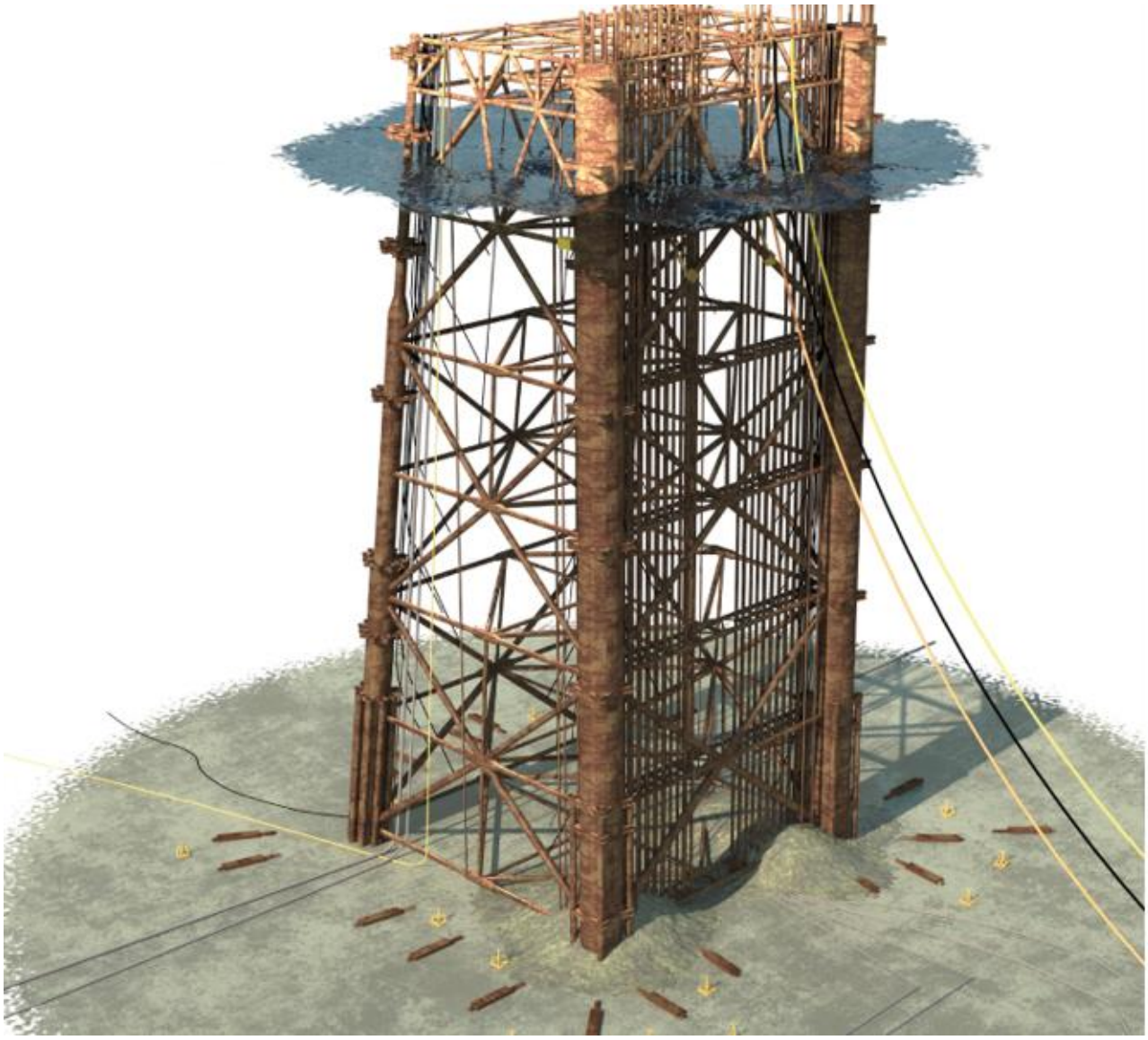
Thistle Alpha Platform
Upper Jacket
Decommissioning Programme



Consultation Draft

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TABLE OF TERMS AND ABBREVIATIONS

ABBREVIATION	EXPLANATION
~	Approximate
<	Less than
>	More than
1568 (Figure 1.6.2)	DANICE
1737 (Figure 1.6.2)	CANTAT-3
Britoil	Britoil Limited
CANTAT-3	The fibre-optic submarine telecommunications cable system CANTAT-3 became ready for service around November 1994. The system has a length of 2,500km and is owned and/or operated by Faroese Telecom. CANTAT-3 has landing points in Denmark, Germany, Faeroe Islands, and Iceland.
Chrysaor	Chrysaor Production (U.K.) Limited (refer Table 1.6.1)
CNRI	CNR International (UK) Limited (refer Table 1.6.1)
COABIS	Component Orientated Anomaly Based Inspection System™ (database)
COS	Crude Oil Storage (tanks)
DANICE	The DANICE submarine communications cable system transits 2,250km of the North Atlantic Ocean and the North Sea to connect Landeyjarsandur, Iceland and Blaabjerg, Denmark. The cable went into operation in November 2009. The owner of the cable is Farice ehf, a Faroese telecommunications provider.
DGFI	Dunlin Fuel Gas Import
DP	Decommissioning Programme (refer Table 1.6.1)
DP	Dynamic Positioning
DSV	Dive Support Vessel
El.	Elevation (relative to LAT)
EMT	Environmental Management Team
EnQuest	EnQuest Heather Limited
FPSO	Flowing Production Storage and Offloading (Vessel)
FPU	Floating Production Unit (refer Table 1.6.1)
GBS	Gravity Based Structure (concrete) (refer Table 1.6.1)
GMG	Global Marine Group
HLV	Heavy Lift (Crane) Vessel
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
in	inch
IPR	Interim Pipeline Regime
Jacket	substructure that supports topsides
Jacket footings	Part of jacket or substructure resting on the seabed up to the highest point of the piles, or a part of the steel installation that is so closely connected as to present

ABBREVIATION	EXPLANATION
	major engineering problems in being severed (refer [6]).
km	Kilometre
L	Length
LAT	Lowest Astronomical Tide
m	Metre(s)
m^2	Square Metre(s)
m^3	Cubic Metre(s)
m/s	Metres per second
MARPOL	The International Convention for the Prevention of Pollution from Ships
MBES	Multi-Beam Echo Sounder (which is a sonar-based seabed imaging system)
MSF	Module Support Frame
N,S,E,W	North, South, East, West
n/a	Not Applicable
NFFO	National Federation of Fishermen's Organisations
NIFPO	Northern Ireland Fish Producers Organisation
NLGP	Northern Leg Gas Pipeline
NORM	Naturally Occurring Radioactive Material
NSTA	North Sea Transition Authority
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OSPAR	Oslo Paris Convention
PL	Pipeline Identification numbers (UK)
SALM	Single Anchor Leg Mooring
SFF	Scottish Fishermen's Federation
SLV	Single Lift Vessel
SOPEP	Ship Oil Pollution Emergency Plan
SSCV	Semi-Submersible Crane Vessel
SSIV	Subsea Isolation Valve
TAQA	TAQA Europa B.V. (refer Table 1.6.1)
Te	Tonne
TFSW	Transfrontier Shipment of Waste
Thistle	Thistle Alpha
UK	United Kingdom
UKCS	United Kingdom Continental Shelf
W	Width
WGS84	World Geodetic System 1984
x	Number of…

1. EXECUTIVE SUMMARY

1.1 Decommissioning Programme

This document presents the Thistle Alpha (referred to as Thistle) upper jacket Decommissioning Programme.

The jacket footings, topsides and pipeline infrastructure covered by notices under Section 29 of the Petroleum Act 1998 are subject to separate Decommissioning Programmes. The Thistle topsides Decommissioning Programme was approved 23 December 2021. The Decommissioning Programmes for the pipeline infrastructure and jacket footings will be submitted at a later stage.

As the mass of the Thistle jacket is larger than 10,000 tonnes and due to complexities associated with complete removal, it is a candidate for derogation from the requirements of OSPAR Decision 98/3 [6]. This Decommissioning Programme concerns removal of the upper jacket, whereby the jacket will be severed between 65 m and 75 m below Lowest Astronomical Tide ('LAT') with the upper section (upper jacket) being removed. The water depth is ~162 m.

The removal of the topsides and upper jacket will not preclude available decommissioning options for the Thistle jacket footings.

Although decommissioning of the Thistle upper jacket is being treated in this document as part of the Thistle project, EnQuest will continue to explore cost saving synergies with other projects.

1.2 Requirement for Decommissioning Programme

Installations: In accordance with the Petroleum Act 1998, EnQuest Heather Limited (as operator of the Thistle field), and on behalf of the Section 29 notice holders (Table 1.4.2), is applying to the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) to obtain approval for removal of the Thistle upper jacket as detailed in Section 2 of this document. Partner Letters of Support will be provided directly to OPRED.

In conjunction with public, stakeholder and regulatory consultation, this Decommissioning Programme document is submitted in compliance with national and international regulations and OPRED guidance notes [1]. The schedule outlined in this document is for a 5-year period to remove the upper jacket down to the top of the jacket footings and return it to shore for recycling, and earliest removal and disposal due to begin in 2025.

1.3 Introduction

The Thistle field was discovered in 1972 in the fourth UK acreage licensing round in block 211/18 and 211/19 (licenses P236 and P475). The field is produced over the Thistle Alpha platform (here after referred to as the Thistle A platform), a fixed installation providing manned production, drilling, and utilities facilities. The Thistle A installation is situated in block 211/18a of the United Kingdom Continental Shelf and operated by EnQuest Heather Limited. The Thistle field is located ~201km North-East of Shetland, in a water depth of ~162m.

The Thistle jacket was installed in 1976 with the topsides' modules being installed in the following year. Oil production commenced in February 1978.

Decommissioning of the Thistle topsides and pipelines (PL13, PL74, PL75, PL2578, PL4555, and PL4556) associated with Thistle will be subject to separate Decommissioning Programmes. The Thistle Topsides Decommissioning Programme was approved 23 December 2021.

A Cessation of Production application for Thistle was accepted by the Oil and Gas Authority[1] on 14th September 2020.

The Thistle substructure is a steel jacket that weighs more than 10,000 tonnes in air, being a weight of 33,734 tonnes[2] (including piles to a depth of 3m below mudline) and along with the Section 29 holders EnQuest believes that there is a case to be made for derogating the jacket footings from the requirements of OSPAR Decision 98/3. This Decommissioning Programme is concerned with removal of the upper jacket. It is supported by an environmental appraisal in section 4.

1.4 Thistle overview

1.4.1 Installation

Table 1.4.1: Installation being decommissioned			
Field(s):	Thistle	**Production Type**	Oil
Water Depth (m)	~162 m	**UKCS Block**	211/18a
Distance to median (km)	~11km (Norway)	**Distance from nearest UK coastline**	~201 km NE of Shetland
Surface Installations			
Number	**Type**	**Mass (Note 1)**	
1	Jacket	Upper jacket 11,320 Te	

NOTE

1. Estimated mass of upper jacket includes a nominal 566 Te of marine growth. Total mass of the jacket including the footings and piles is 44,104 Te.

1.4.2 Drill Cuttings

Drill Cuttings pile[3]			
Number of Piles	1	**Total Estimated Volume (m³)**	31,651

NOTE

1. For information and context, Thistle has a drill cuttings pile with an estimated volume 31,651 Te. The decommissioning proposals for the drill cuttings will be addressed in the Decommissioning Programme for the jacket footings.

During the early years of Thistle platform operations, drill cuttings were discharged to the seabed via the two drill cuttings caissons. Accumulation of the drill cuttings has resulted in the burial of some of the jacket bottom plan members, most notably the conductor guide frame.

Drill cuttings comprise a mixture of lubricating fluids ('mud') and rock chippings that are brought to surface during the process of drilling an oil and gas well. Various types of drilling mud are used depending on the type of well drilled. Diesel was often added to the fluid offshore because it was believed to improve performance.

There is a drill cuttings mound underneath the jacket structure. During a survey in 2021 multibeam echosounder ('MBES') mapping recorded the cuttings mound geometry [2]. The natural seabed profile was extrapolated from the surrounding background and two overlapping drill cuttings mounds could be identified. As they merge in the middle they are treated as a single

[1] Rebranded North Sea Transition Authority in early 2022.
[2] Including the footings and the mass of the piles penetrating in the seabed.
[3] Volume of drill cuttings pile based upon Thistle pre-decommissioning survey conducted in 2020.

drill cutting mound with an estimated maximum drilling discharge deposition depth of 8.3 m for the South Western peak and 5.8 m for the south eastern peak. The volume and footprint of mound has been calculated to be 31,651 m^3 and 26,422 m^2, respectively.

The surface of Thistle cuttings mound is generally covered in a veneer of mussel of varying densities. Mussel shell cover was prevalent throughout, with the thickness of the layer reducing with distance away from the jacket [3].

In addition to the mussel cover, stony coral (*Desmophyllum pertusum*) rubble is also present throughout the cuttings mound. Inside the jacket structure satellite colonies are found on the cuttings mound itself along with occasional clumps of live mussels, likely to have originated from the jacket and with seabed survival dependant on the hard substrate and modified currents from the presence of the jacket footings.

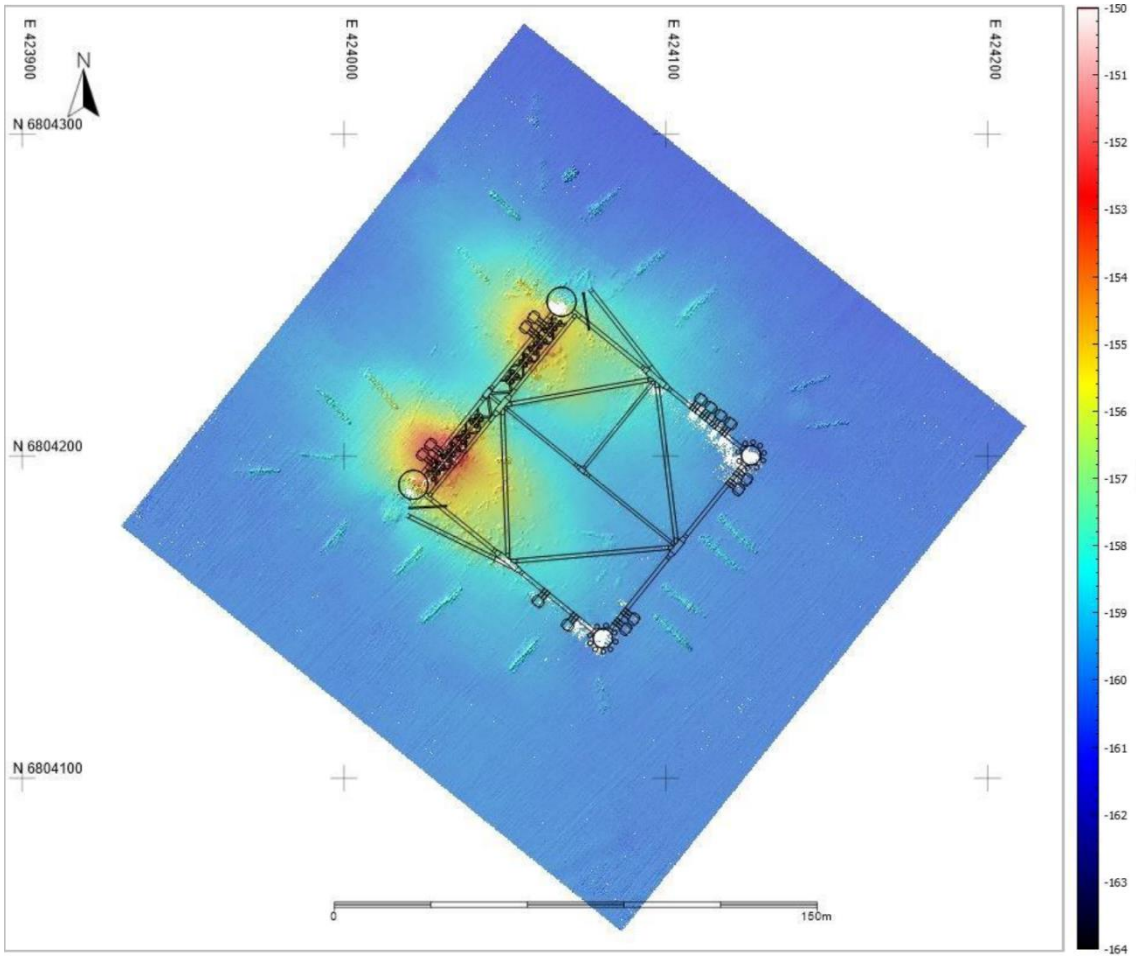


Figure 1.4.1: Drill cuttings mound – plan view of MBES data (2021)

Multiple items of seabed debris have been observed on ROV survey footage, including scaffold poles, fenders, caissons, etc.

1.4.3 Section 29 holders

Table 1.4.2: Section 29 notice holder details - installation		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)[4]**
EnQuest Heather Limited	02748866	-
Britoil Limited	SC077750	81.72%
Chrysaor Production (U.K.) Limited	00524868	18.28%
EnQuest Thistle Limited	04487223	-

Table 1.4.3: Section 29 notice holder details – Thistle field risers		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)[4]**
EnQuest Heather Limited	02748866	-
Britoil Limited	SC077750	81.72%
Chrysaor Production (U.K.) Limited	00524868	18.28%
EnQuest Thistle Limited	04487223	-
NOTE 1. The Thistle field risers comprise PL13, PL74, PL75, PL166 (NLGP), and PL4555.		

Table 1.4.4: Section 29 notice holder details – Don field risers		
Section 29 Notice Holder	**Registration Number**	**Equity Interest (%)**
EnQuest Heather Limited	02748866	-
Britoil Limited	SC077750	81.72%
Chrysaor Production (U.K.) Limited	00524868	18.28%
EnQuest Thistle Limited	04487223	-
NOTE 1. The Don field risers comprise PL598, PL599, PL600, 4in control umbilical) all housed inside a grout filled caisson connected to the Thistle jacket. 2. Details of the Section 29 Holders for the Don field partners is included for information only. Letters of support will not be required. Refer section 1.2.		

Table 1.4.5: NLGP pipeline and PLU6221 29 notice holder details			
Section 29 Notice Holder		**Registration Number**	**Equity Interest (%)[5]**
Magnus Field Group	BP Exploration Operating Company Limited	00305943	-
	EnQuest Heather Limited	02748866	36.000%
	EnQuest NNS Limited	10573715	-

[4] The Thistle Field is beneficially owned 1% Britoil and 99% by EnQuest. However, the decommissioning liability is shared with the previous Thistle Field owners, Britoil (81.71875%) and Chrysaor Production (U.K.) Limited (18.28125%).
[5] Ownership of the NLGP is the same, but the decommissioning liability is shared slightly differently. It is the decommissioning liability interests that are quoted here.

Table 1.4.5: NLGP pipeline and PLU6221 29 notice holder details			
Section 29 Notice Holder		**Registration Number**	**Equity Interest (%)[5]**
Murchison Field Group	CNR International (U.K.) Limited	00813187	14.004%
	Wintershall DEA Norge AS	985 224 323	3.996%
Thistle Group	EnQuest Heather Limited	02748866	-
	Britoil Limited	SC077750	4.903125%
	Chrysaor Production (U.K.) Limited	00524868	1.096875%
UK Statfjord Field Group	Spirit Energy Resources Limited	02855151	40.00%

NOTE

1. Ownership of the NLGP pipeline (PL166) terminates at the bottom of the Thistle owned NLGP riser.
2. Details of the Section 29 Holders for the control umbilical for the SSIV (PLU6221) are included for information only. Letters of support will not be required, but the NLGP owners will be asked to confirm to OPRED separately the proposals for decommissioning that the NLGP spur pipeline PL166 and control umbilical for the SSIV (PLU6221) and to confirm that they are no longer required.
3. Due to timing, in the absence of a Decommissioning Programme, the owners of PLU6221 (control umbilical for the PL166 SSIV) will liaise directly with OPRED with regard to the fate of the control umbilical before the upper jacket is removed.

1.5 Summary of proposed decommissioning programme

Table 1.5.1: Summary of decommissioning programme	
Proposed Decommissioning Solution	**Reason for Selection**
1. Upper Jacket	
Removal of the upper jacket and recycling. Subject to detailed engineering and design, and confirmation by the removal contractor, the upper jacket will be removed down to between 65 m and 75 m below LAT with the jacket footings to remain *in-situ* pending a later decision on their fate. The upper jacket will be taken to shore for recycling with small quantities of material (<1%) potentially destined to landfill. The exact height of severance is subject to commercial agreements that will be influenced by technical constraints, issues of cross bracing design, cutting technology, structural integrity concerns and lift vessel capacity. Permit applications required for work associated with removal of the jacket will be submitted to the regulator as required. OPRED will be notified once the severance height is confirmed.	Meets regulatory requirements and maximises opportunity for re-use or recycling of materials. Complies with the requirements of OSPAR Decision 98/3.
2. Risers	
Removal of the risers PL13, PL74, PL75, PL166, and PL4555 down to the top of the footings and recycling. The fixed risers on the Thistle jacket will be removed to a height that is at or below the maximum height of upper jacket severance with the lower part of the risers remaining *in-situ*. The upper part of the risers will be taken to shore for recycling with small quantities of material (<1%) potentially destined to landfill. The exact height of severance is subject to commercial agreements. Proposals for the sections of the risers connected to the jacket footings will be addressed in the Decommissioning Programme for the jacket footings.	Meets regulatory requirements.

Table 1.5.1: Summary of decommissioning programme
3.Wells
n/a - covered by the Thistle topsides Decommissioning Programme.
4. Interdependencies
An assessment of alternative use has been made for the Thistle platform and there were no options that were considered economically viable (refer section 3.2.1). Due to timescales of decommissioning, separate Decommissioning Programmes will be submitted in due course for the jacket footings and pipeline infrastructure. The topsides Decommissioning Programme was approved 23 December 2021. The control umbilical for the Northern Leg Gas Pipeline third-party infrastructure will be affected by the decommissioning proposals. Infrastructure associated with the Don South-West and West Dons fields is connected to the Thistle platform. The Decommissioning Programmes for the Dons and West Dons infrastructure was approved 02 August 2021. The jacket footings will be subject to a separate Decommissioning Programme. The removal of the topsides and upper jacket will not preclude available decommissioning options for the Thistle jacket footings. The drill cuttings will not be affected by the proposals for decommissioning the upper jacket.

1.6 Field locations including field layout and adjacent facilities

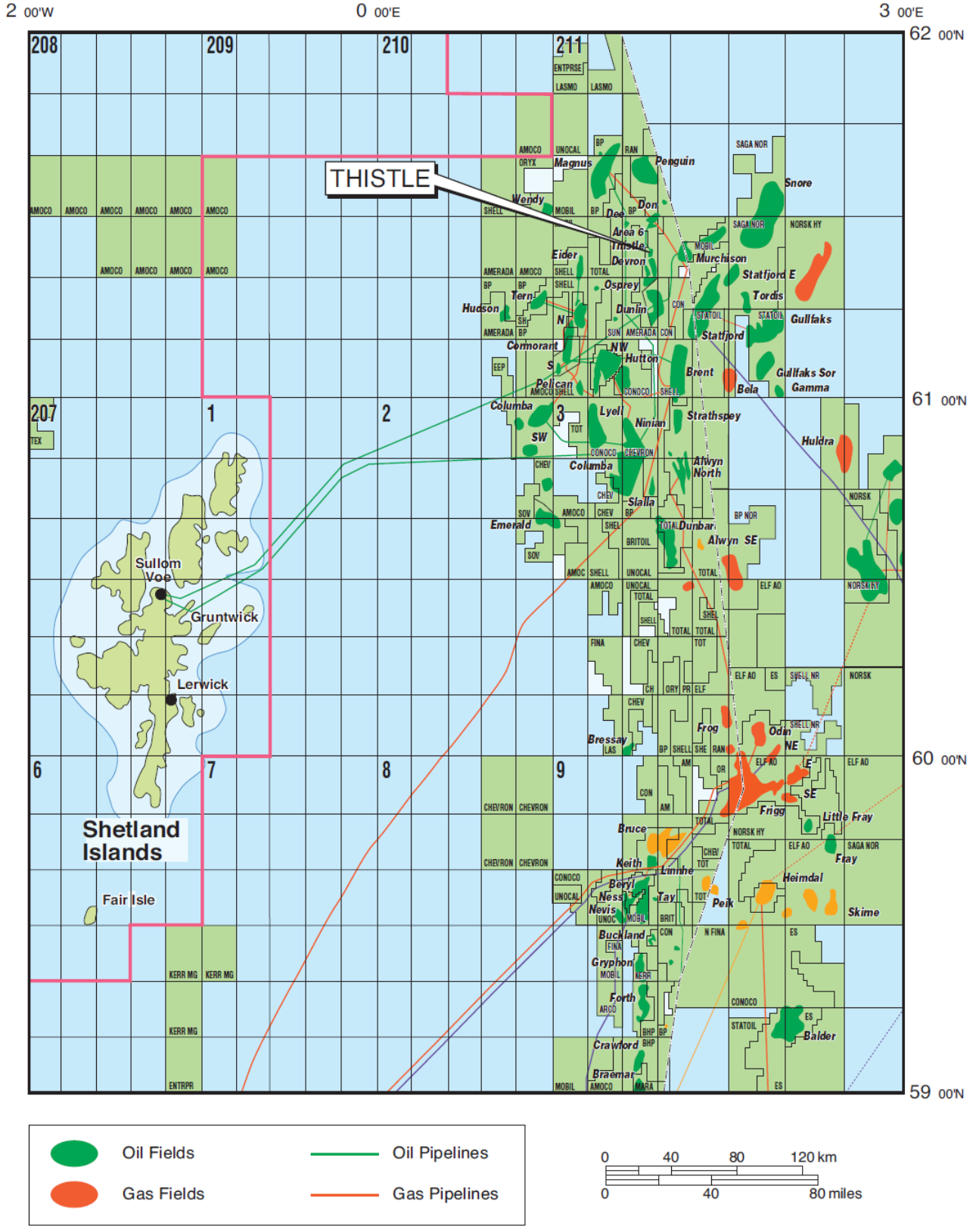


Figure 1.6.1: Thistle Field location in UKCS

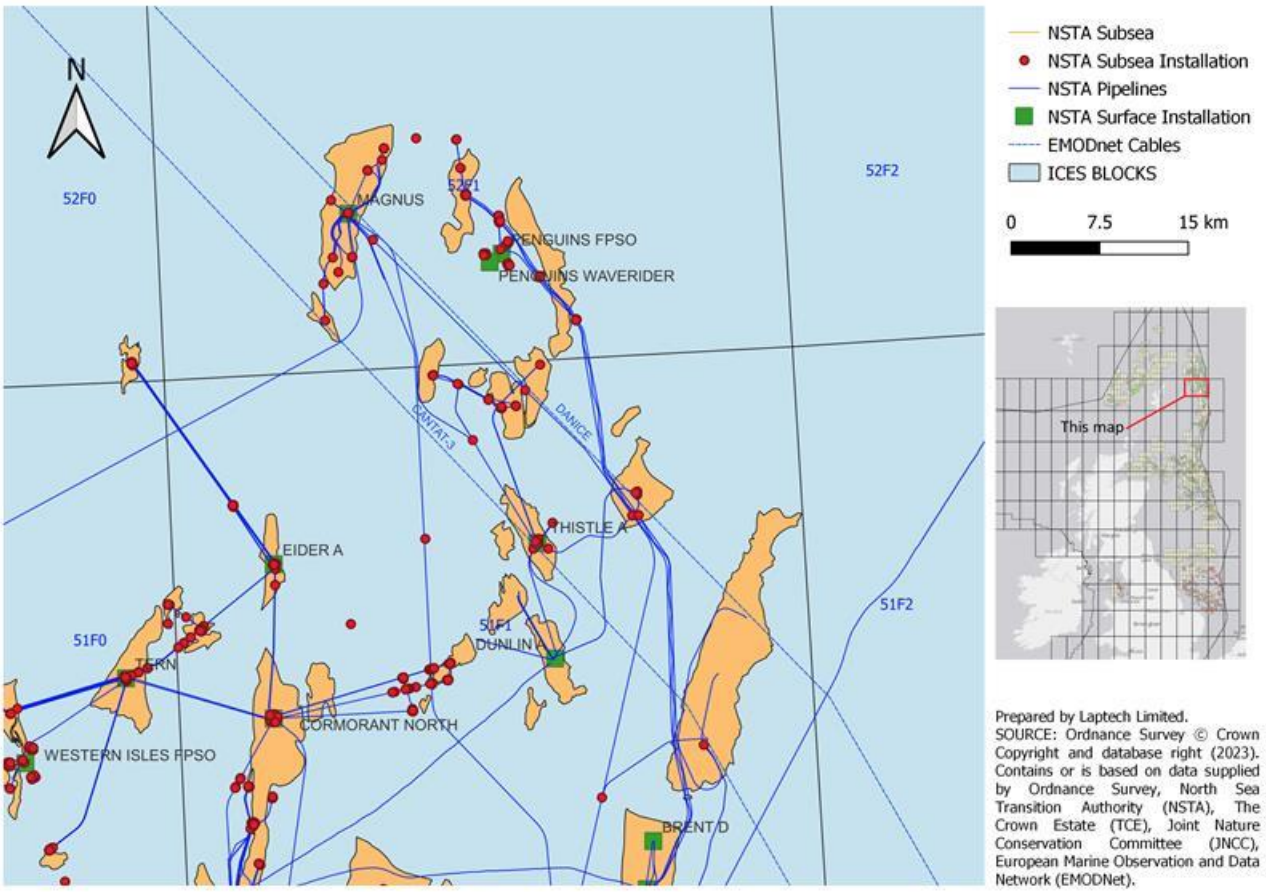


Figure 1.6.2: Thistle adjacent facilities[6,7]

[6] The Northern Producer FPSO and infrastructure within its 500m zone have been decommissioned. The Murchison installation and pipelines have been decommissioned.
[7] For description of telecommunication cables 1568 and 1737 please refer Table of Terms and Abbreviations.

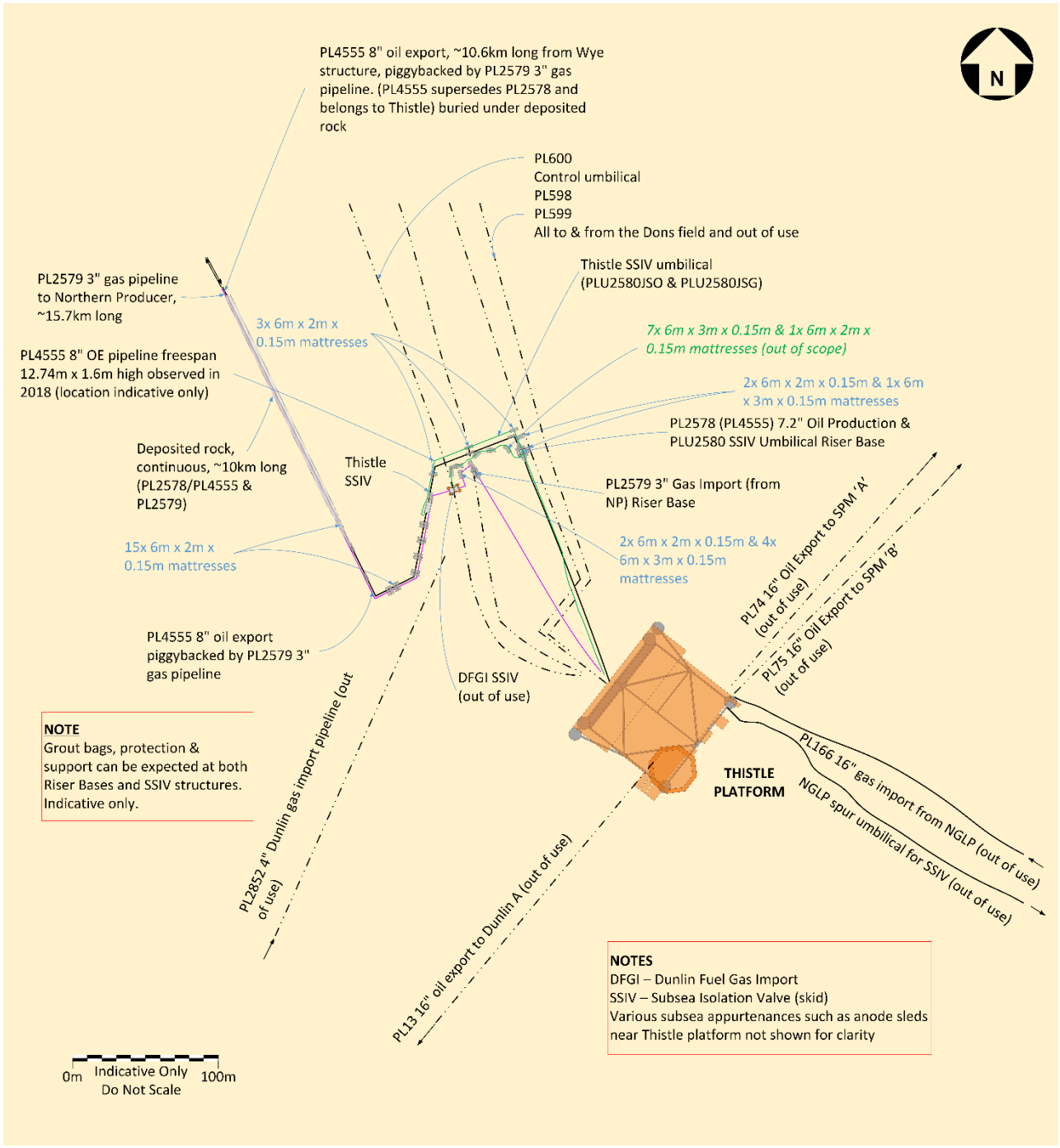


Figure 1.6.3: Thistle 500m zone

Table 1.6.1: Adjacent facilities					
Owner	**Name**	**Type**	**Distance/ Direction**	**Information**	**Status**
CNRI & Wintershall Norsk AS	Murchison	Jacket footings	~9.5km NE of Thistle A	DP approved Aug 2014.	Decommissioned
MCX Dunlin (UK) Limited	Dunlin A	Fixed GBS	~9.7km S of Thistle A	Originally connected to Thistle via PL13, now bypassed.	Decommissioned
TAQA	Eider A	Steel jacket	~22.5km W of Thistle A		Out of use
EnQuest	Thistle	SALM Base	~2.4km NE of Thistle A	Gravity base foundation	Non-operational
EnQuest	Northern Producer	FPU	~15.1km NNW of Thistle A	Tied back to Commingling Wye via PL2578	Decommissioned[1]
Britoil	PL598	Pipeline	8in production pipeline	Pipeline within Thistle 500m zone	Out of use
Britoil	PL599	Pipeline	8in water injection pipeline	Pipeline within Thistle 500m zone	Out of use
Britoil	4in control umbilical	Pipeline	4in control umbilical	Pipeline within Thistle 500m zone	Out of use
Britoil	PL600	Pipeline	3in chemical injection umbilical	Pipeline within Thistle 500m zone	Out of use
EnQuest	Magnus	Fixed steel platform	~32.2km NNW of Thistle A	Connected to Commingling Wye via PL4556	Operational
EnQuest, Britoil, Chrysaor	PL13	Pipeline	16in Oil Pipeline ~12.7km long	Thistle A Platform to Dunlin A Platform. Pipe spool removed at Dunlin A. Pipeline in IPR.	Out of use
EnQuest, Britoil, Chrysaor	PL74	Pipeline	16in Oil Pipeline ~2.4km long	Thistle A Platform to SALM Base	Pipeline currently in IPR. Disused since 1983
EnQuest, Britoil, Chrysaor	PL75	Pipeline	16in Water Ballast Pipeline ~2.4km long	Thistle A Platform to SALM Base	Pipeline currently in IPR. Disused since 1983
EnQuest	PL2579	Pipeline	3in Gas Import (Fuel Gas) Pipeline ~15.7km long	Thistle A Platform to Northern Producer	Out of use
Fairfield Betula Limited, MCX Dunlin (UK)	PL2852	Pipeline	4in Gas Import Pipeline ~10.3km	Thistle A Platform to Dunlin A	Decommissioned

Table 1.6.1: Adjacent facilities					
Owner	**Name**	**Type**	**Distance/ Direction**	**Information**	**Status**
Limited			long	Platform	
EnQuest, Britoil	PL4555 (Includes section of pipeline previously numbered PL2578)	Pipeline	8in Oil Pipeline ~10.6km long	Thistle 'A' Platform to Commingling Wye Structure	Out of use
Impacts of decommissioning proposals					
There are no direct impacts on adjacent facilities from the decommissioning works associated with removal of the Thistle upper jacket.					
NOTE: 1. Refer Decommissioning Programmes for "Northern Producer FPF and Don SW and West Don riser disconnection" and "Conrie, Don South-West, West Don and Ythan" were approved 02 August 2021. These are available here: https://www.gov.uk/guidance/oil-and-gas-decommissioning-of-offshore-installations-and-pipelines.					

1.7 Industrial implications

It is EnQuest's intention to develop a contract strategy and Supply Chain Action Plan that will result in an efficient and cost-effective execution of the decommissioning works. The Thistle upper jacket Decommissioning Programme will be managed by EnQuest to ensure safe, efficient, and legally compliant delivery of the various elements of the decommissioning scope. The intention is to make efficient use of the supply chain to generate value through the application of knowledge, innovation, and technology, explore collaboration opportunities and to employ best practice in the management of the supply chain to deliver a cost effective and reliable service. Where appropriate existing framework agreements may be used for decommissioning activities.

2. DESCRIPTION OF ITEMS TO BE DECOMMISSIONED

2.1 Installation: upper jacket

Table 2.1.1: Surface facilities information					
Name	Facility Type	Location WGS84 Decimal WGS84 Decimal Minute	Upper jacket Weight (Te)	No of Legs	Number of Piles
Thistle Alpha	Fixed Steel Jacket	61.363036°N 1.579761°E 61°21.7821''N 1°34.78567''E	11,320	4	n/a
NOTE 1. Mass of upper jacket includes a nominal 566 Te of marine growth = 10,754 + 566 = 11,320 Te.					

2.1.1 Jacket description

The Thistle jacket was installed in 1976 with an original design life of 25 years and has now been in place for ~45 years. It is a northern North Sea steel piled jacket, a spaceframe structure with four legs and 'K-bracing" on the four primary frames. Three faces are vertical while the fourth has a slope at 1/7.5875. There are eight plan frames in the jacket with the bottom plan nominally 3.1 m above the seabed, but in practice partially buried under drill cuttings.

The jacket has two 9.15 m diameter pontoon legs plus two tapered legs with diameter reducing from 6.1 m at the mudline to 1.83 m at skid deck level. The conductors are at the north-west end of the jacket with guides at all plan levels. The 60 conductor slots are distributed between 40 outboard slots and 10 slots in each of the two large diameter pontoon legs.

The top dimensions of the jacket, measured between leg centres are 73.15 m x 51.82 m, and the corresponding base dimensions of the jacket are 73.15 m x 76.20 m. The overall height of the jacket is 185 m, and its mass is ~32,320 Te, excluding the mass of marine growth and excluding the mass of foundations more than 3 m below bottom of jacket.

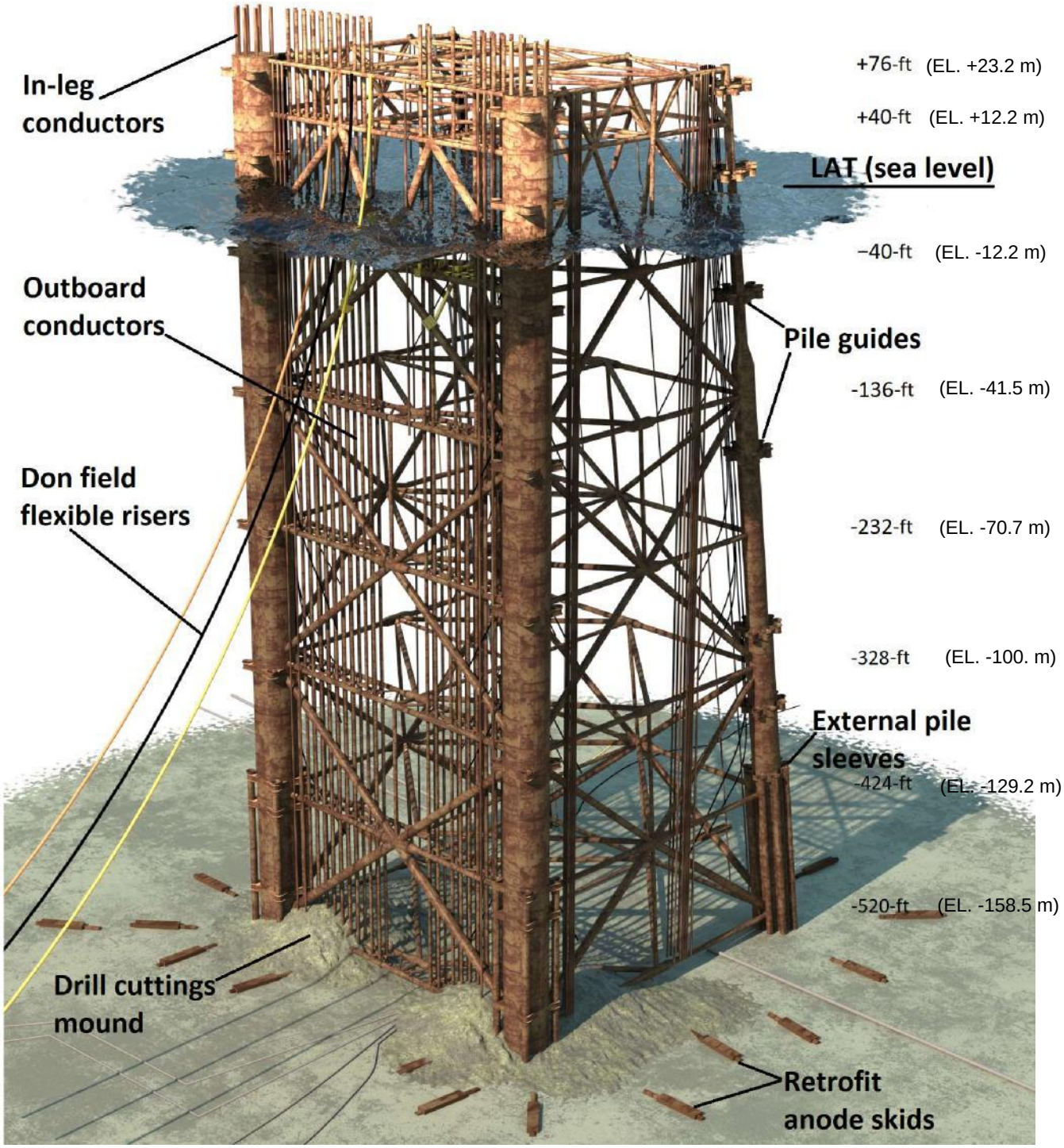


Figure 2.1.1: Schematic of Thistle jacket

2.1.2 Pontoon legs

Thistle jacket was towed to field supported primarily on the two 9 m (30-ft) diameter frame 9 pontoon legs (Figure 2.1.2). In addition to resisting hydrostatic loads during jacket tow and upend, the pontoon legs were also designed to perform a range of functions including:

- primary load path under jacket operating conditions.
- primary interface with jacket Frame 9 piled foundations comprising internal and external piles.
- support of COS tanks which provided additional buoyancy during jacket installation.

- conduit for in-leg conductors.
- conduit for a variety of flood, vent, oil, water and other pipework.
- and integral diesel and water tanks between -12.2 m (-40-ft) and +14.0 m (+46-ft) bulkheads in legs G9 and B9 respectively.

The structural configuration of the legs varies substantially along their length. Shell plate thickness ranges from 25 mm (1-inch) to 38.1 mm (1.5-inch) in the bays and up to 44.5 mm (1.75-inch) at jacket plan levels. The shell plate is reinforced with circumferential ring stiffeners throughout, with supplemental longitudinal stiffening between -12.2 m (-40-ft) and -41.5 m (-136-ft). At each plan level the leg nodes are heavily reinforced with horizontal bulkheads, diaphragms, ring stiffening and insert steelwork fully backing up incident braces.

Pile guides and conductor conduits penetrate the horizontal diaphragms and are furnished with conical stabbing guides and associated stiffening. Conductor conduit tubes span between the +23.2 m (+76-ft) and -12.2 m (-40-ft) diaphragms to permit diesel storage and personnel access. Internal pile sleeves run from the bottoms of the legs up to -70.1 m (-230-ft) which defines the top of footings.

Service pipework down the pontoon legs is generally mounted externally, only penetrating the shell plate local to the target delivery point. Much of this was removed after installation of the jacket and the penetrations sealed off with blinding plates.

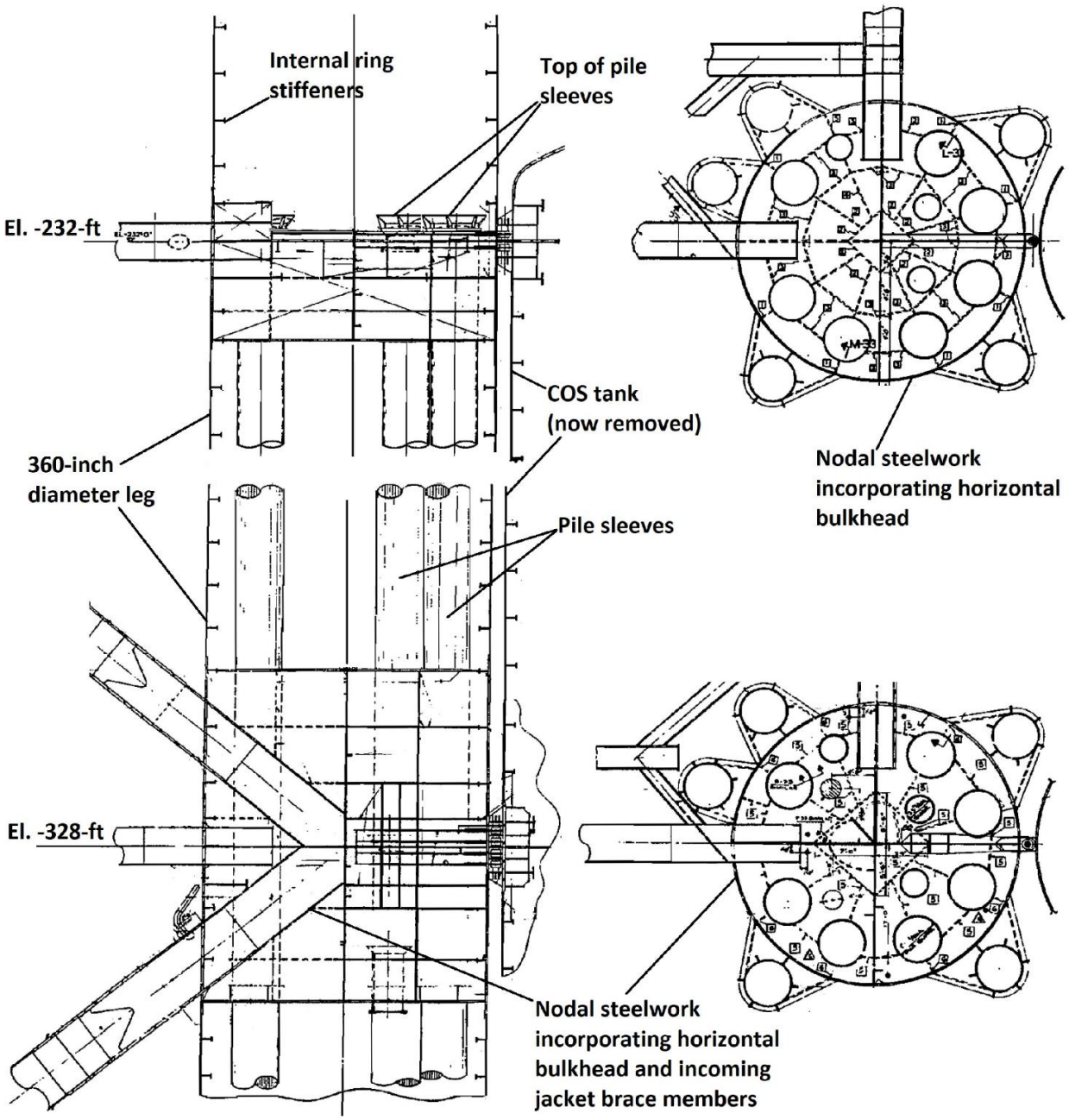


Figure 2.1.2: Thistle 'pontoon' leg sections (Frame 9)

2.1.3 Pile clusters and the small diameter legs

The smaller diameter legs on Frame 2 increase from 1.8 m (72-inch) diameter at the top of jacket to 6.1 m (240-inch) at the level of the pile clusters. The 2.4 m (96-inch), 4.6 m (180-inch) and 6.1 m (240-inch) diameter segments are reinforced with internal ring stiffeners and have extensive internal stiffening at plan nodes.

For design efficiency and to reduce the wall thickness, as is shown in section 4.7 the bottle legs are heavily stiffened on the inside with ring stiffeners and nodal steelwork. These would have been designed to resist both installation and in-place operating loads, including the hydrostatic pressures experienced as the jacket was lowered to the seabed.

Pile sleeves are connected to pontoon and bottle legs using a variety of ring and linear plated stiffeners to transfer the shear forces and resultant bending moments carried by the piles into the jacket structure.

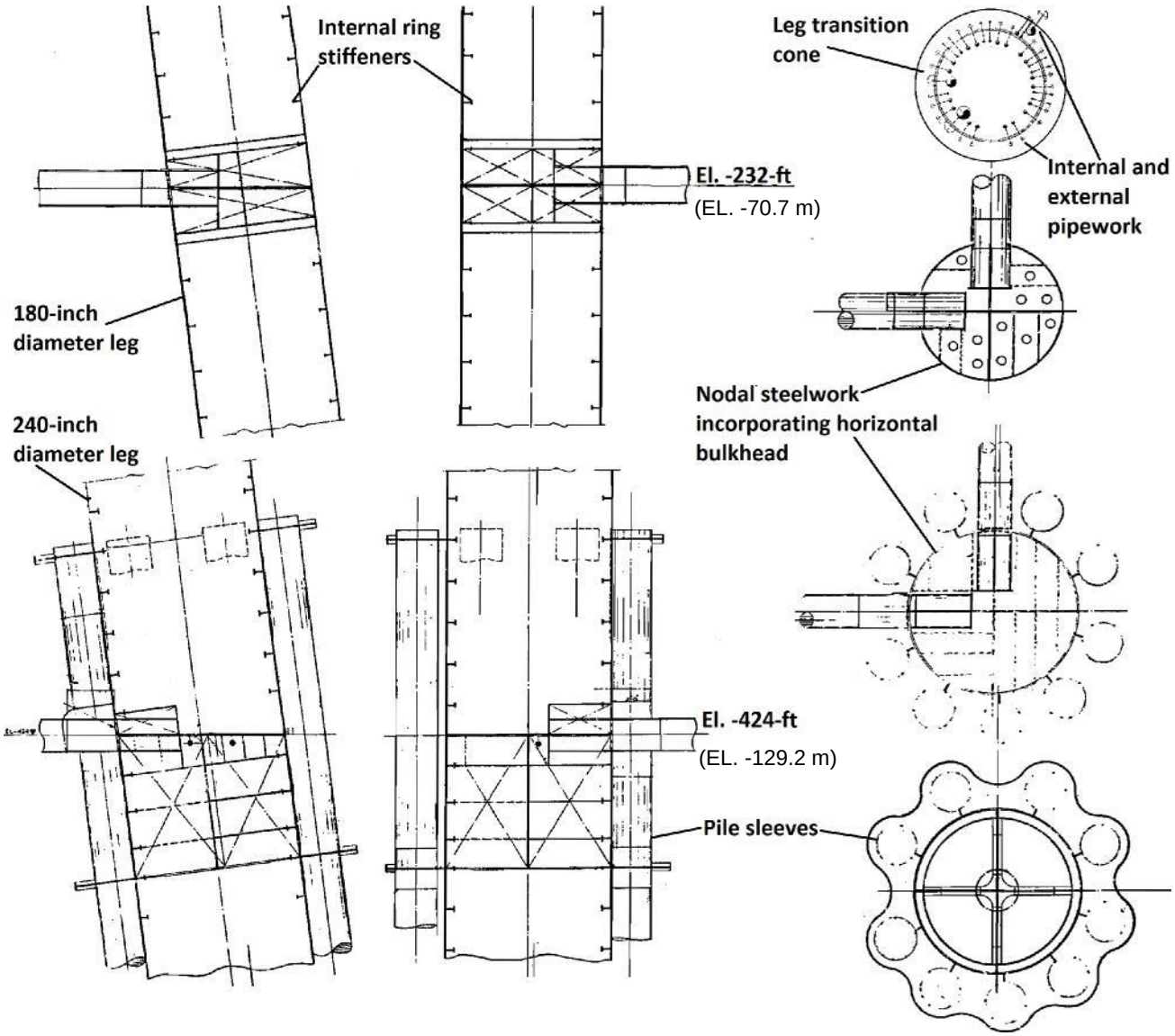


Figure 2.1.3: Thistle leg sections (Frame 2)

Within each bottle leg there are 1x 8-inch pipe, 1x 6-inch pipe, 18x 2-inch pipes, 6x 3-inch grout pipes and 7x 1-inch air lines. There are also a number of external lines and conduits with numerous pipe supports. All these lines are obsolete, and it is anticipated that they will now be in a poor condition.

2.1.4 Foundation piles

The jacket is piled at the four corners with four different pile configurations, as illustrated in Figure 2.1.4 below.

The forty-two 54-inch primary piles were driven through the pile guides and sleeves 30 m into the seabed. Eight of these piles were fitted with pile grippers which secured the jacket until all

the primary piles had been grouted into the sleeves.

Pile types A, B and E were then drilled out to a 48-inch socket to target depths of 95 m and 143 m below seabed, depending upon the specific type. The drilled sockets were filled with weighted mud to stabilise the hole and enabled installation of the 42-inch diameter secondary piles. The thirty-four secondary piles and followers were filled with mud to prevent hydrostatic uplift as they were lowered into the corresponding primary piles.

To achieve the necessary density, prevent losses into the formation and seal the follower connections, the Piling Installation Critique notes that this 'mud' contained unrecorded quantities of cellophane, wood fibre, mica, walnut fines, mud fibre, polyseal, idflo, UK bentonite, Wyoming bentonite and barite.

The secondary piles were then grouted into the seabed formation and primary piles by injecting grout through a grout line stabbed into a "float shoe" at the bottom of the pile.

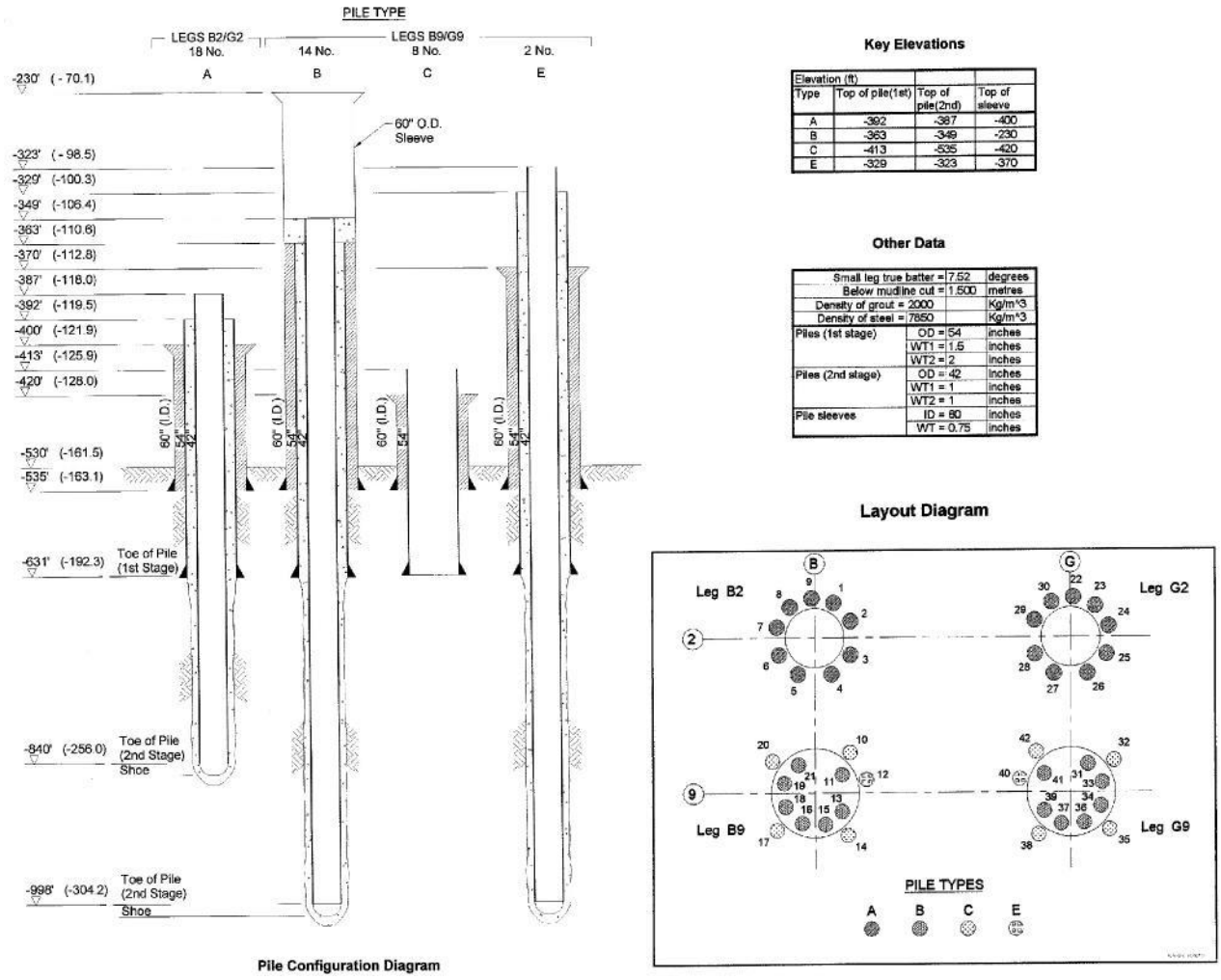


Figure 2.1.4: Thistle pile schematic using four different types of pile configurations

2.1.5 Definition of upper jacket extent

The definition of Thistle jacket footings has been developed from that provided in OSPAR Decision 98/3[6] for footings of a steel piled jacket as follows.

"footings" means those parts of a steel installation which:

(i) are below the highest point of the piles which connect the installation to the sea bed;

(ii) in the case of an installation built without piling, form the foundation of the installation and contain amounts of cement grouting similar to those found in footings as defined in subparagraph 3(a); or

(iii) *are so closely connected to the parts mentioned in subparagraphs (i) and (ii) of this definition as to present major engineering problems in severing them from those parts.*

Thistle jacket has an extensive system of pile foundations including forty-two primary, thirty-four secondary piles and many thousand tonnes of cement. These foundation piles were installed into steel sleeves both external to and within the jacket legs, which form the main load path for self-weight and environmental load transfer between Thistle jacket and the foundation piles.

During installation, those primary and secondary piles that were within the pontoon legs (type B in Figure 2.1.4) were deployed to a depth below the top of pile sleeves. As the piles are fully cemented into the pile sleeves and the pile sleeves themselves form substantial, complex structural elements, the pile sleeves are considered to present "major engineering problems in severing them" from the jacket structure.

Based on subparagraph (iii) within OSPAR definition of jacket footings, the top of Thistle jacket footings is therefore represented by the top of the pontoon leg pile sleeves. Thistle upper jacket represents the jacket structure from top of footings (-70.1 m LAT) to the top of the jacket, which is represented by the skid beams at +23.2 m above LAT.

This position has been developed during engagement with potential cutting and heavy lift removal contractors. Removal of the upper jacket will require severance of the pontoon legs at the top of footings. At 9.2 m diameter these are larger than any equivalent cuts performed to date, so removal of the upper jacket will require the development of new equipment. Performing this cut below the top of pile sleeves would require cutting through the shell plate, internal pile sleeves and possibly cemented conductor/casing strings. This lower cut would involve a steel cross section up to 83% greater than that at the proposed elevation. Failure of a cut would require a fresh start at a new elevation, and repeated failures due to excessive material or problematic internals would eventually result in return to shore and replanning of the cutting operation. Stability of the upper jacket when left in a partially cut condition would require careful consideration. Experience in cutting through the closest equivalent platform legs - smaller with fewer internal foundation elements, for another operator was found to be problematic, with multiple broken wires and failed attempts.

In addition to the cutting challenges, the weight and geometry of Thistle upper jacket section makes recovery to the top of pile sleeves possible in a single operation. Removal of the structure to a deeper elevation would commence with removal of this upper jacket as one lift, followed by subsequent splitting of the footings into sections for multiple lifts and removal to shore. The removal contractors engaged with agree with the challenges presented by separating pile sleeves from the jacket, aligning with the definition for the top of the footings as the top of the pontoon leg pile sleeves.

2.1.6 Current condition

The Thistle jacket was installed in 1976 with an original design life of 25 years and has now been in place for ~45 years.

As required under Health and Safety Executive ('HSE') legislation, the jacket has been subjected to a rolling programme of underwater inspection including visual survey, flooded member detection, Non-Destructive Testing ('NDT') and cathodic protection polarity checks. The purpose of this programme has been to ensure that the jacket remains structurally sound and able to

withstand the natural environmental forces to which it is exposed offshore. All the raw data and results of these surveys are held on a COABIS database.

To enable upending and on-bottom stability of the jacket, many jacket members were designed to be flooded during installation. The four legs (B2, G2, B9 and G9) are flooded to bulkheads at - 12 m, and much of the frame bracing in the lower two bays (below El.-100 m) was designed to be flooded as part of the installation procedure. Several jacket members have subsequently become flooded, many because of accumulated damage around the El.-12 m conductor guide framing. Several members are known to be flooded due the occurrence of structural defects.

Structural modifications undertaken on the jacket following installation comprised piercing the pontoon leg bulkheads to allow pile driving and the removal of some installation aids. Some caissons and risers have been installed, removed, or replaced. Several repair clamps have also been installed on the jacket itself, on conductors and on the conductor guide frames.

Figure 2.1.5: Thistle jacket fabricated at Greythorpe Dry Dock, Middlesbrough

Figure 2.1.6: Thistle jacket immediately prior to upending

2.2 Inventory estimates

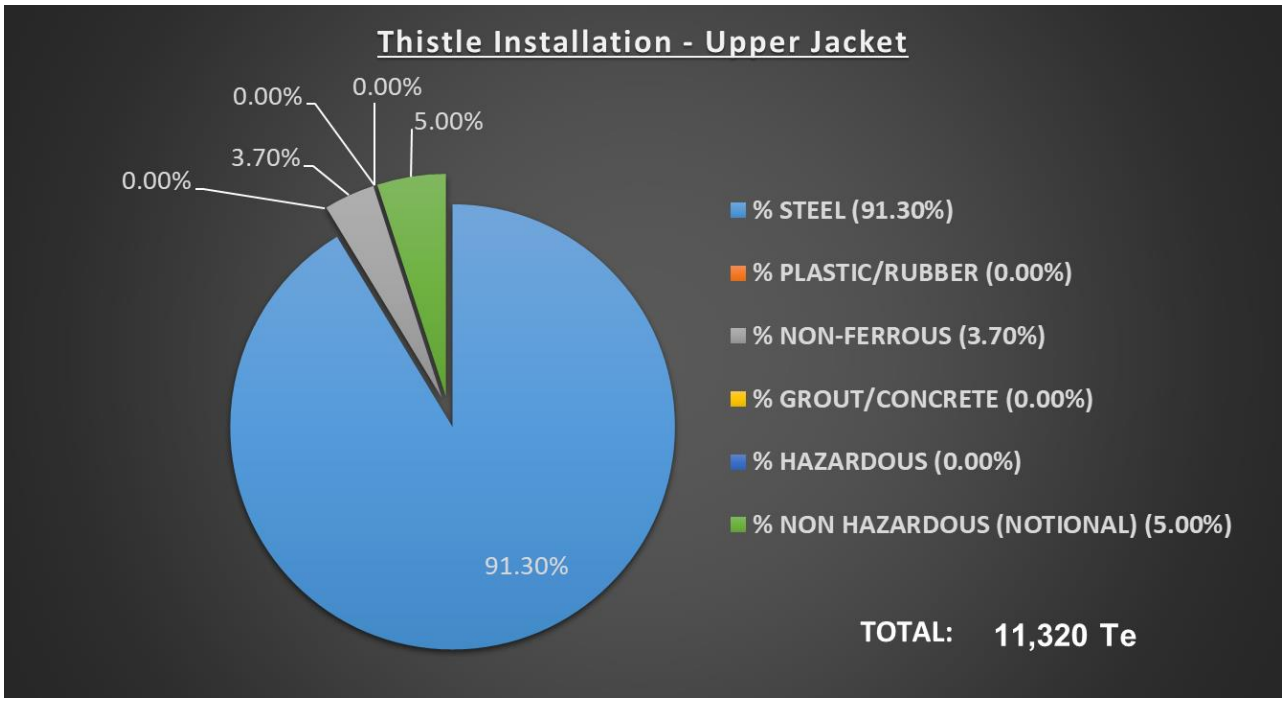


Figure 2.2.1: Pie-chart of estimated inventories for Thistle upper jacket

3. REMOVAL AND DISPOSAL METHODS

3.1 Use of waste framework directive

Waste will be dealt with in accordance with the Waste Framework Directive. The reuse of an installation or pipelines (or parts thereof) is first in the order of preferred decommissioning options. However, given the age of the installations and infrastructure it is unlikely that reuse opportunities will be realised. Waste generated during decommissioning will be segregated by type and periodically transported to shore in an auditable manner through licensed waste contractors. Steel and other recyclable metal are estimated to account for the greatest proportion of the materials inventory.

3.2 Upper jacket / substructure

3.2.1 Opportunities for reuse

The re-use of an installation, pipelines or parts thereof is first in the order of preferred decommissioning options but given the age of the Thistle installation and infrastructure it is unlikely that re-use opportunities would be realised.

Options for re-use and alternative use were considered at the option screening stage in the decommissioning planning for both the installation and pipelines. The Thistle jacket was installed in 1976 with the topsides' modules being installed in the following year and by the time of removal they will be approaching 50 years of service. It was concluded that re-use of the Thistle installation would not be a realistic option for several reasons:

- Significantly past original design life.
- Structural integrity concerns, particularly with jacket.
- High operating and maintenance costs, future reliability and likely obsolescence of equipment and uncertainty around future levels of support from original equipment manufacturers.
- Unlikely to meet current design and certification standards.
- Process compatibility at new location would need to be ensured.
- Extensive destruct required to remove the facilities as a single lift removal is not feasible.
- Suitability of jacket for new location, for example, water depth, environmental conditions, and fatigue life.
- Scope, schedule, and cost of refurbishment.
- Relative economics of re-use against new build.

No opportunities have been identified for the continued use of the Thistle platform for the production or export of oil or gas. The foregoing reasons are such that the platform would not be suitable for use in carbon capture, use and storage ('CCUS') programmes. All other possible non-oil and gas uses for the platform[8], at its present location or at another site, would be technically infeasible or economically unviable. It is therefore concluded that the Thistle platform must be decommissioned.

3.2.2 Whole jacket removal

The Thistle jacket was originally installed by being towed to the installation site and then emplaced on the seabed through controlled ballasting using a temporary ballast control centre mounted on top of the jacket. The jacket was then secured in its final location using a total of 42

[8] Examples might include scientific research station, weather station, or wind turbine.

primary piles and 34 secondary piles. The ballast control centre and equipment used for installation of the piled foundations were removed prior to the installation of topsides modules.

Although Thistle jacket was towed to field using integral buoyancy, upend and set down of the jacket is not a reversible operation. The pontoon leg base plates and intermediate diaphragms on Thistle were pierced during installation of foundation piles and in preparation for installation of the in-leg conductors. Thistle ballast and vent systems were removed and/or isolated on set down and those elements of these system remaining on the jacket will have degraded since 1976. In addition to flooding, venting and grout line leg penetrations, the Thistle jacket leg shells have suffered various damage incidents (such as the cracking associated with COS tank movement). The COS tanks provided necessary buoyancy during jacket installation, however due to the integrity of the tank connections, both tanks were removed in 2020 and wet stored within the Thistle 500 m zone Figure 3.2.1.

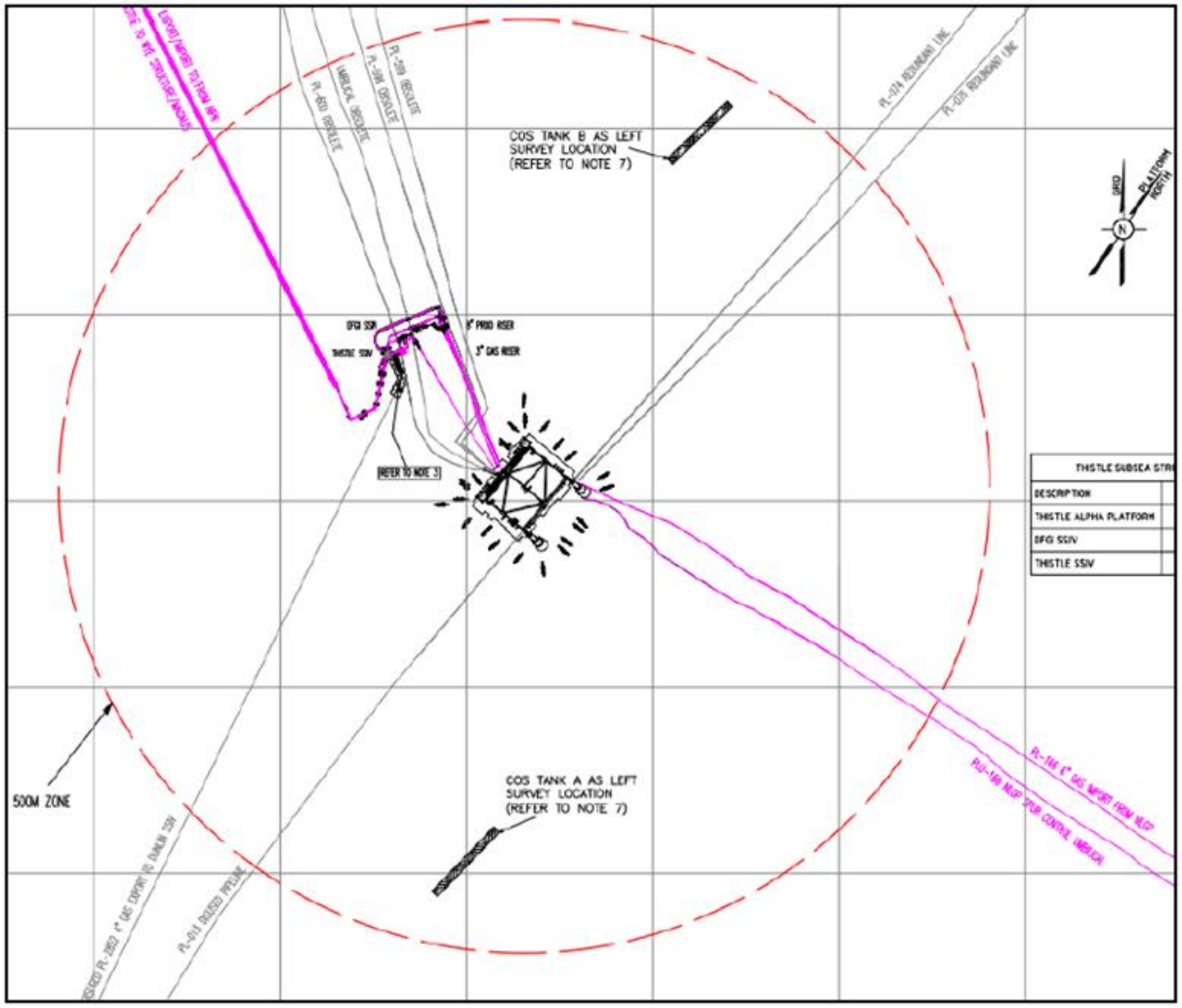


Figure 3.2.1: Thistle COS tanks inside 500m zone

It is noted that in 2009 the 9,300 Te Frigg DP2 jacket was recovered along with 2,500 Te MSF using four bespoke buoyancy tanks each generating approximately 3,000 Te uplift. Each tank weighed 1,025 Te and interfaced with a corner leg of the jacket through pull-in wires, lower guides, upper guides, mating clamps, tank mating units, pull-in jacks, upper main clamps, and lower main clamps. Buoyancy loads were transmitted into the jacket through welded brackets at

the top of the jacket legs. The jacket was then towed in a deep draft vertical orientation to an inshore set down location for subsequent dismantling by an HLV. The method has been studied extensively since DP2 on a range of different jackets but has never been repeated.

Refloat concepts have also been considered for Thistle and rejected. Comparison with the studies performed for the Brent Alpha jacket indicates very similar overall conclusions. The issues considered prohibitive to the concept of removing the whole jacket using the refloat concept include:

- Increased weight of jacket and change in centre of gravity due to piles and grout in the pile sleeves.
- Loss of intact buoyancy due to piercing of bottom of pontoon legs, degradation at installation pipework penetrations, field life mechanical damage, fatigue crack flooding, and removal of COS tanks.
- Lack of effective connection points on the thin-walled pontoon legs for load transfer from any added buoyancy tanks
- Requirements to excavate drill cuttings, sever piles, etc.

Due to its size and configuration the Thistle jacket presents several additional problems to those identified for the Brent Alpha jacket. Thistle jacket also has known fatigue cracks through jacket braces and in service leakage of the pontoon legs. On this basis reverse installation by refloat (including with the use of external buoyancy tanks) is not considered viable for Thistle and has been discounted.

As the proven lifting capacity of marine vessels increases, use of a single lift vessel ('SLV') or a semi-submersible crane vessel ('SSCV') becomes an increasingly viable option for recovering large offshore structures in a single piece. In the case of Thistle however, none of the existing or near-term marine lifting vessels have sufficient lifting capacity to recover Thistle jacket in a single piece. The lift capacity of the Heerema Thialf is quoted as 14,200Te and the Allseas Pioneering Spirit is quoted as 20,000 Tonnes. However, note that these are the advertised lifting capacities, and as a minimum would be restricted by the dimensions of the jacket being lifted as well as the operating radius of the cranes.

3.2.3 Upper jacket/substructure decommissioning overview

Table 3.2.1: Jacket/substructure

Name of Jacket/Substructure	Substructure weight (Te)	Date Installed	Seeking Derogation from OSPAR Decision 98/3 (Yes/No)
Thistle Alpha Platform	11,320 (upper)	1976	No

Removal of the upper jacket would be technically feasible, and this has been demonstrated for similar-sized structures in the past. Removal of the upper jacket will not prejudice the ability to decommission the footings (either in-place or by removal to shore) sometime in future. In any event, industry engagement has indicated that removal of the upper jacket would be the first of several operations to remove the whole jacket if full removal were required.

Subject to detailed engineering and design, and confirmation by the removal contractor, the jacket will be severed at an elevation between 65 m and 75 m below LAT. This will allow the removal contractor to optimise the cut, reducing the technical complexity of the operation by eliminating the need to cut through the pontoon legs and internal piles and caissons at the same time, K-joints, internal stiffeners, etc. The cut line may be staggered to retain part of the -70.7 m

plan bracing and corresponding frame diagonal bracing within the lift for load transfer purposes.

The diesel tank in leg G9 and the compartment below this (see Figure 3.2.2) will be cleaned while the topsides is place [1] to minimise the impact these have on the removal method.

Thistle platform has 60 conductor slots, of which 52 were used during field life. Structural damage to conductors resulted in the installation of more than 75 external repair clamps. As these are too large to pass through the conductor guides, and the conductors are unable to free stand without being restrained by guides, and they cannot be fully removed using the platform drilling rig. Furthermore, 15 of these conductors run through foundation piles and are likely to be fixed into the pile bores by annular cement, thereby further preventing their recovery prior to jacket removal. In response to these constraints, the project has elected to recover those sections of Thistle conductors currently obstructing removal of the upper jacket with a combination of platform drill rig and ship-based subsea cutting and lifting operations. Any remaining conductors will each be cut at a height that will not be higher than the highest part of the jacket footings. If removal of the footings was required, remaining conductor sections would be accessible for individual recovery to below seabed or lifted integral with sections of the footings as appropriate. It is likely that there will be an environmental impact associated with disturbance of the drill cuttings pile whilst pulling the conductors out of the seabed. The environmental impacts associated with the disturbance of the drill cuttings is are not addressed as part of the upper jacket Decommissioning Programme.

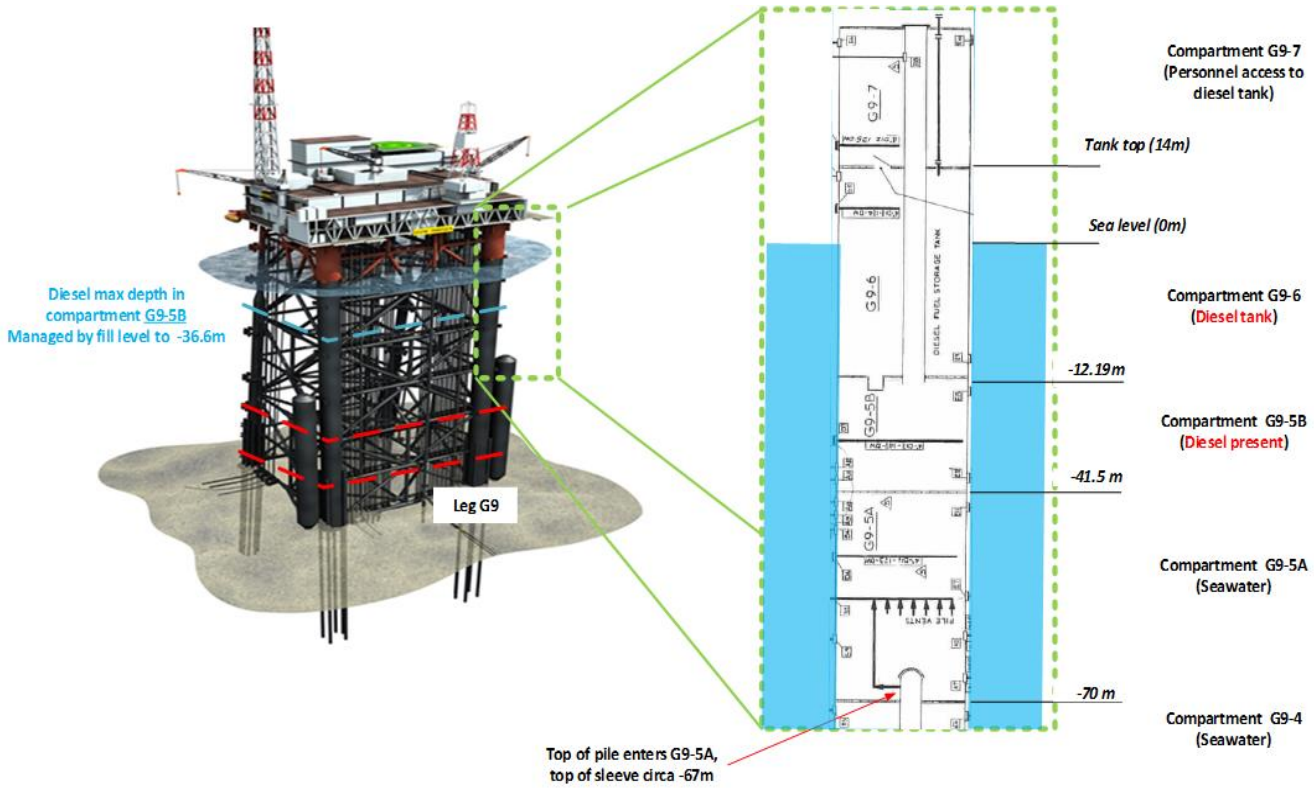


Figure 3.2.2: Diesel tank in leg G9

3.2.4 Upper jacket / substructure removal methods

Best endeavours will be used to ensure that all hydrocarbons and potential pollutants have been removed from well conductors, risers, umbilicals, caissons, that are within the jacket structure before cutting operations take place.

Table 3.2.2: Thistle jacket removal method	
1) Single Lift Vessel ☑; 2) Semi-Submersible Crane Vessel ☑; 3) Hybrid ☑; 4) Piece small ☑; 5) Other (e.g., Buoyancy Tanks) ☑;	
Method	**Description**
Removal of upper jacket as a single unit	Removal of the upper jacket as a single unit down to top of jacket footings (severed between 65 m and 75 m below LAT) and transport to an onshore decommissioning facility to be broken up for recycling, or disposal.
Removal of upper jacket piece-small	Removal of the upper jacket in smaller sections down to top of jacket footings (severed between 65 m and 75 m below LAT) using a smaller capacity HLV (than capable of removing the upper jacket as a single unit) and transport to an onshore decommissioning facility to be broken up for recycling, or disposal.
Removal of the upper jacket using buoyancy	Refloat and tow of upper jacket after installation of external temporary buoyancy tanks and severance from the jacket footings. Upper jacket would be towed to an inshore location for further dismantlement using crane vessels.
Proposed removal method and disposal route	**Removal of upper jacket as a single unit using either an SLV or an SSCV followed by recovery to shore for reuse, recycling, and finally disposal to landfill as appropriate. A final decision on the removal method will be made following a commercial tendering process.** **Tenderers will be asked to nominate onshore reception facilities, in the United Kingdom, Europe or internationally, that are compatible with the tenderer's proposed removal methods. Discussions with the tenderer will also be undertaken to determine the optimum severance elevation. The exact height of severance is subject to commercial agreements that will be influenced by technical constraints, issues of cross bracing design, cutting technology, structural integrity concerns and lift vessel capacity. OPRED to be informed of removal method and disposal route.**

3.3 Well Decommissioning

n/a

3.4 Drill cuttings

n/a

3.5 Waste streams

Table 3.5.1: Waste stream management methods	
Waste stream	**Removal and disposal method**
Diesel	While the Thistle topsides remain in place any diesel in jacket leg G9 (Figure 3.2.2) will be drained and returned to shore for re-use or disposal. The diesel tank and compartment below will also be cleaned to the extent that it is safe to do so. The methods to be used will be agreed beforehand with the EMT Environmental Inspectorate [1].
Marine growth	Where necessary and practicable, to allow access, some marine growth will be removed offshore under a Marine License application. The remainder will be brought to shore and disposed of according to guidelines and company policies.
NORM	Tests for Naturally Occurring Radioactive Material ('NORM') will be undertaken offshore on the recovery vessel by the Radiation Protection Supervisor and recorded. Any NORM encountered onshore will be dealt with and disposed of in

Table 3.5.1: Waste stream management methods	
Waste stream	**Removal and disposal method**
	accordance with guidelines and company policies and under appropriate permit.
Original paint coating	The presence of lead-based paints will be identified as these may generate toxic fumes or dust if flame-cutting, grinding or blasting is used so appropriate safety measures will be taken. Painted items will be disposed of with consideration given to any toxic components.
Onshore dismantling sites	Appropriate licensed sites will be selected. Dismantling site must demonstrate proven disposal track record and waste stream management throughout the deconstruction process and demonstrate their ability to deliver re-use and recycling options. If a non-UK yard is selected, appropriate Trans-frontier Shipment of Waste licences will be applied for. OPRED to be informed once a disposal yard has been selected.

Table 3.5.2: Inventory disposition			
Inventory	**Total inventory (Te)**	**Planned tonnage to shore (Te)**	**Planned left *in situ* (Te)**
Thistle upper jacket	11,320[9]	11,320[9]	0

Table 3.5.3: Re-use, recycle & disposal aspirations for recovered material			
Inventory	**Re-use**	**Recycle**	**Disposal (e.g., Landfill)**
Thistle upper jacket	<5%	>90%	<10%

All recovered material will be transported onshore for re-use, recycling, or disposal. It is not possible to predict the market for reusable materials with any confidence so the figures in Table 3.5.3 are aspirational.

[9] Mass of upper jacket includes a nominal 566 Te of marine growth = 10,754 + 566 = 11,320 Te.

4. ENVIRONMENTAL APPRAISAL

4.1 Environmental sensitivities

Thistle is in Block 211/18a of the NNS in water depth of approximately 162m. Mean residual currents for the field are 0.12m/s, with direction of residual water movement generally to the south or east. Prevailing winds are from the south-west or north-north-east.

The environmental characteristics and sensitivities are listed in Appendix A.1. Sediments in the NNS are predominantly sand and muddy sand and in the vicinity of Thistle comprise of sand and gravelly sand. They are such that the seabed area is generally stable with relatively homogenous community. Multi-Beam Echo Sounder ('MBES') identifies a drill cuttings pile below the platform, and historical records of some Oil Based Mud ('OBM') discharge will likely result in elevated levels of hydrocarbon contamination above background in the vicinity of platform.

There are no offshore conservation sites within 40 km of the Thistle Field (Figure 4.2.1). The North-East Faroe-Shetland Channel Nature Conservation Marine Protected Area ('MPA (NC)') is located approximately 143 km north-west, the Hermaness Saxa Vord and Valla Field Special Protection Area ('SPA') is located approximately 140 km west and the Pobie Bank Reef Special Areas of Conservation ('SAC') is located approximately 103 km southwest of the Thistle jacket respectively.

This information is supported by a full pre-decommissioning Environmental Baseline Survey conducted in May 2021 by GEOxyz [4].

4.2 Impact assessment

Where potentially significant impacts have been identified, mitigation measures have been considered; these include both industry standard and project-specific measures. The intention is that such measures should remove, reduce or manage the potential impacts to a point where the impacts are not significant. Aspects that were considered within the Environmental Impact Identification ('ENVID') for the Heather Upper Jacket were reviewed for their applicability on Thistle. Those taken forward were as follows:

1. Physical presence
2. Energy and emissions
3. Resource use
4. Cutting
5. Dropped objects; and
6. Significant hydrocarbon release.

The decision on which aspects required further study and assessment was based on the specific proposed activities and environmental sensitivities around Thistle, on review of industry experience of decommissioning impact assessments and on assessment of wider stakeholder interest informed in part by stakeholder engagement.

The scope of the upper jacket is such that it will be removed. The Thistle jacket decommissioning activities have the potential to impact upon other users of the sea, but primarily the impacts would be associated with a situation where the jacket footings were to be decommissioned *in situ* and potentially interact with activities such as commercial fishing. However, the decommissioning of the jacket footings will be addressed in a separate Decommissioning Programme and so the environmental impacts associated with this are not addressed here.

Following a detailed review of the project activities, the environmental sensitivities of the Thistle area, industry experience and taking stakeholder concerns into account, it was determined that

all aspects can be scoped out from further review except for the impact on nesting sea birds from decommissioning activities. This was considered further, and a summary of the impact assessment is provided in Table 4.2.1.

Table 4.2.1 Key potential impacts assessed			
Disturbance of nesting seabirds	**ENVID**	**Impact Assessment**	**Significance**
In recent years, there has been an increase in the number of seabirds utilising offshore installations for nesting. Opportunistic species such as kittiwake and herring gull are utilising artificial nest locations and successfully rearing chicks. However due to the location of Thistle being 140 km from the nearest coast, the number of breeding birds remains very low. To date there have been no sightings of nesting birds on Thistle. Decommissioning activities within the area of the Thistle substructure may result in the disturbance/abandonment of nests, if birds colonise the platform, where works or removal operations coincide with breeding periods of seabird species in UK waters. Visual surveys will be undertaken prior to disembarkation and where these surveys indicate nesting birds, measures will be put in place to minimise this to ALARP. This will include ensuring appropriate licences are in place and a bird management plan is active. EnQuest are fully aware of their responsibilities under the legislative expectations and requirements.	This aspect was not initially assessed within the ENVID, however, due to growing regulatory and stakeholder interest and concern EnQuest believe it to be good practice to assess this.	The risk of either loss of nesting habitat or abandonment of eggs / fledglings is sufficiently low and localised that the impact to the local population is considered temporary, highly localised and largely undetectable against natural variation. The consequence on seabird populations is ranked as low. If future nesting surveys are required, the results of these will also be taken into consideration. Where possible, scheduling to avoid bird breeding periods, along with deterrent measures will be considered to minimise this further.	Not significant

By following EnQuest's mitigation measures, the disturbance to nesting birds or forced nest abandonment will be reduced to As Low as Reasonably Practicable ('ALARP'). The consequence on seabird populations will be highly localised and generate a low impact to the local population through the relatively low predicted loss of nesting habitat. The overall impact of decommissioning activities on nesting seabirds is currently considered low and should this outcome change in the wake of any future survey effort, this will be communicated to OPRED.

EnQuest has considered the Scottish National Marine Plan ('NMP'), which has been adopted by the Scottish Government to help ensure sustainable development of the marine area and considers that the proposed decommissioning activities align with its objectives and policies.

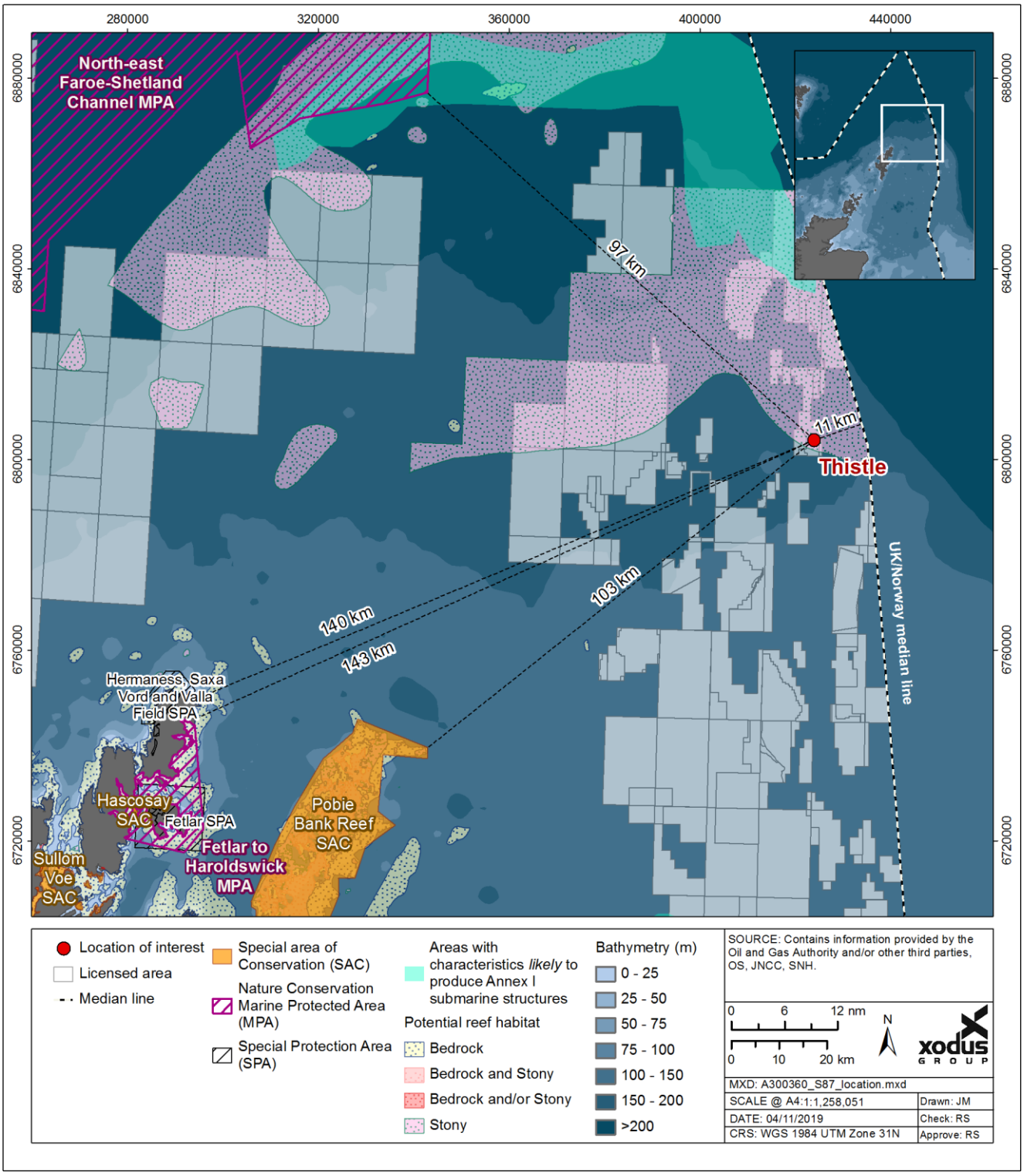


Figure 4.2.1: Protected sites around Thistle

4.3 Impact management

Environmental sensitivities are listed in Appendix A.1. There will be some planned environmental impacts arising from decommissioning of the Thistle upper jacket.

Table 4.3.1: Key Control and Mitigation Measures
Physical presence of infrastructure & vessels
• All vessels will comply with standard marking conditions and consent to locate conditions. • Any interference is expected to take the form of minor alterations to normal operating practices. • If required, a simultaneous operations ('SIMOPS') plan for vessel activity in the field will be put in place, noting that a standard DSV SIMOPS Guideline already exists for the asset. • The jacket footings will remain *in situ* and subject to a separate Decommissioning Programme. UK Hydrographic Office and Kingfisher will be made aware of the jacket footings, which will be marked on Admiralty charts.
Energy use & atmospheric emissions
• Time vessels spend in the field will be optimised (estimated duration of 10 days heavy lift vessel), with a SIMOPS plan in place to ensure that emissions are reduced to a minimum. • Vessel contractor will be required to have an emissions reduction strategy in place. • Vessel contractor will ensure that fuel use is optimised and adopt strategies such as vessel sharing where possible.
Underwater noise
• A SIMOPS plan for vessel activity will be put in place and duration will be limited in the field. • Vessel and cutting operations will use standard methods and equipment. • Machinery and equipment will be in good working order and maintained to minimise noise impacts. • Cutting will be planned and optimised using proven technology such as diamond wire cutting tools, and will be temporary in duration. • No explosives will be used.
Discharges to sea
• All contracted vessels will operate in line with IMO and MARPOL regulations • All discharges will be permitted under applicable UK legislation.
Accidental events
• All contracted vessels will have a ship-board oil pollution emergency plan ('SOPEP') in place. • A Collision Risk Management Plan will be developed and implemented. • Agreed arrangements in place with oil spill response organisation to provide resources in event of a spill. • Lifting operations will be planned and recovery of dropped objects will be undertaken. • Vessel contactors will have procedures for fuel bunkering that meet EnQuest's standards. • Where practicable, re-fuelling will take place during daylight hours only.
Dropped objects
• Post decommissioning debris surveys and seabed verification will be described in the Decommissioning Programme for the jacket footings.
Seabed disturbance
• There is no planned seabed disturbance anticipated as part of the removal of the upper jacket
Waste
• Onshore treatment will take place at waste management site with appropriate permits and licenses. • Reuse or recycling of materials will be the preferential option. • UK waste disposal sites will be used where practicable, however where disposal is planned out with the UK, this will be undertaken in compliance with TFSW Regulations.

Following the environmental assessment and implementation of additional control and mitigation measures where necessary, the level of environmental risk from the planned and unplanned decommissioning operations, is **low**. In addition, any cumulative impacts limited to seabed disturbance have been assessed and considered to be **low**. Therefore, the decommissioning of the Thistle upper jacket installation can be completed without causing significant impact to the environment.

5. INTERESTED PARTY CONSULTATIONS

5.1 Overview

HOLD – to be populated following consultation

5.2 Consultation summary

Table 5.2.1 will be updated when the UK consultation phase is completed.

Table 5.2.1: Summary of stakeholder comments		
Stakeholder	**Comment**	**Response**
INFORMAL CONSULTATIONS		
SFF		
PUBLIC		
CONSULTATIONS		
Stakeholder	**Comment**	**Response**
GMG		
NFFO		
NIFPO		
SFF		
Public		

6. PROGRAMME MANAGEMENT

6.1 Project management and verification

An EnQuest project management team will manage the operations of competent contractors selected for all decommissioning activities. The team will ensure the decommissioning is executed safely, in accordance with legislation and EnQuest HSEA Policy and Principles.

6.2 Post-decommissioning debris clearance and verification

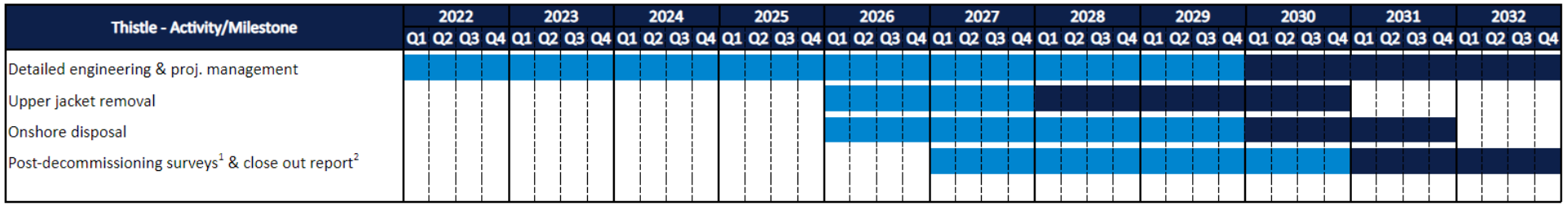
Once the jacket has been removed to the top of the footings, an 'as-built' survey will be carried out to confirm the height at which the jacket has been severed is in accordance with the approved Decommissioning Programme.

This Decommissioning Programme covers removal of the upper jacket. Post decommissioning debris surveys and seabed verification will be described in the jacket footings Decommissioning Programmes and the pipeline infrastructure Decommissioning Programme.

6.3 Schedule

A proposed schedule is provided in Figure 6.3.1. The activities are subject to the acceptance of the Decommissioning Programme presented in this document and any unavoidable constraints (e.g., vessel availability) that may be encountered while executing the decommissioning activities. Therefore, activity schedule windows have been included to account for this uncertainty.

The commencement of offshore decommissioning activities will depend on commercial agreements and commitments.



Notes / Key

Earliest potential activity

Activity window to allow commercial flexibility associated with well decommissioning and decommissioning activities

Pipeline & topsides' decommissioning subject to separate Decommissioning Programmes. The topsides' Decommissioning Programme was approved 23 December 2021;

1. Post decommissioning surveys to follow completion of decommissioning activities;
2. Close out report within 1 year of completion of offshore activities.

Figure 6.3.1: Gantt-chart of project plan

6.4 Interim monitoring and evaluation

Following removal of the Thistle topsides there may be a period of time before the upper jacket is removed. During this time, the jacket will remain above sea level marked by a Navigational Aid that complies with Department for Energy Security and Net Zero standard marking schedule requirements. Throughout this phase of decommissioning and following completion the existing 500 m zone will remain in place. The Thistle Consent to Locate will be revised to reflect the change to the installation. Once the upper jacket has been removed, the jacket footings will be marked on FishSAFE. The UK Hydrographic Office and Kingfisher will be made aware of the presence of remaining footings, and these will be marked on Admiralty charts.

Upon completion of the topsides removal activities the upper jacket will remain in place until it is removed. Studies will be undertaken to understand the integrity status of the jacket while it remains *in-situ* and demonstrate that the structure's integrity can be maintained until the upper jacket is removed, and until the fate of the jacket footings is known (section 6.6). The outcomes of the studies will be shared with OPRED.

EnQuest will develop maintenance and monitoring procedures that will include remote monitoring, periodic maintenance and testing of the Navigational Aids in compliance with the Thistle Consent to Locate. The design, manufacture, installation, and maintenance of the navigational aids will be assured via an independent verification scheme and will be further defined in the Safety Case.

6.5 Costs

Decommissioning costs will be provided separately to OPRED.

6.6 Post-decommissioning monitoring and evaluation

The footings that are left in place following the completion of the Upper Jacket Decommissioning Programme will remain the property and responsibility of the Section 29 holders identified in section 1.4.3 and will be subject to a separate decommissioning programme. Unless agreed otherwise in advance with OPRED, EnQuest will remain the focal point for this, including any change in ownership.

After approval of the jacket footings Decommissioning Programme EnQuest will carry out a environmental survey, centred on the Thistle jacket area. A copy of the survey results will be provided to OPRED.

Once the wider Thistle area has been decommissioned the plans for legacy and liability management will be documented and described in more detail in the final close out report.

6.7 Close out

After the upper jacket has been removed, OPRED will be notified, and a decommissioning close out report will be submitted within 1 year following completion of offshore decommissioning activities although an interim report may be required should onshore disposal activities not have been completed.

Any variances from the approved Decommissioning Programme will be explained in the close out report.

7. REFERENCES

[1] EnQuest (2021) Thistle Alpha Topsides Decommissioning Programme, M3525-ENQ-THI-DN-0000-REP-0004. Weblink last accessed 22 June 2022: Thistle_Topsides_Final_DP.pdf

[2] GeoXYZ (2021) Final Debris Clearance and Drill Cuttings Pile Survey Report, M3525-GXY-THI-SU-0000-REP-0003

[3] GeoXYZ (2021) Final Drill Cuttings Pile Sampling Report, M3525-GXY-THI-SU-0000-REP-0006

[4] GeoXYZ (2022) Thistle Final Environmental Baseline & HAS Survey Results Report, M3525-GXY-THI-DN-0000-REP-0008

[5] OPRED (2018) Guidance Notes, Decommissioning of Offshore Oil and Gas Installations and Pipelines under the Petroleum Act 1998, Version 6, Department of Energy Security and Net Zero. Weblink last 19 May 2021: OPRED Guidance Notes

[6] OSPAR (1998) Decision 98/3 on the Disposal of Disused Offshore Installations. Weblink last accessed 01 April 2020: https://www.ospar.org/documents?d=32646

APPENDIX A THISTLE BASELINE ENVIRONMENT

Appendix A.1 Summary of characteristics & sensitivities

Table A.1.1: Summary of environmental characteristics and sensitivities
Physical Environment: Thistle Alpha is in Block 211/18 and 211/19 of the NNS in water depth of approximately 162 m. Mean residual currents in the area are 0.26 m/s and are generally from the west. Prevailing winds are from the south or south-west.
Seabed Sediments and Contamination: Sediments in the NNS are predominantly sand and within the Thistle area are classified as sand, slightly gravelly sand and gravelly sand. MBES identifies a drill cuttings pile below the platform, and historical records of Oil Based Mud discharge will likely result in elevated levels of hydrocarbon contamination in the vicinity of the platform.
Fish: The Thistle field lies within the International Council for the Exploration of the Sea ('ICES') Rectangle 51F1. Thistle is known to have spawning grounds in the area for Cod (Jan-April), Haddock (Feb-May), Norway Pout (Jan-Mar), Saithe (Jan-Apr) and Whiting (Feb-June). The area is used as nursery grounds for Blue Whiting, Haddock, European Hake, Herring, Ling, Mackerel, Norway Pout, Spurdog and Whiting.
Benthic Communities: Surveys in 2007 and 2018 identified a generally diverse homogenous faunal community associated with sandy sediments. Visible fauna observed included *annelida*, *arthopoda*, *decapoda, bryozoa, cnidaria* and *echinoidea* typical of the area. It is expected that elevated levels of hydrocarbons close to the platform will lead to modified communities of hydrocarbon tolerant species. There was no evidence from seabed imagery of any protected habitats or species.
Plankton: The phytoplankton community is dominated by the dinoflagellate genus Ceratium (*C. fusus, C. furca, C. lineatum*), along with the diatoms, *Thalassiosira spp*. and *Chaetoceros spp*. The zooplankton community comprises *C. helgolandicus* and *C. finmarchicus* as well as *Paracalanus spp*., *Pseudocalanus spp*., *Acartia spp*., *Temora spp*. and *Oithona spp*. Larger zooplankton species such as euphausiids and decapod larvae are also important in the area.
Seabirds: The following species have been recorded in the wider area: Northern fulmar, Northern gannet, Great skua, Black-legged kittiwake, Arctic skua, Razorbill, European storm petrel, Great black-backed gull, Lesser black-backed gull, Herring gull, Common guillemot, Glaucous gull, Little auk, and Atlantic puffin. These seabirds are present for most of the year except October with overall numbers greatest in August and September. As is typical for the North Sea breeding occurs between April and September. Seabird sensitivity in the Thistle area is low for most of the year except for winter months (Nov-Jan) where it is classed as 'high'. The Thistle field is located ~201km North-East of Shetland and is remote for sensitive seabird breeding areas on the coast.
Marine Mammals: Harbour porpoise have been sighted in moderate densities in July and low densities in May and August, whilst both killer whales and minke whales have been sighted in moderate densities in July. Atlantic white-sided dolphin, Risso's dolphin and long-finned pilot whale may be considered occasional visitors.
Conservation Designations: There are no designated conservation sites close to Thistle, with the nearest being the Pobie Bank Reef Sites of Community Importance (103 km south-west), the North-East Faroe-Shetland Channel Nature Conservation Marine Protected Area (97 km north-west).
Commercial Fisheries: The project area lies within ICES rectangle 51F1. Commercial fishing activity within this area is medium to high in comparison with other areas. Landings are a combination of demersal, pelagic and shellfish species representing 0.19% of total UK fishing value in 2018.
Shipping: Shipping density within the area is low, with any traffic associated with oil and gas developments or cargo vessels.
Other Offshore Industries: Thistle is in the northern North Sea oil and gas development area with several fields nearby (Figure 1.6.2).
Other Users of the Sea: The closest submarine telecommunication cable is the CANTAT-3 telecommunications cable owned by Faroese Telecom within 1km to the south-west of Thistle. There are no Ministry of Defence exercise areas or danger areas nearby that might be used for military training. There is only one wreck located within Block 211/18.

APPENDIX B CONSULTEE CORRESPONDENCE

Appendix B.1 Public Notices

The public notices and consultee correspondence will be added following Statutory Consultation.

APPENDIX C JACKET SCHEMATICS

Appendix C.1 Jacket gridline 2

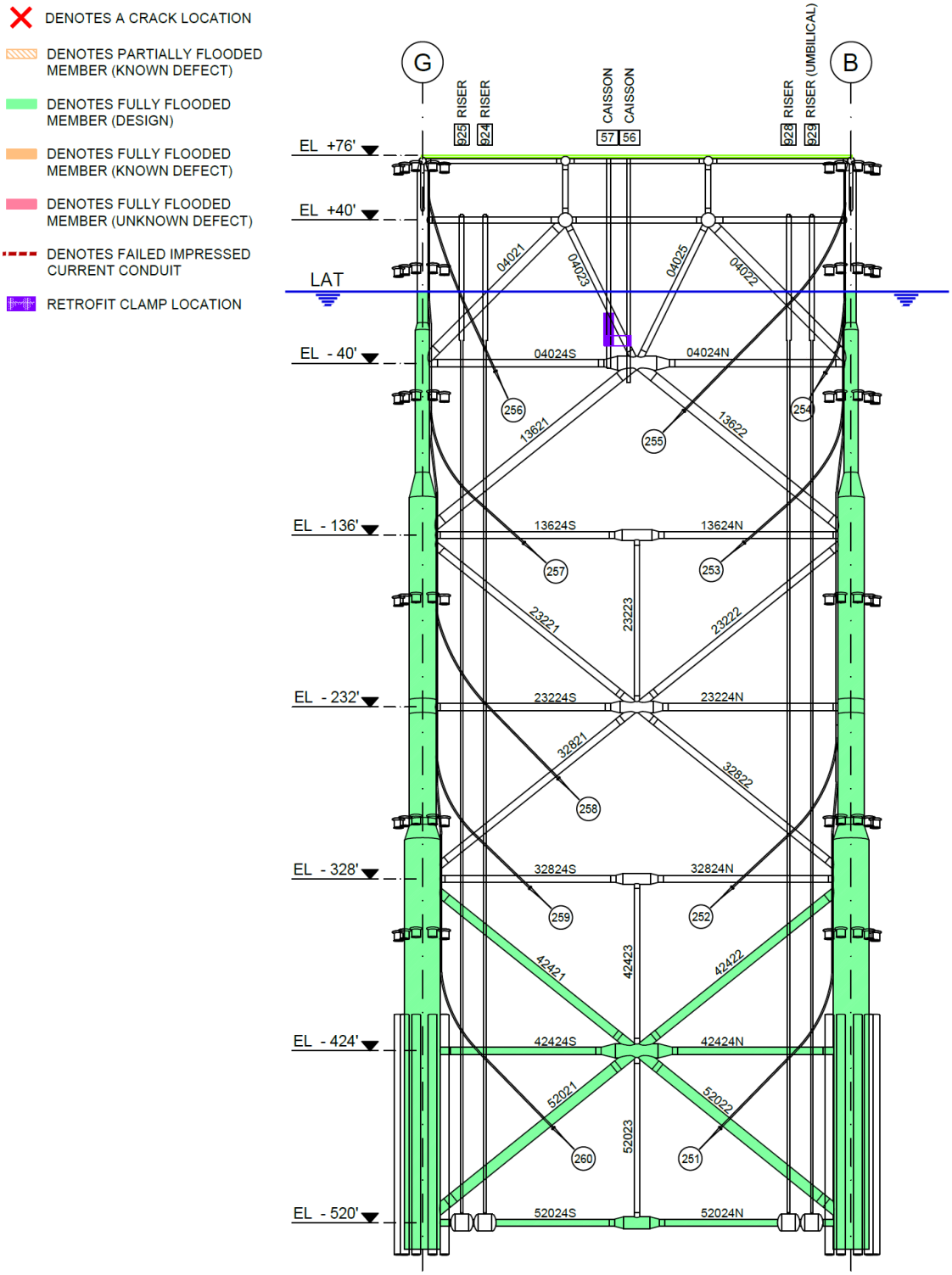


Figure C.1.1: Thistle jacket gridline 2

Appendix C.2 Jacket gridline 9

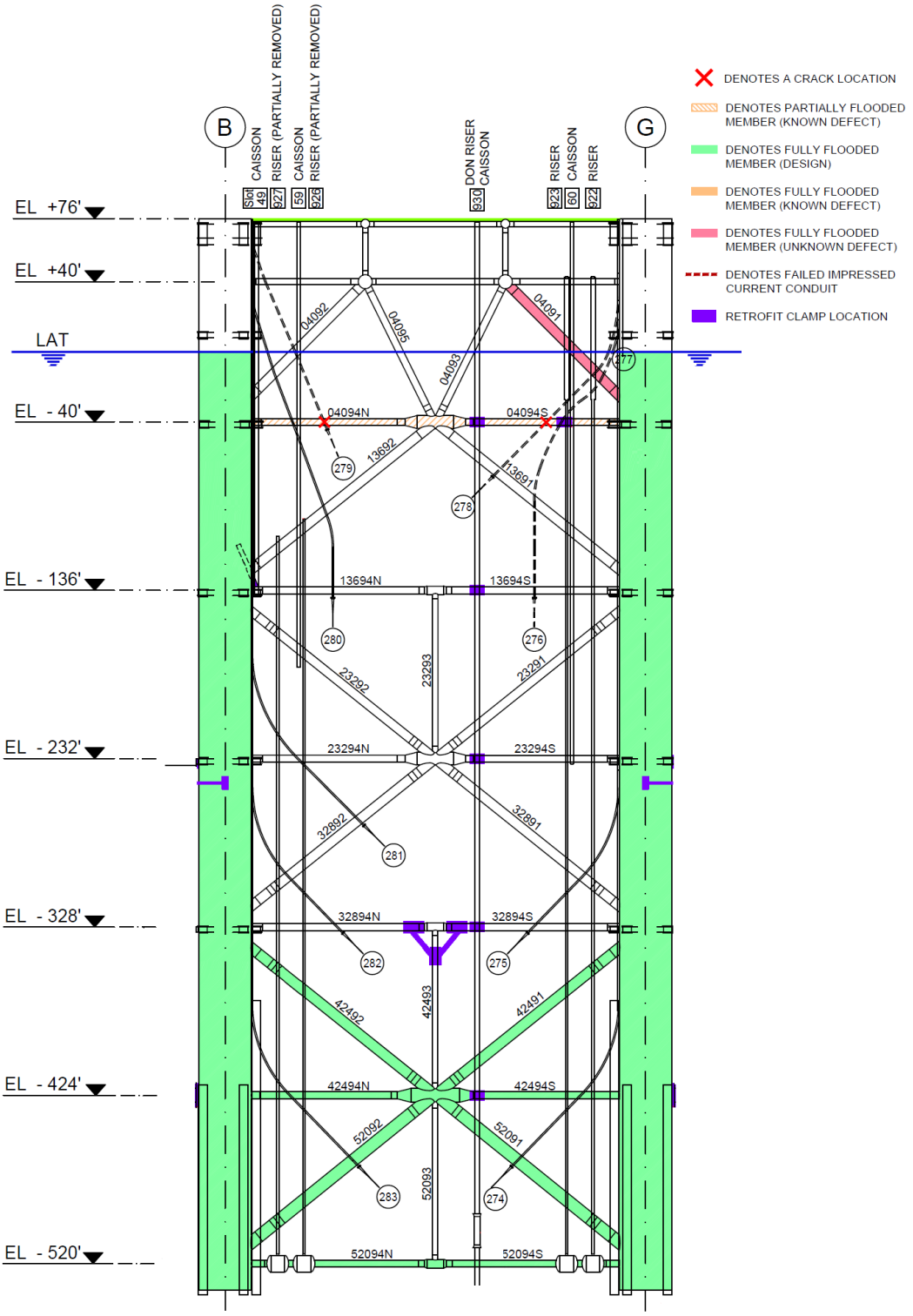


Figure C.2.1: Thistle jacket gridline 9