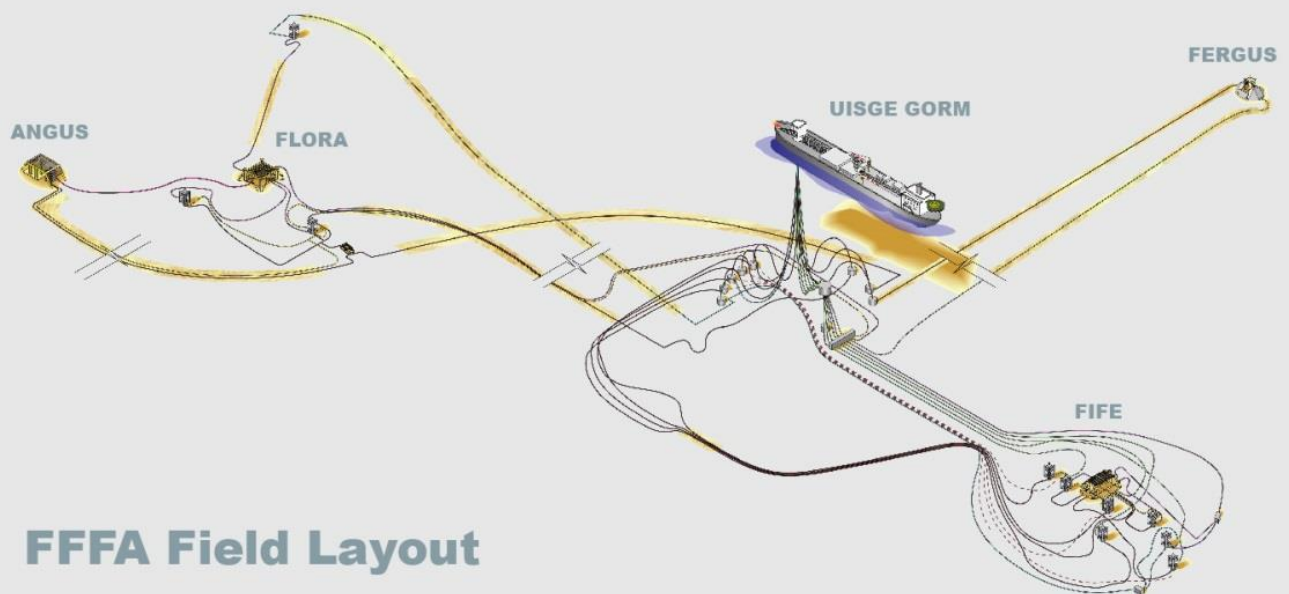




Fife, Fergus, Flora and Angus Fields Decommissioning Programmes

Close-Out Report



FFFA Field Layout

1	INTRODUCTION
1.1	Scope of Document
1.2	Project Background
2	EXECUTIVE SUMMARY
2.1	Project Overview
2.2	Approved FFFA Decommissioning Programme
3	DECOMMISSIONING PROGRAMME OF WORK
3.1	Phase 1
3.1.1	Field Suspension and FPSO Removal
3.1.2	Subsea Marine Equipment Removal
3.1.3	Pre-Decommissioning Environmental Baseline Survey
3.2	Phase 2
3.2.1	Subsea Facilities Removal
3.2.2	Well Abandonment
3.2.3	Debris Clearance
4	DEVIATIONS FROM APPROVED PROGRAMMES
4.1	Non Recovery of Armorflex Mattresses
5	POST DECOMMISSIONING ACTIVITIES
5.1	Field Over-Trawl Trials
5.2	Post Decommissioning Surveys
5.2.1	Area Seabed Clearance Survey
5.2.2	Environmental Baseline Survey
6	DECOMMISSIONING PROGRAMME OUTCOME
6.1	Project Summary and Conclusion
6.2	Legacy Management
7	PROJECT MANAGEMENT
7.1	Overview
7.2	EHS Strategic Objectives
7.3	Waste Disposal
7.4	Control of Permits
7.5	Key Project Learnings
8	PROJECT COSTS
8.1	Cost Summary

APPENDIX 1

Schedule of Works

APPENDIX 2

FFFA Seabed Clearance Certificate

List of Figures

- Figure 1 FFFA Fields Location
- Figure 2 FFFA Fields Layout Schematic (Pre-Decommissioning)
- Figure 3 Profiled Rock Installation Design Parameters
- Figure 4 Rock Installation Field Location
- Figure 5 As-Built Survey Screen Shot, Final Profile
- Figure 6 As-Built Cross Section of Rock Installation, Final Profile
- Figure 7 FFFA Fields Typical Sweep Pattern of Well Centres
- Figure 8 FFFA Fields Typical Sweep Pattern of Pipeline Corridors
- Figure 9 Fife Central Armorflex Mattress Location Sweep Patterns (FPSO 500m Zone)
- Figure 10 FFFA Fields Typical Debris Recovery From Trawl Sweeps
- Figure 11 FFFA Fields Layout Schematic (Post-Decommissioning)

List of Tables

- Table 1 FFFA Fields Co-venturers
- Table 2 Overview of the FFFA Development
- Table 3 Rock Dump Application Details
- Table 4 FFFA Environmental Survey Sample Stations Summary
- Table 5 Material Waste Disposal Tonnage Summary
- Table 6 Material Waste Disposal Percentage Breakdown
- Table 7 Norm Scale Disposal Record
- Table 8 Cost Data Summary

ABBREVIATIONS

BoD	Basis of Design
CSV	Construction Support Vessel
DECC	Department of Energy and Climate Change (formerly BERR)
DSV	Diving Support Vessel
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessment
ES	Environmental Statement
FFFA	Fife, Fergus, Flora and Angus
FPSO	Floating Production, Storage and Offloading (vessel)
HSE	Health and Safety Executive
IMO	International Maritime Organisation
JNCC	Joint Nature Conservation Committee
JOA	Joint Operating Agreement
KPI	Key Performance Indicator
LSA	Low Specific Activity (scale)
LWIV	Light Well Intervention Vessel
MODU	Mobile Offshore Drilling Unit
MSL	Mean Seabed Level
MV	Motor Vessel
NORM	Naturally Occurring Radioactive Material
OPEP	Oil Pollution Emergency Plan
PLANC	Permits Licences and Consents
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishermen's Federation
SRI	Subsea Rock Installation
te	Tonnes
THC	Total Hydrocarbon Content
UKCS	United Kingdom Continental Shelf
UKHO	United Kingdom Hydrographic Office

1 INTRODUCTION

1.1 SCOPE OF DOCUMENT

The scope of this document is to report the outcome of the Decommissioning Programmes for the Fife, Fergus, Flora and Angus Fields installation, pipelines and structures as defined in the Fife, Fergus, Flora and Angus Fields Decommissioning Programmes, document number ADP-010, 16th February 2012.

1.2 PROJECT BACKGROUND

The FFFA development comprises of the Fife, Fergus, Flora and Angus fields. The FFFA fields are located in the central North Sea, in Blocks 31/21, 31/26, 31/27a, 39/1 and 39/2, of the UK Continental Shelf (UKCS), approximately 330 km east-south-east of Aberdeen, in a water depth of approximately 71m.

Figure 1 FFFA Fields Location



SECTION 1 : INTRODUCTION

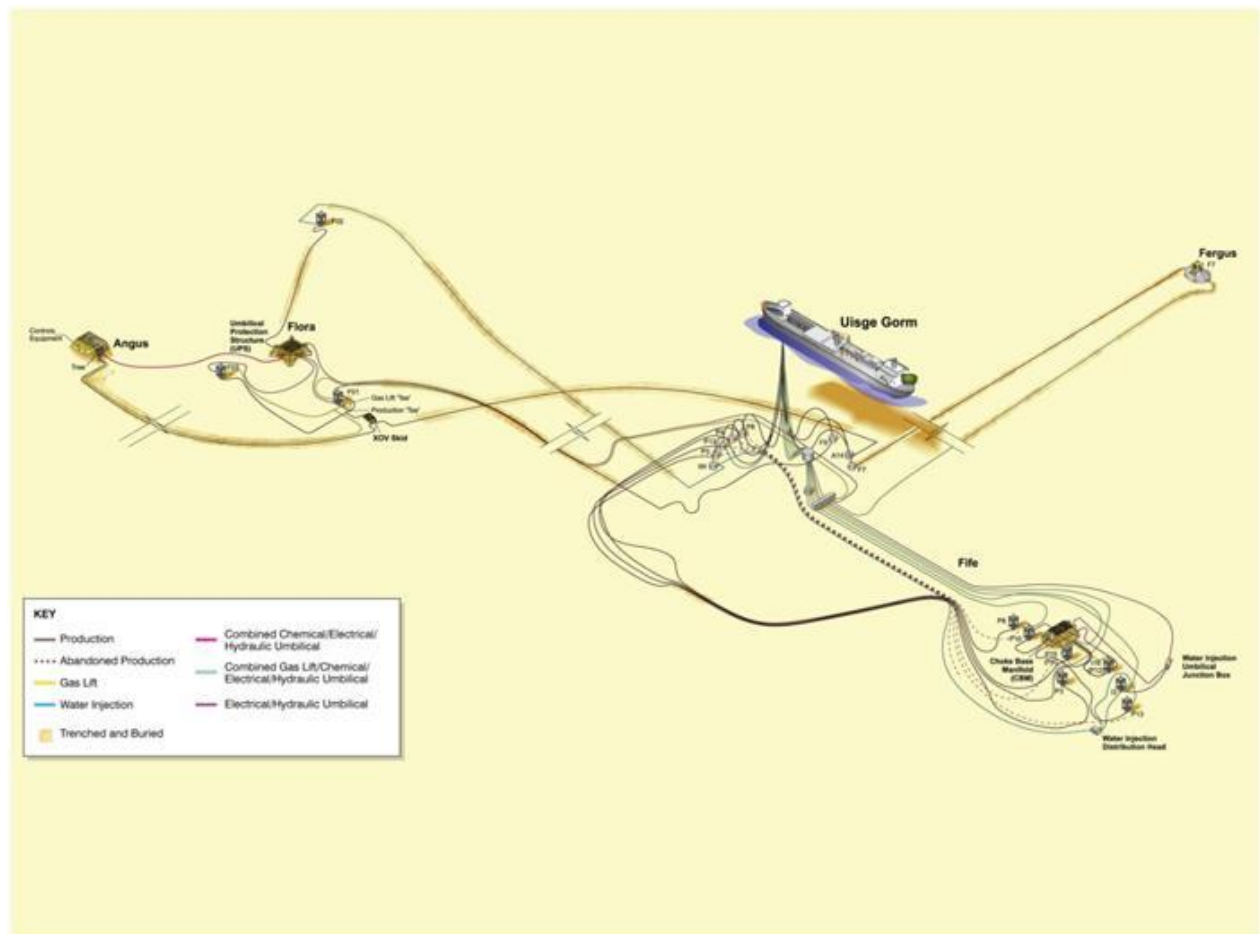
The FFFA Co-venturers are Hess Limited (Hess) and Premier Oil Exploration Limited (Premier) in the following ratios:

Table 1 FFFA Fields Co-venturers

Field	Hess	Premier
Fife, Flora and Angus fields	85%	15%
Fergus Field	65%	35%

Hess was the Operator of the four fields on behalf of the co-venturers. Bluewater Energy Services (BES) owned and supplied the FPSO *Uisge Gorm* and operated the four fields as Duty Holder, under contract to Hess.

Figure 2 FFFA Fields Layout Schematic (Pre-Decommissioning)



SECTION 1 : INTRODUCTION

Collectively, the FFFA fields produced approximately 100 mmbbl oil but, having reached maturity, they were no longer economically viable and have been decommissioned. Production from the FFFA development was suspended in March 2008, with full decommissioning to follow if a redevelopment or sale option was not put forward by co-venturer Premier.

Angus was originally developed in 1991 as a stand-alone project with two subsea wells produced via a stand-alone Floating Production, Storage and Offloading (FPSO) vessel *Petrojarl*. The initial phase of production from Angus ceased in 1993 and the *Petrojarl* was removed, but after lying dormant for eight years the field was redeveloped in 2001 and tied back to the newer Fife, Fergus and Flora FPSO - the *Uisge Gorm*.

The Fife, Fergus and Flora fields came on stream between 1995 and 1998 and were located approximately 18 km south-east of Angus, the *Uisge Gorm* was located in the central Fife area and in operation for 13 years. Table 2 provides an overview of the fields that made up the development, and Figures 1 and 2 provide a schematic overview of the location and initial layout of the fields.

Table 2 Overview of the FFFA Development

Field	Block	Average Water Depth	Distance from FPSO	Production Life	Oil Production Wells	Water Injection Wells
Fife	31/26a, 31/27a 39/1a 39/2a	70 m	1.5 km	1995 - 2008	P3, P8, P10, P13, P15	I3, I16
Fergus	39/2a	71 m	7.25 km	1997 - 2008	F7	None
Flora	31/26a, 31/26c	71 m	8 km	1998 - 2008	F01, F03	F02
Angus	31/21a, 31/21b 31/26g	72 m	18 km	2001 - 2006	A14	None

Redevelopment Potential

The co-venturers of the FFFA development explored all available options for continuing production from the fields using the FPSO *Uisge Gorm*, but concluded that none was economically viable.

They also considered the potential for redevelopment of oil and gas resources in the vicinity of the FFFA fields. Hess decided not to pursue the redevelopment of these fields but Premier wished to maintain the option of redevelopment, subject to further studies. In February 2008, Hess and Premier therefore agreed and proposed:

‘That pursuant to each of the FFFA fields’ Joint Operating Agreements (JOAs), a unified recommendation has been made to the Department for Energy and Climate Change (DECC) for Phase 1 – Removal of the FPSO *Uisge Gorm* and safe suspension of the FFFA fields and facilities.

SECTION 1 : INTRODUCTION

In April 2008, Hess wrote to DECC outlining their proposals for removal of the FPSO *Uisge Gorm* and suspension of the FFFA fields. DECC replied in September 2008, stating that they were 'content with Hess's proposals in relation to this matter'. In addition, DECC advised that Premier had been given a 2-year period, with a possible extension to 4 years, to enable redevelopment opportunities to be investigated. In order to accommodate this period, a 5 year design life was adopted for the suspension criteria, equipment and preservation chemicals.

Originally, part of the subsea infrastructure (riser bases, flowlines and umbilicals) for the Fife and Fergus fields was installed and owned by Bluewater. As part of the agreement to demobilise the FPSO and suspend the fields, the ownership of this infrastructure was transferred to Hess and Premier.

Premier Oil UK completed field redevelopment studies in December 2010 and concluded that no viable opportunities for redevelopment existed. Accordingly, they released the fields to the joint venture for full decommissioning.

2 EXECUTIVE SUMMARY

2.1 PROJECT OVERVIEW

Decommissioning of the FFFA Development

Hess, on behalf of the co-venturers, prepared Decommissioning Programmes for all the fields in accordance with the requirements of the Petroleum Act 1998. Options for the decommissioning of the FFFA development were evaluated and assessed through a combined Comparative Assessment and Environmental Impact Assessment process.

Cessation of Production from the FFFA fields took place on 2nd May 2008, thereafter the active field subsea infrastructure was flushed clean of hydrocarbon residue, left filled with inhibited seawater and the well Christmas Trees disconnected from the flowlines. The risers were also disconnected from the FPSO.

Phase 1 of the decommissioning project was completed in 2008 with completion of field suspension activities and the removal of the *Uisge Gorm* FPSO. The disconnected risers were retrieved in two campaigns carried out in 2008 and 2009. A Pre-Decommissioning Environmental Baseline Survey was carried in 2011 and the marine related mooring system was also recovered in 2011.

Phase 2 activities for full field decommissioning commenced in January 2012 and were completed in June 2014. Field decommissioning activities encompassed abandonment of all 12 FFFA wells and removal of all seabed surface subsea infrastructure, with the exception of a quantity of unrecoverable stability mattresses to which an approved rock dump profile was applied.

2.2 APPROVED FFFA DECOMMISSIONING PROGRAMME

The Field Decommissioning Programmes for the Fife, Fergus, Flora and Angus Fields installation, pipelines, structures removal and well abandonment (document number ADP-010) was prepared by Hess on behalf of the Joint Venture, and submitted to DECC for approval in Q1 2012. Approval was granted on 16th February 2012.

Subsequently, consultation with DECC and SFF was undertaken in respect of 76 Armorflex pipeline stability mattresses that proved unrecoverable due to seriously degraded integrity. Agreement was reached that they could remain in situ with a covering of rock-dump, and a Fife DP1 Section 34(1)(a) Amendment to the programme was prepared, submitted and approved by DECC on 12th July 2013.

3 DECOMMISSIONING PROGRAMME OF WORK

The proposed programme of work for field decommissioning is described fully in the approved Fife, Fergus, Flora and Angus Fields Decommissioning Programmes (Hess document number ADP-010).

In summary, the programme of works undertaken are as detailed below.

3.1 PHASE 1 (2008 - 2011)

3.1.1 Field Suspension and FPSO Removal

The FFFA development was suspended by shutdown of the fields, the in-service subsea pipeline infrastructure was flushed clean of hydrocarbons to a level of 30mg/l by 'round-robin' circulation of inhibited seawater from the FPSO, and bullheading hydrocarbons to wells where possible.

On satisfactory hydrocarbon testing of the flushing water returns to the FPSO each well was shut in and isolated at the Xmas tree prior to flowline disconnection from the tree and the installation of blanking plates on the trees and flowlines and satisfactory completion of the flushing programme. The eight flexible production and water injection risers and anchor mooring system were all disconnected from the FPSO and laid on the seabed. The FPSO *Uisge Gorm* was then removed from the location in September 2008 and handed back to the owners at exit of the 500m zone.

Due to its height in the water column and in preparation for its later removal, the flexible riser system Mid Water Arch was sunk to the seabed just after the FPSO left the location.

A guard vessel was deployed to the area to monitor the remaining subsea exclusion zones and notify shipping of the existence of subsea hazards.

3.1.2 Subsea Marine Equipment Removal

Agreement was reached with DECC to permit removal of all marine related equipment - marine riser system, mid-water arch and moorings - prior to approval of the main decommissioning programme.

The flexible risers were removed from the seabed in Q4 2009 and the FPSO mooring chain and anchoring system was subsequently removed from the seabed in Q4 2011.

Once the mooring chain assembly was removed, the piles/chain ends were cut to at least 0.6m below the seabed and buried. The mooring chains along with the back-up mooring failure protection hook were retrieved and disposed of as appropriate.

3.1.3 Pre-Decommissioning Environmental Baseline Survey

An environmental survey was carried out in mid-2010 prior to commencing the main Phase 2 infrastructure decommissioning programme and subsea equipment removal. The sampling protocol aimed to generate sufficient data to allow an assessment of the current state of seabed contamination throughout the Fife, Fergus, Flora and Angus fields, and inform the future decommissioning process with regards to the potential disturbance of habitats and contaminated sediments.

Surface sediment samples from the survey were analysed for sediment characteristics, total organic carbon/total organic matter, hydrocarbons, 2 to 6 ring aromatics, and heavy metal content. Macrofaunal analysis (0.5 mm fraction) was carried out on duplicate samples with a further replicate stored pending possible analysis should there be marked variation between the duplicate samples.

In summary, the survey analysis concluded that overall, the environmental data obtained from the environmental baseline survey at the Fife, Fergus, Flora and Angus sites indicated that seabed sediments beyond ca 500 m can generally be considered 'background' for the central North Sea region.

Assessment of the data with respect to cited background North Sea levels is supported by reports such as the 1993 Quality Status Report by the North Sea Task Force (NSTF, 1993) and the more recent OSPAR (combined Oslo and Paris Commissions) status report (Region II Greater North Sea; OSPAR, 2000) and OSPAR Agreement 2005 - 2006 on background concentrations (OSPAR, 2005 and 2009). Of particular relevance is a study commissioned by UKOOA (United Kingdom Offshore Operators Association) compiling environmental survey data around oil and gas installations between 1975 and 1995 (UKOOA, 2001).

3.2 PHASE 2 (2012 - 2014)

3.2.1 Subsea Facilities Removal

Options for the decommissioning of subsea flowlines and umbilicals were the subject of a Comparative Assessment study, as required under the Petroleum Act 1998. Factors such as complexity/technical risk, risks to personnel, environmental impact, effect on other users of the sea and economics were considered for each option. The options were then scored and ranked to identify the preferred decommissioning solution.

Full field decommissioning commenced in late December 2011, and infrastructure recovery was conducted by a series of six DSV and CSV campaigns, and concluded in January 2013. The primary role of the DSV was to prepare components for lifting from the seabed and the CSV carried out the major lifts.

The programme involved the decommissioning and removal or making safe of all remaining subsea infrastructure which comprised of pipelines, umbilicals, protective structures on the seabed, and the wells.

Pipelines and umbilicals lying on the seabed were completely removed and taken to shore for reuse, recycling or disposal, as appropriate. Where pipelines or umbilicals were already buried, their exposed end sections were cut off and returned to shore for recycling or disposal. The exposed cut ends of these lines were then buried to the full depth of the existing trench by water-jetting.

SECTION 3 : DECOMMISSIONING PROGRAMME OF WORK

Initial recovery of the Angus to Flora production flowline (PL1857) seabed surface section at the Angus/Flora Cross-over Structure location resulted in a quantity of trapped hydrocarbons being released to the environment from a pipeline highpoint during the cutting process. The recovery operation was suspended and the pipeline capped to prevent further release until such times as a flushing programme could be devised to remove all residual hydrocarbons.

The main manifold structures located on the seabed - Fife Choke Base Manifold, Water Injection Distribution Head, Water Injection Umbilical Junction Box and Flora Umbilical Protection Structure and Cross-Over Valve Skid - were recovered and returned to shore for reuse, recycling or disposal. Where such structures were piled, the piles were completely removed or cut at least 0.6m below the seabed before being back-filled.

Where safe to do so the stabilisation mattresses were recovered and brought ashore for re-use / recycling. However, two types of stabilisation mattresses were in place at the FFFA location – Polyprop of a rope lattice construction and Armorflex of a wire lattice construction. During early lift attempts, the integrity of the Armorflex mattresses was found to be severely impaired to the extent where the wire construction broke down during the lift allowing the blocks to fall to the seabed.

These mattresses became the subject of a Section 34 Amendment under the 1998 Petroleum Act, and are detailed in Section 4.

Wellhead protective structures on the seabed were recovered and returned to shore for reuse, recycling or disposal on completion of the well abandonment programme. Where such structures were piled, the piles were completely removed or cut at least 0.6m below the seabed before being back-filled. The main structure of this nature was the Angus Well Overtrawlability Frame. The structure consisted of a tubular frame on which was mounted a top lid. A well control cabinet was located on a mezzanine deck and the whole structure was piled into the seabed to a depth of approximately 7 metres. The structure was successfully cut into sections and the piles fully removed from the seabed in Q1 2014.

During the campaign to recover the Angus well overtrawl structure, a flushing programme was successfully carried out on the Angus/Flora production flowline (PL1857) to remove all residual hydrocarbon content prior to remaining surface section recovery.

All activities were consented under the appropriate permits.

3.2.2 Well Abandonment

The wells were plugged and abandoned in accordance with the worldwide Hess Global Drilling “Design and Operations Standards” plus its “Recommended Practice for the Abandonment of North Sea Subsea Wells”, the latter being specifically compiled and signed off for this decommissioning campaign.

The initial concept was to abandon the wells by means of an LWIV inserting a cement plug within the casing bore. The casing strings were to be cut at least 10ft (3m) below the seabed with the completion strings in situ and the cut casings, wellheads and trees taken to shore for reuse or recycling.

SECTION 3 : DECOMMISSIONING PROGRAMME OF WORK

However, adherence to the Hess Standards meant that the completion tubing strings should be recovered to enable verification of barrier quality cement in the annulus outside the production casing. Where a 100ft barrier of cement was proven to exist by electric-line logging, the cement barrier was to be set within the casing bore, contiguous with the verified annular interval. However, if barrier quality cement was not proven to exist around the production casing, a 100ft length of the casing was to be section milled and a cement barrier set across the exposed formation and wellbore.

The Basis of Design (BoD) required that two independently installed and tested cement barriers be set above the producing sandstone formations, opposite formation of adequate strength, to ensure long term isolation of the reservoir interval. An upper environmental plug was then to be set just below the mud line following removal of the upper casings and wellhead to a minimum of 10ft below the mud line. The well decommissioning BoD was agreed with the independent Well Examiner and the HSE.

All wells were abandoned to this Standard, and in accordance with the Recommended Practice. All activities were consented under the appropriate permits and continuously reviewed by the independent Well Examiner as operations were conducted.

The completion tubing strings, wellhead structures and trees were taken ashore for re-use, recycling / disposal.

As the drill cuttings piles did not exceed the OSPAR 2006/5 thresholds for oil loss or persistence, they were left in situ on the seabed to degrade naturally.

3.2.3 Debris Clearance

From the 5th to 18th May 2014 a DSV completed a full inspection sweep of all Hess Fife, Fergus, Flora and Angus licence areas consisting of the 500 metre zones around all existing well centres, the FPSO location 500 metre zone, structure locations and a 200 metre corridor on either side of all existing pipeline tracks.

The scope covered:

- Cutting and recovery of Angus pipeline PL1857 and PL1858 to their trenched transition location in the Flora field
- Demolition and recovery of Concrete Protection Bases at F01 and F02
- Recovery of wet stored Concrete Protection Mattresses
- Burial of redundant cut ends of anchor chain at the former FPSO site (Uisge Gorm)
- Survey Target Identification and recovery

The primary scope of work was fully executed, and in addition to recovery of all known targets, any additional target debris identified within Hess areas of responsibility were retrieved and transported ashore for processing.

4 DEVIATIONS FROM APPROVED PROGRAMMES

4.1 NON RECOVERY OF ARMORFLEX MATTRESSES

The FFFA Fields Decommissioning Programmes received Secretary of State approval on the basis of recovery of all mattresses from the seabed.

During the subsequent programme of subsea infrastructure recovery in 2012, approximately 76 wire construction Armorflex type mattresses comprising of 200 individual concrete blocks in a lattice were encountered whose condition was severely degraded. The wire lattice work broke down during the recovery lifting process allowing the mattress blocks to fall to the seabed, exposing the divers to significant risk of injury.

The operation was suspended and Hess completed an intensive study into all possible options but principal recovery methods remained a manually intensive task relying on diver intervention and carrying a high risk of injury to personnel. The conclusion was reached that the option with the least impact to personnel safety or the environment was to leave the mattresses in situ with the five abandoned pipelines cut on either end of the mattress area and remaining buried underneath.

Consideration was also given to other users of the sea and the potential for residual snag hazards on the seabed. SFF were engaged in detailed discussions as key stakeholders and users of the sea to agree a forward strategy, an agreement being reached that profiled rock dump may be applied in the affected area to minimise the snagging potential, whilst at the same time maintaining minimum burial depth requirements. SFF were also actively engaged in approving the rock dump profile design.

The proposal was agreed with DECC and approval of a Fife (DP1) Decommissioning Programme Section 34(1)(a) Amendment was granted in July 2013 in accordance with the requirements of the Petroleum Act 1998, Revision of Programmes.

In February 2014, a layer of rock dump was applied over the mattresses to provide an over-trawlable profile and conform to minimum burial depth requirements of 0.6 metres.

Rock Installation Detail

Approximately 76 non-standard Armorflex mattresses covered 5 sections of abandoned flowline (4 x 6" Production and 1 x 7" Water Injection) of approximately 100m at the Fife Central location. All lines had been cut where they meet the mattresses and the remaining exposed sections had all been recovered. All other surface infrastructure had been removed from this location previously, leaving the mattresses and flow-line sections beneath them.

Rock Installation Scope of Work

1. Carry out a full as-found survey of the mattresses and adjacent seabed to be covered.
2. Rock dump over all mattresses, including any cut pipeline ends, ensuring a minimum cover of 600mm and a berm gradient of 1 in 3.
3. Rock dump is to be a smoothly contoured mound over the mattresses.
4. Carry out an as left survey of the rock dumped area.

SECTION 4 : DEVIATIONS FROM APPROVED PROGRAMMES

Figure 3 Profiled Rock Installation Design Parameters

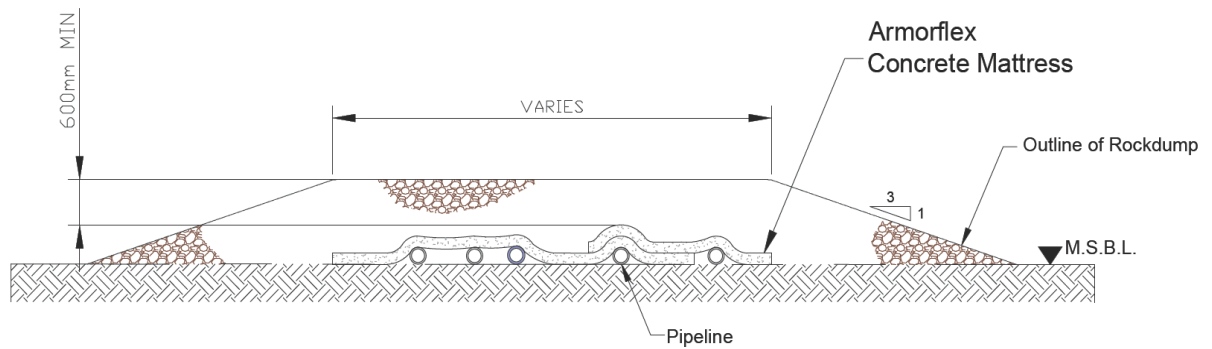
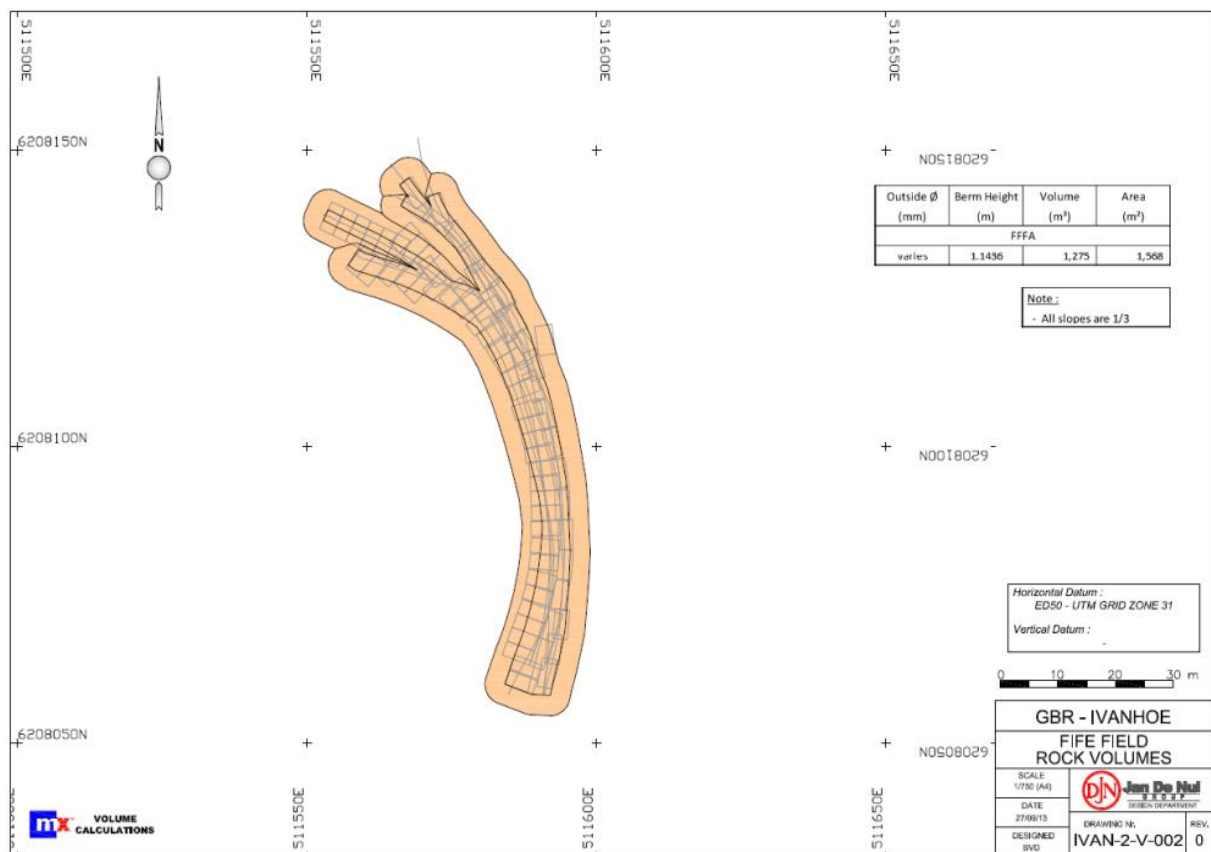


Figure 4 Rock Installation Field Location



SECTION 4 : DEVIATIONS FROM APPROVED PROGRAMMES

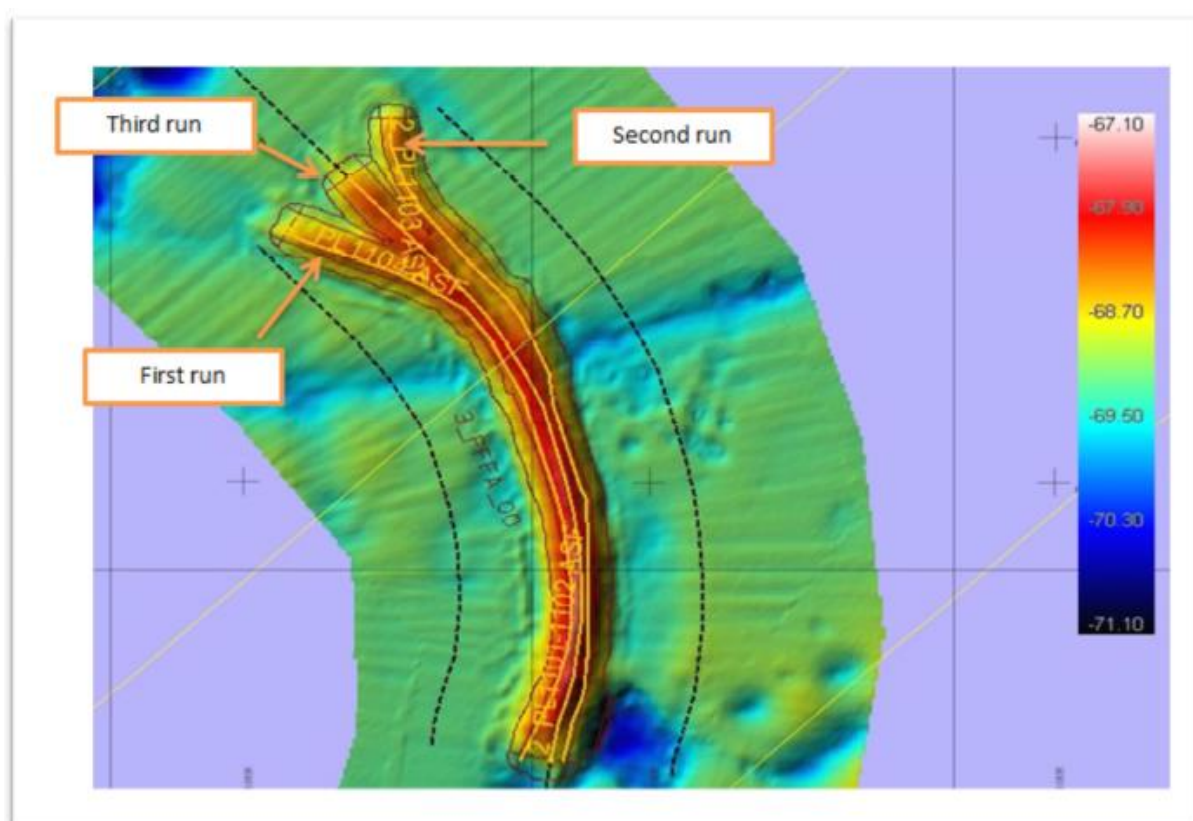
Table 3 Rock Installation Application Details

BERM ID	Design Vol.	Installed Ton.	Vol on Seabed	Vol in Design	Install. Factor
FFFA	532m ³	1764T	960m ³	531m ³	2.76t/m ³

As Left Rock Installation Information

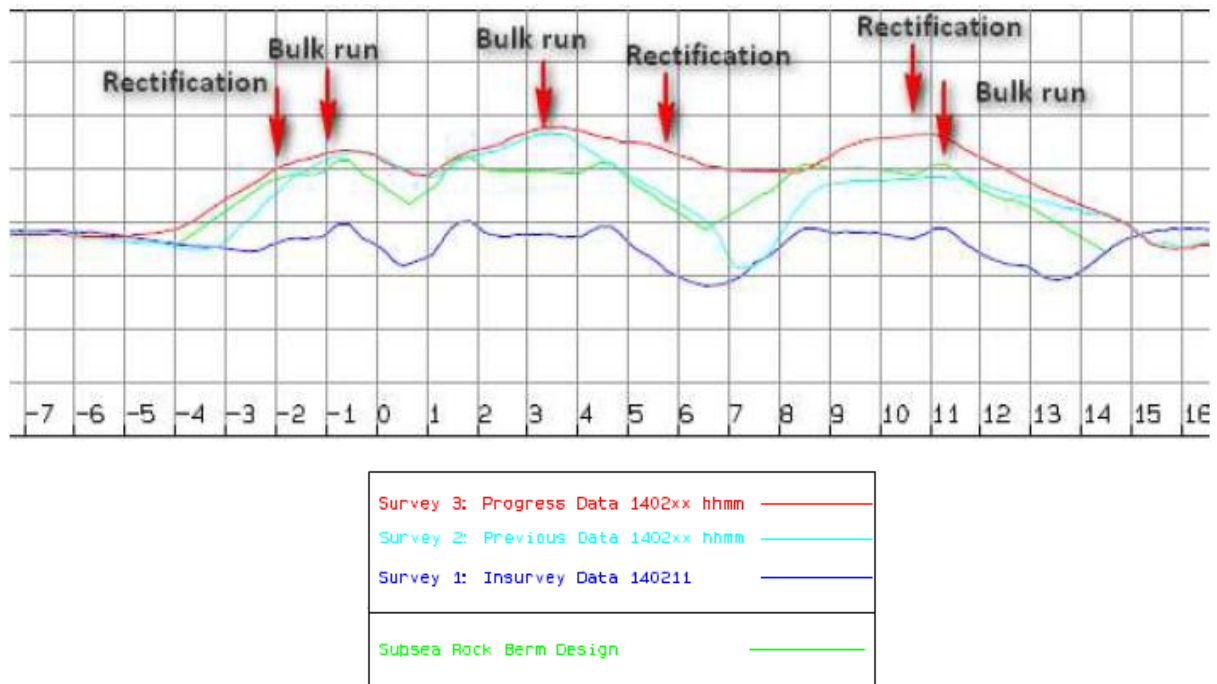
Due to complex SRI design at the FFFA location it was decided to work with three dumping lines. The first two runs were made with an offset of 0.7m on either side of the dumping line and a third run in middle (see Figures 5 and 6). After a visual check, the last rectifications were completed at lower rates.

Figure 5 As-Built Survey Screen Shot, Final Profile



SECTION 4 : DEVIATIONS FROM APPROVED PROGRAMMES

Figure 6 As-Built Cross Section of Rock Installation, Final Profile



5 POST DECOMMISSIONING ACTIVITIES

5.1 FIELD OVER-TRAWL TRIALS

Summary

A Trawl Sweep of Fife, Fergus, Flora and Angus Decommissioned Site including all wellheads and pipeline tracks was carried out between 23rd May and 10th June 2014. Both a chain mat (initial sweeps) and trawl net (secondary sweeps) were employed for the purpose with minimal additional debris recovery.

The trawl sweeps covered the 500 metre safety zone of all wellheads from a variety of compass approaches and all existing pipeline corridors in a zig-zag pattern along the length of the pipeline from both ends to provide full and effective coverage.

Figure 7 Typical Sweep Pattern of FFFA Well Centres

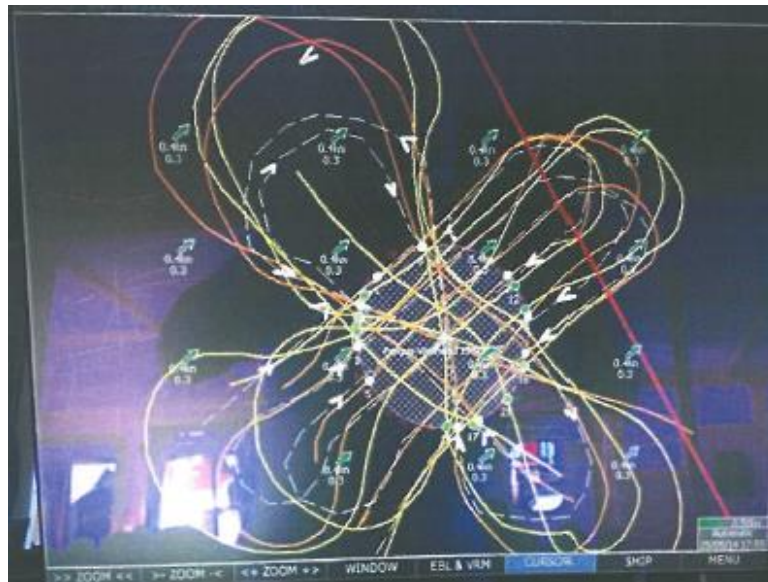


Figure 8 Typical Sweep Pattern of FFFA Pipeline Corridors

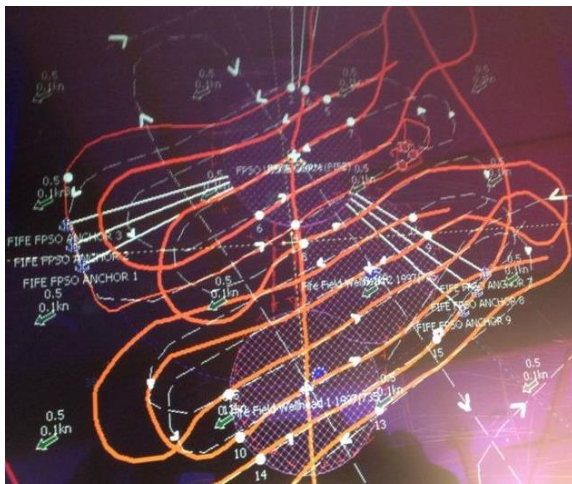


SECTION 5 : POST DECOMMISSIONING ACTIVITIES

The defined scope of work also included a detailed sweep pattern over the Armorflex mattress rock dump location within the original FPSO 500m zone area to ensure rock dump profile stability and over-trawlability. The vessel completed several sweeps over the area from different compass approaches as shown below in Figure 9, with no snags or hazards identified.

Accordingly the area has been deemed clear for the resumption of normal fishing vessel activities.

Figure 9 Fife Central Armorflex Mattress Location Sweep Patterns (FPSO 500m Zone)



Day 10 Sweeps



Day 11 Sweeps



Day 12 Sweeps



Day 13 Sweeps

SECTION 5 : POST DECOMMISSIONING ACTIVITIES

During the Fife area chain mat sweeps, a snag hazard on hard debris was identified outwith the defined 500 metre safety zones whilst the vessel was executing a turn to adopt a different approach path to continue sweeping the 500 metre zone. The chain mat could not be released from the snag and was deposited in order to release the vessel and allow further investigation.

On subsequent ROV side scan sonar survey of the objects they were identified to be cylindrical in shape, measuring 20.6m x 3m and 18m x 3m (length x diameter) respectively. It was apparent they were non-oil related, possibly being two steel tower sections for a wind farm forming part of a cargo that was lost at sea from the vessel Lass Moon en route from Denmark to Lewis during rough weather in late October 2006.

The items have not been recovered, the location is noted on the Clearance Trawl Sweep Certificate and both Fishsafe and the UK Hydrographic Office have been informed.

The entire licensed FFFA area was deemed to be snag free and safe for normal fishing activity to resume. The Post Decommissioning Clearance/Verification Trawl Sweep Certificate is attached in Appendix 2.

Figure 10 Typical Debris Recovery From Trawl Sweeps



5.2 POST DECOMMISSIONING SURVEYS

A combined subsea inspection and environmental sampling survey scope was carried out from 10th to 30th June 2014.

The objective of the survey was primarily to acquire, process and document high quality side scan sonar data and carry out environmental seabed sampling in order to assess the seabed along routes of various pipelines and umbilicals as well as multiple drill centres which have been decommissioned.

SECTION 5 : POST DECOMMISSIONING ACTIVITIES

The main subsea inspection scope of work required side scan sonar lines to be acquired along a 200m corridor of pipeline and umbilical routes, Fife central location and all drill centres which have all been decommissioned to locate debris and any movement to remaining buried/trenched pipeline sections (set at a minimum of 0.6m below seabed).

The purpose was to identify any anomalies which may pose a risk to trawling activities utilising a Remotely Operated Vehicle (ROV).

Side scan sonar data were acquired using either a free tow Edgetech 4200-FS side scan sonar operated at high frequency (75m range at 410kHz) or a MacArtney FOCUS-2 Remotely Operated Towed Vehicle (ROTV) mounted with side scan sonar transducers operated at high frequency (75m range at 600kHz).

The Environmental Baseline Survey was a repeat of the 2010 Pre-Decommissioning Environmental Baseline Survey with sampling at 66 stations using a Day or Dual Van Veen grab, capable of recovering one or two 0.1m² samples respectively in a single deployment

5.2.1 Area Seabed Clearance Survey

The seabed was found to be relatively uniform and featureless across the entire survey area. The seabed sediments across the survey area are interpreted to comprise sand. Radial anchor patterns, conceivably due to decommissioning operations and regions of disturbed seabed including associated anchor pull out pits, were observed around the previously drilled Flora Production Centre, Angus and Fergus Well Centres, Fife Drill Centre and Central Location and Flora WI Centre. In addition, some small gravel dumps remain associated with the previously drilled Fife Drill Centre and Flora Production and WI Centres. Numerous trawl scars were observed across the survey area.

A total of 265 targets were identified within the entire survey area. The majority of these are interpreted as boulders, depressions, anchor pull out pits, sections of protective mattress and small debris items, none of which pose additional risk.

5.2.2 Environmental Baseline Survey

Sample Collection

Four samples were acquired from each of the stations, with three replicates from each station retained for macrofaunal analysis; these were fixed in circa 8% formal saline solution. From the surface of the fourth grab, subsamples were taken for physico-chemical analyses. Two subsamples were taken, using a solvent-cleaned metal scoop, for hydrocarbon analysis, while samples for heavy metals analysis were recovered using a cleaned plastic scoop. Further samples were taken for particle size analysis, total organic carbon and organic matter. Samples for physico-chemical analyses were then frozen. Of the three replicates obtained for macrofaunal analysis only two will be analysed, with the third analysed should a large variation exist between the first two samples.

The environmental sampling stations are presented in Table 4.

SECTION 5 : POST DECOMMISSIONING ACTIVITIES

Table 4 FFFA Environmental Survey Sample Stations Summary

Location	Stations	Grabs Taken		Samples Analysed	
		Chemistry	Biology	Chemistry	Biology
Fife	21	21	63	21	42
Flora	15	15	45	15	30
Fergus	15	15	45	15	30
Angus	15	15	45	15	30
Total	66	66	198	66	132

Sample Analysis

Seabed samples were taken from a total of 66 sites around the former Uisge Gorm FPSO production area which included the Fife, Fergus, Flora and Angus fields. These samples were analysed to determine the presence and characteristics of the following;

- Hydrocarbon contamination; both aliphatic and aromatic hydrocarbons
- Heavy metal content (including barium)
- Macrofauna
- Sediment type (including particle size analysis)

The selected sample sites and analyses were kept similar to those from the previous seabed sampling survey carried out in 2010 wherever possible.

Overall, the analysis found a slight decrease in sediment mean diameter and for the most part hydrocarbon (THC) and total barium levels compared to the 2010 data. Seabed contamination by hydrocarbons, including OBM, was found to be lower in 2014 than recorded in 2010 at Fife, Flora and Angus and only very slightly higher at Fergus. The residual contamination, $>50 \mu\text{gg}^{-1}$ (only observed at Fergus station FE02), was found to be restricted to within 250m of the original wellhead locations hence the calculated persistence level would be less than the OSPAR threshold value of $500 \text{ km}^2\text{yr}$.

The concentrations of heavy metals were by and large slightly elevated in comparison to those measured in 2010, however levels did fluctuate between lower and higher for most metals across the sites. The macrofaunal analysis found that, for the most part, the seabed communities comprised species indicative of undisturbed communities in the central North Sea. The macrofauna was, in general, similar to that expected in this area of the central North Sea. Differences identified between the communities pre and post-decommissioning were attributable to natural variations in the taxa across the survey area.

The analyses results will be made available to DECC upon completion of the reports.

6 DECOMMISSIONING PROGRAMME OUTCOME

6.1 PROJECT SUMMARY AND CONCLUSION

The Fife, Fergus, Flora and Angus decommissioning activities were carried out in accordance with the approved Fife, Fergus, Flora and Angus Fields Decommissioning Programmes (ADP-010, 16th February 2012).

The approved Fife DP1 Section 34 Amendment (Petroleum Act 1998) described in Section 4 was also complied with for rock dumping the unrecoverable Armorflex mattresses with the final berm closely adhering to the initial berm design and latterly being subjected to overtrawl trials successfully.

Phase 1 of the project, which commenced in 2008, encompassed CoP, full field shutdown, flushing of the subsea pipeline infrastructure and suspension of all wells. The flexible riser system was disconnected and FPSO Uisge Gorm taken off location.

Agreements were in place for field partners to assess redevelopment options hence field suspension included flooding the pipeline infrastructure with fluid anti-corrosion inhibitor protection for a period of up to 5 years.

The field remained in the suspended state during this period, but commensurately by agreement with DECC the marine related infrastructure was removed to mitigate the hazard of the flexible riser system present in the mid-water column. The FPSO mooring system was also disconnected subsea and removed.

Field partners concluded their redevelopment studies and relinquished any field redevelopment options in December 2010, at which time the fields were released for full field decommissioning. Planning commenced for full field decommissioning, with the Decommissioning Programme being granted approval in February 2012.

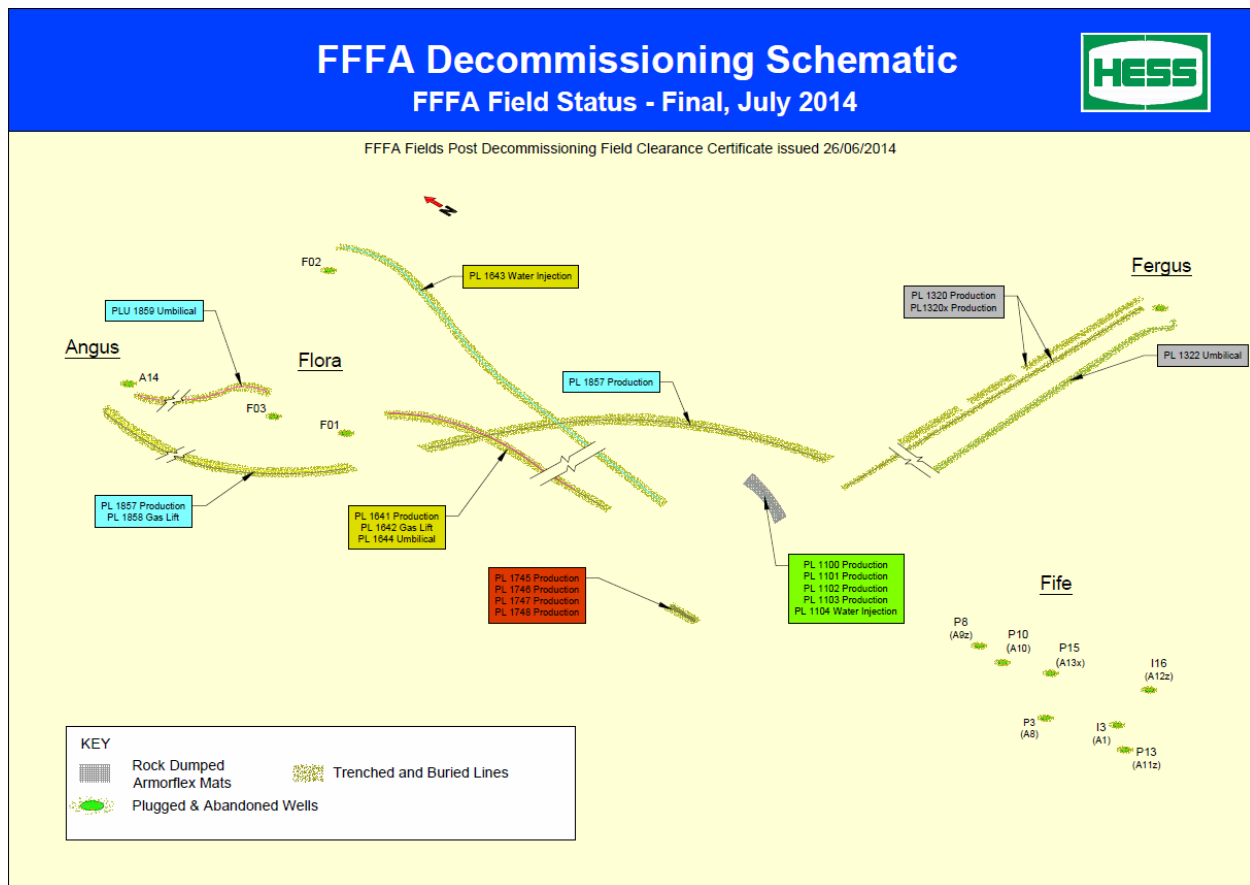
Phase 2 of the project to remove all seabed surface infrastructure and complete well abandonments were carried out between early 2012 and early 2014, with the final well abandonment completed on the 14th January 2014.

All subsea facilities decommissioning and well abandonment operations were carried out under the appropriate permit regime. The wells have been abandoned with two tested barriers within the well, with the casing milled back to formation where necessary, plus a seabed surface environmental barrier. The remaining sub-seabed surface infrastructure (namely previously buried pipelines and piles) have been proven to meet the criteria on minimum burial depth of 0.6m, with 1m being the target burial depth for pipeline ends. The unrecoverable mattresses have been rock dumped with an approved profile, providing a cover of a minimum of 0.6m.

Data compiled from subsequent surveys and tests give evidence to the final condition of the seabed surface being stable and it is likely to remain so.

Hess has therefore concluded that the FFFA Decommissioning Project has met all its statutory obligations in returning the seabed back to its natural state as far as possible.

Figure 11 FFFA Fields Layout Schematic (Post-Decommissioning)



6.2 LEGACY MANAGEMENT

Following completion of the FFFA decommissioning workscope, the HSE and UKHO were notified of the changes. SI 2011 No. 2492 (The Offshore Installations [Safety Zones] Order 2011) came into force on the 14th November 2011 and includes the revocation of the FFFA safety zones.

The Statutory Safety zones in place at the Fife, Fergus, Flora and Angus field were:

SI 1997 No 735 - Fife 1&2 and Fergus	SI 1998 No 1660 - Flora 1&2
SI 2001 No 2528 – Angus	SI 2008 No 2157 - Fife Central

An application for revocation of these zones was submitted to the HSE on 14th July 2014. The Kingfisher service has also been notified of seabed clearance status.

The sections of flowline remaining buried in situ number 7 in total, and umbilicals 3:

- Fergus – PL1320, PL1320x (production) and PL1322 (umbilical)
- Flora – PL1641 (production), PL1642 (gas), PL1643 (WI) and PL1644 (umbilical)
- Angus – PL1857 (production), PL1858 (gas) and PL1859 (umbilical)

PL1641, PL1642 and PL1644 are all trenched together, as are both PL1857 and PL1858.

SECTION 6 : **DECOMMISSIONING PROGRAMME OUTCOME**

In the central Fife area there is an existing rock dumped area 100m long over 4 matted flowline sections that was installed in 2000 to protect the flowlines from the FPSO mooring chains. In addition, there is a newly installed rock dumped area 75m long covering 5 earlier abandoned flowline sections and unrecoverable mattresses.

As-left data burial depth for all lines and rock dump areas has been reviewed and compared with earlier data where possible with the average burial depth being well in excess of the minimum 0.6m criteria and in excess of 1 metre in most cases. There has been no perceivable change in burial depth over the period.

The Field Over-trawl Trials carried out by SFF confirmed that the FFFA licence area is free of seabed obstructions and the area is open for normal fishing activity to resume with application for revocation of safety zones submitted. All FFFA areas were thoroughly swept both by chain-mat and trawl net in the field overtrawl trial, including all decommissioned wells' 500m zones, existing pipeline corridors and Fife Central FPSO 500m zone within which both the existing and new rock dump installations are located.

In addition, the Seabed Clearance Survey confirmed minimal topographical changes and no additional hazards were identified.

Comparison of the 2010 Environmental Baseline Survey results with those of the recent 2014 survey indicated an overall decrease in seabed contamination. From the soil sample analysis results, the residual contamination calculated persistence levels less than the OSPAR threshold value of 500 km²/yr and indications of undisturbed seabed communities.

Historical fishing activity data (2008 - 2012) has also been considered for the area which indicates that minimal fishing activity has taken place overall.

Summary

Six years have elapsed since the FFFA field decommissioning project commenced with the field initially put into suspension until all partner and government approvals were in place.

All remaining subsea infrastructure has been subject to annual survey inspection in the intervening period, with the pre-decommissioning baseline survey taking place in 2010 and the post-decommissioning baseline survey recently completed in 2014.

The environmental surveys have proven that the elapsed time span has allowed the seabed to return to a stabilised state symptomatic of pre-decommissioning conditions. In addition there are no cuttings piles present.

All inspection surveys carried out have demonstrated that there has been no change in status of the remaining infrastructure, with all residual buried items being dormant and meeting the minimum burial criteria.

The field decommissioning standards employed have ensured the seabed residual condition is fully compliant with regulatory standards with little risk to other sea users remaining. There is minimal likelihood of seabed topographical changes occurring in the future as a result of the decommissioning activities carried out.

SECTION 6 : **DECOMMISSIONING PROGRAMME OUTCOME**

The frequency of surveys carried out both before and during the field decommissioning since CoP, the burial depth of remaining items and the final field clearance, inspection and condition verification regime have all been taken into account during the As-Left Seabed Status Assessment. Vessel traffic in the area is generally at a low volume and Hess is satisfied of seabed stability and the fact that it is likely to remain static in the future.

All relevant supporting data has been provided and the future monitoring strategy will be discussed and agreed with DECC.

7 PROJECT MANAGEMENT

7.1 OVERVIEW

Hess assembled a multi-disciplined project team with the responsibility of executing the decommissioning of Fife, Fergus, Flora and Angus subsea wells and infrastructure in a safe manner whilst protecting the environment and complying with Hess EHS&SR Goals and Objectives.

The project scope was principally executed by contractors working in conjunction with the Hess project team and in compliance with Hess expectations, their own Management Systems and regulatory requirements.

7.2 EHS STRATEGIC OBJECTIVES

The EHS Objective can be defined as:

- The return of Fife, Fergus, Flora and Angus fields seabed area to acceptable condition with minimum Environmental Impact whilst meeting Hess EHS&SR Goals and Objectives.

The Project EHS Aim can be defined as:

- To achieve upper quartile EHS performance and ensure that both Hess and their contractors identify, manage and minimise all EHS risks appropriately throughout all project phases.

The Project EHS Deliverables can be defined as:

- Minimising the potential for injury to personnel and harm to the environment
- Re-use or recycle 95% of recyclable materials of recovered product with the minimum of waste disposal to landfill
- Compliance with Legislation and Regulatory Standards.

7.3 WASTE DISPOSAL

Hess intention has been to identify re-use opportunities for all the recovered equipment/materials as far as possible. Where re-use was not possible, materials were to be recycled with the final option being landfill of residue.

An onshore Waste Management Company was appointed for the sole purpose of receiving incoming materials from offshore, handling and processing (re-use and recycling with minimum landfill) as appropriate in accordance with applicable legislation.

Any disposal of waste relating to the FFFA Decommissioning Project was recorded and the Waste Disposal Summary is presented in Table 5.

SECTION 7 : PROJECT MANAGEMENT

Table 5 Material Waste Disposal Tonnage Summary

Material	Tonnage Re-used	Tonnage Recycled	Tonnage Disposed
Steel	1358.7	4492.12	4
Composites	0	0	79
Concrete	3085.9	0	200

Table 6 Material Waste Disposal Percentage Breakdown

Percentage Re-used	Percentage Recycled	Percentage Landfill
48.21%	48.72%	3.07%

Any variance in recovery data is attributable to the completion tubing being recovered from all wells to effect satisfactory abandonment in accordance with Hess standards.

The compiled data confirms that Hess has well and truly exceeded the internal project target of re-use and recycling a minimum of 95% of all recovered recyclable materials and minimum disposal to landfill, with a total of 97.93% of materials being reused or recycled.

The combined material tonnage of all flowlines and umbilicals left buried in situ equates to approximately 3992te of steel and 351te of composites.

The total tonnage of concrete from the rock dumped mattresses is approximately 342te.

NORM Scale Management

NORM scale contaminated materials were decontaminated by high pressure jetting under permit, and the non-exempt scale disposed of through Veolia Environmental Services Hazardous Waste Incinerator at Ellesmere Port. High Temperature Incineration is a proven solution destroying wastes at temperatures of up to 1200°C to guarantee 99.99% efficiency.

Table 7 NORM Scale Disposal Record

NORM Scale Source	Weight of Scale (Tonnes)
PL1745:	36.2
Well Completion Tubulars:	37.1

7.4 CONTROL OF PROJECT PERMITS

A Project Licences and Consents Register (PLANC) was created as per the Petroleum Act 1998 requirements to ensure that all operations were carried out under the auspices of the applicable legislation.

7.5 KEY PROJECT LEARNINGS

Execution philosophy has evolved during the lifecycle of the project with key learnings from each phase being captured and implemented during future activities as far as possible.

Topic	Learning Point
Data retention	Accurate recording of historical subsea configuration changes to wells and infrastructure is essential for efficient decommissioning planning.
Ageing Infrastructure - Flexible riser integrity	Increased risks associated with recovering flexible risers of deteriorated integrity.
Efficiency of subsea infrastructure flushing regime during decommissioning	Removal of entrained hydrocarbons from all associated subsea flow-lines achieved by accurate as-left status mapping prior to devising subsea infrastructure flushing programme.
Disconnection of flowline infrastructure from subsea trees	Initiate as early as possible during field suspension phase after CoP to mitigate against the potential for well pressure migration through shut-in trees.
Removal of subsea infrastructure by cutting and lifting in sections	Seabed surface pipeline topography mapping to be understood prior to cutting subsea pipelines. Cutting methodology to allow for remedial containment plan in the event of trapped hydrocarbons at high points.
Ageing Infrastructure - Subsea mattresses construction	Evaluate subsea structures integrity prior to defining recovery inventory, decommissioning strategy and programme approval.
NORM scale management	Evaluate recovery to shore vs decontaminate and dispose offshore vs leaving contaminated components buried in situ subsea to arrive at the optimal solution with minimum environmental impact and EHS risks.

SECTION 7 : PROJECT MANAGEMENT

Topic	Learning Point
Well Abandonment	The use of dedicated disposal wells to flush subsea flow lines clear of residual hydrocarbons prior to disconnecting at the tree wing flange (production or injection) can result in serious well control uncertainty and clean up issues during the future well abandonment phase.
Well Abandonment	Recovery of completion tubing and verification of casing cement bond by logging essential to dictate requirement for section milling and provide assurance of effective casing / zonal isolation in perpetuity.

Consistent, effective and regular external stakeholder dialogue was an integral part of ensuring successful project completion.

8 PROJECT COSTS**8.1 COST SUMMARY**

The project cost is based on the abandonment of a total 12 Fife, Fergus, Flora and Angus wells in accordance with Hess Global Standards for Well Abandonment, the decommissioning and full removal of subsea seabed surface infrastructure as per approved FFFA Field Decommissioning Programmes, and recycling of 95% of recyclable materials.

The cost basis includes:

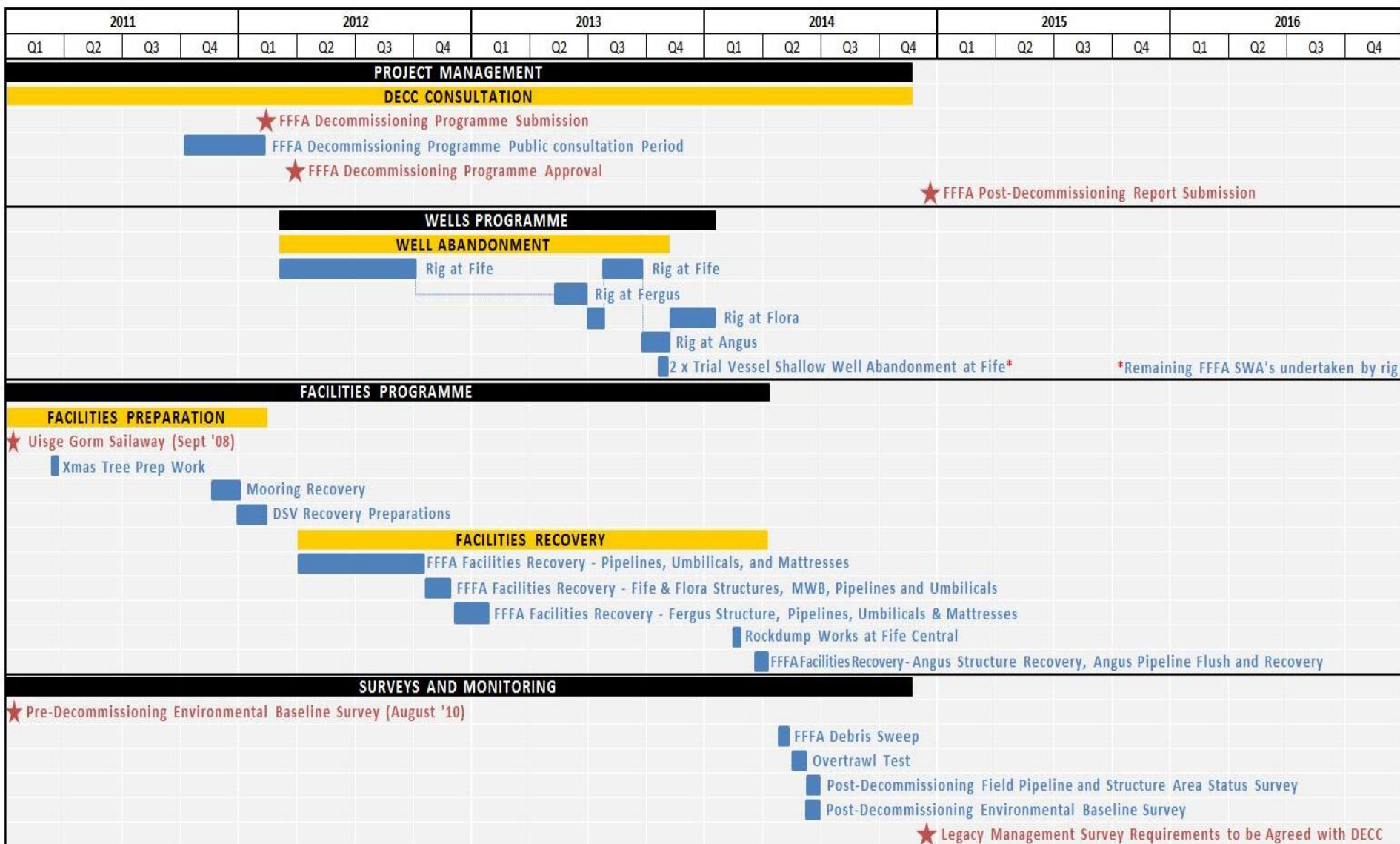
- Project Management and Engineering
- Execution of the Decommissioning Works
- Onshore receipt, recycling or disposal of materials where recycling is not possible
- Field surveys and monitoring

The overall project cost data is summarised in Table 8 below, showing both the estimated cost per Hess letter reference JW/LT/ip/DECC of January 2012 and the final actual project cost in £M.

Table 8 Cost Data Summary (£M Gross)

Project Spend to End September 2014			
		Estimate	Actual
PHASE 1	Includes: Suspension Costs, FPSO Removal, Subsea Disconnections, Flexible Riser System Removal, Mooring System Recovery, Waste Management	£44.0	£44.6M
PHASE 2	Includes: Suspension Costs, Well Abandonment, Subsea Infrastructure Removal, Field Surveys, Rock Dump, Waste Management	£176.5M	£221.3M
PHASE 1 & 2	OVERALL TOTAL	£220.5M	£265.9M

Variations in actual cost versus estimated cost are attributed principally to the well abandonment campaign requirements post Macondo and the additional scope of rock dumping non-recoverable mattresses.



ACTUAL FFFA DECOMMISSIONING PROJECT EXECUTION SCHEDULE

APPENDIX 2: SEABED CLEARANCE CERTIFICATE



Our Ref:

Your Ref:

26th June 2014

SFF Services Limited
24 Rubislaw Terrace
Aberdeen, AB10 1XE
Scotland UK

T: +44 (0) 1224 646966
F: +44 (0) 1224 647078
E: sff.services@sff.co.uk


www.services.sff.co.uk

HESS SERVICES UK LIMITED: FIFE, FLORA, FERGUS AND ANGUS (FFFA) FIELDS POST DECOMMISSIONING CLEARANCE / VERIFICATION TRAWL SWEEPS

This is to certify that the MV "Rebecca" FR 143 has carried out a full post decommissioning sea bed / trawl verification sweep of all seven 500 metre safety zones, possible anchor mounds and connecting pipelines.

We believe, to the best of our knowledge, and using best endeavours and practice available, that the areas mentioned have been successfully cleared of all equipment / infrastructure to allow normal fishing to be resumed safely. See further observation note below.¹

Signed for on behalf of the Owners of the MV "Rebecca" FR 143


.....
ADAM TAIT
(Name of Skipper) (Skipper)

Signed for on behalf of SFF Services Limited


.....
JOHN WATT - INDUSTRY ADVISOR
(Name) (Designation)

¹ Please note that there are two tubular items estimated between 15 and 30 m long x 3 and 4 m diameter and between 30 and 40 tonnes in weight at this location. There are no plans for recovery of these items, therefore beware of the trawl hazard that they represent. It is recommended that all fishing vessels maintain a safe distance from the obstruction. The coordinates for the snagging hazard are: 56°00.844'N 003°11.816'E
Please note the debris has been confirmed as non-Hess related

A company wholly owned by the Scottish Fishermen's Federation VAT Reg No: 898 429 807
Registered in Scotland Company No: SC 098563 Registered Office: 24 Rubislaw Terrace Aberdeen, UK, AB10 1XE

