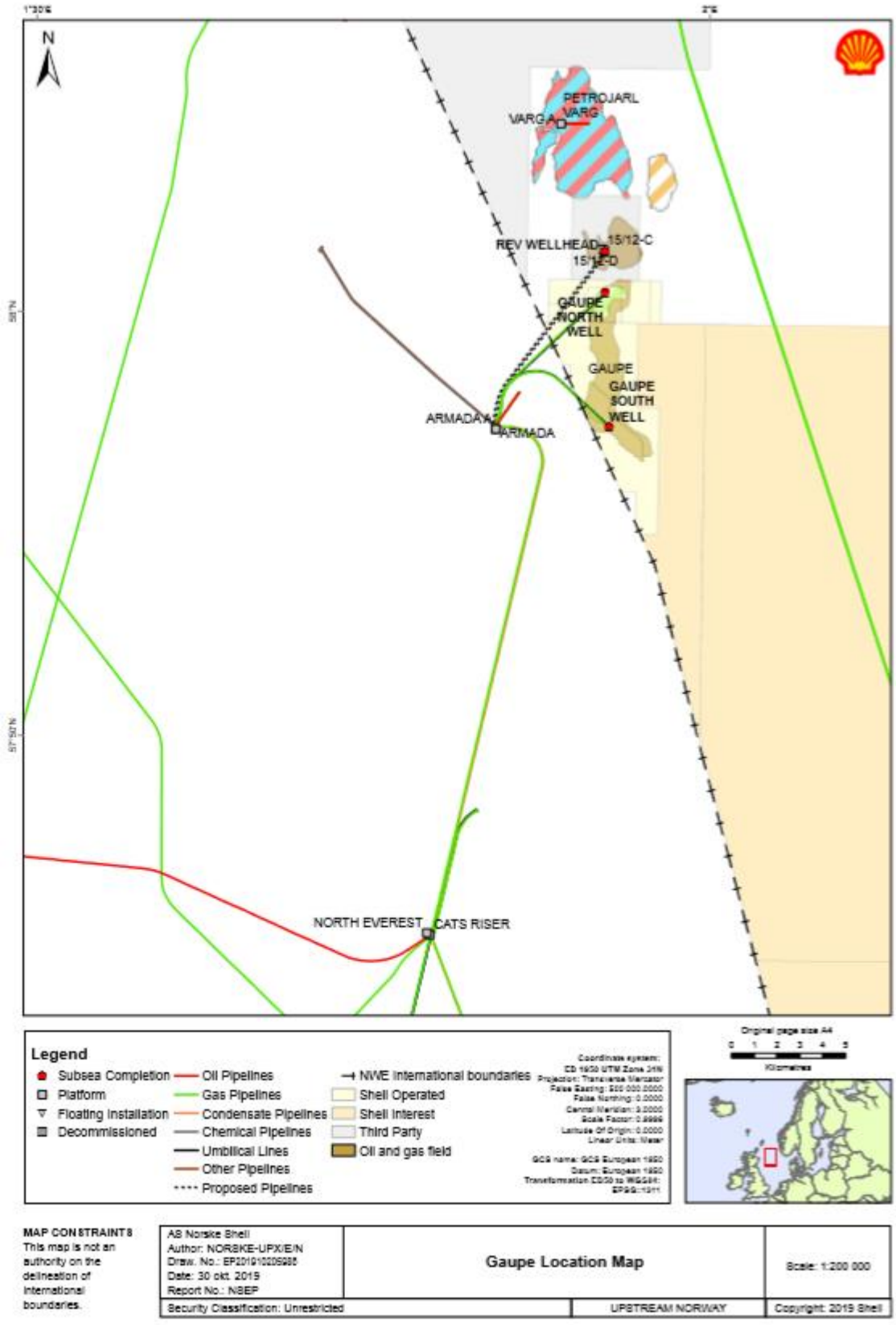


Figure 1.2: Field Layout (scope of this DP highlighted in red)

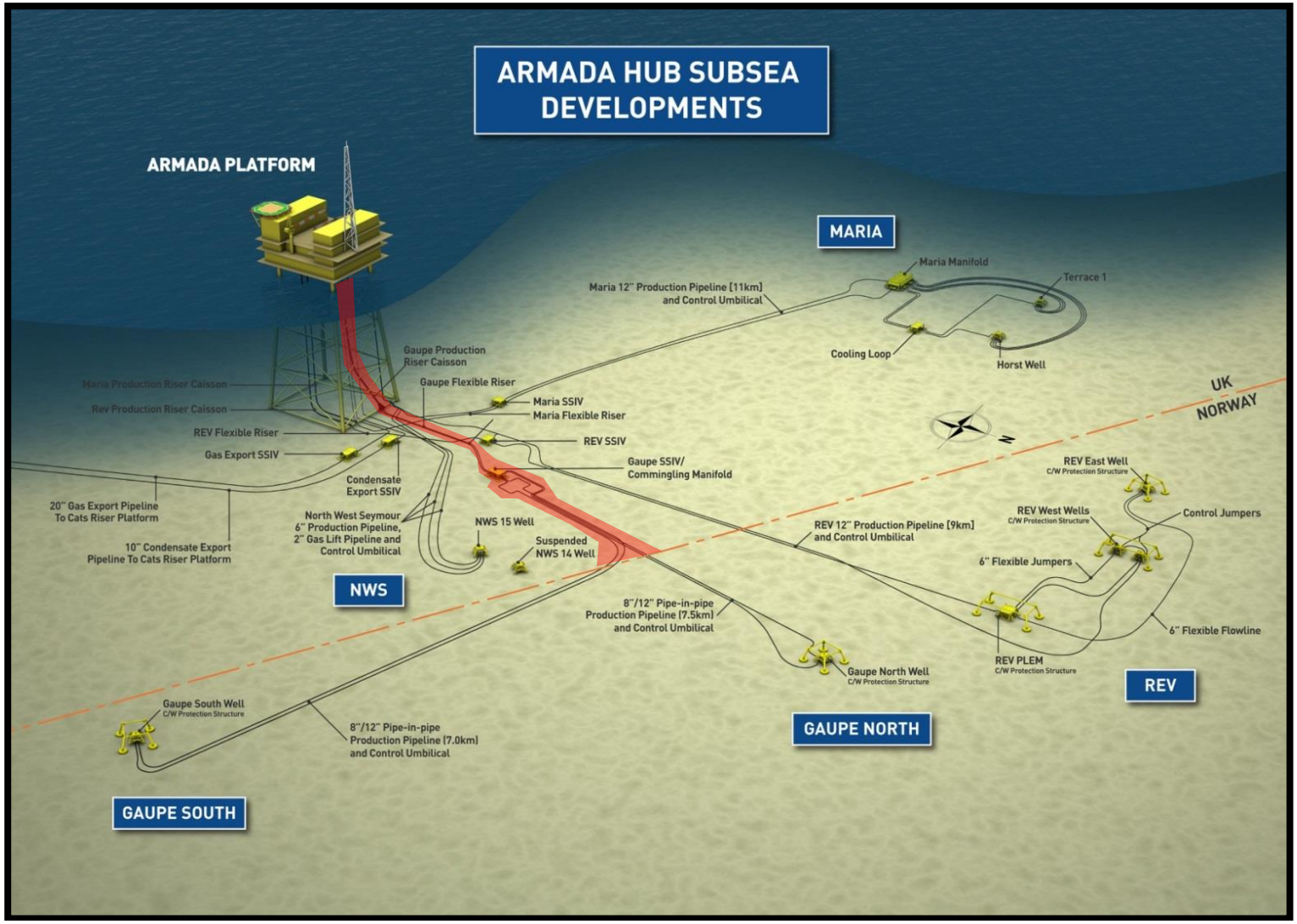
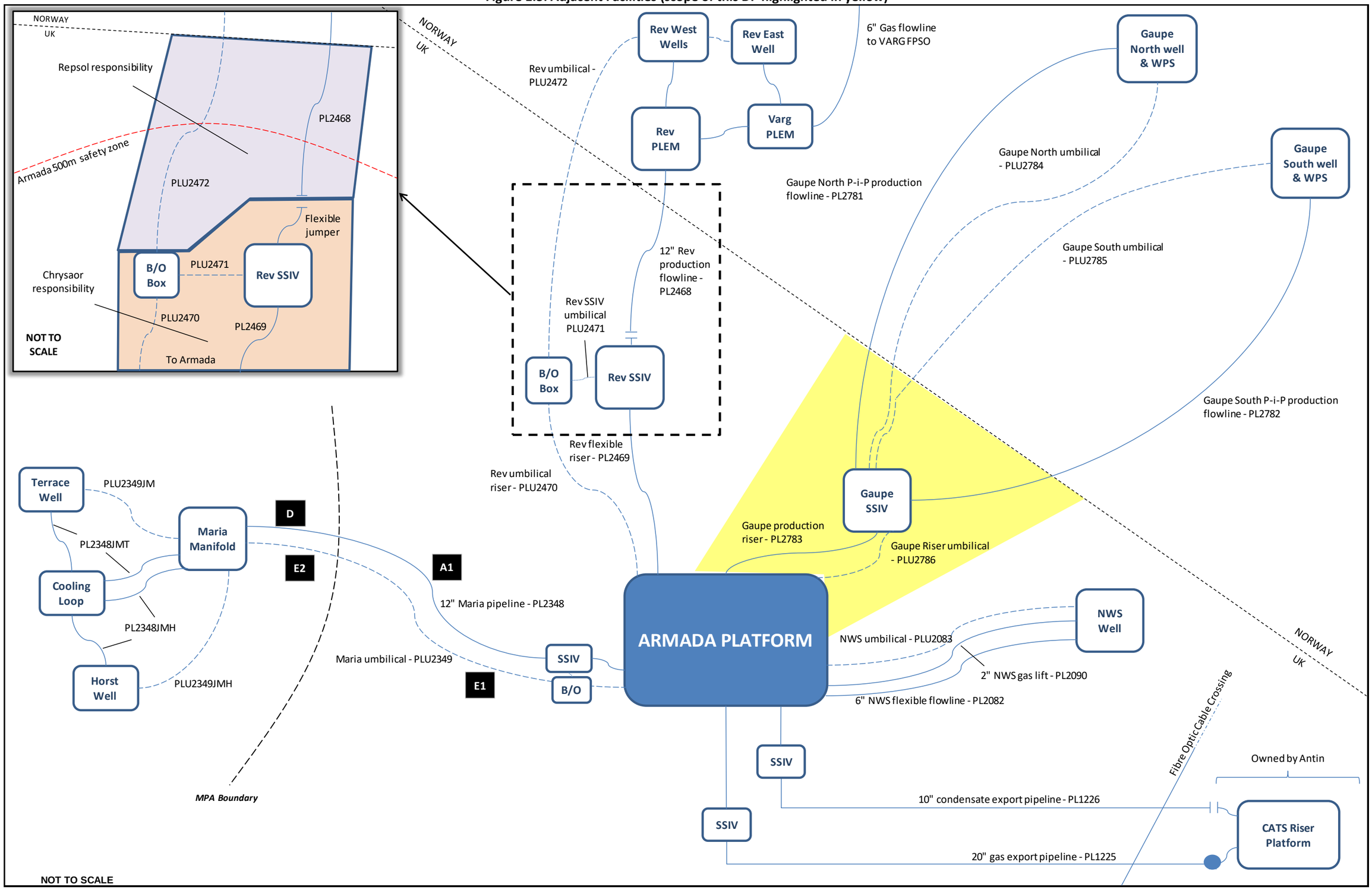


Table 1.4 Adjacent Facilities					
Operator	**Name**	**Type**	**Distance/ Direction**	**Information**	**Status**
Armada Platform					
Chrysaor North Sea Limited and Chrysaor Limited	Armada	Platform	0 – used as ref point.	Gaupe field is tied-back to the Armada Complex via a flexible riser. Armada Complex also provides well control via an EHC umbilical riser	Active
North West Seymour production line (PL2082), gas lift flowline (PL2090) and umbilical (PLU2083)					
Chrysaor North Sea Limited and Chrysaor Limited	North West Seymour	Subsea tieback (1 well) to Armada Complex	1.9 km north-northeast	The three lines share a continuous 2km rock-berm from the well site to the Armada Complex. Approaches Armada Complex from the north in close proximity to the Gaupe lines.	Active
Maria pipeline PL2348 and umbilical (PLU2349)					
Chrysaor North Sea Limited and Chrysaor Limited	Maria	Subsea tieback (2 wells) to Armada Complex	11.2 km northwest	Maria is tied-back to Armada Complex via a flexible riser; Armada Complex also provides well control via an EHC umbilical riser. Approaches Armada Complex from the north in close proximity to the Gaupe lines.	Active
Armada export pipelines for gas (PL1225) and condensate (PL1226)					
Chrysaor North Sea Limited and Chrysaor Limited	Armada Export	Export pipelines	25 km south-southwest	Gas and condensate is exported to the CATS Riser Platform approximately 25km away. The export risers approach from the north side of Armada Complex, in close proximity to the Gaupe lines.	Active

Rev pipeline PL2469 and umbilicals PLU2470 and PLU2471					
Repsol Norge AS	Rev	Subsea 3-well tieback to Armada Complex	9.1 km northeast	Armada Complex's production riser (PL2469), riser umbilical (PLU2470) and SSIV umbilical jumper (PLU2471) combine with Rev's production pipeline PL2468 and umbilical PLU2472 to form single production and control systems respectively. Approaches Armada Complex from the north in close proximity to the Gaupe lines. [Note Sinopec only part of UK Repsol Sinopec activities, Norway – Repsol Norge is separate)	Active
Impacts of Decommissioning Proposals					
Removal of SSIV and risers is scheduled in conjunction with Armada Complex decommissioning operations. It is however likely that the Armada Complex will be live and operational during the decommissioning activities required for Gaupe pipelines and umbilicals. Vessels will be required to work within the existing 500m safety zone at Armada. Shell will seek to defer post-decommissioning over-trawl trials and surveys of the areas affected by the Gaupe Decommissioning Programme until the Armada Complex has itself been decommissioned.					

Figure 1.3: Adjacent Facilities (scope of this DP highlighted in yellow)



1.8 Industrial Implications

The Gaupe Operator initiated contact with heavy lift contractors in late 2014 as part of the decommissioning project for the wider Armada Complex. The supply chain was approached to explore decommissioning execution solutions, including:

- Regularly inviting supply chain companies to present to the decommissioning team on their capabilities
- Publishing project information online via the Oil & Gas Authority's Project Pathfinder Portal and Decom North Sea website (home page listing under current projects, and members' intranet)
- Participation in industry workgroups, events, seminars and conferences

All procurement will be carried out in accordance with Shell's contracting principles and standards.

2 DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Pipelines Including Stabilisation Features

Table 2.1: Pipeline/Flowline/Umbilical Information

Description	Pipeline Number (as per PWA)	Diameter (mm)	Length (m)	Description of Component Parts	Product Conveyed	From - To End Points	Burial Status	Pipeline Status	Current Content
Pipelines									
Gaupe North pipe-in-pipe production pipeline	PL2781	Various, see below	4 377	Gaupe North 8”/12” PIP and tie-ins	Oil/gas/ produced water	From NCS/UKCS boundary to Gaupe SSIV manifold	Various, see below	Shut-in	Hydrocarbon (well fluids)
		295.3, 190.5	4 325	13Cr stainless steel with aerogel insulation, and 12” CS outer pipe with PP coating		From NCS/UKCS boundary to end of PIP	Trenched		
		190.5	47	Flexible jumper		From end PIP to SSIV	Covered with mattresses		
		182.5	5	8” Internal Pipework		SSIV internal pipework	-		
Gaupe South pipe-in-pipe production pipeline	PL2782	Various	5 254	Gaupe South 8”/12” PIP and tie-ins	Oil/gas/ produced water	From NCS/UKCS boundary Gaupe SSIV manifold	Various, see below	Shut-in	Hydrocarbon (well fluids)
		295.3, 190.5	5 202	13Cr stainless steel with aerogel insulation, and 12” CS outer pipe with PP coating		From NCS/UKCS boundary to end of PIP	Trenched		
		190.5	47	Flexible jumper		From end PIP to SSIV	Covered with mattresses		
		182.5	5	8” Internal Pipework		SSIV internal pipework	-		

Table 2.1: Pipeline/Flowline/Umbilical Information									
Description	**Pipeline Number (as per PWA)**	**Diameter (mm)**	**Length (m)**	**Description of Component Parts**	**Product Conveyed**	**From - To End Points**	**Burial Status**	**Pipeline Status**	**Current Content**
Gaupe production riser	PL2783	Various, see below	491	Gaupe flexible riser	Oil/gas/ produced water	From Gaupe SSIV manifold to Riser on Armada platform	Various, see below	Shut-in	Hydrocarbon (well fluids)
		182.5	6	8” Internal Pipework		SSIV Manifold	-		
		190.5	485	8” Production Flexible Riser		From SSIV to ESDV	Covered with mattresses		

Table 2.1: Pipeline/Flowline/Umbilical Information									
Description	**Pipeline Number (as per PWA)**	**Diameter (mm)**	**Length (m)**	**Description of Component Parts**	**Product Conveyed**	**From - To End Points**	**Burial Status**	**Pipeline Status**	**Current Content**
Umbilicals									
Gaupe North umbilical	PLU2784	190.5	3 236	Steel armoured electrohydraulic and chemical injection umbilical	Power, signals and injection chemicals	From Gaupe SSIV manifold to UKCS/NCS boundary	Trenched	Operational	Hydraulic fluid and chemicals
Gaupe South umbilical	PLU2785	190.5	3 290	Steel armoured electrohydraulic and chemical injection umbilical	Power, signals and injection chemicals	From Gaupe SSIV manifold to UKCS/NCS boundary	Trenched	Operational	Hydraulic fluid and chemicals
Gaupe riser umbilical	PLU2786	190.5	485	Steel armoured electrohydraulic and chemical injection umbilical	Power, signals and injection chemicals	From Armada Complex to Gaupe SSIV manifold	On seabed, covered by concrete mattresses	Operational	Hydraulic fluid and chemicals
Structures									
Gaupe SSIV Manifold	1	10.8m x 6m x 4.0m 82.1te		WGS84 Decimal WGS84 Decimal Minute	57.960056°N 01.845111°E 57° 57.603'N 01° 50.707'E	Gravity base structure Water depth 89 meter			

Table 2.2: Subsea Pipeline Stabilisation Features				
Stabilisation Feature	**Total Number**	**Weight (Te)**	**Location(s)**	**Exposed/Buried/Condition**
Concrete mattresses	292 (1)	1394	Protecting spools, jumpers, transition areas, surface laid areas of riser and crossings	Exposed and assumed recoverable. Mattresses to be removed and returned to shore in conjunction with decommissioning operations for said equipment
Grout bags	4000 (1)	100 (total)	Multiple locations throughout the field	Exposed and assumed recoverable. Grout bags to be removed and returned to shore
Formwork	n/a	n/a	n/a	n/a
Frond Mats	n/a	n/a	n/a	n/a
Rock Cover	n/a	4642 (1)	Multiple locations throughout the field	Rock cover to remain *in situ*

(1) Figures supplied are for UKCS mattresses, grout bags and rock only.

2.2 Inventory Estimates

The total inventory of materials for the Gaupe field tieback is 3,709 tonnes, including stabilisation features but excluding rock cover.

Table 2.3a Inventory Disposition			
	Total Inventory Tonnage	Planned tonnage to shore	Planned left *in situ*
All	3,709	1,749	1960

Table 2.3b Gaupe Material Inventory							
Pipelines							
	Concrete (te)	Ferrous Metal (te)	Haz Mat/NORM (te)	Non-ferrous Metal (te)	Other Non Hazardous (te)	Plastic (te)	-
Gaupe SSIV	-	82.1	-	-	-	-	-
Gaupe UKCS pipelines, umbilicals and spools	1,493.8*	2,004.3	-	3.34	16.7	108.3	-
Pipelines Total	**1,493.8***	**2,086.4**	**-**	**3.34**	**16.7**	**108.3**	**-**

*Including grout bags

The table present estimates for the Gaupe field assets tieback inventory including inventory within Armada safety zone.

Further details of inventories are given in Section 4 of the Gaupe Decommissioning EA [2]. Details of wastes are given in Section 3.8 of this Decommissioning Programme and in Section 4 of the EA.

Produced water from Gaupe contains no seawater with sulphate, hence risk for barium or strontium sulphate scale with NORM is very low.

3 REMOVAL AND DISPOSAL METHODS

The Gaupe decommissioning project will implement Shell's HSSE & SP Control Framework, supporting a waste management hierarchy that optimises the re-use and recycling of waste and aims to minimise waste disposal. Shell will engage with the appropriate waste regulator(s) throughout the process. The risks associated with waste will be assessed before removal to shore and opportunities to re-use the waste for the same or other purposes or, failing that, to recycle or recover materials will be identified. Waste will be characterised, classified, segregated, stored and transported according to appropriate regulatory requirements.

When removed from the seabed, the equipment will be transported to a decommissioning contractor's onshore yard, where different types of material (e.g. steel, copper) will be segregated with a view to optimising re-use and recycling. The selected decommissioning contractor will advise on the opportunities for re-use of inert materials (e.g. concrete) that are available in the proximity of the decommissioning yard.

The decommissioning contractor's established arrangements with recycling companies will facilitate optimisation of the quantity of materials that can be sent for recycling. A project Waste Management Plan will be implemented that tracks waste materials through to the recycling endpoint.

Materials for which no re-use or recycling options are available will be tracked through to disposal in landfill.

3.1 Subsea Installations and Stabilisation Features

Table 3.1: Subsea Installations and Stabilisation Features			
Subsea installations and stabilisation features	**Number**	**Option**	**Disposal Route (if applicable)**
None – SSIV Manifold included in Pipelines section.			

3.2 Pipelines

Note that "Pipelines" includes the Gaupe SSIV Manifold which at a later stage will be completely removed and returned to shore for recycling and disposal together with the production riser PL 2783 and umbilical riser PLU 2786. The Gaupe SSIV Manifold and riser sections are fully within the Armada Safety Zone. Removal of SSIV and risers will be scheduled in conjunction with Armada Complex decommissioning operations, to enable efficient and safe operations and facilitating possible synergies with Armada Complex decommissioning operation. Re-use options for the SSIV Manifold and associated risers are being investigated and the infrastructure will be preserved if any credible re-use opportunities arise. The SSIV Manifold and riser sections will be removed within 3 years of the Armada Complex DP approval while the Armada Safety Zone remains in place or mitigating actions are put in place. If CoP of Armada Complex is delayed beyond 2028 or Armada Complex decommissioning operations are planned later than 3 years after Armada Complex DP approval, Shell will contact OPRED and a revised schedule will be agreed by both parties.

As part of decommissioning, all pipelines will be cleaned of hydrocarbons and chemicals to a level of cleanliness demonstrating ALARP and filled with filtered seawater.

At the comparative assessment review for the subsea pipelines and umbilicals, the following options for decommissioning were considered (see also Table 2.1 for more information on current status):

Key to Options:

1) Remove – reverse reeling
2) Remove – Reverse S-lay
3) Trench and bury full-length
4) Leave in situ with ends cut-and-removed
5) Leave in situ with ends buried
6) Partial removal
7) Leave in situ
8) Total removal by cut-and-lift
9) Leave in situ with ends rock-covered

Table 3.2: Pipeline or Pipeline Groups Decommissioning Options

Pipeline/ group	Condition of line/group	Whole or part of pipeline/group	Decommissioning options considered
PL2781, PL2782	Trenched, buried	Whole	1, 4, 5, 9
PLU2784, PLU2785	Trenched	Whole	1, 3, 4, 5, 9

Comparative Assessment Method:

Decommissioning options were assessed in line with the requirements of the OPRED Guidance Notes [5] and largely adopting the scoring guidance provided in Appendix A of the Oil and Gas UK Guidelines for Comparative Assessment [6]. A project specific CA Procedure [4] was produced which tailored the assessment criteria to the particular circumstances of the project.

Screening workshops were held to ensure the required information was available for CA and that relevant studies were available. The CA workshops themselves were held with subject matter experts and relevant external stakeholders and consultants to ensure a robust assessment was completed.

Options were scored according to pre-agreed qualitative and quantitative scales provided in the CA Procedure.

After the assessment was completed, pre-agreed weightings were applied to ensure correct emphasis was applied to the more important criteria, e.g. Safety. Two sensitivity checks were completed before the recommended option was determined. The sensitivity checks had no effect on the emerging recommendations. More details on the assessment can be found in the Comparative Assessment Report [3]

The results of the CA were issued to stakeholders as the “emerging recommendations” of the CA process, with feedback sought prior to the final recommendations being issued as the Comparative Assessment Report in support of this document [3]. Note that the CA of the Gaupe pipelines and umbilicals was conducted as part of the wider Armada Complex Decommissioning Project before the latter was suspended. Scopes were arranged by unique geographical and technical conditions and there is no impact on the CA recommendations from separating the Gaupe pipelines from the wider project.

Outcome of Comparative Assessment:

Table 3.3: Outcomes of Comparative Assessment		
Pipeline or Group	**Recommended Option**	**Justification**
PL2781, PL2782	Leave *in situ* with ends cut-and-removed	The CA concluded that this option has the lowest residual risk to other users of the sea; lowest marine impact of operations; lowest impact on marine end points and lowest risk of major project failure.
PLU2784, PLU2785	Leave *in situ* with ends cut-and-removed	The CA concluded that this option has the lowest risk to project personnel offshore and onshore; the lowest residual risk to other users of the sea and the lowest risk of major project failure.

3.3 Pipeline Stabilisation Features

Table 3.4: Pipeline Stabilisation Features (per s29 notice)			
Stabilisation feature(s)	**Number**	**Option**	**Disposal Route (if applicable)**
Exposed concrete mattresses	292	Full recovery	Recover to shore for recycling
Grout bags	4000	Full recovery	Recover to shore for recycling
Rock cover (te)	4642 te	Leave *in situ*	n/a

Notes

1. It is intended that all mattresses and grout bags will be removed to shore; however, in the event of practical difficulties, OPRED will be consulted.
2. The exact distribution of grout bags (rock covered or exposed) is not known, however it is intended that all exposed bags will be recovered to shore.
3. The numbers provided for mattresses are estimates based on the design drawings and may be subject to some variation.

3.4 Waste Streams

Table 3.5: Waste Stream Management Methods	
Waste Stream	**Removal and Disposal Method**
Bulk liquids	Cleaning and decontamination will take place onshore prior to recycling / re-use. Gaupe umbilicals will, where practicable, be cleaned of hydrocarbons and chemicals to a level of cleanliness demonstrating ALARP.
Marine growth	Small quantities of marine growth are expected to be present on the removed subsea infrastructure. Any marine growth returned to shore will be disposed of in accordance with the regulations in force at the site following the site operator's licences and procedures.
NORM/LSA Scale	Produced water from Gaupe contains no seawater with sulphate, hence risk for barium or strontium sulphate scale with NORM is very low Upon retrieval of the infrastructure, monitoring will be undertaken in accordance with appropriate procedures. Any NORM discovered within the material returned to shore will be removed and treated prior to disposal. If the Gaupe infrastructure is to be transported onshore to a foreign country for treatment and recycling, transport of waste will be undertaken in accordance with the requirements of the Basel Convention, the UK Transfrontier Shipment of Waste Regulations 2014, the Radioactive Substances Act 1993 and applicable regulations in the receiving country. The appropriate notifications will be made to SEPA and to the competent authority in the foreign country. Transfrontier shipment may involve the repatriation of NORM.
Asbestos	All material data available contains no asbestos material. In addition, the Gaupe field tieback was installed in 2011, therefore there is no expectation that any asbestos will be present in the material to be recovered or returned to shore. Should asbestos waste be found, it will be disposed of under the appropriate permit.
Other hazardous wastes	Will be recovered to shore and disposed of under appropriate permit.
Onshore Dismantling sites	Selection of an onshore dismantling site will be made on the basis of a commercial tender. Shell will only consider sites that are licenced to receive the types and quantities of materials identified in the Materials Inventory. Candidate sites must demonstrate a proven track record of waste stream management and disposal throughout the deconstruction process. The dismantling site operator will have established arrangements with facilities that recycle steel, copper, aluminium and other materials.

The Section 29 Notice Holders' Waste Management Strategy for the Gaupe Decommissioning Project is based on the waste hierarchy (avoid, re-use, recycle, recover energy, dispose) underpinned by the commitment to comply with legal requirements.

The material to be removed during decommissioning activities is shown in Tables 3.6 to Table 3.8.

Table 3.6 Inventory Disposition			
	Total Inventory Tonnage	Planned tonnage to shore	Planned left *in situ*
Pipelines			
Gaupe UKCS pipelines, umbilicals, spools and SSIV	3709	1749	1,960
Pipelines Total	**3709**	**1749**	**1,960**

*Weights are provided as quantified in the D3 Report [7].

Table 3.7: Inventory of Materials to be Removed During Decommissioning		
Category	**Installation (te)**	**Pipelines (te)**
Concrete mattresses	-	1,393.8
Grout bags	-	100.0
Ferrous Metal	-	211.9
Hazardous Material/NORM	-	-
Non-ferrous Metal	-	0.74
Plastics	-	41.0
Other Non-Hazardous Material	-	1.22
Unassigned	-	-
Total	**-**	**1748.6**

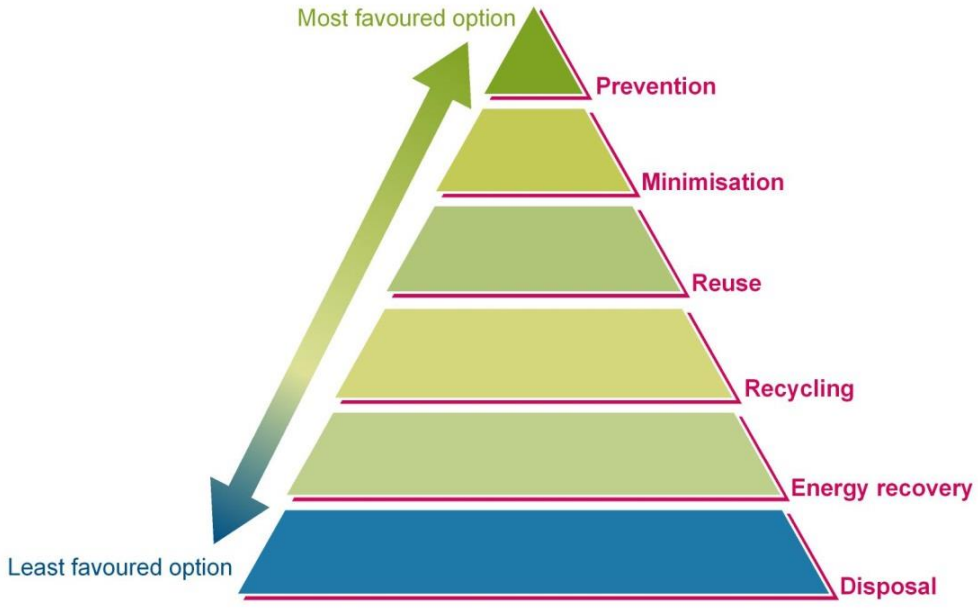
Table 3.8 Material to be Recovered from Gaupe							
	Concrete (Te)	Ferrous Metal (Te)	HazMat/ NORM (te)	Non-Ferrous Metal (te)	Other Non Hazardous (Te)	Plastics (Te)	Unassigned (Te)
Pipelines							
Gaupe SSIV	-	82.1				-	
Gaupe UKCS pipelines, umbilicals & spools	1,493.8	129.8	-	0.74	1.22	41.0	-
Pipelines Total	**1,493.8**	**211.9**	**-**	**0.74**	**1.22**	**41.0**	**-**

The Gaupe Decommissioning Project will undertake to ensure that opportunities for re-use and recycling of material returned to shore are maximised.

Efforts will be made to remove marine growth offshore, to minimise marine growth which is returned to shore for disposal. Following discussions with an anaerobic digestion plant operator, at the request of SEPA, Shell was advised the material is unsuitable as bio-reactor feedstock, so it is anticipated that the marine growth will be disposed of to landfill.

Shell's waste management hierarchy is summarised in Figure 3.1 below.

Figure 3.1: Waste Management Hierarchy



4 ENVIRONMENTAL APPRAISAL

4.1 Environmental Sensitivities

Table 4.1 Summary of key environmental sensitivities
For more details refer to the Environmental Appraisal Report[2]

Table 4.1: Environmental Sensitivities	
Environmental Receptor	**Main Features**
Animals living on or in the seabed	The habitat assessment undertaken for the project determined the sediments to be mainly Offshore circalittoral sand, Megarippled gravelly sand and Muddy gravel. The visible animals found across the survey area generally were dominated by polychaete worms. These results compare to those recorded from previous surveys in the Armada Complex area and the central North Sea. The pre-decommissioning survey found species that tend to disappear first from baseline communities affected by contamination, suggesting the Armada Complex is generally free of significant contamination.
Fish	The fish populations in the area are characterised by species typical of the central North Sea, including anglerfish, bib, cod, haddock, hagfish, lemon sole, ling, plaice, poor cod, saithe and tusk. High-density shoals of sandeels have also been observed. The Armada Complex area supports spawning and nursery habitats for a number of commercially important species. However, these are part of much wider spawning and nursery areas and cod is the only species that is thought to spawn in the Armada Complex project area with high intensity.
Seabirds	The project area is important for northern fulmar, black-legged kittiwake and the common guillemot, as they make use of the area at various times of the year. Predicted densities of seabirds in the Armada area are low with less than five individuals per km^2 for each species and between 5-10 individuals per km^2 for all species combined. The seasonal vulnerability of seabirds to oil pollution in the immediate vicinity of the project area has been derived from Joint Nature Conservation Committee data. The highest seabird vulnerability occurs later in the year, when birds (some of which will become flightless whilst they change plumage) have moved offshore following breeding.
Whales, dolphins and seals	Spatially and temporally, harbour porpoises, minke whales, killer whales, white-sided dolphins and white-beaked dolphin are the most regularly sighted cetacean species in the central North Sea. Given the distance to shore, species such as the bottlenose dolphin and grey and harbour seals are unlikely to be sighted in the project area.
Conservation	As documented in the Environmental Appraisal none of the survey work undertaken in the project area has identified any seabed habitats or species that are of specific conservation significance, apart from low numbers of ocean quahog, which is a threatened species. The wider Armada Hub area may support 'seapen and burrowing megafauna communities', which are a Scottish PMF and are listed by OSPAR List as 'threatened and or declining species and habitats' (OSPAR, 2008). However, although the pre-decommissioning survey observed seapens, the 'seapen and burrowing megafauna communities' classification was

Table 4.1: Environmental Sensitivities	
	not assigned to any habitat identified during the survey (Benthic Solutions, 2016b). The EUNIS biotope 'offshore circalittoral sand' (A5.27) has been identified in the vicinity of the Armada platform and Gaupe infrastructure (Benthic Solutions, 2016). Although this habitat is relatively common, with a large natural range it is listed as 'Endangered' on the European Red List of Habitats, with threats from over fishing as well as pollution and climate change (EU, 2016). Areas of 'Circalittoral mixed sediment' (A5.44) were also noted (Benthic Solutions, 2016) and are listed as 'Vulnerable' on the European Red List of Habitats. Parts of the nearby Maria pipeline and umbilicals, and the Maria wells themselves, sit within the Norwegian Boundary Sediment Plain Nature Conservation Marine Protected Area. This site has been designated for the conservation of aggregations of the ocean quahog and the sand and gravel habitat that supports the species. Gaupe dedicated decommissioning activities are outwith the MPA boundaries (approximately 5 km away) and therefore the risk is low for any impact on the protected site.
Fisheries and other sea users	The five-year average value of commercial fisheries within 2 km of the Armada Complex is just under £4,500 per year, relating to approximately 250 hours fishing per year. This indicates that the area is not significantly important to commercial fisheries, and this is consistently reflected in data from the past five years. Fishing that has taken place is likely to be exploratory in nature, rather than the consistent targeting of known fishing grounds, as can be seen elsewhere in the region. Although, the North Sea has substantial traffic of commercial ships trading between North Sea and Baltic ports, the density of shipping in the Armada Complex area is low, with approximately 1-2 vessels passing each month. There is limited other activity in the area, with only a small number of oil and gas installations and no offshore renewable activity.
Nearshore and onshore	At this stage of the project, the onshore dismantling and disposal sites are not yet chosen, and therefore it is not possible to describe the specific locations where activity may take place. Site will be selected following the HSE and commercial review and only yards compliant with relevant legislation and good industry practices will be selected.

4.2 Potential Environmental Impacts and their Management

Environmental Appraisal Summary

Overview:
The EA concludes that the DP can be executed with minimal impact on the environment. The baseline environment in the affected area is well understood, the potential for impact from the decommissioning activities are appreciated and Shell procedures designed for robust, well established control measures to reduce the potential for negative impacts to develop and mitigate those that are unavoidable.
The development of the decommissioning programme for the Gaupe infrastructure has been informed by ongoing appraisal of the environmental impacts and risks posed by options under consideration. The environmental appraisal has been based on an understanding of the baseline environment established from multiple web-based sources and seabed surveys.

Protected sites and species:
The Environmental Appraisal has concluded that there will be no significant impact on any Annex I habitat (of the Habitats Directive). There are a number of offshore and coastal conservation areas on the Scottish mainland that have been designated under the Habitats Directive as SACs, under the EU Birds Directive as SPAs and under the Marine Scotland Act 2010 and Marine and Coastal Access Act 2009 as NCMPAs and MCZs. The potential for significant impacts on any such site has been considered within each impact assessment, with particular focus given to the Norwegian Boundary Sediment Plain NCMPA as the Gaupe field is located approximately 5 km away. Given the short-term duration of the decommissioning activities, the mitigation measures to be executed and the expected swift recovery from the approved decommissioning activities, the Gaupe decommissioning project is confident that the conservation objectives or site integrity of any SAC, SPA, NCMPA or MCZ are unlikely to have any significant or mid to long lasting impact.

The majority of species protected under Annex I of the Birds Directive that are present within the North Sea will generally be found much closer to shore and may only encounter the project with any regularity during the limited period of the vessel activity. Given such vessel use will result in limited interaction with individuals of those protected species, the Gaupe decommissioning project will not likely result in significant impacts to those populations.

The presence within the Gaupe area of species protected under Annex II of the Habitats Directive is limited to marine mammals. Marine mammal species that may be present in the Gaupe area occur in relatively low densities, or occur only occasionally, or as casual visitors. The EA has assessed whether the noise emitting operations associated with the project have the potential to result in injury or disturbance to any marine mammal species. This assessment concluded that there is a very low likelihood of injury (such as temporary or permanent hearing loss), or disturbance as a result of the activities associated with the project and that potential environmental impacts would not result in population level impacts.

Considering all of the above, no significant impacts are expected upon protected species and habitats.

Cumulative and Transboundary impacts
A review of each of the potential environmental impacts associated with the project, and the proposed mitigation measures against the range of other activities in the region, indicates that no significant cumulative impacts are expected.

A review of each of the potential environmental impacts associated with the Gaupe infrastructure decommissioning project and the mitigation measures proposed, indicate that no significant transboundary impacts are expected.

All reviews are included in the Environmental Appraisal report.

Some wax will be left in the northern pipeline. Discharge is expected to be in small concentrations over a long period of time. The environmental impact from wax is expected to be low.

The residual environmental impacts for the Gaupe infrastructure decommissioning Impact project (i.e. following application of any mitigation) are summarised in table 4.2. For more details refer to the Environmental Appraisal Report [1].

Table 4.2 Environmental Impacts

Impact	Key potential impacts assessed	Mitigation identified?	Residual risk	Environmental Impact
Seabed disturbance	Effects of disturbance of seabed on habitats and species.	Yes	Slight	Not significant/low impact
Underwater noise	Vessel use, survey operations and cutting noise on marine mammals and fish	Yes	Minor	Not significant/low impact
Other sea users	Short and longer-term effects on fisheries use of the Armada Complex	Yes	Minor	Not significant/low impact
Discharges to sea	Short and longer-term release from lines decommissioned *in situ*	Yes	Slight	Not significant/low impact
Energy use and atmospheric emissions	Emissions resulting from vessel use and recycling/replacement of materials	Yes	Slight	Not significant/low impact
Accidental events	Vessel-vessel collision	Yes	Minor	Not significant/low impact
Onshore	Disturbance to onshore communities from dismantling activities	Yes	Slight	Not significant/low impact

Legacy:

Once decommissioning activities have been completed, all subsea structures (such as the SSIV manifold) will have been removed in accordance with the approved schedule. Whilst some of the pipelines, flowlines and umbilicals will remain in place, they will be buried in trenches and protected by rocks where necessary. The rock profiles will be suitable for overtrawling by fishing gear, and the trenches will be as near to flat with the seabed as can be achieved in order to permit overtrawling by fishing gear. Prior to the decommissioning activities being formally closed out surveys will be undertaken to ensure there are no snagging hazards, methods will be discussed and agreed by OPRED.

Once these surveys are completed, a risk-based strategy will be developed and agreed with OPRED to monitor (and remediate if necessary) any snag risks that may develop in the future as infrastructure decommissioned in situ degrades. Given that there will be low snag risk at the point of

decommissioning close-out, and given that appropriate monitoring and remediation will be undertaken beyond close-out, there is expected to be no exclusion of fishing from the area (either due to the presence of physical infrastructure or due to perceived snag risk).

Final remarks:

The EA presented in this document has been informed, in part, by extensive stakeholder engagement, the Comparative Assessment process and by specialist environment studies associated with the Armada Complex Decommissioning project (such as the environmental baseline surveys). This has facilitated the development of a robust environmental baseline and a comprehensive environmental assessment, which has considered the resultant environmental impacts.

An integral part of the EA has been the development of appropriate mitigation measures (detailed within each of the relevant impact assessment sections) to ensure that environmental impact is minimised as far as is reasonably practicable. The implementation of mitigation measures will be tracked as part of the Gaupe decommissioning project HSSE-SP Plan.

Taking into account the environmental sensitivities of the area, the proposed decommissioning activities, and the mitigation measures that will be deployed, it is concluded that the Gaupe Decommissioning Project will result in low environmental impact.

Table 4.3: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
Decommissioning of Pipelines and Umbilical including subsea Infrastructure and SSIV Manifold	• Effects of disturbance of seabed on habitats and species. • Vessel use and cutting noise on marine mammals and fish • Effects on fisheries use of the Armada Complex • Emissions resulting from vessel use • Accidental events	The size and grade of any rock used will be discussed with SFF. Any objects dropped during decommissioning activities will be recovered and removed from the seabed as appropriate. Details of all infrastructure decommissioned in situ will be made available for inclusion on Admiralty Charts and the FishSAFE system. Minimise duration of operations. Minimise numbers of cuts as far as it is practicable. All deployed vessels will be MARPOL compliant. ROV uses biodegradable hydraulic fluid. OPEP will be in place. Minimising amount of stabilisation material used for pipeline ends. Flushing of chemical cores where feasible. Chemicals left in situ are not environmentally harmful. Flushing of production pipelines to minimise hydrocarbon levels. Waste Management Plan in place. Relevant permits and consents will be in place (subject to regulatory approval).
Decommissioning of Stabilisation Features	• Effects of disturbance of seabed on habitats and species. • Vessel use and cutting noise on marine mammals and fish • Accidental events.	Ensure as little disturbance as possible Preparation and implementation of the Waste Management Plan maximise recycling/ reuse of waste and to minimise landfill disposal. Licensed waste management contractors to be used.

Table 4.3: Environmental Impact Management		
Activity	**Main Impacts**	**Management**
Post-decommissioning Surveys	Debris clearance and overtrawl surveys are expected to cause: • Effects of disturbance of seabed on habitats and species.	The surveys area will be well defined. Following recovery of subsea infrastructure and debris the seabed will be subjected to surveys to confirm that the seabed is clear and safe for fishing. Surveys may include video, side scan sonar or similar. If the survey results identify areas where there are specific safety concerns, such as at pipeline ends, it may be necessary to supplement the surveys with over trawl trials to demonstrate that the seabed has been left in a safe state. Once the surveys or potential overtrawls are completed, a risk-based strategy will be employed to monitor any risks that may develop in the future as in situ infrastructure degrades. Follow JNCC guidelines for minimising the risk of injury to marine mammals in as much as they relate to the use of Sub-bottom Profile for geophysical surveys should this technique be required.

5 INTERESTED PARTY CONSULTATIONS

Pre-Engagement Summary

Pre-engagement with stakeholders commenced as part of the Armada Complex Decommissioning Project in May 2015 with discussions on the scope of the pre-decommissioning environmental baseline survey held with statutory advisor and regulatory bodies. Ongoing engagement with a wider audience (including statutory consultees and the public through interested organisations) was initiated in March 2016 with consultation on the draft scope of the Environmental Impact Assessment. This was followed by an introductory workshop held in June 2016 and follow-up meetings with regulatory authorities (e.g. SEPA, JNCC, Marine Scotland, OPRED Environmental Management Team) and others as required. After analysis of the survey results, a further (pre-comparative assessment) workshop was held in October 2016 to take stakeholders through the findings. For both workshops, reports were circulated to all stakeholders, including those unable to attend. All subsequent comments received from stakeholders were fully addressed.

The emerging recommendations from the comparative assessment of decommissioning options were subsequently circulated to stakeholders for comment in an 'emerging recommendations' report in February 2017.

In July 2017, following the separation of the Gaupe decommissioning scope from the wider Armada Complex Decommissioning Project, Shell engaged with BEIS and agreed that credit could be taken for stakeholder engagement performed to date and no repetition was required for ongoing development of the Gaupe DP.

Consultations Summary

To be updated following consultation, at which point copies of statutory consultee correspondence and public notices will be provided as an Appendix.

Table 5.1 Summary of Stakeholder Comments		
Points raised during statutory and public consultations		
Statutory Consultees		
Stakeholder	**Comment**	**Response**
National Federation of Fisherman's Organisations	None	N/A
Scottish Fishermen's Federation	The Scottish Fishermen's Federation (SFF) appreciates the clearly laid out and detailed explanation of the proposals submitted by Shell U.K. Limited for the decommissioning of the Gaupe Field's infrastructure located on the United Kingdom Continental Shelf (UKCS) and place on record our appreciation of the information provided. It is noted that as the Gaupe Field is located on the Norwegian Continental Shelf (NCS) that a separate decommissioning plan has been submitted to the Norwegian authorities for approval. For your information, I can advise that the SFF's Oil and Gas Decommissioning Policy and accompanying Key Principles document can be viewed via the SFF's website using the following link: https://www.sff.co.uk/sffoffshore-oil-gas-decommissioning-policy/. As highlighted in these documents, the concerns of fishermen are primarily that of safety and the physical impact on the fishing grounds of the long-term presence of oil industry infrastructure on the seabed. I can confirm that the SFF's preferred position regarding the decommissioning of oil and gas infrastructure is one of total removal.	We thank you for your letter of 23rd June 2020 and note the guidance provided therein. Specifically with regard to the penultimate paragraph on seabed clearance verification, Shell would like to advise you of the following changes to the Gaupe Decommissioning Programmes Part 1. Since issuing the programmes for public consultation, Shell has been advised by OPRED of a change to their seabed clearance verification policy. To reflect this change in policy, the following text will be added to Section 6.2 of the Decommissioning Programmes (Part 1). References to seabed clearance surveys in the EA have also been updated to reflect the below: "The default OPRED policy requirement is for clear seabed verification to be undertaken using non-intrusive means, such as side scan sonar. Overtrawl surveys as a means to locate debris and/or verify clear seabed, are likely only to be

	We are therefore pleased to note that under the Gaupe Decommissioning Programme, it is Shell's intention to fully remove the Gaupe SSIV manifold installation and all associated apparatus in line with the requirements of OSPAR Decision 98/3. Given that this installation and associated apparatus are fully within the Armada 500 metre Safety Zone, it is noted that their removal will take place in conjunction with Armada Complex decommissioning operations. Regarding the proposals for decommissioning pipelines (three) and umbilicals (three), it is noted that these have been prepared in line with OPRED Guidance Notes and following comparative assessment of credible options. In relation to the offshore pipelines (two) and umbilicals (two) that are proposed to be decommissioned in situ, we accept the reasoning behind the recommendation (based on the outcome of the comparative assessment of feasible options) of leaving these in situ with minimum intervention in order to minimise seabed disturbance. As you will be aware, any pipelines/umbilicals left on the seabed represent a legacy issue and will require on going monitoring. Where rock cover is deployed, we would look for the size and profile of the rock to follow normal industry standards and would recommend that such rock dump berms are incorporated into the post decommissioning debris clearance trawl sweeps to verify that, at the time of deposit, they did not pose a risk to fishing. We would take this opportunity to once again highlight that the SFF has serious reservations and is yet to be convinced regarding the use of alternative methods of verifying to fishermen that it is safe for fishing to resume in an area following the removal of oil and gas related	approved in cases where it is deemed necessary i.e. where there are specific safety concerns such as pipeline bundle ends, extensive debris and/or extensive seabed disturbance resulting from decommissioning operations. However, for the purposes of estimating environmental impact, a worst-case position has been taken in this DP and supporting EA with the assumption that over-trawling may be required. It should be understood that assumption has been used only for estimating worst-case environmental impact; actual methods of verification will be discussed and agreed with OPRED on a case-by-case basis with an assumption that less intrusive methods of clear seabed verification are the base case."

	infrastructure, and has made its views known to OPRED. For where an area of seabed was previously bottom trawled prior to oil and gas operations taking place and where bottom trawling is permitted to take place following decommissioning works, it is our view that the best way to satisfy fishermen that the area is safe for fishing to resume is to undertake a trawl sweep, under controlled conditions, which replicates the most common method of fishing that takes place in that locality. It is noted that Shell will seek to defer post-decommissioning over-trawl trials and surveys of the areas affected by the Gaupe Decommissioning Programme until the Armada Complex has itself been decommissioned. The Federation having stated the above position, would reaffirm its appreciation of the decommissioning plans provided and its wish to work closely and positively with the Gaupe Field Decommissioning Team, as you work through the challenges before you.	
Northern Ireland Fishermen's Federation	None	N/A
Global Marine Systems Limited	None	N/A

6 PROGRAMME MANAGEMENT

6.1 Project Management and Verification

Members of the Project Management team will be appointed to manage selected Contractors for the removal activities. Standard company procedures for operational control and hazard identification and management will be used. Where possible, the work will be coordinated with other decommissioning operations in the Central North Sea to secure schedule and cost efficiencies. This may lead to Gaupe Field decommissioning being executed in several phases over an extended time. Where significant periods of inactivity follow a phase of work, an interim decommissioning close out report may be issued. If it is determined by OPRED that pipeline monitoring is required during a prolonged decommissioning execution period, the results of any such surveys will be submitted to OPRED. The process of consents and the consultations required as part of this process have commenced and will be fully managed and monitored. In the event of any changes in the detail of the approved offshore removal programme being required, these would be discussed and agreed with OPRED in advance. Aligning the execution of the subsea removals for Gaupe with the host platform's removal would maximise the potential for cost synergies and a campaign approach. Noting that the surface-laid infrastructure is within the 500m safety zone around the Armada Complex, postponing the removal activities to align with the removal of the jacket does not increase the risk to other users of the sea. Shell will provide interim progress reports to OPRED on a quarterly basis for quarters where decommissioning activities have been executed. Where no activities have been executed, Shell will advise OPRED that no progress report is required for that quarter.

6.2 Post-Removal Debris Clearance and Verification

On completion of each decommissioning activity, the associated contractor will be required to verify through survey that all debris has been removed from the area, including a 100m corridor width along each pipeline and umbilical route (50m either side of each pipeline/umbilical). Any defined debris falling into scope for removal will be recovered for onshore disposal or recycling in line with existing disposal methods.

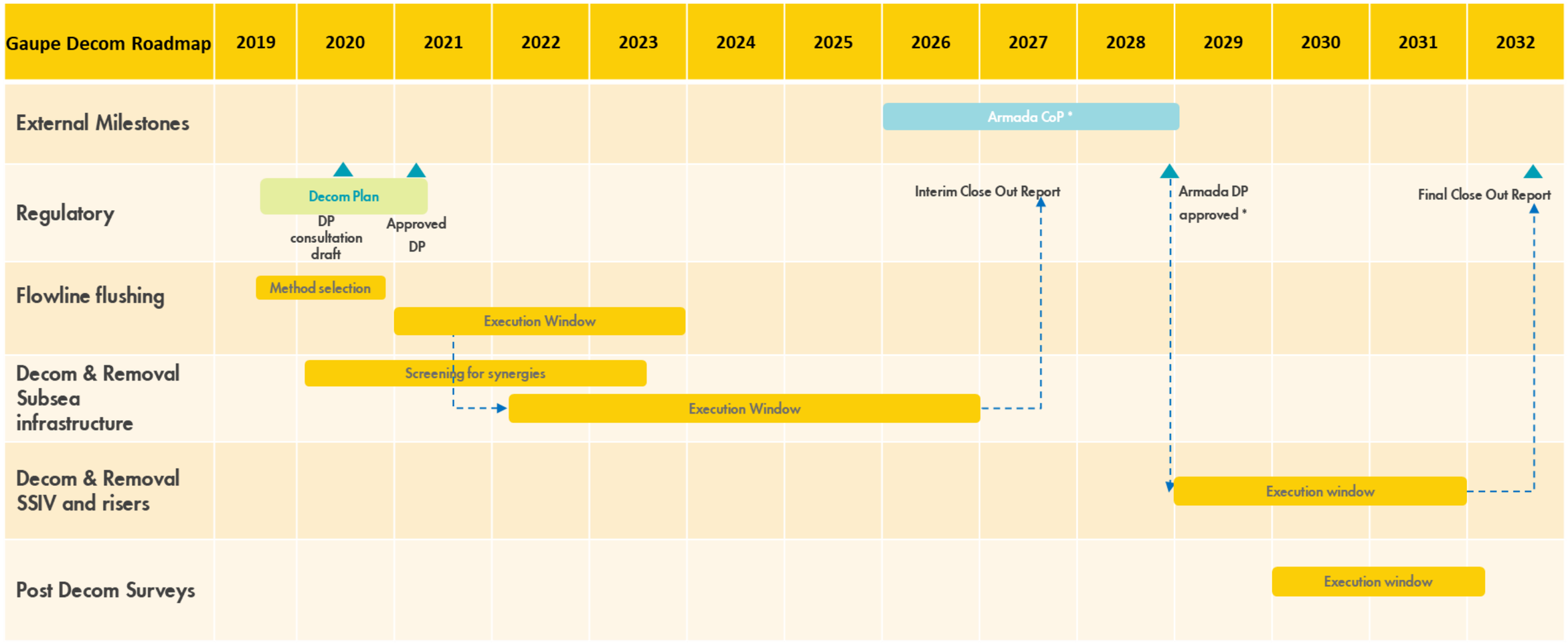
Verification of seabed clearance will be submitted to OPRED. Confirmation of seabed clearance will also be submitted to the Seabed Data Centre (Offshore Installations) at the United Kingdom Hydrographic Office.

The default OPRED policy requirement is for clear seabed verification to be undertaken using non-intrusive means, such as side scan sonar. Overtrawl surveys as a means to locate debris and/or verify clear seabed, are likely only to be approved in cases where it is deemed necessary i.e. where there are specific safety concerns such as pipeline bundle ends, extensive debris and/or extensive seabed disturbance resulting from decommissioning operations. However, for the purposes of estimating environmental impact, a worst-case position has been taken in this DP and supporting EA with the assumption that over-trawling may be required. It should be understood that assumption has been used only for estimating worst-case environmental impact; actual methods of verification will be discussed and agreed with OPRED on a case-by-case basis with an assumption that less intrusive methods of clear seabed verification are the base case.

Due to the presence of adjacent live pipelines, it is proposed that clear seabed verification of areas within the Armada safety zone will be deferred until the Armada Complex is to be decommissioned and the safety zone removed.

6.3 Schedule

Figure 6.1: Gantt Chart of Project Plan



*Note these are third-party activities and are therefore indicative only

6.4 Costs

An overall cost estimate is being provided to OPRED in confidence, following UK Oil and Gas Guidelines on Decommissioning Cost Estimation. Updated estimates will be provided to OPRED at the 'define' stage as appropriate.

Table 6.1 – Provisional Decommissioning Programme - Costs	
Item	**Estimated Cost (£m)**
Operator project management	Provided to OPRED in confidence
Facility running / owner costs	
Well plugging and abandonment	
Facilities / pipelines making safe	
Topsides preparation	
Topsides removal	
Substructure removal	
Topsides and substructure onshore recycling	
Subsea infrastructure (pipelines, umbilicals)	
Site remediation	
Monitoring	

6.5 Close Out

In accordance with the OPRED Guidance Notes, a close out report will be submitted to OPRED explaining any variations from the Decommissioning Programme within one year of the completion of offshore work, including debris removal, independent verification of seabed clearance and the first post-decommissioning environmental and pipeline surveys. Where possible, the work will be coordinated with other decommissioning operations in the Central North Sea to secure schedule and cost efficiencies. This may lead to Gaupe Field decommissioning being executed in several phases over an extended time. Where significant periods of inactivity follow a phase of work, an interim decommissioning close out report may be issued. If it is determined by OPRED that pipeline monitoring is required during a prolonged decommissioning execution period, the results of any such surveys will be submitted to OPRED. At the end of execution of Decommissioning and Removal, an interim report will be submitted.

6.6 Post-Decommissioning Surveys, Evaluation and Future Monitoring

Following completion of removal and remediation activities, an environmental survey will be carried out centred on the pipeline / umbilical corridors and, after Armada Complex CoP, the site of the SSIV Manifold. The monitoring regime will be risk based.

The survey(s) will fulfil the requirements for environmental seabed sampling as contained in Section 12 of the OPRED Guidance Notes [5]. Shell will propose a survey strategy to OPRED.

The survey(s) will focus on those areas where decommissioning activity has been conducted and may have disturbed or otherwise affected the seabed since the pre-decommissioning survey.

The survey will focus on chemical and physical disturbances from the decommissioning activities and will be compared against the baseline provided by the pre-decommissioning survey. Results of the survey will be issued to OPRED for review once the work is complete.

After the survey has been completed and the results reviewed by OPRED, the requirement for further surveys and post-decommissioning monitoring will be agreed by both parties.

The parties to the approved Decommissioning Programme will be the contact points for any third-party claims arising from damage caused by any remaining infrastructure under the approved Gaupe Decommissioning Programme. All the pipelines which are proposed to be left in place remain the property and responsibility of the owners, even if they were to exit the UKCS.

7 SUPPORTING DOCUMENTS

Table 7.1: Supporting Documents		
Ref	*Document Number*	*Title*
[1]	GP50-BGNO-Z-RB-0003	Technical Note Future Operation of the Gaupe Field beyond 1 October 2018
[2]	GP50-BGNO-S-RA-0001	Environmental Appraisal
[3]	GAUPD-PT-S-AA-7480-00001	Comparative Assessment Report
[4]	BG-ARMD-46-40-00003	Comparative Assessment Procedure
[5]	N/A	Guidance Notes – Decommissioning of Offshore Oil and Gas Installations and Pipelines November 2018 produced by ODU and OPRED
[6]	N/A	Oil & Gas UK Guidelines for Comparative Assessment in Decommissioning Programmes, Issue 1
[7]	BG-ARMD-46-40-00029	D3 Consultants - Armada Hub Waste Materials Inventory Report

The Gaupe Decommissioning Programme as well as the supporting documents are available as follows:

1. At the Shell website at https://www.shell.co.uk/sustainability/decommissioning.html.
2. On request by email to James Blackburn (Decommissioning Business Opportunity Manager) / E-mail address: SUKEP-Shell-Decommissioning-Correspondence@shell.com

8 PARTNER LETTERS OF SUPPORT

Lundin
Energy Norway

Offshore Petroleum Regulator for Environment and Decommissioning
Department for Business, Energy & Industrial Strategy
3rd Floor, Wing C, AB1 Building
Crimon Place
Aberdeen AB 10 1BJ
Scotland

Lysaker, April 16, 2021

GAUPE DECOMMISSIONING PROGRAMME PETROLEUM ACT 1998

Dear Sir or Madam,

We acknowledge receipt of your letter dated 14.04.2021

We, Lundin Energy Norway AS confirm that we authorise A/S Norske Shell to submit on our behalf an abandonment programme relating to the Gaupe facilities as directed by the Secretary of State on 14.04.2021.

We confirm that we support the proposals detailed in the Gaupe Decommissioning Programme dated 05.02.2021, which is to be submitted by A/S Norske Shell in so far as they relate to those facilities in respect of which we are required to submit an abandonment programme under section 29 of the Petroleum Act 1998.

Kind regards
Lundin Energy Norway AS

Kristin Færøvik
Managing Director

Lundin Energy Norway AS
Strandveien 4, P.O. Box 247,
N-1326 Lysaker, Norway
Tel. +47 67 00 20 00
www.lundin-energy-norway.com

APPENDIX 1 – PUBLIC NOTICE

Scan of Public Notice in the Press and Journal newspaper, 11/06/20

PUBLIC NOTICE

The Petroleum Act 1998

Gaupe Decommissioning Programmes

On 11 June 2020, A/S Norske Shell submitted, for the consideration of the Secretary of State for Business, Energy and Industrial Strategy, the draft Decommissioning Programme for the Gaupe Field in accordance with the provisions of the Petroleum Act 1998.

It is a requirement of the Act that interested parties be consulted on such decommissioning proposals.

The items/facilities covered by the Decommissioning Programme are:

• Subsea infrastructure associated with the Gaupe Field

A/S Norske Shell hereby gives notice that the Gaupe Decommissioning Programme can be viewed online at https://www.shell.co.uk/sustainability/decommissioning/Gaupe

Alternatively, a digital copy of the programmes can be requested:

Contact:
Rob Jansen, Head of Projects, Decommissioning Strategy

E-Mail:
SUKEP-Shell-Decommissioning-Correspondence@shell.com

Shell U.K. Limited will provide a UK contact point on behalf of A/S Norske Shell, and all responses regarding the Gaupe Decommissioning Programmes should be submitted in writing to Shell U.K. Limited marked for the attention of Rob Jansen at the above email address, where they should be received no later than the consultation closing date 10 July 2020 and should state the grounds upon which any representations are being made.

11 June 2020

Rob Jansen
Head of Projects, Decommissioning Strategy
Shell U.K. Limited
1 Altens Farm Road
Nigg
Aberdeen
AB12 3FY

Scan of Public Notice in The Times newspaper, 11/06/20

PUBLIC NOTICE

The Petroleum Act 1998

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